

UPDATE 2000: PROGRESS AND LIMITATIONS IN DEVELOPING A WATER MARKET IN CALIFORNIA

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ABSTRACT

Water markets have long been proposed for California as a water management tool to increase water use efficiency. Variability of precipitation across time and space, a fast growing population with strong environmental concerns, a vocal agricultural sector, and a powerful service economy combine to create pressure on limited indigenous water supplies. While continued investments in conservation are needed to continue to reduce demand-side pressure, California water policymakers are seeking innovative market-based solutions to cooperatively and efficiently allocate water. So far, California has failed to create the key elements that would support a dynamic water market. This paper will review efforts to initiate a water market in California, provide an update on the state-of-the market, and suggest some solutions.

Keywords: California, water marketing, water transfers, water efficiency, economic efficiency

The theme of this special issue of *Water Resources Update* focuses on trans-boundary water issues. Although most California water does not cross national boundaries from source to use, agriculture-to-urban water transfers do traverse political, social, and economic borders.¹ The progress made in developing a water market in California may inform efforts in other basins where similar efforts are ongoing.

CALIFORNIA'S WATER SUPPLY

California's water supplies are distributed unevenly, both geographically and temporally. Of the 71 million acre-feet (maf) of average annual runoff, more than 70 percent occurs in the northern half of the state while about 75 percent of water demand is in the southern half of the State (DWR p. 3-2).² Seventy-five percent of the State's average annual precipitation occurs between November and March (DWR p. 3-5). In addition to seasonal variability, California is prone to multi-year droughts, the most recent of which lasted six years from 1987 until 1992 (DWR p. 3-6). Making matters worse, California's population is expected to grow quickly

from a projected 35 million people in year 2000 to 45 million in 2020, an annual increase of 1.4 percent (CA Dept of Finance website). To meet these demands in drought years and otherwise, a market mechanism reallocating only a small percentage of available water would increase system flexibility, reliability, and ecosystem protection.

Instead of encouraging a dynamic market mentality, California has continued to rely on hardware fixes to address the combined pressures of seasonal and annual variability with population growth. The result has been massive efforts to control water supplies to the extent possible through storage and conveyance. The State Water Project, the federal Central Valley Project, and numerous regional and local projects have been constructed to store water when it is available and to transfer water to where it is needed. By 1980, almost every viable dam site had been used.

Now, without a vigorous water market, California has arrived at a point at which, even with extensive infrastructure, each of three major water use sectors in California (agriculture, urban, environment) faces future water shortages as pressures rise from population increases, economic growth and implementation of environmental regulations. If a drought were to occur in the year 2000, California would likely see the following effects: Water supply for all uses would decline from 78 maf to 60 maf; urban areas in the San Francisco Bay Area and the south coast region, including Los Angeles and San Diego counties, would be vulnerable to 50 percent reductions in supply; agricultural users in the San Joaquin Valley could face reductions up to 75 percent of their surface water supply; and aquatic species and riparian habitat would be severely impacted (DWR p. 3-23; Gleick et. al. 1995).³ While users with a groundwater supply would have a cushion, no sector would be left unaffected, repeating the California experience in the 1987-92 drought. Had California supported a market mechanism for reallocating a fraction of available water between willing buyers and willing sellers, there would now be in place a system to help address the needs for additional flexibility, reliability, and ecosystem protection.

CALIFORNIA WATER MARKET HISTORY

Since the construction of the state's water conveyance facilities, the ability for third parties to transfer water has been constrained by the internally conflicting roles of the public agencies. The California Department of Water Resources (DWR), the United States Bureau of Reclamation (USBR), and the Metropolitan Water District of Southern California (MWD), are simultaneously the operators and the regulators of their respective facilities, the State Water Project, the Central Valley Project, and Colorado River Aqueduct. The result is that the agencies allocate capacity in their pumps and aqueducts in their own interest in order to retain power for themselves and their contract constituents through continued control of the facilities (Easter, et. al. 1998). Additionally, state laws that mandate open access to conveyance facilities for fair compensation have not been supported or clarified by the legislature or the courts.

Water transfers are not new to California. In fact, transfers within water districts and within project service areas are commonplace. Individual farmers have completed over 1,200 transactions within the Central Valley Project service area (Littleton et. al. 1995). Agricultural districts buy and sell water to each other on a spot market, usually within the same basin. Contractors of the State Water Project have executed a handful of transfers, most between agricultural users (Littleton et. al. 1995). This evidence illustrates that transfers do occur, but usually only within the agricultural sector and rarely the long distances between different hydrologic basins, which would require the use of project facilities such as those controlled by DWR, USBR, and MWD.

