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CALIFORNIA DREAMING: WATER TRANSFERS FROM THE PACIFIC NORTHWEST

By
CLIFFORD J. VILLA*

A prolonged drought in California has prompted renewed interest in proposals to transfer water from the Pacific Northwest, where rainfall is more plentiful, to the arid Southwest. While recent storms have obviated the need for water transfers at the present time, it is likely these proposals will resurface with the next drought. This Comment will examine past proposals, and discuss less expensive and less drastic means for satisfying the need for water in the Southwest.

I. INTRODUCTION

I know as well as the next person that there is considerable transcendent value in a river running wild and undammed, a river running free over granite, but I have also lived beneath a river when it was running in flood, and gone without showers when it was running dry.¹

In January 1993, flooding in southern California and blizzards in northern California alleviated public concerns for the drought which gripped California for the past six years.² The California drought brought severe societal hardship³ and ecological devastation.⁴ The drought reminded all observers that standards

* J.D. 1993, Northwestern School of Law of Lewis & Clark College. The author wishes to thank Professor Michael Blumm for his helpful comments on an earlier draft. The author also thanks attorney Mark Eissler for his humor and insight on this and other topics.

1. JOAN DIDION, *Holy Water*, in *THE WHITE ALBUM* 59 (1979).

2. This recent drought rivaled the severity of the drought in the late 1920s and early 1930s, considered to be the worst drought on record. In some areas of California, the four years between 1987 and 1991 marked the most severe four-year period on record. PETER H. GLEICK & LINDA NASH, *THE SOCIETAL AND ENVIRONMENTAL COSTS OF THE CONTINUING CALIFORNIA DROUGHT* 5-7 (1991).

3. *Id.* at 35-55 (losses in agriculture, timber, hydropower, and tourism).

4. *Id.* at 17-29. The report documents the widespread effects on the natural

of living depend on access to water.⁵ Along with concerns for the drought, the January storms washed away the myriad of ideas for dealing with the drought: seeding clouds, towing icebergs, desalting seawater, shipping water in supertankers, and transferring water from the Pacific Northwest via pipeline or aqueduct.⁶ Few of these ideas received serious consideration by citizens or government agencies.⁷ However, seawater desalination emerged as a popular response to the drought,⁸ and water transfers from the Pacific Northwest also generated substantial interest.⁹

Between 1990 and 1991, politicians and businessmen discussed no less than four separate proposals to transfer water from the Pacific Northwest.¹⁰ The seriousness of these proposals to transfer water from the Northwest was reflected in hostile responses from Northwest residents and representatives.¹¹ These hostile responses maintained the western tradition of jealously defending regional water supplies.

Despite the social, political, and technical complications, the initial argument for transferring water across basins appears quite simple: parts of the Pacific Northwest receive much more precipi-

ecosystem including the devastating, possibly fatal, effect the drought has had on the threatened winter-run chinook salmon in the Sacramento River, the striped bass in the San Francisco Bay-Delta region, waterfowl in the Central Valley, and a number of endangered or threatened species of terrestrial flora and fauna.

5. See, e.g., SANDRA POSTEL, *LAST OASIS* 17-18 (1992).

6. See Carl Nolte, *No Shortage of Problematic Schemes to Ease the Drought*, S.F. CHRON., Dec. 24, 1990, at A4; Stephen Braun, *A Deluge of Drought Solutions*, L.A. TIMES, June 21, 1990, at A1.

7. Maurice Roos, chief hydrologist for California, dismissed several such ideas including a plan to induce rainfall with a steam-emitting greenhouse 6.7 miles in diameter. Braun, *supra* note 6, at A1.

8. A poll of 1986 Californians taken in the fifth year of drought showed seawater desalination and wastewater reclamation as the preferred responses to the drought, followed by conservation, storage projects, and growth limits. Kevin Roderick, *The Times Poll: Rationing, Slow Growth Favored to Offset Drought*, L.A. TIMES, Jan. 31, 1991, at A1. Santa Barbara proceeded to construct the largest desalination plant in the United States. POSTEL, *supra* note 5, at 46.

9. In the fifth year of drought, one poll revealed that Californians favored, two to one, importing water from the Pacific Northwest. Roderick, *supra* note 8.

10. See *infra* notes 37, 64, 71, 79.

11. See, e.g., *infra* note 67. See also John Balzar, *Term-Limit Fight Invokes California as the Bogyman*, L.A. TIMES, Nov. 5, 1991, at A24 (Washington voters rejected term-limit initiative, fearing loss of political strength to defeat California efforts to obtain Columbia River water).

tation than most of the Southwest.¹² At the same time, the population of the Los Angeles metropolitan area greatly exceeds the combined populations of the states of Oregon, Washington, Idaho, and Montana.¹³ The tremendous difference in water demand predictably prompted proposals to distribute water more evenly throughout the West.

