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The Reasonable Use Doctrine in California Water Law and Policy

BRIAN E. GRAY

The cardinal principle of California water law is that all water rights, and all uses of water, must be reasonable. This seemingly simple and innocuous sentence masks a world of meaning and complexity, however, because the requirement of reasonable use embraces at least four interrelated concepts. The determination of reasonable water use is *utilitarian*: the law seeks to encourage relatively efficient, economically and socially beneficial uses of the state's water resources. It is *situational*: the evaluation of individual reasonable use concerns not only the water right holder's own uses but also other competing demands (both consumptive and ecological) on the water resource. The reasonable use doctrine is also *dynamic*: the definition of reasonable use varies as the economy, technology, demographics, hydrologic conditions, environment, and societal needs evolve. And, because all uses of water must be consistent with this interdependent and variable definition of reasonable use, the law renders all water rights *fragile*. A water right that was reasonable when first recognized, and which may have been exercised reasonably for many years, may become unreasonable as hydrologic conditions change, as California's economy evolves, as population grows and new demands for water arise, as ecological needs are better understood, and as the environmental laws that protect the state's aquatic ecosystems and native species are applied in ways that limit the impoundment and diversion of water for consumptive uses.

The doctrine of reasonable use is thus both a policy mandate and a limitation on water rights. A part of California's Constitution since 1928, it applies to all branches of government, to all levels of governmental administration of the state's water resources, and to public and private uses of the state's waters. Its overarching directives, comprehensive reach, and infusion into the water rights system make it the most powerful of all of the laws that govern California's water resources.¹

THE CONSTITUTIONAL DOCTRINE OF REASONABLE USE

Article X, section 2 of the California Constitution declares that, because of the state's hydrologic and economic conditions, the general welfare requires that its water resources "be put to beneficial use to the fullest extent of which they are capable, and that the waste or unreasonable use or unreasonable method of use of water be prevented." It also stipulates that "the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare."²

Article X, section 2 then ties the reasonable use requirement to the water right itself: "The right to water or to the use or flow of water in or from any natural stream or water course in this State is and shall be limited to such water as shall be reasonably required for the beneficial use to be served, and such right does not and shall not extend to the waste or unreasonable use or unreasonable method of use or unreasonable method of diversion of water." It concludes with the statement that the amendment "shall be self-executing, and the Legislature may also enact laws in the furtherance of the policy in this section contained."

In one of its early interpretations of article X, section 2, the California Supreme Court emphasized the fundamental purposes of the doctrine of reasonable use, explaining in *Peabody v. City of Vallejo* (1935): "The waters of our streams are not like land which is static, can be measured and divided and the division remain the same. Water is constantly shifting, and the supply changes to some extent every day. A stream supply may be divided but the product of the division in nowise remains the same. When the supply is limited public interest requires that there be the greatest number of beneficial uses which the supply can yield."

Three decades later, in a case that presaged the modern era in California water law and policy, the court expressly linked these aspects of article X, section 2, to the definition of water rights.

REASONABLE USE AND THE PROPERTY
RIGHT IN WATER

In *Joslin v. Marin Municipal Water District* (1967), the Supreme Court rejected the claims of riparian landowners who harvested sand and gravel deposited by the natural flow of Nicasio Creek for commercial sale. The landowners alleged that the district violated their water rights by constructing a dam that impaired the natural flow and thus deprived them of the suspended materials carried by the water.

The court observed that, to prevail on their damages claim, the Joslins must “first establish the legal existence of a compensable property interest” and that such an interest “consists in the right to a reasonable use of the flow of water.” Although evaluation of reasonable use “depends on the circumstances of each case,” the court reasoned, “such an inquiry cannot be resolved *in vacuo* isolated from statewide considerations of transcendent importance. Paramount among these [is] the increasing need for the conservation of water in this state, an inescapable reality of life quite apart from its express recognition in the 1928 amendment.” The court then concluded that the Joslins’ reliance on the unimpaired flow had become unreasonable in light of the new demands for municipal water supply. Moreover, “since there was and is no property right in an unreasonable use [of water] there has been no taking or damaging of property by the deprivation of such use and, accordingly, the deprivation is not compensable.”

Although *Joslin* is sometimes read as a simple decision not to countenance a use of water that required an inordinate percentage of the flow of the stream, a closer reading reveals that the Supreme Court had broader purposes in mind. The opinion emphasized the utilitarian goals of the doctrine of reasonable use: to ensure that the state’s water resources are used in ways that serve the public interest, not just to benefit senior water right holders. Equally importantly, the court focused on the dynamic nature of the reasonable use inquiry and the consequent fragility of the property right in water. Water rights are defined by reasonable use, and they are thereby limited by reasonable use. A use of water that may have been lawful when established—and that continued to be exercised lawfully for many years—may become unreasonable as conditions change. Moreover, because the property right in water is defined by contemporary standards of reasonable use, a water right (or certain aspects of the right) may cease to exist as a result of changes in hydrologic, economic, demographic, or environmental conditions that are well beyond the control of the water right holder.

REASONABLE USE AND WATER RIGHTS
ADMINISTRATION

In the years following *Joslin*, the California courts applied the doctrine of reasonable use principally to enhance the regulatory jurisdiction of the State Water Resources Control Board (SWRCB). In *In re Waters of Long Valley Creek Stream System* (1979), the Supreme Court held that when the board conducts a statutory adjudication of all surface water rights, it has authority to relegate unexercised riparian rights to a priority below all active uses of water in the system—both riparian and appropriative.³ In *People v. Shirokow* (1980), the court ruled that a nonriparian water user may not claim prescriptive rights outside of the SWRCB’s permitting and licensing jurisdiction. Both decisions emphasized that the legislature had created the board for the express purpose of implementing and enforcing the constitutional reasonable use mandates.⁴ Assertions of previously dormant riparian rights to preempt valid existing uses and claims to water rights based on prescriptive use were unreasonable, the court concluded, because they created uncertainty and undermined the SWRCB’s ability comprehensively to administer California’s surface water rights system.

