



Better Access. Healthier Environment. Prosperous Communities.

Recommended Reforms for the California Water Market

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Environmental Defense Fund is dedicated to protecting the environmental rights of all people, including the right to clean air, clean water, healthy food, and flourishing ecosystems. Guided by science, we work to create practical solutions that win lasting political, economic, and social support because they are nonpartisan, cost-effective, and fair.

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Table of contents

Executive summary	4
Introduction and background	5
The problem	5
Market reform	6
Policy objectives for water market reform	7
1. Build resiliency and adaptability to drought and climate change.	7
2. Increase transparency and decision-making capacity by better integrating data collection and reporting into the approval process.	7
3. Facilitate water sharing arrangements with a centralized exchange platform and a better coordinated transfer approval process.	8
4. Create benefits for disadvantaged communities and the environment.	8
5. Enable public and private investment in improved water technologies and practices.	8
6. Support water markets as an effective tool for both surface water and groundwater management.	9
Recommended administrative and state legislative actions	10
1. Standardize and publicly disclose supporting data for all transfers.	10
2. More effectively coordinate the transfer approval process.	12
3. Structure the transfer approval process to ensure environmental and DAC benefit.	14
4. Promote water sharing based on investments and changes in practices to achieve water savings.	19
5. Integrate water markets into implementation of SGMA.	20
Conclusion	22
References	23
Notes	24

Executive summary

The market is a powerful force. When designed well and harnessed by the right rules, it can drive positive results—which is why EDF has long advocated for water marketing in California, particularly as a means of benefitting the environment.

Environmental Defense Fund envisions a future where California's water management system provides incentives for meeting human needs while benefitting nature instead of harming it. That way, over time, we can ensure our cities, farming communities, and ecosystems become more resilient and robust in the face of climate change and a growing population.

Realizing this vision will require more than a single strategy. Water markets in particular have a key role to play. Markets can reward efficient use of this finite resource, steer it to places where it can create the most value, and help maintain rural incomes during times of scarcity.

Although California has a water market, it is bogged down by patchwork regulations that discourage transfers and routinely benefit only well-capitalized users. As a result, water users with fewer resources, such as small farmers, poor communities, and the environment, have suffered disproportionately during the drought. And even well-capitalized users have been hindered by the system's complexity.

In this discussion paper, EDF assesses California's current water-sharing system and proposes a set of policy changes that can provide benefits to *all* water users without altering the existing water rights system.

Our goals are straightforward: **better access to water, a healthier environment, and prosperous communities.** To that end, we propose several specific reforms that fall into five outcome-based categories:

- **Improve market transparency** by, among other things, standardizing and publicly disclosing supporting data for all transfers.
- **Reduce transaction costs and eliminate barriers to participation** by, among other things, establishing a new entity to coordinate the approval process and develop a centralized exchange platform.
- **Ensure benefits to disadvantaged communities and the environment** by incorporating incentive mechanisms into the market.
- **Free up more water for sharing** by rewarding transfers that achieve water savings.
- **Alleviate pressure on overstressed aquifers** by integrating markets into implementation of the Sustainable Groundwater Management Act.

The market is a powerful force. When designed well and harnessed by the right rules, it can drive positive results—which is why EDF has long advocated for water marketing in California, particularly as a means of benefitting the environment. When people who use or manage our natural resources are rewarded for providing environmental benefits while maintaining or enhancing their livelihoods, everyone benefits.

We look forward to continuing a dialogue with stakeholders engaged in the current discussion about reforming California's water market.

Introduction and background

The problem

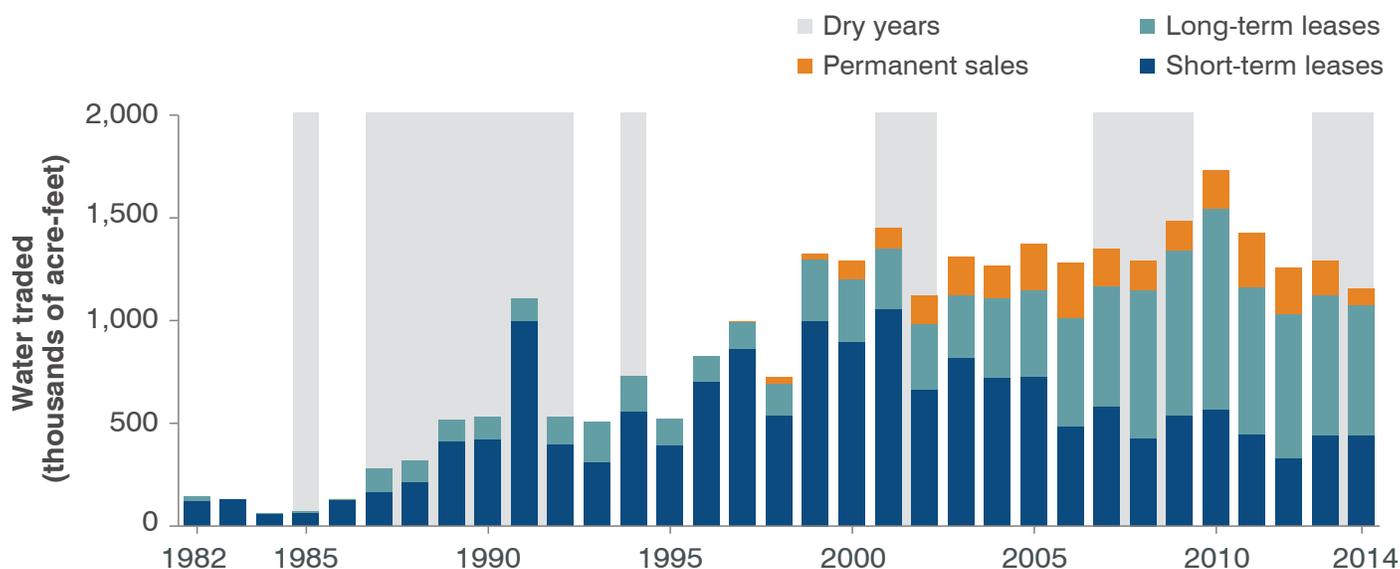
California has a long tradition of conflict over water. But after five years of drought, it has become a crisis. Declining water deliveries have forced cities and agriculture to make do with less or deplete groundwater reserves to continue business as usual.