While the wet winter of 1992-93 largely submerged the recent water transfer proposals, such proposals assuredly will return with the next dry spell.¹⁴ Grand schemes for transferring water from the Pacific Northwest to the Southwest have repeatedly surfaced over the past forty years and will surface in the future. Section II of this Comment summarizes the history and outcomes of several proposals to transfer water from the Pacific Northwest, including three proposals prompted by the recent drought. Section III discusses some of the less expensive means for satisfying water requirements in the Southwest. Section IV briefly discusses some of the costs and benefits from the water transfer proposals, recognizing the significant external costs represented by environmental statutes. Section V concludes by noting the national trend

12. On average, Los Angeles, California receives approximately 14.8 inches of rain per year. Portland, Oregon, 825 miles north, on average receives approximately 37.4 inches per year. *THE WORLD ALMANAC AND BOOK OF FACTS* 186 (Mark S. Hoffman ed., 1993). However, parts of the Northwest have experienced a drought rivaling that publicized in California. In 1992, the governor of Oregon declared the entire state a drought emergency and requested federal assistance. The city of Portland instituted strict water conservation measures. See Paul Koberstein, *Draining Oregon's Rivers Dry*, OREGONIAN, Nov. 8, 1992, at A1. Seattle, Washington has also seen empty reservoirs and water restrictions. Ferdinand M. de Leon, '92 Weather: Warm Days of Winter Had a Price—Year Began with Wet Look, Ended in Dry Run, SEATTLE TIMES, Jan. 3, 1993, at B2.

13. BUREAU OF THE CENSUS, STATISTICAL ABSTRACT OF THE UNITED STATES 29, 31 (1990).

14. While the common understanding of 'drought' may relate to rainfall, the availability of water depends more on snowcap and runoff. In February 1992, flashfloods in Los Angeles did little to alleviate the continuing drought because the floodwaters emptied quickly into the ocean. See Robert Reinhold, *New California Storm Brings Worst Floods in Decades*, N.Y. TIMES, Feb. 13, 1992, at A18. In January 1993, when the Sierra Nevada snowpack reached 180% of normal, California officials remained cautious, suggesting it may take two years or more to fill the state reservoirs which had been depleted through the six years of drought. Entirely independent of precipitation, demands for water created by California's growing population and environmental regulations have created a so-called 'regulatory drought.' See Dean E. Murphy, *A Drought that Won't Die—Experts Insist It's Still On*, L.A. TIMES, Jan. 20, 1993, at A1, col. 5.

away from large-scale water projects and toward water conservation. In the end, this Comment should lay to rest any serious enthusiasm or concern for future proposals to transfer water from the Pacific Northwest.

II. MAJOR PROPOSALS FOR WATER TRANSFERS FROM THE PACIFIC NORTHWEST

The dream of transferring water across regions of the West probably began soon after the American settlers discovered the disparities in precipitation. In 1902, Congress created, within the Department of the Interior, the Bureau of Reclamation to examine the potential for reclaiming the arid West through 'irrigation works for the storage, diversion, and development of waters'¹⁵ Over the years, the Bureau of Reclamation evaluated various proposals to transfer water from the Pacific Northwest to the Southwest. Other such proposals originated from local politicians and private entrepreneurs. This Section will explore some of the more prominent transfer proposals and the *ad hoc* responses to them.

A. *United Western Investigation, 1951*

In 1947, the House Public Lands Committee directed the Bureau of Reclamation to investigate and report on the engineering feasibility and economic justification of 'diverting surplus water from other basins to Southern California and the Colorado River Basin'¹⁶ The resulting two-year study, designated the

15. Reclamation Act of June 17, 1902, ch. 1093, § 2, 32 Stat. 388 (1902) (codified at 43 U.S.C. § 411 (1988)). Soon thereafter, the Bureau embarked on a series of water diversion and storage projects which fundamentally altered the character and habitability of the western United States. For a succinct history of the Bureau of Reclamation and western water development, see RICHARD W. WAHL, *MARKETS FOR FEDERAL WATER, SUBSIDIES, PROPERTY RIGHTS, AND THE BUREAU OF RECLAMATION* 11-25 (1989). For a colorful view of the same, see MARC REISNER, *CADILLAC DESERT* (1986).

16. 93 CONG. REC. 6890 (1947). Sponsoring the resolution, Representative Richard Welch of California explained,

Other river basins are blessed with abundant water supplies—supplies so abundant that, each year, thousands of acre-feet of good water are wasted into the ocean. In this connection, I think particularly of the Columbia River. I do not regard it as too fanciful to suggest that ways and means be found to divert, from some point whence it would otherwise be wasted into

United Western Investigation (UWI), compiled a wealth of data on several options for distributing Northwest water among twelve western states and the Republic of Mexico.¹⁷

The *UWI* focused upon a single plan to transfer water from the Klamath River in northern California. According to the plan, a dam near the mouth of the Klamath would facilitate the storage and distribution of nine million acre-feet of water.¹⁸ This water would be transported throughout central and southern California by aqueduct and tunnel, satisfying irrigation, industrial, and municipal demands. The imported water could in turn eliminate the need for Los Angeles to continue diverting water from the Owens Valley¹⁹ and the Colorado River.²⁰ If more water was later needed, the system could be expanded to add 1.5 million acre-feet from the Eel River in northern California,²¹ 2.3 million acre-feet from the Rogue River Basin in southern Oregon,²² or ten million acre-feet from the Willamette or Columbia Rivers at the northern border of Oregon.²³

the sea, a portion of the surplus waters of that ideal stream.