In the wake of *Joslin*, the California Courts of Appeal also bolstered the SWRCB’s power directly to enforce the reasonable use doctrine. In *People ex rel. State Water Resources Control Board v. Forni* (1976), the court held that the board had authority under Water Code section 275 to enjoin vineyards along the Napa River from diverting water to spray on their crops during periods of low temperatures to prevent wine grapes from freezing. The lawsuit was based on the board’s determination that “direct diversion during the frost season may at times dry up the river and deprive many of the vineyardists of water which they need to protect their vines from frost” (Cal. Code Regs. Title 23, § 735). The court affirmed the board’s decision to compel all vineyards—including those that diverted water pursuant to riparian rights—to construct storage to minimize aggregate demands on the available water. According to the court, the “overriding constitutional consideration is to put the water resources of the state to a reasonable use and make them available for the constantly increasing needs of all the people. In order to attain this objective, the riparian owners may properly be required to endure some inconvenience or to incur reasonable expenses.”

In *Imperial Irrigation District v. State Water Resources Control Board* (1986, 1990), the court upheld the SWRCB’s finding that the

Imperial Irrigation District's unlined canals and lack of regulating reservoirs were causing flooding and waste of water within its service area. It also rejected the irrigation district's argument that, as a pre-1914 appropriator, it was not subject to the SWRCB's regulatory authority. As in *Forni*, the court held that section 275 conferred independent jurisdiction on the board to enforce the reasonable use mandates of article X, section 2. Faced with the prospect of losing a substantial portion of its water rights, the district agreed to a 35-year transfer of more than 100,000 acre-feet of conserved water each year to the Metropolitan Water District of Southern California.⁵

The courts also have affirmed the SWRCB's assertion of its reasonable use powers to set water quality and flow standards for the Sacramento–San Joaquin Delta and to establish operational constraints on the Central Valley Project, the State Water Project, and other water right holders as required to protect water quality, fisheries, and other instream uses in the Delta ecosystem. In *United States v. State Water Resources Control Board* (1986), the Court of Appeal again emphasized the multifaceted and dynamic nature of article X, section 2:

We perceive no legal obstacle to the Board's determination that particular methods of use have become unreasonable by their deleterious effects upon water quality. Obviously, some accommodation must be reached concerning the major public interests at stake: the quality of valuable water resources and transport of adequate supplies for needs southward. The decision is essentially a policy judgment requiring a balancing of the competing public interests, one the Board is uniquely qualified to make in view of its special knowledge and expertise and its combined statewide responsibility to allocate the rights to, and to control the quality of, state water resources.

The court concluded that the “power to prevent unreasonable methods of use should be broadly interpreted to enable the Board to strike the proper balance between the interests in water quality and project activities in order to objectively determine whether a reasonable method of use is manifested.”

Finally, in something of a sequel to *Forni*, the Court of Appeal recently affirmed the SWRCB's power to regulate the diversion of water from the Russian River system—including most of its tributaries and all hydrologically connected groundwater—to protect coho salmon. The board determined that simultaneous diversions and pumping by vineyards for frost-prevention purposes were unreasonable because the aggregate withdrawal of water caused migrating juvenile salmon to become stranded in the river bed. In *Light v. State Water Resources*

Control Board (2014), the court held that the board could include riparians and pre-1914 appropriators (including those that extract hydrologically connected groundwater from the river system) within this regulatory scheme: “That the Board cannot require riparian users and pre-1914 appropriators to obtain a permit before making reasonable beneficial use of water does not mean the Board cannot prevent them from making unreasonable use. Any other rule would effectively read Article X, Section 2 out of the Constitution.”

THE REASONABLE USE DOCTRINE AND ENVIRONMENTAL QUALITY

The California Supreme Court’s most important applications of the reasonable use doctrine following *Joslin* came in two high-profile cases that pitted municipal water use against environmental protection. In *Environmental Defense Fund v. East Bay Municipal Utility District* (1980), the court held that environmental advocates may rely on article X, section 2, to claim that a proposed upstream point of diversion for water supplied by the CVP to the East Bay Municipal Utility District was unreasonable because of its adverse effects on water quality, fish and wildlife, and recreational uses in the lower American River. Three years later, in its landmark opinion in the Mono Lake litigation, the court held that the mandate of reasonable use also embraces the *public trust*, an ancient doctrine that protects recreational access, boating, fishing, and ecological uses of the state’s navigable waters.

In *National Audubon Society v. Superior Court* (1983), the Supreme Court ruled that Los Angeles’s long-standing rights to appropriate water from the streams that supply Mono Lake are subject to the public trust. Just as the doctrine of reasonable use serves as an inherent limitation on the exercise of all water rights, the court declared that the public trust doctrine “imposes a duty of continuing supervision over the taking and use of the appropriated water. In exercising its sovereign power to allocate water resources in the public interest, the state is not confined by past allocation decisions which may be incorrect in light of current knowledge or inconsistent with current needs.”

Although *Audubon* is best known as the case in which the Supreme Court incorporated the public trust doctrine into California’s water rights system, it is equally important as a reasonable use decision. First, the court explained that, although the public trust doctrine and the water rights laws “developed independently of each other,” its integration of

the two would bring both under the umbrella of article X, section 2. The constitutional amendment “establishes state water policy. All uses of water, including public trust uses, must now conform to the standard of reasonable use.”

Second, the court recognized that water rights do not exist in isolation from the broader society and environment. In its earlier reasonable use decisions, the paramount goal was conservation of scarce water resources to accommodate new consumptive demands as California’s population and economy continued to grow. In *Audubon*, the court built on its *Environmental Defense Fund* holding and emphasized that fish, wildlife, recreation, and other in-stream uses that depend on that same water are also important societal interests that must be taken into account.

Third, the *Audubon* court’s articulation of the evolving nature of the public trust was consonant with its dynamic conception of the doctrine of reasonable use. Both laws recognize that “the state is not confined by past allocation decisions which may be incorrect in light of current knowledge or inconsistent with current needs.”

Fourth, this dynamic feature means that water rights are mutable under both the reasonable use and public trust doctrines. *Joslin* held that there “is no property right in an unreasonable use of water” and that the definition of “what constitutes reasonable water use is dependent upon not only the entire circumstances presented but varies as the current situation changes.” *Audubon* embellished these principles, emphasizing that the law “prevents any party from acquiring a vested right to appropriate water in a manner harmful to the interests protected by the public trust.”

LEGISLATIVE DECLARATIONS OF REASONABLE USE

The legislature also has exercised its constitutional authority under article X, section 2, to declare that certain environmental uses of California’s water resources are reasonable. For example, section 1243 of the Water Code states that “the use of water for recreation and preservation and enhancement of fish and wildlife resources is a beneficial use of water.” Similarly, the California Wild and Scenic Rivers Act provides: “It is the policy of the State of California that certain rivers which possess extraordinary scenic, recreational, fishery, or wildlife values shall be preserved in their free-flowing state, together with their immediate environments, for the benefit and enjoyment of the people of the state. The Legislature declares that such use of these rivers is the highest and

most beneficial use and is a reasonable and beneficial use of water within the meaning of Section 2 of Article X of the California Constitution” (Cal. Pub. Res. Code § 5093.50).

