

Can the Clean Water Act Succeed as an Ecosystem Protection Law?

by Holly Doremus and A. Dan Tarlock*

The modern Clean Water Act¹ (“CWA”) has come to be seen chiefly as a technology-based pollution control law, but it was intended to be much more. Its stated objective was (and remains) “to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.”² In other words, the CWA was specifically intended to protect aquatic ecosystems and encourage their restoration where they had already become degraded. Yet forty years after the Act’s passage, the nation’s aquatic ecosystems are among its most stressed and distressed.³

Others have examined why the CWA has yet to fulfill its water quality objectives through the control of point and nonpoint source discharges.⁴ In this Article, we look one level beyond water quality to the ecosystem conservation and restoration the CWA is intended to facilitate.⁵ As federal and state governments have begun to invest in ecosystem restoration, this aspect of the CWA has been thrust into the spotlight in several locations. We tell the story of the San Francisco Bay/Sacramento-San Joaquin-Delta (“Bay-Delta” or “Delta”) as a case study of the intersection between the CWA and ecosystem restoration.

The Bay-Delta story is worth exploring both for its unique attributes and for those it shares with other ecosystem restoration efforts. The Bay-Delta story runs counter to conventional understanding of the history of water pollution control in the United States. Water pollution, so the usual story

goes, was first recognized as a serious urban problem in the nineteenth century after contaminated water was linked to infectious diseases.⁶ States thereafter began to control water pollution, but even in progressive states such as Wisconsin efforts proved inadequate.⁷

The Bay-Delta story is different. It shows that pollution can be a rural problem, and that sincere state efforts to address pollution face structural, as well as political, barriers. As early as the beginning of the twentieth century, California was actively engaged in salinity control in the Bay-Delta.⁸ The inability to control salinity stemmed not from a lack of aggressive legislative and administrative attempts, but from the entanglement of control efforts with deeply entrenched property rights.⁹

The Bay-Delta story is also important because it is distinctly Western, different in an important respect from the Eastern experiences that drove the CWA’s passage. In the West, water quality standards conflicted with consumptive water rights in ways that were not clearly anticipated by the framers of the CWA.¹⁰ The major focus of the CWA was on cleaning up Eastern rivers.¹¹ Given the region’s abundance of water and the Act’s focus on controlling industrial sources, there was little apparent tension between consumptive uses and pollution control. There was some concern that the new limitations on the use of rivers as waste sinks would be challenged as takings of property rights.¹² Commentators correctly assumed, however, that because pollution was a common law nuisance, what later came to be called “background

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1. Clean Water Act of 1972 (“CWA”), 33 U.S.C. §§ 1251–1387 (2006).
2. Federal Water Pollution Control Act Amendments of 1972, Pub. L. No. 92-500, § 2, 86 Stat. 816, 816 (1972) (codified as amended at 33 U.S.C. § 1251(a) (2006)).
3. See *infra* notes 120–22 and accompanying text.
4. The literature includes Robert L. Glicksman & Matthew R. Batzel, *Science, Politics, Law, and the Arc of the Clean Water Act: The Role of Assumptions in the Adoption of a Pollution Control Landmark*, 32 WASH. U. J.L. & POL’Y 99 (2010); William L. Andreen, *Water Quality Today: Has the Clean Water Act Been a Success?*, 55 ALA. L. REV. 537 (2004); Robert W. Adler, *The Two Lost Books in the Water Quality Trilogy: The Elusive Objectives of Physical and Biological Integrity*, 33 ENVTL. L. 29 (2003); Lawrence S. Bazel, *The Clean Water Act at Thirty: A Failure After All These Years?*, 18 NAT. RESOURCES & ENV’T 46 (2003).
5. See CWA § 101(a), 33 U.S.C. § 1251(a).

6. William L. Andreen, *The Evolution of Water Pollution Control in the United States—State, Local, and Federal Efforts, 1789–1972: Part II*, 22 STAN. ENVTL. L.J. 215, 287 (2003).
7. See generally JAMIE BENIDICKSON, *THE CULTURE OF FLUSHING: A SOCIAL AND LEGAL HISTORY OF SEWAGE* (2007) (tracing the rise of sewage treatment, the discharge of wastes into streams and lakes, and the rise of efforts to control these discharges in the first three decades of the twentieth century); EARL FINBAR MURPHY, *WATER PURITY: A STUDY IN LEGAL CONTROL OF NATURAL RESOURCES* 134 (1961).
8. Michael Hanemann & Caitlin Dyckman, *The San Francisco Bay-Delta: A Failure of Decision-Making Capacity*, 12 ENVTL. SCI. & POL’Y 710, 713 (2009).
9. *Id.* at 712.
10. Dave Owen, *Law, Environmental Dynamism, Reliability*, 37 ENVTL. L. 1145, 1154–56 (2007).
11. Richard A. Lovett, *Clean Water Act at 40: Rivers No Longer Burn but Climate Threats and Runoff Now Rush In*, NATURE, Nov. 14, 2012, available at <http://www.nature.com/news/mixed-reviews-for-us-clean-water-act-1.11809>.
12. See *United States v. 531.13 Acres of Land*, 366 F.2d 915, 916 (4th Cir. 1966).

limitations” on property rights would immunize pollution control from takings challenges.¹³ In the West, states did see a threat from the CWA, but not the one that haunts the Bay-Delta today. Western irrigators depend on return flows, including municipal sewage discharges.¹⁴ There was concern that technology-forcing standards would reduce these return flows.¹⁵ Congress assuaged these fears by exempting irrigation return flows from the CWA’s permit requirements.¹⁶

Salinity presented a more difficult problem because it was so intimately connected with flows. The Sacramento and San Joaquin rivers and their tributaries are subject to large consumptive water rights dating to the late nineteenth and early twentieth centuries.¹⁷ Controlling salt levels in the Bay-Delta estuary is a zero sum game pitting ecosystem protection against the exercise of those rights.¹⁸ Salinity within the Bay is a function of flows; high freshwater flows mean salty water stays closer to the Golden Gate, lower flows allow it to intrude further upstream in the Bay-Delta.¹⁹ But any water allowed to flow to the Bay to hold back salty ocean waters means that much less can be taken out of the rivers for agricultural or municipal uses.²⁰

Our review of the Bay-Delta experience highlights several lessons. First, we acknowledge that the CWA, by itself, cannot effectively ensure ecosystem protection.²¹ But no law needs to function in isolation. The CWA can and should play an important role in a larger suite of laws and policies that support aquatic ecosystem protection. Second, the CWA can only play its role effectively if the relevant states are full and enthusiastic partners.²² The Bay-Delta is in some ways a best case example of the prospects for CWA-based ecosystem pro-

tection because California has its own strong water pollution laws implemented by an agency with unusually broad authority.²³ The CWA, as implemented in California, is the centerpiece of a reasonably robust state-federal partnership for water quality protection. But third, the fact that the Bay-Delta ecosystem nonetheless continues to decline shows that, even in this best-case scenario, protection tools have not yet proved sufficient.²⁴ In part, the shortfall is a result of political timidity and lack of creativity in implementing the CWA and its state analogue. We discuss how federal and state regulators could do more with their existing tools. But the Bay-Delta’s continuing ecological decline also highlights both the limits of our understanding of the steps needed to restore degraded aquatic ecosystems and the very real political barriers to taking those steps. Although the CWA provides some incentives for increasing our knowledge, those incentives need to be used more effectively, and information generated through the CWA needs to be better integrated with information gained through other programs. The political barriers cannot be easily removed, but it might be possible to improve the incentives for states to at least more clearly acknowledge the conflicts between ecosystem protection and the exercise of existing water entitlements.

In short, the primary lesson of this case study is that water quantity is an indispensable dimension of water quality protection,²⁵ but the CWA alone cannot reliably integrate the two. The cooperation and active participation of the state agencies with the authority to allocate water is essential, but institutionally as well as politically, difficult to procure. In the end, we offer some suggestions for incremental improvement, but offer no hope that this is a problem that can easily be solved.

I. The Clean Water Act’s Ecosystem Protection Objective

The primary historical innovation of the CWA was its recognition of federal responsibility to protect public health.²⁶ The federalization of water pollution control both broadened the scope of pollution control and enshrined the power of engineers, as opposed to water managers, to define what elements

13. In a major foundation case, *Weyerhaeuser Co. v. Costle*, 590 F.2d 1011, 1043 (D.C. Cir. 1978), the D.C. Circuit observed that prior to its holding, “the right of polluter was pre-eminent, unless the damage caused by pollution could be proven. Henceforth, the right of the public to a clean environment would be pre-eminent, unless pollution treatment was impractical or unachievable.” Although most courts did not use a rights analysis to describe the CWA, implicit in this statement is that the pre-1972 “right to pollute” was based more on government inaction and the limitations of common law litigation than the existence of any legally protected property right. *See id.* In 1966, the Fourth Circuit rejected a takings claim by a textile mill which had to build a treatment facility to comply with South Carolina’s water quality standards with the observation that “[n]o absolute right . . . was vested in [the company] under the law of South Carolina to discharge untreated wastes . . .” 531 F.2d at 918.

14. W. WATER POLICY REVIEW ADVISORY COMM’N, WATER IN THE WEST: CHALLENGE FOR THE NEXT CENTURY 4–15 (1998).

15. *Id.*

16. *Id.* at 4–6.

17. *See* STATE WATER RES. CONTROL BD., CAL. ENVTL. PROT. AGENCY, WATER QUALITY CONTROL PLAN FOR THE SAN FRANCISCO BAY/SACRAMENTO-SAN JOAQUIN DELTA ESTUARY 1 (1995) [hereinafter 1995 WATER QUALITY CONTROL PLAN] (describing the high volume of demand for use of water from the Sacramento-San Joaquin river basin).

18. Hanemann & Dyckman, *supra* note 8, at 711.

19. *See id.* at 713 (discussing the various impacts on freshwater flow and how it affected salinity).

20. *Id.* at 716.

21. W. WATER POLICY REVIEW ADVISORY COMM’N, *supra* note 14, at xii–xxxi.

22. *See id.* at 4–24 (describing the means through which federal agencies and state and local governments must work together to achieve restoration of aquatic ecosystems).

23. *See infra* notes 191–93 and accompanying text.

24. We recognize that the section 404 program, which requires that a person who discharges dredge or fill material into navigable waters obtain a permit from the U.S. Army Corps of Engineers, is an ecosystem protection and restoration program. *See* CWA § 404, 33 U.S.C. § 1344 (2006). That permit requirement, though, applies primarily to wetland fills, and it has never served as a framework for the protection of broader aquatic ecosystems. Our focus here is on the prospects for broader protection.

25. Justice O’Connor recognized this connection in *PUD No. 1 of Jefferson Cnty v. Wash. Dept. of Ecology*, 511 U.S. 700, 719 (1994), when she noted that any distinction between water quantity and water quality is “artificial.”

26. CLAUDIA COPELAND, CONG. RESEARCH SERV., RL30030, CLEAN WATER ACT: A SUMMARY OF THE LAW 2 (2010), available at <http://cf.ncseonline.org/nle/crsreports/10May/RL30030.pdf>.

of water quality received primary protection.²⁷ The control of point source discharges is a major success story, but it also illustrates the challenges of using the CWA to move to a more holistic view of the relationship between water quality and healthy ecosystems.

Water pollution regulation in the United States began at the state level specifically in response to public health, rather than environmental protection, concerns.²⁸ Little was done about protecting water uses other than drinking; indeed, many states explicitly classified many waters not needed for drinking water supply as receptacles for waste disposal.²⁹

The federal government did not get into the business of water pollution control until after World War II, and then only very gingerly. The stated goals of the 1948 Federal Water Pollution Control Act were to recognize state primacy in controlling water pollution, support research to improve treatment of industrial effluent, and provide federal technical assistance and financial aid.³⁰ Although Congress made some minor changes to federal water pollution law in 1956, those limited purposes remained in place and, tellingly, the law was left under the supervision of the Public Health Service.³¹ In 1961, finally recognizing that the Act's scope extended "far beyond usual public health legislation,"³² Congress moved formal implementation responsibility to the Department of Health, Education and Welfare, but again the goals remained unchanged.³³

By 1965, as the environmental era was dawning, it was clear that the states were not doing enough to control water

pollution.³⁴ Congress again amended the Water Pollution Control Act, this time revising the Act's goals to include "enhanc[ing] the quality and value" of the nation's water resources and establishing a national policy "for the prevention, control, and abatement of water pollution."³⁵ The 1965 amendments put water quality at center stage for the first time, requiring that states adopt water quality standards for interstate waters sufficient "to protect the public health or welfare."³⁶ As that language suggests, the 1965 amendments extended the function of water quality standards well beyond public health; the amendments required that standards consider the value of waters "for public water supplies, propagation of fish and wildlife, recreational purposes, and agricultural, industrial, and other legitimate uses."³⁷ A year later oversight authority was transferred to the Department of the Interior, an agency focused on environmental protection rather than human health.³⁸

The broader statutory language and new institutional home should have catalyzed a shift to ecosystem protection. State resistance and a weak institutional structure, however, prevented any real advance. All states adopted water quality standards by the 1967 deadline, but few of those standards met with federal approval.³⁹ By 1971, barely over half the states had fully approved water quality standards,⁴⁰ and water quality was continuing to decline.⁴¹

Interior Secretary Stewart Udall's concerted effort to make the statute work was stymied by two major limitations. First, except in the most extraordinary cases, the standards could only be enforced through conferences with affected states and polluters.⁴² These conferences could drag on for years, and compliance with the infrastructure upgrades they tended to recommend was uneven.⁴³ Second, where water quality was violated, it was typically difficult to tie responsibility for that violation to any specific polluter.⁴⁴

Congress reacted in 1972, adopting the modern CWA. The new law, which radically overhauled the old, began with a sweeping statement of purpose: "The objective of this chap-

27. *Id.* at 6.

28. William L. Andreen, *The Evolution of Water Pollution Control in the United States—State, Local, and Federal Efforts, 1789–1972: Part I*, 22 STAN. ENVTL. L. J. 145, 178–85 (2003) [hereinafter Andreen, *Part I*]. Those early efforts sought to protect water quality, but not at anything like "pristine" levels. For example, in 1959 the governments of Canada and the United States agreed to allow the International Joint Commission to investigate pollution in the Rainy River, on the border between Minnesota and Ontario. The resulting report documented extensive sewage and pulp mill discharges and recommended that standards be set for coliform bacteria, suspended solids and dissolved oxygen levels. The report's statement of water quality objectives reflected the then-enlightened view of pollution control:

The Commission recognizes that the maximum beneficial use of available water resources should be permitted and unreasonable use of water should be prevented. The disposal of wastes into a river should be controlled so as to achieve the highest quality consistent with the maximum benefit to all users.

The Commission considers that discharging suitably treated domestic and industrial wastes into a river is a reasonable use of these waters provided that such use does not create a hazard to public health or cause undue interference with the rights of others to use these waters for legitimate purposes.

REPORT OF THE INTERNATIONAL JOINT COMMISSION ON THE POLLUTION OF RAINY RIVER AND LAKE OF THE WOODS (1965), reproduced reprinted in part in JAMES BARROS & DOUGLAS M. JOHNSON, *THE INTERNATIONAL LAW OF POLLUTION* 93, 104 (1974).

29. Andreen, *Part I*, *supra* note 28, at 185.

30. *Id.*

31. Water Pollution Control Act Amendments of 1956, Pub. L. No. 84-660, § 1(a), 70 Stat. 498, 498.

32. William L. Andreen, *The Evolution of Water Pollution Control in the United States—State, Local, and Federal Efforts, 1789–1972: Part II*, 22 STAN. ENVTL. L.J. 215, 243 (2003) [hereinafter Andreen, *Part II*] (quoting H.R. REP. NO. 87-306, at 4 (1961)).

33. Federal Water Pollution Control Act Amendments of 1961, Pub. L. No. 87-88, 75 Stat. 204. In practice, the program remained "buried deep within the [Public Health Service] . . ." Andreen, *Part II*, *supra* note 32, at 243.

34. Andreen, *Part II*, *supra* note 32, at 244–45.

35. Water Quality Act of 1965, Pub. L. No. 89-234, § 1(a), 79 Stat. 903, 903.

36. *Id.* § 5(a), 79 Stat. at 906–08.