Market Obstacles: Third Party Impacts and Transaction Costs

Obstacles to water transfers usually have taken one of two forms: over-sensitivity to third party impacts and high transaction costs. Third-party impacts are so named for the potential impacts on those parties other than either the buyer or the seller of water. Of most concern is the reduction in economic or environmental benefits to the area-of-origin, from which the water is being transferred. An acre-foot of water transferred elsewhere, it is argued, will mean one less acre-foot of water used to grow local crops locally. Hence, the demand for services to manage crops will be reduced. Fewer seeds and less fuel for tractors may be purchased and less farm labor will be required. Less water applied may also translate into less return flow to other farmers downstream and possibly less water for species

dependent on farm habitat. To date, these arguments have been compelling to decisionmakers and have resulted in the demise of several proposed transfers.

However, transfers are specific to a particular situation and can be designed to avoid or mitigate most impacts. For example, transfers of conserved agricultural water manage to avoid third party impacts by selling only water that is made available by increases in efficiency. Shifting to crops that evapotranspire less, for example, reduces consumptive use while maintaining the total number of acres in production. Such a transaction may even produce additional environmental benefits by increasing flow in rivers below the original point of diversion and secondary economic and community benefits if the substitute crop is of higher value. While each water transfer deal is different and should be evaluated on its own merits, proposed transfers of conserved water indicate that market participants have incorporated some third-party impact concerns and have worked to reduce or minimize those negative impacts.

While some obstacles have been overcome, high transaction costs continue to be a major reason for unsuccessful inter-sectoral deals. Archibald and Renwick (1998) group transaction costs into two types: administratively-induced costs (AICs), which include marketing-related expenses such as developing customers and negotiating contracts; and policy-induced costs (PICs), which include regulatory, permitting, and compliance costs. They applied this framework to the California marketplace to analyze potential gains-from-trade from hypothetical water transfers. Their results indicate that PICs are preventing inter-district transfers from occurring and suggest "policies influencing PICs need to be examined to clarify and perhaps to reduce these costs if market performance is to be improved." Archibald and Renwick's results mirror the practical experience of many private water companies in their efforts to facilitate inter-sectoral transactions. PICs associated with some transfers can be more than the value of the entire transaction, making them economically impracticable.

California Drought Water Bank: Fleeting Success

An example of the regulators' power is that the only period in which inter-sectoral and inter-basin transfers were successful was when the government orchestrated the California State Emergency Water Bank of 1991. In a short period, the government-run Water Bank program developed 800,000 AF of supply from 351 contracts with agricultural users, with the DWR negotiating with farmers as a group (Coppock 1994). Water was purchased at a flat rate of \$125 per acre-foot, to prevent

sellers from earning excessive profits, and sold to urban and agricultural users at \$175 per acre-foot.⁴ Water in excess of demand was stored. The Water Bank was extended another year, but demand dwindled as winter rains returned and was closed thereafter.

The Water Bank succeeded in assisting the opening of a market. In 1991, the fifth consecutive year of drought, stakeholders dropped many common objections to large-scale trading, such as objections to fallowing (as a way of obtaining water for transfer), and cleared the way for the reduction in transaction costs and streamlining the regulatory process. To do this, the Legislature promulgated emergency legislation: Assembly Bill 9X provided water suppliers the ability to transfer water outside the supplier's service area and Assembly Bill 10X ensured no risk to the supplier's water right during the drought (Littleton et. al. 1995). The Bank showed that under conditions of drought, political and economic obstructions to large-scale markets diminish enough to allow agreement.

Closure of the Water Bank: A Market For Emergencies Only

The Water Bank closed in 1992 for several reasons: demand dwindled as precipitation increased and studies found evidence of economic impacts to areas-of-origin from the practices of fallowing land (Howitt 1994). The Bank's demise illustrated that, under the current regulatory and institutional dynamic, a dynamic marketplace cannot be sustained. Since 1992, DWR, the same agency that was able to develop and transfer 800,000 AF under its own program during the drought, has been unwilling to provide similar access to facilities at economic rates to third parties. The transaction costs associated with meeting high access prices and overcoming these regulatory hurdles have effectively prevented third parties from completing long-distance transfers.

