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Future of Water Law Reform in California a Quarter Century after the Governor's Commission, The

Gregory A. Thomas
Natural Heritage Institute

The Future of Water Law Reform in California a Quarter Century After the Governor's Commission

Gregory A. Thomas*

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* President of the Natural Heritage Institute, a non-profit, public interest law firm and natural resource conservation organization in San Francisco, California, specializing in water resource restoration and protection domestically and internationally. The author gratefully acknowledges the assistance of Nathan G. Alley and Ellen Cheng in the preparation of this article.

"Do not control the people with laws, Nor violence nor espionage, But conquer them with inaction."[1]

"The life of the law has not been logic: it has been experience."[2]

I. INTRODUCTION

When it comes to California water, a quarter of a century is just a moment in the life of the law.[3] That has been the interlude since the Governor's Commission to Review California Water Rights Law ("Governor's Commission") attempted to administer a dose of logic to the accretion of codes, cases, and customs constituting California water law.[4] The subsequent experience of implementing the recommendations for legal reform has yielded mixed results, as the commentators in this symposium have chronicled.

The Governor's Commission identified four areas for improvement: certainty in water rights,[5] efficiency in water use,[6] protection of instream uses,[7] and effective groundwater management.[8] The recommendations to reduce uncertainty in the quantification of water rights—improving recordation of non-statutory[9] and future rights to water,[10] defining key operative terms such as "reasonable and beneficial use,"[11] and fostering basin-wide adjudication of all rights, including groundwater and non-permitted rights[12]—were not adopted by a legislature that

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1. LAO TZE, TAO TE CHING ch. 57, *available at* http://www.chinapage.com/gnl.html (last visited Feb. 12, 2005) (copy on file with the *McGeorge Law Review*).

2. OLIVER WENDELL HOLMES, JR., THE COMMON LAW 1 (1881).

3. By comparison, it has been over 125 years since the legislature, in 1872, codified the customs that more or less defined early California water rights theretofore.

4. *See generally* GOVERNOR'S COMMISSION TO REVIEW CALIFORNIA WATER RIGHTS LAW, FINAL REPORT (1978) [hereinafter FINAL REPORT] (copy on file with the *McGeorge Law Review*).

5. *See id.* at 16-49.

6. *See id.* at 50-98.

7. *See id.* at 99-134.

8. *See id.* at 135-254.

9. *See id.* at 17-18. Non-statutory rights include riparian rights and rights of prescription. Whereas users who appropriate water must file for relevant permits, thereby establishing a detailed record of consumption, riparian and prescriptive rights holders are not subject to permitting. *Id.*

10. *See id.* at 18-21; Samantha Olson & Erin K.L. Mahaney, *Searching for Certainty in a State of Flux: How Administrative Procedures Help Provide Stability in Water Rights Law*, 36 MCGEORGE L. REV. 73 (2005).

11. *See* FINAL REPORT, *supra* note 4, at 21. Article X, section 2 of the California Constitution reads: "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. . . ." CAL. CONST. art. X, § 2. The meanings of "reasonable" and "beneficial" are vague and have been determined largely through case-by-case adjudications; this creates uncertainties for individual water users who wish to comport with the statutory requirements. *See* Olson & Mahaney, *supra* note 10.

12. *See* FINAL REPORT, *supra* note 4, at 27-30.

has long ago concluded it is better to tolerate uncertainty in water rights than in political futures. The Governor's Commission published twelve water use efficiency and conservation recommendations that could be accomplished through regulatory, market-based, or administrative mechanisms.[13] Many of these confirm that initiatives to conserve water will not impair the underlying water right or entitlement.[14] The Governor's Commission's recommendations on integrating instream flows into the water rights administration have been largely superceded by regulatory interventions, such as the completion of flow standards to protect the aquatic ecosystems of the Sacramento-San Joaquin Delta (reviewed below),[15] by ambitious ecosystem restoration initiatives promised (although not delivered) by the CalFed Bay-Delta Program, by the Environmental Water Account[16] (also chronicled below),[17] and by the instream water transfer mechanism provided by section 1707 of the Water Code.[18] Finally, the Governor's Commission's recommendations on groundwater management have been

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13. *See id.* at 71-72; *see also* Andrew H. Sawyer, *Improving Efficiency Incrementally: The Governor's Commission Attacks Waste and Unreasonable Use*, 36 MCGEORGE L. REV. 209 (2005); Caitlin Dyckman, *A Dynastic Disruption: The Use Efficiency and Conservation Legacy of the Governor's Commission to Review California Water Rights Law Recommendations*, 36 MCGEORGE L. REV. 175 (2005).

14. CAL. WATER CODE §§ 1011, 1241 (West 1971 & Supp. 2005); *see id.* §§ 1210-1212, 1244; Dyckman, *supra* note 13.

15. *See infra* Part II.A.

16. *See* Cal. Bay-Delta Authority, Environmental Water Account, *at* http://calwater.ca.gov/Programs/EnvironmentalWaterAccount/EnvironmentalWaterAccount.shtml. (last visited Dec. 20, 2004) (copy on file with the *McGeorge Law Review*). The Water Transfer Workgroup describes the Environmental Water Account ("EWA") in the following terms:

> The EWA is a program that allows state and federal fishery agencies to call for reductions in exports at key times, generally during the winter and spring, to reduce the entrainment of fish at the state and federal pumping plants in the southern Delta. The resulting reductions in water supply from these actions are repaid to the state and federal water projects later in the year at no increased cost to the water projects. Public funds are used to finance the program. Water transfers are a key component of the EWA. During its first year of operation (water year 2001), the EWA obtained 264,000 acre-feet of water from transfers. An additional 72,000 acre-feet held in San Luis Reservoir from water transfers the previous year were also provided to the EWA by USBR. About 40 percent was obtained upstream of the Delta and about 60 percent was obtained in the export areas south of the Delta, making the EWA a major factor in the water market during 2001. In addition, both DWR and USBR instituted dry-year programs and a program to obtain water supplies for wildlife refuges. These three programs obtained water transfers of 363,000 acre-feet in 2001. The water for these transfers was obtained mostly upstream of the Delta for use in areas south of the Delta. Only one relatively small water transfer (10,000 acre-feet) across the Delta, unrelated to the actions by the state or federal agencies, was approved last year. In water year 2001 over 630,000 acre-feet were transferred. The vast majority was transferred either under the guidance of, or funded by, a state or federal program. The complexity of cross-Delta water transfers and the flexibility derived by using the water rights of the DWR and USBR to facilitate these transfers makes the active involvement of these agencies in water transfers a critical factor.

WATER TRANSFER WORKGROUP, WATER TRANSFER ISSUES IN CALIFORNIA: FINAL REPORT TO THE CALIFORNIA STATE WATER RESOURCES CONTROL BOARD 4-5 (June 2002), *available at* http://calwater.ca.gov/Programs/WaterTransfers/adobe_pdf/Final_Report%20_Water_Transfer_Group.pdf (copy on file with the *McGeorge Law Review*). The concept was first tabled by the Natural Heritage Institute in the water policy dialogue known as the Three-Way Process, in many respects the predecessor to the CalFed Bay Delta Program.

17. *See infra* Part II.A.

18. *See infra* Part III.B.3.

largely ignored,[19] because if there is anything that is scarier to a California legislator than allocating a public resource such as surface water, it is allocating an incident of private property such as groundwater. This default has left California—the state that pumps more groundwater than any other—standing alone with Texas as the only western states to have failed to enact a statutory groundwater management regime.

In a nutshell, the Legislature has taken steps to secure rights to save water against the old "use it or lose it" adage and has created a mechanism for dedicating existing rights to instream flows. But the Legislature has also declined to adopt recommendations that would have removed uncertainties in water rights associated with unquantified rights and the vagaries of the reasonable and beneficial use doctrine. It also declined to enlarge the regulatory reach of the State Water Resources Control Board ("SWRCB") to prescribe instream flow standards or to exert jurisdiction over groundwater, leaving both of these areas to local initiative. If a new water law reform effort were to take up today where the 1978 Governor's Commission left off, would its neglected recommendations still constitute the most pressing agenda, or has the water world moved on?

Two conclusions regarding the pathways of reform for water management can be distilled from the record. First, reforming rights and regulations alone will not solve the next generation of water conflicts in California. The existing water rights system, and the skein of state and federal regulations in which it is suspended, are just the beginning point for a consideration of market-based transfers. Such transfers are essential, during times when all needs cannot be met—inevitable in a desert climate where interannual variation in runoff can exceed an order of magnitude—to allocate the available water to the uses of greatest economic and social value. The regulatory apparatus can always be improved, yet the SWRCB already possesses more regulatory authority than it is willing to exercise, often preferring to hold up the specter of mandated solutions to induce "voluntary" ones.[20] Notably, the 1995 Water Quality Control Plan for the Bay-Delta water system[21] is being implemented primarily through agreements among the water rights beneficiaries in the San Joaquin basin (the Vernalis Adaptive Management Program),[22] which was then adopted by the SWRCB,[23] and the Sacramento Valley Water Management Agreement.[24] Both settlements

19. *See* Kevin M. O'Brien, *The Governor's Commissions Recommendations on Groundwater: Treading Water Until the Next Drought*, 36 MCGEORGE L. REV. 435 (2005).

20. *See, e.g.*, Brian E. Gray, *The Modern Era in California Water Law*, 45 HASTINGS L.J. 249, 277-83 (1994).

21. STATE WATER RES. CONTROL BD., WATER QUALITY CONTROL PLAN FOR THE SAN FRANCISCO BAY/SACRAMENTO-SAN JOAQUIN DELTA ESTUARY (May 1995), *available at* http://www.waterrights.ca.gov/baydelta/1995WQCPB.pdf [hereinafter BAY-DELTA PLAN] (copy on file with the *McGeorge Law Review*).

22. SAN JOAQUIN RIVER GROUP AUTH., THE SAN JOAQUIN RIVER AGREEMENT (March 1999), *available at* http://www.sjrg.org/agreement.htm [hereinafter SAN JOAQUIN RIVER AGREEMENT] (copy on file with the *McGeorge Law Review*).

23. S.W.R.C.B., Revised Water Right Decision 1641, at 2 (Mar. 15, 2000) [hereinafter Decision 1641].

24. N. CAL. WATER ASS'N, THE SACRAMENTO VALLEY WATER MANAGEMENT AGREEMENT 11 (Sept. 2001), *available at* http://www.norcalwater.org/pdf/sac%20valley%20water%20mgmt%20agrmt.pdf [hereinafter SACRAMENTO VALLEY WATER MANAGEMENT AGREEMENT] (copy on file with the *McGeorge Law Review*).

are premised on "physical solutions" in the form of water supply enhancement strategies—particularly conjunctive water management and water conservation projects—that will enable the water users to meet their share of the delta inflow requirements without sacrificing irrigation water.[25]

Another prime consideration bearing upon the direction of future reforms is that California's water supply system is so federalized that the state, acting alone, cannot hope to accomplish all of its needed reforms. The federal Central Valley Project ("CVP") is the largest water supply system in the state (indeed, in the United States), encompassing some twenty storage dams and reservoirs, eleven power plants, five-hundred miles of major canals, and over 250 contracting water districts. It manages some nine million acre-feet of water per year for agricultural, urban and wildlife uses. Under the Supremacy Clause of the U.S. Constitution, federal regulatory programs drive water allocation and management throughout the Central Valley far more than do state laws. For example, Federal Clean Water Act[26] mandates drove the development of the state's water quality control plan for the Bay-Delta system.[27] The plan's constraining features are the restrictions on delta pumping that the SWRCB incorporated—as it was required to do—from biological opinions issued by the U.S. Fish and Wildlife Service ("FWS") and the National Marine Fisheries Service ("NMFS") to protect fish species listed and protected under the Federal Endangered Species Act ("ESA").[28] Operations of the state dam at Oroville and of the non-project hydropower dams[29] in the Central Valley are dictated by the Federal Energy Regulatory Commission ("FERC"). Flood control operations for all eleven terminal reservoirs in the Central Valley system are controlled by the U.S. Army Corps of Engineers. Water diversion infrastructure in navigable waterways, including all developed rivers in the Central Valley and its delta, are subject to dredge and fill permits issued by that same federal agency. To be sure, federal reclamation facilities are subject to state water rights administration under section 8 of the Federal Reclamation Act,[30] and the Bureau of Reclamation ("USBR") stores and delivers water subject to water rights permits issued by the SWRCB. But it is fanciful to imagine that California can reform water use and development practices in the state simply by tuning up its own water codes.

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25. *See* SAN JOAQUIN RIVER AGREEMENT, *supra* note 22, at § 6.1; SACRAMENTO VALLEY WATER MANAGEMENT AGREEMENT, *supra* note 24, at 12.

26. 33 U.S.C.A. §§ 1251-1387 (West 2001).

27. It was the U.S. Environmental Protection Agency's declaration of the inadequacy of state water quality standards under the Federal Clean Water Act—and Governor Wilson's fear of losing state prerogatives to the Federal Endangered Species Act—that drove the SWRCB to reinitiate efforts to promulgate substitute standards for the Bay-Delta estuary, which culminated in the 1995 Water Quality Control Plan.

28. 16 U.S.C.A. §§ 1531-1544 (West 2001).

29. *E.g.*, New Bullards Bar operated by the Yuba County Water Agency, New Exchequer dam operated by the Merced Irrigation District, and New Don Pedro dam operated by the Modesto and Turlock Irrigation Districts.