The results have been alarming. Rivers, lakes and wetlands have dropped to dangerously low levels, harming salmon, migratory birds, and other wildlife. Farmers have fallowed fields. Not only has excessive groundwater pumping caused land to sink faster than ever before,¹ it has left many poor communities in the Central Valley without access to any water at all.

The situation has intensified rhetoric, pitting urban water users against agriculture, farmers against fish, and consumers against water-needy crops and livestock operations.

As Australia and other arid regions have demonstrated, market forces can be designed and harnessed constructively to ease conflict and mitigate the risks of long-term drought. Water sharing does not create a new supply of water. Rather, it encourages conservation and allows more of the finite resource to move to higher value uses. Markets can facilitate the allocation of this supply more quickly and cost-effectively than alternative sources like water recycling or seawater desalination.²

Growth in California's water market has been fairly flat since the early 2000s



Note: The figure shows water traded between entities that are not members of the same water district or wholesale agency. It excludes volumes committed under long-term lease and permanent-sale contracts that were not physically transferred because of hydrologic conditions or other factors (in 2014, roughly 800,000 acre-feet). Dry years are those classified as critical or dry for the Sacramento Valley. Source: Hanak, Ellen and Jelena Jezdimirovic. 2016. *Just the Facts: California's Water Market*. PPIC. http://www.ppic.org/main/publication_show.asp?i=1177.



Currently, water transfers in California account for only about 3% of the total amount of water used in the state, despite great potential to do more.

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California has a water market, but its function is limited due to a patchwork of regulations that act as institutional barriers to water-sharing transactions.

California has a water market, but its function is limited due to a patchwork of regulations that act as institutional barriers to water-sharing transactions. Regulatory oversight of proposed transfers is fragmented,³ with complex rules for trading that have yielded a prohibitively difficult approval process with high transaction costs.⁴ This complexity reduces market accessibility and is compounded by incomplete and opaque reporting and collection of data supporting transfers. Those able to navigate and benefit from the existing system tend to be large-scale buyers and sellers with resources. Transfers that do occur often fail to benefit the environment and local communities.⁵

Currently, water transfers in California account for only about 3% (roughly 1.3 million acre-feet) of the total amount of water used in the state, despite great potential to do more.⁶ The Department of Water Resources (DWR), the State Water Resources Control Board (SWRCB), and the U.S. Bureau of Reclamation (USBR), in collaboration with others, have taken steps over the past two years to improve and simplify the transfer process with limited success. The rate of water transfers has largely plateaued in recent years.

We can do more. Water users in other parts of the world share and transfer more than a third of the total water used regionally. Even urban water agencies in southern California rely on water transfers for more than 10% of their water supply.⁷ The same proportion, if applied to the entire state of California, would nearly equal the full capacity of Lake Shasta (4.55 million acre-feet).

Market reform

Recognizing these problems, a growing number of policymakers has expressed interest in reforming California's water market. This document outlines EDF's contributions to the ongoing dialogue.

Our recommendations follow from the belief that the benefits of a 21st century water market can and must extend to California's vulnerable communities and the ecosystems that sustain us all. Water sharing arrangements—formal transfers, leases, and other exchanges, including those not currently requiring agency approval—can be structured to provide multiple benefits, which will build flexibility and resiliency into the state's water supply system and ensure that water is distributed more equitably.

On the following pages, we outline our priority policy objectives for achieving better access to water, a healthier environment, and prosperous communities, and offer recommendations to accomplish them.

Policy objectives for water market reform

The reforms proposed in this document can help achieve the following policy objectives.

1. Build resiliency and adaptability to drought and climate change.

Water markets can efficiently move water to its best use and enable water users to manage periods of extended scarcity. If designed correctly, they minimize environmental, social, and economic harm in doing so. The sections below describe how markets can also ensure that disadvantaged communities (DACs) and the environment are not priced out and, in fact, gain in water security through a design that considers these environmental and community interests as part of water's best use. The need for such a system has been made especially clear in the context of the present drought, where the complex and often opaque set of rules embedded in the existing transfer approval process limits the ability of water rights-holders, communities, and environmental interests to obtain much-needed water to protect crops, quality of life, and vulnerable ecosystems.⁸ Establishing a more robust market system can create incentives that promote successful adaptation to the long-term water scarcity associated with climate change by encouraging water trades that protect and enhance environmental and DAC values.

2. Increase transparency and decision-making capacity by better integrating data collection and reporting into the approval process.

A lack of data needed to support water transfers—including information on individual water rights-holders' water diversion and consumptive use, environmental water needs, and the price of water—exacerbates the complexity of the water transfer approval process and sustainable water management.⁹ Information gaps necessitate increased levels of review to dispel uncertainty about third party impacts of transfers and obscure transfer opportunities from current water users seeking to buy or sell water. The complexity they engender limits the viability of water markets as a mechanism to economically and timely address water scarcity. It hinders government regulators' and other stakeholders' ability to allocate and obtain water needed to protect community interests and the environment by protracting transfer approval times and creating uncertainty with regard to environmental management. State policy should make standardized, site-specific data on transfers, accompanied by robust monitoring and evaluation of data collected, readily accessible by the public and water district managers for all water transfers, leases, and exchanges in California.¹⁰ This would increase state accountability and water user certainty in water supply planning, for example by improving the reliability of water delivery projections to rights-holders and for the environment.

Establishing a more robust market system can create incentives that promote successful adaptation to the long-term water scarcity associated with climate change.



3. Facilitate water sharing arrangements with a centralized exchange platform and a better coordinated transfer approval process.

Greater institutional coordination among the many entities in the state that govern water is needed to support water transactions. Fragmentation among all the federal, state, and local agencies involved results in an unnecessarily arduous review and approval process for all kinds of transfers. Building on the coordination of transfer data described above, policy reforms should promote adoption of market structures that preserve, but yet more effectively coordinate, existing regulatory authority among separate agencies to expedite approval of transfer classes that avoid undesirable impacts of transactions and combine benefits for the environment and DACs with trading that would otherwise contribute to statewide water security. The increased regulatory efficiency in the market and reduced transactions costs associated with these changes are essential elements of a system that is able to distribute water supply benefits widely among various water needs.