Despite some optimistic studies, no formal market for water actually exists in California. Easter, Dinar and Rosegrant (1998) argue that, despite high transaction costs, a formal market has developed in California during the 1990s because of (1) excessive economic and environmental costs of developing new sources of supply; and (2) potentially significant gains-from-trade of transferring existing water supplies (Vaux and Howitt 1984).⁵ To be sure, California has experienced a growth in market transactions *within* agricultural districts and *within* sectors. However, completed inter-regional and inter-sectoral transfers outside of the State Water Bank, remain elusive with broken deals littering the landscape. Numerous single seller – single buyer agricultural-to-

urban transactions have been negotiated and signed, but water never actually moved. Three of these transactions include those between (1) Imperial Irrigation District and Metropolitan Water District of Southern California; (2) Palo Verde Irrigation District and MWD; and (3) Devil's Den Water District and Castaic Lake Water Agency (Haddad 2000). These and other uncompleted agricultural-to-urban transfers form a long historical chain of unconsummated deals in the California market. The pressing question is: why, in an environment so needy for innovative measures of water policy, have water transfers not succeeded?

CURRENT STATE OF THE MARKET

In expectation of a free market created by increased demand, significant regulatory and institutional reform, and lower transaction costs, for-profit companies and environmental organizations have increased their market activity. Each new entrant adds liquidity in a market that has long been dominated by powerful public agencies and monopolistic quasi-public wholesalers. New entrants promote reform by encouraging retail users to demand supplier choice and by signaling to government that large constituencies are depending on a water market to meet their growing needs.

For-Profit Companies

For-profit entrants into this marketplace include Western Water Company (Western), Vidler Water Company (Vidler), Azurix, and Cadiz Land Company (Cadiz). The strategy of each of these companies is, in part, to generate profits from water transfer transactions. Most importantly, these firms act as catalysts for reform by sponsoring new legislation and assisting government agencies in streamlining the transfer process.

Each firm is implementing its strategy in a slightly different way and across the demand and supply chain. Unlike other firms that have invested heavily in storage facilities, Western focuses on water transfer transactions. In the absence of legal consistency and clarity, Western engages in transactions that generate profits and reduce policy-induced transaction costs. Western completed the first ever privately facilitated agriculture-to-urban water transfer utilizing publicly owned conveyance facilities in December 1998 by wheeling 1,000 acre-feet from a San Joaquin Valley source to the Santa Margarita Water District in Orange County. The transfer utilized the State Water Project and MWD's conveyance and treatment facilities, paying full cost, which caused Western to incur a financial loss. However, the transaction illustrated that profitable transfers of this kind are possible if only third parties

were provided access to fairly priced wheeling capacity in public conveyance facilities.

Western has also helped irrigation districts to make conservation water available for transfer. To encourage farmers and agricultural districts to invest in water conservation methods, the California Water Code allows water users to retain the rights to the conserved water and to transfer that water to other users (CA Water Code). As a result, the transferred water is defined as beneficially used, thereby increasing the dominion of the water right and allowing a return on the water conservation investment. Western's first success was the water transfer petition filed jointly with partner Natomas Central Mutual Water Company, which was approved by the State Water Resources Control Board in Order 99-012, issued on December 28, 1999. This decision and Western's more recent transfer approvals, Orders 00-08 and 00-09 of July 10, 2000, have helped clarify the transfer rules surrounding conserved water (CA Water Code; State WRCB; Western Wat. 2000).⁶ With each such successive transaction, Western has achieved greater clarity of water policy and regulations. It is unfortunate and sub-optimal that regulatory clarity can only be gained submitting real transactions through the regulatory process.

While Western is striving to create a market for transfers in every type of hydrologic year, other companies have placed bets on wheeling water only in dry years, when water demand and prices are higher. To do so, Vidler, Cadiz and Azurix have all invested in groundwater storage projects in order to store water in wet years and deliver water in dry years. Vidler has developed a conjunctive use groundwater storage project in Arizona utilizing a plan to store Central Arizona Project water in normal and wet years, and to sell exchange water in dry years to urban southern California through the Colorado River Aqueduct (Schlehuber 1999). Vidler has also purchased space in the Semitropic Groundwater Storage Project in California's San Joaquin Valley, which it hopes to lease to municipal water districts.

Cadiz Land Company also has extensive underground storage capacity in San Bernadino County and signed a 50-year agreement to allow MWD to store surplus flows from its Colorado River rights. In dry years, stored water would be pumped into the Colorado River Aqueduct, along with some of the Company's indigenous water supplies for delivery into MWD's service area (Cadiz Land Co).