Id. Perhaps anticipating the political opposition from the Northwest, Representative Welch further stated, 'Let me emphasize the word 'surplus,' for it is extremely important.' *Id.*

17. BUREAU OF RECLAMATION, U.S. DEP'T OF INTERIOR, UNITED WESTERN INVESTIGATION, INTERIM REPORT ON RECONNAISSANCE 1 (1951) (copy on file with *Environmental Law*).

18. *Id.* at 66. Volumes of water are typically measured in 'acre-feet' which is defined as the volume of water necessary to cover one acre to a depth of one foot. One acre-foot equals approximately 325,851 gallons.

19. *Id.* at 38. In 1913, Los Angeles began diverting water from the Owens Valley, more than 220 miles away, causing grave harm to the valley economy and environment. See REISNER, *supra* note 15, at 64-89. At the time of the 1950 study, however, the Bureau of Reclamation completely failed to recognize this harm. Instead, the Bureau argued that discontinued diversions by Los Angeles would free the Owens Valley water for use in the Mojave Desert. BUREAU OF RECLAMATION, *supra* note 17, at 38.

20. At the time, California was in the middle of a protracted legal battle against its neighboring State of Arizona for use of water from the Colorado River. In 1963, the U.S. Supreme Court finally settled water rights between the two states, largely in favor of Arizona. *Arizona v. California*, 373 U.S. 546 (1963). The Bureau of Reclamation, carefully declining comment on the controversy, observed that the importation of Northwest water would make the legal battle moot. BUREAU OF RECLAMATION, *supra* note 17, at 37.

21. BUREAU OF RECLAMATION, *supra* note 17, at 123.

22. *Id.* at 127.

23. *Id.* at 124. The 'Willamette Pump Route' would pump water from the

The *UWI* found that the Klamath project and many of the supplementary projects showed both engineering and economic feasibility.²⁴ The *UWI* calculated that the basic Klamath project would cost the government \$3.25 billion (\$18.37 billion in 1991 dollars) and could be constructed over a twenty-year period.²⁵ Amortized over 100 years, annual benefits were projected to exceed annual costs by over eighty million dollars.²⁶

The Bureau calculations, however, admittedly excluded numerous critical considerations. The *UWI* made no attempt to consider the social and political opposition from the Northwest, the impacts on fish and wildlife, the effects of water rights or state water laws, or the desirability of fueling further growth of agriculture or the population in Los Angeles. The *UWI* simply stated that its scope 'at this stage does not cover these admittedly difficult and important problems'²⁷

Recognizing the importance of these unconsidered problems, the *UWI* declined to make any specific recommendation for construction.²⁸ In the end, the Bureau never proceeded with any related construction,²⁹ a result apparently driven by unique political factors.³⁰ In 1972, California sealed the fate of the *UWI*

Willamette River near Oregon City or the Columbia River below Bonneville Dam up the Willamette Valley, 381 miles south, including a final 55 miles through tunnel, to the Klamath River. *Id.* at 124-25.

24. *Id.* at 101-06 (describing benefits of the basic Klamath project), 118-19 (illustrating potential results of expansion projects). However, the report specifically concluded that a proposed diversion from the Snake River in Idaho appeared 'unattractive' in light of the considerable distances and elevations involved. *Id.* at 140-41.

25. *Id.* at xi-xiii.

26. BUREAU OF RECLAMATION, *supra* note 17, at 109-10 (\$170 million in annual benefits over \$89 million in annual costs, assuming discount rate of 2.5%).

27. *Id.* at ii.

28. *Id.*

29. While the federal government eventually dropped the Klamath River plan, California, as part of its State Water Project, proceeded to construct a very similar project, substituting the nearer and smaller Feather River for the distant Klamath. The State Water Project transfers approximately three million acre-feet of Feather River water through the 444-mile California Aqueduct. To reach Los Angeles, this water must make a 3400-foot ascent over the Tehachapi Range. REISNER, *supra* note 15, at 368-70.

30. The Pacific Northwest expressed predictable outrage. Los Angeles, unexpectedly, also opposed the *UWI* ideals, reportedly viewing them as a ploy to weaken its resolve against Arizona for Colorado River water. See *supra* note 20.