More recently, the legislature exercised its reasonable use authority to enact the Delta Reform Act of 2009, which established a Delta Stewardship Council to formulate a Delta Plan and to oversee actions that may affect the waters and resources of the Delta ecosystem. The act declares that waters of the Sacramento–San Joaquin River and Delta system shall be administered to achieve the “co-equal goals” of “providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem” (Cal. Water Code §§ 85020, 85054). The legislature also stated that the “longstanding constitutional principle of reasonable use and the public trust doctrine shall be the foundation of state water management policy and are particularly important and applicable to the Delta” (§ 85023).

In *California Trout v. SWRCB* (1989), the Court of Appeal upheld the legislature’s authority to make these types of categorical declarations of reasonable use. One of California’s oldest environmental protection statutes directs that the “owner of any dam shall allow sufficient water at all times to pass through a fishway, or in the absence of a fishway, allow sufficient water to pass over, around or through the dam, to keep in good condition any fish that may be planted or exist below the dam” (Fish and Game Code § 5937). The court rejected the claim that this statute violates article X, section 2. It emphasized that the Constitution expressly authorizes the legislature to enact laws in furtherance of the policy of reasonable use and held that where “various alternative policy views reasonably might be held whether the use of water is reasonable within the meaning of article X, section 2, the view enacted by the Legislature is entitled to deference by the judiciary.”

THE REASONABLE USE DOCTRINE AND WATER ALLOCATION

Although the SWRCB and the courts have authority under the reasonable use doctrine to reallocate water (out of priority) between water right holders, and to require consumptive users to provide more water to environmental uses, the relationship between water rights priorities and reasonable use continues to raise questions.

In its most recent groundwater rights case, *City of Barstow v. Mojave Water Agency* (2000), the California Supreme Court overturned a decision

Statutory Encouragement of Efficient Water Use

The legislature has enacted a variety of statutes that are designed to encourage more efficient use of the state's waters. For example:

- It has declared that the cessation or reduction in the extraction of groundwater—either as a result of the use of alternative sources or to allow for the replenishment of the aquifer—is a reasonable and beneficial use (Water Code §§ 1005.1–1005.4).
- It has stated that the cessation or reduction in the use of water made possible by the substitution of recycled, desalinated, or treated polluted water is a reasonable beneficial use (§§ 1010(a)).
- It has mandated similar treatment for cessations or reductions in water use because of conservation or the use of groundwater that is managed as part of a conjunctive use program (§§ 1011(a), 1011.5(a)).
- It has authorized the transfer of water that is made available by conservation or the substitution of these alternative sources and has guaranteed that the transferor's rights to the transferred water will be protected and preserved during the term of the transfer agreement (§§ 1010(b), 1011(b), 1011.5(b), 1014–1017).
- It has required municipal water agencies to meter and report on water use, and it has required agricultural supply agencies to monitor and report on groundwater levels (§§ 500–535, 10920–10936).
- It has authorized counties and local agencies to conjunctively manage surface and groundwater supplies and has required urban and agricultural water agencies to adopt best management practices to promote conservation and efficient use (§§ 10608–10608.64, 10610–10656, 10750–10783.2, 10800–10853).

The legislature also has granted public water agencies authority to use “allocation-based conservation water pricing”—i.e., tiered water pricing—which it identified as “one effective means by which waste or unreasonable use of water can be prevented and water can be saved in the interest of the people and for the public welfare, within the contemplation of Section 2 of Article X of the California Constitution” (§§ 370–374).

that “equitably apportioned” the safe yield of an overdrafted groundwater basin among all water right holders regardless of the type or priority of water right. “We have never,” the court stated, “endorsed a pure equitable apportionment that completely disregards overlying owners’ existing legal rights.”

Yet, the court also rejected the view that priority of water right alone should determine which users should curtail their pumping and which may continue. It confirmed the broad holding of *Joslin* that article X, section 2, “dictates the basic principles defining water rights: that no one can have a protectible interest in the unreasonable use of water, and that holders of water rights must use water reasonably and beneficially.” Although “water right priority has long been the central principle in California water law, . . . the corollary of this rule is that an equitable physical solution must preserve water right priorities to the extent those priorities do not lead to unreasonable use.” In crafting a “physical solution” to the problem of aggregate overdraft, the court concluded, a trial court “may neither change priorities among the water rights holders nor eliminate vested rights in applying the solution *without first considering them in relation to the reasonable use doctrine*” (emphasis added).

The two other courts that have confronted this question of the relationship between water rights priorities and reasonable use have followed this approach. In *El Dorado Irrigation District v. State Water Resources Control Board* (2006), the Court of Appeal overturned a decision by the board that required all permittees and licensees in the Sacramento River basin to cease diversions whenever the CVP or SWP are releasing stored water to meet Delta water quality standards—regardless of the appropriator’s priority *vis-à-vis* the two projects. The court explained that “sometimes the use of water under a claim of prior right must yield to the need to preserve water quality to protect public trust interests, and continued use under those circumstances may be deemed unreasonable.” If, for example, “El Dorado’s diversions of natural flow contribute to the degradation of water quality in the Delta, the Board has a legitimate interest in requiring [the district] to reduce its diversions to contribute toward the maintenance and improvement of water quality in the Delta.”

The court cautioned, however, that the board must respect the relative water rights priorities:

When the Board seeks to ensure that water quality objectives are met in order to enforce the rule against unreasonable use and the public trust doctrine, the Board must attempt to preserve water right priorities to the extent those priorities do not lead to unreasonable use or violation of public trust values. In

other words, in such circumstances the subversion of a water right priority is justified only if enforcing that priority will in fact lead to the unreasonable use of water or result in harm to values protected by the public trust.

The Court of Appeal also recently grappled with the question of priority of water rights in the context of the Russian River adjudication. It acknowledged that when “the supply of water is insufficient to satisfy all persons and entities holding water rights, it is ordinarily the function of the rule of priority to determine the degree to which any particular use must be curtailed. Yet even in these circumstances, the Board has the ultimate authority to allocate water in a manner inconsistent with the rule of priority, when doing so is necessary to prevent the unreasonable use of water” (*Light v. SWRCB*, 2014). This is especially true, the court stated, when the board is acting to protect the public trust. It added, quoting *El Dorado*, that because “‘no one can have a protectible interest in the unreasonable use of water’ . . . when the rule of priority clashes with the rule against unreasonable use of water, the latter must prevail.”