Azurix, a publicly traded subsidiary of the international energy company Enron, acquired in October 1999 the Madera Ranch groundwater project in San Joaquin

Valley ("Madera . . . Bank"). Azurix intends to bank surplus flows exported from the Bay-Delta and other sources in the groundwater basin and sell pumped or exchange water in dry years to southern California.

Both the Cadiz and the Azurix groundwater project are currently undergoing permitting processes, which prevents the estimation of a completion date.

Water on the Web

In what is becoming a competitive space online, a number of websites catering to the trading of water rights have emerged. So far, the number of buyers and sellers is small, but the potential exists for the Internet to lower administratively-induced transaction costs by improving the exchange of information, such as price discovery through competitive bidding. Azurix has invested heavily in an online exchange called Water2Water.com. Azurix announced the creation of the website in December 1999, and launched it in March 2000. Azurix may have underestimated the complexity of executing water trades online, and as of June 2000, no water trades have been completed. Azurix is revamping its website, which will be devoted to individual watersheds. A pilot is currently being developed for a watershed in the state of Texas (White 2000).

However, Azurix's experience has not deterred others from developing more of these so-called business-to-business marketplaces. New entrants seeking to establish an online water exchange include WaterRightsMarket.com of Littleton, CO; WaterBank.com of Albuquerque N.M., and WaterInvestments.com from Group Triton of San Diego, CA.

Non-Governmental Organizations (NGOs)

Environmental organizations are entering the market largely as potential lessees of temporary water rights or purchasers of permanent water rights to protect and restore riparian habitat and instream fisheries. In particular, environmental NGOs are motivated to explore the as-yet unused California Water Code Section 1707, which allows riparian water rights to be transferred off the land only for instream environmental or recreational uses. Environmental Defense and the Trust for Public Land are in the market to secure water flows specifically to augment supplies for critical ecosystems (Suyeyasu 2000). The Rivers Program of the Trust for Public Land is also evaluating purchases of additional water flows for fishery restoration and overall

ecosystem health and protection (Holland 2000). These entrants are too recent to evaluate their potential impact on a water market, but these ventures from non-profit organizations are an encouraging sign of an emerging market. Their participation is also a validation for environmentalists who have long argued in favor of markets as an alternative mechanism to government intervention for the return of much needed flows into the Bay-Delta ecosystem.

Governmental Agencies

Several agencies are participating in the California market in various roles. A recently developed new approach has been taken by CALFED's Environmental Water Account (EWA), which is designed to purchase water on the market just as any other third party would. Through extensive computer simulations, EWA can predict what water quality and fish flows can be improved significantly with small purchases and releases during critical periods. CALFED intends to implement a small-scale version of the EWA during 2000.

CALFED also is implementing a Water Transfer Program with a mission to reduce policy-induced transaction costs, increase conveyance capacity availability, and improve information sharing (Young 2000). "On-Tap", will be a web-based information clearinghouse designed to improve information sharing and will provide a range of valuable services including a guide to assist parties through the permitting process and a database of historical and pending water transfers (CALFED). The database will be particularly useful to third parties who otherwise would not have access to up-to-date information about proposed transactions that may impact their livelihoods. DWR, USBR and State Water Resources Control Board (SWRCB) will manage the clearinghouse collectively. The clearinghouse is a start, but agencies need to continue to drastically reduce PICs in new ways.

Unfortunately, some agencies have chosen other roles that may hurt rather than help the market. For example, the United States Bureau of Reclamation (USBR) is allocating \$10 million during 2000 to purchase water to supplement water deliveries to agricultural contractors of the Central Valley Project who are receiving less than their maximum annual allotments. While Central Valley farmers are not undeserving of efforts by USBR to fulfill their contractual obligations, the \$10 million allocation acts as a government subsidy to contractors and distorts the water market for all other participants. If government agencies are looking to market

mechanisms to make California's water system more efficient, they should abide by the same ground rules as all other market players and not skew the system for the benefit of particular water market participants.

In its effort to acquire additional rights to water in dry years, MWD released a request for proposals in January 2000. In May 2000, 16 offers were received from prospective sellers that included water agencies and landowners. The offers ranged widely in geography, price as well as in the way water would be made available. However, by acting as a single buyer, the agency is stifling the creation of a dynamic market. MWD is instead using its power over Southern California's distribution system to control the water market, in effect becoming the only practical buyer of water. The market would be better off if MWD and other agencies chose a role either as a system operator or as regulator, but not both.