Klamath project by placing the lower river within the protection of the California Wild and Scenic Rivers Act.³¹

B. North American Water and Power Alliance, 1964

By far the most ambitious water transfer project ever conceived, the North American Water and Power Alliance (NAWAPA) sought to construct a massive system of reservoirs and canals to divert water from Canada and the Pacific Northwest for use throughout the North American continent. Designed and promoted by the Ralph M. Parsons engineering firm of California, the projects, when completed over a twenty-year period, would transfer water from the Copper, Susitna, and Yukon Rivers in Alaska, the Fraser and Peace Rivers in British Columbia, and the Snake and Columbia Rivers in the Columbia Basin.³² According to the plan, this water would initially provide 110 million acre-feet annually, expandable to 250 million. It could supply water to seven Canadian provinces, thirty-three states in the United States, and three northern states of Mexico.³³

The NAWAPA proposal raised tremendous excitement in its early days prompting a Senate subcommittee study in 1964³⁴ and gathering supporters such as former Utah Senator Frank Moss.³⁵

Consequently, Bureau careers were ruined and copies of the *UWI* report disappeared. See generally REISNER, *SUPRA* note 15, at 275-80. Hours spent by the author calling Bureau offices and searching through the Library of Congress, the National Archives, and the Department of the Interior library in Washington, D.C., failed to locate a copy of this report. Only a chance contact with a Bureau employee over a year later allowed the author to obtain a copy.

31. 1972 Cal. Stat. ch. 1259, § 1 (codified as amended at CAL. PUB. RES. CODE § 5093.54(a) (West 1984 & Supp. 1993)). The Act generally prohibits construction of any water storage facility and severely restricts construction of diversion facilities on a designated river. *Id.* § 5093.55.

32. REISNER, *supra* note 15, at 506-07.

33. CHARLES W. HOWE & K. WILLIAM EASTER, *INTERBASIN TRANSFERS OF WATER* 17 (1971).

34. FRANK E. MOSS, *THE WATER CRISIS* 251 (1969).

35. *Id.* at 254. Senator Moss expressed his enthusiasm for the NAWAPA concept:

The real significance of NAWAPA is that a competent engineering firm has found that it is technically feasible and economically realistic to collect and distribute water on a continental basis. . . . The concept is based entirely on published topographical and hydrological data. . . . The report, published in 1964, has been stimulating and provocative—and encouraging.

Id. at 245.

The proposal, however, failed to gain the massive support that its \$100 billion price-tag would require. Almost thirty years later during the recent drought, however, the NAWAPA concept received a renewed flurry of publicity.³⁶ In the spring of 1990, the retired chairman of the Parsons firm lobbied in Washington, D.C., for renewed consideration of NAWAPA.³⁷ Parsons also updated its 1964 cost estimate for NAWAPA, now projecting a cost 'almost certainly in the \$400-billion range.'³⁸

C. Colorado River Augmentation, 1965

On a scale less grand than the NAWAPA plan, though still independently impressive, various proposals have been suggested for transferring water from the Pacific Northwest to 'augment' the overburdened demands on the Colorado River. The 1922 Colorado River Compact divides the Colorado Basin into an Upper Basin and Lower Basin, with each basin allocated 7.5 million acre-feet a year.³⁹ A 1944 treaty guaranteed Mexico an additional 1.5 million acre-feet.⁴⁰ This allocation of 16.5 million acre-feet was based on an estimate of 18 million available from the river. Unfortunately, this estimate has proven overly optimistic with actual flows averaging only 16 million.⁴¹

36. See, e.g., Scott Armstrong, *Southwest Water Shortage Lets Loose Pipedreamers*, CHRISTIAN SCI. MONITOR, May 3, 1991, at 4; Nolte, *supra* note 6; Mindy Cameron, *Californians Won't Face Watery Truth*, SEATTLE TIMES, May 27, 1990, at A18.

37. Braun, *supra* note 6, at A1.

38. *Id.* This cost would be spread over twenty years of construction. By contrast, the U.S. Department of Defense budgeted nearly \$300 billion for fiscal year 1991 alone. OFFICE OF MANAGEMENT AND BUDGET, BUDGET OF THE U.S. GOVERNMENT, FY91, at 10 (1990).

39. 70 CONG. REC. 324 (1928). The states of Utah, Wyoming, Colorado, and New Mexico comprise the Upper Basin; Nevada, California, and Arizona make up the Lower Basin.

40. Treaty on the Utilization of Colorado and Tijuana Rivers of the Rio Grande, Feb. 3, 1944, U.S.-Mexico, art. 10(a), 59 Stat. 1219, 1237.