30. *See* California v. United States, 438 U.S. 645, 675 (1978) (upholding the state's authority to impose "conditions on the permits granted to the United States which are not inconsistent with congressional provisions authorizing the project in question").

In sum, the future of water law reform in California will necessarily transcend the narrow focus of the Governor's Commission on state water rights and regulatory programs. The reform agenda will be driven by the need to foster, facilitate, and accommodate water management strategies that reduce conflicts among water users, including the environment, and these will surely increase as a growing population places ever greater strains on a fixed and variable supply. These strategies are known in the law as "physical solutions," which are simply practical alternatives that the courts or the SWRCB[31] can either impose or approve to provide water rights holders the benefits secured by their rights *in lieu* of their literal exercise. Physical solutions reduce conflicts among water users and "achieve better overall utilization of the resource."[32] This accommodative device is a judicial and regulatory response to the 1928 Amendment to the California Constitution, Article X, Section 2, which enjoins the administrators of water rights in California to derive the maximum public benefit from a scarce and vital resource.[33] The physical solution doctrine has been used to curtail wasteful practices,[34] "compel a senior right holder to accept a substitute source of water or modification of its means of diversion, distribution, or use of water at a junior right holder's expense,"[35] allow appropriators to satisfy riparian rights by substitute supplies,[36] and address unsustainable demands on a groundwater basin.[37]

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31. The courts, using their equitable powers, and the SWRCB, through section 275 of the Water Code, have the authority to fashion and enforce physical solutions to ensure more efficient use of water, provided that the legal rights of the parties are protected and senior rights holders are not required to incur any material expense. *See generally* City of Barstow v. Mojave Water Dist., 5 P.3d 853 (Cal. 2000); City of Lodi v. E. Bay Mun. Util. Dist., 60 P.2d 439, 450 (Cal. 1936) (stating "it is not only within the power but it is also the duty of the trial court to admit evidence relating to possible physical solutions, and if none is satisfactory to it to suggest on its own motion such physical solution"). For examples of SWRCB enforcement of physical solutions, see S.W.R.C.B., Decision 1631 (Sept. 28, 1994); S.W.R.C.B., Order No. WR 98-05 (Sept. 2, 1998); S.W.R.C.B., Decision 1600 (June 21, 1984); S.W.R.C.B., Order No. WR 88-20 (Sept. 7, 1988); S.W.R.C.B., Order No. WR 2000-13 (Oct. 19, 2000); S.W.R.C.B., Order WR 96-02 (Feb. 27, 1996); S.W.R.C.B., Order No. WR 94-02 (Feb. 2, 1994); S.W.R.C.B., Order No. WR 93-08 (Nov. 18, 1993); S.W.R.C.B., Order No. WR 90-16 (Nov. 7, 1990).

32. Harrison C. Dunning, *The "Physical Solution" in Western Water Law*, 57 U. COLO. L. REV. 445, 448 (1986).

33. In the main, the physical solution doctrine is most appropriately viewed as a part of the common law of water in California. Specific reference is made to the "physical solution" doctrine in four sections of the Water Code, but each reference is applicable to the protection of the quality of groundwater only. Remarkably, the Water Code does not mention physical solutions in conjunction with surface water. *See* CAL. WATER CODE §§ 2100, 2101 (West 1971 & Supp. 2005); *id.* §§ 78648, 79149 (West 2004).

34. *See, e.g., City of Lodi*, 60 P.2d at 450 (where the court struggled to determine how best to distribute appropriative water rights along California's Mokelumne River in order to avoid waste). In *State Water Resources Control Board v. Forni*, 126 Cal. Rptr. 851, 853, 858 (Ct. App. 1976), the SWRCB initiated an action to compel Napa Valley winemakers to implement a physical solution to avoid drawing water directly from the Napa River during frost season on the grounds that the wine makers could instead implement a water storage alternative. *Id.* at 853. The Court of Appeal ruled that the SWRCB's decision was a legitimate exercise of the police power to enforce the reasonable use requirement of the California Constitution. *Id.* at 858; *see also* Jeffrey A. Wilcox, Note, *Taking Cover: Fifth Amendment Takings Jurisprudence as a Tool for Resolving Water Disputes in the American West*, 55 HASTINGS L.J. 477, 502-503 (2003).

35. Dunning, *supra* note 32, at 448.

36. *See* Clifford W. Schultz & Gregory S. Weber, *Changing Judicial Attitudes Towards California Water Resources: From Vested Rights to Utilitarian Reallocations*, 19 PAC. L. J. 1031, 1061-86 (1988); A. Dan

As this article will argue, physical solutions are the pathway to the future in California.[38] From that vantage point, the improvements in regulatory programs and in the administration of water rights that are needed to facilitate physical solutions will constitute the legal reform agenda for the future.

To elaborate on that thesis, this article will describe the types of physical solutions that appear most promising to improve water resource management in the near-term in California.[39] The article will then illustrate the types of facilitative legal reforms that may be warranted by focusing a more detailed analysis on the legal uncertainties that are today impeding groundwater banking, one of the most promising techniques for expanding water storage in the Central Valley.[40] First, it will be useful to make reference to two transformational developments in water management in California that have materially changed some of the realities that preoccupied the Governor's Commission, particularly with regard to the challenge of accommodating instream flow demands within the California water rights structure.[41]

II. FROM THE GOVERNOR'S COMMISSION TO THE PRESENT: TWO TRANSFORMATIONAL EVENTS

In the twenty-five years that have elapsed since the Governor's Commission rendered its recommendations for water law reform, two milestones in California water management—one in the regulatory realm and one in the planning realm—have erected a pathway on which future innovations will move forward. The first is the culmination of a seventeen year-long process to establish water quality standards that require the exercise of water rights to conform to the ecological requirements of the Sacramento-San Joaquin delta, the hub of the California water system.[42] The second is the multi-agency, system-wide planning process, originally known as the CalFed Bay-Delta Program, and now codified as the CalFed Bay-Delta Authority.[43]

Tarlock, *The Creation of New Risk-Sharing Water Entitlement Regimes: The Case of the Truckee-Carson Settlement*, 25 ECOLOGY L.Q. 674, 704 n.34 (1999).

37. Rancho Santa Margarita v. Vail, 81 P.2d 533, 561 (Cal. 1938) (stating that "[w]ith a relatively small quantity of water available, far insufficient to meet all the needs therefore, the court should not grant an injunction until every reasonable physical solution, and every reasonable source of supply, has been thoroughly investigated").

38. *See infra* Part IV.

39. *See id.*

40. *See infra* Part V.

41. *See infra* Part II.

42. *See* BAY-DELTA PLAN, *supra* note 21.

43. *See* CAL. WATER CODE §§ 79400-79476 (West 2004).

A. The 1995 Water Quality Control Plan

The saga leading up to the plan and the steps that have been taken to implement it are succinctly reviewed in Superior Court Judge Roland Candee's Statement of Decision in *Coordinated Special Proceeding*,[44] resolving eleven consolidated challenges to the SWRCB's Decision 1641,[45] which implemented the plan.[46] The story begins in 1927, when the state filed for appropriative water rights for what eventually became the Federal Central Valley Project[47]—the largest reclamation project in the country—which would eventually and fundamentally alter natural flow regimes in the Central Valley river system and its delta. Forty years thereafter, the state also applied for permits for its own State Water Project ("SWP"), creating a second massive and disruptive water storage and delta export project.[48]

However, the long and torturous regulatory saga really began in 1978, when the SWRCB first tried to deal with the resulting impacts on fisheries and delta habitat by promulgating water quality standards in Decision 1485.[49] Those standards were obsolete almost from their promulgation. The standards were predicated upon protection of striped bass as surrogate of the delta ecosystem,[50] but, in an anomaly that may seem comical today, it turned out that the striped bass is a non-native game species that feeds upon native species.[51] Even the striped bass proved to be an unstable regulatory marker, as the index of their abundance began to plummet. Eventually, the U.S. Environmental Protection Agency ("EPA")—the federal cop on the beat—notified the SWRCB that it would have to go back to work on a more satisfactory standard. Soon thereafter, a state appellate court weighed in with a landmark decision, *United States v. SWRCB* (often referred to as the "*Racanelli* Decision"),[52] that proclaimed that the Decision 1485 standards were legally invalid because the SWRCB had calibrated them to what the State and Federal Water Projects alone could achieve, thereby relieving other water rights holders in the system from regulatory responsibility for maintaining adequate fishery flows.[53] The SWRCB's approach was based on the theory that, because the Water Projects were the junior water right holders in

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44. Statement of Decision, Coordinated Special Proceeding, at 21-35 (Super. Ct. Sacramento County, May 5, 2003, No. JC 4118) [hereinafter Candee Statement of Decision] (copy on file with the *McGeorge Law Review*).

45. Decision 1641, *supra* note 23.

46. *See also* David R.E. Aladjem, *Innovation within a Regulatory Framework: The Protection of Instream Beneficial Uses of Water in California, 1978 to 2004*, 36 MCGEORGE L. REV. 305 (2005).

47. *See* Candee Statement of Decision, *supra* note 44, at 21.

48. *See id.* at 22.

49. *See id.* at 23-24; S.W.R.C.B., Decision 1485 (Aug. 16, 1978) [hereinafter Decision 1485].

50. *See* Decision 1485, *supra* note 49, at 12-13, 40.

51. The precipitous decline of those native species under drought conditions was the main impetus for replacement standards that were finally adopted in 1995.

52. 227 Cal. Rptr. 161 (Ct. App. 1986).

53. *Id.* at 179-81.

the system (and by far the largest right holders), they should shoulder the regulatory burden.[54]

The *Racanelli* Decision rejected the SWRCB's approach and held that the responsibility to exercise water rights to maintain fisheries is not limited to junior appropriators, but falls upon all rights holders together, be they public or private, state or federal, junior or senior, appropriators or riparians, subject to the jurisdiction of the SWRCB or exempt from it.[55] This result was based on a spate of legal doctrines that comprise the bedrock of state power to limit and control water rights to protect the public interest, including the Constitutional doctrine of reasonable and beneficial use, the public trust doctrine, and the reserved jurisdiction of the SWRCB to amend permit terms as contemporary conditions may dictate.[56] However, the appellate court did not vacate the standards because the SWRCB was already committed to their revision, and some standards, even if legally infirm, were needed to protect the object of the regulations in the interim.[57]

The SWRCB commenced evidentiary hearings in 1987 to set replacement standards, and continued by fits and starts until new standards were promulgated in 1995.[58] The first set of proposed standards was undermined by the legislature, and the second attempt ground to a halt inconclusively. A third set ("Decision 1630") was withdrawn by Governor Pete Wilson—after EPA informed the state that it would reject the proposed standards—because he objected to the federal government pre-empting state discretion through listings of vulnerable fish species under the ESA.[59]

Finally, in 1995, the SWRCB adopted the current Water Quality Control Plan in Decision 1641.[60] The Board set salinity standards to protect agricultural uses in the south delta, where depleted flows in the summer and fall are a problem. Additionally, the Board regulated chlorine concentrations in delta exports to municipal water suppliers. For environmental resources, the Board established volumetric delta inflow requirements and export pumping rates.[61] It is these environmental regulations that are the most constraining for water project operations and water users. Ironically, these environmental standards are calibrated to achieve the conditions mandated by the biological opinions issued by the federal fishery protection agencies under the ESA, further evidence of both the federalization of water management in California and the decisive role of the ESA in establishing the "law of the river."

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54. *Id.* at 179-80.

55. *Id.* at 190 (stating that "requiring equal responsibility for maintaining the water quality standards . . . did not infringe upon or otherwise unlawfully impair . . . 'vested' appropriative rights").

56. *Id.* at 185-88, 201-02.

57. *Id.* at 181.

58. *See* Candee Statement of Decision, *supra* note 44, at 26-28.

59. *See id.* at 26-27.

60. Decision 1641, *supra* note 23.

61. *See id.* at 87-89.

These delta inflow standards must be met through reservoir releases and bypass flows at diversion points upstream of the delta. In this manner, they address the instream flow challenge that was the focus of one of the four substantive areas of the Governor's Commission and, together with other initiatives such as the Environmental Water Account ("EWA") and delta ecosystem restoration measures that emanated out of the CalFed Bay-Delta Program, described below,[62] the anadromous fish restoration program of the FWS, and dedication of CVP water to environmental protection and restoration under the Central Valley Project Improvement Act, have gone a long way toward establishing an environmental protection baseline. As this article will argue below, the challenge for the future is to move beyond these baseline protections in the direction of restoration of the aquatic ecosystems that have been damaged by the intensive water development of the past 150 years in California.[63]

A final salient note of this regulatory process is that the implementation programs to achieve these water quality standards are products of negotiated "settlements" of compliance responsibilities among the Federal and State water projects and their contracting water districts. As previously noted, these agreements are the San Joaquin River Agreement (for the purpose of conducting the Vernalis Adaptive Management Program ("VAMP"))[64] and the Sacramento Basin Water Management Plan. The underlying strategy for both of these settlements is "physical solutions" designed to generate the compliance water, with the USBR acting as the default guarantor of that water.