OPPORTUNITIES FOR REFORM

In the last two years, there has been a convergence of opinion that a water market is an important tool for managing water supply in the future. Governmental agencies, non-governmental environmental organizations, and for-profit corporations are all in support of pursuing transfers as a tool. State and federal agencies publicly support water transfers and, in the cases of DWR and USBR, are required to facilitate transfers. CALFED, the joint state & federal consortium of agencies working towards a solution for the Bay-Delta, has promoted water transfers as a key tool integral to its water supply, water quality and ecosystem restoration components.

Advocates of water marketing in California hope that continued interest in markets and the increasing need for efficient water allocations will result in necessary improvements in market performance. An excellent start would be the adoption of the specific reforms recommended in the recently published California Legislative Analyst's Office report on water transfers (Hill 1999). The recommendations, focusing on clarifying laws and procedures, echo Archibald and Renwick's analysis advocating a reduction in policy-induced transaction costs to increase market performance. Most important are the lack of a clear, consistent statutory policy and to make available capacity in publicly owned conveyance facilities for a fair price. Without clarity, parties must an inordinate amount of time and money to achieve regulatory approvals. Without fairly priced and available capacity, long-distance transfers will remain economically infeasible.

Figure 1: Analysis of California Water Transfer Market by Legislative Analyst’s Office (Hill 1999)

Problems	Recommendations
Lack of Clear, Consistent Statutory Policy	Consolidate Water Transfer Law Into Single Act
Lack of Information About Transfers and Their Impacts	Establish Water Transfer Information Office
Uncertain Water Rights	Consolidate and Clarify Statutory Protection of Water Rights When a Transfer Takes Place
Infrastructure Constraints	Distribute Forecasts of Available Capacity in Public Conveyance Facilities; and Clarify Statutory Definition of “Fair Compensation” to Be Paid for Use of Public Conveyance Facilities
Transaction Costs Could Be Lower	Establish Water Transfer Information Office to Facilitate Transfers
Inadequate Third-Party Protection	Assess Water Transfer Fee to Fund Appropriate State Agency Review; Establish Statutory Criteria for Consistent and Comprehensive Protection; Utilize Water Transfer Information Office for Impact Evaluation and Information Disclosure

Legislative And Legal Solutions

Recent California water policy has not been without attempts at additional clarity in water transfer laws and regulations. Recent developments include Senate Bill 970, introduced by Senator Jim Costa (D-Fresno), which Governor Gray Davis signing into law. This bill, “The Water Rights Protection and Expedited Short-Term Water Transfer Act of 1999,” facilitates short-term transfers by amending existing statutes. The law grants rights to water purchasers in State Water Resource Control Board proceedings, and it qualifies water made available from temporary land fallowing as a conservation effort and protects water transferred as a beneficial use. The combined effect will be support for a short-term spot market by providing farms the ability to sell into the market on an annual basis, thereby allowing the market to react more closely with hydrologic conditions. At the same time, the law recognizes and minimizes third party impacts by limiting fallowing for transfers to one year.

The Legislature should pass Senate Bill 506, which addresses the inordinately high cost of conveyance through publicly owned conveyance systems.⁷ SB 506 is intended to amend the 1986 Katz Wheeling Statutes (California Water Code Section 1810-1814) so that third parties will be charged fair compensation for access to publicly owned conveyance facilities. This amount would be an incremental, or marginal, fee based on the portion of the system that is used, plus some charge to

cover a portion of the fixed cost. However, facility owners have real concerns about transfers jeopardizing their financial integrity by displacing current sales. But the increased use of excess capacity in existing pipelines at marginal prices would increase new sources of supply to a region in long-term shortage. So far, MWD and others have successfully prevented SB 506 from passing.

The Legislature is not only tackling conveyance costs directly with SB 506, but is also addressing the lack of oversight of MWD’s rate setting through Senate Bill 1973.⁸ Under the Metropolitan Water District Act, the only body with current authority over MWD is the legislature itself. SB 1973 would obligate the California Public Utilities Commission to oversee the rate setting of conveyance by MWD, and to determine the fairness of the rates.