41. *Lower Colorado River Basin Project: Hearings on H.R. 4671 Before the Subcomm. on Irrigation and Reclamation of the House Comm. on Interior and Insular Affairs*, 89th Cong., 1st Sess. 11 (1965) (letter from Stewart L. Udall, Secretary of the Interior, to Wayne N. Aspinall, Chairman, House Comm. on Interior and Insular Affairs). During the recent drought, flows in the Colorado River dropped to nine million acre-feet a year. Paul Gray, *A Fight Over Liquid Gold*, TIME, July 22, 1991, at 20. The Colorado River, with strength enough to carve the Grand Canyon and form a broad delta in the Gulf of California, no longer reaches

Recognizing the excessive demands on the Colorado River, and anticipating continued rapid growth of cities in the Lower Basin states,⁴² various proposals have emerged urging augmenting flows in the Colorado River with water transferred from the Columbia Basin.⁴³ The most serious of these proposals emerged during the 1965 drafting of the Lower Colorado River Basin Project.⁴⁴ The House Committee on Interior and Insular Affairs, concluded, 'the need for augmentation is beyond reasonable dispute. The only legitimate areas for difference of opinion lie in how and when this augmentation must be accomplished.'⁴⁵

Proponents of the proposal underestimated the opposition from Northwest legislators. At the insistence of Senator Henry Jackson of Washington, Chairman of the Senate Committee on Interior and Insular Affairs, the House bill was expressly modified to forbid any federal study of water importations.⁴⁶ As enacted, the Colorado River Basin Project Act placed a ten-year moratorium on the federal study of 'any plan for the importation of water into the Colorado River Basin from any other natural river drainage basin.'⁴⁷ As the ten-year moratorium approached expiration, talk again arose about the possibility of augmenting the Colorado River.⁴⁸ However, the talk did not continue for long. In

the sea, but trickles out of existence below the U.S. border. Jim Carrier, *The Colorado: A River Drained Dry*, 179 NAT'L GEOGRAPHIC, June 1991, at 4, 16-17.

42. Outside Florida, cities in the Southwest, particularly Phoenix, Arizona; Las Vegas, Nevada; and Riverside, California, posted the highest rates of growth in the United States during the 1980s. BUREAU OF THE CENSUS, *supra* note 13, at 29-31.

43. An expanded UWI project would have accomplished this objective indirectly. *See supra* note 20.

44. H.R. 4671, 89th Cong., 1st Sess. § 101 (1965). For an excellent review of these and earlier proposals to transfer water from the Pacific Northwest, see Chapin D. Clark, *Northwest-Southwest Water Diversion—Plans and Issues*, 3 WIL-LAMETTE L.J. 215 (1965). Professor Clark's report challenged the popular support for such proposals and reminded readers that 'engineering feasibility must not be confused with social policy and economic gain.' *Id.* at 254.

45. H.R. REP. No. 1312, 90th Cong., 2d Sess. (1968), *reprinted in* 1968 U.S.C.C.A.N. 3666, 3688.

46. *Id.* at 3688-89.

47. Pub. L. No. 90-537, § 201, 82 Stat. 885, 886 (1968) (codified as amended at 43 U.S.C. § 1511 (1988)).

48. A 1977 article revealed:

The engineers—the same ones who have so cleverly diverted water out of the basin—now have marvelous schemes to drill tunnels and build massive aqueducts to divert water into the Colorado Basin. They call it 'aug-

1978, Senator Jackson succeeded in renewing the moratorium for another ten years.⁴⁹

Following Senator Jackson's death in 1983, there was a continuing defense of Northwest water. Before the second ten-year moratorium could expire, Congress effectively established a lasting ban on the transfer of water from the Columbia River. The current law, not subject to stated expiration, forbids a federal agency from participating in any study regarding the transfer of water from the Columbia River Basin, without the prior approval of all governors of the affected states.⁵⁰ This law has prevented and continues to prevent further federal study of proposals to transfer water from the Columbia River.

D. California Undersea Aqueduct, 1975

In 1968, at the behest of Congress,⁵¹ the Bureau of Reclamation began a 'prereconnaissance' study of a proposal to transfer freshwater from northern California to southern California via an offshore pipeline running along the Continental Shelf.⁵² In 1971, Congress approved funds for a full reconnaissance study,⁵³ to include examination of pipeline materials; tides, waves, currents, and buoyancy; construction and maintenance; and the marine environment, including ecology, topography, seismicity, and sediments. The results of this study appeared in a 1975 special report.⁵⁴

The 1975 report detailed a plan to divert a combined total of four million acre-feet from the Klamath and Eel Rivers, and to transfer this water through a thirty-four foot wide, 800-mile long pipeline to southern California.⁵⁵ Regulation of the seasonal flows

menting" the Colorado's supply. They have their eyes on the Columbia River valley to the north. . . .

The Colorado: Run Red, Run Salty, Run Dry, NAT'L J., Apr. 9, 1977, at 542.

49. Reclamation Safety of Dams Act of 1978, Pub. L. No. 95-578, § 10, 92 Stat. 2471, 2472 (codified at 43 U.S.C. § 1511 (1988)).

50. 33 U.S.C. § 2265 (1988).