4. Create benefits for disadvantaged communities and the environment.

Disadvantaged communities (DACs) and the environment continue to suffer from water scarcity in California. A well-designed market can benefit these interests by not only preserving essential protections for these groups against unintended consequences of transfers—such as public hearings and “no injury” reviews—but by incorporating incentive mechanisms into the market that can directly *improve* water security for DACs and the environment beyond existing protections. Reforms should include provisions that ensure these entities benefit from increased water sharing throughout the state through trades that create multiple benefits for water users and the environment, increased access to financial resources to support drinking water projects, or otherwise.

5. Enable public and private investment in improved water technologies and practices.

Enabling spending by and on behalf of water users on technologies and practices that could make more water available for trade is vital to advancing this policy framework. Capital is

The Sustainable Groundwater Management Act (SGMA) provides the opportunity to develop market structures that can contribute to groundwater sustainability.

needed to fund efficiency improvements, build-out monitoring systems, and other functions that would enable the market to better meet DAC and environmental needs. However, even with the Proposition 1 water bond, public funding to establish the foundation of a robust water market in California will likely be limited. The relative uncertainty and duration of returns on investment (namely, water supply benefits) associated with private investments by water users in water conservation and efficiency infrastructure can further suppress capital flow. Integration of water market activity on the exchange platform described above would provide essential information on water price and trends in market demand to help create certainty, as would water transfer arrangements that share benefit among individual landowners, water districts, and mutual water companies and lower any resistance to transfers among these parties.

6. Support water markets as an effective tool for both surface water and groundwater management.

Growing water scarcity in California affects both surface water and groundwater supplies. The Sustainable Groundwater Management Act (SGMA) provides the opportunity to develop market structures that can contribute to groundwater sustainability. Markets that promote trading water as an asset have proven valuable tools for efficient groundwater management in some of California's adjudicated basins and can contribute to sustainability in unadjudicated basins by providing recharge supplies from surface water transfers and/or as part of an effective extraction shares-based trading system. State policies should recognize this important role and promote it as an essential element of integrated water management—with appropriate instructional guidance for market design—amidst the development of groundwater sustainability plans across the state.¹¹ The market can be designed to favor transfers that most positively contribute to groundwater sustainability across the state.

Recommended administrative and state legislative actions

The enactment of the following actions and changes are necessary to advance the policy objectives enumerated above.

1. Standardize and publicly disclose supporting data for all transfers.

The state lacks a significant amount of information needed to inform robust decision-making around water transfers and to make the market a more accessible and transparent water allocation tool that aligns with the needs of DACs and the environment. The following changes should be made to resolve issues related to data deficiency.

Summary of suggested reforms:

- Collect data and report on all transfers
- Publicize data in a centralized location
- Standardize information collected
- Develop authoritative water accounting system
- Make water users report to participate

1a. Collect data and report on all transfers.

Some information on transfers is currently available.¹² Good progress has been made recently toward improved monitoring practices and collection of data—in part, assuring that information is submitted—necessary to inform water management decisions and transfer approvals (see endnote 10 on the passage of Senate Bill 88). However, the data needed to provide a comprehensive representation of the water market for transparent, effective, and holistic management is still incomplete and disaggregated. California needs to implement yet greater information-gathering, evaluation, and reporting standards to increase transparency in the water market and develop more informed decision-making protocols on water deliveries and more.

Suggested reform: The new water market exchange (see recommendation 2) should be responsible for compiling data on all water transactions, with appropriate protections to ensure confidentiality, in the state through the database described below. Informal trades exempt from regulatory agency review, including both intra-district trades within the same contract or water right and trades involving pre-1914 water rights, would be included for the purposes of better revealing the nature of water use in California as well as increasing transparency and access to the market for parties that have historically had less opportunity to participate. These expanded reporting requirements for transfers beyond those currently requiring agency approval could be phased in over time to reduce reporting costs.

California needs to implement greater information gathering, evaluation, and reporting standards to increase transparency in the water market.

The central entity responsible for water market management should host a readily accessible, online database containing information on every water transfer that occurs in the state.

As discussed below, reporting through the state transfer platform would be required for all those participating in the market. This should increase transfer feasibility by reducing the transaction costs of price negotiation and opening up more sharing opportunities over time.

1b. Publicize data in a centralized location.

Some existing transfer data is already publicly available, but it is disaggregated and difficult for water users and the general public to access. For example, some transfer data is coded within larger state databases, making it difficult to obtain and apply, while many old paper records defining water rights have never been digitized. This increases transactions costs and contributes to delays for market participants who might develop a transfer based on that information to supplement their drinking water supply or contribute to another beneficial use.

Suggested reform: The central entity responsible for water market management should host a readily accessible, online database containing information on every water transfer that occurs in the state. This database would drive development and digitization of new and existing stores of information, in addition to linking to the exchange platform hosted by the water market management entity. Completed transactions would then be logged and categorized in a way that would inform trends in water use and subsequent management decisions in subsequent years.

1c. Standardize information collected.

Inconsistencies in reported transfer information limit prospective transferors' and transferees' capacity to identify optimal exchange opportunities and thus, their capacity to plan most effectively to meet water supply needs. Similarly, without collecting consistent data on the distribution and exercise of water rights, the state is less able to confidently make water delivery decisions that influence water user supply planning and preserve necessary supplies for the environment and DACs.

Suggested reform: The public database should publish consistent information for each water transfer processed, taking appropriate protections for confidentiality. Information documented for all transfers should include:

- The buyer and seller, with appropriate safeguards to ensure protection of personal information;
- The quantity of water transferred, in acre feet;
- The price of water, in total and per acre foot;
- The timing of the transfer, including specific dates as to when water will be moved as well as duration;
- Geographic origin and destination of the transfer, including associated conveyance loss ratios;
- Nature and exercise of the underlying right, including right ownership and historic diversion and consumptive use data, to determine whether water should be available for transfer;
- Nature of water transferred, i.e. whether the transfer is conservation-based, a forbearance arrangement, surface water destined for groundwater recharge, etc.; and
- The quality of water transferred, i.e., is the source of water a potable, non-potable, or historically contaminated supply.