37. *Id.*

38. Reorganization Plan No. 2 of 1966, 31 Fed. Reg. 6857 (Feb. 28, 1966), reprinted in 80 Stat. 1608 (1966); see also Press Release, Dep't of the Interior, Transfer of Federal Water Pollution Control Administration to Department of the Interior Is Effected (May 10, 1966), available at <http://www.bia.gov/cs/groups/public/documents/text/idc017374.pdf> (announcing the transfer of responsibility).

39. *Id.*

40. S. REP. NO. 92-414, at 4 (1971), reprinted in 1 CONG. RESEARCH SERV., A LEGISLATIVE HISTORY OF THE WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972, at 1422 (1973).

41. *Id.* at 4–5, 8, reprinted in 1 CONG. RESEARCH SERV., A LEGISLATIVE HISTORY OF THE WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972, at 1422–23, 1426.

42. Water Quality Act of 1965, Pub. L. No. 89-234, § 5(a), 79 Stat. 903, 908–09 (amending section 10 of the Federal Water Pollution Control Act, 33 U.S.C. § 466g).

43. See Andreen, *Part I*, *supra* note 28, at 254 (explaining both the old and new conference processes were not optimal).

44. As William Hines noted in 1968, "the standards are not intended to serve primarily enforcement purposes." N. William Hines, *Controlling Industrial Water Pollution: Color the Problem Green*, 9 B.C. INDUS. & COM. L. REV. 553, 590 (1968).

ter is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."⁴⁵ The baseline to which the waters were to be returned was their natural condition, prior to anthropogenic modification.⁴⁶ That baseline was intended not only to protect human health and recreational opportunities, but also to preserve and restore the full complement of aquatic life.⁴⁷

In order to achieve the "integrity" objective, Congress declared twin goals with short deadlines: eliminating the discharge of pollutants to waters by 1985;⁴⁸ and achieving "water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water" by 1983, "wherever attainable."⁴⁹ Despite the co-equal presentation of the goals, technology-based pollution control took priority as the new law was implemented.⁵⁰

45. Federal Water Pollution Control Act Amendments of 1972, Pub. L. No. 92-500, § 2, 86 Stat. 816, 816-17 (codified as amended at 33 U.S.C. § 1251(a) (2006)). Robert Adler has described this objective as "one of the broadest whole ecosystem restoration and protection aspirations in all of environmental law." Adler, *supra* note 4, at 29.

46. The Senate bill had stated the objective as "to restore and maintain the natural chemical, physical, and biological integrity of the Nation's waters." Federal Water Pollution Control Act Amendments of 1972, Pub. L. No. 92-500, § 2, 86 Stat. 816, 816 (1972) (codified as amended at 33 U.S.C. § 1251(a) (2006)). Although the word "natural" was removed in the final version, the intent was unchanged. See H.R. REP. NO. 92-911, at 76 (1972), *reprinted in* 1 CONG. RESEARCH SERV., A LEGISLATIVE HISTORY OF THE WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972, at 753, 763 (1973) ("The word 'integrity' as used is intended to convey a concept that refers to a condition in which the natural structure and function of ecosystems is maintained. . . . Although man is a 'part of nature' and a product of evolution, 'natural' is generally defined as that condition in existence before the activities of man invoked perturbations which prevented the system from returning to its original state of equilibrium. . . . Any change induced by man which overtaxes the ability of nature to restore conditions to 'natural' or 'original' is an unacceptable perturbation."). Congress stuck to the objective of restoring natural water quality in the face of objections from the Nixon Administration's Environmental Protection Agency ("EPA"). See H.R. REP. NO. 92-911, at 148, *reprinted in*, 1 CONG. RESEARCH SERV., A LEGISLATIVE HISTORY OF THE WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972, at 753, 835 (reproducing a letter from EPA Administrator William D. Ruckelshaus to Hon. John A. Blatnik, Chairman, House Committee on Public Works) ("We do not support the new purpose of [sic] 'general objective' that would be provided. The pursuit of natural integrity of water for its own sake without regard to the various beneficial uses of water in [sic] unnecessary, uneconomic, and undesirable from a social, economic, or environmental point of view.").

47. See, e.g., Federal Water Pollution Control Act Amendments of 1972, § 2, 86 Stat. at 817 (codified as amended at 33 U.S.C. § 1252(a) (2006)) (directing EPA, in developing programs to reduce pollution, to give due regard "to the improvements which are necessary to conserve such waters for the protection and propagation of fish and aquatic life and wildlife . . ."); Federal Water Pollution Control Act Amendments of 1972, § 2, 86 Stat. at 850 (codified as amended at 33 U.S.C. § 1314(a)(1) (2006)) (directing EPA to develop "criteria for water quality accurately reflecting the latest scientific knowledge (A) on the kind and extent of all identifiable effects on health and welfare including, but not limited to, plankton, fish, shellfish, wildlife, plant life, shorelines, beaches, esthetics, and recreation which may be expected from the presence of pollutants . . . [and] the effects of pollutants on biological community diversity, productivity, and stability . . .").

48. *Id.* at § 2, 86 Stat. at 816 (codified as amended at 33 U.S.C. § 1251(a)(2)).

49. *Id.*

50. Kenneth M. Murchison, *Learning from More Than Five-and-a-Half Decades of Federal Water Pollution Control Legislation: Twenty Lessons for the Future*, 32 B.C. ENVTL. AFF. L. REV. 527, 551-56 (2005). In voting on the final bill that became the CWA, the Senate appeared to endorse assigning secondary priority to the Act's water quality provisions "to the extent limited manpower and funding may require a choice between a water quality standards process and early and effective implementation of the effluent limitation-permit program." *Consideration of the Report of the Conference Committee Before the S. Comm.*

As of 1972, then, federal water pollution law included a clear ecosystem protection purpose, although it did not use that term. The CWA was intended to restore and maintain natural water quality conditions, and the living systems those conditions supported.⁵¹ That purpose was not redundant with any other law. The modern Endangered Species Act ("ESA"), which is currently the broadest ecosystem protection law in the United States, did not yet exist. There were already a number of federal conservation laws that provided some protection for aquatic ecosystems, including the National Forest Organic Administration Act,⁵² National Park Service Organic Act,⁵³ and Fish and Wildlife Coordination Act,⁵⁴ but their coverage was limited to federally owned lands or federally approved actions. Private purchasers were already protecting terrestrial systems,⁵⁵ but the complexities of water flow and water law made that strategy much less suitable for aquatic systems.⁵⁶

Even today with the ESA in place, the CWA's ecosystem protection aspects are not irrelevant. The CWA theoretically provides much more comprehensive coverage than the ESA. Its goal is to restore and maintain the entire suite of the nation's waters. If the CWA can be put into practice effectively, that goal is far broader than the ESA's protection, which is limited to rapidly disappearing species. The CWA can also help address two important criticisms of the ESA: that its focus on individual species leaves the larger systems in which those species are embedded at risk;⁵⁷ and that by the time it can be invoked, recovery to self-sustaining levels is costly or even impossible.⁵⁸

Effective implementation, of course, is the key issue. Ecosystem protection is inextricably bound up with the CWA's water quality provisions. The CWA's major legal innovation, feasibility-based limits on pollution discharges by industrial sources, cannot by itself protect or restore aquatic ecosystems. Ecosystem protection also requires ensuring that industrial sources are not concentrated on sensitive waters, dealing with non-industrial discharges, and limiting diversions. As explained in the next Part, although the CWA contemplates the first two of those steps, they have substantially lagged the implementation of technological pollution controls.⁵⁹

on Pub. Works, 93d Cong. (1972), *reprinted in* 1 CONG. RESEARCH SERV., A LEGISLATIVE HISTORY OF THE WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972, at 161, 171.

51. CWA § 101(a), 33 U.S.C. § 1251(a) (2006).

52. 30 Stat. 34 (1897) (codified as amended at 16 U.S.C. §§ 473-82 (2006)).

53. 39 Stat. 535 (1916) (codified as amended at 16 U.S.C. §§ 1-18f-3 (2006)).

54. 48 Stat. 401 (1934) (codified as amended at 16 U.S.C. §§ 661-667c (2006)).

55. Prior to the 1960s private philanthropists such as John D. Rockefeller, Jr., played a major role in purchasing land for inclusion in national parks. John Daugherty, *The National Park Service: The First Seventy Five Years, Biographical Vignettes, John D. Rockefeller, Jr.*, U.S. NAT'L PARK SERV., http://www.cr.nps.gov/history/online_books/sontag/rockefeller.htm (last updated Dec. 1, 2000). The Nature Conservancy, a nonprofit organization that works to further conservation primarily through land purchases, made its first acquisition in 1955. *Our History: History & Milestones of the Nature Conservancy*, THE NATURE CONSERVANCY, <http://www.nature.org/about-us/vision-mission/history/index.htm> (last visited Apr. 11, 2013).

56. See *infra* Part III.

57. *Id.*

58. John Charles Kunich, *The Fallacy of Deathbed Conservation Under the Endangered Species Act*, 24 ENVTL. L. 501 (1994).

59. See *infra* Part II.

Moreover, because of strong western opposition to federal intrusion on water allocation decisions, the CWA does not directly deal with flow.⁶⁰ As we shall explain later, however, the CWA can help states appreciate the need for flow regulation and find the political courage to impose it.⁶¹

II. Disappointing Progress on Water Quality

Progress on water quality, and therefore progress on protecting and restoring aquatic ecosystems, has been slow in the forty years since adoption of the modern CWA. The nation's waters, although not as obviously polluted as the burning rivers that catalyzed the adoption of the CWA, remain substantially altered from their natural conditions. A high percentage of them do not meet water quality standards. The nation's aquatic ecosystems are in similarly poor shape. Their poor health is traceable both to limits inherent in the CWA's structure and to the limited enthusiasm with which key CWA provisions have been implemented.

A. Reading the Scorecard: The Unhealthy State of the Nation's Waters

When the modern CWA was before Congress, the U.S. Environmental Protection Agency ("EPA") estimated that one-third of the nation's stream-miles violated existing water quality criteria.⁶² The agency's most recent water quality report, covering the state of the nation's waters as of 2004, suggests that conditions have, if anything, worsened. It concludes that forty-four percent of assessed stream-miles and sixty-four percent of assessed lakes and reservoirs are impaired.⁶³ The agency speculates that the startlingly bad numbers might be due in part to states directing limited monitoring resources to waters they suspect are impaired.⁶⁴ Even if that were persuasive,⁶⁵ at best the report indicates that water quality remains a serious problem forty years into the CWA era.

Other sources corroborate the dismal state of the nation's aquatic systems. The Heinz Center for Science, Economics and the Environment, for example, reported in 2008 that chemical contaminants were detectable in virtually all of the nation's streams and stream sediments, and that more than half of stream waters, stream sediments, and estuarine sediments tested contained at least one contaminant at levels

threatening to aquatic life.⁶⁶ Chemical pollution is far from the only problem. The vast majority of the nation's waters and waters-edge systems have been structurally altered by floodplain development, removal of riparian vegetation, dam construction, water diversions, and other changes.⁶⁷

Given the extensive modification of aquatic systems in the United States, it should come as no surprise that the native inhabitants of those systems are suffering. The Heinz Center's 2008 study concluded that thirty-seven percent of native freshwater species were at risk nationwide, twice as high a proportion as in major terrestrial habitats,⁶⁸ and that on a state-by-state basis between twenty and sixty percent of freshwater plant communities were at risk.⁶⁹ Ten years earlier, The Nature Conservancy and NatureServe reported that forty percent of the nation's freshwater fish, half of its crayfish, and two-thirds of its mussels were at risk of extinction.⁷⁰

Climate change will make the situation worse for many aquatic ecosystems, especially wetlands and deltas.⁷¹ The impacts of climate change include altering water flow patterns, disrupting the hydrologic assumptions on which both discharge and water quality standards have been set; increasing floods and droughts that may interfere with species reproduction and thus affect species composition and ecosystem productivity; increasing water temperatures that will alter ecological processes and the geographic distribution of species; and weakening aquatic ecosystem water quality from phenomena such as algal blooms.⁷² The net impacts are difficult to predict.⁷³ Staggering levels of uncertainty and geographic variation complicate predictive efforts.⁷⁴ It seems likely, though, that climate change will be even more disruptive for aquatic than for terrestrial ecosystems because aquatic flora and fauna are less able to move to more suitable locations. The Pew Center has concluded:

66. THE H. JOHN HEINZ III CTR. FOR SCI., ECON. & THE ENV'T, *THE STATE OF THE NATION'S ECOSYSTEMS 2008: MEASURING THE LANDS, WATERS, AND LIVING RESOURCES OF THE UNITED STATES* 19 (2008).

67. Adler, *supra* note 4, at 51–52.

68. THE H. JOHN HEINZ III CTR. FOR SCI., ECON. & THE ENV'T, *supra* note 67, at 21.

69. *Id.* at 22.

70. THE NATURE CONSERVANCY, *RIVERS OF LIFE: CRITICAL WATERSHEDS FOR PROTECTING FRESHWATER BIODIVERSITY* 1, 7 (Lawrence L. Master, Stephanie R. Flack & Bruce A. Stein eds., 1998), available at <http://www.natureserve.org/library/riversoflife.pdf>. Aquatic species were more endangered than any other groups.

71. See generally N. LEROY POFF, MARK M. BRINSON & JOHN W. DAY, JR., *AQUATIC ECOSYSTEMS AND GLOBAL CLIMATE CHANGE: POTENTIAL IMPACTS ON INLAND FRESHWATER AND COASTAL WETLAND ECOSYSTEMS IN THE UNITED STATES* 18–22 (2002) (discussing the effects of temperature change and altered water regimes on freshwater wetlands).

72. *Id.* at ii.

73. As the Pew Center's report puts it:

Assuming no change in food resources, invertebrate production of streams and rivers may increase, potentially yielding more food for fish. However, higher water temperatures will also increase the rate of microbial activity and thus the rate of decomposition of organic material, which may result in less food being available for invertebrates and ultimately fish In either case, warmer water holds less dissolved oxygen, so water quality will be reduced for organisms such as invertebrates and fish that have a high oxygen demand.

Id. at 7.

74. See *id.* at 32 (describing effects such as habitat loss, fragmentation, and species migration).

60. See *infra* Part II.B.1.

61. See *infra* Part III.

62. 117 CONG. REC. 38834 (Nov. 2, 1971) (statement of Sen. Walter Mondale (D-Minn.)).

63. OFFICE OF WATER, U.S. ENVTL. PROT. AGENCY, *NATIONAL WATER QUALITY INVENTORY: REPORT TO CONGRESS, 2004 REPORTING CYCLE 1–2*, available at http://water.epa.gov/lawsregs/guidance/cwa/305b/upload/2009_01_22_305b_2004report_2004_305Breport.pdf.

64. *Id.* at 7.

65. States have incentives to underplay, rather than overplay, the extent to which their waters are impaired, because they must prepare Total Maximum Daily Loads for waters they report as impaired. CWA § 301(d)(1)(C), 33 U.S.C. § 1313(d)(1)(C) (2006). It seems unlikely that states are deliberately seeking out their worst waters for preferential testing.

Expected rates of climate change are probably too great to allow adaptation through natural genetic selection. Many types of habitat will be diminished or possibly lost entirely (e.g., alpine wetlands). Animals and plants will need to disperse northward or to higher elevations, but aquatic species differ greatly in their dispersal abilities, so not all species will be able to move to more hospitable habitat. Further, most high-quality aquatic habitats are now spatially isolated (due to human activities), making successful dispersal even more difficult.⁷⁵

B. Limited Tools, Limited Implementation

The CWA should not be blamed for all the woes of the nation's aquatic ecosystems, but it is certainly fair to ask why it has not come closer to achieving its water quality goals. Two major factors have contributed to the shortfall. First, the CWA provides federal authorities with only limited tools for water quality protection.⁷⁶ It leaves important areas of responsibility to the states, which have not always been anxious to take on that responsibility. Second, EPA has been slow to implement the tools the law does provide.⁷⁷

I. Restrictions on Federal Authority

The most obvious limit on EPA's authority to protect water quality is the lack of any direct power to regulate pollution originating from nonpoint sources. The CWA draws an important line between point and nonpoint source pollution. Unpermitted discharges of pollutants from point sources to waters under federal jurisdiction are prohibited.⁷⁸ "Point source" is defined broadly to include "any discernible, confined and discrete conveyance."⁷⁹ Point source dischargers must obtain a National Pollutant Discharge and Elimination System ("NPDES") permit;⁸⁰ in most states, state authorities issue those permits under authority delegated by EPA and subject to EPA oversight.⁸¹ Permits must include not only technology-based discharge limits, but also water-quality based limits.⁸² Although the permit system has done a great deal to reduce industrial discharges to water,⁸³ it leaves out diffuse run-off, which is a major source of water pollution. Unchanneled run-off from agricultural lands, logging operations, roads, and residential areas carry silt, fertilizer,

pesticides, oil, trash, and other pollutants into waterways.⁸⁴ All of that pollution is beyond the direct reach of the CWA.

