

# Managing Drought for the Economy and the Environment



Prepared for



Submitted by

2015 William R. Gianelli Water Leaders Class  
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Front cover photos:

*Top left: Irrigation water runs along a dried-up ditch between rice farms in Richvale, CA. Photo taken on May 1, 2014*  
*Source: <http://www.wsj.com/articles/drought-will-cost-california-2-2-billion-in-losses-costs-this-year-1405452120>*

*Bottom left: Lake Oroville, Enterprise Bridge: July 20, 2011 (top), Aug. 19, 2014 (bottom)*  
*Source: Getty*

*Right: Folsom Lake 2011 (top) and 2014\* (bottom)*  
*Source: <http://fyehcalifornia.com/shocking-before-and-after-photos-of-californias-drought/>*  
*\*Water storage in Folsom Lake was at 20% capacity when photo was taken.*

## Disclaimer

This report, and the opinions expressed herein, do not necessarily represent the views of the Water Education Foundation (WEF) or its Board of Directors. The William R. Gianelli Water Leaders Class of 2015 was granted full editorial control of this report. Throughout the development of this report, the Water Leaders gained a valuable understanding of the complicated and sometimes contentious nature of water management issues in California. The sections presented in this report are useful in outlining various positions and perspectives; however, the statements expressed in this report are not endorsed by all Water Leaders or their employers.

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## Acronyms

<b>Acronym</b>	<b>Long Form</b>
AB	Assembly Bill
ACWA	Association of California Water Agencies
AGNW	Australian Government National Wetlands Update (Department of Sustainability)
CALFED	CALFED Bay-Delta Program
CDEC	California Data Exchange Center and Reservoir Storage Data
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CPUC	California Public Utilities Commission
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CVWD	Coachella Valley Water District
CWC	California Water Code
CWS	UC Davis Center for Watershed Sciences




<b>Acronym</b>	<b>Long Form</b>
DWR	California Department of Water Resources
DWRAT	The Drought Water Resources Allocation Tool
EIS/EIR	Environmental Impact Statement (NEPA) / Environmental Impact Report (CEQA)
EO	Executive Order
ESA	Endangered Species Act
EWA	Environmental Water Account
FMMP	Farmland Mapping and Monitoring Program
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
IID	Imperial Irrigation District
IRWM	Integrated Regional Water Management
MAR	Managed Aquifer Recharge
MWD	Metropolitan Water District
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration





<b>Acronym</b>	<b>Long Form</b>
NRCS	Natural Resources Conservation Service
NWRS	National Wildlife Refuge System
OCWD	Orange County Water District
PPIC	Public Policy Institute of California
PVWMA	Pajaro Valley Water Management Agency
RWMG	California's Regional Water Management Groups
SDCWA	San Diego County Water Authority
SGMA	Sustainable Groundwater Management Act
SLDMWA	San Luis & Delta-Mendota Water Authority
SWP	State Water Project
SWRCB	California State Water Resources Control Board
USBR	United States Bureau of Reclamation
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WMA	Water Management Area
WCB	Wildlife Conservation Board





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## Executive Summary

California is the eighth-largest economy in the world, with 38.8 million people (US Census Bureau, 2014) and 27 million acres of cropland, nine million acres of which are considered prime irrigated acreage (American Farmland Trust, 2009). Water continues to be a major driver in the development of California's thriving economy, particularly for the agricultural powerhouse in the Central Valley, which is considered to be the most productive agricultural region in the nation. Nearly two-thirds of California's residents and millions of acres of irrigated farmland rely on water stored in reservoirs located in places of ample supply in Northern California and transported through natural and engineered conveyance systems throughout the state while adequate flows must be maintained through and out of the Sacramento-San Joaquin Delta (the Delta), the hub of the state's water system.

***Nearly two-thirds of California's residents and millions of acres of irrigated farmland rely on water stored in reservoirs ... and transported through natural and engineered conveyance systems throughout the state ...***

While California's diverse ecosystems and abundant natural resources helped propel economic development, the state's prosperity has resulted in unintended consequences such as large-scale losses of native species and habitats. The degradation of California's environment may negatively impact the very economy it enabled to prosper. Although regulations and policies targeted at environmental protection have been in place since 1970, the quality of California's natural ecosystems have continued to decline.

California is nearing the end of its fourth consecutive year of drought. The resultant reduction in snow pack and surface water runoff has severely limited water supplies to well below average conditions. Although drought is a statewide issue, the challenges are particularly daunting in the Delta. Federal, state, and local water managers are tasked with optimizing the operations of Delta waterways, lands, and pumps to balance the needs of the economy and the environment in accordance with water law and policy. However, this balance becomes increasingly difficult to maintain as drought conditions continue.

The drought's impacts to both the economy and the environment are unprecedented. Significant localized economic impacts occurred throughout the Central Valley, particularly in areas that are supported by agriculture, one of the state's largest uses of water. The reduction in available water supplies resulted in the fallowing of approximately 550,000 acres of farmland. Combined with the multiplier effect on related industries, this reduction in farming likely cost the California economy \$2.74 billion and 21,000 jobs in 2015 alone.

***California is nearing the end of its fourth consecutive year of drought. Although drought is a statewide issue, the challenges are particularly daunting in the Delta.***

The overall health of California's species and ecosystems was stressed and often experienced irreparable damage with the diminishing ability to withstand drought conditions. In 2014, Sacramento River water temperatures

warmed sufficiently to cause a collapse of naturally spawned and federally endangered winter-run Chinook salmon. Groundwater resources have also been severely impacted by the drought as farmers and cities have sought alternatives to replace the lack of surface water supplies. The rapid depletion of

***The William R. Gianelli Water Leaders Class of 2015 was charged with developing policy recommendations for managing drought for the economy and the environment.***

groundwater levels has resulted in impacts such as land subsidence and reductions in surface water flow in areas where surface and groundwater are interdependent.

The William R. Gianelli Water Leaders Class of 2015, sponsored by the Water Education Foundation, was charged with developing policy recommendations for managing drought for the economy and the environment. Through research and with insights provided by the Class mentors, four areas of water management were identified

and evaluated to develop recommendations for alleviating competition for water while striking a balance among economic, environmental, and societal demands during difficult drought periods.

The specific water management practices explored in detail included **Water Prioritization, Water Transfers, Financing Environmental Water, and Water Rates**. Several overarching themes and recommendations that would address multiple issues were identified. The top recommendations are:

### Recommendation No. 1

California must vastly improve its monitoring and evaluation of the state's water resources to ensure long-term water supply reliability and sufficient allocations for both economic and environmental purposes during times of shortage. These data would be invaluable to the following efforts:

- a. The development of a statewide Drought Water Resources Allocation Tool that could efficiently prioritize and allocate available water to rights holders at precise times of need and minimize the need for curtailments in dry years.
- b. The development of an efficient, water transfer market to move water to its highest value uses on a rapid time scale. High-quality data enables a transparent system in which economic and environmental impacts can easily be quantified and mitigated.
- c. Improve the ability to conjunctively manage surface water and groundwater.

### Recommendation No. 2

The state must prioritize multiple benefit water uses. Multi-benefit projects can garner broad support across numerous sectors of the economy and are attractive sources for grant funding. Examples of multi-benefit projects that should be prioritized include:

- a. Projects that increase aquifer recharge on floodplains while improving flood protection for humans and providing habitat for fish and wildlife, using setback levees.
- b. Partnerships with farmers to help them implement practices that promote and create habitat while supporting agriculture.



- c. Conjunctive use projects that integrate the management of surface and groundwater.

### Recommendation No. 3

California must develop long-term funding sources for environmental water and habitat projects. Funding should be used to:

- a. Purchase permanent usufructuary water rights for the environment.
- b. Implement multi-benefit habitat projects.

### Recommendation No. 4

The California Constitution should be amended to provide greater flexibility to water agencies in their ability to set water rates within certain limits and with proper oversight. Providing water agencies with the flexibility to set water rates is paramount to reducing competitive demands on water passing through the Delta. Such flexibility can be used to:

- a. Establish budget-based water rates to incentivize water conservation which increases water available for environmental uses, storage for future drought resilience, and future economic development and population growth.
- b. Establish budget-based water rates to ensure fiscal stability in times of drought. Fiscal stability can ensure water service providers are able to finance drought planning and mitigation strategies, such as purchasing additional water supplies or investing in higher-cost, drought-resilient water supplies.
- c. Establish public goods charges to finance locally managed environmental water projects.



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## 1. Introduction

This report was prepared by the William R. Gianelli Water Leaders Class of 2015, sponsored by the Water Education Foundation (WEF). The Water Leaders Class was charged with developing policy recommendations for the topic: Managing Drought in California for the Economy and the Environment. To explore this topic, each Water Leader was assigned to a mentor who provided valuable guidance and insight in addition to the shared expertise among the members of the Water Leaders Class. The Water Leaders Class of 2015 is comprised of 21 experienced professionals from diverse sectors in water resources management including federal, state and local governments, private law firms, agriculture lending, environmental and engineering consulting, and non-governmental organizations.

As the fourth consecutive year of drought comes to a close, it is no surprise that water resource industry news is inundated with various ideas on how to improve California's water woes. But the question remains: **how can California improve water management practices and policy to ensure better resilience for the economy and the environment in future drought conditions?**

### 1.1. Background

California is the eighth-largest economy in the world, equivalent to India (International Monetary Fund, 2015), with 38.8 million people (US Census Bureau, 2014) and 27 million acres of cropland, 9 million of which are considered prime irrigated acreage (American Farmland Trust, 2009). California's diverse ecosystems and abundance of natural resources helped fuel economic development. As one example, the highly productive agricultural lands in the Central Valley were created through the wholesale reclamation of historic wetlands. The Sacramento-San Joaquin Delta in particular was restructured from a tidal marsh estuary to a complex agricultural and industrial mosaic that has allowed the Central Valley to become the richest agricultural region in the nation (WEF, 2011). The ability to deliver water to Central Valley agricultural lands was essential to its success. The same can be said for much of the population and economic growth that has occurred throughout the State.

The construction of the Central Valley Project (CVP), which transports surface water more than 450 miles from Lake Shasta in Northern California to Bakersfield in the Southern San Joaquin Valley, is one of two prime examples of the large-scale re-engineering of California's natural river systems to move water from places of abundance to places of scarcity for the benefit of economic development. In addition to supporting millions of acres of Central Valley agriculture, the wide-spread availability of water and hydroelectric power provided by the CVP facilities created millions of jobs and yielded billions in manufacturing and commerce (WEF, 2011). The CVP also provides flood protection for the cities and towns that were built around the economic centers it supports.

Similarly, the State Water Project (SWP) transports water through 700 miles aqueducts that traverse the state from North to South and from East to West. The SWP has fueled the development of California's economy by providing supplemental water for 26 million residents and 750,000 acres of farmland. Other

examples of the economic opportunities afforded by the SWP include the ability to supply Silicon Valley with the reliable, high-quality water needed for the electronics revolution and valuable outdoor recreational opportunities (WEF, 2013). The SWP was fundamental to the growth of Southern California’s population and economy. Together, the CVP and SWP facilities made it possible to deliver water to areas

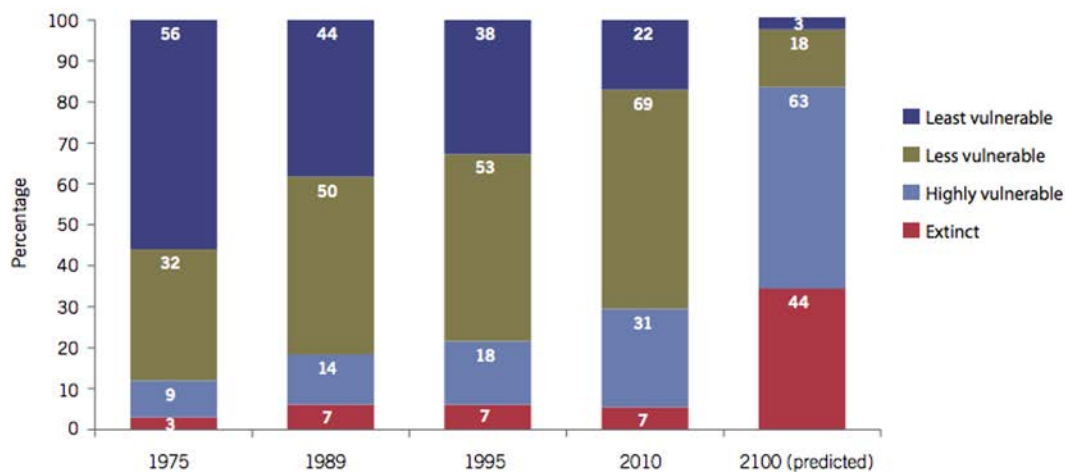
***A significant portion of the state’s rivers and streams are now confined and encroached upon. The historic abundance of native species has dwindled in some cases to the level of extinction.***

that would not otherwise have been able to sustain continued growth.

The growth of the state’s economy may have come at a cost to native species and habitats. Historically, large portions of the floodplains adjacent to rivers were inundated annually, even in low to moderate precipitation winters. This annual flood phenomenon provided species with habitat to develop strength and complexity

in their life histories so they would have the resilience to withstand stressors such as drought. A significant portion of the state’s rivers and streams are now confined and encroached upon. This results in rivers and streams that are disconnected from floodplains, and has confined aquatic, avian, and terrestrial species to use of deeper river channels. The historic abundance of native species has dwindled in some cases to the level of species extinction (see **Figure 1**). Less than 5 percent of California’s pre-development wetlands remain (PPIC, 2015) and more than 80 percent of the Central Valley’s historical floodplain, riparian and seasonal wetland habitats have been lost in the last 150 years (Brown, 2014).

**CALIFORNIA'S NATIVE FRESHWATER FISHES ARE IN TROUBLE**



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* (May 22, 2013), 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.

*Figure 1: Predicted Extinction of California’s Native Freshwater Fishes (PPIC, 2015)*

In the latter half of the past century, attention has been called to the degradation of California's environment and the imposing threat to the economy it has enabled to flourish. This shift in understanding resulted in the adoption of regulations, policies, and funding mechanisms to protect and restore California's environment. The results are both promising and disappointing. Passage of the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) in 1970 has provided numerous species protection and increased public awareness of environmental tradeoffs of development; however, the quality of California's natural ecosystems have continued to decline. The importance of a healthy environment in supporting a thriving economy and a healthy population necessitates improved efforts to reduce species decline and maintain a diverse and robust environment for future generations.

Today, two-thirds of all Californians and millions of irrigated farmland acres are dependent on the ability to move fresh surface water from its places of origin in Northern California through the Delta to the CVP and SWP export pumping facilities, located at the southern edge of the Delta. Thus, the Delta is thought of as "the hub of California's water distribution system."<sup>1</sup> The Delta is home to people, farms, and industry. The Delta is also one of the most important ecologically active and diverse areas in the western Americas. Annually it provides habitat to more than 500 species. However, due to reoperation of the Delta's natural landscape for farming, flood protection and water conveyance, some of these species, like Delta smelt and winter-run Chinook salmon, are near extinction and federally listed as endangered.

***Balancing the needs of the economy and the environment becomes challenging to maintain when the water needed to sustain both are in short supply.***

Delta waterways, lands, and pumps, are managed to help recover endangered species habitat and species abundance. State and federal water professionals are tasked with managing the Delta to balance the needs of endangered species by altering pumping schedules, the needs of those living and working in the Delta by managing salt water intrusion from the San Francisco Bay, and the needs of the millions of people and acres of farmland south of the Delta. Balancing the needs of the economy and the environment becomes especially challenging to maintain during drought conditions when the water needed to sustain both are in short supply.

## 1.2. The Current Drought

Due to record-breaking high temperatures, low precipitation and inadequate winter snowpack, California is experiencing the most severe drought in its recorded history. The 2014-2015 winter provided California with the lowest snowpack in 500 years (Belmecheri et al., 2014). Historical and predictive climate change analyses suggest these conditions will continue to occur in the future, with greater frequency and intensity (DWR, 2015a).

The current drought has impacted both the economy and the environment, but the severity of the impacts tell a mixed story.

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<sup>1</sup> California Department of Water Resources, "Where Rivers Meet-The Sacramento-San Joaquin Delta". <http://www.water.ca.gov/swp/delta.cfm>

When asked to describe the greatest impact on the economy from drought, the Water Leaders' mentors cited the insufficient amount of water available for beneficial uses; the increase to food prices; the loss of jobs, specifically in the landscaping, farm labor and recreation sectors; and declines in overall economic output. Some mentors noted that the drought specifically hit urban consumers hard and exacerbated problems associated with water supplies available for disadvantaged communities, particularly those on small community water systems. When asked to describe the greatest impact on the environment from drought, the Water Leaders' mentors predominantly referenced the loss of in-stream flows to support aquatic habitat and fisheries, specifically the impact to anadromous fisheries. Some mentors suggested that without a renewed drought management approach in California, the extinction of native fish species is imminent.

California's overall economy has performed better than expected given the lack of surface water supplies available. Between 2010 (the last full pre-drought year) and 2014, the state's contribution to gross domestic product increased by \$345 million, representing a compound annual growth rate of 4 percent. The impacts are likely to remain minor, but only in the short term (Bergman, 2015). Localized impacts of the drought have been more notable, particularly in areas that are supported by the agriculture and food processing industry, one of the state's largest consumers of water. While agriculture and food processing make up only 3 percent of the California economy, these industries can support much larger percentages of rural counties. In the San Joaquin Valley, one in five jobs is directly related to agriculture.<sup>2</sup> Thus, it is not surprising that some of the most devastating impacts of the drought were felt in the Central Valley. For example roughly 200 wells in Tuolumne County have gone dry, some of which were more than 900 feet deep (Ibarra, 2015). In Tulare County, more than 7,000 residents are without potable water in their homes due to the drying up of shallow domestic water wells.<sup>3</sup> Providing the necessary funding and infrastructure to ensure a reliable water supply to California's numerous small water systems is a perpetual challenge and has been further exacerbated by the current drought. Also farm labor and food processing jobs have suffered greatly (Carroll, 2015).

***[Agricultural] impacts [from the drought] likely cost the California economy \$2.74 billion and 21,000 jobs in 2015 alone.***

By some estimates gross farm revenue increased slightly in 2014, and food prices remained steady despite crop declines (Kasler, 2015a). These estimates indicate that approximately 550,000 acres of farmland were fallowed in 2015, primarily in the Central Valley. Although generally higher farm gate prices made up for some of the revenue lost due to fallowed acreage, revenue loss is estimated at \$902 million. Additionally, farmers incurred \$587 million in

increased costs due to groundwater pumping, and dairy and livestock industries saw costs increase by \$250 million and \$100 million, respectively. These impacts, combined with the multiplier effect on related industries, likely cost the California economy \$2.74 billion and 21,000 jobs in 2015 alone. The ability to supplement and even replace surface water with groundwater provided a buffer to impacts on agriculture. However, without this source of water, impacts would have been much more notable (Howitt, MacEwan, Medellin-Azuara, Lund, & Sumner, 2015).

<sup>2</sup> Tulare County Farm Bureau, "Tulare County Agricultural Facts". <http://www.tulcofb.org/index.php?page=agfacts>

<sup>3</sup> Smith, S., The Associated Press, "California drought: Some wells running dry in Central Valley". <http://www.dailynews.com/general-news/20140921/california-drought-some-wells-running-dry-in-central-valley>

Water suppliers have also experienced economic impacts in the current drought. Mandatory state-wide requirements to reduce residential water use by as much as 38 percent have reduced water sales and revenues, threatening to weaken the fiscal stability of water agencies that do not utilize conservation pricing structures. Fiscal stability is important for water agencies as it ensures that water service providers are able to finance necessary drought mitigation strategies, such as purchasing additional water supplies or investing in higher-cost, drought-resilient water supplies.


As previously described, many of California's species and ecosystems were already stressed before the drought due to significant habitat loss and degradation, and thus lack the resilience to withstand additional drought-related stress. The Delta smelt, the icon of California water wars, is "almost extinct" or "functionally extinct" (Kay, 2015; Ruyak 2015). In 2014, Sacramento River water temperatures warmed sufficiently to cause a collapse of naturally spawned and federally endangered winter-run Chinook salmon (Quinton, 2015). Extensive actions to maintain this resource have been implemented, with little success (Weiser, 2015). In an unmodified system, salmon and Delta smelt would likely have had a diversity of life history types and larger non-drought year populations providing resilience during drought conditions. Reductions in habitat and declining water flows have exacerbated ecosystem vulnerability, especially during consecutive drought years (Moyle, 2010).

***Reductions in habitat and declining water flows have exacerbated ecosystem vulnerability, especially during consecutive drought years.***

Groundwater resources have also been severely impacted by the drought. As noted, groundwater is being used as a substitute for surface water supplies. Four years of continued groundwater extractions have caused severe water level declines, particularly in the San Joaquin Valley where farmers with junior water rights have been cut off from surface water deliveries for two years. The California Department of Water Resources (DWR) reported that in many parts of the state water levels have dropped 50 to 100 feet below their previous historical lows (DWR, 2015b). During the Water Education Foundation's 2015 Drought Tour, one resource speaker noted that farmers in the western San Joaquin Valley had pumped nearly three times the natural annual yield of the groundwater basin in response to severely reduced surface water allocations. Declining water levels have resulted in environmental impacts including land subsidence and reductions in surface water flow in areas where surface and groundwater normally interact.