B. The CalFed Bay-Delta Program

On the heels of the longest drought in recent history, California and the federal government undertook a five year planning effort to improve the reliability and quality of water supplies for twenty-two million residential users and an $18 billion per year irrigated agriculture industry throughout the Central Valley and Bay-Delta region, while creating the most ambitious program ever to restore fisheries and aquatic ecosystems. Never before have all eighteen agencies of the state and federal government with responsibilities for water management and water-dependent environmental regulation engaged in a consensual planning process with water stakeholders to forge a mutually acceptable future for the

62. *See infra* Part II.B.

63. *See infra* Part III.A.

64. Notably, this compliance agreement has been returned to the SWRCB for further proceedings by a Superior Court judge hearing consolidated appeals of Decision 1641 on the grounds that the Agreement does not always assure that the delta inflow requirements measured at Vernalis will be met. The court intimated that the VAMP experiment would satisfy the Water Quality Control Plan if the SWRCB were to require that the Bureau of Reclamation (or some other entity) guarantee the additional compliance flows. *See* Candee Statement of Decision, *supra* note 44, at 90. This element of the Superior Court's decision is on appeal to the California Court of Appeal for the Third District *sub nom Westlands Water District v. Anderson*, No. C044714. No decision has been rendered as of this writing.

Central Valley water system—including the export areas south of the Valley. The shared objectives of this informal planning process, known as the CalFed Bay-Delta Program, were to improve water supply reliability for all sectors, restore the Bay-Delta ecosystem, improve drinking water quality, and address risks to the delta levee system (on which water exports to the Central Valley irrigation and the Los Angeles basin depend).[65]

Because of the attempt to bring all parties under the tent, the resulting water management framework is a broad political compromise to which technical merit became subservient. This is most evident in the pragmatic decision to jettison equal consideration of a delta water transfer alternative that would have reduced conflicts between water conveyance and essential fishery habitat by segregating the two demands.[66] That proposed solution became politically untenable because of relentless opposition from delta landowners who have traditionally worried that such a scheme would invite the Department of Water Resources ("DWR") and the USBR to abandon maintenance of the delta levees system—which protects private farmland at considerable public expense—because such a system would no longer be necessary for water export purposes. But this decision removed much of the water quality and reliability benefits for the beneficiaries of water exports out of the delta—the irrigation districts on the west side of the San Joaquin River, and the Metropolitan Water District of Southern California ("MWD")—and hence their willingness to pay the costs of implementing the Record of Decision ("ROD"). In effect, the ROD substituted a pledge of public money for the abandoned structural solution. Consequently, the implementation of this program has been almost entirely dependent upon funding from the state and federal governments. But, by making the implementation of this delicately balanced political deal depend on annual appropriations, the ROD simply substituted another forum to perpetuate the historic debates over dams versus the environment. Californians endowed the state government with the means to provide its share of the funding by passing Proposition 13 in the year 2000[67] and Proposition 50 in 2002. In October of 2004, the U.S. Congress enacted the Water Supply, Reliability, and Environmental Improvement Act,[68] authorizing the federal agency members of the CalFed Bay Delta Authority to undertake specified actions to implement the ROD, including water storage investigations, delta levee stabilization and ecosystem restoration actions. However, funding of

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65. CAL. WATER CODE § 79400 (West 2004).

66. For an extended analysis of the advantages and disadvantages of an isolated delta conveyance system, see NATURAL HERITAGE INST., AN ENVIRONMENTALLY OPTIMAL ALTERNATIVE FOR THE BAY-DELTA: A RESPONSE TO THE CALFED PROGRAM 85-98 (Oct. 1998), *available at* http://www.n-hi.org/Publications/Pubs_pdf/EOA98.pdf (copy on file with the *McGeorge Law Review*).

67. *See* Robert J. Glennon & John E. Thorson, *Federal Environmental Restoration Initiatives: An Analysis of Agency Performance and the Capacity for Change*, 42 ARIZ. L. REV. 483, 519-20 (2000) (stating that "Proposition 13, approved by California voters on March 7, 2000, authorized $1.97 billion in bonds for a multitude of water management activities.").

68. Pub. L. No. 108-361, 118 Stat. 1681 (2004).

these activities remains subject to annual appropriations with no assurance that they will be forthcoming. Unless the appropriations are forthcoming, Californians are likely to get another grand education in management of water shortfalls by crisis rather than by foresight, and the tuition is likely to be particularly high for both human and environmental stakeholders.

We can gain further insight into the agenda for future physical solutions and facilitative water law reforms by looking at what the CalFed program (if implemented) will accomplish and what it will leave undone. For the environment, the big potential gain is a commitment (if it can be funded) to maintain an ambitious ecosystem restoration program, without a reciprocal commitment to major new storage or conveyance projects—although there is a commitment to investigate specified storage options. Urban and agricultural water users were promised large subsidies for water conservation measures. Indeed, the ROD proposes to invest some $3 billion in water efficiency improvements over seven years, by far the most expensive single component of the plan.[69] Thus, the potential for physical solutions involving conservation transfers within and outside of agriculture should be substantially enhanced. For improved reliability of water supplies, CalFed assigned the largest role to groundwater storage, calling for 500,000 to one million acre-feet of new supplies. However, the ROD addresses only groundwater storage capacities. It does not consider the source of the water that would be banked,[70] although other research suggests that actively recharged conjunctive management projects, such as are described section IV of this article on physical solutions, can provide large new yield benefits system-wide.[71]

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69. That commitment is twice as large as the funding for ecosystem restoration or water storage, for instance. Yet, the CalFed RoD is silent as to the destination of the saved water. If the public is to bankroll these initiatives, at least some of the benefits should accrue to the public under the logic of the "beneficiary pays" principle, perhaps in the form of water for the Environmental Water Account. There is also the serious question of whether the desired results could be achieved more surely and more efficiently by simply giving these funds to the EWA to enable it to purchase the water from the agricultural water districts and thereby create market incentives for more efficient use. This can be far more effective than spending public funds to bridge the gap between the level of water conservation investments that are cost-justified from the vantage point of the grower or district, and the level of investment that is cost-justified from the vantage point of the public at large.

70. There is an implication that the groundwater storage program is contemplated as a passive recharge program that relies upon exploitation of native groundwater resources with recharge through natural infiltration. This approach could be problematic. First, passive recharge projects have very limited potential to contribute to the water supply reliability goals of CalFed if they are operated to provide local benefits only. Indeed, such groundwater development is already being pursued where feasible. Second, exploiting native groundwater for export to service areas overlying other basins is very controversial and tends to be resisted by the groundwater users in the basin of origin.

71. *See infra* Part IV. The most promising and abundant source of artificial recharge is the terminal reservoirs of the Central Valley water system, which are owned by USBR, DWR, the Corps of Engineers, and several non-project agricultural and urban water districts. Research by the Natural Heritage Institute indicates that up to one million acre-feet of new supply on an annual average could be generated from reoperation of the eleven terminal reservoirs of the Central Valley in combination with local groundwater banks. NATURAL HERITAGE INST., FEASIBILITY STUDY OF A MAXIMAL PROGRAM OF GROUNDWATER BANKING 20 (Dec. 1998).

The greatest substantive deficiencies of the ROD are probably the failure to provide any significant improvement in raw water quality for the urban water supply systems that export water out of the delta and CalFed's unwillingness to take seriously the seismic risk to the delta levee system.[72] The ROD underestimates the risk of seismic levee failure to the delta ecosystem and water supply,[73] and misses the opportunity to reduce this unacceptable risk by rebuilding key delta islands back to sea level.[74] Neither of these are water supply conflicts amenable to physical solutions as such. But both have large economic consequences (actual or potential) that will continue to perturb the California water policy arena in the years ahead.

III. A NEW PARADIGM FOR RECONCILING COMPETING USES

Physical solutions are the devices crafted by the courts in California to reduce conflicts among competing water users. Classically, these conflicts were encountered among water rights holders drawing on a common source of supply. In recent decades, however, these conflicts are increasingly caused by a new claimant who is, paradoxically, the original "owner" of the water: the natural aquatic ecosystem. Environmental water demands have the greatest potential to perturb vested water rights—and thereby engender conflict—because these demands represent the latest entrant into a water allocation system that historically favored early "appropriators" over later ones.

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72. The ROD incorrectly assumes that the impacts of levee failure will be limited to short-term impacts on water quality that can be remedied by an emergency response program. A multiple levee breach scenario will almost certainly overwhelm emergency response capabilities, leading to permanent inundation of western delta islands and long-term degradation of the delta environment and water supply.

73. A panel of engineers and seismologists convened by CalFed determined that there is a twenty percent probability of catastrophic levee failure (ten or more simultaneous levee breaches) over the next fifty years. Such a failure of the levee system would increase salinity levels throughout the Delta, devastating both the delta ecosystem and water supply system. The same panel of engineers also concluded that CalFed's plan to upgrade delta levees would not significantly reduce seismic vulnerability. *See* NATURAL HERITAGE INST., *supra* note 66, at 5-7.

74. Natural Heritage Institute believes that a concerted subsidence reversal program to rebuild key western delta islands to sea level could simultaneously reduce the risk of levee failure significantly and restore thousands of acres of tidal marsh in the heart of the delta. Rebuilding the entirety of the subsided delta to sea level would be a daunting and perhaps impossible task, but rebuilding key islands may be an affordable and effective way to simultaneously reduce seismic risk and restore tidal marsh. For instance, the CalFed seismic panel attributed over forty percent of the risk of seismic levee failure to Sherman Island, and its failure would have the largest impact on the delta's water supply and ecosystem. A concerted effort to isolate and rebuild large peninsulas on Sherman Island with cross levees and fill could reduce the risk of Sherman Island failure by fifty percent over the next ten years. *See* NATURAL HERITAGE INST., SUBSIDED ISLAND RESTORATION DESIGN IN THE SACRAMENTO-SAN JOAQUIN DELTA: A SOLUTION FOR LEVEE FRAGILITY AND WATER SUPPLY VULNERABILITY IN THE DELTA 1-2 (Feb. 2002), *available at* http://www.n-h-i.org/WhatsNew/NHI%20subsided%20island%20report1.pdf (copy on file with the *McGeorge Law Review*).

Reinstating ecologically beneficial flow patterns requires that a certain volume of water be available at the right time, with the right frequency, and in the right place to create the desired instream conditions and to re-establish necessary river-floodplain interactions. In sum, in restoring ecological flows, we usually need to address both the environmental supply, and the environmental demand sides of the equation. Sometimes, as in the case of hydroelectric dams that do not divert water but simply store it for release through turbines, re-establishing favorable downstream conditions is a matter of changing the storage and release regime. In these cases, the challenge is not so much "generating" environmental water, but modifying management of existing supplies for ecological benefit. In many other cases, however, the challenge is not just one of rescheduling a given volume of flow, but dedicating additional water to environmental uses. That can be done by reallocating water that is subject to existing rights, or by generating new water not otherwise available to the system. The vehicles for the first avenue are found in the water rights and regulation toolkit, which represent the historic means for conservation of aquatic resources; the vehicles for the second avenue are found in the physical solutions toolkit, which requires a new paradigm that will pose new challenges to the legal system. If a Governor's Commission to review California water rights were launched today, these challenges would occupy a central place in the scope of that review. To define these challenges, we can compare the trends of the past with the possible trends of the future.

A. *From Protection to Restoration*

In the face of headlong and relentless development of the state's rivers for water supply, conservation efforts have been necessarily focused on protecting the rivers that remain intact and the aquatic species that can be saved from extinction. Thus, free-flowing rivers have been preserved under the state and national Wild and Scenic Rivers programs.[75] In the final days of the Carter Administration, anticipating the sea change in federal environmental sensibilities of President Reagan, six prized rivers in northern California were designated in a single stroke.[76] In addition, the safety net of the California and federal Endangered Species Acts has been invoked to keep aquatic habitat conditions

75. *See generally* NAT'L PARK SERV., NATIONAL WILD AND SCENIC RIVERS SYSTEM, *at* http://www.nps.gov/rivers/ (last visited Dec. 20, 2004) (copy on file with the *McGeorge Law Review*).

76. NAT'L PARK SERV., WILD AND SCENIC RIVERS BY STATE, *at* http://www.nps.gov/rivers/wildriverslist.html#ca (last visited Dec. 20, 2004) (copy on file with the *McGeorge Law Review*). For a concise summary of the political and legal circumstances of these designations, see Lance Bocarsly, *Scenic Rivers Designation Maintained*, 4 UCLA J. ENVTL. L. & POL'Y 257 (1985). For a more lengthy discussion, see Sally K. Fairfax et al., *Federalism and the Wild and Scenic Rivers Act: Now You See It, Now You Don't*, 59 WASH. L. REV. 417 (1984). The Wild and Scenic Rivers Act allows state governments to designate rivers under state law and then petition the Secretary of the Interior, rather than Congress, for federal designation. Charlton H. Bonham, *The Wild Scenic Rivers Act and the Oregon Trilogy*, 21 PUB. LAND & RES. L. REV. 109, 119 (2000).

from deteriorating further.[77] Necessary though these stopgap measures are in the view of conservationists, they, in effect, freeze the *status quo*. These devices do nothing to repair the damage of the past. Yet, a system in a perpetual state of biological crisis leaves all water users at risk. A healthy and secure water resource system is one in which the environmental resources have been restored to the point where conflicts no longer bring crises. Thus, in the future, legal structures will need to accommodate a shift from *protection* to *restoration*.