The CWA does try to approach nonpoint source pollution indirectly, through voluntary measures and drawing attention to the problem.⁸⁵ It also uses water quality standards to highlight nonpoint source, as well as point source, pollution. States must determine which of their waters do not meet water quality standards,⁸⁶ and develop "total maximum daily loads"⁸⁷ ("TMDLs")—pollution budgets establishing the amount of discharge the waterway can accept without violating water quality standards.⁸⁸ Waters must be listed and TMDLs produced even if run-off is the only source of pollution.⁸⁹ But the CWA does not explicitly require implementation of TMDLs, or impose any penalty for failure to implement them. At the end of the Clinton Administration, EPA had the temerity to issue regulations requiring that TMDLs include reasonable assurances that contemplated load reductions would actually be achieved, but Congress blocked their implementation and the next administration withdrew them.⁹⁰ Currently, therefore, TMDLs effectively control nonpoint sources only to the extent the state decides that they should do so.⁹¹

Another important limit on federal authority is the CWA's stated policy of leaving authority over water allocation to the states.⁹² That complicates aquatic ecosystem protection because flow and water quality are tightly coupled. As the Supreme Court has recognized, "[i]n many cases, water quantity is closely related to water quality; a sufficient lowering of the water quantity in a body of water could destroy all of its designated uses, be it for drinking water, recreation, navigation or . . . as a fishery."⁹³ Many ecosystem-relevant aspects of water quality depend on the concentration of pollutants in waterways.⁹⁴ The higher the flow, the greater the pollution load can be without exceeding tolerable concentrations. Other aspects of water quality are also linked to volumes of

75. *Id.*

76. See Part II.B.1.

77. See Part II.B.2.

78. See CWA § 301(a), 33 U.S.C. § 1311(a) (2006) (stating that it is unlawful to discharge a pollutant without compliance with CWA section 402, 33 U.S.C. § 1342 (2006)).

79. *Id.* § 502(14), 33 U.S.C. § 1362(14) (2006).

80. See *id.* § 401(a)(2), 33 U.S.C. § 1341(a)(2) (2006).

81. See *id.* § 402(b)–(c), 33 U.S.C. § 1342(b)–(c); see generally *National Pollutant Discharge Elimination System (NPDES): State Program Status*, U.S. ENVTL. PROT. AGENCY, <http://cfpub.epa.gov/npdes/statestats.cfm> (last updated Apr. 14, 2003) (showing which states have an EPA-approved NPDES Program).

82. CWA §§ 301(b), 302, 33 U.S.C. §§ 1311(b), 1312 (2006); 40 C.F.R. § 122.44(d) (2012).

83. Andreen, *supra* note 4, at 591.

84. See *id.* at 593.

85. *Id.* at 544–45, 545 n.42.

86. CWA § 303(d)(1)(A), 33 U.S.C. § 1313(d)(1)(A) (2006).

87. See *id.* § 303(d)(1)(C), 33 U.S.C. § 1313(d)(1)(C).

88. *Id.*

89. See *Pronsolino v. Nastri*, 291 F.3d 1123, 1139 (9th Cir. 2002).

90. Oliver A. Houck, *The Clean Water Act Returns (Again): Part I, TMDLs and the Chesapeake Bay*, 41 ELR 10208, 10210 (Mar. 2011).

91. EPA regulations do require that point sources seeking a new permit to discharge to impaired waters show that "existing dischargers into that segment are subject to compliance schedules designed to bring the segment into compliance with applicable water quality standards." 40 C.F.R. § 122.4(i)(2) (2012). According to the Ninth Circuit, this provision requires that the water be brought into compliance with water quality standards. *Friends of Pinto Creek v. U.S. Env'tl. Prot. Agency*, 504 F.3d 1007, 1014 (9th Cir. 2007) ("If there are not adequate point sources to do so, then a permit cannot be issued unless the state or [the applicant] agrees to establish a schedule to limit pollution from a nonpoint source or sources sufficient to achieve water quality standards.").

92. CWA § 101(g), 33 U.S.C. § 1251(g) (2006).

93. *PUD No. 1 of Jefferson Cnty. v. Wash. Dep't of Ecology*, 511 U.S. 700, 719–20 (1994) (holding that the Petitioner's asserted distinction between water quality and water quantity was artificial).

94. *Water: Monitoring & Assessment, 5.1 Stream Flow*, U.S. ENVTL. PROT. AGENCY, <http://water.epa.gov/type/rs/monitoring/vms51.cfm> (last updated Mar. 6, 2012).

flow. High flows can help scour away silt and keep waterways cool.⁹⁵

Although wholly understandable from a political perspective, leaving allocation decisions to states puts a key tool solely in state hands. Federal agencies are supposed to stand willing to help: the CWA directs them to cooperate with state and local governments to control pollution “in concert with programs for managing water resources.”⁹⁶ The CWA also provides states with tools they may not otherwise have to control diversions. Section 401,⁹⁷ which gives states veto power over federally-authorized activities that may result in discharges to water, has been interpreted to allow states to impose minimum flow requirements on federally-licensed hydroelectric projects independent of any conflicting water rights.⁹⁸ In other words, motivated states get some federal help in dealing with flows, but the CWA lacks strong federal levers to move states in that direction.

2. Tentative Implementation

Of course, Congress and the states do not bear all the responsibility for the CWA's failure to protect aquatic ecosystems. EPA owns a significant share of that responsibility as well. Since the CWA was enacted, EPA has consistently emphasized the law's technology-based provisions at the expense of the water quality provisions, interpreted its own authority narrowly, and avoided enforcing water quality-based requirements.

Implementation of the water quality-based provisions of the CWA began slowly. EPA, which has always had limited resources for implementing the laws under its jurisdiction, picked the low-hanging fruit first. It concentrated initially on developing technology-based standards and approving state permitting programs. The Senate expressly endorsed that early prioritization.⁹⁹ As a result, water quality programs lagged.

EPA did not just move slowly on water quality. It also adopted a series of narrowing interpretations of its permitting authority. Despite acknowledging the extensive water quality impacts produced by dams, for example, in 1973 EPA adopted the position that dams are not point sources requiring NPDES permits.¹⁰⁰ The D.C. Circuit upheld that interpretation in 1982.¹⁰¹ EPA has also successfully exempted

water transfers from the permitting program.¹⁰² Taken together, EPA's narrowing interpretations have limited the reach of the NPDES program, and therefore its ability to protect aquatic ecosystems. Congress and the courts have provided some check on EPA's attempts to narrow the scope of the NPDES program,¹⁰³ but as a practical matter, EPA has been able to delay application of the CWA's permitting requirements to some important categories of sources.

EPA has also tread cautiously within the boundaries of its admitted authority. Faced with opposition from polluters and water users, it has been reluctant to push states to develop numerical water quality standards, or standards addressing the physical and biological integrity of their waters.¹⁰⁴ Moreover, it has rarely exercised its oversight authority to disapprove state-issued NPDES permits.¹⁰⁵ That passivity, combined with the lack of numerical standards, has allowed some states to routinely issue permits lacking water quality based effluent limitations.¹⁰⁶ When water quality-based provisions are included, they often simply parrot narrative water quality standards, making them nearly impossible to enforce.¹⁰⁷

III. Room for Hope? Water Quality Standards and Management of the Bay-Delta

Based on the history recounted in the previous section, it would be easy to conclude that the CWA is a failure as a water-quality or ecosystem protection tool. But that would be an unfortunate and premature conclusion. The CWA is a needed adjunct to the ESA and other conservation laws. Although the challenges are admittedly large, there is room to hope that under the right circumstances, the CWA can play an important role in protecting and restoring aquatic ecosystems.

In this Part, we consider the role and potential of the CWA in the context of the Bay-Delta. In legal and institutional terms, there are several reasons for viewing the Bay-Delta as a “best case” scenario for the CWA's ability to protect ecosystems. California, unlike some other states, is a willing partner.

95. *A Citizen's Guide to Understanding and Monitoring Lakes and Streams: Chapter 3—Streams*, WASH. STATE DEP'T OF ECOLOGY, <http://www.ecy.wa.gov/programs/wq/plants/management/joymanual/streamtemp.html> (last visited Apr. 11, 2013).

96. CWA § 101(g), 33 U.S.C. § 1251(g).

97. *Id.* § 401, 33 U.S.C. § 1341 (2006).

98. *PUD No. 1*, 511 U.S. at 720–21.

99. See 39 Stat. 535 (1916) (codified as amended at 16 U.S.C. §§ 1–18f-3 (2006)).

100. See *Nat'l Wildlife Fed'n v. Gorsuch*, 693 F.2d 156, 169 (D.C. Cir. 1982) (citing Letter from Alan Kirk, Acting Assistant Adm'r for Enforcement & Gen. Counsel, U.S. Env'tl. Prot. Agency, to S. Leary Jones, Dir., Div. of Water Quality Control, Tenn. Dep't of Pub. Health (June 23, 1973)). The Gorsuch opinion recounts the history of EPA's interpretation. See *id.* at 166–70. Although the agency has occasionally waffled, it has never changed its view that dams are outside the NPDES universe. *Id.* at 169.

101. *Id.* at 183.

102. See *Friends of Everglades v. S. Fla. Water Mgmt. Dist.*, 570 F.3d 1210, 1228 (11th Cir. 2009) (upholding the Water Transfers Rule as a reasonable interpretation of an ambiguous statute); National Pollutant Discharge Elimination System (NPDES) Water Transfers Rule, 73 Fed. Reg. No. 115, 33697 (June 13, 2008) (codified at 40 C.F.R. pt. 122).

103. In 1987, Congress amended the CWA to make clear that permits are required for municipal and industrial stormwater discharges. CWA § 402(p), 33 U.S.C. § 1342(p) (2006). Federal courts have rejected EPA's attempts to exempt pesticide application and ballast water discharges from ships from the NPDES program. *Nat'l Cotton Council v. U.S. Env'tl. Prot. Agency*, 553 F.3d 927 (6th Cir. 2009); *Nw. Env'tl. Advocates v. U.S. Env'tl. Prot. Agency*, 537 F.3d 1006 (9th Cir. 2008). The Supreme Court has recently taken up another long-running battle, over discharges from logging operations. Another longstanding EPA narrowing interpretation was recently upheld by the Supreme Court. *Decker v. Nw. Env'tl. Def. Ctr.*, No. 11-338, 2013 WL 1131708 (U.S. Mar. 20, 2013).

104. See Adler, *supra* note 4, at 66–70.

105. *Id.* at 67–68, 76; CWA § 402(d), 33 U.S.C. § 1342(d).

106. See WATER PERMITS DIV., OFFICE OF WASTEWATER MGMT., U.S. ENVTL. PROT. AGENCY, REVIEW OF CLEAN WATER ACT § 402 PERMITTING FOR SURFACE COAL MINES BY APPALACHIAN STATES: FINDINGS & RECOMMENDATIONS ES-1, 23 (2010).

107. *Id.* at 18–19.

EPA has historically been more willing to push its authority in the Bay-Delta than elsewhere.¹⁰⁸ State law fills some of the most important gaps in the CWA. Furthermore, the state agency that implements the CWA and the state's analogous water quality law also implements the state's appropriative water rights system, providing institutional opportunities to integrate management of water quality and water quantity. The state's courts have pushed the agency in that direction, ruling decades ago that water rights can, and indeed must, be adjusted if necessary to protect water quality.¹⁰⁹ A close look at this context both illustrates what the CWA can do when both state and federal partners are enthusiastic about the task of protecting aquatic ecosystems and highlights remaining barriers to success.

A. Setting the Stage: Salinity in the San Francisco Bay-Delta

The Delta is the paradigm of a stressed ecosystem. Until the mid-nineteenth century, it was a tidal marsh rich in biodiversity.¹¹⁰ Starting in the 1860s, the sloughs and islands of the Delta were drained and diked to allow agriculture;¹¹¹ at the time, the modern idea of a "wetland," with its positive connotation of ecosystem function and ecosystem services, did not exist. Today, the transformation of the Delta from a vibrant "ecosystem that worked" into a "hard-working" one¹¹² is complete; only scant traces of the earlier system remain. As the leading modern historian of California, Kevin Starr, has written, "[n]ot since ancient Rome or the creation of Holland had any society comparably subdued, appropriated, and rearranged its water resources."¹¹³

It is widely agreed that the Delta is in crisis, both as an ecosystem and as the hub of California's water delivery system, with its associated economic ramifications.¹¹⁴ EPA recently described the ecosystem problem in these terms:

Water quality and aquatic resources in the Bay Delta Estuary are under serious stress. All of the waters of the Bay Delta Estuary and most of its tributaries are listed as impaired for one or more parameters under the federal Clean Water Act. Populations of many formerly abundant open-water (i.e., pelagic) fish species, including delta smelt, longfin smelt,

and threadfin shad, have collapsed in recent decades. Anadromous fishes, including the winter run chinook salmon, have suffered a similar decline.¹¹⁵

Global climate change will exacerbate the Delta's stresses, squeezing the estuary from both directions.¹¹⁶ Sea level at the entrance to the San Francisco Bay has risen significantly since the 1930s.¹¹⁷ By the end of the current century, the Pacific Ocean is expected to rise another 70 to 185 cm,¹¹⁸ pushing salty water inland. At the same time, the freshwater inflows that hold back salt water will decrease as California's primary reservoir—the Sierra snowpack—shrinks.¹¹⁹ The net result is a projected increase in Delta salinity of roughly ten percent.¹²⁰

This is bad news, given that persistent efforts since the 1920s have failed to solve the salt water intrusion problem, which has long threatened both ecosystem stability and the Delta's usefulness as a source of fresh water for municipal and agricultural use. We briefly recount the history of those efforts in the following sections.

I. The California Supreme Court Rejects a Bold Common Law Approach

It took decades for stakeholders and public officials to view the Delta problem as one of ecosystem restoration rather than merely an economic one subject to engineering fixes.¹²¹ From the late nineteenth century, when large scale irrigation withdrawals from the Sacramento and San Joaquin rivers began, water users in the Carquinez Straits and the Delta feared that salt water intrusion would render their lands and industries valueless.¹²² These fears accelerated as the federal Central Valley Project and the California State Water Project came on line.¹²³ The Delta became the transfer hub for movement of the state's water supply from the wetter north to the drier south. In any given year, fifty percent of the state's water

108. Indeed, EPA recently announced a broad review of its authority to take ecosystem-protective steps in the region. Water Quality Challenges in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary, 76 Fed. Reg. 9709 (proposed Feb. 22, 2011) (to be codified at 40 C.F.R. ch. I); see also U.S. DEP'T OF THE INTERIOR ET AL., INTERIM FEDERAL ACTION PLAN FOR THE CALIFORNIA BAY-DELTA 14 (2009).

109. Nat'l Audubon Soc'y v. Superior Court, 658 P.2d 709, 732 (Cal. 1983); see United States v. State Water Res. Control Bd., 227 Cal. Rptr. 161, 162 (Ct. App. 1986).

110. U.S. DEP'T OF THE INTERIOR ET AL., *supra* note 108, at 2.

111. JAY LUND ET AL., ENVISIONING FUTURES FOR THE SACRAMENTO-SAN JOAQUIN DELTA 19–21 (2007).

112. A working river provides a variety of ecosystem functions including biodiversity conservation and also supports direct human uses such as irrigation, power production, and municipal water supply. CYNTHIA KOEHLER, SAVE THE BAY, PUTTING IT BACK TOGETHER: MAKING ECOSYSTEM RESTORATION WORK 59 (2001).