### 1.3. Challenges and Opportunities

In a protracted drought scenario, the impacts to both the economy and the environment will be exacerbated and could threaten to irreversibly impact the quality of life for all Californians. California's existing water management and drought planning practices can and should be improved to serve the needs of today's economy and environment. As the drought has continued, discussion of actions taken by Australia during the Millennium Drought to overhaul its water management system have dominated headlines, often suggesting that California follow suit. A discussion of the Australia drought and related actions taken by its government is provided in Section 2 of this report. The Australia examples provide context to how some of the strategies and recommendations explored herein have worked elsewhere.



Sections 3 through 6 of this report explore the effectiveness of certain aspects of California's water management system. Although drought and water management challenges impact the entire state, nowhere are these issues more prominent than the Delta. The challenges and opportunities for improved management focus on alleviating competition at the hub of our water delivery system, where managing environmental and societal needs during drought is most difficult. The specific water management practices covered in this report include:

- Water Prioritization
- Water Transfers
- Financing Environmental Water
- Water Rates

Each section explores the relevant policies and provides recommendations for overcoming existing challenges. The report concludes by highlighting the 2015 Water Leaders' main recommendations and conclusions for managing drought for the economy and the environment.



## 2. "Just Do What Australia Did!"

Australia has experienced two significant "100-year droughts" since 1895.<sup>4</sup> The most recent extreme drought, the "Millennium Drought" resulted in drastic reforms to the country's water management policies and practices. California's media, academics, and policy-makers are turning to Australia, often viewed as a leader in comprehensive water policy,<sup>5</sup> for replicable solutions as the Golden State's drought rages on. While some of Australia's responses to the Millennium Drought have been lauded as an example of how California could balance the management of the economy and the environment, there are legal and practical considerations unique to California that may impede the wholesale adoption of the Australian systems. However, California can learn from and potentially implement specific actions in an effort to improve the state's water management as discussed below and throughout the report.

Like California, Australia has had to grapple with the tension between common law doctrines rooted in history and variable water supplies often insufficient to meet competing demands. Australia has reconfigured its water rights system in recent years, following the Millennium Drought. The national government established an environmentally-sustainable rate of water diversion for its rivers and watershed basins, with allowances for flexibility in times of drought (Australia, 2012).

While Australia and California share similar water law systems, they have different constitutional obligations regarding eminent domain and financial compensation. Turning briefly to the gross distinctions between the constitutions, the Fifth Amendment to the United States Constitution mandates that "private property [shall] not be taken for public use, without just compensation." Under Section 51(xxxi) of the Australian Constitution, "the Parliament shall...have power to make laws...with respect

to...the acquisition of property on just terms...." American law speaks of 'taking' property and considers compensation for takings to be a fundamental freedom (Rochford, 2009). Australian law speaks to 'acquisition' of property and perceives the notion of 'just terms' more a matter of sensible business practice (Rochford, 2009). Most relevant to drought discussions are the financial implications of the respective exercises of authority over property. American law requires the payment of compensation upon a finding that the government has, among other circumstances, physically occupied the property or imposed regulations so severe that a property owner is essentially deprived of all economically beneficial or productive use of land. Australian law does not require compensation upon a finding that the property has been directly or indirectly acquired but, instead, only provides compensation when there is a further finding that another party derived an advantage from the loss (Rochford, 2009). Mimicking Australia's drought response in California would be significantly more costly because American law would require

***Mimicking Australia's drought response in California would be significantly more costly where compensation would be paid to parties whose water rights had been reallocated.***

<sup>4</sup> Australian Government, "Natural disasters in Australia". <http://www.australia.gov.au/about-australia/australian-story/natural-disasters>

<sup>5</sup> Godden, L., "Water Law Reform in Australia and South Africa: Sustainability, Efficiency and Social Justice". Journal of Environmental Law Vol 17 No 2 (2005).

many more instances where compensation would be paid to parties whose water rights had been reallocated.

As to the similarities between the water law systems, both inherited common law riparian rights from Great Britain (Kwasniak, 2010), and adopted the prior appropriation doctrine to support goldfield development in the 1850s. Both judicial systems also feature “first in time, first in right;” include a seniority rule; forfeiture for non-use; and tradability of rights (Harris, 2010). Australia’s modern water policy reform began in the 1990s during a particularly severe drought (Haisman, 2005). Agriculture was hit hard, and city residents started taking notice when fruit and vegetable prices started to rise and public parks changed color from green to brown (Folger, 2014).

The New South Wales Water Management Act (WMA, 2000) expressly abolished common law riparian rights in 2000. Reforms included further development of water markets to allow rights holders to trade across river systems and state boundaries. State governments initially determine a water budget — the total quantity of water available to users in a given year — before each user was granted its allotment. The system is heavily-regulated, ensuring each user adheres to the state limit on how much naturally available water can be used. Water metering is strictly enforced in Australia, greatly reducing unauthorized extractions and accounting for every drop in the system. Within this framework, all Australian water users can trade between themselves for short- and long-term water rights (Maddocks, 2013).

The Australian government has spent billions of dollars to buy permanent water rights for the environment; once the government owns water individual users cannot purchase it back (Maddocks, 2013). As part of its reform measures to secure water for the environment, Australia approved the Water Amendment Act of 2013, which established the Water for the Environment Special Account (Account) and codified into law specific environmental objectives with quantitative thresholds. The Account is used to purchase permanent environmental water entitlements and implement projects that help move water to specific environmental areas within a basin. The Account appropriates approximately \$1.23 billion over 10 years from the Consolidated Revenue Fund.<sup>6</sup>

***The Australian government has spent billions of dollars to buy permanent water rights for the environment; once the government owns water individual users cannot purchase it back.***

The Account can be used for:

- Improving the water efficiency of infrastructure (e.g. on-farm irrigation efficiency programs);
- Improving or modifying infrastructure that constrains the delivery of environmental water in order to ease or remove those constraints;

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<sup>6</sup> In accordance with the Australian Constitution, all revenues or moneys raised or received by the Government of the Commonwealth form one Consolidated Revenue Fund (CRF) and may not be spent unless under an appropriation by the Parliament for the purposes of the Commonwealth. A special account is an appropriation mechanism that sets aside an amount of money within the CRF to be expended for a specific purpose. <https://www.comlaw.gov.au/Details/C2012B00198/Explanatory%20Memorandum/Text>

- Increasing the capacity of dams and storages to deliver environmental water and entering into easements or agreements;
- Purchasing water access rights; and,
- Making payments in relation to projects whose aim is to further the objectives of the Act.

Payments may also be made from the Account to address and offset any detrimental social or economic impacts on the well-being of communities that are associated with a funded project.<sup>7</sup>

All remaining water that is not dedicated to the environment is divided into individual, useable entitlements. Entitlements are permanent and perpetual water rights that are held as permits with the state government, which determines how much water an individual can use based on the total volume of water available in a basin in any given year. Entitlements can be sold to other water users or to the government for environmental purposes. (Maddocks, 2013)

***All remaining water that is not dedicated to the environment is divided into individual entitlements. Entitlements can be sold to other water users or to the government for environmental purposes.***

Entitlements in regulated systems are categorized by degree of reliability.<sup>8</sup> Reliability is referred to in some jurisdictions as security, divided into three tiers: (Maddocks, 2013)

1. High-security rights promise a full supply of allocated water 95 percent of the time. These are generally held by farms with permanent plantings, such as vineyards or orchards.
2. General rights vary from 30 to 80 percent reliability and are held by annual crop farms (e.g., rice or cotton).
3. Low-security rights are only available in years of unusually high rainfall or flooding.

Allocations are unit volumes of water that can be traded by entitlement holders to deal with immediate, day-to-day supply issues. These exchanges are a one-time transaction, and essentially allow entitlement holders to buy water from someone else's "pool, only for that year" (Maddocks, 2013). Because every drop of water is accounted for in the Australian market, users seeking more water cannot just take it from the environment. Australian state governments banned additional licenses for accessing water, starting as early as 1969. These bans on issuing more licenses acted as an indirect "cap" before the proliferation of "cap and trade" water markets.<sup>9</sup> Individuals seeking an allocation must convince the existing allocation-holder for use this year or an entitlement for use in perpetuity. Some users may decide it is economical to buy or sell water, while others may decide to manage water more efficiently. State-enforced limits only apply to naturally occurring water; some users may opt to purchase water from a desalinating facility or importer (Maddocks, 2013). Australia's system strives to streamline the transfer process, going so far as

<sup>7</sup> Australian Government. "Water Amendment (Water for the Environment Special Account) Bill 2012". <https://www.comlaw.gov.au/Details/C2012B00198/Explanatory%20Memorandum/Text>

<sup>8</sup> Australian Government. "National Water Market". <http://www.nationalwatermarket.gov.au/about/resources.html>

<sup>9</sup> Australian Government. "Water Markets in Australia, A Short History". [http://archive.nwc.gov.au/\\_\\_data/assets/pdf\\_file/0004/18958/Water-markets-in-Australia-a-short-history.pdf](http://archive.nwc.gov.au/__data/assets/pdf_file/0004/18958/Water-markets-in-Australia-a-short-history.pdf)

permitting real-time viewing of water right prices and trades online. Additionally, data needed to set prices, such as up-to-the-minute water usage and records of water rights is all available publicly at hand (Bloomberg, 2015).

During drought, reductions of water are proportionally shared between all water users of the basin, with adjustments made to manage critical human water needs. The environmental water recovery strategy is managed by one entity, an individual (similar to a Watermaster) for each watershed or basin. Environmental water “holdings” are purchased through funding from the Environmental Water Holdings Special Account, funded by the government. The Watermaster purchases new water holdings and makes

***Monitoring of environmental responses has already detected improved tree growth, decreased salinity, and other benefits to a range of plants and animals, after just a few years of water.***

water allocations available for environmental activities (Australia, 2010).

Monitoring of environmental responses to the Australian environmental “watering” program has already detected improved tree growth, decreased salinity, and other benefits to a range of plants and animals, after just a few years of water. The 2010-2011 environmental recovery program plan notes that ecological outcomes can take time to

materialize and further benefits will be reported over time (Australia, 2010). In extreme dry years, priorities are to avoid damage to targeted environmental refuges and sites with threatened species.

Prioritization of specific environmental areas to protect with water during a drought can avoid critical population loss to key species. Establishing these habitat areas required managing water accordingly – including the precise timing, method, and location of water delivery – to ensure habitat efficacy (AGNW, 2012). Wetland-river interactions were reestablished, and environmental water was applied at precise times and quantities to benefit both fish spawning and aquatic plant seeding. These actions also benefited invertebrates, which provided food for waterfowl (AGNW, 2015). The desired ecosystem response was achieved with optimized water application.

## 3. California Water Prioritization

### 3.1. Water Rights

A fundamental principle of California water law is that one may not withdraw water from its source without first acquiring a “water right” (CWCs §§102, 1052). Water rights are “usufructuary:” a right to use the water, not to own the molecules of water.<sup>10</sup> The people of California own the water molecules; the state holds the water in trust for the public (CWC §102). The various types of water rights share some common elements. A water right must identify a point of diversion, a place of use, the quantity of water to be diverted, the season or time of diversion and the purpose of use. California recognizes the following beneficial uses: municipal, irrigation, domestic, industrial, recreation, aesthetic enjoyment, and the protection of fish, wildlife and habitat.

#### 3.1.1. Riparian

The riparian doctrine confers upon the owner of land contiguous to a watercourse the right to the reasonable and beneficial use of water on that land (CWC §101). Riparian water right holders share water flows and water shortages in a correlative manner.<sup>11</sup> In order to establish a riparian right, a potential water right holder must prove that the riparian parcel is (i) contiguous to a stream or natural watercourse, (ii) within the watershed of the stream, and (iii) is part of the smallest tract held under one title in the chain of title leading to the present owner (i.e., no ‘severance’ of the land from the watercourse without an explicit reservation of the riparian right).<sup>12</sup>

#### 3.1.2. Appropriative

There are two types of appropriative rights: pre-1914 water rights and post-1914 licenses to divert water. Between appropriators, the rule of priority is “first in time, first in right” whereby the senior appropriator is entitled to fulfill his needs before a junior appropriator is entitled to use any water.<sup>13</sup> Pre-1914 water rights refer to the water rights in existence prior to the establishment of the Water Commission, predecessor to the current California State Water Resources Control Board (SWRCB); such rights to divert

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<sup>10</sup> Eddy v. Simpson, 3 Cal. 249, 252 (1853), It is laid down by our law writers, that the right of property in water is usufructary, and consists not so much of the fluid itself as the advantage of its use.

<sup>11</sup> United States v. State Water Res. Control Bd., 182 Cal. App. 3d 82 (1986), Riparians have no right to specific amount of water, but enjoy as incident of common ownership with other riparians on stream a correlative share of natural flow.

<sup>12</sup> Hudson v. West, 47 Cal.2d 823, 829 (1957); Rancho Santa Margarita v. Vail, 11 Cal.2d 501, 528-529 (1983).

<sup>13</sup> United States v. State Water Res. Control Bd., 182 Cal. App. 3d 82, 102 (1986).

are treated as a property-interest,<sup>14</sup> which affords them constitutional protections of due process and just compensation if the water right holder is deprived of that property absent specified circumstances.

Since 1914, the SWRCB (to include predecessor agency) has been the exclusive agency to issue licenses to divert water (CWC §1201) in order to allow appropriation for beneficial purposes “under such terms and conditions as in its judgment...will best develop, conserve, and utilize [the water] in the public interest....” (CWC §1253).

The Board has two primary duties to issue a permit: (i) to determine if surplus water is available and (ii) to protect the public interest.<sup>15</sup> The public interest is served when the water resources are used to the fullest extent capable (CWC §100) and for the greatest public benefit (CWC §101).

### 3.1.3. Additional Types of Water Rights

There is no federal system of water rights administration. There are circumstances where the federal government must comply with a state’s water rights system and there are circumstances where it does not. For example, the federal reserved rights doctrine (sometimes referred to as the Winters Doctrine) recognizes that Indian reservations and certain federal lands (wildlife refuges, military reservations, national parks, forests and monuments) are entitled to sufficient water to meet the purposes for which the federal lands were set aside. Reserved rights claimed to be paramount to any state water right; are often difficult to quantify; might go unused for many years; and are not subject to abandonment or relinquishment.<sup>16</sup> Since the doctrine was established in 1908, both Congress and the United States Supreme Court have acted over the years to minimize disruption to state water law systems by limiting the federal government’s ability to claim a reserved right or by limiting the size of the water right.

A Mexican pueblo water right belongs to a city that succeeds in interest to a Mexican or Spanish pueblo and includes use of all the surface and ground water that naturally flowed through the original pueblo. Pueblo rights are superior in priority to a riparian or an appropriator in the watershed of that successor city.<sup>17</sup> As of 2015, California has only recognized pueblo rights for the City of Los Angeles<sup>18</sup> and the City of San Diego.<sup>19</sup>

There have traditionally been three methods available for managing groundwater resources in California: (i) by local agencies under authority granted by the state, (ii) by local groundwater management ordinances and (iii) by court adjudications. In 2014, the Legislature enacted the Sustainable Groundwater Management Act (SGMA) (CWC §10720 et seq.), which defines a comprehensive statewide framework for regulating groundwater basins through the establishment of local Groundwater Sustainability Agencies

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<sup>14</sup> United States v. State Water Res. Control Bd., 182 Cal. App. 3d 82, 104 (1986), Because water rights possess indicia of property rights, water rights holders are entitled to judicial protection against infringement, e.g., actions for quiet title, nuisance, wrongful diversion or inverse condemnation. (See generally, Hutchins, pp. 262–282, 348–356; Rogers & Nichols, pp. 530–534, 545–547). It bears reemphasis that the Board’s role in examining existing water rights to estimate the amount of surplus water available for appropriation does not involve adjudication of such rights. Temescal Water Co. v. Dept. Public Works, 44 Cal.2d 90, 103–106; Hutchins, pp. 98–99).

<sup>15</sup> United States v. State Water Res. Control Bd., 182 Cal. App. 3d 82, 102 (1986).

<sup>16</sup> [http://www.waterplan.water.ca.gov/docs/cwpu2009/0310final/v4c19a06\\_cwp2009.pdf](http://www.waterplan.water.ca.gov/docs/cwpu2009/0310final/v4c19a06_cwp2009.pdf) (website visit Sept. 2015).

<sup>17</sup> City of Los Angeles v. City of Glendale, 23 Cal. 2d 68, 73 (1943).

<sup>18</sup> City of Los Angeles v. Baldwin, 53 Cal. 469 (1879).

<sup>19</sup> City of San Diego v. Cuyamaca Water Co., 209 Cal. 105 (1930).

(CWCs §§ 10723 to 10726.9 and §§ 10730 to 10732) that will adopt Groundwater Sustainability Plans (CWCs §§ 10727 to 10728.6).

Courts typically classify water rights in an underground basin as overlying, appropriative, and prescriptive. As between overlying owners, they are like riparian water right holders and take correlative reductions in water use when there's a shortage of water between them. As between appropriators, the doctrine of prior appropriation applies.<sup>20</sup> Prescriptive rights are not established when there is surplus water in the basin; but an appropriative taking of water which is not surplus is wrongful and may become a prescriptive right if the statutory elements are met.<sup>21</sup>

### 3.2. California's Water Rights System

California's water rights developed over time, in response to the state's needs and priorities at various points in history. The California Gold Rush of the late-1840s brought the doctrine of **prior appropriation**, or "first in time, first in right," to secure the land and water needed to operate mining claims.<sup>22</sup> The 1848 Treaty of Guadalupe Hidalgo ceded California from Mexico to the United States, but preserved Mexico's **pueblo** land and water rights within ceded watersheds. When California gained statehood, it adopted English common law **riparian** water rights (which ensure landowners the right to reasonable and beneficial use of water on or adjacent to their land).<sup>23</sup> In addition to other types of water rights, the federal government has **inchoate** water rights (defined as a water right that has begun but has not been completed) that introduces further uncertainty into water rights administration.<sup>24</sup>

Long-standing tensions between California water rights holders and competing beneficial uses have evolved and expanded over time. While the historical doctrines of riparian and pueblo water rights are based on notions of political favor and land ownership, the appropriative doctrine is based on the theory that everyone has access to the resource if the party is willing to put the water to work and to stand in line with everyone else. These two types of systems are fundamentally incompatible in many ways, most certainly with respect to water supply and demand accounting since the appropriative doctrine requires certainty in the scope of a water right while other water rights (that must presumably be accounted for in the same system of administration) are defined by their ability to change with the user's needs. Time has not healed the incompatible characteristics within the water rights system; it has only increased the complexity.

*Time has not healed the incompatible characteristics within the water rights system; it has only increased the complexity.*

One of the more contentious modern issues is how to protect environmental resources. Some water rights holders dedicate portions of their water right to environmental purposes, either permanently or

<sup>20</sup> City of Barstow v. Mojave Water Agency, 23 Cal. 4th 1224 (2000).

<sup>21</sup> Peck v. Howard, 73 Cal.App.2d 308, 325–326 (1946); City of Barstow v. Mojave Water Agency, 23 Cal. 4th 1224 (2000).

<sup>22</sup> Common law appropriation originated in the gold rush days when miners diverted water necessary to work their placer mining claims. The miners adopted among themselves the priority rule of 'first in time, first in right,' and California courts looked to principles of equity and of real property law to adjudicate conflicting claims. Thus it was initially the law in this state that a person could appropriate water merely by diverting it and putting it to use. National Audubon Society v. Superior Court, 33 Cal. 3d 419, 441 (1983).

<sup>23</sup> People v. Shirokow, 26 Cal.3d 301, 307 (1980).

<sup>24</sup> Caeppeart v. U.S., 426 US 128, 138 (1976). <http://www.justice.gov/enrd/water-rights-reclamation> (accessed Sept. 2015).

temporarily. Various legal theories support voluntary or involuntary dedication of water for environmental purposes; the **public trust** doctrine may be the most important.<sup>25</sup> All water in California is subject to the public trust doctrine,<sup>26</sup> which obligates the state to protect important public values and prohibits the state from permanently conveying certain public resources into private hands. Public trust is traditionally applied to navigation, commerce and fishing; in California the doctrine includes fish, wildlife, habitat, recreation and natural ecosystems.<sup>27</sup>

### 3.3. Water Allocation and 2014 Curtailments

The SWRCB has the authority to determine whether water rights holders are diverting in conformity with the law and to enforce against unlawful diversions of water when necessary. In times of drought curtailments of diversion, these decisions are made based on a number of factors, including but not limited to, when and how the right was obtained and supply and demand curves for key river systems (see **Figure 2**).

The SWRCB creates those supply and demand curves using multiple data sources that include (SWRCB, 2015a):

- Reports filed by water rights holders;
- California Data Exchange Center and Reservoir Storage Data (CDEC);
- DWR;
- National Oceanic and Atmospheric Administration's (NOAA) National Weather Service data;
- U.S. Geological Survey (USGS) National Water Information System Surface Water Data for California;
- USGS California Water Science Center;
- U.S. Bureau of Reclamation (USBR) Mid Pacific Region Central Valley Operations Office; and
- U.S. Army Corps of Engineers Water Control Data System.

In 2014 and 2015, the SWRCB curtailed water rights due to insufficient water supply to meet the needs of all water rights holders and insufficient flows to protect fish in certain watersheds (see **Table 1**). Prior to the current drought, the SWRCB had not curtailed water rights since the 1987-88 drought (rights were also curtailed during the 1976-77 drought) (SWRCB, 2015a). The 2014 curtailments followed the same procedures used in the 1976-77 drought year (Lund et al., 2014).

Senate Bill X7-8, one of the policy bills enacted as part of a comprehensive water package in November 2009, required pre-1914 water rights holders and riparian water rights holders to report diversions to the

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<sup>25</sup> Illinois Cent. R. Co. v. State of Illinois, 146 U.S. 387, 435 (1892). Roman Emperor Justinian codified Roman law in the Institutes of Justinian (530 ACE), to include "By the law of nature these things are common to all mankind; the air, running water, the sea, and consequently the shores of the sea."