These cases add an important caveat to the law of reasonable use. Although all water rights are defined by reasonable use and must be exercised reasonably in light of contemporary conditions and standards, the doctrine does not apply *carte blanche*. Aggregate unreasonable use (such as groundwater overdraft or harm to water quality or fisheries) does not necessarily mean that every water user is acting unreasonably. Nor does it mean that the SWRCB and the courts may necessarily require *pro rata* reductions in water use or impose equal conditions on all water users regardless of their relative priority of right. While the reasonable use doctrine grants the board and the courts broad powers to correct the overall problem, the remedies applied to each water user must be more nuanced. The trier of fact must make individualized determinations of reasonable use and must be guided by the rule of priority. As all three of these cases make clear, the SWRCB and the courts may depart from the underlying water rights priorities only if they justify their decisions on findings of individual unreasonable use *vis-à-vis* the other potentially affected water right holders. The reasonable use doctrine is powerful, but it is not a magic wand.

THE FUTURE OF REASONABLE USE

Although there is no single response to the challenges of California water management in the twenty-first century, the reasonable use doctrine will

play an important role in helping to effectuate a variety of necessary improvements in California water policy.

*Prevention of Waste and Improvements in
the Efficiency of Water Use*

The state has estimated that available improvements in the efficiency of water use could conserve between 180,000 and 1.1 million acre-feet per year in the agricultural sector and 1.2 million to 2.1 million acre-feet per year currently used for municipal and industrial purposes (California Bay-Delta Authority 2005). Although this analysis probably underestimates the statewide water conservation potential, it does suggest that many water-use practices may be unreasonable in light of the existing strains on the state's developed water supplies and the future diminution in useable supplies that is a predicted consequence of climate change.

The state—acting principally through the SWRCB or the courts—has authority to investigate individual cases of unreasonable use and to declare unreasonable a variety of water practices that may have been acceptable in the past, but which are no longer tolerable in the face of contemporary and future water supply challenges. These may include excessive evaporative and conveyance losses, inefficient irrigation techniques, failure to adopt or to implement best management practices, and perhaps other profligate uses such as the irrigation of water-intensive crops and landscaping. Future unreasonable use also may include excessive reliance on imported water instead of shifting to a more varied water portfolio that includes cost-effective alternatives such as demand reduction, use of recharged groundwater, and recycling of reclaimed wastewater.

The Delta Watermaster has issued a report to the SWRCB and the Delta Stewardship Council advocating greater enforcement of the reasonable use doctrine to address wasteful water practices and to create incentives to achieve more efficient water use (Wilson 2010). “The underlying premise of this report,” he stated, “is that the inefficient use of water is an unreasonable use of water.” The Watermaster then provided examples of a variety of currently available agricultural water management practices that could be required to promote the reasonable use of water, including “weather-based and deficit irrigation scheduling, water distribution systems that can supply water to farmers ‘on-demand,’ and improved irrigation methods, such as substituting drip and sprinkler irrigation for flood irrigation.”

The report provides a template for focused and proactive application of the reasonable use doctrine to promote greater efficiency in water use. Although the report addressed only agricultural water practices, there is a significant role for reasonable use investigations of water use in California's urban and suburban areas as well. There exists the potential for significant water savings, especially in irrigation of landscaping and other outdoor uses (Hanak et al. 2011, 171-73).

*Regional Water Management, Water Pricing,
and Water Use Efficiency*

In the Delta Reform Act of 2009, the legislature declared a state policy “to reduce reliance on the Delta in meeting California’s future water supply needs through a statewide strategy of investing in improved regional supplies, conservation, and water use efficiency” (Cal. Water Code § 85021). It then directed that “each region that depends on water from the Delta watershed shall improve its regional self-reliance for water through investment in water use efficiency, water recycling, advanced water technologies, local and regional water supply projects, and improved regional coordination of local and regional water supply efforts.” A variety of statutes empower local and regional agencies to promote greater efficiency in water use. These include the requirements that municipal water agencies meter and report on water use (Cal. Water Code §§ 500-535), that agricultural water agencies monitor and report on groundwater levels (§§ 10920-10936), and that agencies adopt urban and agricultural water management plans that include best practices to promote conservation and efficient use (§§ 10608-10608.64, 10610-10656, 10750-10783.2, 10800-10853). The legislature also has authorized (with voter approval) more than \$2 billion in bond funding to support forty-six integrated regional water management programs that allow cities, counties, and other agencies to coordinate their water supply, water management, and flood control efforts (Hanak et al. 2011, 365-68). All of these laws build on the constitutional mandate that California’s water resources be administered to promote reasonable, and reasonably efficient, water use.

Water pricing also plays an important role in encouraging reasonable use. The legislature has authorized public water agencies to adopt “allocation-based conservation water pricing” (Cal. Water Code §§ 370-374). The agency may set a base rate that is designed to cover its fixed costs and then one or more higher rates that increase with volume of

water use. Tiered rate structures create incentives for conservation and more efficient use, because the cost per unit of water rises as each customer's demands increase (Hanak et al. 2011, 270–73). Agencies with allocation-based tiers typically use revenues from the upper tiers to fund conservation programs within their service area. Since the legislature's express authorization of allocation-based conservation pricing in 2008, a number of water supply agencies have adopted tiered rates (Hanak et al. 2011, 270–73).

Although enacted pursuant to article X, section 2, tiered rate pricing has raised questions under article XIID of the California Constitution, which was passed by the voters in 1996 as Proposition 218. This law provides *inter alia* that water rates “shall not exceed the proportional cost of the service” attributable to each parcel of land that receives water service (Cal. Const. art. XIID, § 6(b)(3)).

In *City of Palmdale v. Palmdale Water District* (2011), the California Court of Appeal invalidated a tiered-rate structure that set different rates (and different percentage increases between tiers) for residential, commercial, and irrigation customers. The court recognized that the district had adopted the tiered rates for the purpose of encouraging conservation and efficient use, consistent with the constitutional reasonable use mandate as well as the legislature's authorization of allocation-based conservation pricing. It explained, however, that “article X, section 2 is not at odds with Article XIID so long as . . . conservation is attained in a manner that ‘shall not exceed the proportional cost of the service attributable to the parcel.’” The court concluded that the district had not explained “why [these other laws] cannot be harmonized with Proposition 218 and its mandate for proportionality. PWD [Palmdale Water District] fails to identify any support in the record for the inequality *between* tiers, depending on the category of user.”