113. KEVIN STARR, CALIFORNIA: A HISTORY xii (2005).

114. See, e.g., U.S. DEP'T OF THE INTERIOR ET AL., *supra* note 108, at 2–3 (noting both ecological and economic aspects of the crisis).

115. Water Quality Challenges in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary, 76 Fed. Reg. 9709, 9710 (proposed Feb. 22, 2011) (to be codified at 40 C.F.R. ch. I).

116. James E. Cloern et al., *Projected Evolution of California's San Francisco Bay-Delta-River System in a Century of Climate Change*, PLOS ONE, vol. 6, issue 9, Sept. 2011, at 1, available at <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0024465>.

117. Sea level at the entrance to San Francisco Bay has increased about 2.2 cubic meters ("cm") per decade over this period, and the frequency of extreme tides has increased twenty fold since 1915. *Id.* at 2.

118. *Id.* at 4. A recent National Research Council report integrating the effects of sea level rise and land subsidence projects relative sea level increase off San Francisco to be about 90 cm by 2100; given the high uncertainties of such projections, the report puts the range of possibility at about 42 to 166 cm, or between 17 and 65 inches. COMM. ON SEA LEVEL RISE IN CAL., OR., & WASH., NAT'L RESEARCH COUNCIL, SEA-LEVEL RISE FOR THE COASTS OF CALIFORNIA, OREGON, AND WASHINGTON: PAST, PRESENT, AND FUTURE 117 (2012).

119. Cloern et al., *supra* note 116, at 11.

120. *Id.* at 7. Salinity is a measure of how much sea salt is contained in a unit of water. California coastal seawater currently contains about 33 parts salt per thousand parts water by weight. That level is expected to rise between 2.1 and 4.5 parts per thousand ("ppt"). *Id.*

121. *Id.* at 174–75.

122. W. TURRENTINE JACKSON & ALAN M. PATTERSON, WATER RES. CTR. TECHNICAL COMPLETION REPORT W-501, THE SACRAMENTO-SAN JOAQUIN DELTA: THE EVOLUTION AND IMPLEMENTATION OF WATER POLICY: AN HISTORICAL PERSPECTIVE 7 (1977), available at <http://escholarship.org/uc/item/36q1p0vj>.

123. *Id.* at 188–89.

supply dedicated to the Central Valley and urban Southern California passes through the Delta into the powerful pumps at the southern end, which supply the two projects.¹²⁴ Like those who draw their water directly from the Delta, beneficiaries of the new water projects are also worried that they might get salty water.¹²⁵

Delta salinity was initially the concern of downstream water users. Excessively saline water can harm plants, wildlife, and people.¹²⁶ Reducing salt concentration requires either removing salt or adding water. Although a bedrock principle of the CWA is that dilution is not a solution to pollution, dilution has historically been relied on to reduce salinity because the costs of desalination are extremely high and salt input is difficult to block at the source.¹²⁷

Spanish explorers noticed the Delta's salt-fresh boundary, but the C&H sugar refinery in Crockett made the first accurate measurements between 1908 and 1920.¹²⁸ Their barges were measuring the impact of the major nineteenth century withdrawals on the San Joaquin, and subsequently, the impacts of rice farmers in the early twentieth century on the lower Sacramento.¹²⁹ The legal battle over Delta salinity control began soon afterwards, when the City of Antioch, which sits at the mouth of the San Joaquin River, sued water users who diverted from the Sacramento River north of the city of Sacramento.¹³⁰ California water law, policy, and politics have never departed from the reasons the state's Supreme Court gave for telling Antioch literally to continue sucking it up.¹³¹

In 1920, a very dry year, the flow of the Sacramento River dropped to 420 cubic feet per second at Sacramento.¹³² Antioch asserted that upstream diversions had allowed saline San Francisco Bay water to push into Antioch's intake structures, making its water unfit for residential and commercial customers.¹³³ The trial court agreed; it entered an injunction setting minimum river flow levels, and therefore limiting upstream withdrawals.¹³⁴ The ruling was a legal bombshell, even more explosive than the one dropped by the Court of Appeals eighty-four years later when it held that the state can limit all water rights to meet water quality standards.¹³⁵ Then and now, though, the irrigators eventually prevailed.¹³⁶

The *Antioch* decision was quickly reversed by the California Supreme Court. The high court agreed that appropriators generally have a right to water quality as it existed at the time of their appropriation,¹³⁷ but refused to apply

that rule to salt water intrusion.¹³⁸ In a preview of later CWA debates,¹³⁹ the court drew a distinction between the addition of polluting substances and the diversion of water upstream.¹⁴⁰ Senior downstream water rights holders could complain about upstream withdrawals, the court held, only if those withdrawals left an insufficient volume of water in the stream to supply their established rights.¹⁴¹ They could not complain, however, that upstream diversions did not leave the much greater quantity of water needed to keep the salty tides at bay.¹⁴² That distinction, between adding pollution and removing water, held until 1986.¹⁴³

The California Supreme Court's struggle to reverse the injunction won by Antioch below led it into the history of California's efforts to find a water law adapted to its climate.¹⁴⁴ In the end, the court, foreshadowing *Bush v. Gore*,¹⁴⁵ decided that it would adopt a special rule for a situation it believed to be unique.¹⁴⁶ Describing this location as the only one in the state where this particular conflict could arise, the court wrote that "[t]he rule that we may adopt here can scarcely be a precedent for any case except for one arising on these two rivers, concerning a similar claim of some prior appropriator near the outlets thereof."¹⁴⁷ Nonetheless, the court's reasoning was more general. It placed all of the risk on Antioch, the downstream user, on the grounds that one who takes water near the salt-fresh interface "must take notice of these conditions, and his rights will necessarily be restricted thereby."¹⁴⁸

The real justification for the decision, however, was a straight utilitarian one: it was necessary to give preference to the diverters in the state's rapidly growing interior valleys because "the full use of the waters of the rivers and mountain streams for irrigation . . . is absolutely necessary to the continued growth and prosperity of the state."¹⁴⁹ The court declined to ask exactly how necessary the precise upstream uses at issue were, rejecting Antioch's objection that most of the irrigated area was planted with rice, an especially water-intensive crop.¹⁵⁰ Although acknowledging that "it may be that, under these circumstances, rice culture in this state should not be encouraged," the court decided that was a question properly left to the legislature.¹⁵¹ Legislators declined to take up such questions, leaving protection of the Bay-Delta in the hands of engineers until the 1980s.

124. *Id.*

125. *Id.*

126. THOMAS V. CECIL, PRINCIPLES OF WATER RESOURCES: HISTORY, DEVELOPMENT, MANAGEMENT, AND POLICY 310 (Ryan Flahive & Jerry Correa eds., 2d ed. 2003).

127. JACKSON & PATTERSON, *supra* note 122, at 11.

128. *Id.* at 2.

129. *Id.*

130. *Id.* at 6.

131. *Id.*

132. *Id.* at 7.

133. See *Town of Antioch v. Williams Irrigation Dist.*, 205 P. 688, 690 (Cal. 1922).

134. See *id.* at 689.

135. State Water Res. Control Bd. Cases, 39 Cal. Rptr. 3d 189, 323–24 (Ct. App. 2006).

136. See *id.* at 324; *Town of Antioch*, 205 P. at 695–96.

137. *Town of Antioch*, 205 P. at 691–92.

138. See *id.* at 692.

139. See, e.g., *S. Fla. Water Mgmt. Dist. v. Miccosukee Tribe of Indians*, 541 U.S. 95, 109 (2004) (transfer of water within a single water body not an addition of a pollutant).

140. See *Town of Antioch*, 205 P. at 694.

141. See *id.* at 691.

142. See *id.* at 694.

143. See *United States v. State Water Res. Control Bd.*, 227 Cal. Rptr. 161, 179 (Ct. App. 1986).

144. See generally *State Water Res. Control Bd. Cases*, 39 Cal. Rptr. 3d 189, 200 (Ct. App. 2006) (noting the history of controversy around the San Joaquin River and the intervention of the State Water Control Board).

145. 531 U.S. 98, 103, 110 (2000).

146. See *Town of Antioch*, 205 P. at 695.

147. *Id.* at 694.

148. *Id.* at 692.

149. *Id.* at 693.

150. *Id.*

151. *Id.* at 695.

2. The Engineers and Dam Operators Can Solve the Problem

After *Antioch*, California relied on engineering solutions to “solve” the Delta problem by preventing saline intrusion without limiting irrigation withdrawals. Until the decision to turn the unbuilt Central Valley Project (“CVP”) over to the federal government in the 1930s, there were a number of schemes to place a barrier across the bay to maintain the fresh-salt water balance.¹⁵² These plans died after the Bureau of Reclamation, as the operator of the CVP, promised to solve the problem by providing sufficient releases from upstream dams.¹⁵³ Federal and state water project managers assumed that salinity balance and fish losses were minor technical problems that could be solved by modest upstream reservoir releases, add-ons such as fish ladders or hatcheries, and modest manipulations of flows through the Delta.¹⁵⁴

The precise level of salinity control releases necessary became an unresolved tug of war between the State of California and the Bureau of Reclamation, with the Delta ecosystem the ultimate loser. After construction of the CVP and the California State Water Project (“SWP”), salinity control became an interest to be accommodated or traded off to serve farmers in the Central Valley and the burgeoning population of Southern California.¹⁵⁵

3. California Unsuccessfully Tries to Control the Bureau of Reclamation

To pry water away from the federal government, California relied on section 8 of the Reclamation Act of 1902,¹⁵⁶ which requires that the federal government acquire project water rights in accordance with state law. The Bureau of Reclamation complied with section 8 in the development of the Central Valley Project, as California had plenty of unappropriated water. The state’s insistence on conditioning the Bureau’s water rights on salinity control flows, however, was a sticking point. The Bureau was willing to release some water, but the state wanted more.¹⁵⁷ The Delta was not without political power, as it was home to both large farmers and downstream urban areas and industries, all of whom were at risk from the failure to at least stabilize salinity levels.¹⁵⁸ In 1958, the State Water Resources Board first asserted the authority to condition the Bureau’s exercise of its water rights on the provision of flows needed to maintain fisheries, putting the Bureau on notice that additional salinity control releases would be required.¹⁵⁹

The Board was given the express statutory authority to impose such requirements in 1959,¹⁶⁰ but was reluctant to use it. Instead, in a 1961 decision, the Board reserved its right to do so in the future, while urging the state and federal government to resolve their conflict.¹⁶¹ The result was an important precedent that “signified a degree of passivity that persisted in subsequent Delta decisions.”¹⁶²

The same pattern played out in a series of temporizing decisions, even as the California legislature and the U.S. Supreme Court expanded the state’s power. The Bureau was confident it could resist any state demands for increased flows.¹⁶³ The Supreme Court had ruled in 1958 that the Bureau’s duty to comply with state law under section 8 of the Reclamation Act applied only to the acquisition of water rights for federal projects, not to their operation.¹⁶⁴ So, although the innovative Porter Cologne Act of 1969 gave the Board the authority to consider the impact on water quality of diversion applications,¹⁶⁵ the Bureau of Reclamation had good reason to believe that authority could not be applied to its diversions, despite their massive volume.

The Bureau’s argument, however, was undermined by the Supreme Court’s 1978 change of heart. *California v. United States* abandoned the New Deal preference for federal river management. Justice Rehnquist returned to the long-established understanding of the Reclamation Program: the states control the distribution of water and the federal government pays. The case involved a challenge to the State Board’s D-1422 decision, which imposed, *inter alia*, flow release conditions on the operation of the Bureau’s New Melones Dam.¹⁶⁶ Without reversing its prior CVP jurisprudence, the Court required the Bureau, if it wanted to escape state-imposed conditions on project operation, to prove that those conditions were inconsistent “with clear congressional directives respecting the project.”¹⁶⁷ After *California*, the State Board adopted the “principle” that Delta water quality conditions had to be “at least as good as those levels which would have been available had the state and federal projects not been constructed.”¹⁶⁸

deprived of any commitment by the Bureau of Reclamation to control tidal salinity beyond the point required for the transfer of sufficiently pure water south.” *Id.* at 50.

160. CAL. WATER CODE § 1394 (West 2012).

161. In the Matter of Applications 5625, 5626, 9363, 9634, 9365, 9366, 9367, and 10588 of the U.S. Bureau of Reclamation, Decision No. 990, at 1, 61–62 (State Water Res. Control Bd., Feb. 9, 1961), *available at* http://www.waterboards.ca.gov/waterrights/board_decisions/adopted_orders/decisions/d0950_d0999/wrd990.pdf.

162. Hanemann & Dyckman, *supra* note 8, at 715.

163. The major State Water Resources Control Board decisions demanding such flows include In the Matter of Application 5625 and 38 Other Applications of the U.S. Bureau of Reclamation, Decision No. 1379, at 1, 19, 61–62 (State Water Res. Control Bd., Sept. 16, 1961), *available at* <http://www.waterrights.ca.gov/hearings/decisions/WRD1379.PDF>.

164. *Ivanhoe Irrigation Dist. v. McCracken*, 357 U.S. 275, 291–92 (1958). That holding was reaffirmed five years later. *City of Fresno v. California*, 372 U.S. 627, 630 (1963).

165. CAL. WATER CODE §§ 1300–24 (West 2012).

166. *California v. United States*, 438 U.S. 645, 651 (1978).

167. *Id.* at 645, 676.

168. In the Matter of Permit 12720 (Application 5625) and Other Permits of the U.S. Bureau of Reclamation, Decision No. 1485, at 10 (State Water Res. Control Bd., Aug. 16, 1978) [hereinafter Decision No. 1485], *available at* <http://www.waterrights.ca.gov/hearings/decisions/WRD1485.PDF>.

152. See Hanemann & Dyckman, *supra* note 8, at 713.

153. See *id.*

154. *Id.* at 714.

155. *Id.* at 715 n.24.

156. 43 U.S.C. § 383 (2006).

157. JACKSON & PATTERSON, *supra* note 122, at 50.

158. *Id.* at 55.