<sup>26</sup> People ex inf. Webb v. California Fish Co., 166 Cal. 576 (1913)

<sup>27</sup> Marks v. Whitney, 6 Cal. 3d 251 (1971).



state (WaterBlog, 2014). Post-1914 appropriative water rights holders are required to file reports yearly by July 1 for the prior year's use and pre-1914 appropriative and riparian water rights holders are required to file reports once every three years (SWRCB, 2015). SWRCB used this newly available data to estimate the total demands of right holders within river systems (WaterBlog, 2014). However, the SWRCB only had complete water diversion data for post-1914 appropriative water rights holders up to 2012, and for pre-1914 appropriative and riparian water rights holders up to 2010 (SWRCB, 2015a).

Aside from consideration of Term 91 permit conditions<sup>28</sup> and curtailments to protect fisheries as allowed under California Code of Regulations, title 23, sections 877, the SWRCB was not authorized to prioritize environmental uses (such as groundwater recharge and support of non-endangered species habitat) during its curtailment analysis. The 2014 curtailments were "necessarily somewhat crude, based on broad priority dates, and applied uniformly over large basins for many months." Also, environmental and water quality water flows were not strongly considered in the 2014 curtailments, nor were groundwater systems (Lund et al., 2014). Many, including one Water Leaders mentor, suggested that the use of real-time data would help to equitably and appropriately allocate water during times of drought.

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<sup>28</sup> From State Water Resources Control Board website ([http://www.waterboards.ca.gov/waterrights/board\\_info/water\\_rights\\_process.shtml](http://www.waterboards.ca.gov/waterrights/board_info/water_rights_process.shtml), accessed 9/24/2015): "When natural flows to the Delta are insufficient to meet water quality standards, the State Water Project and the Central Valley Project (Projects) will be operated to meet instream water quality standards. The Projects will release supplemental, stored water to meet the water quality standards which initiates Term 91. Term 91 is a permit condition that curtails downstream diverters from taking diversions from streams when the Projects are releasing water from storage to meet the water quality standards."

Table 1: 2014 and 2015 Water Rights Curtailments

Watershed	2014	2015
Eel River Watershed	<u>June 2014</u> : Post-1914 appropriative water rights curtailed based on projected water supply and reported diversion demands. <sup>29</sup>	No curtailments.
Russian River Watershed	<u>May 2014</u> : Post-1914 appropriative water rights curtailed due to insufficient water supply to meet needs of all water rights holders. <sup>30</sup>	No curtailments.
Sacramento and San Joaquin River Watersheds	<u>May 2014</u> : Post-1914 appropriative water rights curtailed due to insufficient water supply to meet needs of all water rights holders. <sup>31</sup>	<u>April and May 2015</u> : Post-1914 appropriative water rights curtailed due to insufficient water supply to meet the needs of all water rights holders. <sup>32, 33</sup>  <u>June 2015</u> : 1903-1914 water rights curtailment advisory notice that there may be insufficient water in the system to service claims of right. <sup>34, 35</sup>
Scott River Watershed	<u>May 2014</u> : Junior rights (various) curtailed due to insufficient water supply to meet needs of all water rights holders. <sup>36</sup>	<u>April 2015</u> : Junior rights (various) curtailed due to insufficient water supply to meet needs of all water rights holders. <sup>37</sup>

<sup>29</sup> SWRCB. Notice of Unavailability of Water. June 30, 2014.

[http://www.waterboards.ca.gov/waterrights/water\\_issues/programs/drought/docs/eelriverletter063014.pdf](http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/docs/eelriverletter063014.pdf) (accessed 9/22/2015)

<sup>30</sup> SWRCB. Notice of Unavailability of Water. May 27, 2014.

[http://www.waterboards.ca.gov/waterrights/water\\_issues/programs/drought/docs/rr\\_curtailment052714.pdf](http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/docs/rr_curtailment052714.pdf) (accessed 9/22/2015)

<sup>31</sup> SWRCB. Notice of Unavailability of Water. May 27, 2014.

[http://www.waterboards.ca.gov/waterrights/water\\_issues/programs/drought/docs/rr\\_curtailment052714.pdf](http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/docs/rr_curtailment052714.pdf) (accessed 9/22/2015)

<sup>32</sup> SWRCB. Notice of Unavailability of Water. May 1, 2015.

[http://www.waterboards.ca.gov/waterrights/water\\_issues/programs/drought/docs/sac2015\\_post14curtail.pdf](http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/docs/sac2015_post14curtail.pdf) (accessed 9/22/2015)

<sup>33</sup> SWRCB. Notice of Unavailability of Water. April 23, 2015.

[http://www.waterboards.ca.gov/waterrights/water\\_issues/programs/drought/docs/sjrg\\_2015\\_curtail.pdf](http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/docs/sjrg_2015_curtail.pdf) (accessed 9/22/2015)

<sup>34</sup> SWRCB. Notice of Unavailability of Water. June 26, 2015.

[http://www.waterboards.ca.gov/waterrights/water\\_issues/programs/drought/docs/uppertsj\\_2015curttr.pdf](http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/docs/uppertsj_2015curttr.pdf) (accessed 11/11/2015)

<sup>35</sup> SWRCB. Notice of Unavailability of Water. June 12, 2015.

[http://www.waterboards.ca.gov/waterrights/water\\_issues/programs/drought/docs/pre14curtailmentjun2015.pdf](http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/docs/pre14curtailmentjun2015.pdf) (accessed 11/11/2015)

<sup>36</sup> SWRCB. Notice of Unavailability of Water. May 16, 2014.

[http://www.waterboards.ca.gov/waterrights/water\\_issues/programs/drought/docs/scott\\_curtailment051614.pdf](http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/docs/scott_curtailment051614.pdf) (accessed 9/22/2015)

<sup>37</sup> SWRCB. Notice of Unavailability of Water. April 23, 2015.

[http://www.waterboards.ca.gov/waterrights/water\\_issues/programs/drought/docs/sjrg\\_2015\\_curtail.pdf](http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/docs/sjrg_2015_curtail.pdf) (accessed 9/22/2015)

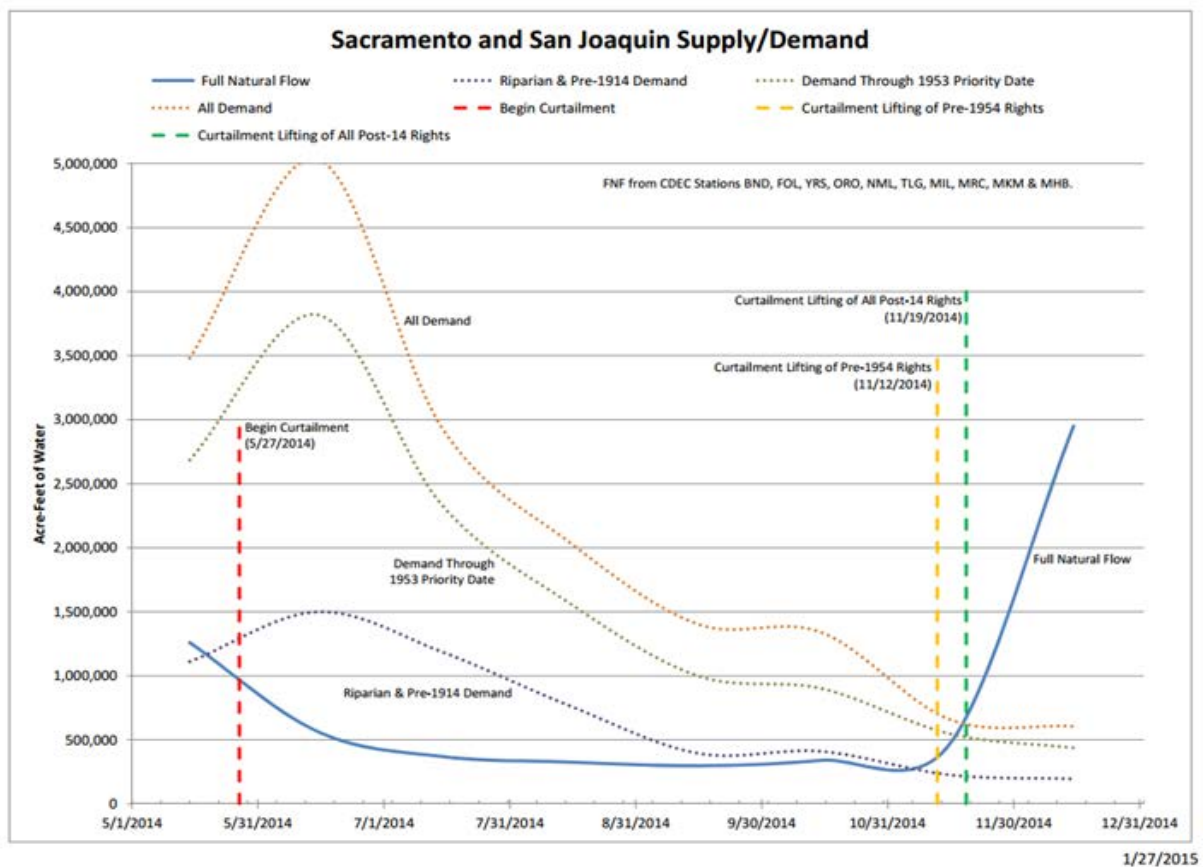


Figure 2: Example of SWRCB's Division of Water Rights Supply/Demand Graph and Curtailments for Sacramento/San Joaquin River Watersheds from 5/1/2014 – 12/31/2014

Source: SWRCB, 2015b

### 3.4. Assessment of California's Water Rights System

California's water rights priority system is tested, both in practice and as a matter of statewide water policy, during each drought cycle. Opinions abound regarding the viability, efficacy, equity and legality of California's current water rights system. Many of these opinions are captured in the Water Leaders Mentor interviews. Some propose a review of the water rights system effectiveness. Others suggest improvements to state agency recordkeeping to expedite water transfers.

Critics of the existing water rights system argue it is inflexible, limited in recognition of environmental water needs, lacking in transparency, incentivizing of inflated water rights claims, lacks a central record, inadequately informed to administer rights during shortages, overly-reliant on self-reported water use records, and unlimited in riparian diversion claims.<sup>38</sup>

<sup>38</sup> Pitzer, Gary. "Allocating Water In A Time Of Scarcity: Is It Time To Reform Water Rights?" Western Water 2015: 4-11. Web. 18 Aug. 2015.

A recent article in Water Education Foundation's magazine *Western Water* discussed several potential reforms to California's water rights system, which some of those interviewed for the article said could greatly benefit the state. One simple change that would not require legislation but would revolutionize the system is to transition the SWRCB away from paper files as a primary documentation platform, and develop an online database that includes legal and other information relevant to water rights. The article further suggests that better water metering is needed to improve water management practices and accountability and that experts suggest more effective verification of historical water rights claims, and better tools for enforcing illegal diversions and preventing waste and unreasonable use. Opponents of the current system suggest a preferred alternative would be following the model of a fully appropriated western state, such as Colorado, investigating stream over-allocation and adjudicating water rights throughout the state. Others propose California should consider issuing environmental water rights or reclassifying certain rights (e.g., riparian water rights) to streamline curtailment administration.

Those in favor of California's existing water rights system acknowledge its imperfections, but attest that it provides a fair, reliable basis upon which to base capital investments and to exercise long-term resource planning and management.<sup>39</sup> Other proponents claim that the system relies heavily on the effective

***It is predicted that water rights could be curtailed once every five to ten years... the SWRCB may need to improve its practices for determining appropriate water rights allocations and curtailments.***

administration and enforcement of post-1914 appropriative rights by the SWRCB, claiming that the system is not in need of changes itself, but changes to the way the SWRCB administers the system could have a positive impact on the regulated community of water suppliers and water users. Others believe that this system allows for a functional water market where water transfers provide flexibility to the system by helping move water where it is valued the most. These supporters of the system argue that transfers are only effective if they are administered and approved in a timely fashion.

Proponents of the system (typically those who are reliant upon water diverted by senior water rights holders) claim that the system's opponents are typically those who do not operate any waterworks, have not perfected any water rights or who are not financially responsible for decisions at issue. For example, academic institutions, natural resource regulatory agencies, non-governmental organizations, or sometimes those exercising junior water rights may be subject to such allegations. Additionally, legal considerations surrounding the implementations of the Fifth Amendment of the US Constitution and its Takings Clause cloud any conversation about the reallocation of water rights.

The current drought is causing California water managers and regulators to take a serious look at water supply, water use, and water rights. Going forward, it is predicted that water rights could be curtailed once every five to ten years (Lund et al., 2014), meaning the SWRCB may need to improve its practices for determining appropriate water rights allocations and curtailments, taking into consideration many of the concerns summarized above.

<sup>39</sup> Family Farm Alliance. "The Argument for the Prior Appropriations Doctrine to Allocate Water in the Western U.S.". Klamath Falls, Oregon. September 2015.  
[http://www.familyfarmalliance.org/sites/www.familyfarmalliance.org/assets/files/Final\\_Family\\_Farm\\_Alliance\\_Water\\_Rights\\_Report\\_Sept\\_2015.pdf](http://www.familyfarmalliance.org/sites/www.familyfarmalliance.org/assets/files/Final_Family_Farm_Alliance_Water_Rights_Report_Sept_2015.pdf)

### 3.4.1. Colorado Water: A Study in Collaboration and Conjunctive Management

A study of Colorado water provides a unique insight into management in other western states. With significant winter snowpack in the Rocky Mountains and the headwaters of many river systems, it might appear that Colorado has substantial water resources. However, Colorado cannot legally keep all water that originates within the state, creating limitations and tradeoffs for all users.

#### 3.4.1.1. *Background and Economic and Environmental Considerations*

The Colorado economy, with a gross domestic product contribution of \$306.7 billion in 2014, is highly diversified and has evolved significantly from its late 19<sup>th</sup> and early 20<sup>th</sup> century roots in mining and agriculture. Current contributions of these two sectors are \$19.0 billion and \$3.3 billion, respectively. In the evolving technology age, Colorado has developed notable scientific research and high-tech industries that contribute to the state's \$27.3 billion professional, scientific and technical services industry. Tourism and recreation consistently play a large role in the overall state economy, contributing \$13.9 billion. Water dependent sectors (agriculture, mining, utilities) contribute about \$17 billion to the Colorado economy (BEA, 2014).

Both Colorado's economy and natural environment share similarities with California. The vast majority of Colorado's water resources fall outside of the area in which use is concentrated. Areas west of the Continental Divide receive 70 percent of the state's precipitation, but are home to only 11 percent of the population. The region of the state east of the Continental Divide, which includes Denver, Boulder and Colorado Springs, uses 70 percent of the state's water. The high mountain lands average more than 60 inches of precipitation annually, while the Eastern Plains, Front Range area and Western Slope (where Colorado's agricultural, municipal and industrial uses are concentrated), receive 10 inches per year, or less in some areas. Of all the water originating in Colorado, about 38 percent is used within the state, compared to 50 percent in California. Of the water originated within the state, 34 percent is used by agriculture and 4 percent for municipal and industrial uses (Colorado, 2015). This compares to 40 percent and 10 percent respectively in California. (Mount et al., 2014) Mining and tourism (notably snow-making for winter sports) are more significant contributors to the Colorado economy than California, and both require notable amounts of water.

In 2014, the contribution of agriculture to both states' economies was similar, 1.5 percent in California and 1.1 percent in Colorado (BEA, 2014). The agricultural industry, however, differs greatly in these two states. A much smaller percentage of Colorado's farmed land area is irrigated compared to California (79 percent in California vs. 59 percent in Colorado).<sup>40</sup> There are also differences in the crops that are irrigated. In California, 32 percent of irrigated agriculture is high-value permanent plantings (e.g., nuts, grapes and other fruit).

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<sup>40</sup> US Department of Agriculture, Economic Research Service. (2008). Retrieved from Western Irrigated Agriculture: <http://www.ers.usda.gov/data-products/western-irrigated-agriculture.aspx#36165>

### 3.4.1.2. *History, Legal and Regulatory Framework*

Despite the aforementioned similarities between the economy and natural environment, Colorado and California water management differ in infrastructure and governance. Colorado's infrastructure to move water from the Western Slope to the Front Range, and localized canals to move water from rivers to end users, pales in comparison to California's vast network of reservoirs and conveyance. California water governance is far more complex than that of Colorado, with its numerous state agencies devoted to each specific aspect of water management. Colorado, however, has a legal system dedicated solely to water litigation.

In Colorado, water rights are appropriated for instream flows, natural lake levels and recreational diversions. These rights are non-consumptive, and can be used for other purposes. Colorado faces challenges in managing water for the environment. The state has identified 13,500 perennial stream miles with important environmental attributes, including imperiled species and riparian habitat (Colorado, 2015). Management of environmental and endangered species issues, compliance with interstate decrees and compacts, and increasing population create new issues for an already limited water supply.<sup>41</sup>

Colorado's water management system dates back to the 1860s, when the principles of prior appropriation were formalized in the Colorado Doctrine and imbedded in the State Constitution (Colorado, 2015). Similar to the doctrines established in California during the Gold Rush of 1840 (see Section 3.2) the main concepts established by the Colorado framework were "first in time, first in right" and the concept of beneficial use (the "application of water necessary to accomplish the purpose of the appropriation, without waste"). Common beneficial uses include agriculture, wildlife, mining, recreational use, municipal and industrial use, and evolve with changing public values.<sup>42</sup>

Subsequently, this framework was amended by the Water Right and Administration Act of 1969 ("1969 Act"). This act integrated surface and groundwater into a single adjudication and administration system, established water court jurisdiction, provided administration on a watershed basis, and authorized augmentation plans to enable out-of-priority use through the utilization of replacement water (The Water Right Determination and Administration Act of 1969).

Colorado allocates and administers surface and groundwater in two categories (1) surface water (including all tributary groundwater) and (2) other groundwater. All groundwater is considered tributary unless proven otherwise.<sup>43</sup> "Other groundwater" is a small portion of the state's water, with the most notable instance being Denver Basin, a nonrenewable bedrock aquifer that provides water for many municipalities along Colorado's Front Range.<sup>44</sup>

Most of Colorado's streams and rivers are over-appropriated. When combined with the joint appropriation of surface and groundwater rights specified in the 1969 Act, this means that obtaining a groundwater right requires a plan for augmentation to protect senior water rights. Augmentation can be

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<sup>41</sup> History of Water Rights. (n.d.). Retrieved from Colorado Division of Water Resources: [water.state.co.us](http://water.state.co.us)

<sup>42</sup> Waskom, R., & Neibauer, M. (n.d.). Glossary of Water Terminology. Retrieved from Colorado State University Extension: [www.ext.colostate.edu](http://www.ext.colostate.edu)

<sup>43</sup> Safranek v Limon, 228 P.2d 975, 977 (Colorado 1951).

<sup>44</sup> Topper, R., & Reynolds, B. (n.d.). Citizen's Guide to Denver Basin Groundwater. Retrieved from Colorado Foundation for Water Education: [www.cfwe.org](http://www.cfwe.org)

accomplished by supplementing surface water in a time and place substantially similar to the original diversion (typically through purchase or other water transfer mechanisms). Engineering models approved by the Division Water Court are required to prove the validity of the augmentation plan.<sup>45</sup> At this time, the only groundwater drilling permits issued without an augmentation plan are those for small residential and livestock wells.<sup>46</sup>

Colorado is a critical headwaters region, contributing to the Colorado, Rio Grande, Missouri and Arkansas rivers. Disputes between states regarding control and use of water erupted in response to infrastructure development. Resolution of these disputes was initially sought through Supreme Court litigation, but eventually transitioned to inter-state compacts between Colorado and other jurisdictions governing downstream water distribution. These decrees and compacts govern how water is shared — and often how much water can be used in each of the noted basins (Colorado, 2015).

### 3.4.1.3. *Lessons from Colorado*

*Measurement of Water Use* — In Colorado, it is the responsibility of the diverter (i.e., irrigation district, individual rights holder, etc.) to measure all diversions. Diversers must provide, at their own expense, a device for measurement (e.g., flume, flow meter, power coefficient calculation) and regularly certify the accuracy of those measurements. Diversers must also report usage on a predetermined basis to the state. The penalty for failing to report is a “red tagged” pump; the point of diversion is rendered inoperable until the issue is resolved. Long-term failure to report is considered abandonment of the water right.

*Conjunctive Water Management* — the vast majority of water in Colorado (groundwater or surface water) is considered by the state as tributary to some surface flow. Surface water and groundwater management is integrated and managed at the basin scale.

*Water Budgeting* — through interstate decrees and compacts, Colorado has established a clear accounting of its total water budget and the volume required to leave the state. The state can then work through allocations to specific rights holders, either environmental or economic, because the entire Colorado water rights system is fully appropriated.

## 3.4.2. Drought Refuges

Experts observed that the environment naturally contracts in drought conditions (Doolan, 2015). As water becomes scarce and habitat more limited, species move into the more confined area where water is still available. However, if species are already confined due to anthropogenic effects, too many consecutive years of drought can lead to extinction. While all wildlife requires water, fish and birds require more water than others. Birds require large areas of wetland habitat for breeding and migration pathways, and fish obviously require water in rivers, with various temperature, water quality, and turbidity requirements depending on the species. Of key concern for the California drought is the requirement of cold water for

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<sup>45</sup> Reid, J. (2015, July 19). Director, Horse Creek Water Users Association. (S. Reid, Interviewer)

<sup>46</sup> History of Water Rights. (n.d.). Retrieved from Colorado Division of Water Resources: [water.state.co.us](http://water.state.co.us)

endangered salmon species, which is challenging to maintain during drought conditions with limited snowmelt runoff into reservoirs (Reese, 2015).