51. See H.R. REP. NO. 1065, 90th Cong., 2d Sess. (1968).

52. U.S. DEP'T OF THE INTERIOR, BUREAU OF RECLAMATION, CALIFORNIA UNDERSEA AQUEDUCT 3-4 (1975) [hereinafter CALIFORNIA AQUEDUCT].

53. Pub. L. No. 91-439, 84 Stat. 890 (1970). See CALIFORNIA AQUEDUCT, *supra* note 52, at 6.

54. CALIFORNIA AQUEDUCT, *supra* note 52, at 7.

55. *Id.* at 11-15.

of these rivers would require installation of nine million acre-feet of storage.⁵⁶ Total construction costs for the undersea aqueduct were estimated at twenty billion dollars (sixty-one billion 1991 dollars) with a construction time of ten years.⁵⁷ At this price, it was assumed that water from the undersea aqueduct would be too expensive for irrigation; therefore, the primary uses for this water would be municipal and industrial.⁵⁸ More than half of the water (2.5 million acre-feet) would be needed for Colorado River augmentation.⁵⁹

Unlike the *UWI*, the *California Undersea Aqueduct* report made at least a cursory sketch of a few environmental impacts. The report identified two principal areas of concern: fisheries and free-flowing rivers. The report recognized the recreational and commercial significance of the anadromous fish in the Klamath and Eel Rivers, as well as the public interests in preserving the 'free-flowing nature of these rivers.'⁶⁰ Regardless of the environmental concerns or engineering feasibility, the *California Undersea Aqueduct* report concluded that foreseeable water demands in California could not justify the project.⁶¹ The report therefore 'recommended that no further study of the Undersea Aqueduct concept be undertaken until needs are more pressing.'⁶² The Bureau of Reclamation thereafter took no further action on this idea.

E. Kenneth Hahn Columbia River Proposal, 1990

Former Los Angeles County Supervisor Kenneth Hahn persistently supported the idea of interbasin water transfers to meet California water needs. In May 1990, Hahn began promoting a

56. *Id.* at 13.

57. *Id.* at 117, 122.

58. *Id.* at 17.

59. CALIFORNIA AQUEDUCT, *supra* note 52, at 16.

60. *Id.* at 25-26.

61. The report rather vaguely explained, 'After the study was underway, changing conditions and revised projections of population and water requirements indicated additional water supplies would not be needed in California until after 2020. The decision was made to terminate the study with this appraisal report documenting the results of studies to date.' CALIFORNIA AQUEDUCT, *supra* note 52, at 7.

62. *Id.* at ii.

ten billion dollar plan to pipe water from the Columbia River.⁶³ According to Hahn's figures, diversion of just 1/30th of the water from the Columbia River would enable California to meet its critical water needs.⁶⁴ The water would be piped across the length of Oregon to Shasta Lake in northern California where existing structures could be used to distribute the water throughout the state.⁶⁵

Hahn succeeded in soliciting unanimous support from his colleagues on the Los Angeles County Board of Supervisors,⁶⁶ and unified opposition from the governors of Oregon, Washington, and Idaho.⁶⁷ Undaunted by the Northwest opposition, Hahn called for repeal of the federal law which requires unanimous approval from the Northwest governors for any federal studies of water transfers from the Columbia.⁶⁸ The federal law, however, remained in effect. In December 1992, after forty years in office, Hahn finally retired,⁶⁹ leaving no one of equal stature to champion the Columbia River proposal.

F. Alaska Water Pipeline, 1991

During his last years in office, Kenneth Hahn cast his attention toward water even further north than the Columbia River. At the request of Hahn and Alaska Governor Walter J. Hickel, the

63. Hahn raised similar proposals in 1977 and 1985. Jay Mathews, *County Supervisor Looks A Long Way North for Water*, WASH. POST, May 20, 1990, at A23.

64. Hahn explained: "The entire state of California uses only 35 billion gallons of water each day. Just 3 billion gallons of the valuable surplus water from the Columbia River could be diverted and used to help meet the critical 10 percent shortage facing our farmlands, industry and residents." *Id.*

65. Kenneth Hahn, *Columbia River Surplus Water*, L.A. TIMES, May 19, 1990, at B6.

66. Dean S. Miller, *Idaho, Washington Wary of Call to Pump Water to California*, CHRISTIAN SCI. MONITOR, July 31, 1990, at 7.

67. Idaho Governor Cecil Andrus labelled Hahn's proposal "ridiculous." Mathews, *supra* note 63. Former Oregon Governor Neil Goldschmidt wrote back to Hahn: "Hoping you're not serious." *Id.* A spokesman for former Washington Governor Booth Gardner declared that his state would also oppose any diversion of water from the Columbia River. Richard Simon, *Hahn Calls for an Aqueduct to the Northwest*, L.A. TIMES, May 4, 1990, at B3.