159. Salinity control was one of the original purposes of the Central Valley Project (“CVP”), but it was never listed a CVP purpose in the federal legislation. The Bureau of Reclamation continued to assure California that releases from Shasta Dam would be used for this purpose, but by the late 1940s, the Bureau began to back away from earlier commitments. “By 1952, . . . the Delta had been

4. Engineers Once Again to the Rescue

The Board's decision was immediately challenged, but for a time, it looked like there might be a technological fix.¹⁶⁹ After the initial small releases proved insufficient, the federal and state governments discovered what they thought was a win-win solution.¹⁷⁰ A new "peripheral canal" would divert Sacramento River water at the northern end of the Bay-Delta, deliver it to the federal and state pumps near Tracy, and release some water for salinity control along the way.¹⁷¹ The canal would have relieved stresses on the Delta by decreasing the use of pumps at the Clifton Forebay in the south Delta.¹⁷² Initially, the canal seemed to be a go.¹⁷³ In 1980, the state's voters approved a constitutional amendment that represented a compromise between the now powerful environmental movement and big urban and agricultural water users.¹⁷⁴ Most of the state's undammed north coast rivers would be designated as wild and scenic and the Delta would be protected by the peripheral canal.¹⁷⁵ The canal, however, ultimately fell victim to a lethal combination of environmental concern about its impact on the Delta, which was now seen as a valuable ecosystem, and traditional northern California hostility to sending "our" water to the alien south.¹⁷⁶ After just two years, voters repealed the 1980 Amendment and killed the Peripheral Canal.¹⁷⁷

5. The State Courts Step In

Four years after defeat of the Peripheral Canal proposal, a state appellate court effectively reversed *City of Antioch*, with a decision that appeared to upend settled interpretations of the relationship between water rights and water quality.¹⁷⁸ The *Racanelli* decision, as it has come to be known, did more than just reaffirm the Board's power to impose salinity control conditions on water projects. It held that the Board had an affirmative *duty* to adopt salinity water quality standards for the Delta *and* to integrate those standards into the state's dual system of appropriative and largely unquantified riparian water rights.¹⁷⁹ This decision was almost without precedent in the West.¹⁸⁰ Water rights holders were accustomed to taking their water without even minimal consideration of water quality impacts because their rights were established long before states began to regulate water quality.¹⁸¹

When the states did eventually begin to regulate waste discharges, they typically assigned that responsibility to public health, rather than water rights, agencies.¹⁸² California, however, took a more progressive path, in large part because of the Delta.¹⁸³ The 1969 Porter-Cologne Act¹⁸⁴ merged the State Water Quality Control Board with the State Water Rights Board and required the new State Water Resources Control Board ("SWRCB") to consider both the quantitative and qualitative impacts of new water rights applications.¹⁸⁵ When the state's failure to control salinity was directly challenged, the courts used two related theories to impose new duties on the state.¹⁸⁶ The path-breaking *Racanelli* decision took the Porter-Cologne Act at its word,¹⁸⁷ especially in light of the 1983 *Mono Lake* decision, which had imposed a continuing duty on the State Water Rights Board to apply the public trust to new and perfected water rights.¹⁸⁸

6. The State Is Unable to Implement the *Racanelli* Decision

The *Racanelli* decision had less impact on the Delta's ecosystems than might have been expected because political realities intervened. The Board initially complied with the spirit of the decision by proposing to cap water diversions at 1985 levels and imposing spring salinity and fish conservation releases.¹⁸⁹ The Board's draft decision threatened the coalition of powerful federal water contractors and private holders of unquantified water rights along the rivers.¹⁹⁰ These powerful interests were soon also threatened by the federalization of water pollution control in 1972¹⁹¹ and the rise of "fish power."¹⁹² There is a long history of efforts to mitigate the impact of dams on fish populations, but the ESA gave environmental protection advocates a new legal basis to subordinate other uses to species preservation, and salinity control was a direct beneficiary of this development.¹⁹³ The aggressive efforts to integrate water quantity and quality energized strong constituencies invested in the status quo and ultimately prevented any effort to achieve a consensus among all Delta interests.¹⁹⁴ Farmers played the stakeholder game not to reach a solution, but to delay a solution.

182. See *id.* at 94–98.

183. See *id.* at 5–6, 97.

184. CAL. WATER CODE §§ 13000–16104 (West 2012).

185. See *id.* §§ 13100, 13274.

186. See *United States v. State Water Res. Control Bd.*, 227 Cal. Rptr. 161, 197 (Ct. App. 1986).

187. *Id.* at 173–74.

188. *Nat'l Audubon Soc'y v. Superior Court*, 658 P.2d 709, 732 (Cal. 1983).

189. See Hanemann & Dyckman, *supra* note 8, at 718.

190. See *id.* at 718–19.

191. *National Pollutant Discharge Elimination System (NPDES): Clean Water Act*, U.S. ENVTL. PROT. AGENCY, http://cfpub.epa.gov/npdes/cwa.cfm?program_id=45 (last updated Dec. 17, 2012).

192. See Hanemann & Dyckman, *supra* note 8, at 719. For a survey of how the environmental movement constrained dam operation and construction for the benefit of fish species, see A. Dan Tarlock, *Hydro Law and the Future of Hydroelectric Power Generation in the United States*, 65 VAND. L. REV. 1723 (2012).

193. See U.S. DEP'T OF AGRIC. ET AL., COLORADO RIVER BASIN SALINITY CONTROL PROGRAM FEDERAL ACCOMPLISHMENT REPORT FOR FISCAL YEAR 2011, at 14 (2011), available at <http://www.usbr.gov/uc/progact/salinity/pdfs/FedAccompRep-2011.pdf>.

194. See Hanemann & Dyckman, *supra* note 8, at 719.

169. NORRIS HUNDLEY, JR., *THE GREAT THIRST: CALIFORNIANS AND WATER: A HISTORY* 315 (Univ. of Cal. Press rev. ed. 2001).

170. *Id.* at 315–16.

171. *Id.* at 315.

172. *Id.*

173. *Id.* at 325.

174. *Id.*

175. *Id.* at 327.

176. *Id.*

177. *Id.* at 331–32.

178. See *United States v. State Water Res. Control Bd.*, 227 Cal. Rptr. 161, 179 (Ct. App. 1986).

179. See *id.* at 179–80.

180. See DAVID H. GETCHES, LAWRENCE J. MACDONNELL & TERESA A. RICE, *CONTROLLING WATER USE: THE UNFINISHED BUSINESS OF WATER QUALITY PROTECTION* 97 (1991) (providing an excellent examination of the state of water quantity and quality integration at the time of the decision).

181. See *id.* at 4–5, 92–93.

By this time, the polarization of Bay-Delta interests was intense, and both environmental interests and water users trashed the Board's draft decision.¹⁹⁵ It was quickly withdrawn.¹⁹⁶ Chastised, the Board punted.¹⁹⁷ In 1991, it issued a final decision that set stringent water quality standards for the Delta, but that avoided mandatory flow releases.¹⁹⁸ At this point, EPA and the Department of Interior intervened. The initiative passed from the state to the federal government, which embraced the newly emerging theory of place-based consensus stakeholder solutions.¹⁹⁹

B. *The Clean Water Act Helps Drive Collaboration, for a Time*

I. State Inaction Triggers Federal Action

Declaring the law is one thing. Enforcing it is another. The implementation of controversial judicial decisions by political actors is often a major stumbling block,²⁰⁰ and so it proved with the *Racanelli* decision. The Board was reluctant to set water quality standards that would modify major water entitlements.²⁰¹ Joint federal-state control of the Delta slipped away in the midst of a five-year drought as federal environmental laws took center stage.

In 1993, the federal government listed the Delta smelt as a threatened species under the ESA.²⁰² To bolster the ESA's protections, EPA threatened to exercise its CWA authority to impose stringent Delta water quality standards. In 1994, in the midst of a drive by the new Republican majority in the House of Representatives to weaken the ESA, the federal government cobbled together a major federal-state-stakeholder initiative, known as Cal-Fed, to "fix the broken Delta."²⁰³

Understanding the role the CWA played in Cal-Fed requires familiarity with the framework of water pollution law in California. The state's Porter-Cologne Water Quality Control Act²⁰⁴ makes the SWRCB responsible for formulating water quality control policy²⁰⁵ and implementing

the CWA.²⁰⁶ The modern Board's charge is "comprehensive planning and allocation of [surface] waters" within the state.²⁰⁷ The California legislature has directed that

activities and factors which may affect the quality of the waters of the state shall be regulated to attain the highest water quality which is reasonable, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible.²⁰⁸

Responsibility for most detailed water quality planning, permit issuance, and identification of impaired waters has been delegated to nine Regional Water Quality Control Boards ("Regional Boards").²⁰⁹ Regional Boards are required to adopt water quality control plans,²¹⁰ subject to review by the State Board.²¹¹ The State Board also has independent water quality planning authority; any plan it adopts supercedes any conflicting Regional Board plan.²¹² The State Board has made a practice of issuing its own plans for the Delta, covering the effects of water supply operations.²¹³ The plans, whether issued at the State or Regional Board level, must include "water quality objectives" (the state's terminology for water quality standards) sufficient to reasonably protect the water's beneficial uses²¹⁴ and a program to achieve those objectives.²¹⁵

To comply with the CWA, state designated uses must include all existing uses²¹⁶ in several specified categories, including "propagation of fish and wildlife."²¹⁷ EPA encourages states to divide ecosystem-protection uses more finely,²¹⁸ and California has done so. Under state law, beneficial uses for water quality planning purposes "include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves."²¹⁹ Beneficial uses designated in the state's various water quality plans include a range of specific ecosystem and ecosystem-service-focused functions, such as: commercial, sport, and subsistence fishing; shellfish harvesting; aquaculture; water quality enhancement; flood attenuation; freshwater, estuarine, inland saline, marine, and wetland habitat; preservation of areas of special biological significance; preservation of rare, threatened, or

195. *See id.*

196. *See id.*

197. *See id.*

198. Decision No. 1485, *supra* note 168, at 10.

199. *See* Hanemann & Dyckman, *supra* note 8, at 720.

200. A famous example is *Worcester v. Georgia*, 31 U.S. 515 (1832), in which Chief Justice John Marshall rejected the state's assertion of sovereignty on Cherokee lands. President Andrew Jackson is supposed to have reacted with the derisive statement, "John Marshall has made his decision. Now let him enforce it." Kathleen Sands, *Territory, Wilderness, Property, and Reservation: Land and Religion in Native American Supreme Court Cases*, 36 AM. IND. L. REV. 253, 310 n.267 (2012). There is no evidence that Jackson actually made this statement, *see* Andrew Jackson: On Indian Removal, ENCYCLOPEDIA BRITANNICA, INC., <http://www.britannica.com/presidents/article-9116896> (last visited Apr. 11, 2013), but he did successfully resist Marshall's Native American jurisprudence, Sands, *supra* at 297.

201. A. DAN TARLOCK ET AL., WATER RESOURCES MANAGEMENT: A CASEBOOK IN LAW AND PUBLIC POLICY 753 (6th ed. 2009).

202. Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Delta Smelt, 58 Fed. Reg. 12854 (Mar. 5, 1993) (codified at 50 C.F.R. pt. 17).

203. TARLOCK, WATER RESOURCES MANAGEMENT, *supra* note 201, at 753–60 (tracing the origins of Cal-Fed).

204. CAL. WATER CODE §§ 13000–16104 (West 2012).

205. *Id.* § 13140.

206. *Id.* § 13160.

207. *Nat'l Audubon Soc'y v. Superior Court*, 658 P.2d 709, 726 (Cal. 1983).

208. CAL. WATER CODE § 13000.

209. *See id.* §§ 13200–275 (describing the composition and functions of Regional Boards).

210. *Id.* § 13240.

211. *Id.* § 13245.

212. *Id.* § 13170.

213. 1995 WATER QUALITY CONTROL PLAN, *supra* note 17, at 8.

214. CAL. WATER CODE § 13241 (West 2012).

215. *Id.* § 13242.

216. Existing uses, according to EPA regulations, include any uses that have been attained since November 28, 1975. 40 C.F.R. § 131.3(e) (2012).

217. CWA § 303(c)(2)(A), 33 U.S.C. § 1313(c)(2)(A) (2006).

218. 40 C.F.R. § 131.10(c); 2.3 *Use Subcategories*—40 CFR 131.10(c), in *Water Quality Handbook—Chapter 2: Designation of Uses* (40 CFR 131.10), U.S. ENVTL. PROT. AGENCY, <http://water.epa.gov/scitech/swguidance/standards/handbook/chapter02.cfm#section3> (last updated Aug 1, 2012).

219. CAL. WATER CODE § 13050(f).

endangered species; migration of aquatic organisms; and spawning, reproduction, and/or early development of aquatic organisms.²²⁰

California law requires only “reasonable” protection of beneficial uses, considering economic as well as other factors.²²¹ The CWA, however, is less flexible. As interpreted by EPA, it mandates that water quality standards protect the most sensitive designated use.²²² Water quality standards are established based on criteria—or, in California’s terminology “objectives”—that will protect the uses. EPA has established reference criteria for many pollutants,²²³ but states may also choose to adopt their own criteria, so long as they are scientifically defensible.²²⁴ California’s water quality plans include both numeric and narrative objectives covering such ecosystem-protection factors as dissolved oxygen, pesticides, pH, sediment, temperature, and turbidity.²²⁵ EPA does not produce criteria for minimum flows, but California water quality planning documents have included flow objectives since at least the 1960s.²²⁶

Unlike EPA’s, the state’s regulatory authority extends beyond point sources. The regional boards have statutory authority to regulate any discharge of waste “that could affect the quality of the waters of the state,” regardless of its source.²²⁷ In general, discharges are forbidden unless permitted by the boards through issuance of “waste discharge requirements.”²²⁸ The requirement for individual discharge approval, however, can be waived.²²⁹ Historically, the boards issued waivers for nonpoint sources, such as timber and agricultural operations, with few conditions and no oversight.²³⁰ Beginning in 1999, however, the state legislature imposed a series of new restrictions on waivers. Currently, the Board cannot issue a waiver without an affirmative finding that it is in the public interest. Waivers must be reconsidered every five years, and generally must require monitoring.²³¹

Importantly, the State Board’s authority is not limited to regulating water pollution. It also has responsibility for administering the state’s surface water rights permitting system.²³² In addition to ruling on applications for new water

rights or for modification of existing rights, the Board has both the right and the duty to supervise existing rights.²³³ In the *Mono Lake* decision,²³⁴ the California Supreme Court declared that water rights are subject to public trust restrictions and that the Board has continuing supervisory power to ensure that public trust interests are protected to the extent feasible.²³⁵ That power is most necessary when (as in *Mono Lake* itself) the initial allocation has been made without regard to public trust values, but it is not limited to those circumstances. As the court put it:

In exercising its sovereign power to allocate water resources in the public interest, the state is not confined by past allocation decisions which may be incorrect in light of current knowledge or inconsistent with current needs. The state accordingly has the power to reconsider allocation decisions even though those decisions were made after due consideration of their effect on the public trust.²³⁶

A few years later, in the *Racanelli* decision, the California Court of Appeal squarely concluded that the Board enjoys authority to modify water rights, including those held by the federal and state governments for the CVP and SWP, in order to achieve water quality objectives.²³⁷ Furthermore, relying on *Mono Lake*, the court clarified that those objectives can, indeed must, protect all the beneficial uses enumerated by the legislature, including preservation of fish, wildlife, and other aquatic resources.²³⁸ Beneficial uses, however, need only be “reasonably” protected, not absolutely.²³⁹ Accordingly, the *Racanelli* court, echoing the California Supreme Court many years earlier, endorsed the Board’s determination that the Projects need not provide the high flows needed to meet salinity standards at Antioch.²⁴⁰

EPA’s gradually more aggressive implementation of the CWA was an important driving force behind the Cal-Fed experiment.²⁴¹ As it had been since the 1920s, the key water quality issue was salinity.²⁴² But, whereas the earlier salinity concerns had focused on protecting agricultural, municipal, and industrial uses, since the 1960s, state-federal conflict over Bay-Delta salinity has been primarily about ecosystem protection.²⁴³

The state’s efforts have been marked by consistent delay and procrastination, received by federal authorities with increasing impatience. In 1967, when the state first transmitted water quality standards for the Bay-Delta, the Department

220. JON B. MARSHACK, STATE WATER RES. CONTROL BD., CAL. ENVTL. PROT. AGENCY, A COMPILATION OF WATER QUALITY GOALS 4–5 (16th ed. 2011), available at http://www.waterboards.ca.gov/water_issues/programs/water_quality_goals/docs/wq_goals_text.pdf.

221. CAL. WATER CODE § 13241.

222. See 40 C.F.R. § 131.11(a)(1) (2012).

223. See *id.* § 131.11; *Water Quality Handbook—Chapter 3: Water Quality Criteria* (40 C.F.R. 131.11), U.S. ENVTL. PROT. AGENCY, <http://water.epa.gov/scitech/swguidance/standards/handbook/chapter03.cfm> (last updated Feb. 14, 2013).

224. See 40 C.F.R. § 131.11.

225. MARSHACK, *supra* note 220, at 7.

226. See STATE WATER RES. CONTROL BD., CAL. ENVTL. PROT. AGENCY, WATER QUALITY CONTROL PLAN: SACRAMENTO-SAN JOAQUIN RIVER AND SUISUN MARSH, at IV-7 to IV-10 (1978) [hereinafter 1978 WATER QUALITY CONTROL PLAN].

227. CAL. WATER CODE § 13260(a) (West 2012).

228. *Id.* § 13264.

229. *Id.* § 13269.

230. Lee N. Smith & Loren J. Harlow, *Regulation of Nonpoint Source Agricultural Discharge in California*, 26 NAT. RESOURCES & ENV’T 28, 28, 30 (2011); STATE WATER RES. CONTROL BD., CAL. ENVTL. PROT. AGENCY, IRRIGATED LANDS REGULATORY PROGRAM (n.d.), available at http://www.waterboards.ca.gov/water_issues/programs/agriculture/docs/about_agwaivers.pdf.