Australia responded to the Millennium Drought environmental contraction by creating “drought refuges” - managed habitat areas for maintaining targeted species. Prioritization of vital environmental areas to protect and provide with water during a drought can avoid critical population loss to key species. Establishing these habitat areas required managing water carefully – including the precise timing, method, and location of water delivery – to ensure habitat efficacy (AGNW, 2012). Wetland-river interactions were reestablished, and environmental water was applied at precise times and quantities to benefit both fish spawning and aquatic plant seeding. These actions also benefited invertebrates, which provided food for waterfowl (AGNW, 2015). The desired ecosystem response was achieved with optimized water application.

California already has protected habitat areas, some of which have been established as part of the National Wildlife Refuge System (NWRS), which is operated primarily to maintain the Pacific Flyway for migratory birds. The Central Valley refuges require water for migratory birds in fall and winter months, but not summer and late spring (when agricultural water demands are highest). According to USBR engineers, the federal NWRS has not been provided the required surface water, especially in dry years. Limited surface water allocations lead to increased reliance on groundwater (often requiring new drilling) to supply wetlands and maintain species. Limited water supplied (from surface or groundwater sources) results in loss of habitat, waterfowl crowding, and resultant increase in diseases. According to the refuge managers and contractors associated with the CVP and NWRS, the 2014 loss of habitat caused disease outbreak, and nearly led to large-scale bird kills (Weiser, 2014).

There are several types of water supply for the federal National Wildlife Refuges. The Central Valley Improvement Act (CVPIA) directs USBR to make water available for full habitat development at specific Central Valley state and federal refuges and private wetland areas. Some federal refuges are not included in CVPIA. A base level of supply (referred to as Level 2 supplies) was made available immediately in CVPIA. Level 4 supplies, which would have allowed ideal management of the refuges, were to be made available in 10 percent increments over 10 years. The sum of refuge water supply for CVPIA refuges is 560,000 acre-feet, with some reductions under drier years (USBR, 2008). However, water supply infrastructure has been a major hurdle. Several refuges do not have the required canals, pumping plants, and conveyances to physically move the water required by CVPIA. Consequently, the primary focus of the CVPIA Refuge Water Supply Program since the passage of CVPIA in 1992 has been to develop the necessary conveyance capacity in addition to acquiring the water to meet the prescribed needs. In 2015, infrastructure is still required, with approximately \$12 million dedicated for refuge water supply infrastructure, and \$16 million for the purchase of refuge water supply and administration of the refuge water supply program (USBR, 2015b). A full Level 4 water supply, which has never been delivered, will provide for optimum habitat management, supporting a range of species including targeted threatened and endangered species (USBR, 2015b).

In droughts, meeting the requirements of CVPIA is challenging, but should be prioritized. Further discussion of components of the CVPIA is included as a case Study in Section 5.3.3.1.



### 3.5. Recommendation: The Drought Water Resources Allocation Tool (DWRAT)

The UC Davis Center for Watershed Sciences (CWS) collaborated with the SWRCB to test a new Drought Water Right Allocation Tool (DWRAT) in the Russian and Eel river watersheds. The DWRAT estimates optimal curtailments based on water rights and water availability data (Lund et al., 2014). The goal of the DWRAT was to develop a more formal and analytical approach to curtailing individual water rights.

The DWRAT “mathematically estimates the legally required curtailment of water rights, given explicit interpretations of water law and data on water availability, uses, and legal priorities” (Lund et al, 2014). The DWRAT was applied experimentally in the Eel River. Results were compared to actual curtailments issued by the SWRCB. The developers of the tool recommend agencies establish procedures for estimating and prioritizing environmental, water quality, and public health and safety uses in drought conditions (Lund et al., 2014).

The DWRAT would enable transparent, precise, and minimal curtailment of water rights, and improve curtailment forecasting through hydrologic predictive modeling. The tool could provide more precise and increasingly accurate quantification of water availability, rights, and uses based on real-time field sensors. Initially, the tool could identify data gaps and inaccuracies that need to be resolved, and could eventually integrate remote sensing, groundwater interactions, and return flow information. The model could be used to predict how to allocate water between riparian and appropriative water right holders with restricted flow availability throughout a basin. The tool incorporates the following concepts: (Lund et al., 2014)

- All riparian right holders have equal priority, with water shortage allocated as an equal proportion of normal diversions for all riparian users within each sub-basin (i.e., shortage is allocated among riparian water right holders by restricting certain withdrawals to a certain proportion of normal usage in a basin);
- Appropriative users as a class have a lower priority than riparian users, shortages allocated among appropriative water right holders are made strictly by water right seniority (i.e., senior appropriative water right holders have a higher priority in access to water, but may experience shortage due to reduced flow); and,
- Environmental flows are assumed to be a fraction of total water availability within a basin (about 20 percent of the flow) and non-consumptive.

In the face of sustained drought conditions and more frequent occurrences of drought, the SWRCB needs a consistent, reliable, and timely method for allocating and prioritizing water use (Lund et al., 2014). The DWRAT is one way to equitably and efficiently make curtailment decisions, especially if it incorporates the suggestions for future development included in the October 2014 UC Davis Center for Watershed Sciences report. Use of the tool will identify data gaps and force decision-makers to establish procedures for prioritizing water use for the environment, public health and safety, and water quality.



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## 4. Water Transfers

Water transfers are voluntary agreements, proposed by willing buyers and sellers, which result in a temporary, long-term, or permanent change in the type, time, and/or place of use of a water right. In a typical water transfer, the seller relinquishes its right to a specified quantity of water to a buyer who purchases the water for a higher-value use, such as the irrigation of permanent crops or to meet urban water demands. Such transfers occur at both local and distant scales, and are executed for agriculture, municipal, industrial, or environmental beneficial uses. In California, transfers of surface water rights are an especially important tool for managing drought, and will become more important as growing demand stresses limited available supplies.<sup>47</sup>

Recognizing the importance of water transfers to drought management, Water Leaders' mentors were asked: ***what mechanisms need to be established to facilitate water transfers?*** Generally, mentors suggested solutions involving better planning, a better market structure, improved data and information, or a combination of all three, and believed that a good examination of the current water transfer market structure was needed.

This section focuses on transfers that utilize state and federal facilities to move surface water from buyer to seller and will discuss background information on how the current system of water transfers works, the regulatory constraints preventing transfers from being effectively utilized during drought, and provides recommendations for improving the water transfers system.

### 4.1. Transfer Mechanisms

Water can be transferred throughout the state via the following mechanisms and processes:

- Groundwater substitution: Sellers forego the use of surface water under their water right and substitute the supply with water pumped from the ground.
- Crop idling, shifting, or land fallowing: The seller opts to not plant (and thus not irrigate) a portion of his or her agricultural land during the farming season and the foregone water right (the unused surface water) is diverted by the buyer to be used elsewhere. No groundwater pumping would occur as a condition of the crop idling and/or land fallowing. Water savings achieved through a shift to lower-water use crops may also be transferred.
- Reservoir reoperation: Water is made available for transfer when stored surface water is released in excess of what would be released annually under normal operations. The water must be released at a time when it can be captured and/or diverted downstream by the buyer, which might require the seller to temporarily store water in the reservoir.

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<sup>47</sup> In areas where groundwater rights are adjudicated, the transfer of groundwater rights from one user to another, can also serve as an important water management tool, but such transfers are subject to the specific terms of the groundwater adjudication and are not covered as part of this report.

- Water conservation: The buyer pays for technology and equipment improvements that increase efficiencies for the seller (e.g., irrigation or industrial efficiencies), thus reducing the water demand of the seller. The volume of water conserved is transferred to the buyer.

## 4.2. Types of Transfers

The three general types of water transfers are categorized by the duration of transfer: permanent, long-term and short-term. Permanent transfers are the transfer of the water right itself. Long-term and short-term transfers involve transferring use of the water under the right, not the right itself. **Figure 3** displays a historical account of water transfers in California over the last 30 years, by type and volume.

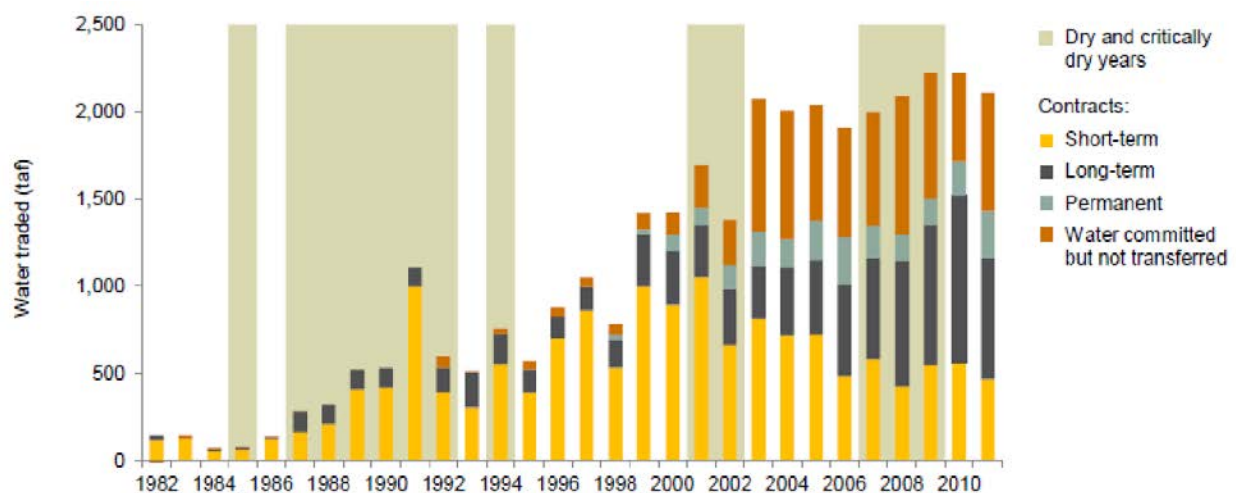


Figure 3: History of Water Transfers in California

Source: Hanak and Stryjewski, 2012.

Permanent and long-term water transfers generally reflect the shift in the local economy from agriculture to urban use. Several long-term transfers have occurred, however, in regions where agriculture remains central to the local economy. The most notable long-term surface water transfers have occurred in Southern California to help meet the demands of more than 19 million residents as follows:

- Transfers from Coachella Valley Water District (CVWD) to the Metropolitan Water District (MWD) for a term of 68 years, where MWD takes CVWD's allocation from the SWP in exchange for providing them with water from the Colorado River;
- Transfers of 30,000 to 120,000 acre-feet per year from the Palo Verde Irrigation District (PVID), which sits along the Colorado River, to MWD for a term of 35 years, where MWD pays for the rotational fallowing of land in the PVID's service area in exchange for the transfer of the water conserved; and
- Transfers of up to 300,000 acre-feet per year from the Imperial Irrigation District (IID) to the San Diego County Water Authority (SDCWA), MWD and CVWD for a term of up to 75 years, wherein IID is fallowing land, improving agricultural irrigation efficiency, and reducing water

losses from water conveyance facilities and transferring the conserved water for urban use in the buyers' service areas.

Transfers such as this can secure water supplies to support long-term regional growth, and are an important tool for managing water in times of drought. However, local economic impacts of water transfers must be taken into account, such as the loss of jobs that might occur due to large scale following. Some of the aforementioned transfers implemented successful economic mitigation strategies. These strategies can inform future transfer mitigation strategies for other communities and are further discussed in Section 4.5.3.

Short-term, or temporary transfers are those that occur over a period of one year or less, and are the most common type of transfer executed in California. Short-term transfers are particularly useful during times of drought but are often a costly, time-consuming, and contentious process that can prevent the rapid realization of transfers that are needed in times of drought. The complexities of water transfers lie in the analyses required to quantify the potential impacts to third parties (e.g. downstream water rights), the environment, and economies in the region where the water transfer originates. Further complicating the process are the number of regulatory agencies often involved in the review and approval of any given transfer, including: local and regional water districts, county governments, the SWRCB, DWR, USBR, the California Department of Fish and Wildlife (CDFW), the US Fish and Wildlife Service (USFWS), and the National Marine Fisheries Service (NMFS).

### 4.3. Regulatory Constraints on Water Transfers

Regardless of the transfer type, mechanism, or duration, the ability to transfer water is constrained by certain limitations such as the location of the buyer and seller, the specific facilities needed to convey the water, and the cumbersome regulatory process required to obtain approval. Intra-basin transfers (those between buyers and sellers within the same basin) are subject to the lowest level of regulatory review. Intra-basin transfers usually require no change in the point of diversion and minimal change to the place and manner of use. Transfers from the northern part of the state to the southern, called through-Delta transfers, are far more complicated. Through-Delta transfers are subject to many layers of regulatory approval due to the change in point of diversion and use, the required use of federal and/or state facilities to move the water, and the potential for environmental and economic impacts from moving water through and out of the Delta.

SWRCB approval is generally required for all transfers of post-1914 water rights involving a change to the permitted point of diversion, place of use, or purpose of use. Transfers requiring use of CVP or SWP facilities to convey water from buyer to seller must also receive approval from USBR or the DWR, respectively. **Figure 4** depicts the complexity of determining the relevant regulatory approvals and the process for obtaining approval by the appropriate agency when conveying transfer water through CVP or SWP facilities.

AGENCY	DWR	USBR	SWRCB
<b>How to start agency process?</b>	<ul style="list-style-type: none"> <li>• Contact DWR with transfer proposal</li> <li>• Agree to cost reimbursement</li> </ul>	<ul style="list-style-type: none"> <li>• Send letter of request for transfer with information on seller, buyer, type, amount, and timing of transfer</li> <li>• Reclamation sends letter back with cost reimbursement requirements</li> <li>• Agencies agree to move forward</li> </ul>	File petition for temporary water transfer (1 year or less) or for long-term transfer under applicable provisions of the Water Code
<b>What technical information is required in submittal packages?</b>	Information as listed in Water Transfer Technical Information (crop/shifting/cropland idling and groundwater substitution)	Information as listed in <ul style="list-style-type: none"> <li>• CVPIA Criteria Checklist for a complete written Transfer Proposal</li> </ul> Water Transfer Technical Information (crop/shifting/cropland idling and groundwater substitution)	Information as required for the type of transfer being sought by the appropriate SWRCB form
<b>What regulatory compliance is required?</b>	CEQA (DWR requires transfers to complete CEQ documentation)	NEPA and ESA	Temporary water transfers are exempt from CEQA. Long-term water transfers require CEQA compliance
<b>What is acceptance of transfer proposals based on?</b>	<ul style="list-style-type: none"> <li>• Complete Submittal Package</li> <li>• Determination of real water and Project operation considerations</li> <li>• Water Code Section 1810 – use of water conveyance facility is to be made without injuring any legal user of water and without unreasonably affecting fish, wildlife or other instream beneficial uses; the overall economy; or the environment of the transferor area</li> <li>• CEQA</li> </ul>	<ul style="list-style-type: none"> <li>• Complete Submittal Package</li> <li>• Determination of real water and Project operation considerations</li> <li>• CVPIA section 3405(a) – No adverse impacts on CVP contractors, water supply or operations, fish and wildlife obligations, and groundwater conditions in the transferor area</li> <li>• NEPA – No adverse environmental impacts</li> </ul>	Transfer shall not injure any legal user of the water and not unreasonably affect fish, wildlife or other instream beneficial uses

Figure 4: Agency Water Transfer Process

Source: recreated from *DRAFT Technical Information for Preparing Water Transfer Proposals (Water Transfer White Paper)*. Prepared by DWR and USBR, Mid-Pacific Region. November 2014. Key: NEPA – National Environmental Policy Act; ESA – Endangered Species Act; CEQ – Council on Environmental Quality.

#### 4.4. Recent Improvements to the Transfer Approval Process

To improve and standardize the water transfer application process for short-term transfers requiring conveyance through state or federal facilities (i.e., through-Delta transfers), DWR and USBR developed joint criteria and technical guidance documents specifying the information that must be provided in a water transfer proposal, regardless of the facility owner.<sup>48</sup> SWRCB approval, if required, is still a separate process and the environmental review procedures remain inconsistent between the agencies despite this recent DWR-USBR consolidation. Although the specific legal authorities used by each agency to review

<sup>48</sup> DWR and USBR, “Draft Technical Information for Preparing a Water Transfer Proposals”. February, 2013

and approve the transfer proposals differ, information required for the approval process is similar.<sup>49</sup> Basic determinations used to evaluate and approve water transfer proposals that use state and/or federal facilities are as follows:

- Demonstration of the amount of water available for transfer (known as a Real Water Determination);
- Availability of storage and conveyance capacity to move the water during the specified transfer period;
- Demonstration of no injury to other legal users of water;
- Demonstration that there will be no unreasonable unmitigated impacts to fish and wildlife or other instream beneficial uses (in terms of supply and quality);
- Demonstration that there will be no unreasonable unmitigated impacts to the economy of the area where the water transfer is transferred from (for crop idling/shifting transfers);
- Demonstration that there will be no unmitigated impacts to a groundwater basin and legal users therein (for groundwater substitution transfers); and
- Development of a monitoring program to evaluate impacts of the transfer while it is in process.

It is necessary for the parties involved in a proposed water transfer to provide these data and time-intensive demonstrations. Unfortunately, the needed data are often unavailable or unreliable. Further, criteria for measuring and mitigating economic and environmental impacts are not standardized. Thus, transfers are vulnerable to challenges through the CEQA and/or NEPA process, and so demonstrating no impact can be difficult. In the case of short-term transfers, the opportunity to execute the transfer and move available water to a high-valued use can be missed if making the required demonstrations and completing environmental review exceeds the window of time available to transfer the water.

#### 4.5. Recommendations for Improving the Transfer Process

As discussed in Section 2 of this report, Australia was able to develop a streamlined water transfer market as a result of a series of aggressive reforms that clearly quantified water entitlements (water rights), established a process to determine the allocations of water available under an entitlement in any given year, required metering and monitoring of all water diversions and uses, permitted real-time viewing of water rights prices and trades, and provided public access to the data needed to set transfer prices. These programs have even enabled state-held environmental water entitlements to participate in the transfer market, providing a mechanism to raise money for the environmental water program.

Thus, moving toward an efficient water transfer market in California requires adopting similar practices that enable a transparent system in which buyers and sellers know the rules for participation and can

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<sup>49</sup> The State Board must demonstrate consistency with beneficial use provisions, DWR must satisfy Water Code Section 1810 criteria, and USBR must satisfy CVPIA Section 3045(a) criteria.

execute transactions on a rapid time scale (weeks instead of months). There are a number of policy changes and financial investments California must take in order to begin to make this a reality:

- Perform programmatic environmental reviews and approvals for short-term water transfers over a long period of time;
- Improve data collection and monitoring protocols to quantify water rights available for transfer and to measure impacts to other;
- Develop standard practices for measuring and mitigating economic impacts; and
- Establish mechanisms to purchase water for the environment.

#### 4.5.1. Establish Long-term Environmental Review and Approval for Short-Term Transfers

An essential component of water transfer applications is the required environmental review process, which must fully demonstrate NEPA and/or CEQA compliance, and account for the economic, social, and environmental impacts associated with a given transfer. In 2015, the U.S. Department of the Interior, USBR and the San Luis & Delta-Mendota Water Authority (SLDMWA) finalized a joint environmental impact statement/environmental impact report (EIS/EIR) evaluating the impact of establishing long-term pre-approval (10 years) for short-term water transfers of CVP and non-CVP water from north of the Delta to CVP contractors south of the Delta using federal, state, and local facilities. The purpose of the EIR/EIS is to facilitate, approve, and expedite voluntary transfers in order to provide greater flexibility in meeting water demands during periods of shortage.

If approved, the EIS/EIR will only apply to water transfer applications involving the parties listed in the EIS/EIR, having identified themselves as willing buyers or sellers for short-term water transfers. Willing sellers represent several irrigation districts, mutual water companies, reclamation districts, local water agencies, and private farms and ranches from Central Valley watersheds north of the Delta. The maximum combined potential annual transfer amount from the sellers' available supply for transfer is approximately 500,000 acre-feet.

The EIS/EIR alternatives are formulated to reflect the types of available water transfer mechanisms (e.g., cropland idling/shifting, groundwater substitution, reservoir release, etc.). The seller is required to demonstrate that no unmitigated impacts will occur as a result of a transfer, based on the following alternatives that meet the objectives of short-term water transfers:

- Alternative 1: No Action
- Alternative 2: Full Range of Transfers (Proposed action)
- Alternative 3: No Cropland Modifications (i.e., all transfer types except changes to cropland)
- Alternative 4: No Groundwater Substitution (i.e., all transfer types except groundwater substitution)



Each of these alternatives were evaluated for potential impacts to water supply, water quality, air quality, wildlife, regional economics, and environmental justice, among other factors. Impacts as a result of water transfers that are considered “beneficial” include: increased water supply available in CVP and non-CVP facilities and reservoirs, reduced groundwater pumping in buyer service areas, improvements in air quality in the seller service areas that result from cropland idling, and revenues generated from water transfer for both sellers and buyers. Conversely, impacts considered to be significant (i.e., negative) include the effects of increased groundwater pumping in seller service areas and the reduction in farming of prime agriculture land. The EIS/EIR includes mitigation measures for these potential impacts, such as a groundwater monitoring program to evaluate effects on land parcels using the classifications identified in the Farmland Mapping and Monitoring Program (FMMP).