Some of this data is required in transfer applications, while the rest is finalized or becomes available only upon completion of the transfer. The database should report on both pre- and post-transfer information.

Compilation of this data going forward would allow for sorting within the database by, for example, hydrologic region. In the future, water users would then be able to make sound management decisions regarding their water use, knowing the prices and availability of supplemental water in their region or beyond. Regulators would benefit too. For example, more consistent information on the nature and exercise of the underlying right in a transfer could help them prevent the sale of historically unused paper water rights that could disrupt another water user's supply.

1d. Develop authoritative water accounting system.

All of this information would support an authoritative water accounting system for the state, which is foundational to “transparent, reliable, timely administration (and, if necessary, curtailment) of water rights, management of groundwater, and water trading,” all of which is needed to make sure water is available to meet the needs of ecosystems, rural communities, and other water users.¹³

Suggested reform: Reporting on water transfers should link with a defined state agency process for reviewing and compiling information received from water right-holders on net water use (the amount applied from diversions and use, minus the return flow) at a frequency that accommodates operational needs (i.e., Delta flows are adjusted daily with reservoir operation and diversions). This information on surface water use should be integrated with groundwater extraction data from SGMA and modeled conjunctively to prevent surface flow depletion in interconnected systems. Finally, the state should encourage adoption of new cost-effective, accurate information-gathering technologies such as remote gauge, meter reading, and other emerging technologies as they are vetted and deemed effective.¹⁴ These changes would further benefit the state by providing a clear basis for water management decision-making.

1e. Make water users report to participate.

Consistent reporting on water use and transfers can be expensive for water users tasked with tracking and submitting the information. The state can avoid undue cost to rights-holders for whom reporting would be a significant burden by designing the reporting requirements articulated in 1c that go beyond those of SB 88 as an incentive, rather than a blanket regulatory measure.

Suggested reform: All water rights-holders should have to report on transfers and water use in accordance with the requirements of 1c as a condition of participation in the water transaction. This requirement would not alter the nature of their right in any way, but would aid in sound water management planning by helping to track diversions of water, return flows, and other water use characteristics that must be considered when assessing environmental flow needs and transfer viability for other water users. This would build on data collection already underway by the SWRCB in the Russian River system and the Delta.

2. More effectively coordinate the transfer approval process.

Currently, obtaining approval for a proposed transfer is an arduous process. Different types of water rights and contracts are subject to different approvals that can be granted by numerous local, state, and federal entities and agencies. Practitioners have indicated that successive reviews by different parties can extend the time required to achieve approvals before the transfer can occur past the times when the transfer can be made. As a result, trades have been concentrated within the same large projects (Central Valley Project, State Water Project, and Colorado River) in order to minimize the differences in water rights. These trades have

Fragmented regulatory oversight of proposed transfers and inconsistent, unclear rules for trading have yielded a prohibitively complex approval process.

accounted for over 60 percent of all trades (and 80 percent of trades apart from direct state or federal government purchases) since the mid-1990s.¹⁵

Timing and increased ability to move water at optimal moments is vital due to, for example, constraints on conveyance availability and time-sensitive cropping demands. However, it can be extremely difficult and resource intensive to navigate this process successfully for the reasons mentioned. Creating a single entity specifically dedicated to the water market with the responsibility of coordinating—while not appropriating—the separate sets of existing approval authorities among different agencies could significantly diminish the transaction costs of buying and selling water.

Summary of suggested reforms:

- Establish a centralized state entity
- Ensure independent board oversight
- Develop a central exchange platform

2a. Establish a centralized state entity.

Fragmented regulatory oversight of proposed transfers and inconsistent, unclear rules for trading have yielded a prohibitively complex approval process.¹⁶ This complexity reduces market transparency and accessibility. EDF has been told that some small water agencies across the state that have historically lacked the resources to navigate the existing system desire to participate in the market. Those that are currently able to successfully navigate the existing system tend to be large buyers and sellers with resources to dedicate to seeking out and securing transfers.

Suggested reform: The state should establish a new entity, perhaps housed in an existing state agency such as the California Natural Resources Agency, that would assume responsibility for managing the water market and, to avoid further regulatory fragmentation, the transfer database by coordinating with the transfer approval authority otherwise retained by existing state agencies.¹⁷ This entity must be empowered and have sufficient staff capacity to manage the transfer approval process for all proposed transfers in a way that satisfies all existing regulatory requirements held by separate state and federal agencies while also speeding the completion of eligible transfers.¹⁸ For example, the new California Water Market Exchange (“exchange”) could track proposed transfers through separate regulatory agencies and impose shortened deadlines for responses from regulators, as Washington, Oregon, and other states do in the case of short-term transfers.¹⁹

2b. Ensure independent board oversight.

The exchange would not usurp the authority of other regulatory agencies in transfer review, but it would have important responsibilities maintaining comprehensive information on transfers and guiding trades through the approval process that would afford it some influence over the water market.

Suggested reform: An independent board should oversee this new entity to ensure accountability and transparency in the fulfillment of its duties. Board members must reflect diverse water interests, so positions should be reserved for a diverse set of representatives. The chairperson would represent state agencies. Alternatively, the exchange could report to an existing body such as the California Water Commission.

2c. Develop a central exchange platform.

Decentralization of authority governing formal transfers, coupled with the many transfers that take place that are exempt from state or federal approval, has limited the transparency of and

A 21st century water market can and must extend to California's vulnerable communities and the ecosystems that sustain us all.



access to water markets, preventing many water users and communities who would like to participate in water sharing arrangements from doing so.

Suggested reform: The state should charge this new entity with developing a centralized, online water market platform that would host information about water demand and supplies available for trade. Though the board would decide the specific data and features to include, EDF's recommendations are described in recommendation 1.