Restoration of more natural flow patterns in developed rivers is a large step beyond the concept of minimum stream flows, which has dominated thinking about fishery protection in the past as exemplified by the hydropower relicensing process. In both snowmelt-fed and monsoon-fed stream systems, the natural hydrograph is characterized by seasonal peak and base flows. These are hard to recreate when the river is used to store and release water through hydropower turbines on a rhythm that follows electricity demand curves or where the stream channel is used as a water supply delivery conduit. Restoration to more natural flow patterns will require reoperation of existing reservoirs, often in combination with secondary storage facilities such as groundwater banks, and reconnection of flood plains with the stream channel. Though difficult to accomplish, natural resource restoration is the wave of the future, and one of the most vibrant new areas of applied environmental science.

B. Beyond Legal Mechanisms to Reallocate Water to Development Paths that Incorporate Restoration

In the past, an arsenal of legal devices has been invoked to reallocate appropriated water to maintain instream values. Some of these devices are regulatory programs, some are based on property rights, and some involve market transactions. Each results in the dedication of water that would otherwise be stored and diverted for irrigation or domestic uses to environmental purposes. The following are examples:

1. Regulatory Devices

As hydropower licenses are renewed under the Electric Consumers Protection Act,[78] new instream flow releases are routinely imposed by FERC as conditions of the new licenses. As of this writing, 541 non-federal hydropower dams have been relicensed since 1986, and 144 more will undergo relicensing within the next ten years.[79]

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77. *See, e.g.*, United States v. Glenn-Colusa Irrigation Dist., 788 F. Supp. 1126 (E.D. Cal. 1992) (enjoining water district from pumping to protect migratory salmon).

78. 16 U.S.C.A. § 797 (West 2000).

79. NATURAL HERITAGE INST., HYDROPOWER LICENSES DATABASE (2003) (copy on file with the *McGeorge Law Review*).

Under the Federal and California Endangered Species Acts, water storage and diversion projects that create adverse conditions may constitute an illegal "take" of protected species. Where necessary to the survival of such species, the authorized fishery protection agencies can prescribe limitations on the operations of such facilities. Since western watercourses in the arid basins are heavily developed for irrigation and municipal water supply, as well as flood control and power generation, aquatic species endangerment is frequent, and the ESA strictures often dictate the "law of the river."[80]

The Federal Clean Water Act and the California Porter-Cologne Water Quality Control Act regulate the physical, chemical, and biological integrity of navigable rivers to support designated uses, including maintenance of fish and wildlife resources. It is now clear in both U.S. Supreme Court decisions[81] and SWRCB practice[82] that the physical integrity of a watercourse includes the adequacy of instream flows to support the designated use. Thus, the controlling feature of the Water Quality Control Plan for the Delta water system is the prescription of delta inflows from the Sacramento and San Joaquin Rivers.[83]

2. *Limitations on Property Rights in Water*

In the arid west, water is as scarce as it is vital. This reality has impelled California and other western jurisdictions to adopt numerous well-established common law doctrines and statutory provisions that significantly limit the nature and extent of property interests in water. State laws establish that water rights are far from absolute; indeed, as the U.S. Supreme Court once said, "[r]ights, property or otherwise, which are absolute against all the world are certainly rare, and water rights are not among them."[84] Thus, California does not recognize private property rights to appropriate or use water in an unreasonable manner. This principle has been a foundational doctrine of California water law since as early as 1855 when the California Supreme Court gave it recognition in the landmark case of *Irwin v. Phillips*.[85] Thus, appropriative rights holders have been on notice for more than 100 years that they must exercise their water rights in a manner consistent with contemporary social needs and values, and that their rights are subject to modification in light of increasing demands on a finite water supply.[86] In 1928,

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80. *See, e.g.*, Mary C. Wood, *Reclaiming the Natural Rivers: The Endangered Species Act as Applied to Endangered River Ecosystems*, 40 ARIZ. L. REV. 197 (1998).

81. *See, e.g.*, PUD No. 1 v. Wash. Dep't of Ecology, 511 U.S. 700, 719 (1994).

82. *See, e.g.*, United States v. State Water Res. Control Bd., 227 Cal. Rptr. 161 (Ct. App. 1986).

83. *See* BAY-DELTA PLAN, *supra* note 42.

84. United States v. Willow River Power Co., 324 U.S. 499, 510 (1945).

85. 5 Cal. 140 (1855). By the end of the last century, the doctrine was well established as a powerful and explicit limitation on the exercise of appropriative rights. *See, e.g.*, Barrows v. Fox, 32 P. 811, 812 (Cal. 1893); Natoma Water & Mining Co. v. Hancock, 35 P. 334, 337 (Cal. 1894).

86. Brian Gray, *In Search of Bigfoot: The Common Law Origins of Article X, Section 2 of the California Constitution*, 17 HASTINGS CONST. L.Q. 225, 227, 271-72 (1986).

California enshrined this common law principle in a constitutional amendment that prohibits the waste of water, and applies a rule of reasonable and beneficial use, method of use, and method of diversion to all water rights in California.[87] Courts throughout California's history have held that exercise of a water right in a manner inconsistent with the reasonable use doctrine can confer no title.[88]

The public trust doctrine became a creature of California's common law as early as 1854, and since then, courts have applied it directly to all of the state's navigable waters.[89] By 1879, the public trust doctrine had been enshrined in California's Constitution.[90] Because the public trust doctrine incorporates public property interests in water resources, it necessarily limits the nature and extent of private interests in those resources.[91] Parties "acquiring rights in trust property generally hold those rights subject to the trust, and can assert no vested right to use those rights in a manner harmful to the trust," nor can they claim "a vested right to bar recognition of the trust or state action to carry out its purposes."[92] In *Marks v. Whitney*,[93] the California Supreme Court held that, in addition to

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87. CAL. CONST. art. X, § 2; United States v. State Water Res. Control Bd., 227 Cal. Rptr. 161, 171 (Ct. App. 1986). In analyzing what is a reasonable use, it is important to distinguish between the two facets of the reasonable use doctrine as articulated in the California Constitution. The amendment states in pertinent part: "[t]he right to water . . . does not and shall not extend to the waste or unreasonable use or unreasonable method of use or unreasonable method of diversion of water." This text contains two fundamental limitations on water rights. First, there is no right to waste water—that is, to extract an *amount* of water in excess of that which can be beneficially used. Second, there is no right to extract water in a *manner* or utilizing a *method* that is harmful to other beneficial uses, including fish and wildlife resources. The most definitive appellate court case on the unreasonable method of diversion doctrine is *State Water Resources Control Board v. Forni*, 126 Cal. Rptr. 851 (Ct. App. 1976). Similar results have been obtained where the protected interest is a fishery or other instream beneficial use as opposed to other water uses. In *Environmental Defense Fund v. East Bay Municipal Utility District*, 605 P.2d 1 (Cal. 1980), the California Supreme Court applied the unreasonable method of diversion doctrine to reinstate a lawsuit contending that a municipal water supply agency could not properly divert water at a point harmful to the fishery, where a diversion point downstream of that reach was feasible. *Id.* at 4-5.

88. *See, e.g.*, Joslin v. Marin Mun. Water Dist., 429 P.2d 889 (Cal. 1967).

89. In *Eldridge v. Cowell*, 4 Cal. 80 (1854), the California Supreme Court declared that the state "holds complete sovereignty over her navigable bays and rivers, and . . . her ownership is . . . attributed to her for the purpose of preserving the public easement, or right of navigation." *Id.* at 87. By 1867, the court expanded this public easement to include the right to fish. Ward v. Mulford, 32 Cal. 365, 372 (1867).

90. *See* CAL. CONST. art. X, § 4 (former art. XV, § 2) (enacted 1879) (right to navigation; prohibiting obstruction of navigation); *see also id.* art. I, § 25 (enacted 1910) (public right to fish).

91. *Ward*, 32 Cal. at 372 (stating "the right of the State is subservient to the public rights of navigation and fishery"); People v. Cal. Fish Co., 138 P. 79, 84 (Cal. 1913). The state's "power to control, regulate and utilize [its] waters within the terms of the trust is absolute except as limited by the paramount supervisory power of the federal government over navigable waters." Colberg, Inc. v. State, 432 P.2d 3, 9 (Cal. 1967), *cert. denied*, 390 U.S. 949 (1968); *see also Cal. Fish Co.*, 138 P. at 87-88. The "paramount supervisory power" referred to by the court is the federal navigational servitude, which, similar to the public trust doctrine, prohibits private parties or the state from substantially interfering with the navigability of any stream without the United States' explicit consent. *See* United States v. Rio Grande Dam & Irrigation Co., 174 U.S. 690, 709 (1899) (holding that private parties were prohibited from building a dam on a non-navigable tributary to a navigable waterway, where such dam was found to interfere with navigation).

92. Nat'l Audubon Soc'y v. Superior Court of Alpine County, 658 P.2d 709, 721, 723 (Cal. 1983) (emphasis added).

93. 491 P.2d 374 (Cal. 1971).

protecting the public's right of navigation and fishery, the public trust doctrine protected the public's interest in environmental preservation.[94] The court stated:

> [t]here is a growing public recognition that one of the most important public uses of the tidelands . . . is the preservation of those lands in their natural state, so that they may serve as ecological units for scientific study, as open space, and as environments which provide food and habitat for birds and marine life, and which favorably affect the scenery and climate of the area.[95]

Then in 1983, the California Supreme Court decided *National Audubon Society v. Superior Court of Alpine County*,[96] which held that the public trust doctrine prevents diversions of water from non-navigable tributaries which impair these contemporary public trust values in a downstream navigable water body.[97]

Water right permits are generally expressly conditioned upon the continuing authority of the SWRCB to alter or amend the permits at any time, whenever consistent with the public interest or the public trust.[98] Water rights are not actually "vested" by the issuance of a permit. The purpose of a permit is simply to establish a conditional priority of usage during an interim period of continuing supervision by the SWRCB to assure that the water is put to reasonable and beneficial use.[99]

3. *Market Transactions*

California has a unique, but underutilized, legal framework for transferring water from consumptive to instream uses. Under section 1707 of the Water Code, an existing rights holder can petition the SWRCB to amend its permit to authorize a change in the purpose of use to an instream use.[100] The petition will

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94. *Id.* at 380.

95. *Id.*

96. 658 P.2d 709 (Cal. 1983), *cert. denied*, 464 U.S. 977 (1983).

97. *Id.* at 721.

98. The SWRCB may include in a permit to appropriate a provision reserving its jurisdiction to "amend, revise, supplement, or delete" terms and conditions in a permit in order to prevent waste of water or to "best develop, conserve, and utilize in the public interest the water sought to be appropriated." CAL. WATER CODE § 1394 (West 1971 & Supp. 2005).

99. A permit ripens into a vested right under a license only after the SWRCB makes certain findings that the water has been put to reasonable and beneficial use, based on reports that the permittee is required to submit. *Id.* § 1600. As explained by the court in *United States v. SWRCB*:

> Once an appropriative water right permit is issued, the permit holder has the right to take and use the water according to the terms of the permit. Upon compliance with the permit terms, a license—the final document in the permit process—is issued and the appropriative rights become confirmed. Until the license is issued, the Board may reserve jurisdiction to amend the terms of the permit.

United States v. State Water Res. Control Bd., 227 Cal. Rptr. 161, 169 (Ct. App. 1986).

100. CAL. WATER CODE § 1707 (West 2004).

be granted if the SWRCB finds that the change will not adversely affect other water rights holders or fish and wildlife.[101] While water rights not subject to permits—for example, riparian rights and pre-1914 appropriations—are also nominally authorized to be transferred in this fashion, it is problematic whether a finding of no harm can be made with respect to such unquantified rights. There are other critical unresolved issues with section 1707 transfers that might be the subject of a water rights review process. These issues include the downstream reach through which a water rights holder can control instream flows (prevent diversions) under a section 1707 change order, and whether a rights holder can temporarily dedicate unused water to streamflow under section 1707 to avoid forfeiture for non-use.

Notably, however, the section 1707 process has rarely been used, just as other long-term or permanent transfers of water rights are rarely consummated in California. Instead, the EWA and other buyers tend to look to short-term transfers (less than one year) of water, rather than water rights under the "spot market", in order to avoid the need to undergo a water rights proceeding before the SWRCB and the likely (expensive and time-consuming) reporting and mitigation requirements under the California Environmental Quality Act ("CEQA"). Whether this state of affairs calls for legal reform or whether the spot market will remain a satisfactory alternative for the future, remains to be seen.[102]

C. Conditioning Water Projects on Environmental Restoration

There is every reason to believe that the aforementioned legal devices will continue to be used and refined to meet environmental needs as we move into an era where flow restoration is the prime objective. But these devices also have the potential to engender conflict over water supply because they satisfy environmental needs with water that would otherwise flow to irrigation and municipal uses. They involve a "zero-sum" reallocation. There may be another pathway that avoids this disadvantage. It involves the potential for advancing environmental restoration and water supply development compatibly rather than competitively.

Recent history suggests that California is on the brink of a future in which major new water development—infrastructure construction or large-scale water transfers—will not be politically or economically feasible, absent a component that provides a tangible net environmental restoration benefit. Reciprocally, we may soon be living in a world in which future increments of ecosystem restoration will be possible only as a component of a broader water supply augmentation strategy. Projects that require public funding to be financially viable will necessarily need to satisfy a public benefit test in the political arena.