This long-term EIS/EIR covers a 10-year period, from 2015 to 2024, and is expected to expedite voluntary short-term water transfers to provide immediate relief as needed. This programmatic approach of identifying transfer participants that understand the impacts and mitigation costs in advance of executing short-term transfers serves as a model for developing a larger-scale water market. Expanding this model state-wide would improve California’s ability to move water in times of shortage and surplus.

#### 4.5.2. Improve Data Collection and Retention

An issue in the overall management of water throughout the state is determining the quantity of available surface water and groundwater with reasonable accuracy. Water rights in California have been administered by the SWRCB for more than 100 years; however, as water demand has grown over time many in the water management community have come to believe that the accuracy and completeness of existing water rights information are of poor quality. Currently, water agencies manage and analyze data independently with little crossover among them. The separate paths taken by different agencies to manage data and conduct in-house analyses are an inefficient way to manage California’s water.

In order to quantify the impacts resulting from water transfers, accurate information specific to groundwater management and agricultural practices is necessary. Both efforts rely on up-to-date and reasonable information to support several crucial analyses. For example, groundwater well information collected over several years would provide sufficient information in determining if ample water can be supplied in a substitution transfer of surface water. Similarly, data specific to crop information and the associated consumptive water used to irrigate these crops can be monitored to more precisely establish the quantity of water that can be transferred if fallowing or crop shifting were to occur.

***It is essential that the collaboration occur between federal, state, and local agencies to better track and regulate all water management activities.***

For system-wide efforts, it is essential that the collaboration occur between federal, state, and local agencies to better track and regulate all water management activities, as was discussed in Section 3.4 of this report. Water measurement and water monitoring, according to some mentors, is where private industry has the greatest potential to help California better manage its water supplies. Inter-agency databases accessed by common software platforms would be an initial step forward to improve data quality and reliability. The

robustness of available information technologies, once implemented, can easily centralize databases among multiple users while further developments in technology will only improve over time. However, further challenges will be realized if the status quo of current data management and analyses conducted using different approaches by self-governing agencies persists, and will arguably counteract the common goal to efficiently manage California's water under any circumstance.

#### 4.5.3. Expand Economic Mitigation Efforts

As mentioned in Section 4.2 water transfers may impact the economy in the area where the water is transferred from by reducing the number of jobs available for farm workers and reducing the economic output of other local services used by the farm (e.g. equipment, shipping, etc.). This in turn reduces the amount of money that can be reinvested in the local economy. Solutions to California's water market need to recognize and mitigate for these problems. California should invest in developing practices for measuring and mitigating economic impacts so that these practices can be incorporated into a mitigation program within the programmatic EIS/EIR solution.

The continued economic vitality of any region hinges on reinvestment in the community at large. One way is to incentivize farmers who sell water and fallow land to use the money they earn to invest in other local industry or to invest in on-farm improvements. Water transfer income may allow a farmer to invest in farm technology upgrades, increasing yield and decreasing water use in future growing seasons. Making these technologies available from local sources will serve to keep local monies local.

#### 4.5.4. Establish an Environmental Water Fund

In 2014 and 2015, notable emphasis has been seen in media coverage of the drought regarding the implied or explicit "farm versus fish" competition for water. Environmental flow requirements linked with climatological variability make it hard to establish when and where water will be needed most to protect aquatic and riparian habitat throughout the state.

Transferring water from agricultural or urban uses for environmental flows is not financially beneficial for the seller because the money to support such flows is limited. Generally, it comes from three sources: environmental groups with limited resources, industries that are required to provide such flows as a result of a lawsuit, or the government in certain instances such as the CVPIA, which provides certain water rights for refuges. In California, government regulations determine environmental flows, rather than water rights or acquisitions specifically for the environment.

The state could take a more active role to promote environmental flows by establishing water rights for instream uses and developing an environmental water fund or endowment for environmental flows, as is further discussed in Section 5 of this report. By establishing water rights for instream uses, the state can actively transfer water between environmental uses, establish a value for environmental flows and generate revenue for environmental restoration when there is water available for sale. Oregon, Washington, and Texas have all established water trusts for this purpose whereby state agencies can

establish new water rights and existing water rights holders can voluntarily lease, sell, or donate part or all of their water rights for instream uses.

In Australia, the *Water Act 2007* established the Commonwealth environmental water portfolio by acquiring water entitlements for environmental flows. Following the Millennium Drought, the entire Australian water rights system was overhauled and redistributed. As part of the redistribution, the environmental water portfolio was established, currently comprised of both entitlements and allocations that have been accrued since the entitlements were acquired (Australia, 2011). As part of the Basin Plan process (analogous to the Basin Plan's developed under the Regional Water Quality Control Boards) an environmental watering plan was developed and describes how environmental assets are protected and restored. The portfolio is managed by an independent statutory position within the government known as the Commonwealth Environmental Water Holder (Holder). Active management of the environmental flows includes delivery of water to environmental sites, storing and carrying over water to future years, and trading water. When funds are available and demand is present, the holder may purchase water for the portfolio. When there is sufficient water to meet annual environmental needs and there is no carryover storage available, the Holder may trade (sell) the water and use the funds to purchase other allocations and/or entitlements that improve the capacity of the portfolio to meet environmental goals in the long-term (Australia, 2011). Establishing a State Water Holder, and funding to support it, would be an initial step toward improving environmental flow management in California.



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## 5. Financing Environmental Water

### 5.1. Introduction

Many of California's species and ecosystems, already stressed before the drought by reduced and degraded habitat, lack the built-in resilience to withstand additional drought-related stress. The Delta smelt, which is referred to as the "Icon of California water wars" became almost extinct, or "functionally extinct" in 2015 (Kay, 2015; Ruyak, 2015). In 2014, water flows in the Sacramento River warmed sufficiently to cause a collapse of naturally spawned and federally endangered winter-run salmon (Quinton, 2015). In an unmodified system, salmon and Delta smelt would have higher average populations — with massive numbers of fish in wet years and low numbers in dry years — a diversity of life history types and high wet year populations providing resilience during drought.

The following sections explore means to set aside water, or funding for water purchases, for the environment in times of drought. However, funding long-term environmental flow purchases could take decades to implement. Other short-term mechanisms to obtain water for the environment during drought, such as combining environmental needs with needs of the economy in multi-benefit projects are also discussed. Multi-benefit projects can increase the resilience of the environment to better withstand drought conditions, and avoid potential cutbacks due to environmental regulations and environmental water needs.

### 5.2. What is Environmental Water?

Environmental water is defined as: water flowing in "wild and scenic" rivers, water to maintain rivers and streams for aquatic species, water for wetlands and refuges, and water to maintain water quality standards for other water users (Mount et al., 2014).

Based on DWR's calculations, California's water budget, all of the potentially available water in the entire state's hydrologic system, is roughly 50 percent environmental, 40 percent agricultural, and 10 percent urban. Several North Coast rivers are federally designated wild and scenic, and thus that water cannot be used for any other purpose and in fact, few other purposes are available in those watersheds due to the extreme terrain and geographic distance from population centers (Freeman, 2014). Excluding the North Coast river flows, the rest of California's water (the water available for use through most of California) is shared by approximately 33 percent environmental, 53 percent agricultural, and 14 percent urban (Mount et al., 2014).

***California's water budget is roughly 50 percent environmental, 40 percent agricultural, and 10 percent urban. (DWR)***

Several environmental water uses are legally designated as "beneficial uses" in California. These uses include fish and wildlife preservation and enhancement, recreational, water quality, or heat control.

California lacks a comprehensive, statewide, long-term program to fund environmental flow purchases. Existing funding sources for environmental water are generally small or only periodically funded. The state and federal governments have some small funding sources (less than \$1 million per grant) that could be used for environmental water programs. These include: the CVP Habitat Restoration Program, the CVP Conservation Program, United States Department of Agriculture's Natural Resources Conservation Service (NRCS) Environmental Quality Incentives Program, NRCS Floodplain Easement Program, NOAA Fisheries Restoration Center grants, National Park Service Land and Water Conservation Fund, DWR's Integrated Regional Water Management program grants, California Natural Resources Agency River Parkways Program, NRCS Agricultural Conservation Easement Program, and the SWRCB 319(h) Non-point Source Grant Program. Some of these and other funding sources are discussed as case studies below.

### 5.3. Recent Challenges in Providing Environmental Water

The Public Policy Institute of California (PPIC) reports that the state's water infrastructure funding gap is on the order of \$2 billion to \$3 billion annually. This estimate includes \$400 million to \$700 million for ecosystem support and endangered species; and \$200 million to \$300 million for integrated water management. Compared to current spending of roughly \$30 billion per year in the water sector, California needs to raise an additional 7 percent to 10 percent — or \$150 to \$230 per household — annually to fill this gap (Hanak et al., 2014).

In recent history, California has repeatedly used bond measures for financing water system capital improvements. Propositions 50 (2002), 84 (2006), and 1 (2014) are recent examples. This approach, which is subject to voter attitudes, is irregular and unreliable. Relying on general obligation bonds — subject to inflation — for financing infrastructure can also increase the cost of borrowing and decrease funds for other purposes. Long-term, non-bond funded financing for environmental water projects is greatly needed.

The Governor's 2013 California Water Action Plan commits the SWRCB and the CDFW to administrative actions to enhance flows in at least five stream systems that support critical habitat for anadromous fish, yet lacks acknowledgement of any problems related to long-term funding for environmental flows (Brown, 2014). This omission suggests a continuation of the state's current regulatory approach to instream flows. Instream flow regulations lack immediate effect during drought for a number of legal and administrative reasons. Regulations alone fail to leverage the efficiencies of a market economy, which could help reduce controversy by compensating those who give up water.

### 5.3.1. Provide Appropriative Water Rights to the Environment

Several regulatory and litigious mechanisms exist for obtaining environmental flows. Environmental flow requirements of various kinds are currently established for salmon and other anadromous fish, the delta smelt, migrating waterfowl, wild and scenic rivers, water quality, and salinity. The SWRCB could use the authorities identified below to improve environmental flows.

Possible methods include:

- Article X, Section 2 of the California Constitution requires reasonable and beneficial uses of water, and prohibits waste or unreasonable use, regardless of water right (riparian, pre-1914, appropriative, etc.). This could be used by the SWRCB as justification to curtail unreasonable or wasteful water uses, and thus increase water for the environment.
- Under the Public Trust Doctrine, the SWRCB retains a duty of continuous supervision over appropriated water, and must consider public trust either when making allocations or later when public trust uses are recognized (*National Audubon Society vs. Superior Court* (1983)). This doctrine was used to reduce diversions by the Los Angeles Department of Water and Power from Mono Lake's tributary streams. More recently, this doctrine was used in *Environmental Law Foundation vs. SWRCB*<sup>50</sup> to state that Siskiyou County must consider the public trust when issuing groundwater well permits. The SWRCB could use Public Trust in the future to define required environmental flow minimums, or even to award the environment an appropriative water right. California Fish and Game Code 5937 states that "The owner of any dam shall allow sufficient water ... around or through the dam, to keep in good condition any fish that may be planted or exist below the dam." A federal court ruled in *Natural Resources Defense Council v. Rogers* (2004) that USBR violated this code, leading to a court settlement that created the San Joaquin River Restoration Program. This approach could be used by other litigants to increase environmental flows below dams.
- The federal and state Wild and Scenic Rivers Acts preserve certain rivers in free-flowing condition (i.e., no dams) for their outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values. Wild and scenic designation was used in the 1970s to prevent construction of the Dos Rios Dam, which would have impounded the Eel River on California's North Coast and diverted water to the SWP (Simon, 2001).
- The Endangered Species Act (ESA) prohibits any public agency or private individual from "taking" an endangered species without a permit. "Take" means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct," and includes "significant habitat modification or degradation" (*Babbitt v. Sweet Home* - 515 U.S. 687 (1995)). The SWP's and CVP's Delta pumps are currently restricted as a requirement in their respective biological opinions issued for the Delta smelt and Chinook salmon. While not directly increasing flows, the net effect of ESA biological opinions can be

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<sup>50</sup> *Environmental Law Foundation et al. v. SWRCB et al.* Superior Court of California, Sacramento County. Case No. 34-2010-80000583 <http://www.envirolaw.org/documents/ScottOrderonCrossMotions.pdf>

to increase water for environmental purposes. This action is funded by litigants and the sued agencies.

- The Porter-Cologne Water Quality Control Act regulates both point (e.g., power plant effluent) and non-point (e.g., agricultural or stormwater runoff) sources of pollution that discharge to waters of California, including both surface water and groundwater. The SWRCB is currently updating the Bay Delta Water Quality Control Plan, which includes instream flow objectives for the San Joaquin River watershed to benefit downstream beneficial uses (SWRCB, 2015c). The Plan proposes a range of unimpaired flows from 20 to 60 percent from San Joaquin River tributaries, with a SWRCB staff preference of 35 percent (SWRCB, 2012).

As these examples illustrate, lawsuits and regulations may not provide the funding necessary to secure water for the environment. However, regulations and litigation are tools that are used by the environmental justice community because funding to purchase an environmental appropriative water right from existing water users is unavailable. Money could be a great motivator to balance water supply

***Regulations and litigation are tools that are used by the environmental justice community because funding to purchase an environmental appropriative water right from existing water users is unavailable.***

and demand, much as the market economy does for other goods and services. The development of a transparent and easy-to-use market for environmental flows, which would use existing mechanisms to increase environmental flows and lands, is a chief recommendation of this report as it is also covered in Section 5.4. This market will require identification of a long-term consistent funding source for environmental flows. It can use existing mechanisms and programs to effectuate the transfer of water or purchase of water for environmental uses on a primarily permanent basis, with some small spot market water purchases.

### 5.3.2. Use Proposition 1 to Fund Voluntary Programs to Dedicate Water to the Environment

Several voluntary programs exist that allow water users to give up water rights for environmental uses, or to manage existing water for environmental benefits. Funding currently available through the Water Quality, Supply, and Infrastructure Improvement Act of 2014 (Proposition 1) can be used with these voluntary programs to permanently increase environmental flows, as described below.

- California Water Code Section 1707 allows any water user (appropriative, riparian, or other) to petition the SWRCB and dedicate a portion of their right to instream use, for preservation or enhancement of “wetlands habitat, fish and wildlife resources, or recreation in, or on, the water.” This mechanism to permanently dedicate instream flows has been in effect since 1986, and is currently being used to obtain more flow in the Scott and Klamath Rivers (SWRCB, 2015b).
- CDFW has several Landowner Incentive Programs to help manage wetland habitat. More than two thirds of wetlands in the Central Valley are privately owned, for either rice farming or



duck hunting. The Permanent Wetland Easement Program pays willing landowners approximately 50-70 percent of their property's fair market value to purchase farming and development rights in perpetuity, and allows wetlands to naturally form along waterways such as the Sacramento River (CDFW, 2015). The Waterfowl Habitat Program, which includes more than 29,000 acres of waterfowl habitat in the Tulare Basin Grasslands, Suisun Marsh, and Sacramento Valley pays private landowners \$20 per acre annually (\$30 per acre in the Tulare Basin) for ten years to create waterfowl habitat (CDFW, 2015). Unfortunately, this program is currently oversubscribed and underfunded.

### 5.3.2.1. *Proposition 1 Case Study: Funding for the Environment amidst Historic Drought*

California's water and environmental funding has generally rolled from bond measure to bond measure in response to the crises of the day. This is not a sustainable approach, but at least helps move the state toward a more resilient water management system. In November 2014 amidst a critical drought, California voters passed Proposition 1 – a \$7.5 billion bond measure. The bond measure provides funds for improving long term watershed restoration. \$1.495 billion is eligible for projects to improve watershed restoration and, thereby, improve ecosystem resilience. **Table 2** below outlines the bond's watershed restoration funds.

*Table 2: Proposition 1 Funding for Watershed Restoration*

Spending category	\$ Amount
<b>Total bond funds</b>	<b>\$7.545 billion</b>
Watershed Restoration	\$1.495 billion
\$327.5 million for specific watersheds	
\$200 million for enhanced instream flows	
\$100 million for urban creeks in Southern California	
\$20 million for multi-benefit urban watershed projects	
\$475 million for water related prior state commitments	
\$285 million for watershed restoration statewide	
\$87.5 million for Delta water quality, restoration and fish	

Funds granted by the Wildlife Conservation Board's (WCB) Stream Flow Enhancement Program from the \$200 million provided in Proposition 1 will be focused on providing and protecting enhanced streamflow, especially in those streams that support anadromous fish; special status, threatened, endangered or at

risk species; or provide resilience to climate change. The Wildlife Conservation Board defines enhanced streamflow as a change in the amount, timing or quality of the water flowing down a stream, or a portion of a stream, to benefit fish and wildlife (WCB, 2015). Potential projects include change of use petitions (i.e., 1707 dedications) to benefit fish and wildlife, forbearances of water rights, permanent and long-term (not less than 20 years) acquisition of water from willing sellers, acquisition of lands that provide water, reconnecting flood flows with restored floodplains, water efficiency, gauging, and studies.

The funds are being distributed through a competitive grant process, specifically for long-term, permanent instream flow dedications or long-term seasonal transfers. This approach is intended to benefit the environment in the long run by avoiding temporary price effects to the water spot market, which was the downfall of CALFED's Environmental Water Account (EWA) (League of Women Voters, 2015). Over the EWA's seven-year operation, 43 percent of the spot market was Environmental Water Account purchases, at an average price of \$96 per acre-foot (Lusvardi, 2015). The EWA drove up prices for water districts and discouraged diversification of water supplies. Consider the impact if the EWA were operating today, with current spot market rates at \$700–\$2,000 per acre-foot (Kasler, 2015b; Krieger, 2014).

### 5.3.3. Enact Locally Controlled Environmental Surcharges

Water districts could add environmental surcharges to their existing water rates, but such charges may be subject to the legal hurdles surrounding water rates, as described in Section 6 of this report. Such surcharges — an additional fee on each acre-foot — would encourage conservation, and would be paid by water users into an environmental fund. The fund would then be spent by the local water district or Integrated Regional Water Management (IRWM) group. Many see this as a promising model to fund environmental water or habitat enhancement purchases across the state (Hanak and Stryjewski, 2012).

SWP users could also pay an additional fee into a managed fund, which would be administered by a Watermaster (similar to CVPIA management) to purchase water for environmental priorities. This approach, though, requires state legislation to establish such a fund and allow the surcharges. Similar surcharges could be added to chemicals (e.g., fertilizers, pesticides), road usage (fuels), and hydropower to fund improvements to ecosystems impacted by related human activities (Hanak and Stryjewski, 2012). This approach has not yet been tested in California.

The Sonoma County Water Agency adds a surcharge (currently \$81 per acre-foot) to water sold to retail agencies. The surcharge funds ecosystem enhancement on the Russian River for Coho salmon. This model has also been used as part of funding the San Joaquin River Restoration Program, wherein Public Law 111-11 implemented a \$7 per acre-foot surcharge on water sales to the Friant Division that goes to the San Joaquin River Restoration Fund for use in implementing the court Settlement and Restoration Program. Finally, the San Francisco Public Utilities Commission also charges its retail agency customers and its own customers to support environmental resources in the Tuolumne River watershed and within local Bay Area watersheds (Hanak et al., 2014).

While such models do exist, they are uncommon. Publicly owned water utilities are governed by boards, whose members are often elected precisely because they oppose such fee increases (California Public Utility Commission (CPUC), 2010). Fear of Proposition 218 challenges add to water districts' reluctance to raising fees for conservation, efficiency, or environmental programs. Thus, the regions in which

environmental surcharges have succeeded tend to have higher average income and greater social value for the environment (such as Sonoma County and San Francisco).

The alternate yet more controversial option of a public goods charge added to all retail water sales in California for financing environmental water projects would more accurately depict the true cost of water to consumers, and thus encourage efficiency. Funded projects would also provide a broad public benefit. A fee per acre-foot of water sold would provide a small price signal to customers, thus encouraging conservation and water use efficiency (CPUC, 2010). California does have authority to require that water districts implement such a fee, but doing so would require legislation to overcome Proposition 13 requirements as discussed in Section 5. This approach would bypass potential local resistance to fee increases and spread the costs of environmental protection across all water users in the state. Public goods charge funds could be managed through Joint Power Authorities created within IRWM regions. Individual utilities and water districts would collect fees through the existing billing process, and then pass the revenue on to the Joint Power Authorities. Similar to SGMA, the SWRCB could serve as a backstop, with the authority to take over management of public goods charge funds for any region that does not create an authority to manage the funds, or if funds management does not meet DWR's established criteria.

***Regions in which environmental surcharges have succeeded tend to have higher average income and greater social value for the environment.***

### *5.3.3.1. Case Study: Central Valley Project Improvement Act*

As previously discussed in Section 3.4.2 the CVPIA, passed in 1992, established environmental protection as a purpose of the USBR's CVP — the Bureau's major water supply project in California. Key elements mandated in the CVPIA include 800,000 acre-feet of water annually dedicated to fish, wildlife, and habitat restoration (Section 3406(b)(2)), and to secure water supplies for Central Valley wildlife refuges (Section 3406(d)). CVPIA requires a baseline "Level 2" water supply for refuges. On average, USBR delivers 91 percent of this Level 2 supply (USBR, 2013). CVPIA also quantifies ideal "Level 4" supplies. The CVPIA has never met the refuges' ideal Level 4 water supply, due to lack of funding for both water purchases and basic refuge operations and maintenance. In 2011, USBR was able to deliver 78 percent of the incremental Level 4 supply, but the overall average from 2002-2013 was only 47 percent (USBR, 2013).