3. Structure the transfer approval process to ensure environmental and DAC benefit.

Coordination of transfer approvals can greatly reduce the time and resources involved in securing a water transfer. The exchange should work with other state agencies to ensure approvals benefit ecosystems and DACs, for example by defining transfer conditions that create this benefit, or a set of multiple benefits, that could be subject to expedited review. Such transfers could be evaluated using multidimensional “bands” of characteristics—such as geographic area, intended use, and timing—to afford more timely evaluation and approval.

Summary of suggested reforms:

- Establish an environmental and DAC water fund
- Expedite intra-watershed transfers and consolidate place of use
- Expedite temporary transfers for environmental needs
- Expedite transfers that benefit high-value wildlife habitat or special-status species
- Create incentives for multi-benefit transfers through state grant funding

3a. Establish an environmental and DAC water fund.

Multiple-benefit transfers are important for improving water security for vulnerable communities and ecosystems, many of which would benefit greatly from increased investment in or flows contributed to their respective water supplies. Transfer proponents could achieve multiple benefits with their transfers if they contributed to a fund that would allocate money or

water to projects that maximize the return on investment, as measured in environmental and DAC water supply benefit.

Suggested reform: Transferors should contribute to an environmental and DAC water fund as a condition of transfer approval. This could entail some fraction of transfer cost or water and would create benefit in areas or through projects with the best return on investment for ecosystems and communities, thereby creating the greatest gains in water security for these groups.

Projects to benefit the environment could include:

- Instream flow or aquatic and terrestrial ecosystem water supply acquisitions through the market, including those providing incidental benefits through wildlife-friendly agricultural practices and adequate supplies of water for state and federal wildlife refuges;
- Facilitation of more open and transparent water management through improved water monitoring and data networks, including enhanced gauging of instream flows and groundwater conditions in priority watersheds and in areas of transfer origin; and
- Other restoration projects that would benefit aquatic, riparian, and wetland species (e.g., restoration of riparian zones).

Funding to benefit DACs could support:

- Technical studies to inform and finance much-needed drinking water infrastructure and water quality projects such as building emergency wells, closing contaminated wells, and groundwater banking and recharge that improves the quality of supplies, which could also help facilitate procurement of additional sources of state funding (see below);
- DAC participation in the water market—in particular to overcome barriers such as a lack of information on opportunities to purchase water, high legal fees for securing trades, the cost of water, and storage and conveyance capacity—coupled with infrastructure investments to link DAC water systems to other supply systems in order to address storage and conveyance constraints; and
- Increased outreach to DAC water agencies in order to build capacity with regard to technical, managerial, and financial expertise.

To ensure these funds support projects that generate the highest ecosystem and community value over time, some funding should be spent on a risk assessment that identifies threats to California ecosystems and DACs given the inevitability of climate change, as well as increased water market activity.

There are several existing sources of funding to support projects providing enhanced benefits to DACs and the environment through propositions approved by voters, General Fund appropriation, and federal sources. Even so, project proponents, in particular those addressing DAC water supplies, have struggled to implement them.²⁰ Accordingly, the Legislature should also identify an entity responsible for administering this new fund that is able to address these capacity constraints and ensure monies and water are delivered when needed. The new exchange and its supervising board could assume the role as part of its authority in water market oversight. Existing state agencies such as the Department of Fish and Wildlife, the Wildlife Conservation Board, or the Office of Emergency Services could also channel the funds to augment programs already underway to benefit the state's ecosystems and DACs. State water planning programs that address regional priorities and promote long-run water sustainability

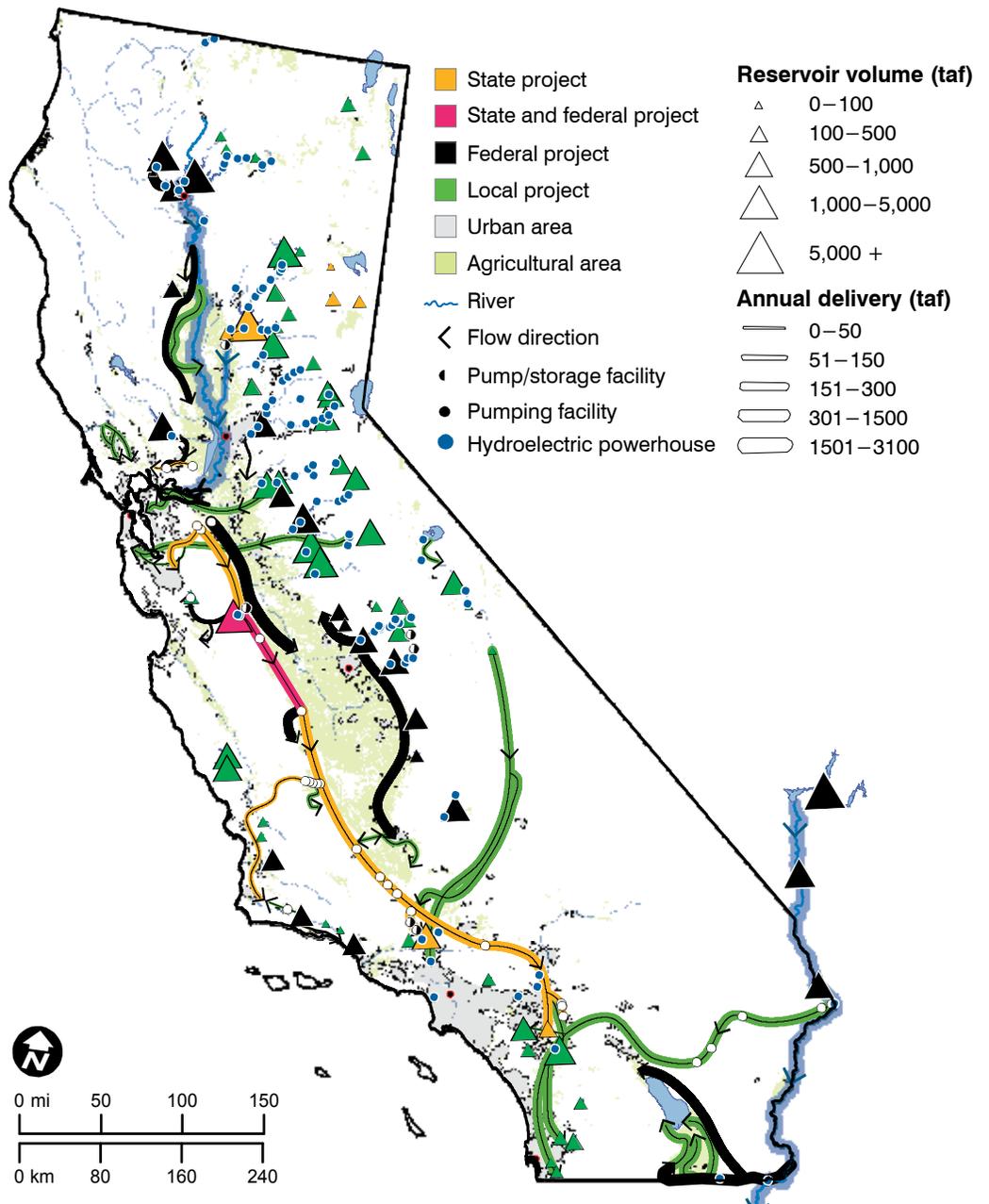
Transferors should contribute to an environmental and DAC water fund as a condition of transfer approval.