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101. *Id.* § 1707(b)-(c).

102. *See* Ellen Hanak & Caitlin Dyckman, *Counties Wresting Control: Local Responses to California's Statewide Water Market*, 6 U. DENV. WATER L. REV. 490 (2003).

Projects with strong environmental restoration features are far more likely to survive and projects that yield a net environmental improvement will find a relatively easy path through the permitting and environmental assessment minefield. For instance, it should be relatively easy to satisfy the mitigation standard expressed in regulations implementing section 404 of the Clean Water Act,[103] which prohibits discharge of dredged or fill material into navigable waters "if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem. . . ."[104] In California, any project that is implemented or approved by state agencies, and has a significant effect on the environment, is subject to the requirements of CEQA.[105] CEQA, much like its federal counterpart, the National Environmental Policy Act ("NEPA"),[106] requires an analysis of environmental impacts projected to result from proposed projects.[107] However, while the federal courts have consistently limited NEPA to procedural mandates, CEQA includes a substantive proscription that a state agency may not approve a project where feasible alternatives or mitigation measures are available that would "avoid or substantially lessen" significant environmental effects.[108] In addition, California agencies are authorized to undertake mitigation measures to the full extent of their legal powers,[109] and public authorities must provide for the enforceability of mitigation requirements through permit conditions, agreements, or other measures.[110] When preparing a draft environmental impact report, including discussion of mitigation measures, agencies must consult with other interested agencies[111] and allow public opportunities for notice and comment.[112] Water development or transfers that incorporate a "net environmental restoration benefit," go a long way beyond mere mitigation of adverse environmental impacts.

Indeed, a future in which water supply and environmental restoration will be pursued reciprocally rather than competitively seems to be here already. Improving water supply reliability while restoring aquatic ecosystems—"getting better together"—was a theme underlying the CalFed Bay-Delta process. The new paradigm is also exemplified by current events, such as the mega water transfer from the Imperial Irrigation District to the San Diego County Water

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103. 33 U.S.C.A. § 1344(a) (West 2000). Section 404(a) authorizes the EPA to prohibit or restrict permits issued by the Corps of Engineers for impacts to navigable waters which EPA determines will have an "unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreational areas." Thus according to its plain text, section 404 extends beyond traditional notions of water quality to wildlife and recreation concerns.

104. 40 C.F.R. § 230.10(a) (2004).

105. CAL. PUB. RES. CODE §§ 21000-21177 (West 1996).

106. 42 U.S.C.A. §§ 4321-4347 (West 2003).

107. CAL. PUB. RES. CODE § 21100.

108. *Id.* §§ 21002, 21081.

109. *Id.* § 21004.

110. *Id.* § 21086.6(b).

111. *Id.* §§ 21003.1, 21086.6(c), 21104.

112. *Id.* §§ 21003.1, 21091, 21092.

Authority, to implement the Quantification Settlement Agreement ("QSA") on the Colorado River. This deal would not have been possible without the state commitment to restore the Salton Sea.[113] In a similar vein, it seems unlikely that new surface storage projects such as Sites Reservoir will be politically viable unless some fraction of the storage is dedicated to environmental purposes.[114] Likewise, the expansion of pumping capacity in the south delta under the "Napa Agreement"[115] will probably not prove viable unless it results in net benefits for the EWA. New water development projects are often dependent upon public financing, which is increasingly difficult to obtain absent a public benefit such as environmental restoration through CEQA mitigation requirements. It is unlikely, for instance, that the storage enhancements that the CalFed ROD targets for investigation will be economically viable unless they dedicate a fraction of their water storage to environmental restoration. Environmental benefit has become an explicit weighting factor in awarding bond funds to groundwater storage projects under Proposition 13.[116]

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113. The QSA, signed into effect in October 2003, was the culmination of seven years of intensive negotiations between federal and state government officials and the San Diego, Coachella, Imperial, and Metropolitan Water Districts of Southern California. It resolved a seventy-year water war centered on California's recurrent overdraft of almost one million acre-feet per year of Colorado River water, and at the same time promised long-term environmental benefits through water conservation, efficiency programs, and wetlands restoration. Under the terms of the Agreement, California will have fourteen years to reduce its overdependence on Colorado River water, a feat it will accomplish largely by transferring water from agricultural use in the Imperial Valley to municipal use in San Diego County. The San Diego district will pay market prices for the water, or about $258 per acre-foot, compared to the $15 or $20 per acre-foot paid by Imperial Valley farmers. Farmers will be compensated for their water loss and will be encouraged through financial incentives to conserve water and participate in a temporary fallowing program to reduce water use. One of the key inducements in the negotiations was a commitment by the State of California to finance restoration efforts in the Salton Sea, a vast inland lake that depends on inflows from the irrigation tailwater produced from Imperial Valley farms, to offset the reduction in those inflows that would result from the deal. DEP'T OF WATER RES., COLORADO RIVER QUANTIFICATION SETTLEMENT AGREEMENT, *at* http://www.saltonsea.water.ca.gov/crqsa/index.cfm (last visited Dec. 20, 2004) (copy on file with the *McGeorge Law Review*).

114. The Sites off-stream storage project is considered by DWR and CalFed to be one of the most cost-effective and environmentally beneficial new facilities proposed for construction in California. A joint planning effort is currently underway for the 1.9 million acre-feet reservoir, which would enhance water management flexibility and water supply reliability for environmental, urban, and agricultural uses throughout the state. Sites Reservoir would be a critical component of an integrated water management program for the Sacramento Valley, providing additional storage capacity for water diverted from the Sacramento River during peak flow periods in winter months. The stored water would then be released in average and dry years to enhance Delta outflows, recharge critical groundwater supplies, contribute to the EWA, and meet or supplant other urban, agricultural, and environmental water needs, including in-stream flows for fish migrations.

115. Revealed in August 2003, the Napa Proposition is a proposal by state and federal water agencies and California's biggest water contractors for increasing water supplies to the Central Valley and Southern California, and for sharing water that will become available if the expansion of the capacity of the Delta export pumps at Tracy is approved. The "proposition" seeks to improve integration and coordination of day-to-day operations of the State Water Project and the Federal Central Valley Project. State contractors would have access to federal reservoirs to store their water. In exchange, federal contractors would be allowed to ship water through state pumps. In addition to improving overall operating efficiency, the plan would increase the water supply for both projects and reduce water supply uncertainty. However, in the opinion of this author, the proposition is likely to be viable only if it also provides benefits for the EWA, such as providing permanent water assets in lieu of spot market purchases dependent upon annual appropriations of funds.

116. CAL. WATER CODE § 79141 (West 1971 & Supp. 2005).

By contrast, water projects that have failed to include an environmental benefit have not proven to be politically viable. The failed efforts to appropriate federal funds for the Auburn Dam on the American River are a recent case in point. In 1965, Congress authorized construction of the dam to protect against floods, store 2.3 million acre-feet of water for cities and farms, provide 300 megawatts of hydroelectricity, and create new recreational opportunities. But the dam would have further impaired environmental flows on the river. Construction on the dam was halted in 1975 after an earthquake in Oroville raised concerns about the safety of the proposed dam. Since then, the Auburn Dam and related projects have been considered by Congress in some twenty studies. But intense opposition from environmentalists, river rafters, and taxpayers to the proposed dam has led to its repeated rejection by Congress. In an unprecedented move, the USBR is now completing a plan to flood the abandoned construction zone of the defunct Auburn dam to open seven miles of river for whitewater rafting by late 2004, restoring habitat for fish and other species.

Dual purpose water projects—that augment water supply while improving the environment—will generally entail physical improvements in water storage, delivery, and use. The large potential for such "physical solutions" to resolve conflict between environmental restoration goals and water supply development is a key to a more harmonious California waterscape. Is the current state of water laws and institutions adequate to foster, facilitate, and accommodate the types of physical solutions that have the greatest potential? We can discern where future legal reforms may be warranted by first taking a closer look at such management strategies. As we shall see, finding physical solutions requires an entirely different way of thinking about rivers, not as discrete segments under the jurisdiction of separate regulatory or management entities, but as an integrated physical system that includes surface and groundwater interactions, and in which changes at any particular part reverberate downstream—and, through more sophisticated management arrangement, upstream as well. This new way of viewing river systems requires not just new analytical tools—"whole basin" hydrologic planning models—but entirely different planning, management and regulatory institutions, and the laws to govern them.

IV. THE FUTURE OF CALIFORNIA WATER LAW REFORM: "PHYSICAL SOLUTIONS"

Water rights, and other legal devices for managing natural resources in general, are not ends unto themselves. They are but a set of social conventions that may or may not be efficacious in achieving certain objectives in the physical world. The need for reforms should be viewed through the lens of how well these legal tools serve broader objectives. In the California water arena, the classic challenge is expanding the economic, social, and environmental benefits that can be derived from a limited and variable endowment of water—both ground and surface. Another way to state the relevant reform metric is: how well do current legal tools

facilitate "physical solutions" to water resource conflicts? That metric, unlike abstract assumptions about how legal doctrines should work, will tell us a great deal about what needs to be fixed and how to fix it. "Physical solutions" are strategies for bringing new water into an over-taxed system and improving the operational flexibility of water storage and delivery facilities to meet new needs. Conceptually, the types of techniques that can be utilized fall into just a few categories. Describing some of these may provide some useful insights into the sufficiencies or deficiencies in existing legal structures to facilitate the application of these physical solutions.

A. *Reducing Physical Losses of Water*

A key strategy for generating water that can be used to reduce conflicts among water users is to save water that would otherwise be lost to beneficial use. This gives rise to water that can then be transferred to effect a physical solution. These arrangements are sometimes called "conservation transfers."[117]

Because agriculture is by far the single largest consumptive user of water,[118] strategies for reducing physical losses in agriculture will have the greatest payback. In agriculture, water only goes in four directions, and by tracking its fate we can understand where losses can be harvested to supplement ecological flow needs. Irrigation water can go *up* into the atmosphere where it is lost to evaporation, a substantial loss on farms in the arid Central Valley where flood irrigation and inefficient sprinkler applications remain common, even today. Irrigation water may also go *down*, where it may replenish groundwater that is being beneficially used, or it may percolate into saline aquifers and be lost to subsequent reuse; or *in*, that is, into the biomass that is the product of agriculture. Finally, irrigation water can go *out*, as water flows from agricultural lands back into rivers or streams.

The first three routes—up, down, and in—each present an opportunity for application of improved technologies and techniques for the reduction of consumptive use. Evaporation (the upward flow) can be reduced through improved methods of applying irrigation water. The downward flow can be reduced through application of proper amounts of water. The inward flow (into biomass) can be reduced by replacing existing crops with high value, water frugal crop types. Of course, all of these routes are entailed when agricultural land is fallowed, as in dry year leasing arrangements. The disadvantage of fallowing is that it can produce third-party economic impacts on the local agricultural community. These are not, however, injuries to "legal users of water" within the meaning of the California Water Code and are not, accordingly, grounds for the SWRCB to disapprove the conservation transfer.[119]

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117. Ronald A. Kaiser, *Texas Water Marketing in the Next Millennium: A Conceptual and Legal Analysis*, 27 TEX. TECH L. REV. 181, 199 (1996).

118. Gray, *supra* note 20, at 308.

119. STATE WATER RES. CONTROL BD., A GUIDE TO WATER TRANSFERS, DRAFT 3-7 to 3-9 (July 1999),

Much recent legislative reform has been directed at fostering such conservation transfers,[120] but to limited effect. Experience has shown that the barriers to efficiency improvements in agriculture have not been primarily legal, but economic.

Water savings are usually made possible through economic incentives. Today, California farmers are about as efficient as is economically justified, given the artificially low prices they pay for water. To improve efficiencies, the value of irrigation water would have to be increased to make it worthwhile (and economically rational) for farmers (and their districts) to invest more in efficiency measures and technologies. In theory, this could be done by raising the cost of water, but that would not be acceptable to farmers. The alternative is to raise the value of water in agriculture without raising the cost. That is what water markets can do. If the market value of water is higher than its irrigation value (which is the case where water is applied inefficiently or on low-value crops), it is worthwhile for the farmer (or district) to invest more in water conservation or crop shifting. This incentive is greatly increased if the conserved water can be stored for use during years of relative scarcity.

Today, there is not much incentive to make investments that could save water but that would pay off only over several years, because the market for conserved water is intermittent. In years when there is a lot of water available, the incentives to conserve are low because the demand for (and therefore the market value of) the water is relatively low. Conversely, in dry years, there is not much potential for saving water for future years because the water is needed for present consumption.

However, if water districts or government agencies offer to buy back entitlements from growers during wetter than average years (and thereby bolster the market prices) for resale during drier years, multi-year investments in water conservation will become worthwhile and the value of conserved water will be maximized. The purchased water must be stored, either in groundwater banks or through arrangements with surface reservoirs. When it is extracted in drier years, it is resold to the growers as a supplement to surface water deliveries and at prices that recoup the initial purchase costs plus the storage and administrative costs. This is a powerful dry year coping strategy for the growers, assuring improved reliability of supplies for the agricultural district. It is also a powerful water conservation incentive because it provides market opportunities in wetter years, when demand and therefore prices are otherwise relatively low, as well as in drier years, when demand and therefore prices naturally provide strong market incentives to conserve.

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available at http://www.waterrights.ca.gov/watertransferguide.pdf (copy on file with the *McGeorge Law Review*).