The Restoration Fund, which pays for CVPIA implementation, is financed by fees collected from contractors receiving water from the CVP system (between \$7 and \$40 per acre-foot) (USBR, 2015a). The CVPIA spends \$50 million per year from the Restoration Fund. Spending priorities vary from year to year, but include water purchases for federal refuges that provide waterfowl habitat (Mooney, 2015a). The 2015 CVPIA Annual Work Plan includes \$2.9 million for the purchase of additional instream flows for refuges, and nearly \$29 million for basic refuge water supply infrastructure projects (USBR, 2015b). USBR estimates it would take hundreds of millions of dollars to build the infrastructure necessary for refuges to obtain full Level 4 supplies (Mooney, 2015b).

### 5.3.3.2. *Case Study: Energy & Greenhouse Gas Models*

In 1996, a statewide electricity public goods charge was passed as part of energy sector deregulation, which has effectively funded many regional and local energy conservation and efficiency programs (CPUC, 2010). California has maintained consistent per-capita energy consumption over the two decades since the charge was passed, while national energy consumption increased by 150 percent (CPUC, 2010). Ten years after the public goods charge was passed, Assembly Bill (AB) 32 authorized the collection of fees from sources of greenhouse gases. In 2010, the California Air Resources Board adopted regulations to administer the greenhouse gas program, collecting annual fees from large sources of greenhouse gases (e.g., oil refineries, power plants, cement plants, and other industrial sources). These two examples of public goods charges or fees could be applied to water, and would provide funding for critical environmental infrastructure.

### 5.3.4. **Manage groundwater for both the environment and the economy**

In 2014, California passed landmark legislation to transform the state's approach to groundwater management. SGMA establishes a statewide framework for managing groundwater, requiring the formation of local or regional groundwater sustainability agencies (GSAs) with the authority to develop and implement groundwater sustainability plans (GSP's) over the next 20 years. According to the legislation, "It is the policy of the state that groundwater resources be managed sustainably for long-term reliability and multiple economic, social, and environmental benefits for current and future beneficial uses." GSAs are required to consider the interests of all beneficial uses of groundwater (including environmental uses) and surface water, if there is a hydrologic connection between surface water and groundwater bodies (SGMA §10723.2).

Groundwater recharge benefits the environment by setting aside surplus water that is available in wet years for environmental and all water users in the future. Filling groundwater aquifers for use in droughts

#### ***Filling groundwater aquifers for use in droughts can leave more surface water in rivers and streams to support habitat and species.***

can leave more surface water in rivers and streams to support habitat and species. In some aquifers, groundwater recharge that raises the groundwater table near the surface may also directly benefit instream flows for surface streams. Additionally, groundwater recharge basins themselves provide habitat for many species. The new tools and authority available to GSAs for raising funds and administering projects should alleviate two of the primary hurdles to implementing Managed Aquifer Recharge (MAR) and levee setback

programs that increase groundwater recharge: financing and governance. In addition to the funding available through fees collected by GSAs, Proposition 1 (2014) secured \$100 million in competitive grant funding for GSP implementation projects. DWR will administer these grants, which will require a 50 percent minimum 50 percent local cost share.

Ideally, GSAs (and the GSPs they develop) will recognize the connection between surface water and groundwater, consider the environmental uses of water in the groundwater basin, and use available

funding sources to finance projects that increase water and habitat for the environment while also recharging depleted aquifers and increasing future supply flexibility for all water users (such as MAR).

#### *5.3.4.1. Case Study: Managed Aquifer Recharge*

Artificial groundwater recharge (i.e. MAR) occurs by injecting or percolating available surface water into an aquifer. MAR projects increase water storage, mitigate groundwater overdraft, provide water treatment through adsorption by soil particles, avert seawater intrusion, and restore riparian base flow conditions. MAR projects can be financed in a variety of ways, but usually recover operational costs with revenue from selling the recharged water. Many successful examples of MAR projects exist throughout California, at a variety of scales.

In southern California, Orange County Water District (OCWD) developed one of the largest MAR systems in the state, covering more than 1,500 acres and recharging an average of 230,000 acre-feet of water to the groundwater basin each year. This MAR system effectively doubled the basin's yield, and supplies roughly 75 percent of the region's annual groundwater pumping (Hutchinson, 2009).

On the Central Coast, the Pajaro Valley Water Management Agency (PVWMA) operates a small-scale MAR system, which diverts up to 2,000 acre-feet of water during winter high-flow periods, and recharges it through a 14-acre recharge pond. Recharged water is pumped from the underlying aquifer during summer months and distributed via pipeline to 7,000 acres of coastal farmland, much of which is impacted by seawater intrusion. PVWMA meters all groundwater pumping in the basin, and charges users \$162-\$192 per acre-foot. Water pumped by PVWMA and delivered through the distribution system is sold at \$306 per acre-foot (PVWMA, 2015).

While certainly not a panacea –projects take time to plan, permit, and engineer – MAR projects have proven to be great investments in several regions. Many factors must be considered when establishing MAR systems; two of the most critical are: 1) securing the recharge source water, and 2) purchasing the land to be used for recharge. MAR source water can come from stormwater flows, flood control reservoirs, and reclaimed or recycled water treated through the advance stage. Recycled water is more advantageous than many other supplies, as it is a reliable, year-round supply, has a low sediment load (fine particles in recharge water diminish recharge efficiency), and reduces MAR operational costs.

Purchasing land for recharge projects can be a challenge in many regions. OCWD succeeded in part due to foresight: they began purchasing land for recharge in 1936 (Hutchinson, 2009). Regions where recharged water is highly valued may be able to justify costly land acquisition, or recharge projects may be more feasible in areas with lower land acquisition costs. Identifying land not only available for purchase but also appropriate for recharge can be difficult. Underlying geology must be determined to insure there is a connection between the recharge site and regional or local aquifers, and that the recharged water will be recoverable.

Several challenges exist to implementing MAR for the environment. First of all, groundwater recharge must be added as a beneficial use. SB 228, proposed by Senator Canella in February 2015 but not anticipated to be debated again until 2016, would “declare that the recharging of a groundwater basin constitutes a beneficial use of water if the recharge is consistent with the local agency's groundwater

management plan or groundwater sustainability plan.” Secondly, entities (public or private) are only willing to invest in storage if their right to withdraw that water is guaranteed. The SGMA currently requires agencies to consider environmental uses of water as well. When combined with the funding sources described above, groundwater agencies could consider storing water in groundwater aquifers for both environmental and non-environmental uses in the future. The IRWM Joint Powers Authority, proposed for managing environmental surcharge funds in the previous section, could compensate groundwater agencies or another entity that stored the water underground through money from the environmental public goods charge. In already adjudicated basins, this may not be possible.

### 5.3.5. Fund Multi-benefit Flood Protection, Groundwater Recharge, and Habitat Projects

For California to better manage drought for the economy and the environment, the state must prioritize multiple benefit water uses over single-benefit uses, as is embodied in Article X, Section 2 of the state constitution. To be effective and to avoid legal contention, prioritization must be conducted within the context of the state’s existing water rights prioritization system.

***For California to better manage drought for the economy and the environment, the state must prioritize multiple benefit water uses over single-benefit uses.***

Proposition 1 funds – if properly implemented – provide a rare opportunity to invest in long-term, large-scale, multi-benefit ecosystem restoration efforts. Proposition 1, the California Water Action Plan, and the *Draft Central Valley Flood System Conservation Strategy* (part of the 2017 update to the Central Valley Flood Protection Plan) all emphasize multi-benefit projects and combining funding sources to provide benefits across sectors while developing broad bases of support to accomplish such projects. This

approach may be the practical reality of California water infrastructure and environmental projects in the future.

Projects that provide aquifer recharge on floodplains while increasing flood protection for humans and providing habitat for fish and wildlife, using setback levees<sup>51</sup> are a clear multiple-benefit approach that deserves prioritization. Setback levees create more space for riparian habitat, mitigate downstream flood risk, and are cost-effective. Some successful examples of floodplain multi-benefit projects are described below.

- On the Cosumnes River, setback levees provide 100 to 300 acre-feet of recharge through a 500-acre floodplain with only a brief storm (UC Merced, 2015). This is roughly three times the rate of recharge possible through deep percolation from irrigation (UC Merced, 2015). Even in dry years, California typically receives at least a few small storms, thus multiplying this recharge volume three or more times per year, providing 1,000 acre-feet or more of additional local groundwater recharge.

<sup>51</sup> A setback levee is a levee that is moved further from the river in order to allow the river greater space. Setback levees are often less expensive to maintain than traditional levees, which must hold the river in place and thus can be armored and require maintenance

- The preliminary San Joaquin Basin-Wide Feasibility Study (part of the 2017 update to the Central Valley Flood Protection Plan), proposes a project to increase flood protection for the City of Firebaugh — a disadvantaged community of around 10,000 residents, which currently has only 10-year flood protection. The project would provide 100-year flood protection for the city while increasing transitory storage to benefit downstream communities, providing floodplain habitat for rearing re-introduced spring-run Chinook salmon, creating recreation for city residents, increasing bird habitat, and reducing agricultural impacts by allowing flood-compatible, wildlife-friendly farming. The many benefits of setback levee floodplain projects such as this can garner support from a wide range of stakeholders, thus easing approval and increasing funding opportunities. Drought-emergency legislation signed in 2015 reallocated \$660 million of remaining Proposition 1E (2006) funds for flood protection, including construction of setback levees. Several funding sources in Proposition 1 could also be used for such projects.

#### *5.3.5.1. Case Study: The Nigiri Project*

Several 2015 Water Leaders' mentors indicated that the lack of resources to support anadromous fisheries is a significant environmental impact of the current drought, and that new ecosystem management approaches are needed. The Nigiri Project, initiated by California Trout, UC Davis and DWR at Knaggs Ranch in Yolo County, northwest of Sacramento, is an attempt to address this issue by piloting floodplain management for multiple benefits. Out-of-season rice fields along the Yolo Bypass serve as ideal spawning and rearing habitat for many species, including salmonids (Sommer, 2001; Roach, 2015). Early results show improvements in salmon survivability along the Sacramento River.

Studies indicated a strong correlation between the size of Chinook salmon smolt and survival rates both prior to and during outmigration to the ocean. Nigiri Project smolts increased in size five-fold during a six-week period (Katz, 2015).<sup>52</sup> Rice fields, which are out of production during winter months, were flooded with small amounts of Sacramento River water, which produced additional food sources for rearing smolts. Smolts thrived in a rearing habitat with abundant food and relatively free of aquatic predators. Smolt survivability, measured at the Golden Gate Bridge, was seven times greater than historical Chinook averages.<sup>53</sup>

The Nigiri Project is an example of complementary benefits for both the economy (i.e., agriculture) and the environment with the same water. If projects such as this continue to demonstrate success, it is quite possible to increase salmon productivity without dedicating additional instream flows, thus improving both the economy and the environment in tandem.

The Nigiri project is not the only example of multi-benefit water application along the Sacramento River. Each year, more than half a million acres of rice fields are planted in the northern Sacramento Valley. Flood-irrigated rice fields provide environmental benefits, functioning as surrogate wetlands for migratory birds, and partially mitigating the significant loss of California's historic wetland acreage. Many rice farmers now try to avoid insecticides and prioritize habitat preservation on their property. Stakeholders

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<sup>52</sup> Caltrout.org, "The Nigiri Concept: Salmon Habitat On Rice Fields | California Trout, Inc.". N.p., 2015. Web. 27 July 2015.

<sup>53</sup> Michel, C., "River and Estuarine Survival and Migration of Yearling Sacramento River Chinook Salmon (*Oncorhynchus Tshawytscha*) Smolts and the Influence of the Environment". Master's Thesis. University of California, Santa Cruz. December 2010.

have come to accept the crucial role that rice fields play in maintaining the Pacific Flyway, and its annual migration of between 4 and 6 million birds. But this surrogate habitat is not necessarily secure.

In most water years, rice farmers can choose how to best use their water. Many of these farms were established more than 100 years ago, and thus have secure water rights (many pre-1914). Farmers can either plant a crop for harvest or fallow the land and sell the water on the informal spot market or negotiate deals with other interested water districts (Kasler, 2015c). In wet years, the going rate can be as little as \$12 per acre-foot. But in times of water scarcity — such as prolonged drought — the rate for water can climb higher than the profit margins for the rice market. With the current drought stretching into its fourth year, an increasing number of rice farmers are selling water for more than double the usual price \$500 per acre-foot up to as high as \$2,000 per acre-foot (Vekshin, 2014).

The half-million acres of rice fields in this region play a key role in protecting wildlife; if fallowed, there would be negative consequences for birds and other endangered species. When rice acreage is reduced, migratory birds are crowded into smaller areas, thus increasing the spread of diseases. Hundreds of thousands of birds in the Sacramento valley are at risk for botulism and avian cholera. In order to strike a balance, the state should provide both regulations and financial incentives for rice farmers to maintain wildlife habitat, even when participating in water transfers.

CDFW identified methods for providing wildlife habitat on non-irrigated lands in this region while still meeting water transfer requirements. Rice farmers are encouraged to plant non-irrigated cover crops or other vegetation for wildlife habitat on fallowed land, allowing water to be sold or used elsewhere.<sup>54</sup> Additionally, state regulation restricts the contiguous acreage that can be fallowed, as a mechanism for protecting giant garter snakes (which live and hunt in rice fields). CDFW and other relevant resource agencies must continually assess the likely impacts of proposed water transfers on wildlife protection, and oversee and/or implement conservation measures to minimize these impacts and achieve multi-beneficial use of water for California rice farms.

#### *5.3.5.2. Case Study: Sacramento River Flows*

Flood flows are a considerable portion of the flow in the Delta. During the SWRCB public workshop on May 20, 2015 (SWRCB, 2015c), one of the presenters provided an analysis of Sacramento River flow in 2014 (a critically dry year), 2011 (a wet year), and 2015 (a critically dry year; note the figures provide flow estimates for the time period after the day of the presentation, May 20, 2015, these estimates are based on assumed Salinity Control and Total Delta Export flow) (see **Figure 5**). As shown in Figure 5 between 10 percent and 27 percent of total Delta outflow is considered for the purposes of this analysis “uncapturable” in critically dry years, with up to 65 percent of total Delta outflow uncapturable in wet years. By definition, the presented uncapturable outflow is not available for use by the existing water delivery infrastructure due to the lack of capacity to pump or convey, and in some cases other regulatory requirements may further reduce the capacity of existing water delivery infrastructure. The 2014 river flows were some of the lowest on record. Still 10 percent of the Delta outflow was uncapturable. This is

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<sup>54</sup> California Department of Water Resources and USBR, Mid-Pacific Region. Technical Information for Preparing Water Transfer Proposals: Information for Parties Preparing Proposals for Water Transfers Requiring Department of Water Resources or USBR Approval. Water.Ca.gov. Nov 2014. Web. 30 July 2015.



water that flows through the Sacramento River and other tributaries rivers without diversion on its way to the ocean. A simple purchase value estimate of this water provides context for its potential worth. Agricultural water prices vary greatly in a non-drought year based on the location of demand water and attached water rights. Drought prices are much higher: reportedly as high as \$1,000 to \$2,000 per acre-foot in 2014 and 2015 (Vekshin, 2014). Assuming a purchase price of \$1,000 per acre-foot, it would cost \$770 million to purchase the equivalent of the 2014 uncapturable outflows (770,000 acre-feet). Therefore, this water source is available even in historically low-flow conditions, and offers potential environmental value that would be otherwise infeasible to purchase. Reconnecting the channels to floodplains will expand the uses of uncapturable flow, providing much needed habitat and drought resilience for stressed species without requiring expensive water purchases in drought conditions.

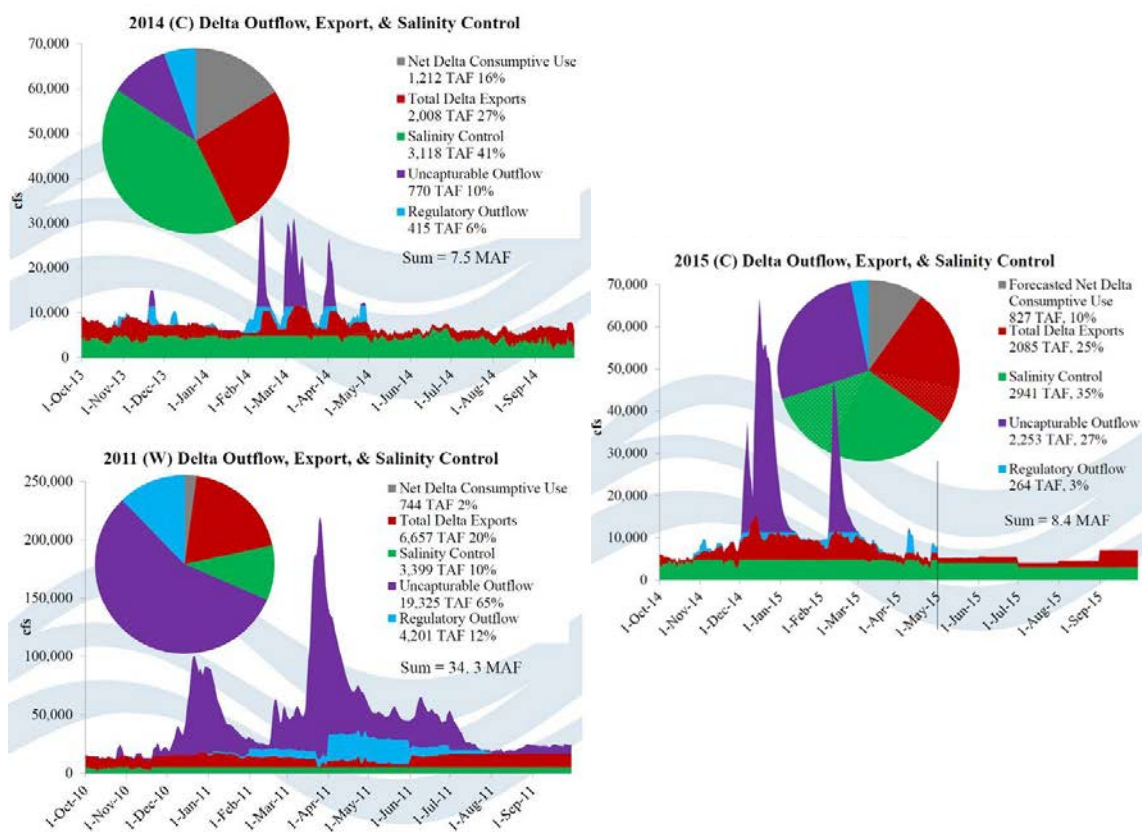


Figure 5: 2014 (C-Critically Dry Year), 2011 (W-Wet Year) and 2015 (C-Critically Dry Year) Sacramento River delta outflow water budget.

Source: SWRCB, 2015c



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## 6. Water Rates: Stable Revenue and Conservation in Times of Drought

### 6.1. Introduction

In California, water is delivered by more than 2,000 local water service providers, each with its own rate structure, billing systems, and customer groups. Water agencies use rates as a means to collect revenue and in some cases to manage water demands by incentivizing lower water use. During drought conditions, additional demand reduction is encouraged, or even required, which results in reduced revenues that impact fiscal stability. Funding for the environment is easy to overlook, but does occur as discussed in Section 5.4.3, when developing rates that must be lawful reflections of cost of service and then approved by ratepayers.

Water service providers need flexibility in setting water rates in order to stabilize revenue and maintain fiscal stability, especially during drought. This principle was echoed by a general consensus of the 2015 Water Leaders mentors. Fiscal stability ensures that water service providers are able to finance necessary drought mitigation strategies, such as purchasing additional water supplies or investing in higher-cost, drought-resilient water supplies. Rate structure flexibility enables water service providers to determine locally how best to recover fixed operation, maintenance and infrastructure costs (which do not change, regardless of reduced water sales during drought); and to protect and enhance the environment and available water supply by encouraging conservation through a tiered volumetric rate structure. Thus, additional flexibility may result in environmental protection.

***Water service providers need flexibility in setting water rates in order to stabilize revenue and maintain fiscal stability, especially during drought.***

Fiscally and socially responsible water agencies provide important benefits to the state: more water for environmental uses, more water stored for future drought resilience, less production from groundwater aquifers, and more water available for future economic development and population growth. By reducing water demand through a rate design that covers fixed costs, water agencies can plan for capacity expansion projects. To allow these rate designs to be implemented, California must alleviate existing challenges that hinder the ability of water agencies to reduce water demand and maintain fiscal stability.

### 6.2. Background on Rate Structures

Water agencies have a number of mechanisms to collect revenue (e.g. property tax bills, water bills, etc.). Costs, and how they are presented to the customer, vary depending on policy objectives. Several of the most common rate structures are outlined in **Table 3** below.

Table 3: Most Common Rate Structures

Rate Structure Type	Primary Objective
Flat Fee	Simple to implement and does not require tracking volumetric consumption
Declining-block rate	Encourages economic development by incentivizing industry
Uniform rate	Easy to understand and provides a signal for consumption
Seasonal rate	
Inclining-block rate	Encourages the most conservation and efficiency by providing messaging with regards to consumption levels and increased incentives for reduced consumption
Budget-based rate	

A fiscally stable approach that allows an agency to recover costs even during periods of low water sales and diminished supplies is ideal in the context of managing drought for the economy. Flat fee rates on a water bill or fixed charges help recover costs, but additional usage is not billed. Conversely, tiered rates, either inclining-block or budget-based rate structures, encourage water conservation, which helps manage drought for the environment but this incentivized conservation often results in volatile revenues. Rate structures can absorb this volatility if they cover a certain percentage of fixed costs in a fix charge, and cover the remaining fixed costs in the tiers of water use that are essential for their customers.