231. CAL. WATER CODE § 13269.

232. See *id.* § 174.

233. *The Water Rights Process*, STATE WATER RES. CONTROL BD., CAL. ENVTL. PROT. AGENCY, http://www.waterboards.ca.gov/waterrights/board_info/water_rights_process.shtml (last visited Apr. 11, 2013).

234. Nat’l Audubon Soc’y v. Superior Court, 658 P.2d 709 (1983).

235. *Id.* at 726–27.

236. *Id.* at 728.

237. United States v. State Water Res. Control Bd., 227 Cal. Rptr. 161, 185, 187 (Ct. App. 1986).

238. *Id.* at 148–51.

239. *Id.* at 122.

240. Antioch diverters were not left high and dry by this decision. The Projects had offered to provide a substitute freshwater supply, an approach that protected Antioch’s water supply at far lower cost in Project water. *Id.* at 133–34.

241. See Elizabeth Ann Rieke, *The Bay-Delta Accord: A Stride Toward Sustainability*, 67 U. COLO. L. REV. 341, 355 (1996).

242. See Hanemann & Dyckman, *supra* note 8, at 721.

243. See *id.*

of Interior, which at that time was in charge of implementing federal water pollution law, proposed additional standards for chloride and total dissolved solids.²⁴⁴ Interior eventually approved the state's standards without those requested additions based on the state's commitment to revise its salinity standards by 1970.²⁴⁵

Those standards turned out to be much longer in coming, however, and were unimpressive when they arrived. In 1978, the State Board adopted a new Water Quality Control Plan for the Bay-Delta ("Delta Plan").²⁴⁶ Again, federal officials were not convinced the Delta Plan did enough to protect the aquatic ecosystem, but again they approved it, conditioned on the state's agreement to make needed revisions if indicators of fish health declined.²⁴⁷ Despite those promises, and notwithstanding continued declines in the indicators, periodic urging by EPA, and its own acknowledgment that the standards were inadequate to protect the estuary's fish, the State Board continued to drag its heels on tightening salinity standards.²⁴⁸ Meanwhile, the ecosystem's decline accelerated. By the early 1990s, three fish species were listed under the federal ESA and all the major fish species of the Delta were in decline.²⁴⁹ Finally, in 1991, the State Board revised the Delta Plan, slightly changing the standards for salinity, dissolved oxygen, and temperature.²⁵⁰ Those changes, however, did not satisfy EPA. Concluding that the salinity and temperature standards remained inadequate to protect the Bay-Delta's designated fish and wildlife uses, EPA disapproved those parts of the Delta Plan.²⁵¹ After the State Board's next attempt at revising the Plan also fell short, EPA, prodded by litigation,²⁵² eventually proposed,²⁵³ and ultimately adopted,²⁵⁴ federal standards, as the CWA requires.²⁵⁵

The final federal standards required that the low salinity zone, essentially the transition between salt and fresh water, be maintained at specified locations in Suisun Bay beyond the western Delta during the spring months in order to protect the designated Estuarine Habitat.²⁵⁶ EPA also set performance standards to protect the Fish Migration and Cold Freshwater Habitat designated uses.²⁵⁷ Rather than

specify conditions believed to support successful passage, EPA framed its fish migration standard in terms of an index of survival of salmon smolts passing through the Delta.²⁵⁸ Although EPA derived the standard from a set of management measures proposed by the U.S. Fish and Wildlife Service to protect salmon populations, EPA's framing intentionally left the state free to implement the standard through any combination of management measures that would produce the desired outcome.²⁵⁹

2. An Attempt at Collaboration

EPA's 1991 disapproval of the Delta Plan was a shot across the state's bow. It came as the federal agencies were negotiating a coordinated approach to Bay-Delta issues, which seemed to threaten the state's management primacy,²⁶⁰ and as the National Marine Fisheries Service ("NMFS") was developing its first ESA biological opinion on the operations of the CVP.²⁶¹ Fear on the state side of losing control of water resource management, coupled with uncertainty on the federal side about the scope of legal authority to force water reallocation (and no doubt concern about the political consequences of testing those waters),²⁶² triggered the Cal-Fed experiment, a short-lived attempt at state-federal cooperative ecosystem management in the Bay-Delta.

Cal-Fed was based on an agreement between the state and federal water operations and environmental protection agencies with authority in the Bay-Delta. In the June 1994 "Bay-Delta Accord," state and federal officials agreed to cooperate on water project operations, water quality standard setting, and development of a long-term management strategy.²⁶³ Negotiating that long-term agreement took five years; its lifetime was shorter than its gestation period.²⁶⁴

One expectation of the Cal-Fed agreement was that the process would, in EPA's words, "lead to approvable state standards for protecting the designated uses in the Bay/Delta estuary," which would then replace EPA's standards.²⁶⁵ EPA's standard-setting process, already underway and with litigation-driven deadlines, continued in parallel with a stakeholder negotiation process.²⁶⁶ In December 1994, that process produced agreement on export limits and the location of the "X2" saltwater to freshwater transition zone in Suisun Bay.²⁶⁷ Those principals, together with EPA's agree-

244. 1978 WATER QUALITY CONTROL PLAN, *supra* note 226, at IV-3.

245. *Id.*

246. *Id.* at I-2.

247. Water Quality Standards for Surface Waters of the Sacramento River, San Joaquin River, and San Francisco Bay and Delta of the State of California, 59 Fed. Reg. 810, 811 (proposed Jan. 6, 1994) (to be codified at 40 C.F.R. pt. 131).

248. *Id.*

249. *Id.*

250. *Id.* at 812.

251. *Id.*

252. Rieke, *supra* note 241, at 355-56.

253. *Id.*

254. Water Quality Standards for Surface Waters of the Sacramento River, San Joaquin River, and San Francisco Bay and Delta of the State of California, 60 Fed. Reg. 4664, 4683 (Jan. 24, 1995) (codified at 40 C.F.R. pt. 131).

255. CWA § 303(c)(4), 33 U.S.C. § 1313(c)(4) (2006).

256. Low salinity was defined in the rule as two ppt, representing the mixing zone between salt water, which typically contains about thirty ppt, and fresh water, which usually has less than one ppt. Water Quality Standards for Surface Waters of the Sacramento River, San Joaquin River, and San Francisco Bay and Delta of the State of California, 60 Fed. Reg. at 4671 & n.10. The two ppt isohaline remains a crucial element not only of water quality standards but also of the Endangered Species Act ("ESA") biological opinions for water project operations. It is commonly referred to these days as "X2." *Id.*

257. *Id.* at 4681-82.

258. *Id.* at 4683-85.

259. *Id.* at 4683.

260. Jody Freeman & Daniel A. Farber, *Modular Environmental Regulation*, 54 DUKE L.J. 795, 840 (2005).

261. NAT'L MARINE FISHERIES SERV., NAT'L OCEANIC & ATMOSPHERIC ADMIN., BIOLOGICAL OPINION FOR THE OPERATION OF THE FEDERAL CENTRAL VALLEY PROJECT AND THE CALIFORNIA STATE WATER PROJECT 1-2 (1993), available at http://www.science.calwater.ca.gov/pdf/workshops/SP_workshop_ocap_CVP-SWP_021293.pdf.

262. Rieke, *supra* note 241, at 355-56.

263. *Id.*

264. Freeman & Farber, *supra* note 260, at 843.

265. Water Quality Standards for Surface Waters of the Sacramento River, San Joaquin River, and San Francisco Bay and Delta of the State of California, 60 Fed. Reg. 4664, 4667 (Jan. 24, 1995) (codified at 40 C.F.R. pt. 131).

266. Rieke, *supra* note 241, at 362-63.

267. CALFED BAY-DELTA PROGRAM, PRINCIPLES FOR AGREEMENT ON BAY-DELTA STANDARDS BETWEEN THE STATE OF CALIFORNIA AND THE FEDERAL

ment “to withdraw Federal standards pursuant to the Clean Water Act when the SWRCB adopts a final plan consistent with these Principles,”²⁶⁸ became the basis for State Board revisions of the Delta Plan.²⁶⁹

The new Plan was issued in May 1995. Its focus was a new set of water quality objectives for the fish and wildlife uses of the Bay-Delta.²⁷⁰ Not surprisingly, it concentrated on flow criteria and water project operations, although the Board contended those were not subject to EPA approval.²⁷¹ In September, EPA approved the 1995 Delta Plan.²⁷² EPA did not, however, immediately withdraw its own standards.²⁷³ The State Board’s 1995 Delta Plan established new water quality objectives, but the objectives needed to be implemented through a water rights proceeding.²⁷⁴ That proceeding, which culminated in Water Rights Decision D 1641, was not completed until March 2000.²⁷⁵ Six years later, the California Appellate Court ruled that D 1641 failed to adequately implement several of the flow and salinity objectives of the 1995 Delta Plan.²⁷⁶ Cal-Fed had failed to produce a viable water quality plan.

C. *After Things Fall Apart, Can the CWA Help Put Them Back Together?*

It is easy to criticize Cal-Fed. In retrospect, its premise appears naive. Cal-Fed’s architects assumed that a stakeholder process could produce a win-win management solution for the Bay-Delta that would be accepted by environmentalists and farmers alike. Everyone, it was promised, could “get better together.”²⁷⁷ Cal-Fed would restore the Bay-Delta’s ecological health while making more water available to irrigators.²⁷⁸ Reducing conflict among stakeholders, and the attendant litigation, was explicitly identified as one of the program’s key goals.²⁷⁹

The problem, of course, is that, ultimately, fights for limited resources are unlikely to produce true win-win solutions. Hamstrung by expectations that it could please all constituencies, Cal-Fed exalted process over substance and never faced the fundamental fact that restoration of the ecosystem’s health required cutbacks in irrigation water deliveries. Its focus on reducing conflict kept it from doing what Australia

has begun to do in the similarly stressed Murray-Darling Basin: set environmental outcomes.²⁸⁰

Not surprisingly, Cal-Fed failed to produce the results it had promised. As one commentator puts it, a program premised on increasing water supply and improving ecosystem conditions “might succeed if brilliantly implemented by resourceful and well-funded managers, and under relatively benign and stable environmental conditions, but its chances of failure seem uncomfortably large.”²⁸¹ Cal-Fed failed as an ecosystem protection strategy, as a program for ensuring water reliability, and as an institutional innovation. By 2005, the fragile truce Cal-Fed had forged among competing Delta interests had fractured. The state of the ecosystem was worse than ever; fish populations were in dramatic decline.²⁸² Water quality had not improved.²⁸³ Both water users and environmentalists, frustrated by Cal-Fed’s failure to fulfill its lofty promises, had resorted once again to the courts.²⁸⁴ Political support and funding both evaporated.²⁸⁵

State efforts to restore the Bay-Delta ecosystem have continued post-Cal-Fed, generating more meetings and paper than tangible progress. The SWRCB has continued its established practice of kicking the water quality can down the road. In 2006, it issued a revised Water Quality Plan for the Bay-Delta that left the tough decisions about responsibilities of water rights holders to a future water rights decision that has never materialized.²⁸⁶ The new plan maintained the contested San Joaquin flow objectives, claiming the Board lacked information to improve them.²⁸⁷ Rather than deal forthrightly with the salinity problem, the Board announced the launch of a salinity management plan with a fifty-year timeline.²⁸⁸ The seemingly endless process of revising water quality plans for the Bay-Delta continues, well behind schedule.²⁸⁹

On a separate track, as directed by the legislature in 2009, the SWRCB has completed a study of the flows needed to support public trust resources in the Bay-Delta.²⁹⁰ Although SWRCB has emphasized that this study has no direct regula-

GOVERNMENT 1 (1994), available at http://www.calwater.ca.gov/Admin_Record/G-000143.pdf.

268. *Id.* at 5.

269. 1995 WATER QUALITY CONTROL PLAN, *supra* note 17, at 6–7.

270. *Id.* at 3–4.

271. *Id.* at 3.

272. DAVID NAWI & JEANETTE MACMILLAN, AUTHORITY AND EFFECTIVENESS OF THE STATE WATER RESOURCES CONTROL BOARD 23 (2008).

273. *Id.*

274. *See id.*

275. *Id.*; In the Matter of: Implementation of Water Quality Objectives for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary, Decision No. 1641, at 23 (State Water Res. Control Bd., Mar. 15, 2000), available at <http://www.waterrights.ca.gov/Decisions/D1641rev.pdf>.

276. State Water Res. Control Bd. Cases, 39 Cal. Rptr. 3d 189, 201 (Ct. App. 2006).

277. LUND ET AL., *supra* note 111, at 87.

278. CALFED BAY-DELTA PROGRAM, PROGRAMMATIC RECORD OF DECISION 9–10 (2000), available at <http://calwater.ca.gov/content/Documents/ROD.pdf>.

279. *Id.* at 9.

280. *Water Act 2007* (Cth) ss 3–4 (Austl.).

281. Owen, *supra* note 10, at 1201.

282. LITTLE HOOVER COMM’N, STILL IMPERILED, STILL IMPORTANT: THE LITTLE HOOVER COMMISSION’S REVIEW OF THE CALFED BAY-DELTA PROGRAM 33 (2005); LUND ET AL., *supra* note 111, at 87; Owen, *supra* note 10, at 1202–03.

283. LITTLE HOOVER COMM’N, *supra* note 282, at 32.

284. LUND ET AL., *supra* note 111, at 88; Owen, *supra* note 10, at 1202–03.

285. Owen, *supra* note 10, at 1204.

286. GITA KAPAH ET AL., STATE WATER RES. CONTROL BD., CAL. ENVTL. PROT. AGENCY, WATER QUALITY CONTROL PLAN FOR THE SAN FRANCISCO BAY/SACRAMENTO-SAN JOAQUIN DELTA ESTUARY 3 (2006).

287. *Id.* at 6.

288. *Id.*

289. *See* U.S. ENVTL. PROT. AGENCY, WATER QUALITY CHALLENGES IN THE SAN FRANCISCO BAY/SACRAMENTO-SAN JOAQUIN DELTA ESTUARY: EPA’S ACTION PLAN 8 (2012); Letter from Thomas Howard, Exec. Dir., State Water Res. Control Bd., Cal. Envtl. Prot. Agency, to Gerald H. Meral, Deputy Dir., Cal. Natural Res. Agency (Dec. 19, 2011) [hereinafter Howard Letter] (on file with author).

290. PHIL CRADER ET AL., STATE WATER RES. CONTROL BD., CAL. ENVTL. PROT. AGENCY, DEVELOPMENT OF FLOW CRITERIA FOR THE SACRAMENTO-SAN JOAQUIN DELTA ECOSYSTEM 2 (2010), available at http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/deltaflow/docs/final_rpt080310.pdf.

tory consequence,²⁹¹ it will certainly have to be considered in setting future flow objectives and in the regulatory decisions of other state and federal agencies with authority over Bay-Delta resources. The report's key conclusion is unsurprising: "Recent Delta flows are insufficient to support native Delta fishes for today's habitats."²⁹² In fact, recent flows do not come close to what is needed. The SWRCB believes that preservation of the system and its native fish would require flows on the order of seventy-five percent of unimpaired (i.e., pre-project) Delta outflows from January through June; seventy-five percent of unimpaired Sacramento River inflow from November through June; and sixty percent of unimpaired San Joaquin River inflow from February through June.²⁹³ Over the last twenty years, Delta outflows in dry years have been only about thirty percent of unimpaired levels, late spring Sacramento River inflows have averaged only about fifty percent of unimpaired levels, and San Joaquin River inflows have been only twenty percent of unimpaired levels in dry years.²⁹⁴

The state has tried to replace Cal-Fed's coordination function by creating a new Delta planning body. In 2009, the legislature enacted a series of water reform bills, including the Delta Reform Act, creating a new Delta Stewardship Council²⁹⁵ as the successor to the Bay-Delta Authority, the state arm of Cal-Fed. But there is still no mechanism at the state level for making the tough trade-offs, and questions about overlapping and competing agency authorities have not been answered. The Delta Reform Act declares that the state has "two coequal goals" in the Delta: "providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem."²⁹⁶ It directs the Council to develop and implement a Delta Plan to further those coequal goals,²⁹⁷ but does not indicate how any conflicts between the goals are to be resolved. The Act does not specify how the Delta Plan would interact with other Delta management efforts, such as the State Water Board's water quality plans for the Delta.