The court's insistence on a cost-based justification of water rates and rate differentials may well be required by Proposition 218, but overly strict judicial interpretations of the law will present challenges for contemporary water administration. Allocation-based conservation pricing is one of the most direct and proactive means of implementing article X, section 2's goals of conservation and efficient use. It accomplishes these goals through price incentives, rather than government fiat; and it fairly distributes the costs of water service by requiring those who use the most to pay the most. The question in these types of cases should not be how to ensure that article X, section 2, “is not at odds with” Proposition 218, but how to ensure that the ratemaking strictures of Proposition 218

do not undermine the most important principles of California water law and policy (Gray et al. 2014).

Integrated Management of Groundwater and Surface Water Resources

One of the most vexing problems in California water law is the antiquated separation between the law of surface water rights and the law governing groundwater (Sax 2003; Hanak et al. 2011, 322–28). Although there is now integrated management of surface and groundwater resources in twenty-two adjudicated groundwater basins and special groundwater management districts, many problems remain (see chapter 8 in this volume).

The most logical and direct response to these problems would be for the legislature to enact a statute empowering the SWRCB to exercise integrated permitting and regulatory authority over surface and groundwater rights. There is no question of the legislature's power to do this under article X, section 2. With limited exceptions, however, it is unlikely to occur.⁶

Yet, the courts have their own constitutional reasonable use authority to address problems of groundwater overdraft and conflict between surface and groundwater uses. For example, the physical solution and final judgment in the *Mojave* adjudication included rights to both groundwater and surface water, based on the trial court's determination that the two are hydrologically connected: diversions from the river reduce groundwater recharge, and groundwater pumping reduces the volume and flow of water in the river. Indeed, the water management system that the judgment created places a water replacement charge on all water extraction that exceeds each user's "free production allowance." The revenues from these charges are used to fund the acquisition of imported surface water to augment and replenish the native groundwater supplies (Littleworth and Garner 2007).

This integrated management of surface water and groundwater supplies established an important precedent: that the courts have authority under article X, section 2, to unify the law of surface and groundwater rights situationally where unintegrated management and regulation would result in unreasonable use. And the courts have this constitutional power despite the general legal distinction between the surface water and groundwater systems. Indeed, as a result of earlier groundwater adjudications and special legislation, integrated surface and groundwater management is

now an important feature of regional water administration in several parts of California. These include the Orange County Water District, the Water Replenishment District of Southern California, the Santa Clara Valley Water Agency, and a number of smaller districts that manage adjudicated groundwater basins (Blomquist 1992).

The SWRCB's assertion of its article X, section 2, authority to limit surface water diversions and groundwater withdrawals from the Russian River system to protect coho salmon is another example of how the reasonable use doctrine can facilitate integrated water management. If the board were confined to its direct authority over surface water permittees and licensees, its efforts to protect the salmon would be frustrated. Not only would riparians and groundwater right holders be exempt, but those appropriators who *are* subject to the regulation could simply shift from surface water diversions to groundwater pumping and evade the restrictions. The aggregate effect would be to place an already endangered species in further jeopardy of extinction, which would unquestionably be an unreasonable exercise of water rights. As the Court of Appeal recognized in *Light v. SWRCB*, integrated surface and groundwater regulation in this context is therefore an appropriate and necessary exercise of the SWRCB's reasonable use powers.⁷

Incentives for Water Conservation and Transfer

Many of the important reasonable use cases have involved reallocations of water from senior water right holders whose existing uses or methods of use had become unreasonable in light of new consumptive demands on the resource or new environmental requirements. The courts in these cases have consistently held that an unreasonable use of water—unreasonable under contemporary standards—may not be asserted to block the new use or to obtain compensation from the new user. Although these principles are a *sine qua non* of reasonable use, some water users, economists, and policymakers have criticized the doctrine for rendering water rights uncertain. This uncertainty is harmful, they argue, because it may deter investment and marketability: “If current owners of water rights do not have secure rights—even if the lack of security serves perfectly valid public purposes—they will have a difficult time finding buyers for those rights” (Haddad 2000, 41).

Properly administered, however, the reasonable use doctrine can place constructive pressure on existing water users not to waste water and to encourage the profitable transfer of water from potentially unreasonable

uses. Indeed, California's two most prominent water transfers resulted from this interplay between reasonable use and the market.

As described above, in 1984 the SWRCB made a determination of unreasonable use against the Imperial Irrigation District (IID), finding that the district's unlined canals and lack of regulating reservoirs in its water distribution system were causing both waste of water and flooding of land adjacent to the Salton Sea. The board ordered the district to correct these problems and to conserve a minimum of 100,000 acre-feet per year. With its water rights in jeopardy of reduction, the district agreed to line its canals, construct regulating reservoirs, and make operational improvements to its distribution system. These conservation actions would be funded, however, by the Metropolitan Water District (MWD) as payment for a 35-year transfer of 106,110 acre-feet per year from the IID to the MWD (Gray 1994). The SWRCB could have simply divested the IID of its water rights to the extent of unreasonable use, but it chose not to do so in favor of the more constructive solution presented in the IID-MWD transfer.⁸

The waste and unreasonable-use laws also served as a catalyst for a subsequent transfer of conserved water from IID to the San Diego County Water Authority. Following years of focus on California's excessive use of water from the Colorado River, the U.S. Bureau of Reclamation made a formal finding that farmers within the IID were wasting water. Based on this finding, the bureau determined that the district was in violation of the beneficial use requirement of federal reclamation law, which includes a reasonable use standard, and it ordered a reduction in water deliveries to the IID of approximately 8 percent. This decision broke a decade-long deadlock in negotiations among the Department of the Interior, the IID, the MWD, and the SDCWA. Two months later, the Southern California water agencies pledged to reduce their use of Colorado River water by 800,000 acre-feet per year over the next 14 years. This Quantification Settlement Agreement (QSA) brought California into compliance with the 4.4 million acre-feet per year limit of the Boulder Canyon Project Act, which governs the allocation of Colorado River water among Arizona, California, and Nevada. In the QSA, IID also agreed to conserve and transfer 277,000 acre-feet per year to SDCWA for a period of 35 years (Gray 2005).⁹

The IID transfers were the product of the state and federal governments' enforcement of the mandate of reasonable use. The SWRCB and the Department of the Interior applied the doctrine of reasonable use aggressively, but also flexibly, to give IID and its members a choice:

forfeit their water rights to the extent of unreasonable use, or correct the problem and benefit economically from the conservation and transfer of their previously wasteful practices. Application of the reasonable use doctrine in this context thus served three salutary purposes. It induced the conservation and more efficient conveyance and use of water within IID. It led to the transfer of the conserved water to higher-valued uses within MWD and SDCWA. And it reduced MWD's and SDCWA's long-term demands for water from both the Colorado River and other sources (such as the Delta or new water projects in the Sierra Nevada).