120. *See, e.g.*, Sawyer, *supra* note 13; Dyckman, *supra* note 13; Ryan S. Bezerra & Yvonne M. West, *Submerged in the Yuba River: The State Water Resources Control Board's Prioritization of the Governor's Commissions Proposals*, 36 MCGEORGE L. REV. 331 (2005); Aladjem, *supra* note 46; Gray, *supra* note 20.

CalFed acknowledges that "in order to promote water use efficiency measures in the agricultural sector, end users need to be able to beneficially participate in an active water transfer market."[121] It then "recognizes that one barrier to an effective water transfer market is the lack of incentive for individual landowners to utilize available water conservation technologies because any water savings frequently accrue not to the landowner but to the irrigation district or water supply agency."[122] The problem of conserved water reverting to the "common pool" is actually easily addressed through the type of district buyback program described above.

Just what may be necessary by way of legal reforms to foster water district conservation buy-backs is grist for a future "Governor's Commission." I do not attempt to supply the answers here, but only to suggest conceptual pathways that may lead to important reform recommendations.

B. Modifying Existing Water Storage and Delivery Infrastructures

There are bountiful opportunities to convert existing (and future) hydraulic infrastructure into ecosystem restoration projects. An obvious example is the removal of now obsolete dams and other barriers to enable fish and other aquatic life to access upstream and downstream habitats. While valuable and dramatic, the practical opportunities are limited in number. Fortunately, there are many other opportunities for converting environmentally damaging water development into environmentally beneficial projects, particularly through modifying the operations of existing water facilities. The most obvious examples of re-operating dams for environmental restoration are found in the relicensing of hydroelectric dams. But many other opportunities also exist, including re-operating flood control and irrigation supply dams.

The core idea here is to deliver some fraction of the water in storage after the irrigation season into groundwater banks, thereby increasing the flood retention capacity of the reservoir. The flood releases thus captured can then be managed to restore a semblance of the natural variability in streamflows in a manner that is calculated to achieve specified ecological restoration objectives in the floodplain. In effect, the reoperation converts uncontrolled flood events to controlled flood events that can better achieve these restoration goals. This is the technique that will make it possible to restore environmental flows to the San Joaquin River in the Central Valley of California. The technique shows great promise for other highly engineered water systems as well.

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121. CALFED BAY-DELTA PROGRAM, CALIFORNIA'S WATER FUTURE: A FRAMEWORK FOR ACTION 27 (June 2000), *available at* http://calwater.ca.gov/Archives/GeneralArchive/adobe_pdf/new_final_framework.pdf (copy on file with the *McGeorge Law Review*). A district-to-district electronic trading system, utilizing that approach, is actually already operating on the west side of the San Joaquin River, within the San Luis & Delta Mendota Water Authority ("SL&DMWA"). It is called WaterLink, and it is the creature of a collaboration between the Natural Heritage Institute, the University of California, USBR, and SL&DMWA.

122. *Id.*

Some of the candidates for reoperation would include those where the following conditions exist:

- Reclamation dams that spill water for flood control on a reasonably frequent basis, and serve areas where groundwater has been intensively developed (most irrigation projects fit these criteria), can often be re-operated to generate source water for actively recharged groundwater banks;
- Points of diversion of reclamation water can often be relocated downstream of the existing out-take to allow a longer reach of the natural channel downstream of the reclamation storage dam. Where the storage and release regime of the storage dam can also be modified to re-introduce peak flow events through this same reach, more natural flow conditions can be reintroduced through a longer reach of the downstream floodplain;
- Where levees can be set back or removed, storage dams can be re-operated to reconnect portions of the historic floodplain with the river channel on a seasonal basis.
- Sediment processes can sometimes be re-establishing in sediment deprived channels below dams;
- Flood easements can alleviate flow constraints in floodplains that have been developed under artificial flow regimes below dams; or
- Sequential use arrangements can be set up, where some portion of the restoration flows are later diverted for groundwater banking and/or immediate consumptive uses.

C. *Augmenting Storage of Flood Flows through Groundwater Banking*

California's chronic water problems are due in large part to the difficulty of storing water to cope with the great variability in runoff among seasons and years, and doing this without violence to natural riverine functions. The most promising future method for augmenting storage in this manner will be integrating the existing reservoir system with potential groundwater banks. Work by the Natural Heritage Institute demonstrates that large new yield can be captured with this technique—up to a million acre feet on an annual average—and that the surplus water can be managed to restore a more natural flow regime in the floodplains below these storage dams—essentially converting uncontrolled flood events into controlled flood events—before it is delivered for consumptive use.[123] The law reform agenda to facilitate this type of physical solution is

123. *See generally* NATURAL HERITAGE INST., *supra* note 71.

described at length below to illustrate the type of detailed analysis that is warranted for all of the physical solution examples set forth in this Article.

D. Treating Unusable Water Sources

Facilities to desalt ocean water are now emerging as the marginal source of municipal water supply for the larger coastal water utilities in California. This "physical solution" truly represents a new, and virtually limitless, source of water not otherwise available. If near term economics permit its exploitation in appreciable volumes, it would relieve diversion pressures on elements of the Central Valley system where ecosystem conflicts tend to be particularly high, such as the migratory pathway for salmon runs in the Delta, where the largest water export pumps in the world now operate. Approximately six-million acre-feet are diverted from the south end of the Sacramento-San Joaquin Delta each year.[124] Of this amount, one million acre-feet flow to the MWD, the largest urban water utility in the nation. An additional 1.7 million acre feet flow to the Westlands Water District, the largest agricultural water district in the nation, and to Kern County for irrigation.

Diversions of water from the south delta have had a devastating effect on salmon migration. Millions of young salmon are diverted from the Sacramento and San Joaquin River to the pumps, instead of finding their way to the ocean. Most are eaten by predators, and many of the rest are pumped into the state and federal aqueducts or killed in the handling process.[125]

These water exporters could be "backed out" of the delta to a large extent if substitute sources of water could be found. Purification of salt water could provide that option. The price of desalting ocean water is dropping quickly. It is now competitive with new SWP water supplies.[126] Using existing coastal power plants and the Salton Sea, it would be possible to produce a significant supply of desalted water. This water would meet the future water needs of the MWD, and also replace their delta supply with desalted water.

Even better, perhaps, would be to desalt the saline aquifers that underlay Westlands and Kern County agriculture that make farming increasingly difficult. These aquifers are less salty than seawater and, consequently, are less expensive

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124. REGIONAL WATER QUALITY CONTROL BD. CENTRAL VALLEY REGION, DIAZINON AND CHLORPYRIFOS TARGET ANALYSIS: WORKPLAN PRODUCT FOR DEVELOPMENT OF DIAZINON AND CHLORPYRIFOS TOTAL MAXIMIM DAILY LOADS IN THE LOWER SACRAMENTO RIVER, LOWER FEATHER RIVER, LOWER SAN JOAQUIN RIVER, AND THE MAIN CHANNELS OF THE SACRAMENTO-SAN JOAQUIN RIVER DELTA 4 (June 2001), *available at* http://www.waterboards.ca.gov/centralvalley/programs/tmdl/sjrop/TargetAnalysis.pdf (copy on file with the *McGeorge Law Review*).

125. Joshua Harris, Note, *A Lasting Proposal for Endangered Bay-Delta Fish Survival: The Environmental Water Account and the Accumulation of Water Contract Rights in the Central Valley Project and State Water Project*, 26 ENVIRONS ENVTL. L & POL'Y J. 121, 127 (2002).

126. CAL. COASTAL COMM'N, SEAWATER DESALINATION AND THE CALIFORNIA COASTAL ACT 9 (Mar. 2004), *at* http://www.coastal.ca.gov/energy/14a-3-2004-desalination.pdf (copy on file with the *McGeorge Law Review*).

to desalt. That provides the interesting option of MWD paying to desalt these aquifers and using that water in lieu of pumping out of the delta. This would reduce the pumping impacts in the delta, reduce the cost of treating the poor quality water from the delta, and improve the farmlands all at once. At least 300,000 acre feet of delta pumping could be eliminated in this way. Utilizing both of these desalinization options, it might be possible to reduce delta pumping by as much as twenty percent. Most biologists agree that this could have a tremendously positive effect on salmon outmigration.[127]

E. Water Transfers

New water may be generated using some of the physical solutions described above, and an essential component of the solution strategy will probably also entail transferring the new water to new uses or to offset existing uses, be they consumptive or instream. The legal reforms that have been suggested to facilitate water transfers largely focus on measures to expedite the approval processes, avoid redundant approval steps, reduce the paperwork burdens, and create uniform requirements for the subset of water transfers that are unlikely to cause untoward consequences. The Water Transfer Workgroup, for instance, has suggested the following types of transfers should be eligible for streamlined approvals based on minimal studies and analysis while providing protection for all legal water users and the environmental resources affected by the water transfers:[128]

- Intrabasin transfers not involving conveyance through the delta;[129]
- Conservation transfers not involving third party impacts;
- Instream flow transfers;
- Transfers within the CVP or SWP export service areas;[130]
- Transfers that are limited to the amount consumptively used;
- Transfers that do not result in changes to existing land use or alter existing employment at the source location;

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127. *See, e.g.*, Jennie L. Bricker & David E. Filippi, *Endangered Species Act Enforcement and Western Water Law*, 30 ENVTL. L. 735, 747-48 (2000).

128. WATER TRANSFER WORKGROUP, *supra* note 16.

129. For interbasin transfers, accompanied by more complex issues (including the need for use of state and federal conveyance facilities), it is critical that DWR and USBR take an active role in the approval studies needed to address these transfers. In particular, these agencies would need to undertake specific analysis of the cumulative effect that the transfers may have on the operations of their respective conveyance facilities, as well as other resources over which they have jurisdiction. The involvement of USBR, as a federal agency, would also require the consultation and coordination of other federal authorities when endangered species issues arise, including FWS and NMFS.

130. The regulatory process for approval of such transfers is facilitated by consolidating the place of use of the federal water project permits so that SWRCB change orders are not required.

- Transfers that do not change existing land use or induce future growth at the transfer destination.

The Work Group also recommends establishing shared places of use for the CVP and SWP for transfers that do not entail land use changes in the source area, induce growth in the receiving area, or adversely affect endangered species or their habitats. This would facilitate both interbasin and intrabasin transfers by allowing an overall SWRCB review and approval of the authorized place of use, thereby reducing the number of steps needed to gain approval of a proposed transfer. If the transfer also requires the approval of DWR or the USBR, USBR or DWR should also participate in the SWRCB proceedings and abide by the SWRCB's findings in order to avoid duplicative analysis by the other agencies on matters that were considered by the SWRCB.

Considerations of time and space do not permit a thorough review of the sufficiencies or deficiencies in existing legal structures to facilitate the application of all of the foregoing categories physical solutions. However, we can take one of the most promising techniques to illustrate how a contemporary review of California water law might evaluate the need for reforms to facilitate these techniques.

V. AN EXAMPLE OF LAW REFORMS NEEDED TO FACILITATE PHYSICAL SOLUTION OPPORTUNITIES: THE CASE OF GROUNDWATER BANKING[131]

Actively recharged groundwater banking[132] is one of the most promising physical solutions for the future of water management in California. When surface water is abundant, it is possible to divert water into underground aquifers for later withdrawal and use. Groundwater banking differs from other water transfers by creating a new supply, rather than just reallocating water from other users. These projects generally involve the importation of foreign surface water originating from a source not hydrologically connected to the groundwater

131. The material for this part of the article is drawn from section 5 of the Water Transfer Workgroup, *supra* note 16, entitled "Transfers of Water Into and Out of Actively Recharged Groundwater Banks," which was written by this author with the assistance of Peter Kiel, now practicing at the Sacramento firm of Ellison, Schneider and Harris. The author also wishes to acknowledge the contribution of Andrew Sawyer, Deputy Chief Counsel of the State Water Resources Control Board who contributed materially to the analysis contained in the Water Transfer Workgroup Report. While the workgroup members that participated in this analysis represent a broad range of interests and perspectives within the water community, not all of the opinions or conclusions are necessarily endorsed by all of the participants.

132. Groundwater banking projects analyzed in this Article involve intentional recharge and recovery. The recovery of incidental or unintended groundwater recharge, such as occurs through deep percolation of irrigation water, is a different topic. Note, however, that the term "conjunctive use" is often used interchangeably with "groundwater banking," and "conjunctive use" encompasses both direct recharge of the aquifer, by spreading or injection of surface water into the aquifer ("actively recharge groundwater banking"), and indirect or passive recharge of the aquifer through substitution of surface water in lieu of groundwater pumping ("*in lieu*" recharge). *See, e.g*, CAL. WATER CODE § 79171 (West 2004).

banking site.[133] The imported water is then injected underground or is applied to spreading grounds where it percolates into the aquifer. The banked water will then be pumped and transferred to non-overlying users during dryer years. The recharge and recovery will be conducted by (or under contract with) an overlying landowner, water district, or groundwater management authority. The Kern Water Bank and the Arvin Edison/MWD arrangement are examples of this type of groundwater banking project. The sequence can also be reversed in the case of full aquifers, most commonly found in the Sacramento Valley, such that native groundwater is first extracted and exported to create storage space, and then subsequently replenished from an imported surface source. To win the support of local groundwater users, this mode of groundwater banking requires firm assurances that the artificial recharge will actually occur. One way to do that is to convey rights to water in reservoir storage before the extraction takes place, so that the local groundwater managers can control the replenishment themselves.[134]

Alternatively, the recharge can be accomplished through the substitution of surface water supplies for existing groundwater use, and recovery can be accomplished by reversing this arrangement. From an aquifer mass balance standpoint, such "*in lieu*" storage may be similar to active recharge projects. In effect, groundwater users agree to forebear pumping groundwater during some periods and instead use surface water which they would not otherwise use, and the conjunctive use program then utilizes groundwater during drier years, over and above historical extractions, and exports it or a like amount of surface water from the basin. This differs from groundwater substitution projects, which do not involve the export of groundwater and its replenishment through imported recharge water. *In lieu* banking may be more appropriate than recharge by percolation through spreading grounds in areas with low permeability soils, as is the case in the east side of the Sacramento Valley. The Semitropic Groundwater Banking Program in the San Joaquin Valley is an example of *in lieu* recharge.