The California courts had an opportunity to reform the way system owners charge for conveyance through its consideration of MWD’s so-called “validation action.” In 1997, MWD sought to solidify its system-wide pricing for wheeling water to prevent new entrants into the southern California market. In January 1998, in what became a fleeting victory for market proponents, the trial court decided against MWD calling the system-wide charge unfair to competition and proposed a fee structure for wheeling based on incremental costs (*CA . . . Reporter* 1999). This decision would have allowed third parties the ability to convey water through existing

pipelines at much less expensive rates and provide for additional competition and choice of suppliers to municipal water districts. It would also have allowed the Katz wheeling statutes to be used in the manner they were intended. Instead, MWD appealed this decision to the California Court of Appeal, Second Appellate District, which overturned the lower court's ruling. The appellate court determined that the wheeling statutes do not prevent owners from including system-wide costs, and, moreover, that "the Legislature did not intend that the impact of the Wheeling Statutes should be to cause a water conveyance facility owner to lose money or to subsidize wheeling transfers" (*Metropolitan . . . District*). The result is that the state's judicial branch of government is unwilling to enforce the Katz wheeling statute, instead forcing the legislature to clarify and strengthen the Katz statutes as needed.⁹

Colorado River Basin: A Market in Hibernation

At the federal government's urging, California's rights holders of Colorado River water signed an historic agreement in October 1999 (Key Terms . . . 1999). The agreement represents a plan for these parties to reduce their diversion of water down to their Colorado River Compact allotment 4.4 maf per year, from current diversions of 5.3 maf. This agreement has positive and negative aspects for the market. MWD has won reoperation of Colorado River reservoirs, and while this provides additional reliability to its customers, MWD will also be able to keep the Aqueduct full through the year 2015, resulting in very little availability of excess capacity to third parties. This ensures that third parties will have no feasible way to transfer water to urban Southern California from any other water rights holder in the Colorado River basin for another 15 years. On the other hand, the Agreement makes provisions for the 1998 water transfer contract between the Imperial Irrigation District and San Diego County Water Authority. The contract calls for the transfer up to 200,000 acre-feet per year of conserved agricultural water to San Diego. The transaction, if consummated, would mark the largest single transfer of water from agriculture-to-urban use and would represent a large step forward in establishing a free market in California.

RECOMMENDATIONS

While there continues to be hope that California's water marketing will emerge as an important tool for water management, the full public and private benefits are yet to be realized. A continued effort must be made to reform the institutions overseeing water policy to allow new, more efficient methods of allocating scarce water

supplies and conveyance capacity. Indeed, policy-induced transactions costs must be lower and government agencies must limit their role to either regulators or facility owners/operators. Market reform can pay enormous future dividends for California by ensuring economic growth, restoring aquatic habitat, and protecting the state's famed quality of life. But without drastic change, entrepreneurial companies will disappear and cease to be an agent of change. Without them, the opportunity for a water market will wane for the foreseeable future. When others evaluate the potential to generate revenue in California from water transfers, they will undoubtedly look at the enormous amount of time and money expended by companies, and look for opportunities elsewhere. Without significant reform now, California's dream of efficient, market-based water reallocation will remain a mirage.

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ENDNOTE

¹ California’s water supply is international to the extent that California has rights to 4.4 million acre-feet of the annual flow of the Colorado River, which eventually runs south into Mexico.

² One acre-foot is equal to 325,900 gallons or 1233.48 cubic meters.

³ N.B.: Gleick et.al. (1995) argue that DWR’s projections are fundamentally flawed by projecting a water future for California that is increasingly unlikely because of probable advances in water efficiencies. For example, Gleick estimates that total applied urban water use in 2020 would be 8.2 maf, 34% lower than DWR’s estimate of approximately 12.5 million acre-feet (DWR 1994 estimate)

⁴ See Haddad, and Easter et. al. who have analyzed why agriculture-to-urban transfers have not been successful.

⁵ Vaux and Howitt some time ago already suggested, based on their 1984 scenario analysis utilizing marginal cost pricing, that potential economic benefits might total \$3 billion by 2020, and that less than 100,000 acre-feet of new storage could be justified.

⁶ Water approved for transfer under the July 10, 2000 Orders has been subsequently sold and delivered to Contra Costa Water District. This transfer is the first privately facilitated agriculture-to-urban transfer to a Bay Area water district.

⁷ Senate Bill 506 was introduced in the California Legislature by Senator Steve Peace (R-San Diego) in 1999 and re-introduced in 2000.

⁸ Senate Bill 1973 was introduced by Senator Don Perata (D-Oakland) in the 2000 session.

⁹ The California Supreme Court denied petitions to review the MWD wheeling case on September 14, 2000.