could help allocate water acquired through the market to achieve community and environmental benefit as well.

3b. Expedite intra-watershed transfers and consolidate place of use.

During the drought of the late 2000s, Central Valley Project and State Water Project (collectively, “Projects”) operators consolidated the place of use for the Projects within the San Joaquin Valley. This allowed farmers to trade more freely by overriding the multiple layers of transfer review

California’s water projects help transfer water within and between regions



Source: Hanak, Ellen and Elizabeth Stryjewski. 2012. *California’s Water Market, By the Numbers: Update 2012*. PPIC. http://www.ppic.org/content/pubs/report/R_1112EHR.pdf.



Transfers between water users can and should be designed in a way that protects and benefits vulnerable wildlife, such as California's giant garter snake.

Dave Felix/Wikimedia Commons

The state should consolidate places of use within regions and make transfers within watersheds subject to expedited review. The state should also include protections for local water uses that might be harmed by changes in place of use.

currently in place to govern trades between different water rights (e.g., locally-held, state, and federal rights to the Projects) without sacrificing important environmental constraints or creating potential for significant third-party impacts. If the water stays in the basin and all local environmental baselines are met, changes to the point within the conveyance network at which it is diverted are unlikely to have a large impact on the environment or significantly change the employment opportunities or productivity of the region. Promoting regional water sharing in this way should be a priority under the new water market to increase water resource sustainability.

Suggested reform: The state should consolidate places of use within regions and make transfers within watersheds subject to expedited review. As part of this, the state should also include protections for local water uses that might be harmed by changes in place of use (e.g., environmental flows in some streams).²¹

3c. Expedite temporary transfers for environmental needs.

California currently allows for expedited review of temporary transfers lasting one year or less. Other states define “temporary” more broadly for certain transfers. Oregon, for example, streamlines review of transfers to environmental flows lasting five years or less, which has helped facilitate market activity and support river and stream ecosystems. A contingency of this expedited process is that the state can revoke transfer leases if they are ultimately found to harm other water rights-holders.²² Transfers of water to environmental water needs is an important way for environmental interests to augment restoration of aquatic and terrestrial ecosystems, in particular when conditions of extreme scarcity may pose an immediate threat to such environments that could cause long-term damage. For example, water transfers that augment managed wetland water supplies can fulfill critical ecosystem forage and habitat functions for a variety of species.

Suggested reform: Following Oregon's model, the state Legislature should modify Water Code §1707 to streamline review of short-term transfers that create environmental benefit such as those destined for managed wetland supply, wildlife refuges, and instream flow. This statute does not effectively expedite review for such transfers at present.²³ Transfers *between* these uses

should also be expedited (e.g., transfer of a wetland supply to be dedicated instream for fish) to optimize the supply available to support nature. These changes would allow greater progress toward degraded ecosystem restoration by facilitating more water sharing to support these habitat needs.

3d. Expedite transfers that benefit high-value wildlife habitat or special-status species

Transfers between water users can and should be designed in a way that protects and benefits wildlife. To incentivize these over other, single-benefit transfers that do not provide environmental (or DAC) benefit, the state should prioritize transfers that fulfill some habitat need for special-status wildlife such as migratory birds, giant garter snake, and Chinook salmon.

Suggested reform: Transfers should receive priority approval:

- When the transfer is based on idling rice fields and the proponent agrees to cultivate or retain non-irrigated cover crops or natural vegetation to provide habitat and forage for birds;
- If the proponent commits to using some of the water remaining in the transfer area of origin for post-harvest flooding using a balanced approach that also maintains salmon temperature and flow thresholds;
- If the transfer is based on crop idling transfers that occurs more than two kilometers from wetlands and refuges, riparian corridors, and known Sandhill crane roost sites;
- If the transfer is based on idling of crops other than corn, winter wheat/triticale, or other grains that are particularly important to cranes and waterfowl; and
- And if the transfer contributes protections outlined in USBR's 2009 and 2010 transfer programs for giant garter snake.

This list is not comprehensive. Other conditions of transfers that have habitat or wildlife benefit should be considered for expedited review.



Endangered species can benefit when flows are provided through market transactions.

Water can be made available for trade when water users implement water use technologies and practices that reduce the net water consumed in crop production. The Center for Irrigation Technology at California State University, Fresno estimates that 330,000 acre-feet of new water per year can be freed up through efficiency improvements.

3e. Create incentives for multi-benefit transfers through state grant funding.

State grants have, in the past, been designed to incentivize water management practices that increase resource sustainability and management capacity (e.g., money available for only those entities with established Integrated Regional Water Management Plans or addressing specific requirements in their groundwater management plans).

Suggested reform: State grant funding should be established to promote exchanges that achieve multiple objectives—for example the transfer of water supplies that create temperature and water quality benefits—provide an instream flow benefit (during conveyance), or contribute to groundwater sustainability in addition to providing a supply of water to the buyer—to develop a more holistically resilient water supply system. The grants could help fund studies that inform completion of such transfers, i.e., by demonstrating the presence of “real water.”