One of the goals of the modern water transfer statutes is to create economic incentives for water right holders and their derivative users to conserve water and to transfer that water to higher-valued uses by presenting them with the opportunity costs of their existing uses—that is, by showing them that they may earn more revenue from selling water than they can through their own uses. Enforcement of the reasonable use mandate to induce these types of transfers is an important means of effectuating these statutory policies and should become a more prominent feature of California's efforts to foster greater efficiency in water use and water allocation. The two IID transfers are a model for this vital synergy between water transfers and reasonable use.

Compliance with Environmental Standards and Protection of the Public Trust

The reasonable use doctrine also serves the important purpose of helping to implement and enforce the public trust and the other environmental laws that protect water quality, endangered species, aquatic habitat, and other *in situ* uses. These laws establish fundamental limitations on the amount of water that water right holders may impound and divert from California's rivers, lakes, and estuaries.

Federal statutes, such as the Clean Water Act (33 U.S.C. §§ 1251 *et seq.*) and the Endangered Species Act (16 U.S.C. § 1531 *et seq.*), are preemptive of California water rights law, as are the water quality standards, biological opinions, and other regulations and administrative actions that implement them. California's environmental laws also take precedence over water rights in the event of conflict. The environmental baselines these laws establish define the quantity of water available for impoundment and diversion (*In re Bay-Delta Programmatic Environmental Impact Report Coordinated Proceedings*, 2008).

Yet, some courts have struggled to understand the relationship between environmental mandates and the reasonable use doctrine as a limit on the exercise of water rights. For example, in *Tulare Lake Water Storage District v. United States* (2001), the U.S. Court of Federal Claims ruled that restrictions on SWP operations required by biological opinions issued under the federal Endangered Species Act to protect winter-run Chinook salmon and Delta smelt were a taking of property, because the operational constraints caused water shortages for some SWP contractors. The court ordered the United States to pay the contractors approximately \$26 million in damages. Although the court noted that the reasonable use and public trust doctrines might preclude the appropriation of water under conditions that would imperil endangered species of fish, it declined to consider either aspect of California water rights law as part of its analysis.

Similarly, in *Casitas Municipal Water District v. United States* (2008), the U.S. Court of Appeals for the Federal Circuit held that the United States's directive that a local water district allow water to pass through a fish ladder was a taking of property. The releases of water were needed to support migration of steelhead, which are also protected under the federal ESA. The court reasoned that the federal government had physically diverted the plaintiff's water for its own purposes—protection of the endangered fish. The court never addressed the question of whether California's reasonable use and public trust doctrines might limit the plaintiff's exercise of its water rights in a manner that could harm the protected fish.¹⁰

Yet, analysis of the reasonable use doctrine in these settings should be straightforward, both for the advocates of environmental protection and for the courts. Article X, section 2, declares as a matter of California constitutional and property rights law that existing uses of water are unlawful if they cause unreasonable harm to water quality, fish, aquatic ecosystems, or other in-stream beneficial uses. Not only does the state have a duty to enforce the reasonable use mandate, but it may do so without violating the water rights of those users who must reduce their impoundment and diversion of water, limit discharges, or otherwise alter their water use practices to comply with this supervening law. As *Joslin* and its progeny make clear, because there is no valid property right in an unreasonable use, when the state acts to abate water practices that unreasonably harm the environment it may do so without compensation.

Although an adjudicatory reasonable use determination always requires an assessment of the competing interests, it is difficult to

imagine a case in which a court would find reasonable a use of water that violates water quality standards or jeopardizes the continued existence of endangered or threatened species. As described above, the California Court of Appeal has held that statutes that allocate water to environmental uses, or which place limits on the impoundment and diversion of water to protect against environmental harm, are presumptively reasonable and are entitled to significant deference (*California Trout v. SWRCB*, 1989). Conversely, uses of water that violate state and federal environmental laws—or the water quality and streamflow standards, effluent limits, biological opinions, incidental take limits, and other regulations that implement those laws—should be presumptively unreasonable and a substantial burden placed on the water right holder to prove otherwise.

Constructive Pressure to Reform

The reasonable use doctrine will continue to be a vital component of California water policy. It is the foundation of the state's water rights system and applies to all water rights. It confers authority on all branches and levels of government to ensure that water is used reasonably (and reasonably efficiently) to maximize the general welfare of Californians. This includes drinking-water supplies and economic uses, as well as the environment. The reasonable use doctrine (sometimes working in tandem with the public trust) therefore serves to ensure that the impoundment and diversion of the state's waters for consumptive uses do not degrade aquatic ecosystems or harm the aquatic and terrestrial species that also depend on these waters.

Some future applications of the reasonable use mandate will be obvious. As discussed in the preceding subsection, assertion of the doctrine both to protect endangered fish and to limit the exercise of water rights that threaten to jeopardize such species is one example. Another obvious (and perhaps easy) application of the reasonable use mandate would be to restrict the groundwater pumping on the west side of the San Joaquin Valley that has caused overdraft and compaction of local aquifers, with attendant land subsidence of almost 30 feet. This overdraft and subsidence now threaten the geologic stability and flow capabilities of the Delta-Mendota Canal and the California Aqueduct, which deliver irrigation water to approximately 3 million acres of farmland in the San Joaquin Valley and Tulare Basin and to more than 16 million residential, commercial, and industrial customers in Southern California (U.S.

Geological Survey 2013). This is a compelling example of the state's obligation to enforce the doctrine of reasonable use for the benefit of California's people and economy.

In less egregious situations, the reasonable use doctrine is likely to play a more indirect role in improving water management and water use. The Delta Watermaster's call for an investigation of irrigation practices is an excellent beginning. Coupled with the statutes that protect existing users' rights to conserved water and allow them to transfer water made available through voluntary conservation, such investigations could induce some farmers and irrigation-water managers to correct wasteful practices and perhaps even profit from their reforms. Presented with both the opportunity costs of their existing uses and the threat of loss of water rights for failure to act, these users may choose to do the right thing. The two IID transfers of conserved water are useful templates for this type of interplay between reasonable use and market incentives.