Active recharge and *in lieu* groundwater banking must as a practical necessity be developed with the cooperation and consent of overlying landowners, groundwater appropriators, water districts, and groundwater management authorities. Indeed, the recharge and recovery operations will generally be conducted by such local interests. There is no realistic prospect of "outside" interests imposing a water bank on reluctant local communities. Projects will also entail consensual contractual arrangements with a source water rights holder (in other words, a reservoir operator and/or direct diverters with the

133. For the purposes of this article, "imported water" refers both to "foreign water imported from a different watershed" or water that comes from an in-basin source that is not hydrologically connected with the banking site within a relevant period of time (for example, surplus flows of a river). City of Los Angeles v. City of San Fernando, 537 P.2d 1250, 1295 n.55 (Cal. 1975). This definition would include water that originates within the same hydrologic basin as the banking site, provided that it would not be available for extraction at that site but for the physical act of bringing it to that location as recharge water.

134. Such "front-end" assurances distinguish this approach from transfers of native groundwater with "back-end" mitigation.

capacity to utilize groundwater) and one or more end use beneficiaries. Sufficient financial and/or hydrologic rewards must accrue to each of these parties to induce all parties to participate in the banking scheme. The need for clear rules to avoid and arbitrate disputes arises in part because of the very real possibility of disagreements among the local landowners themselves over whether an aquifer should be utilized for groundwater banking purposes. Usually, the proponents propose to bank water for the benefit of end-users outside of the groundwater basin. That, after all, is the purpose of groundwater banks.

The primary technical issues of groundwater banking projects involve designing, implementing, and monitoring the recharge and extraction operations without causing injury to other water users or damaging real or personal property.[135] The primary legal issues arise in the permitting and environmental review processes. To the extent the groundwater banking project requires a new water right or approval to change an existing water right, the California water law regulations require the project proponent to bear the burden of establishing that the recharge and withdrawal of water will not adversely affect, or "injure," other "legal users of water."[136] Determining injury in the groundwater banking context is difficult due to the different standards governing surface water and groundwater.[137] The banker must also avoid degrading the quality of the *in situ* groundwater.[138] At a minimum, the SWRCB can impose conditions on

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135. Aquifer geometries are usually rather poorly defined. Subsurface water interacts with surface flows. Water in aquifers is not static, but is itself in perpetual slow motion along gradients and in response to differential hydrostatic pressures. Artificial recharge alters the hydrostatic pressures within the groundwater basin and may cause some of the native groundwater to become unrecoverable to overlying landowners (by migrating to a salt sink or a surface water body, for example). The potential for injury to other groundwater users may be mitigated or avoided by adjusting the rates, volumes, and locations of the extraction wells and the residence time of the banked water. Under the extract and then replenish scenario, care must be taken not to deplete hydrologically connected streamflows or to lower the groundwater table below the level of existing wells.

136. CAL. WATER CODE § 386 (West 1971 & Supp. 2005).

137. It is important to note a distinction relating to the concept of "injury" that makes the analysis much more uncertain (and so raises the question of clarification). With regard to groundwater, California law is relatively clear (given the paucity of cases) that, in order to state a claim for interference with an overlying right, a plaintiff must show that the defendant's use of its overlying right has not been reasonably based, in all likelihood, on the impacts to the plaintiff. This standard of reasonableness means that not every extraction of groundwater that causes a reduction in static water levels rises to the level of an "injury." Nevertheless, at a minimum, the groundwater banker must avoid raising the groundwater table to a level that invades the root zones of neighboring crops or neighboring structures, or causes risk of liquefaction. Bankers must avoid unreasonably lowering the groundwater table below the level that would result in the dewatering of neighboring wells or increasing the power requirements for pumping, and/or causing subsidence or seawater intrusion. By contrast, there is less flexibility in the concept of injury in connection with surface water. In that context, a physical solution can only require a senior water right holder to suffer "de minimis" costs and/or changes in the availability of water in order to make water available to a junior water right holder.

138. Commingling lower quality recharge water with *in situ* groundwater may constitute a legally cognizable injury to other groundwater users. This could be a problem with recycled municipal wastewater or surface water routed through the Sacramento-San Joaquin Delta. Even pure recharge water can mobilize salts and agricultural chemicals in groundwater basins that have been heavily irrigated. In urban areas, there is a similar concern that the raising of the groundwater table as a result of groundwater banking could inadvertently

appropriative permit change orders to ensure protection of other legal users of water, including groundwater users.

The risks associated with uncertainties in the state of the law are particularly problematic for groundwater banking projects. Law reform by the SWRCB or the legislature to eliminate these uncertainties would greatly advance the exploitation of this physical solution. For instance, the allocation and demarcation of authority to control the recharge and extraction of aquifers in such programs is not well defined. The SWRCB and local authorities often vie for jurisdiction. The specific procedural and regulatory hurdles will depend on what governmental bodies assert jurisdiction over which aspects of the project.[139] Uncertainties with respect to property rights in groundwater resources are also particularly problematic.

A water right permit issued by the SWRCB is required for the appropriation of surface water for use in a groundwater recharge project, except where the project can be carried out based on a pre-1914 or other right not requiring a SWRCB permit.[140] Banking projects that involve the transfer from a surface source to the actively recharged groundwater bank may also have to obtain a "change order" from the SWRCB. Such orders will require a finding of "no injury" to legal users of water.[141] Thus, it seems clear that the SWRCB has authority to regulate the storage of water underground and the subsequent use of the stored water as a condition of a water right permit to appropriate surface waters used in underground storage.[142] Yet, whatever the SWRCB's *de jure*

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saturate and mobilize chemical compounds that were previously trapped in the unsaturated upper portions of the soil strata.

139. In cases where the legislature has unambiguously vested management authority over this species of "groundwater" in a special district, or where a watermaster has been appointed to oversee a court-imposed basin management plan, the competing jurisdictional claims are probably quieted. But this is a rare circumstance. In the more typical case, the state of the law is rather unsettled.

140. The Water Code specifies that an appropriation must be for beneficial use. CAL. WATER CODE § 1240 (West 1971 & Supp. 2005). An appropriation of water diverted to groundwater storage is for a beneficial use, provided that "the water so stored is thereafter applied to the beneficial uses for which the appropriation for storage was made." *Id.* § 1242. This code provision has been analyzed in published opinions by both the Assembly Legislative Counsel and the California Attorney General. *See* Op. Leg. Counsel, 1957 A.J. 4034 (1956); 27 Op. Cal. Att'y Gen. 217, 218 (1956). The Legislative Counsel opinion makes clear that water placed into underground storage becomes an appropriative right subject to enforcement by the courts. The Counsel explained that once "water has been introduced into the underground basin for storage, the overlying landowners would have no rights to such water. . . ." Op. Leg. Counsel, 1957 A.J. 4034, 4035 (1956). Consistent with this requirement, SWRCB regulations require that applications for appropriations for underground storage include maps showing points of diversion or rediversion to underground storage, the locations of the underground storage areas, and the place of use. CAL. CODE REGS., tit. 23, § 722 (2002).

141. Many large-scale banking programs may require the wheeling of water through the surplus capacity of existing conveyance systems. *See* CAL. WATER CODE § 1810 (West 1971 & Supp. 2005). Section 1810 requires its own "no injury" analysis. Such analysis will likely consider injury to existing users at the point of diversion but not lost sales incurred by the conveyance operator. *See* San Luis Coastal Unified School Dist. v. City of Morro Bay, 97 Cal. Rptr. 2d 323 (Ct. App. 2000).

142. There remains some uncertainty as to when a change petition is required for a groundwater storage project involving an existing permitted appropriation. The Water Code requires approval of the SWRCB for a change in the point of diversion, the place(s) of use, or the purpose(s) of use specified in a water right permit or

authority over groundwater banking, there is a compelling practical limit to the SWRCB's ability to regulate groundwater recharge and recovery operations. The SWRCB bases its jurisdiction on its authority over the diversion of surface water used for underground storage, and it has not asserted authority over the water in storage. Thus, while the SWRCB may act to protect native groundwater users from the effects of a groundwater banker, it apparently could not act to protect the banker from the other groundwater users. This is because the water right permit system does not apply to the latter. This asymmetry may render its nominal authority in the aquifer ineffectual in a practical sense.[143]

Another jurisdictional uncertainty arises over how the SWRCB's authority interfaces with the powers asserted by local groundwater management entities at both the water importation and storage stage, and the extraction stages under their own version of a "no injury" rule.[144] The potential for conflicting or overlapping standards, procedures, and requirements is obvious.

Sections 10750 through 10753.9 of the Water Code allow existing water agencies to create groundwater management districts. These districts may determine safe yield and impose modest restrictions on withdrawals,[145] replenish supplies,[146] and impose fees and assessments on extractions,[147] but they cannot make binding determinations on matters related to water rights.[148] Districts are not explicitly authorized to prevent the exportation of groundwater, yet a few require a permit for withdrawal or export of groundwater.[149] Increasingly, counties and cities are also asserting jurisdiction over local groundwater resources, generally to prohibit exportation.[150]

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license. CAL. WATER CODE § 1702 (West 1971 & Supp. 2005). SWRCB regulations and practice do generally require a change order in such instances where a project is modified to add additional storage. CAL. CODE REGS., tit. 23, § 791(e) (2002).

143. The SWRCB must make an injury determination when approving the change order transfer into the aquifer for storage and subsequent rediversion. Parties potentially affected by the banking operation would have the opportunity to protest the project as well as seek protection from the SWRCB if the project operation affects their rights. On the other hand, the SWRCB's authority to protect the *banker* is not symmetrical; the SWRCB does not have the power (and, arguably, not the legal authority) to prevent groundwater pumpers from taking the banked water.

144. The extent of local jurisdiction over parties engaged in groundwater banking is unclear. The regulation of private entities with regards to groundwater issues has generally been upheld. *See* Baldwin v. County of Tehama, 36 Cal. Rptr. 2d 886 (Ct. App. 1994). However, because of sovereign immunity issues, such jurisdiction probably does not extend to allow the exercise of police power over cities, counties, and potentially investor-owned-publicly-regulated utilities. *See* CAL. GOV'T CODE §§ 53090, 53091, 53096 (West 1992 & Supp. 2005); Lawler v. City of Redding, 9 Cal. Rptr. 2d 392, 394-96 (Ct. App. 1992).

145. *See* CAL. WATER CODE § 10753.7 (West Supp. 2005). The authority to limit or suspend extractions may only be exercised if the district determines that replenishment programs or supply of alternate water sources is infeasible or inadequate. *See id.* § 10753.8(c).

146. *See id.* § 10754.2.

147. *See id.* § 10754.

148. *See id.* § 10753.8(b).

149. There are ten specially enacted groundwater management districts and several other local agencies with groundwater management authority.

150. Groundwater regulation is within the municipal police power. Accordingly, "a local ordinance may

Demarcating the division of regulatory labor between these levels of government in advance would help demystify groundwater banking and reduce the regulatory risk factors. Jurisdiction could be shared sequentially or concurrently. In a groundwater banking operation, the water moves through a series of discrete steps from a surface water source, through a conveyance channel (which may be a natural channel), to a recharge facility, to an aquifer, through a recovery well, through a conveyance facility (which, again, may be a natural channel), to a point of ultimate beneficial use. Through each link, the banking operation has the potential to affect other water rights or cause injury to other legal uses of water, including instream beneficial uses. If the source water is subject to permit, clearly the SWRCB has jurisdiction at that point. Is there then some point in the chain at which the SWRCB loses its jurisdiction, such as the point at which the imported water is commingled with native groundwater? Or does it retain jurisdiction to the point of end use?

If the SWRCB is unable to protect groundwater bankers from extractions by other groundwater users, the feasibility of concurrent jurisdiction is questionable. In any event, it would seem that the SWRCB pre-empts or supplants local regulation of the stored groundwater only to the extent of actual conflict. This raises the question whether the local authorities are able to go beyond the SWRCB's *extent* of jurisdiction or only beyond its *scope* of jurisdiction. In other words, may the local jurisdiction prescribe measures that are more protective of the other "legal uses of water," or is it restricted to protecting against types of injury not covered by SWRCB regulation, such as impacts to structures or crops from rising water tables, not impacts on other water uses? Under the latter approach, county regulation that substantially affects the definition or exercise of water rights, especially post-1914 appropriative rights, are likely to be preempted.[151] For instance, the SWRCB's determination as to the volume or rate

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be enacted subject to the constitutional constraints applicable to all legislation, unless the power so to do has been preempted by state legislation, i.e., only if it conflicts with general law." Baldwin v. County of Tehama, 36 Cal. Rptr. 2d 886, 890 (Cal. Ct. App. 1994). There has been a great increase in the number of counties passing groundwater management ordinances, especially in the last few years. The ordinances vary greatly in terms of purpose (for example, monitoring, replenishment, export restriction) and type of restriction (for example, permit compliance, impact analysis, fees). Most of the ordinances require a permit to export groundwater outside of the county or to extract groundwater *in lieu* of surface water use. Few of them distinguish between native groundwater and imported water. A few counties explicitly recognize the value of conjunctive management and provide an exception to the permit requirement where it is demonstrated that the activity will result in net annual recharge.