4. Promote water sharing based on investments and changes in practices to achieve water savings.

Water can be made available for trade when water users implement water use technologies and practices that reduce the net water consumed in crop production. The Center for Irrigation Technology at California State University, Fresno estimates that 330,000 acre-feet of new water per year can be freed up through efficiency improvements.²⁴ Adoption of other production practices, such as deficit irrigation and crop shifting, can generate even greater quantities of water for transfer to help alleviate acute impacts of water scarcity on the state’s communities, ecosystems, and other water users. These changes can also improve water quality by reducing polluted agricultural runoff into streams and groundwater basins and increase agricultural yields by lowering input costs. It is important, however, to consider the groundwater recharge implications of reduced applied water runoff as well.

Summary of suggested reforms:

- Create revenue sharing arrangements from transfers for landowners, water districts, and mutual water companies
- Update and establish consistency in DWR and USBR water transfers white paper

4a. Create revenue sharing arrangements from transfers for landowners, water districts, and mutual water companies.

Individual water users and water districts or mutual companies sometimes oppose the sale of conserved water away from the county, district, or region. Among other reasons, this is due to the decrease in local returns on water use associated with the transfer of water.

Suggested reform: The state should direct local agencies to develop rules incentivizing landowner implementation of practices and investments that free up water in return for some sharing of revenues gained from marketing the conserved water in order to eliminate the need for any previously enacted prohibitions on such practices. For example, agencies could adopt a graduated structure where landowners keep the proceeds from conserving and selling up to 10% of their normal water supply but would then have to incrementally share transfer revenue with the water district or mutual water company as greater volume is sold. The arrangement could also be structured as a water supplier loan to the landowner to finance the efficiency improvement to be repaid with revenues gained from marketing the saved water. This would create a landowner incentive to obtain the highest value for their water, while also securing a continued revenue stream for the district or company.

Local districts should develop these rules so that they align with local conditions and needs, in particular the sustainability objectives outlined in SGMA plans. Rules must also reflect significant stakeholder engagement so as to maximize future cooperation between landowners and their districts in this area.

These arrangements could ensure community and environmental benefit by requiring that some portion of revenues be shared with local communities to alleviate any negative socioeconomic or environmental impacts associated with the transfer.²⁵

4b. Update and establish consistency in DWR and USBR water transfers white paper.

The California DWR and USBR have jointly developed guidelines describing the technical information required to complete transfer proposals.²⁶ Currently, the document provides helpful advice to transferors and transferees on what data is needed to support transfers based on land fallowing, groundwater substitution, and reservoir reoperation.

However, sporadic changes to the guidelines create confusion among stakeholders regarding the requirements for transfer approval and decrease transparency in the market process, limiting the capacity for transfer proponents to secure trades to meet water supply needs.

Suggested reform: DWR and USBR should update this white paper to include guidelines on the following.

- Data needs for transfers based on water conservation measures and programs. The revised paper could help predict the success of proposed conservation programs and related transfers, including those based on crop shifting and deficit irrigation. Guidelines to govern these transfers should also address how to monitor the effects and implementation of these trades.
- Guiding estimates for consumptive use of different crops by region. The evapotranspiration (ET) rates of certain crops are already addressed in the DWR/SWRCB white paper, which helps transfer proponents calculate the quantity of water available for sale. This determination can be expensive and time-consuming for crops not presently included. Additional information on ET rates compiled by the University of California could be used.
- Guidance for transfers of environmental water between environmental users. Occasionally, those responsible for dedicating flows to environmental needs seek to transfer these supplies to other environmental uses to optimize the water available to support ecosystem function.

Future changes to the white paper, though, should occur at established and predictable intervals that give water users sufficient advance warning to make water supply decisions in the upcoming water year.

5. Integrate water markets into implementation of SGMA.

Water trading within basins, between watersheds, and through time (i.e., groundwater banking) will be a key tool for groundwater sustainability agencies in overdrafted basins as they attempt to meet sustainable yields.

Summary of suggested reforms:

- Advise on design of market for extraction shares
- Ensure transfers maximize groundwater benefit

Integrated water markets can greatly contribute to the achievement of groundwater sustainability by relieving pressure on stressed groundwater supplies, reducing economic harm to existing pumpers.

5a. Advise on design of market for extraction shares.

Integrated water markets can greatly contribute to the achievement of groundwater sustainability by relieving pressure on stressed groundwater supplies, reducing economic harm to existing pumpers, and, in some cases, addressing issues related to jurisdictional boundaries.²⁷ With growing water scarcity in the state, there will no doubt be a correspondingly increased demand for transfers of both surface and groundwater. SGMA permits groundwater transfers, but it does not go as far as to promote them or advise on how to design an accessible, effective, and sustainable market. As Groundwater Sustainability Agencies (GSAs) develop rules to govern groundwater under SGMA, they must take into account the impacts that can arise from pumping groundwater in interconnected water systems, both for local use and water transfers.

Suggested reform: The Legislature should pass legislation to include explicit language promoting the role of markets conditioned on ensuring environmental and DAC benefit in developing groundwater sustainability plans and reaching basin sustainable yield. Concurrently, DWR should include guidance for market design among the best management practices it already has to develop under SGMA. This guidance should feature advice on the development of markets for extraction shares, building on existing resources that address their role.²⁸

These markets should benefit DACs and the environment, specifically by ensuring that any groundwater use does not impact local ecosystems or communities in the transfer area of origin that rely exclusively on private wells and groundwater for their drinking water supply. When inter-basin transfers are involved, they should similarly be conditioned on the development and ongoing implementation of groundwater sustainability plans, including parameters to govern sustainable transfers, in both the basin of origin and the destination to maximize the benefit accrued from the water's use. This is important to ensure that no "hotspots" occur, where groundwater users in one basin exacerbate local overdraft to the detriment of local ecosystems and other water users, by transferring away excessive amounts of water to another basin, even when the destination basin may benefit greatly from the imported supply.

5b. Ensure transfers maximize groundwater benefit.