Moreover, some environmental groups have suggested that the state should assert its reasonable use authority against those who irrigate water-intensive crops, such as alfalfa and pasture (Natural Resources Defense Council 1996). The doctrine also could be used to put pressure on municipal water agencies and their customers to minimize their use of water for landscaping and other outdoor uses. Whether state and local regulators would have the will to take such actions is an open question. As the foregoing demonstrates, however, the reasonable use mandates clearly apply to uses that demand an inordinate share of the available water in light of contemporary competing demands. It should not matter in this context whether the excessive demands are the result of an unreasonable point of diversion, method of conveyance, or place of use, or are caused by the type of use to which the water is put.

The doctrine of reasonable use may therefore be best understood as a source of pressure on all water users to exercise their rights in a manner that accounts for the effects of their water-use practices on other existing and potential uses—both consumptive and environmental—and that keeps pace with the times. Although the law may not necessarily require that individual water uses be as efficient as technology permits, or that water uses be changed to ensure optimal allocation (however that might be determined), the doctrine does set an enforceable standard of reasonably efficient use and reasonably efficient allocation as current conditions warrant. A consistent and palpable threat of regulatory enforcement of reasonable use may serve as a constructive inducement to better water use and more optimal allocation.

CONCLUSION

Toward the end of his life, Wallace Stegner looked back over a century of water resources policy and wrote: “The West cannot carry what it has lifted. It will make heroic efforts, always in the direction of more grandiose engineering works, and in the end it will subside back to what it was meant to be, an oasis civilization with one great deficiency—water.” We need, he concluded, “a Redeemer” (Stegner 1986).

The twin problems that Stegner identified—overdevelopment of an arid environment and an unrequited faith that we can somehow engineer a solution to water scarcity—are even more palpable 30 years on. Yet, as Stegner knew full well, there will be no redeemer. There is only our capacity to learn from the past, to repair the problems that we have created, and to place ourselves on a more sustainable future path. As California moves forward in the twenty-first century to confront the challenges posed by overuse and misallocation, groundwater overdraft, ecological degradation, continued population growth, and the predicted effects of global warming and climate change, the responsive and dynamic mandates of the reasonable use doctrine will be an essential guide.

NOTES

1. The common law, statutory law, and constitutional law of water rights also contain a “beneficial use” requirement, which means that all uses of water must be for a socially beneficial use (Cal. Const. art. X, § 2; Cal. Water Code § 1240). This chapter focuses on the reasonable use requirement because, both as a water policy directive and as a limitation on water rights, it is the more significant of the two.

2. Although the doctrine of reasonable use was part of the common law of riparian and appropriative rights, the voters placed it in the Constitution in 1928 to overturn a series of California Supreme Court decisions that prevented appropriators from alleging unreasonable use against riparians. The consequence was to allow riparians to enjoin any nonriparian use of water that diminished the natural flow of California’s rivers, regardless of the unreasonableness of the riparian’s claims. This in turn threatened the development of the state’s economy, which was increasingly dependent on water exported from the Sierra Nevada to the Bay Area, the Tulare Basin, and Southern California (Gray 1989; Hundley 2001).

3. In *City of Barstow v. Mojave Water Agency* (2000), the Supreme Court suggested that this same principle may apply to unexercised groundwater rights held by property owners whose lands overlie the aquifer (and hence have first priority to its safe yield).

4. The Court relied in both cases on the Water Code, § 1050, which declares that the SWRCB’s regulatory authority is “in furtherance of the policy con-

tained in Section 2 of Article X of the California Constitution and in all respects for the welfare and benefit of the people of the state, for the improvement of their prosperity and their living conditions.”

5. This transfer, as well as the interplay between the reasonable use doctrine and water transfers, will be discussed in the final section of this chapter.

6. The legislature has granted the board authority to engage in integrated surface and groundwater rights administration in the Scott River system, where the board has the power to conduct a statutory adjudication of all water rights, including “ground water supplies which are interconnected with the Scott River” (Cal. Water Code § 2500.5).

In September 2014, California governor Jerry Brown signed into law three bills that empower local agencies to regulate groundwater pumping: AB 1739, SB 1168, and SB 1319. The legislation also authorizes the SWRCB to regulate groundwater pumping if the board determines that (1) the local groundwater sustainability plan is inadequate and “is not being implemented in a manner that will likely achieve the sustainability goal,” and (2) “the basin is in a condition where groundwater extractions result in significant depletions of interconnected surface waters” (Cal. Water Code § 10735.2(a)(5)(B)(i), (ii)). The new law stipulates that before January 1, 2025, however, “the state board shall not establish an interim plan under this section to remedy a condition where the groundwater extractions result in significant depletions of interconnected surface waters” (§ 10735.8(h)). Although this legislation is an important first step toward integrated regulation of ground and surface water resources, it does not alter the long-standing general legal divide between the two.

7. In May 2014, a Superior Court applied this reasoning to hold that the public trust doctrine may limit groundwater pumping that lowers surface flows in the Scott River and thereby harms fish and recreational uses (*Environmental Law Foundation v. SWRCB*, 2014). This decision is consonant with the integrative and comprehensive interpretation of article X, section 2, described in the text.

8. The board’s forbearance of its power to divest the IID of a portion of its water rights was supported by the legislature’s general declaration that water conservation, as well as the transfer of conserved water, is a reasonable and beneficial use (Water Code §§ 1011(a), (b)). The legislature also enacted a special law to protect the IID against forfeiture or diminution of its water rights as a result of water conservation and to insulate the district from liability for any adverse effects on the Salton Sea that might result (§§ 1012, 1013(a)).

9. As with the IID–MWD transfer, the legislature enacted special legislation to facilitate the IID–SDCWA transfer (Cal. Water Code § 1013(b)–(h)).

10. In a later opinion in the case, the Federal Circuit came closer to the reasonable use question, recognizing that article X, section 2, defines the property right in water. It held that because Casitas had not proved that the loss of the water that the government required to pass through the fish ladder had reduced the amount that the district could apply to beneficial use, the district had failed to establish an interference with its water rights. Under California law, the court concluded, “the concept of beneficial use provides an ‘overriding constitutional limitation’ on a party’s water rights” (*Casitas Municipal Water District v. United States*, 2013).