151. *Baldwin* does not address the extent to which local ordinances may be preempted by the state law of water rights to surface waters (and underground streams in known and definite channels). It is an open question whether the county could regulate extractions of imported surface water beyond regulation to make sure that what is being extracted is in fact the net addition caused by the importation. Concurrent jurisdiction could exist when the SWRCB makes injury determinations in approving a change order and when counties require a permit and analysis of impacts to extract groundwater. Because SWRCB injury determinations would not address every issue subject to county regulations, there is little argument for field preemption, but conflict preemption could occur on a case-by-case basis for those county and state standards or determinations that are irreconcilable.

of banked water that can be extracted without adverse consequence to users of native groundwater would preclude contrary determinations by the local jurisdiction.

Uncertainty as to the division of regulatory jurisdiction is compounded by a degree of uncertainty as to proprietary rights among the importer of the recharge water, the overlying landowner(s), and the overlying water district. In the case of imported water,[152] the case law seems clear that the recharged water belongs to the importer, less whatever losses may be entailed.[153] Thus, a water right holder who imports the water with the purpose of later extracting it has the paramount right to extract that water for use either on the overlying lands or on remote locations,[154] subject of course to the requirement of avoiding injury to legal users of the native groundwater with which the imported groundwater may commingle.[155] However, several complications may arise where the law is not altogether clear.

Who has the paramount claim to augmented groundwater recharge as a consequence of reoperation of upstream reservoirs? Stated another way, is this imported recharge water that would not have been available but for the act of reoperating the reservoir and sending additional water downstream—and therefore belongs to the reservoir operator—or is it natural recharge that would have been available to the groundwater users but for the pre-existing operations of that reservoir, and therefore belongs to those groundwater users? In accord with the "no injury" rule, it is logical that any additional percolation into the basin as a result of the project, which is greater than the amount that would have occurred under a natural state, should be considered imported water, available to the project and/or its beneficiaries unless the additional project water has been abandoned.

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152. With respect to proprietary rights, this article does not address native or *in situ* groundwater, to which overlying landowners presumptively enjoy correlative possessory rights, and groundwater appropriators enjoy appropriative groundwater rights.

153. This will not hold if it is abandoned or acquired by prescription. A conjunctive use program can avoid implication of abandonment of banked water if the project ceases its historic extractions to increase storage levels in wetter years by filing a declaration of intention to extract that water with the SWRCB. *See* CAL. WATER CODE §§ 1005.1, 1005.2, 1010 (West 1971 & Supp. 2005). Prescription cannot be claimed against a municipality. *See* CAL. CIV. CODE § 1007 (West 1982 & Supp. 2005). Prescription may also be limited to the extent that the recharge is made with water subject to permit and license, and pumping is for a place or purpose of use not authorized by that permit or license. *See* People v. Shirokow, 605 P.2d 859 (Cal. 1980).

154. The California Supreme Court has affirmed the paramount rights of the importer to recapture foreign water intentionally stored in a groundwater basin either through direct introduction or indirectly as return flows resulting from surface deliveries. *See, e.g.*, City of Los Angeles v. City of Glendale, 142 P.2d 289 (Cal. 1943).

155. Injury could arise, for instance, where extraction wells are located proximate to those of pre-existing groundwater users and where the rate of extraction creates a cone of depression that increases the neighbor's pumping power requirements compared to pre-existing conditions. Calculating the *amount* of water to which the importer is entitled to withdraw, however, is challenging due to the technical issues described above. Equally difficult is enforcing one's rights to imported water against unauthorized withdrawals by other users of the aquifer.

Where there is local opposition to a project, the issue may arise as to who has the paramount right to use the dewatered storage space and in what circumstances may one entity exclude others from doing so. Although the issue of groundwater storage rights is far from settled, the California Supreme Court has upheld the right to store water in aquifers.[156] It is thus likely that the courts would regard the storage space in an aquifer as a shared asset that any entity can use when there is no shortage of supply of available storage space in relation to demand, and that in such circumstances, no entity, including overlying landowners, can exclude others from using the aquifer storage space nor exact a "rental" fee for such use.[157]

Rather than characterizing the issue of rights to storage space as one of trespass on a property interest, it is probably more accurate to regard it as just another application of the "no injury" rule. Thus, the existing rights holders are probably legally entitled to prevent a water banking project from reducing the natural infiltration capacity of the aquifer on which they depend to capture and store the naturally occurring percolating groundwater, or to otherwise adversely impact their water rights.[158] Under this view, where storage space is plentiful, the real issue is not "who owns the storage space," but how does one calculate the amount of water to which the importer is entitled?[159]

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156. *City of Los Angeles v. City of Glendale*, 142 P.2d 289 (Cal. 1943), and *City of Los Angeles v. City of San Fernando*, 537 P.2d 1250 (Cal. 1975), uphold Los Angeles Department of Water and Power's importation and storage of water underground, despite Los Angeles' status as an appropriator and the lack of any statutorily authorized groundwater management authority. The court in *San Fernando*, analogizing groundwater banking to a surface water reservoir, deems this an economical and efficient method of "natural storage," only subject to the limitation that storage and withdrawal does not harm other legal users, including interference with natural recharge. 537 P.2d at 1297.

For a discussion of these cases, see Victor Gleason, *Water Projects Go Underground*, 5 ECOLOGY L. Q. 625 (1976).

157. If overlying users own a correlative share of the aquifer storage space, they arguably would have to be compensated for use of that space, whether or not they are injured. The *Glendale* and *San Fernando* holdings make no provision for compensation for use of aquifer storage space. Indeed, referring to Los Angeles' entitlement "to use the San Fernando basin for temporary storage of its water by means of artificial recharge and subsequent recapture. . . ," the court explained that "no necessity is shown for interfering with this right to use the basin for storage, for there does not appear to be any shortage of underground storage space in relation to the demand thereof." *City of San Fernando*, 537 P.2d at 1297. The California Supreme Court's sanctioning of such storage without any recognition of a proprietary right on behalf of overlying owners suggests that overlying owners cannot object to groundwater storage beneath their property absent a showing of injury to a recognized right associated with their property ownership, such as their right to extract their correlative share of the aquifer's native yield. Moreover, storage rights are not included in a riparian's correlative surface water rights, and thus by analogy, it could be argued that storage rights are not part of an overlying owner's correlative groundwater rights.

158. In the case of interference, imported water will likely be deemed to "spill first" if an aquifer becomes fully recharged. *See City of San Fernando*, 537 P.2d at 1250.

159. The basic theory supporting the importer's exclusive right, and for the inapplicability of the no injury rule under these circumstances, is that but for the importation the water would not be there for the overlying landowners to extract. To the extent that the water would be still there in the absence of the importation, because the importation supplants natural recharge or the importation increases losses, the basic theory does not justify giving the importer any right at all, let alone an exclusive right. It is also important to distinguish two different questions, the availability of space in storage and the quantity in storage. Making most

Another key issue standing in the way of widespread groundwater banking in areas where the aquifers are not in overdraft, such as the Sacramento Valley, is whether pre-existing groundwater users can be limited to their historic levels of usage to assure that they are not taking imported water that has been banked in the same aquifer. The general rule is that, subject to the avoidance of mutual harm, groundwater users are entitled to as much groundwater as they can beneficially use as long as the "safe yield" of the aquifer is not exceeded. This is true irrespective of their historic usage. If their historic use is less than their correlative share of the safe yield or the amount available for appropriation under their priority of right, restricting these users to their historic usage thus diminishes their current entitlement.[160]

The problem may be more apparent than real, however. Groundwater banking programs are most likely to be established in two circumstances: where there is a pronounced pre-existing cone of depression that can be filled (the San Joaquin Valley), or where aquifers are already full such that groundwater will have to be extracted first in order to create storage space (the Sacramento Valley). In the first instance, the aquifer may already be in overdraft. In this situation, current users are not entitled to increase their pumping because that would necessarily injure other rights holders. In the second case, increased pumping by historic users is unlikely to adversely affect other users, including the groundwater banking project, because the aquifer is so full.[161] In the intermediate case—where the basin is close to balance and the groundwater bank is in an unincorporated area—the appropriate principle would seem to be that existing uses can be allowed to increase only to the level that would represent safe yield, absent the groundwater bank. The problem in applying that principle is the difficulty in establishing the safe yield level short of adjudicating the

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effective use of surface reservoirs has led to elaborate rules on which water "spills" first and under what circumstances. These rules may apply equally appropriately in the context of aquifer storage. One who utilizes aquifer storage space for artificial recharge may not reduce the overlying landowners of the right to natural recharge of that aquifer. Thus, if infiltration is reduced due to lack of aquifer storage capacity, the water banker takes the loss, not the users of native groundwater. In sum, tort-based decisional rules may serve well to protect landowners and other rights holders from physical injuries or water supply impacts associated with groundwater banking. They may not serve as well to apportion unsaturated aquifer storage space among the various parties competing to bank imported surface water. It would obviously facilitate groundwater banking if the legislature would make clear that the interests of overlying owners in the subterranean space beneath their property does not include a right to exclude non-injurious use of the unoccupied aquifer storage space beneath their property for storage of imported water. Such clarification could recognize that the subterranean property is technically part of the overlying owner's property interest, but that it is subject to non-injurious invasion for groundwater storage.

160. However, such rights may potentially be subordinated to existing appropriative rights in an overdrafted basin. *See* City of Barstow v. Mojave Water Agency, 5 P.3d 853, 869 n.13 (Cal. 2000).

161. The problem is also less likely to arise in areas of groundwater use that are incorporated within water district boundaries, even those that do not regulate groundwater. Where water districts operate a groundwater bank within their service area, it presumably does so with the consent and support of those members who rely on groundwater. Similarly, this problem will probably not arise in adjudicated basins where the pumpers are limited by the operating judgment to fixed amount of annual extraction, and the watermaster will likely oversee and monitor groundwater banking projects.

basin.[162] Even in the relatively rare circumstances where these conditions obtain, groundwater banking may be practical without adjudication if the bank can tolerate some increase in groundwater pumping or can purchase forbearance from pumping increases from existing groundwater users.

Finally, there are entitlement problems associated with *in lieu* recharge, where the groundwater banker enters into arrangements with overlying landowners wherein, during periods when the banker desires to recharge groundwater, the overlying landowners would forego pumping and use a substitute surface water supply instead. The aquifer recharges "passively" from natural recharge and percolation of the applied surface water. When the program desires to extract groundwater for export, the landowner would curtail its surface water use and substitute or increase groundwater pumping. The legal problem with *in lieu* banking is that the program does not withdraw groundwater that it has directly and physically put into the aquifer through an active recharge program. Instead, it requires groundwater rights holders in some years to forego pumping water that they are otherwise legally entitled to extract, and to offset that forbearance by drawing more heavily on the aquifer in other years. Sections 1005.2 and 1005.4 of the Water Code treat *in lieu* use of an imported surface water supply as the equivalent of the use of the groundwater, thus legally preserving a user's rights to the supply left *in situ*.[163] As is the case with active recharge, there are problems of enforcement and accounting. In years of forbearance, the other pumpers might extract the water that the program intended to store. In years of extraction, the contracting landowner's rates of withdrawal may impair the rights of the correlative pumpers.

VI. CONCLUSION

The California water world has changed a great deal since 1978, and yet the legal structures have remained very much the same. If a new Governor's Commission were to be convened tomorrow, it is unlikely that it would focus much attention on the unfinished agenda of its predecessor, perhaps with the exception of the failure of the state to integrate management of tributary groundwater into the surface water administration system, an anomaly in the law which defies both physics and logic yet is readily explained by politics. Today's agenda would be broader. It would necessarily include federal institutional reforms as well. It might well focus more on agency mandates than on individual water rights and their administration by the SWRCB. It should be informed and driven primarily by an understanding of the types of physical solutions that hold

162. Of course, basin-wide adjudications may be desirable for other reasons. *See supra* Part I.

163. California Water Code sections 1005.2 and 1005.4 state that where a nontributary source of water (imported foreign water or conserved water otherwise unavailable to the aquifer) is used *in lieu* of groundwater pumping, a reduction or cessation of groundwater pumping to permit groundwater replenishment is deemed a beneficial use of water and will not result in loss, reduction, or forfeiture of the groundwater rights.

the greatest promise for reducing conflicts among water users, including particularly the need for water for environmental restoration, and the legal barriers to their implementation. This would entail a much more interdisciplinary and solution-oriented approach. Very likely, it would be dominated by considerations of how water service benefits from a fixed endowment of water can be expanded and more equitably distributed. In the final analysis, that is the touchstone that has shaped water law in California yesterday and will continue to do so tomorrow.

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