Imported surface water can provide critical supplies for recharge to overdrafted groundwater basins where declining groundwater levels undermine water supply security for the environment and DACs. Both in-lieu and direct recharge can help stabilize and/or restore groundwater levels, as well as increase groundwater quality if the imported water can help to dilute contaminated local supplies. However, regulatory agencies need to weigh the benefit of sending water to the receiving basin against its value in the watershed of origin. If the transfer is of pumped groundwater, for example, it can exacerbate overdraft in the area of origin, deplete local surface water bodies, and lower water levels to cut off nearby wells. These effects should be avoided.

Suggested reform: The state should prioritize water transfers that maximize groundwater benefit accrued to both source and destination watersheds. A prerequisite to any transfer should be both basins' development and ongoing implementation of groundwater sustainability plans that include parameters to govern sustainable transfers, as well as a thorough weighing of the benefit of water in both the basin of origin and its destination. Benefit should be measured as a function of the transfers' contribution to SGMA groundwater sustainability plan objectives, adherence to the parameters governing transfers, and any other regional planning goals, such as those outlined in integrated regional water management plans. These conditions are critical in order to avoid the "hotspot" issue discussed in 5a.

Conclusion



Matthew Grimm

EDF has a long history of advocating for water marketing in California given its belief that water markets can cost-effectively make more water available for environmental resources and DACs while continuing to support productive agriculture. Moving forward in the present effort, EDF remains committed to collaborating with the state, urban and agricultural water users, environmental and disadvantaged community interests, and other stakeholders in order to achieve greater sustainability for all of California's water resources through improved market function.

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Notes

- ¹ Farr, Jones, and Liu (2015).
- ² Water transfers have cost as little as \$50 per acre-foot, though during the present drought, water transfer prices on the spot market have reached up to \$2000 per acre-foot given the restricted ability, particularly in Southern California, to obtain much-needed supplemental water supplies (Hanak et al. (2012); Vekshin (2014)). Seawater desalination can cost as much as \$3000/acre-foot, while recycled municipal water ranges from \$300 to \$1300 per acre-foot (Cooley and Ajami (2012); Hanak and Stryjewski (2012)). The recently completed Carlsbad Desalination Plant took three years to complete; Lake Shasta was built in eight years.
- ³ DWR's 2014 fact sheet on water transfers indicates, "DWR is one of several public agencies involved in approval and management of proposed water transfers in California...Others include the State Water Resources Control Board (State Water Board), the California Department of Fish and Wildlife, US Bureau of Reclamation, US Fish and Wildlife Service, National Marines Fisheries Service, county governments, and local/regional water districts."
- ⁴ Gray et al. (2015).
- ⁵ Hanak and Stryjewski (2012) describe how environmental water acquisitions in particular have fallen since 2008.
- ⁶ This data from Hanak et al. (2015) predominantly includes temporary, long-term, and permanent trades between water districts, not trades among farmers within irrigation districts or trades among water right holders within adjudicated basins, some of which have active trading.
- ⁷ Id.
- ⁸ Gray et al. (2015).
- ⁹ Gray et al (2015).
- ¹⁰ The passage of Senate Bill 88 in June 2015 requires measurement and reporting of all water diversions of 10 acre-feet or more. This marked an important step in gathering the information needed to inform transfer approvals.
- ¹¹ Assembly Bill 1390 and Senate Bill 226, passed in 2015, streamlined California's groundwater basin adjudication process. These should contribute to the development of market-based management strategies for groundwater particularly by reducing the costs historically associated with defining the property (extraction) rights needed for effective market function.
- ¹² DWR reports limited information on transfer activity as they occur: <http://www.water.ca.gov/watertransfers/activity.cfm>. SWRCB also provides a list of transfer activity on its website, but, like DWR, it only enumerates the transfers the Board approved, not those actually completed: http://www.swrcb.ca.gov/waterrights/water_issues/programs/water_transfers/. And the USBR site provides very little accessible detail, offering links to the entire region's National Environmental Policy Act documents without differentiating which pertain to water transfers: http://www.usbr.gov/mp/nepa/nepa_base.cfm?location=all.
- ¹³ Gray et al. (2015). Pg. 9.
- ¹⁴ These recommendations are described in greater detail in Gray et al. (2015) and are attributed to them.
- ¹⁵ Hanak and Stryjewski (2012).
- ¹⁶ Gray et al. (2015).
- ¹⁷ Helpful models for this entity include Covered California, the state healthcare exchange, and the California independent system operator (CAISO), an entity that operates most of the state's electricity grid. See Hanak et al. (2011) for more detail on the operation of a water market operation similar to CAISO.
- ¹⁸ It will be necessary to support specific roles and responsibilities of this entity and its governing board (see 2b) with legislative findings. Accordingly, the Governor first should establish the WMME through an executive order. Successive legislation should then follow to validate its appointments.
- ¹⁹ See Szeptycki et al. (2015) for more information on how Washington and Oregon typically review applications for temporary transfers (defined as five years in duration or less) within two months.
- ²⁰ This is largely because of state grant guidelines that require detailed project feasibility studies informing the proposed efforts. Local agencies often lack the financial, technical, and managerial capacity to complete these studies, as well as the capacity to manage future operations and maintenance, making access to state funds difficult to obtain. See more information in Governor's Drinking Water Stakeholder Group (2013). The state's Division of Drinking Water Programs, now housed in the SWRCB, is working to address these issues.
- ²¹ This recommendation is attributable to Gray et al. (2015).
- ²² Gray et al. (2015).
- ²³ This recommendation is attributable to Gray et al. (2015).
- ²⁴ The Center for Irrigation Technology (2011).
- ²⁵ There is precedent for this in Oregon, where water users must dedicate a portion of all conserved water to the environment, and in California, with the Imperial Irrigation District's \$40 million allocation of funds for socio-economic mitigation in its transfer of water to the San Diego County Water Authority.
- ²⁶ See California DWR and Bureau of Reclamation, Mid-Pacific Region (2015).
- ²⁷ Aladjem and Sunding (2015).
- ²⁸ One example is the SWRCB-commissioned report on groundwater adjudications in California, which details methodologies for allocating groundwater use rights and the role of transfers in adjudicated basins: http://www.waterboards.ca.gov/water_issues/programs/gmp/docs/resources/swrcb_012816.pdf.



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