Meanwhile, a separate state-federal effort to harmonize water project operations with the ESA is on the brink of dissolving. The Bay Delta Conservation Plan ("BDCP") is intended to support the issuance of long-term incidental take permits for the water projects under state and federal endangered species acts.²⁹⁸ In other words, the BDCP is supposed to insulate the water projects from liability under those laws, reducing the threat that courts might order pumping reductions. The BDCP has been under negotiation for more than six years by a group of stakeholders including state and federal

officials, water users, and environmental groups.²⁹⁹ Although neither the complete BDCP nor the accompanying environmental analysis is yet available, state and federal authorities have already announced their support for the peripheral tunnel (or, as they now prefer to call it, "isolated conveyance") at the heart of the plan.³⁰⁰ Partial drafts of the BDCP have been criticized by scientific reviewers,³⁰¹ environmental groups,³⁰² local governments,³⁰³ and politicians representing the Delta region.³⁰⁴ The relationship of the BDCP to the Delta Plan is unclear. The Delta Reform Act directs the Delta Stewardship Council to consider including the BDCP in the Delta Plan, and sets some standards the BDCP would have to meet in order to be included.³⁰⁵ The Act does not, however, clarify what significance the decision to incorporate the BDCP in the Plan or leave it out would have. The State Water Board has made it clear that it will exercise its own independent authority and judgment to the extent its permission is needed to put the BDCP into effect.³⁰⁶

After turning its attention away from the Bay-Delta during the George W. Bush years, the federal government has reengaged with ecosystem restoration efforts in the region. In 2009, six federal agencies signed a Memorandum of Understanding, promising "aggressive and coordinated" efforts to address California water issues.³⁰⁷ The federal government has certainly been engaged, with the Fish and Wildlife Service and NMFS working closely with the state in development of the BDCP, and EPA issuing an Action Plan for the Bay-Delta.³⁰⁸ It is less clear that federal efforts in the Delta have been effectively coordinated. As NRDC's Barry Nelson pointed out in a blog post, the BDCP, which has been publicly endorsed by the Secretary of Interior, appears to be proceeding down a path inconsistent with EPA's Action Plan.³⁰⁹

291. As the agency notes repeatedly, the study looks only at the needs of the environment, whereas its regulatory process considers all competing beneficial uses. *Id.* at Note to Readers, 2–4.

292. *Id.* at 5.

293. *Id.*

294. *Id.*

295. Delta Reform Act, S. X7-1, 2009–10 Leg., 7th Extraordinary Sess. § 39 (Cal. 2009) (codified as amended at CAL. WATER CODE § 85,200 (2012)).

296. *Id.* at § 1 (codified as amended at CAL. PUB. RES. CODE § 29702(a) (2012)).

297. CAL. WATER CODE § 85,300(a) (2012).

298. *Purpose and Approach*, BAY DELTA CONSERVATION PLAN, <http://baydeltaconservationplan.com/BDCPPlanningProcess/AboutTheBDCP/PurposeandApproach.aspx> (last visited Apr. 11, 2013).

299. *About the BDCP*, BAY DELTA CONSERVATION PLAN, <http://baydeltaconservationplan.com/BDCPPlanningProcess/AboutTheBDCP.aspx> (last visited Apr. 11, 2013).

300. Steven Harmon, *Gov. Jerry Brown Fires First Shot in New Water War*, MERCURYNEWS.COM (July 25, 2012), http://www.mercurynews.com/california/ci_21160597/gov-jerry-brown-fires-first-shot-new-water.

301. DELTA SCI. PROGRAM, BAY DELTA CONSERVATION PLAN (BDCP) EFFECTS ANALYSIS CONCEPTUAL FOUNDATION AND ANALYTICAL FRAMEWORK AND ENTAINMENT APPENDIX 6 (2012); NAT'L RESEARCH COUNCIL, A REVIEW OF THE USE OF SCIENCE AND ADAPTIVE MANAGEMENT IN CALIFORNIA'S DRAFT BAY DELTA CONSERVATION PLAN 3 (2011).

302. Dan Bacher, *Fishermen, Tribal Members and Enviro Blast Brown Tunnel Plan*, ALTERNET (July 26, 2012), <http://blogs.alternet.org/danbacher/2012/07/26/fishermen-tribal-members-and-enviro-blast-brown-tunnel-plan/>.

303. Dan Bacher, *Sacramento County Opposes Plan to Build Peripheral Tunnels*, CALITICS (Aug. 28, 2012, 7:00 PM), <http://www.calitics.com/diary/145331/sacramento-county-opposes-plan-to-build-peripheral-tunnels>.

304. Harmon, *supra* note 300; Press Release, U.S. Rep. John Garamendi, At Sacramento Rally, Garamendi Highlights Serious Flaws in the Current Bay Delta Conservation Plan Proposal (July 25, 2012), *available at* <http://garamendi.house.gov/press-release/sacramento-rally-garamendi-highlights-serious-flaws-current-bay-delta-conservation>.

305. CAL. WATER CODE § 85320 (West 2012).

306. Howard Letter, *supra* note 289.

307. U.S. DEP'T OF THE INTERIOR ET AL., *supra* note 108, at 2.

308. U.S. DEP'T OF THE INTERIOR ET AL., INTERIM FEDERAL ACTION PLAN STATUS UPDATE FOR THE CALIFORNIA BAY-DELTA: 2011 AND BEYOND 9 (2010), *available at* <http://www.doi.gov/news/pressreleases/loader.cfm?csModule=security/getfile&PageID=104334>; *Bay Delta Action Plan*, U.S. ENVT'L PROT. AGENCY, <http://www.epa.gov/sfbay-delta/actionplan.html> (last updated Jan. 18, 2013).

309. Barry Nelson, *BDCP Ignores New EPA Bay-Delta Action Plan*, SWITCHBOARD NATURAL RES. DEF. COUNCIL STAFF BLOG (Sept. 4, 2012), http://switchboard.nrdc.org/blogs/bnelson/bdcp_ignores_new_epa_bay-delta.html.

While all this maneuvering continues, the ecosystem is still suffering.³¹⁰ A recent report card issued by the San Francisco Estuary Partnership concludes that native fish species are in trouble throughout the system.³¹¹ Species dependent on estuarine conditions, including, but not limited to, the endangered species, have experienced the most extreme recent declines.³¹² As EPA has recognized, “[d]espite much ongoing activity, CWA programs are not adequately protecting Bay Delta Estuary aquatic resources”³¹³

Could the CWA do better? The next Part explores why the CWA has been more effective in the Bay-Delta than in many other locations, why it has still fallen short as an ecosystem protection and restoration law, and whether its performance can be improved.

IV. The Elements of Success

The Bay-Delta case study indicates that the CWA can be a more important force for aquatic ecosystem protection than is sometimes recognized. But it also highlights the barriers to ecosystem protection that remain, even in this “best case.” It therefore offers both positive and negative lessons.

A. What’s Gone Right

The major advantage in the Bay-Delta is that all the necessary institutional and legal elements are in place, at least on paper. CWA-based ecosystem protection *should* work in this setting. Three key elements distinguish it from so many situations in which the CWA necessarily falls short.

First, the geography is favorable. The Sacramento-San Joaquin watershed lies entirely within the boundaries of California. That makes the problem of overlapping jurisdiction much simpler than in watersheds that cross many state lines, like the Mississippi River. Dealing with the problems of the Bay-Delta requires the cooperation of only two government partners, the state of California and the United States.

Second, the state partner is, at least relative to other states, committed to environmental protection. Public opinion in California leans strongly toward government action to address environmental problems,³¹⁴ and the state has often

been well ahead of the federal government in adopting environmental protection laws.³¹⁵ State willingness to recognize and address water quality problems is crucial to the success of aquatic ecosystem restoration efforts because the CWA provides few tools to force states to deal with water quality problems from nonpoint source pollution or excessive diversions.

Third, California’s legal landscape and institutional architecture provide the tools that are missing from the CWA to integrate water quality and water allocation. A major limitation of the CWA is that it unrealistically separates the water quality problem from the water quantity problem. In reality, of course, quality and quantity are intimately and unavoidably linked, and both are essential to maintaining aquatic ecosystems. Reduced flows mean higher pollutant concentrations at the same input level, warmer temperatures and reduced dissolved oxygen levels, and, at the extreme, the “dewatering” of streams, leaving dry stretches.³¹⁶ The CWA, however, focuses on the addition of pollutants, leaving control over the removal of water almost entirely up to the states.

California is unique among the western states in the extent to which it integrates management of water quality and water quantity. The SWRCB bears responsibility both for the issuance and oversight of water rights and for setting state-level policy with respect to limitation of water pollution.³¹⁷ Those functions are not perfectly integrated, of course. Different divisions of the State Board carry them out.³¹⁸ Having them within the same organization, however, is unusual in the west.³¹⁹ At a minimum, the fact that both are within the Board’s jurisdiction means that the Board’s governing body cannot avoid being aware of the connections between water quality and quantity.

That awareness should, under California law, factor into decisions about water rights as well as into more traditional pollution control decisions. Water rights have long prevailed over water quality in the West.³²⁰ In many states, that hierarchy is expressly written into law: water quality protection measures must not impair, interfere with, or modify water

310. See, e.g., CRADER ET AL., *supra* note 290, at 1 (noting that degradation of the Delta ecosystem continues).

311. S.F. ESTUARY P’SHIP, THE STATE OF SAN FRANCISCO BAY 2011, at 44–45 (2011).

312. *Id.*

313. U.S. ENVTL. PROT. AGENCY, WATER QUALITY CHALLENGES, *supra* note 289, at 7.

314. MARK BALDASSARE ET AL., PUB. POLICY INST. OF CAL., PPIC STATEWIDE SURVEY: CALIFORNIANS & THE ENVIRONMENT 20 (2011), available at http://www.ppic.org/content/pubs/survey/s_711mbs.pdf. Two-thirds of California voters who decline to state their party preference consider themselves conservationists and view environmental regulations in a favorable light. TULCHIN RESEARCH: POLLING & STRATEGIC CONSULTING, CALIFORNIA DECLINE-TO-STATE (DTS) VOTERS SHOW STRONG PROGRESSIVE, PRO-ENVIRONMENT STANCE 1 (2011), available at <http://www.ecovote.org/sites/default/files/CLCVEF%20DTS%20Survey%20Findings.pdf>. In 2010, during the depths of an economic recession that hit the state hard, California voters soundly defeated an oil-industry funded ballot initiative that would have suspended the state’s greenhouse gas emission law. Margot Roosevelt, *Prop 23 Battle Marks New Era in Environmental Politics*, L.A. TIMES (Nov. 4, 2010), <http://articles.latimes.com/2010/nov/04/local/la-me-global-warming-20101104>.

315. California’s leadership is most widely recognized in the context of air pollution from mobile sources, where the state has for decades led the way to progressively tighter federal standards. Ann Carlson, *Iterative Federalism and Climate Change*, 103 NW. U. L. REV. 1107–28 (2009). But California has also been a leader in many other areas, including regulation of pesticides, CAL. DEP’T OF PESTICIDE REGULATION, PESTICIDE REGULATION IN CALIFORNIA 1–11 (2011); coastal and marine resource management, see, e.g., STANLEY SCOTT, GOVERNING CALIFORNIA’S COAST 9–10 (1975); Deborah A. Sivas & Margaret R. Caldwell, *A New Vision for California Ocean Governance: Comprehensive Ecosystem-Based Marine Zoning*, 27 STAN. ENVTL. L.J. 209, 234–42 (2008); and water pollution, KARL BOYD BROOKS, BEFORE EARTH DAY: THE ORIGINS OF AMERICAN ENVIRONMENTAL LAW, 1945–1970, at 66–69 (2011).

316. Reed Benson, *Pollution Without Solution: Flow Impairment Problems Under Clean Water Act Section 303*, 24 STAN. ENVTL. L. J. 199, 203–04, 216 (2005).

317. See *supra* notes 241–42 and accompanying text.

318. *Water Boards’ Structure*, STATE WATER RES. CONTROL BD., CAL. ENVTL. PROT. AGENCY, http://www.swrcb.ca.gov/about_us/water_boards_structure/ (last updated July 5, 2012).

319. A handful of other states place both water pollution and water allocation authorities in a single entity, but that is distinctly a minority choice. See Adam Schempp, *At the Confluence of the Clean Water Act and Prior Appropriation: The Challenge and Ways Forward*, 43 ELR 10138, 10141 (Feb. 2013) (providing a table listing the agencies with primary water quality and water allocation authority in all western states).

320. *Id.*

rights.³²¹ In California, by contrast, water quality is supposed to prevail.³²² New water rights may not be issued unless they are in the public interest.³²³ In making that determination, the Board considers, among other things, the various beneficial uses protected by water quality plans.³²⁴ It is not just new water rights that are, at least on paper, subordinate to water quality. Existing water rights are subject to modification if necessary to achieve water quality standards.³²⁵ California water rights permits now include an explicit statement putting their holders on notice of this possibility.³²⁶ Permits are also subject to modification, if necessary, to protect public trust resources.³²⁷ Modification of water rights remains a last resort, however—available only if discharge limits alone cannot achieve water quality objectives.³²⁸

B. What's Gone Wrong

That limitation of California law encapsulates the single biggest impediment to restoring the physical, biological, and chemical integrity of the Bay-Delta ecosystem as the CWA envisions. That impediment is more a matter of politics than of law. It is the unwillingness to revise water rights, even when the legal authority, and ostensibly the legal obligation, to do so are in place. Decisions to alter existing water entitlements are never going to be easy, but they cannot be avoided if we truly want to protect our aquatic ecosystems.

In some states, the law itself stands in the way of adjusting established water rights to reflect modern environmental goals and ecosystem realities. As explained above, however, California lacks the statutory and regulatory barriers to water rights modernization that are common in other western states.³²⁹ Any time the legal status quo is changed, there will be concerns about takings liability and its potential impact on government budgets. But water rights adjustment in California is less likely to require compensation as a taking than in other states. California's strong public trust doctrine serves as a background limitation on water rights,³³⁰ and the state constitution limits water rights to water reasonably required to serve beneficial uses.³³¹ As a matter of law, therefore, California has the freedom to revise water rights to serve the modern world, in which the values of intact functional ecosystems are recognized as important and climate change imposes new hydrologic limits.

Nonetheless, political resistance poses very real barriers to that kind of adjustment. The status quo has a strong pull both on the human psyche and on the political process.³³² It is easy for academics to criticize SWRCB for its reluctance to revise water rights, but it is important to realize just how difficult those kinds of changes are for an agency that cannot be wholly divorced from political realities. The political resistance to change brings with it practical barriers. When SWRCB has undertaken water rights adjustments, the proceedings are inevitably lengthy and resource-intensive.³³³ Litigation typically follows, further extending the time line before change can become final. In addition to delay, political pressure has tended to push the agency to take the most cautious position it thinks it can defend in the courts. SWRCB has, for example, defended its refusal to revise spring pulse flow standards on the grounds that it does not yet have "conclusive" data to support change.³³⁴

Although law is not the keystone barrier to water rights modernization, it can make a difference in the ability to shift the political keystone. The state and federal processes the CWA has triggered in the Bay-Delta have changed the political landscape. For decades, California chose not to quantify and aggressively administer water rights as other western states have done. Instead, in the words of the late Frank J. Trelease,³³⁵ the state threw money at any problem that arose. California is still trying to "solve" the continuing decline of the Bay Delta by pouring more concrete. But Cal-Fed and subsequent processes have spotlighted the deficiencies in the administration of the system's unique dual system of water rights and the external environmental and other costs that the system has produced. The state has begun the slow process of identifying possible existing water rights, exploring how more water can be wrung from urban and agricultural water conservation, and remedying the externalities of decades of dams and diversions.³³⁶ The scope of this achievement should not be underestimated, but it has not yet gone far enough to reverse decades of harm to the ecosystem. More needs to be, and can be, done. The CWA has a role to play in that process, in California, and beyond.

321. The precise wording varies from state but the idea is a universal one—where they conflict, water rights prevail over water quality concerns. *Id.* at 10143.