68. Hahn, *supra* note 65.

69. Richard Simon, *The Politician's Politician*, L.A. TIMES, Dec. 6, 1992, at B1.

Fluor Daniel engineering firm, in the summer of 1991, produced a rudimentary study of the feasibility of transferring water from Alaska to California via undersea pipeline.⁷⁰ The Alaska Water Pipeline, constructed over fifteen years, would transport four million acre-feet of water annually through four fourteen-foot-diameter undersea aqueducts. The 1400 miles of pipeline would stretch from the mouth of the Stikine River south along the Continental Shelf, requiring land-based pumping stations at 150-mile intervals.⁷¹ Reaching the coast of northern California, the pipeline would turn inland, pumping water into the Shasta Lake system.

The Congressional Office of Technology Assessment (OTA) held a workshop in Los Angeles on August 14, 1991, to discuss the Fluor Daniel report.⁷² The workshop participants received a preliminary report by the OTA which strongly questioned the engineering feasibility of the proposal and the validity of the \$110 billion cost estimate.⁷³

The OTA, in 1992, released a more complete evaluation of the Alaska Water Pipeline proposal.⁷⁴ The report reviewed the findings of the 1975 *California Undersea Aqueduct* report and reached essentially the same conclusion: the Alaska proposal could not be justified by California's present or foreseeable demand.⁷⁵ The OTA therefore dismissed calls for further study of the Alaska Water Pipeline proposal. Nevertheless, at the urging of Governor Hickel, Alaska passed legislation in 1992 to permit sales of water by the state.⁷⁶

70. FLUOR DANIEL, ALASKA WATER PIPELINE FEASIBILITY STUDY 3 (1991).

71. *Id.* at 1.

72. Robert Reinhold, *Alaska Offers California an Additional Water Spigot*, N.Y. TIMES, Aug. 15, 1991, at D23. The workshop featured panelists representing business, academia, government, and environmental groups. See Richard Simon, *Pipeline Plan Seen as a Pipe Dream*, L.A. TIMES, Aug. 15, 1991, at A3.

73. OFFICE OF TECHNOLOGY ASSESSMENT, A PRELIMINARY NOTE ON THE FEASIBILITY OF TRANSFERRING WATER FROM ALASKA TO CALIFORNIA VIA AN OFFSHORE PIPELINE 1 (1991).

74. OFFICE OF TECHNOLOGY ASSESSMENT, ALASKAN WATER FOR CALIFORNIA? THE SUBSEA PIPELINE OPTION (1992).

75. *Id.* at 9.

76. Under the new law, the Alaska Commissioner of Natural Resources 'may provide for the sale of water by the state' if, among other requirements, the water is surplus to needs 'including fishing, mining, timber, oil and gas, agriculture, domestic water supply, and other needs as determined by the commissioner'; and the sale price of the water is 'based upon the fair market value of the water.'

G. *Multinational British Columbia Plan, 1992*

"We have the only answer for California," entrepreneur William Clancey declared.⁷⁷ Clancey's firm, Multinational Water & Power Inc., is promoting a plan to divert one percent of the water from British Columbia's Fraser River⁷⁸ for use in California. Specifically, water from the North Thompson River, a tributary of the Fraser, would be diverted through a 12.5-mile tunnel into the Columbia River Basin. Once in the Columbia River, the water would flow naturally down to the John Day dam on the lower Columbia. Below the dam, the water would be pumped up the Columbia Plateau through a pair of ten-foot pipes and, with help from a series of pumping stations, across the length of Oregon to the Pit River in California. Then the water would flow unaided into Shasta Lake and through the existing state distribution system.⁷⁹

Multinational estimates the project would deliver one million acre-feet annually at a total project cost of about four billion dollars⁸⁰ with a design and construction period of approximately seven years.⁸¹ As opposed to the UWI Study, Multinational emphasizes its environmental consciousness.⁸² If sufficient government interest is shown, Multinational would like to conduct a two-year feasibility study, at its own expense, to more fully identify environmental and technological requirements.⁸³

ALASKA STAT. § 46.15.037 (Supp. 1992).

77. Telephone Interview with William Clancey, President, Multinational Water & Power Inc. (Jan. 14, 1993). See also Sabin Russell, *Backlash on Plan to Sell Canada Water to California*, S.F. CHRON., June 24, 1991, at A13.

78. The Fraser River has a mean annual runoff of approximately 90.8 million acre-feet. FRITS VAN DER LEEDEN ET AL., *THE WATER ENCYCLOPEDIA* 90 (2d ed. 1990).

79. MULTINATIONAL WATER & POWER INC., *WATER: THE COMMODITY OF THE FUTURE* 1-2 (1992).

80. *Id.* at 1.

81. KVA RESOURCES INC., *A PROPOSAL TO SELL SURPLUS BRITISH COLUMBIA WATER TO CALIFORNIA* 15 (1992).

82. In a letter to the author, Clancey wrote, "Please ensure that your attention is drawn to the fact that our organization is most concerned that our proposal does not cause environmental damage." Letter from William Clancey, President, Multinational Water & Power Inc., to Clifford J. Villa (Jan. 14, 1993) (on file with author).