### 6.3. Tiered-Rate Structures

Within the category of tiered-rate structures, water agencies often employ one of two types: either inclining-block rates or budget-based rates. Both structures have a set of price tiers (typically four or five) that increase at a threshold of water use. Inclining-block rates establish water consumption amounts applied to the tier for each customer class (e.g., such as residential, multi-family, commercial, etc.) and budget-based rates are customized to each water meter account (see **Figure 6**). Water budgets, based on specific characteristics such as indoor and outdoor use, are applied to the price tiers. Budget-based water rates have become increasingly popular in California over the past twelve years. In 2003, only one water agency in California, Irvine Ranch Water District located in Orange County, had a form of budget-based rates; currently, there are a total of thirteen agencies.

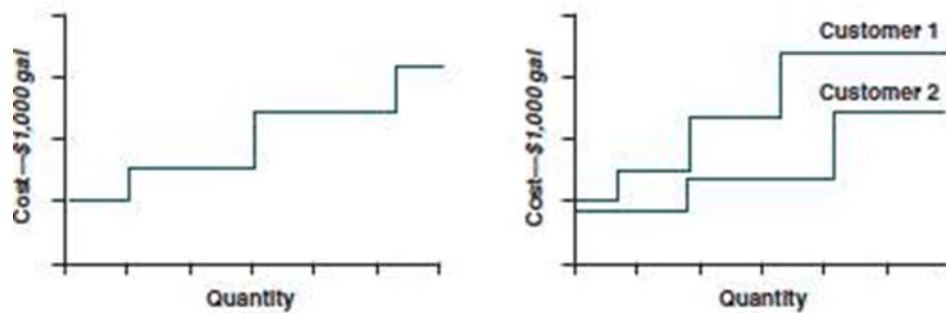


Figure 6: *Graphic of Inclining-Block Rates (L) and Budget-Based Rates (R); Credit: Sanjay Gaur, American Water Works Association May 2007, AWWA Journal*

Several California water agencies have reported the conservation benefits of adopting budget-based rates. Irvine Ranch Water District has been using some form of budget-based rates since 1991. Through this rate structure, the District has experienced an outdoor water use reduction of 61 percent over 13 years. By adopting budget-based rates in 2009, Eastern Municipal Water District, located in Riverside County, was able to reduce water demand by 18 percent over three years by switching to budget-based rates with no appreciable impact to its fiscal balance.<sup>55</sup>

#### 6.4. Existing Legal Framework for Establishing Water Rates

Inflation and high property taxes in the mid- to late 1970s resulted in a political movement to drastically limit the ability of local governments to tax property owners. In 1978, California voters adopted Proposition 13 — a state Constitutional amendment that reduced the property tax rate to 1 percent of assessed property value and restricted the annual increase to the assessed property value. Proposition 13 also expanded the definition of “special tax” and limited tax rates to “the reasonable cost of providing the service or regulatory activity for which the fee is charged.” Local agencies responded to the Proposition 13 restrictions by drastically increasing “fees” and “user charges” not addressed by Proposition 13 in order to compensate for the loss of property tax revenue.

For nearly two decades following Proposition 13, local governments and the general populace battled over government finance. Then, in 1996, California voters passed Proposition 218 — the “Right to Vote on Taxes” Act. The goal of Proposition 218 was to end local agencies’ ability to circumvent the intent of the Proposition 13 drafters by using assessments, fees, and charges to raise revenue for their general fund. But Proposition 218 made sweeping changes to Proposition 13, drastically restricting local governments’ ability to raise revenue and finance critical public functions.

Proposition 218, which applies to local governments and thus municipal water utilities, added Article XIII C and D to the State Constitution, restricting three major sources of local revenue: taxes, property assessments, and property-related fees and charges. Article XIII D, Section 2 defines a “fee” or “charge” as any levy other than property tax, a special tax, or an assessment, “imposed by an agency upon a parcel

<sup>55</sup> Baerenklau, Kenneth A. et al., “Do Increasing Block Rate Water Budgets Reduce Residential Water Demand? A Case Study in Southern California”. Water Science and Policy Center. University of California, Riverside. September 2013

or upon a person as an incident of property ownership, including a user fee or charge for a property-related service.” While it was initially unclear if Proposition 218 applies to water agencies, the California Supreme Court held that water delivery through a pipeline is a property-related service. It was important to water purveyors when the California Supreme Court held that water delivery through a pipeline is a property-related service.<sup>56</sup>

In addition to levying fees or charges for water services, the local agencies may also impose special assessments under Proposition 218 for water system improvements that provide a direct beneficial use to owners of real property. Under Proposition 218, the majority of an agency’s ratepayers may reduce or repeal any local taxes, assessments, charges or fees via a ballot initiative, and the burden of proof is placed on the agency to establish compliance with Proposition 218 if fees or charges are later challenged.

State and local government’s ability to raise revenues for services was even further restricted in 2010 by the passage of Proposition 26. This proposition amended the provisions of State Constitution Articles XIII A and XIII C by providing a new definition of taxes: “any levy, charge or exaction of any kind imposed by local government.” Thus, any fee or charge that is not covered under seven narrow exceptions is subject to voter approval. Proposition 26 also shifts the burden of proof off of the public and on to the agency seeking to adopt, increase, or extend any fee. The agency must prove that the fee: a) is not a tax, b) is no more than the amount necessary to cover the reasonable cost associated with the activity or service provided, and c) burden is appropriate to the benefits received by the payer.<sup>57</sup>

#### 6.4.1. Case Law & Legislation Applying Proposition 218 to Water Rates

Ten years after Proposition 218 passed, the California Supreme Court ruled that the provision of water is a “property-related service” under Article XIII D, and thus requires that the amount of the fee does not exceed the proportional cost of providing service to the parcel. In *City of Palmdale v. Palmdale Water District* (2011), Palmdale Water District adopted a budget-based rate structure to promote water conservation. The court held that budget-based rates do not violate Proposition 218. However, the Water District made no showing that its costs of delivering water service to irrigation customers was proportionally higher to justify the increased rate.

In 2008, AB 2882, introduced by Senator Lois Wolk (D-Davis), was passed to clarify the legal requirements for implementing budget-based rate structures under the Constitutional mandate and authority for reasonable use of water, but in a manner that complies with Proposition 218. It provides an option for Proposition 218 compliance of water rate structures that encourage water conservation, by determining a “basic use allocation” and charging more for increments of metered use above that allocation, to pay the costs of conservation measures and overuse. This “allocation-based” conservation rate is one form of tiered pricing that promotes conservation. The bill requires that the “basic use allocation” provide “a reasonable amount of water for the customer’s needs and property characteristics.” It also preserves local agencies’ authority to impose fixed charges for fixed costs.

<sup>56</sup> *Bighorn-Desert View Water Agency v. Verjil* (2006) 39 Cal. 4th 205, 216-217; see also, *Richmond v. Shasta Community Services District Comm. Serv. Dist.* (2004) 32 Cal. 4th 409, 427.

<sup>57</sup> Proceeding from Association of California Water Agencies 2011 conference. Proposition 26: Local Agency Guidelines for Compliance. <http://www.acwa.com/sites/default/files/post/state-budget-fees/2012/07/prop-26.pdf> January 2012.

In 2014, AB 2403 introduced by Assembly member Anthony Rendon (D-Lakewood) was passed to clarify that the Proposition 218 Omnibus Implementation Act's current definition of "water" includes improvements for producing, storing, supplying, treating, or distributing of water from any source. This bill put the Griffith v. Pajaro Valley Water Management Agency decision into statute and allows public agencies to apply the simpler protest process to the approval of stormwater management fees, where the management programs address both water supply and water quality. In 2002, the Sixth District Court of Appeal interpreted this exception for water/sewer rates to exclude costs for stormwater drains. The service in the 2002 case emphasized flood control, moving water to the ocean as quickly as possible. That program had nothing to do with water supply. Those fees were developed to address the water quality challenges presented by stormwater. Stormwater management has changed since 2002. Since Proposition 218 passed in 1996, managing stormwater has become integrated as a water supply component, as agencies develop methods to collect and treat stormwater, and recharge groundwater aquifers for water supply. In 2013, the Court of Appeals again considered stormwater in a Proposition 218 context, for a program that charged fees for groundwater recharge, including stormwater capture. This bill was introduced to offer an alternative to address the evolving nature of California's stormwater management programs, especially the growing development of stormwater recapture programs for recharging groundwater.

In a more recent decision, *Capistrano Taxpayers Assn., Inc. v. City of San Juan Capistrano*, the court found that the City of San Juan Capistrano violated Proposition 218 because the individual tiered rates did not reflect the actual cost of providing water at each tier's level of usage. While this ruling does not negate or outlaw budget-based water rates, it does make the rate setting process more complex for water service providers. On appeal, the court held that "...City Water had to do more than merely balance its total costs of service with its total revenues...City Water also had to correlate its tiered prices with the actual cost of providing water at those tiered levels."<sup>58</sup> This ruling was met with much opposition from water agencies and the general water industry. According to Governor Brown, the ruling "puts a straitjacket on local government at a time when maximum flexibility is needed."<sup>59</sup> This sentiment was echoed by Tim Quinn, Executive Director of the Association of California Water Agencies.

#### 6.4.2. Drought Executive Order and State Board Resolution

Current state leadership recognizes the importance of using rate structures to achieve conservation and encourages water agencies to adopt such structures. The 2014 California Water Action Plan states that "the administration will work to clarify the 1996 Right to Vote on Taxes Act's (Proposition 218) applicability to water-related fees and taxes, including sponsoring legislation if necessary" (Brown, 2014). With California in its fourth year of an historic drought, Governor Brown issued Executive Order (EO) B-29-15 in April 2015. Directive 8 of the EO instructs the SWRCB to "...direct urban water suppliers to develop rate structures and other pricing mechanisms, including but not limited to surcharges, fees, and penalties, to maximize water conservation consistent with statewide water regulations." The SWRCB is further directed to work with state agencies and water suppliers to identify mechanisms that would encourage and facilitate the adoption of rate structures and other pricing mechanisms that promote water conservation.

<sup>58</sup> *Capistrano Taxpayers Assn., Inc. v. City of San Juan Capistrano* (2015) 235 Cal. App. 4th 1493, 1506

<sup>59</sup> Edmund G. Brown. 4-20-15. Statement on 4<sup>th</sup> District Court of Appel Decision. <https://www.gov.ca.gov/news.php?id=18928>

However, the abilities of the SWRCB and local water agencies to set forth such mechanism are restricted by Proposition 218.

Pursuant to Directive 8, the SWRCB adopted “an emergency regulation for statewide urban water conservation.”<sup>60</sup> Article 9 of the Board’s resolution directs state agencies to assist water suppliers in efforts to implement conservation-based rate structures, and speaks directly to the San Juan Capistrano decision, indicating that the ruling “does not foreclose the use of conservation-oriented rate structures.” Article 10a directs water suppliers to “take immediate steps to raise necessary revenues in a way that actively promotes continued conservation” if they are facing budget shortfalls due to reduced sales.

### 6.4.3. Current Legislative Proposals

Water agencies are actively exploring legislative changes to seek clarification to Proposition 218 since the court decision also says that tiered rate structures can be designed in compliance with state laws and Proposition 218.

After the San Juan Capistrano decision, a small coalition of water agencies, including Irvine Ranch Water District, drafted a legislative proposal to address the specific issues in the San Juan Capistrano decision. This proposal defines a "property use amount" based on the property's number of occupants, use, size of irrigated area, efficiency of irrigation practices, livestock requirements, and the local climate data for the billing period. Water provided in excess of a "property use amount" would fall under the non-property related fee requirement under Proposition 26 and not Proposition 218, and thus an agency could charge what is deemed appropriate for waste.

The leading statewide associations that represent public agencies are also working in coalition to develop an initiative that would amend Proposition 218. The draft proposal would add stormwater discharge fees (sewer, water, and refuse collection services) to the list of charges that are exempt from voter approval requirements. To ensure the support from a broad coalition of stakeholders, the reform will likely include an exemption that would allow assistance to low-income ratepayers. This would allow public agencies to charge "water lifeline rates" that would subsidize rates for low-income customers and exempt these subsidies from the cost of service requirements under Proposition 218.

## 6.5. Current Drought Efforts

Water agencies throughout California are moving forward with plans to achieve increased conservation by financially incentivizing their customers while operating within the bounds of Proposition 218. One of the strategies is for water agencies to assess penalties in violation of an ordinance or resolution that identifies certain prohibited water use conditions that may be implemented during a drought, a water shortage emergency, or other water supply shortage. Through this method, a volumetric penalty is applied to usage above a specified threshold of water usage or applied to usage in specific tiers that correspondingly levy a higher volumetric water service charge. This may be accomplished by the adoption

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<sup>60</sup> California Code of Regulations, Title 23, Section 866, via Resolution 2015-0032



of a resolution or an ordinance establishing a water conservation program or water shortage contingency plan. The program or plan may establish stages of action to be undertaken by the water agency in response to a water supply shortage and specific regulations governing water usage during each stage of action, the violations of which are subject to the imposition of a volumetric penalty.

Under the law, a penalty is neither a tax nor a fee, and therefore does not need to be approved by ratepayers or require cost of service analysis under Proposition 218. Civil penalties may have a punitive or deterrent aspect, but their primary purpose is to secure compliance to statutes and regulations imposed to assure important public policy objectives, such as specific limitations on the use of water during specified stages of a water conservation program or water shortage contingency plan. The resolution or ordinance may provide that when the elected body declares and implements a stage of the program or plan, the volumetric penalty is imposed for water used in excess of the water usage limitations established for that stage.

For example, Moulton Niguel Water District in South Orange County has budget-based water rates. The District adopted a water shortage contingency plan whereby when its Board of Directors declares stages 2-5, any customer who uses water in excess of their indoor and outdoor allocations (i.e., water budgets) will be in violation of the District's water shortage contingency plan rules and regulations and shall pay a volumetric penalty ("Conservation Penalty") for each hundred cubic feet of water used in excess of a customer's water budgets. In stages 3-5 of the water shortage contingency plan, the budget is reduced in incremental steps to target the next most inefficient water use with the Conservation Penalty imposed to gain compliance, illicit a price response, and reduce the customer's demand for water.

## 6.6. Potential Solutions to Proposition 218 Issues

A broad consensus emerged from the Water Leaders' mentors that Proposition 218 is in need of changes to better allow for water purveyors to price water effectively, especially during droughts. There was a general opinion among respondents that Proposition 218 has good intentions generally, but the specifics contained in the law hamstring water agencies. The following are potential solutions to resolving the issues related to Proposition 218.

### 6.6.1. Constitutional Amendment

Since the limitations set forth by Proposition 218 are now part of the California Constitution, the most effective method to revise or remove those constraints is via constitutional amendment. The California Constitution can be amended by three methods (Cal. Const., Art. XVIII §§ 1, 2, & 3):

1. Two-thirds approval of both chambers of the Legislature and a statewide ballot to ratify or reject the proposal.
2. The voters initiative process (which is how Proposition 218 was initially passed), whereby proponents of a ballot initiative must gather the minimally required signatures before petitioning to have the initiative included on the next general election ballot.

3. Two-thirds approval of both chambers of the Legislature and a statewide ballot to approve a constitutional convention during which the constitution will be amended. Each of these three methods requires substantial public support and will take time before a proposal to amend the constitution takes effect. The easiest method to amend Proposition 218 may be to introduce a bill in both chambers of the state assembly and to have the public vote on the proposal as early as November 2016.

### 6.6.2. “Proportionality” Requirement

The “proportionality” language in Proposition 218 has been interpreted as a requirement to allocate charges in a manner that “bear a fair or reasonable relationship to [that fee] payer’s burdens on or benefits from the activity” which is funded by the fee (*Sinclair Paint Co. v. State Board of Equalization* (1997) 15 Cal.4th 866, 878). While courts have recognized the need for flexibility in deciding whether a fee is “proportional,” they are likely to find a violation of Proposition 218 if only a small number of water users are paying for services and benefits provided to all water users (See *California Farm Bureau Federation v. California State Water Control Board* (2007) 146 Cal.App.4th 1126 rev. St’d). Proposition 218 can be amended to exempt water services from the proportionality requirement. However, any such proposal without some limitation on the burden to the top tier users may be unpopular and rejected by voters.

### 6.6.3. Explicitly Permitted Budget-Based Tiered Rates

The San Juan Capistrano court did not attempt to reconcile Proposition 218 with Article X, Section 2 of the California Constitution, which “requires that the water resources of the state be put to beneficial use to the fullest extent of which they are capable, and that the waste or unreasonable use or unreasonable method of use of water be prevented, and that 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.” A constitutional amendment could reconcile these conflicting provisions by: (1) validating tiered rates as a valid and constitutionally recognized method to reduce waste or unreasonable use of water; (2) specifically exempting water from strict proportionality requirements of Proposition 218; (3) specifically permitting a budget-based tiered rate system as opposed to a purely cost-based tiered rate system; and (4) limiting the burden on the top tier water users (e.g., top tier rate may not be more than 10 times the base tier rate, or top tier ratepayers should not have to pay for more than 50 percent of the water supplier’s budget, etc.).

Given the current drought emergency and the associated political climate against water waste, voters are more likely than ever to approve an exemption from Proposition 218, viewing water as a special resource. Any proposed constitutional amendment to Proposition 218, though, will likely succeed only if it includes some limit to water agencies’ ability to assess fees — California’s history demonstrates a strong propensity toward limiting government’s ability to tax or assess fees.

#### 6.6.4. Shifted Burden of Proof in Lawsuit

Proposition 218 states: “[i]n any legal action contesting the validity of any assessment, fee or charge], the burden shall be on the agency to demonstrate” compliance. This means that unless the water agency can satisfactorily demonstrate how it meets the requirements of Proposition 218, the courts must presume that Proposition 218 was violated. It is unlikely that voters would repeal the burden of proof provision, but they may support a specific exemption for water fees or tiered rates provided certain limitations are also adopted, discussed in Section 3.3.2.2 above (e.g., the burden is shifted to the plaintiff if the water agency can demonstrate that the top tier rate is less than 10 times the base tier rate, or that top tier ratepayers are responsible for less than 50 percent of the water supplier’s budget, etc.). Alternatively, the burden may be shifted if the water agency has obtained validation from DWR that the tiered rate in question does not violate Proposition 218. Shifting the burden of proof will not eliminate a water agency’s obligation to comply with Proposition 218, but will decrease the likelihood that a particular water rate structure is challenged in court.

#### 6.6.5. Legislative Actions

The California Legislature can pass bills that amend existing law; such action could facilitate implementation of tiered rates. Legislative actions do not require voter approval, and can be adopted in any legislative session. This may be a less contentious path to establish tiered rates. As the constitution is the supreme law of the state, though, a court may interpret legislative actions as inconsistent with the voter-approved Proposition 218. This would then invalidate such legislative acts in the same manner that the San Juan Capistrano case invalidated the city’s tiered rate structure.

### 6.7. Recommendations

In order to manage water for both the economy and the environment in drought conditions, local water agencies must have flexibility to implement rate structures and charges that encourage efficiency while also stabilizing revenue. This dual goal requires setting rates that provide an adequate pricing signal to incentivize water conservation and maintain sufficient revenue to cover a water agency’s fixed costs.

The recent San Juan Capistrano ruling still enables water agencies to implement budget based water rates, but clarifies that the individual tiers should be directly tied to the cost of service proportionate to the parcel. If a water agency’s various water sources are similarly “priced,” the difference in tiers may not provide sufficient price signals to motivate its rate payers to conserve. To encourage conservation, the upper tiers that represent inefficient water use need to take into account economic principles of demand response. The California Constitution should be amended to clarify that water agencies have the flexibility to set their rates, within certain limits, in order to help them achieve their policy objectives while recovering their cost of service across all tiers, in an agency revenue neutral scenario.

Proposition 218 was enacted to protect the public from unrestricted taxes and rate increases and it is important for public agencies to document their increases through their administrative record. In order

to safeguard the public against what the Proposition 218 drafters feared, the unrestricted setting of rates and charges by public agencies, there still needs to be public involvement in the rate setting process and there should be a cap on the rates charged. For example, the top tier rate could be limited to no more than a certain percentage of the base tier rate, or top tier ratepayers could be limited to paying a percentage of their water agency's total budget. Proposition 218, the "Right to Vote on Taxes Act," should still keep its namesake stipulation which allows rate payers to directly oppose an increase or change in their rate structure. If rate payers are involved, they will be more knowledgeable of the rate setting process and the true cost of conveying and distributing water.

Budget-based water rates, through the case studies of Irvine Ranch Water District and Eastern Municipal Water District do reduce demand overtime. Improved water use efficiency and reduced per-capita demand have multiple benefits, as well as burdens, that are attributable to the goals of this report: managing drought for the economy and the environment. They provide increased water for consumptive use, environmental use, and storage to prepare for future droughts, less overproduction from groundwater aquifers, increased potential for economic development, and a delayed or reduced need for capacity expansion projects.

## 7. Conclusions

Water and the engineered capability to transport it from places of abundance in Northern California and deliver it throughout the state was and continues to be a major driver in the development of California's thriving economy. In this way, the economy and the environment are inextricably linked. While California's diverse ecosystems and abundant natural resources assisted the state's economy in becoming the eighth largest in the world, this economic success has come at the cost of a loss in native species and habitats. The degradation of California's environment poses a threat to the economy it has enabled to prosper. And although regulations and policies aimed at environmental protection and restoration have been in place since 1970, the quality of California's natural ecosystems have continued to decline. Among other things, the ability to provide adequate water supplies for environmental restoration has been hindered by a lack of funding and competition with the need to supply water to California's continuously growing population.