322. See CAL. WATER CODE §§ 1253, 1255 (West 2012).

323. *Id.* § 1255.

324. *Id.* §§ 1243.5, 1257, 1258; United States v. State Water Res. Control Bd., 227 Cal. Rptr. 161, 169–70 (Ct. App. 1986).

325. *State Water Res. Control Bd.*, 227 Cal. Rptr. at 169–70.

326. CAL. CODE REGS. tit. 23, § 780 (2013).

327. Nat'l Audubon Soc'y v. Superior Court, 658 P.2d 709, 712 (Cal. 1983); *id.*

328. CAL. CODE REGS. tit. 23, § 780(b).

329. See *infra* notes 326–34 and accompanying text.

330. See generally *Nat'l Audubon Soc'y*, 658 P.2d at 709 (public trust allows State Water Resources Control Board to impose post-hoc limitations on the exercise of vested water rights which impose trust values).

331. CAL. CONST. art. X, § 2.

332. See Holly Doremus, *Takings and Transitions*, 19 J. LAND USE & ENVT'L. L. 1, 21–24 (2003) (explaining why policy inertia is more likely than policy impulsiveness).

333. Rieke, *supra* note 241, at 355.

334. STATE WATER RES. CONTROL BD., WATER QUALITY CONTROL PLAN FOR THE SAN FRANCISCO BAY/SACRAMENTO-SAN JOAQUIN DELTA ESTUARY 24. (2006).

335. The late Frank J. Trelease was the foremost water law scholar of his generation. Most of his career was spent at the University of Wyoming, but in the 1980s, health reasons forced him to move to California where he taught at the McGeorge School of Law. Professor Tarlock remembers a conversation with him shortly after his move where he expressed amazement that California did not aggressively administer its water rights to the last fraction of an acre foot, as did Colorado and Wyoming, but instead "just threw money at any water problem." For a riff on his reaction to California water rights administration, see A. Dan Tarlock, *From Natural Scarcity to Artificial Abundance: The Legacy of California Water Law and Politics*, 1 HASTINGS W.-NW. J. ENVT'L. L. & POL'Y 71, 77 (1994).

336. See, e.g., CAL. WATER CODE § 85230 (West 2012) (creating a Delta water-master responsible for monitoring water use and enforcing water rights and restrictions in the Delta).

C. Taking the Next Steps

If the nation is serious about protecting and restoring its aquatic ecosystems, it needs a stronger role in flow decisions. This, of course, is not a new suggestion. In 1998, the Western Water Policy Review Advisory Commission wrote that “[f]ulfilling the mandate of [the] CWA to protect physical and biological, as well as chemical, water quality is difficult if not impossible without” effective integration of water quality and water use management.³³⁷ The Commission also recognized the difficulty of moving to a more integrated federal policy.³³⁸ For forty years, the nation has tread softly with respect to decisions about the quantity of water that must remain in its streams, leaving those choices primarily to the states. It is not likely to reverse that stance in the next few years. We do not anticipate repeal of the Wallop Amendment, which declares, as a national policy, “that the authority of each State to allocate quantities of water within its jurisdiction shall not be superseded, abrogated or otherwise impaired by” the CWA.³³⁹

Although we do not foresee a CWA that forces reluctant states into wholesale reallocation of water rights, there are more limited and realistic steps that could make a difference in those states. We also believe EPA could do more to promote success in states, like California, which are generally trying to move ecosystem restoration forward.

I. Replicating the Positive

Some of the positive aspects of the Bay-Delta story cannot be easily translated to other contexts. As we noted above, the geographic and political landscape is unusually favorable for ecosystem protection efforts in California.³⁴⁰ Where watersheds cross multiple states, that complexity cannot be reduced. Nor is there any magic pill to make public opinion in other states take on the green shade it has in California.

The other positive element in the Bay-Delta is legal and institutional integration of water quality and quantity management. That cannot be directly mandated by the federal government, either as a legal or as a political matter.³⁴¹ EPA could do more to encourage effective integration, however. It could, for example, offer financial and technical assistance to states interested in more closely aligning their programs. As a starting point, EPA might undertake a survey of state programs seeking to identify “best practices” for integration under different large-scale structural architectures. The product of that survey could be a web-based resource that would help states identify relatively easy steps they might take. EPA could also undertake a study of the advantages offered by integration. Bureaucratic change is never as easy as it sounds, and states are understandably likely to resist it unless they see clear benefits. Identifying ways that integration can help stretch tight state budgets or improve decisions on discharge

permits over the long term could help justify the unavoidable short-term costs.

2. Improving the Negative

In California, the CWA has helped put the need for water management reform on the table. Even in the Bay-Delta—with all its positives—the CWA and the suite of other federal and state laws that have been brought to bear have not yet overcome resistance to fundamental change. Changing that outcome will require changing the political landscape, which systematically favors the status quo. EPA is using its CWA authority to that end, but it could do so more effectively. It could also do so more generally, in ways that would have effects beyond the Bay-Delta.

Even in a state with strong public support for environmental protection, it is hard to overcome the political power of the status quo. By taking an aggressive stance, EPA can take some of the political pressure off state officials, allowing them more room to take protective measures. That kind of dynamic has played out in the ESA context in California and elsewhere. A recent example is SWRCB’s adoption of regulations limiting water spraying for vineyard frost control in the Russian River Valley.³⁴² When there are late spring frosts, that spraying can dewater stretches of the Russian River, stranding young salmon.³⁴³ After NMFS became aware of strandings of listed salmon smolts, it threatened SWRCB with an enforcement action under the ESA.³⁴⁴ That gave SWRCB the motivation it needed to adopt regulations prohibiting such spraying as an unreasonable use of water unless the vineyards have an approved frost protection plan.³⁴⁵ Some of the most aggressive aspects of the regulations have been ruled invalid by a trial court,³⁴⁶ but the political point remains: SWRCB would not have felt it had the political maneuvering room to adopt the frost protection regulations without a credible push from NMFS.

The CWA does not have the “pit bull” reputation or characteristics of the ESA,³⁴⁷ particularly when it comes to flow regulation, so it cannot be used in quite the same way. But the run up to Cal-Fed shows that threats to disapprove state water quality standards and to impose federal standards can break political gridlock at the state level.³⁴⁸ EPA has been remarkably patient on Bay-Delta water standards since the

337. W. WATER POLICY REVIEW ADVISORY COMM’N, *supra* note 14, at 6–20.

338. *Id.* at xxii (noting that the CWA leaves allocation decisions to the states).

339. CWA § 101(g), 33 U.S.C. § 1251(g) (2006).

340. *See supra* Part IV.A.

341. *See supra* Part II.B.

342. *Frost Protection Regulation*, STATE WATER RES. CONTROL BD., CAL. ENVTL. PROT. AGENCY, http://www.waterboards.ca.gov/waterrights/water_issues/programs/hearings/russian_river_frost/ (last updated Jan. 3, 2012).

343. DIV. OF WATER RIGHTS, STATE WATER RES. CONTROL BD., CAL. ENVTL. PROT. AGENCY, STATE CLEARINGHOUSE NO. 2010102053, DRAFT ENVIRONMENTAL IMPACT REPORT: RUSSIAN RIVER FROST PROTECTION REGULATION 10 (2011), available at http://www.waterboards.ca.gov/waterrights/water_issues/programs/hearings/russian_river_frost/docs/deir/draft_eir_no_figures.pdf.

344. Regulatory authorities violate section 9 of the ESA if they authorize behavior that results in prohibited take of listed species. *Loggerhead Turtle v. Cnty. Council*, 148 F.3d 1231 (11th Cir. 1998); *Strahan v. Cox*, 127 F.3d 155 (1st Cir. 1997).

345. CAL. CODE REGS. tit. 23, § 862 (2013).

346. Order Granting Petition for Writ of Mandate in Consolidated Cases, No. SCUK CVG 11 59127 (Cal. Super. Ct. Mendocino Cnty. Sept. 26, 2012).

347. J.B. Ruhl, *Climate Change and the Endangered Species Act: Building Bridges to the No-Analog Future*, 88 B.U. L. REV. 1, 4 (2008).

348. *See supra* Part III.B.

beginning of the Cal-Fed experiment. Patience is appropriate while a state is making progress, but the time for patience has run out in the Bay-Delta. EPA notes in its recent Action Plan that progress has been much slower than promised on ecosystem protective water standards.³⁴⁹ Rather than continue to defer on those standards, EPA should begin its own proceeding to identify necessary flows and salinity levels. In the larger context, EPA should make it clear that states may not demand absolute certainty before they make necessary changes when water quality standards are not protecting designated uses.

Lingering ambiguity about the extent of EPA's authority to impose standards related to flow need not deter the agency. At some point, EPA will have to push the limits of that authority if it is to achieve the goals of the CWA. It also should keep in mind that SWRCB, when it repeatedly challenges that authority in its water quality control plans,³⁵⁰ is playing to its own political audience and may be bluffing. Some ambiguity about relative legal authorities may even be desirable because it can allow each level of government to push forward when political conditions allow.

Although EPA needs to make it clear that certainty cannot be the trigger for action, it is true that uncertainty about causes of and solutions to decline is a difficult problem for aquatic ecosystem restoration. EPA, in partnership with the federal wildlife agencies, can play three key roles with respect to information. First, federal agencies should maintain a publicly accessible central repository for data on the intersection of water quality and water quantity. State authorities facing the uncomfortable prospect of having to revise water rights may avoid gathering or confronting relevant data.³⁵¹ In this context, it may be a good thing that EPA does not have direct regulatory authority over water rights. It should not have the same reluctance as water rights agencies to gather, interpret, and disseminate relevant monitoring data and models. Those data could be used by ecosystem advocates to push for state regulatory action. Although others have suggested that EPA could more aggressively force states to keep and disclose records on flows and their impacts on water quality,³⁵² we think the political context, coupled with some doubt about authority to force monitoring of this type, argues for direct federal monitoring.

Second, EPA and other federal agencies could direct funding to research designed to clarify relationships between diversions, flows, and ecosystem functions. In the Bay-Delta, the state has supplied reasonable amounts of funding for these sorts of studies, and the Delta Independent Science Board (successor to Cal-Fed's lauded science program) provides a credible venue for identifying promising projects.³⁵³

That will not always be the case, so EPA should generally plan to support independent science. Even in the Bay-Delta, state funding is always limiting; federal funding could thus help leverage state efforts. Federal funding might be specifically targeted toward studies whose conclusions could prove useful beyond the Bay-Delta. There are obvious economies of scale in having the federal government identify and fund overarching research with significance for multiple watersheds. Federal authorities should not simply throw money at scientific problems. They should also convene and finance broad review efforts aimed at clarifying not only what is known of the relationships between flow and water quality, but also what *can* be known, and at what cost. State authorities who find uncertainty a convenient delaying tactic will have little incentive to clarify the causes of uncertainty or the prospects of reducing it. That information, however, may be crucial for reviewing courts,³⁵⁴ and for effective public oversight.

Third, EPA can make information more useful by requiring finer state definition of designated uses and, therefore, of the water quality standards necessary to support those uses. California does reasonably well on this score, but many states do not. The more generally water uses are defined, the more difficult it is for EPA to oversee water quality standards, and the easier it becomes for state authorities to avoid politically difficult decisions.

V. Conclusion

One way to think about the CWA as it turns forty is to consider our reaction today to the cars on the road when the CWA was enacted. Big cars, adorned with killer tails and grills, ruled the road, guzzling gas that was then available for thirty-six cents per gallon. We thought those cars were cool, just as we thought that the CWA was cool. But, of course, times change. Few of us would want to rely on a 1972 car for transportation today, yet we are still trying to maintain and improve the quality of our nation's waters and the aquatic ecosystems they support with a clunky piece of early 1970s legislation. Ultimately, the CWA needs to be traded in.

The Delta experiment, imperfect as it is, contains an important lesson for the future. The guiding principle of a twenty-first century model CWA must be to reintroduce hydrology. This new model must be built on the Supreme Court's 1994 acknowledgment that the distinction between water quality and quantity that has come to dominate CWA implementation is "artificial."³⁵⁵ Hydrology actually was an integral part of pre-1972 pollution control, although not in a way we should want to replicate. Back then, it was used to promote, rather than control, the use of rivers and lakes as waste sinks.

349. See *supra* Part II.

350. KAPAH ET AL, *supra* note 286, at 4.

351. See Eric Biber, *The Problem of Environmental Monitoring*, 83 U. COLO. L. REV. 1, 43-48 (2011) (explaining why regulatory agencies might avoid monitoring).

352. See, e.g., Benson, *supra* note 316, at 257 ("EPA's first and most fundamental step should be to require that all states identify their flow-impaired waters . . .").

353. See *Delta Independent Science Board*, DELTA STEWARDSHIP COUNCIL, <http://deltacouncil.ca.gov/science-board/delta-independent-science-board> (last visited Apr. 11, 2013) ("The Delta Independent Science Board (Delta ISB) is a standing board of nationally or internationally prominent scientists with appropriate expertise to evaluate the broad range of scientific programs that support adaptive management of the Delta.");

354. See *San Luis & Delta-Mendota Water Auth. v. Salazar*, 760 F. Supp. 2d 855, 882 (E.D. Cal. 2010), *appeal docketed*, No. 11-15871 (9th Cir. Sept. 8, 2011).

355. *PUD No. 1 of Jefferson Cnty. v. Wash. Dept. of Ecology*, 511 U.S. 700, 701, 719 (1994).

Hydrology must be reintroduced and turned to ecosystem protection ends for three reasons. First, climate change is here. Given the unwillingness of the international community—led by China, India, and the United States—to engage in serious mitigation efforts, all we can do is adapt.³⁵⁶ We are already seeing adverse impacts on water systems and ecosystems. Second, the federal government and many states have committed billions of dollars to aquatic ecosystem restoration experiments. The kicker is that none of these experiments have a clear target for what the restored system should look like in terms of climate-adjusted water quantity and quality parameters. Third, there are many gaps in the CWA's coverage that need to be closed before we can come close to meeting its goal of restoring aquatic ecosystem integrity.

As Bay-Delta restoration efforts have tried to do,³⁵⁷ we must start with the watershed. There have been numerous efforts to control pollution at the watershed level, but almost none have had an adequate legislative framework. When the federal government stopped building large dams, it also abstained from any serious effort to create effective watershed management institutions.³⁵⁸ This Progressive Era vision needs to be revived and adapted to the Environmental Protection Era.

Next, we need to comb through all post-1972 efforts to measure water quality and synthesize them with all the

research on river function and the ecosystem services that water bodies provide. The end product should be a set of acceptable stream function parameters. For each watershed, these parameters would have to be adjusted for climate change and applied to develop an acceptable range of stream conditions. We could think of these as hydrology-based, rather than use-based, water quality standards. From here, state pollution control agencies, overseen by the federal EPA, would have to identify, using all the new land mapping technology that has been developed since 1972, all major sources of harmful discharges—including dams, diversions, and farms for starters—that need to be controlled to maintain the parameters. Using legislation that gives them authority over all these sources, a mix of best practices, performance standards, and technology-based standards would be applied to bring the watershed into compliance.

This is a big dream, and one that is not likely to be realized overnight. At some point, though, it becomes inefficient, if not impossible, to keep a forty year old car running. Even as individual parts are replaced, the car can no longer perform the functions and services that it did when it was built. The same can be said of the CWA. It is time to think of a trade-in for something suitable to the challenges we face today in managing the natural resources that we need to survive and thrive.

356. Past emissions of greenhouse gases, together with the social inertia that is impeding strong emission controls, make substantial global warming over the next century essentially inevitable. A recent statistical analysis of leading climate models, for example, projects that average seasonal temperatures in North America will increase more than two degrees Celsius by 2070, with much higher winter increases in some locations. Emily L. Kang & Noel Cressie, *Bayesian Hierarchical ANOVA of Regional Climate-Change Projections from NARCCAP Phase II*, 22 INT'L J. APPLIED EARTH OBSERVATION & GEOINFO. 3 (2013).

357. U.S. ENVT'L. PROT. AGENCY, WATER QUALITY CHALLENGES; *supra* note 289, at 16–17.

358. W. WATER POLICY REVIEW ADVISORY COMM'N, *supra* note 14, at 2–12, 13–17.