REFERENCES

Blomquist, William. 1992. *Dividing the Waters: Governing Groundwater in Southern California*. San Francisco: ICS Press.

California Court of Appeal cases

- People ex rel. SWRCB v. Forni, 54 Cal. App. 3d 743, 126 Cal. Rptr. 851 (1976).
 United States v. SWRCB, 182 Cal. App. 3d 82, 227 Cal. Rptr. 161 (1986).
 Imperial Irrigation District v. SWRCB, 186 Cal. App. 3d 1160 (1986).
 California Trout v. SWRCB, 207 Cal. App. 3d 585 (1989).
 Imperial Irrigation District v. SWRCB, 225 Cal. App. 3d 548, 275 Cal. Rptr. 250 (1990).
 El Dorado Irrigation District v. SWRCB, 142 Cal. App. 4th 937; 48 Cal. Rptr. 3d 468 (2006).
 City of Palmdale v. Palmdale Water District, 198 Cal. App. 4th 926, 131 Cal. Rptr. 3d 373 (2011).
 Light v. SWRCB, 226 Cal. App. 4th 1463, 173 Cal. Rptr. 3d 200 (2014).

California legislation

- AB 1739, SB 1168, and SB 1319, California Legislature, 2013–14 Regular Session.
 California Fish and Game Code § 5937.
 California Wild and Scenic Rivers Act, California Public Resources Code § 5093.5.
 California Water Code §§ 275, 370–374, 500–535, 1011–1013, 1050, 1240, 2500.2, 10920–10936, 10608–10608.64, 10610–10656, 10735.2(a)(5)(B)(i), (ii), 10735.8(h), 10750–10783.2, 10800–10853, 85020–85023, 85054.

California regulations

- 23 California Code Regs. § 735.

California Superior Court cases

- Environmental Law Foundation v. SWRCB, No. 34–2010–80000583 (Sacramento Supr. Ct. 2014).

California Supreme Court cases

- Peabody v. City of Vallejo, 2 Cal. 2d 351, 383, 40 P.2d 486 (1935).
 Joslin v. Marin Municipal Water District 67 Cal. 2d 132, 140, 429 P.2d 889, 60 Cal. Rptr. 377 (1967).
 In re Waters of Long Valley Creek Stream System, 25 Cal. 3d 339, 358–59, 599 P.2d 656, 158 Cal. Rptr. 350 (1979).
 Environmental Defense Fund v. East Bay Municipal Utility District, 26 Cal. 3d 183, 605 P.2d 1, 161 Cal. Rptr. 466 (1980).
 People v. Shirokow, 26 Cal. 3d 301, 605 P.2d 859, 162 Cal. Rptr. 30 (1980).
 National Audubon Society v. Superior Court, 33 Cal.3d 419, 443, 658 P.2d 709, 189 Cal. Rptr. 346 (1983).
 City of Barstow v. Mojave Water Agency, 23 Cal. 4th 1224, 1242, 5 P.3d 853, 99 Cal. Rptr. 2d 294 (2000).
 In re Bay-Delta Programmatic Environmental Impact Report Coordinated Proceedings, 43 Cal. 4th 1143, 184 P.3d 709, 77 Cal. Rptr. 578 (2008).

Federal Court cases

- Tulare Lake Basin Water Storage District v. United States, 49 Fed. Cl. 313 (2001).
 Casitas Municipal Water District v. United States, 543 F.3d 1276 (Fed. Cir. 2008), *petition for rehearing denied*, 556 F.3d 1329 (2009).
 Casitas Municipal Water District v. United States, 708 F.3d 1340 (Fed. Cir. 2013).

Federal legislation

- Clean Water Act, 33 U.S.C. §§ 1251 *et seq.*
- Endangered Species Act, 16 U.S.C. § 1531 *et seq.*
- California Bay-Delta Authority. 2005. *Final Draft Year-4 Comprehensive Evaluation of the CALFED Water Use Efficiency Element*. Sacramento: State of California.
- Gray, Brian E. 1989. "In Search of Bigfoot: The Common Law Origins of Article X, Section 2 of the California Constitution." *Hastings Constitutional Law Quarterly* 17:225.
- . 1994. "The Modern Era in California Water Law." *Hastings Law Journal* 45:249.
- . 2005. "The Uncertain Future of Water Rights in California: Reflections on the Governor's Commission Report." *McGeorge Law Review* 36:43.
- Gray, Brian E., Dean Misczynski, Ellen Hanak, Andrew Fahlund, Jay Lund, David Mitchell, and James Nachbaur. 2014. "Paying for Water in California: The Legal Framework." *Hastings L.J.* 65:1603.
- Haddad, Brent M. 2000. *Rivers of Gold: Designing Markets to Allocate Water in California*. Washington, DC: Island Press.
- Hanak, Ellen, Brian Gray, Jay Lund, David Mitchell, Caitrin Chappelle, Andrew Fahlund, Katrina Jessoe, Josué Medellín-Azuara, Dean Misczynski, James Nachbaur, and Robyn Suddeth. 2014. *Paying for Water in California*. San Francisco: Public Policy Institute of California.
- Hanak, Ellen, Jay Lund, Ariel Dinar, Brian Gray, Richard Howitt, Jeffrey Mount, Peter Moyle, and Barton Thompson. 2011. *Managing California's Water: From Conflict to Reconciliation*. San Francisco: Public Policy Institute of California.
- Hundley, Norris, Jr. 2001. *The Great Thirst: Californians and Water—A History*. Rev. ed. Berkeley: University of California Press.
- Littleworth, Arthur L., and Eric L. Garner. 2007. *California Water II*. Point Arena, CA: Solano Press.
- Natural Resources Defense Council. 1998. *Alfalfa Overview*. San Francisco, CA.
- Sax, Joseph L. 2003. "We Don't Do Groundwater: A Morsel of California History." *University of Denver Water Law Review* 6: 269.
- Stegner, Wallace. 1986. "Water in the West: Growing beyond Nature's Limits." *Los Angeles Times*, December 29.
- United States Geological Survey. 2013. *Land Subsidence along the Delta-Mendota Canal in the Northern Part of the San Joaquin Valley, California, 2003-10*. Reston, VA: U.S. Government Printing Office.
- Wilson, Craig M. [Delta Watermaster]. 2010. *The Reasonable Use Doctrine & Agricultural Water Use Efficiency: A Report to the State Water Resources Control Board and the Delta Stewardship Council*. Sacramento: State of California.