California is nearing the end of its fourth consecutive year of drought. The resultant reduction in snow pack and surface water runoff has highlighted the shortcomings of California's management practices to meet the ever-growing water demands of the state. Although drought is a state-wide issue, the challenges are particularly daunting in the Delta, the center of California's water system. Nearly two-thirds of California's residents and millions of acres of irrigated farm land are reliant on the water transported through and out of the Delta. Federal, state, and local water managers are tasked with optimizing the operations of Delta waterways, lands, and pumps to balance the needs of the economy and the environment to the best of their ability and in accordance with water law and policy. However, this balance becomes difficult to maintain during drought conditions when water is in short supply.

The recent impacts to both the economy and the environment are notable. Significant localized economic impacts were realized throughout the Central Valley, particularly in areas that are supported by the agriculture and food processing industry, one of the state's largest consumers of water. The reduction in available water supplies resulted in the fallowing of approximately 550,000 acres of farmland. Combined with the multiplier effect on related industries, this reduction in farming likely cost the California economy \$2.74 billion and 21,000 jobs in 2015 alone. California's species and ecosystems, already stressed before the drought due to increased degradation, are absent the resilience to withstand additional drought-related stress. In 2014, Sacramento River water temperatures warmed sufficiently to cause a collapse of naturally spawned and ESA listed winter-run Chinook salmon. Extensive actions to maintain this resource have been implemented with little success (Weiser, 2015). Groundwater resources have also been severely impacted by the drought as farmers and cities have turned to this resource to replace the lack of surface water supplies. The rapid depletion of water levels has resulted in impacts such as land subsidence and reductions in surface water flow in areas where surface and groundwater normally interact.

In a prolonged drought scenario, the impacts to both the economy and the environment will be aggravated and could threaten to impact the quality of life for all Californians. Drought is predicted to become more commonplace in California's hydrologic cycle, and so California's existing water

management and drought planning practices can and should be improved to serve the needs of the economy and the environment for current and future generations.

The Water Leaders Class of 2015 was charged with developing policy recommendations for managing drought in California for the economy and the environment. Through research and with insights from the Class mentors, four areas of water management and policy were identified and evaluated to develop recommendations for alleviating competition for water at the hub of the water delivery system, where managing economic, environmental, and societal needs during drought is most difficult. The specific water management practices covered in this report included water prioritization, water transfers, financing environmental water, and water rates. Examples of water management practices throughout the state and in other areas of the World and the US, including Australia and Colorado, were discussed to illustrate some of the necessary ingredients for improving management to balance economic and environmental goals.

As presented in Section 3 through 6 of this report, there are a numerous ways in which the California water management system can be improved. While this paper was divided to evaluate four different components of California's water management system, there are several overarching themes and recommendations that would address multiple issues. The top recommendations of the Water Leaders Class of 2015 are as follows:

## Recommendation No. 1

To ensure long-term water supply reliability and sufficient allocations for both economic and environmental purposes during times of shortage, California must vastly improve its monitoring and evaluation of the state's water resources. Requiring the measurement of every water diversion in the state would enable the development of a water budget that provides a clear and complete accounting of the state's available waters. Collaboration between federal, state, and local agencies should be implemented to better track and regulate all water management activities and promote data collection and integration. Inter-agency databases accessed by common software platforms would improve data quality and reliability. These data would be invaluable to the following efforts:

- a. The development of a state-wide Drought Water Resources Allocation Tool that could more easily prioritize and allocate the available water budget to specific rights holders (for environmental and economic uses) at precise times of need and minimize the need for curtailments in dry years.
- b. The development of an efficient, water transfer market to move water to its highest value uses on a rapid time scale. High-quality data enables a transparent system in which economic and environmental impacts can easily be quantified and mitigated.
- c. Improve the ability to conjunctively manage surface and groundwater.

## Recommendation No. 2

The state must prioritize multiple benefit water uses over single-benefit uses, as is embodied in Article X, Section 2 of the state constitution. Multi-benefit projects can garner broad support across numerous

sectors of the economy and are attractive sources for grant funding. Examples of multi-benefit projects that should be prioritized include:

- a. Projects that increase aquifer recharge on floodplains while improving flood protection for humans and providing habitat for fish and wildlife, using setback levees.
- b. Partnerships with farmers to help them implement practices that create habitat and support agriculture.
- c. Conjunctive use projects that integrate the management of surface and groundwater.

### Recommendation No. 3

California must develop long-term funding sources for environmental water and habitat projects. Funding should be used to:

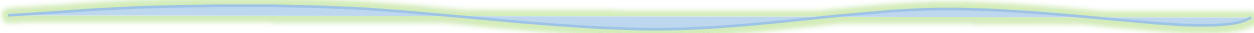
- a. Purchase permanent usufructuary water rights for the environment. By establishing water rights for instream uses, the state can transfer water between environmental uses, establish a value for environmental flows and generate revenue for environmental restoration when there is water available for sale.
- b. Implement multi-benefit habitat projects.

### Recommendation No. 4

The California Constitution should be amended to provide water agencies more flexibility to set their rates, within certain limits and with proper oversight. Providing water agencies with the flexibility to set water rates is paramount to reducing demand on the Delta. Such flexibility can be used to:

- a. Establish budget-based water rates to incentivize water conservation. Water conservation provides important benefits to the state by increasing water available for environmental uses, storage for future drought resilience, less overproduction from groundwater aquifers, and more water available for future economic development and population growth.
- b. Establish budget-based water rates to ensure fiscal stability in times of drought. Fiscal stability is important for water agencies as it ensures that water service providers are able to finance drought planning and mitigation strategies, such as purchasing additional water supplies or investing in higher-cost, drought-resilient water supplies.
- c. Establish public goods charges to finance locally managed environmental water projects.

As evidenced by Australia's example, the most effective strategies could necessitate radical changes in California's existing law and policy and will thus require a high degree of political will and public support. Proposed changes will only succeed if adequately funded; the state is in dire need of reliable, long-term funding to support water infrastructure and management systems that will improve the ability to meet the needs of humans and ecosystems.



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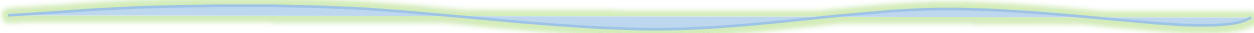
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# Appendices



# Appendix A: Mentor Response Summary

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## Purpose

The purpose of this appendix is to synthesize 21 mentor interviews conducted by the Water Leaders Class of 2015 into an easy-to-read format that summarizes responses and points out general trends in Class Mentor answers. Twenty-one interviewees were each asked up to 12 static questions. The product of these interviews was 252 responses that were analyzed and generally categorized.

It should be noted that data obtained from interviews totals approximately 40 pages of textual responses (see Appendix B). Any attempt to summarize and deduce general trends from a large amount of interview data runs the risk of minimizing the specific details of responses as well as any contextual references. Attachment B of this report lists the raw data obtained by Water Leaders as they conducted interviews with their respective Mentors.

## Water Leader-Mentor Interview Pairings

Water Leader/Interviewer	Mentor/Interviewee
<b>Ian Achimore</b> Senior Watershed Manager Santa Ana Watershed Project Authority	<b>Randy Record</b> Farmer Chairman of Metropolitan Water District Board; Board member of Eastern Municipal Water District
<b>Samantha Adams</b> Principal Scientist Wildermuth Environmental, Inc.	<b>Pete Silva</b> Silva-Silva International Chula Vista, CA
<b>Anna Brathwaite</b> Staff Attorney Modesto Irrigation District	<b>Jennifer Persike</b> Deputy Executive Director for external affairs and operations, Association of California Water Agencies (ACWA)

Water Leader/Interviewer	Mentor/Interviewee
<p><b>Jennifer Capitulo</b> Senior Policy Advisor Nossaman LLP</p>	<p><b>Gwen Buchholz</b> Vice President CH2M Hill</p>
<p><b>Danielle Dolan</b> Project Manager, Water Programs Local Government Commission</p>	<p><b>Alf Brandt</b> Legislative Director Assemblyman Anthony Rendon, chair Utilities and Commerce Committee</p>
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Water Leader/Interviewer	Mentor/Interviewee
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Water Leader/Interviewer	Mentor/Interviewee
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**Question Generation**

The Class developed an initial discussion list of more than 60 potential questions for Mentors related to the topic of the Class Report. After discussion, the list was reduced to 12 final questions, which were approved by the Foundation.

**Interviews**

Mentors were interviewed in informal settings to encourage candid conversations. Water Leaders were encouraged to ask needed follow up questions to develop thorough responses to each of the 12 questions. In a few interviews, all 12 questions were not answered. This is generally attributed to one of two factors; either the interviewer did not get to the question in the allotted time, or the interviewee otherwise deferred to answer the question for legitimate reasons.

## Summary of Responses

**Question 1: If you had to pick only one, would you say California has a water supply problem or a water demand problem? Explain your answer.**

Response Summary:

As one might expect, responses to this question were equally mixed, with eight of 21 mentors (or 38 percent) stating California’s basic water problem is one of supply, and seven mentors (33 percent) opining that water demand in the state is the most simplistic water management problem we face.

Mentors responding with “water supply” generally supported their answers by citing:

- Increased supplies reserved for environmental benefit that were not historically reserved.
- Current and anticipated effects of climate change.
- The lack of existing water storage facilities (surface water or otherwise) to meet demand, or the need to build more storage, specifically surface water and groundwater storage.
- Lack of water supply diversification.
- Demand can be regulated, whereas traditional supply (i.e. precipitation) cannot.
- No major investment in water supply or conveyance in decades.

Mentors responding with “water demand” generally supported their answers by citing:

- Certain beneficial uses could be sustained with less water than they currently use.
- Water is generally inexpensive compared to other resources, signaling that people can demand more of it; and raising water rates is not inherently easy for agencies.
- Demand is a matter of changing behaviors, whereas increasing supply involves construction and financing to build storage facilities; i.e. addressing demand is a lower-hanging fruit.
- Additional demand for environmental beneficial uses, and the regulations often involving the meeting of that demand.

As an example of how supply and demand are dually vexing problems of the state’s water management structure, three mentors (14 percent) said that both supply and demand are foremost problems, hence they cannot be separated.

Further, another three mentors responded with answers that would fit a “neither” or “other” category. These responses claimed the problem facing California was a general problem of water distribution infrastructure (the Delta and engineered conveyance) and location (where the supply falls is vastly different than where the bulk of consumptive uses occur).

**Question 2: What (if any) changes would you propose to existing regulations or policy to streamline drought planning and management? For example, current environmental regulations (CEQA, NEPA, ESA, etc.) Water quality or other ecosystem requirements/ standards? Local/regional issues related to land use planning?**

Response Summary:

While specific responses to this question were scattered across several areas of water management, three general themes resonated in the bulk of responses to this question. These themes included:

- No changes during a drought should substitute for good drought planning.
- Certain environmental protections (CEQA, NEPA, ESA) may be in need of streamlining and additional drought flexibility (with a high bar for such flexibility), but should not be overhauled in either the short or long term.
- Land-use planning concerns may be largely mitigated with successful SGMA implementation.

Additional suggestions for changes included creating an Environmental Drought Management Plan that sets specific objectives, expediting direct potable reuse regulations, basing regulations in real-time monitoring rather than forecasting, looking at water rights priority system in general, having an expedited groundwater adjudication process, and being certain that water dedicated to environmental uses is indeed accomplishing its intended purposes.

**Question 3: What mechanisms need to be established to facilitate water transfers? Emergency responses? Long-term, non-reactionary responses?**

Response Summary:

Generally, mentors thought the answer to this question was one of better planning, a better market structure, better information, or a combination of all three. Nevertheless, there was no overwhelming single “silver bullet” response favored by a majority of interviewees.

In looking at the planning of transfers, respondents thought that emergency contingency transfer plans could help aid local agency decision making, and the construction of regional interties could alleviate some conveyance concerns. Additionally, keeping better records on water rights ownership could expedite transfer approval decisions

Interviewees strongly felt that a good examination of the current water transfer market structure was needed. Some suggested a market administrator similar to how the California Independent System Operator wheels electricity, while others suggested the benefits of a Drought Water Bank, similar to the one in use in the early 1990s

One point of consideration in facilitating transfers mentioned by mentors included a need for some counties and water agencies to be more flexible to allowing water to be transferred away from its place of origin, in order to help maintain a robust water transfer market.

A few respondents also opined of the challenges, and potential conflicts of interest, of DWR and USBR as water right holders who are also reviewers and/or approvers of transfers.



**Question 4: What (if any) water infrastructure projects should be prioritized to help California better meet its co-equal goals of water for people and the environment? (e.g., storage, conveyance, treatment plants, recycling plants, desalination, aquifer recharge.)**

Response Summary:

The mentors overwhelmingly (57 percent) see better utilization of recycled wastewater as a potential long-term supply solution to many of the water management calamities facing California, specifically those that have recurred during historical droughts. Many respondents referenced the high reliability of tertiary-treated or other advanced treated wastewater, with one mentor quipping that recycled water is “not a run of the river project.” Another interviewee suggested that tertiary treatment needs to be more widespread, rather than in larger communities. Conveyance would be needed to ensure that water was not discharged into streams, but rather used for planned beneficial uses.

Groundwater storage was also a priority for those interviewed. Mentors suggested that aquifer recharge projects can be utilized on existing agriculture land in winter when demand is generally low. Also, a few mentors referenced groundwater storage and replenishment systems in Kern, Orange and other Southern California counties, suggesting that type of management should be adopted in the Central and Northern parts of the state. In the same vein, mentors suggested desalination is a good option, but seemingly is not as much of a low-hanging fruit as recycled water.

Conveyance to reduce reliance on existing Delta infrastructure also was mentioned by several mentors. While many interviewees opined that California water conveyance in general need to be prioritized (e.g. improvements to state and federal infrastructure), four mentors suggested a need for better conveying water through or around the Delta (i.e. support for the California Water Fix, or the former Bay-Delta Water Conservation Plan). In addition to these four responses related to Water Fix, other respondents cited the Delta need and increased level of attention, mentioning threats such as sea level rise, water quality and environmental protections.

Surface storage was also mentioned by many mentors. These took the form of oft-discussed CALFED projects such as Sites and Temperance Flat reservoirs, and the enlargement of Shasta Dam. A third expansion of Los Vaqueros Reservoir also was mentioned. There was almost no mention of other possible large, on-stream surface storage projects.

**Question 5: Who do you admire for their management of environmental and/or economic impacts caused by the drought? Are there reasons these management strategies cannot be emulated by others?**

Response Summary:

Responses to this question were as diverse as the mentors themselves. Southern California, either by way of specific agency being mentioned (Metropolitan Water District, Irvine Ranch Water District, Eastern Municipal Water District, San Diego, San Fernando Basin) or by connection to management of the Colorado River Basin were given kudos. On the Colorado River, Southern Nevada Water Authority also got a nod.

Specific individuals like Governor Brown and State Water Resources Control Board Chair Felicia Marcus received multiple mentions for their leadership and ability to take action in the face of drought.

On the whole, for reasons unknown, respondents did not specifically respond to the “management strategies being emulated by others” portion of the question. One could only assume that the focus of respondents was on the first part of the question.

**Question 6: How can changes to water pricing and policy be used to lessen both the economic and environmental impacts of drought, now and in the future? Are there any restrictions (e.g., Props 26 and 218) that should be maintained?**

Response Summary:

A broad consensus emerged from mentors that Proposition 218 and/or Proposition 26 are in need of changes to better allow for water purveyors to price water effectively, especially during droughts. There was a general opinion among respondents that Proposition 218 has good intentions generally, but the specifics contained in the law hamstring water agencies. Many mentors suggested that tiered rates send proper pricing signals to consumers, but the San Juan Capistrano decision may delay people from pursuing such conservation pricing.

At least one responded referenced water being a state property, hence a Public Goods Charge is something that needed to be considered. Another responded referenced the Water Conservation Act of 2009, saying that volumetric pricing must be the norm.

**Question 7: What role is there for private industry investment to help California better manage its water resources during times of drought?**

Response Summary:

Data management, new technologies for water use efficiency, and small-scale private financing for public projects were mentioned by many mentors to a large degree. The Carlsbad Desalination Project and Poseidon was referenced indirectly more than a few times. Many respondents suggested that records management, specifically software systems management, at the state level (SWRCB and DWR) were in need of upgrade, and private industry is the obvious partnership answer.

Water measurement, water monitoring and water-use efficiency technologies, according to some mentors, is where private industry has the greatest potential to help California be better prepared to stave off effects of multi-year droughts.

**Question 8: With so many local, regional, and state agencies managing and regulating water, how can we better coordinate efforts to plan for and manage drought?**

Response Summary:

Consolidation was the principle response among mentors, either in the area of consolidating processes or consolidating water agencies. Five respondents (24 percent) suggested that water agency consolidation would better aid regional management, better integrate resources (specifically water supply resources), and aid water reuse. Three mentors suggested explicitly that mutual water companies or small water systems should be absorbed into existing, larger agencies. One of these mentors cited Arkansas (half of water systems consolidated) as an example that can work.

Consolidation of federal regulations to be managed by a single regulator agency was also suggested, while another mentor suggested that the big three water resource agencies in the state (SWRCB, DWR and USBR) need to do a better job of having drought plans related to their areas of responsibility.

After some level of consolidation, respondents suggested that regional planning, specifically integrated regional planning (IWRMPs) needs to be increased across the state. The Santa Ana Watershed Project Authority was mentioned indirectly by a few respondents.

**Question 9: How can policy-makers and scientists better quantify the costs and benefits of water for the environment and economy?**

Response Summary:

This question was arguably the toughest question for the mentors to answer in great detail, primarily due to what one mentor called “the question of the ages (in California water).” As such, responses were wide-ranging and general in nature. This makes it difficult to glean any certainties, even generally, from the responses. However, one general statement seemed to resonate in many discussions; mentors seemed to think that quantifying costs, value, or benefits was worthy but would not make decisions for how to appropriate water any easier, suggesting that data and science are only two factors to guide policy decisions. A few selected highlights are mentioned below:

- “We need more sophisticated tool to understand the multiple and competing benefits of a particular source of water.”
- “(There are) a lot of judgment calls and case by case review. How do you rank projects? Start with basic themes – helps more than one party, etc. Address (quantification of value) through good projects. Most bang for the buck. Benefit multiple sources. Regional solutions. Sustainable benefits.”
- “If you have a good healthy ecosystem you will have a better source of water. Less water is less economic output.”
- “There are several techniques that economists have to quantify the costs and benefits of water for the environment (e.g., contingent valuation).”
- “An economic study should accompany any environmental plan. Any solution should aim for the largest environmental benefit at the lowest costs.”
- “This constant guessing about what the fish and other parts of the ecosystem need has not worked. We need a new approach.”

**Question 10: What do you believe is the greatest impact on the environment from drought? What do you believe is the greatest impact on the economy from drought?**

Response Summary:

Loss of water to support aquatic habitat and fisheries, specifically anadromous fisheries, was the predominant answer surrounding environmental impact of the drought. Some mentors suggested that California is on the brink of the extinction of native fish species without a renewed drought management approach.

The biggest economic drought impacts, according to interviewees, were less water available for beneficial use, increased food prices, job loss (specifically in the landscaping, farm labor and recreation sectors), and overall economic output. These impacts specifically hit urban consumers hard and further exacerbate problems associated with water for disadvantaged communities.

Wildfire was mentioned by a number of mentors as an impact upon the economy and the environment. Respondents specifically referenced aspects of health and safety concerns, habitat concerns and use of water to drown fires, however the wildfire impact to future runoff and increased risk of charred debris entering streams are also effects of wildfires.

**Question 11: Do steps to conserve water ever have any consequences, unintended or not, on the economy or the environment? If so, what can be done?**

Response Summary:

The primary consequence of conserving water, according to the bulk of interviewees, is the loss of revenue for water agencies. Some feel that can be overcome by allowing agencies more flexibility with pricing (see Question 6 summary).

More than a few respondents said that certain conservation and efficiency measures to agriculture lands that were traditionally irrigated by method of flood irrigation has impacts both shallow and deep aquifer recharge (many areas of California have rely on passive recharge of groundwater via flood irrigation, and these same areas rely solely on groundwater for domestic water). Similarly, one mentor discussed how lining canals is good for conservation, but not so good for rodents or groundwater recharge.

Certain conservation efforts, according to one interviewee, can affect downstream users who have grown accustomed to a “waste” exiting certain gravity-fed systems into connected streams, but, according to the same interviewee, that is not a valid argument against conservation efforts.

Conservation efforts have also been a hurdle to transfers, according to a handful of mentors, specifically transfers that typically benefit refuges that are habitat for migratory birds. Similarly, the Salton Sea is affected by conserved water being transferred from Imperial Irrigation District to San Diego.

**Question 12: What is the craziest solution you’ve ever heard proposed to help solve California’s water crisis?**

Response Summary:

In perhaps the most fun question for Water Leaders to ask and for mentors to answer, responses to this question often circled back to moving water from a place of abundance to a place of need. A majority of the respondents recounted plans surrounding towing icebergs, packaging water in large vessels (such as large plastic bags or retired oil tankers).

Additionally, respondents also relayed some additional interesting ideas they have heard over the years, as listed below:

- Develop plans for a small-scale, solar-powered desalination plant.
- Revamp California’s existing water rights priority system (Carbon-copy Australia’s efforts stemming from Millennium Drought).
- Build BART-like underwater tubes to transport water from Pacific Northwest.
- Build a pipeline from the Columbia River.
- Engineer a River from Alaska to California.
- Install gates near Benicia Bridge to halt ocean water inflow to the Delta.
- Evoke Murphy’s Law of freshly-washed cars and have people park clean cars where they want it to rain or snow.

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