83. MULTINATIONAL WATER & POWER INC., *supra* note 79, at 7.

In addition to other complications with the Multinational project are two major impediments. First, British Columbians have voiced tremendous opposition to the proposal.⁸⁴ In response, John Cashore, British Columbia Environment Minister, declared a two-year moratorium on all major exports of water from British Columbia to the United States set to expire in June 1994.⁸⁵ Second, and perhaps most important, the project's intended customer, the Metropolitan Water District of Southern California (MWD), has flatly denied interest in the project water.⁸⁶ Thus, for the foreseeable future, the Multinational plan appears unlikely to develop further.

III. LESS EXPENSIVE MEANS FOR MEETING WESTERN WATER NEEDS

In 1968, the U.S. Congress established a National Water Commission to identify potential sources for water, 'giving consideration, among other things, to . . . interbasin transfers.'⁸⁷ The Commission's final report in 1973 noted 'proposals abound' for 'large-scale, interstate, interbasin transfers,' and focused an entire chapter on evaluating such proposals.⁸⁸ The chapter advised evaluation of interbasin water transfers according to three criteria. First, the interbasin water transfer should provide the least expensive means to meet the specific water need. Second,

84. 'The overwhelming majority of Canadians are appalled at the idea,' reported one member of the Canadian Parliament from British Columbia (B.C.). 'Our rivers are not for sale.' Russell, *supra* note 77. Nelson Riis, representing Kamloops, B.C., is sponsoring legislation which would prohibit interbasin water transfers. *Id.* In addition, Canadian environmentalists noted the Thompson River supports the largest salmon run in British Columbia. *Id.*

85. At a conference in Vancouver, B.C., on the topic of water exports, John Cashore announced his department would undertake a broad study of all water issues. Specifically referring to the proposal to divert water from the North Thompson River, Cashore stated, 'I can assure you that since the entire spectrum of water issues is under review by this government, there will be no such applications entertained until such time as we have completed our consultation, review and legislation process.' John Cashore, British Columbia Environment Minister, quoted in Gordon Hamilton, *Government Review of Water Issues Halts Bulk Exports to U.S.*, VANCOUVER SUN, May 9, 1992, at 1A4.

86. Telephone Interview with Don Adams, Chief of Operations, Metropolitan Water District of Southern California (Jan. 7, 1993).

87. National Water Commission Act of 1968, Pub. L. No. 90-515, § 3, 82 Stat. 868-869 (1968).

88. NATIONAL WATER COMM'N, WATER POLICIES FOR THE FUTURE 317 (1973).

benefits from the completed transfer should exceed the costs. Third, the expected gain from the project should be compared to possible gains from alternate uses of the same resources.⁸⁹

The second and third criteria will receive brief discussion in Sections IV and V. This Section will focus on the first criterion, that the interbasin water transfer project offer the least-cost solution to future water needs and will show that there are less expensive means for meeting future water needs in the West. Together, several smaller measures can satisfy future water demands in California at much less cost than a single colossal water transfer project.

A. Residential Conservation

Perhaps the least expensive way to satisfy future water demands is simply to reduce demand. This approach may often involve no cost and may result in significant savings. The average American consumes eighty-six gallons of water per day.⁹⁰ Of this number, lawn watering and other outdoor uses account for twenty-five gallons, the largest amount of any use.⁹¹ Xeriscaping, landscaping with rock and plants native to arid environments, can substantially reduce the need for outdoor watering.⁹² Substantial water savings can be realized indoors through retrofitted plumbing, including installation of low-flush toilets, low-flow showerheads, and efficient dishwashers.⁹³

Recognizing the potential water savings, the Los Angeles City Council, in the spring of 1991, instituted a program of mandatory water rationing. According to the program, residents could be fined for failure to meet the fifteen percent conservation level and

89. NATIONAL WATER COMM'N, *supra* note 88, at 320.

90. VAN DER LEEDEN ET AL., *supra* note 78, at 336.

91. *Id.*

92. One study in Novato, California was reported to have found that a Xeriscaped yard requires 54 percent less water than a conventionally landscaped yard. Water savings of 30-80% are typical. POSTEL, *supra* note 5, at 158-59.

93. Toilets constitute the single largest use of water inside the home (28%). VAN DER LEEDEN ET AL., *supra* note 78, at 336. Switching to a low-flow toilet can reduce water use from seven gallons to one. *Id.* at 722. The next most consumptive indoor use is bathing (23%). *Id.* at 336. Switching to a low-flow showerhead can reduce water use from ten gallons per minute to two. *Id.* at 722. Efficient dishwashers can reduce water use from 14 gallons per load to 8.5 gallons. *Id.*

were prohibited from specified outdoor watering practices.⁹⁴ Beyond the city requirements, the MWD⁹⁵ initiated a program in 1991 to encourage residential conservation. The MWD, with corporate sponsorship, assembled and distributed a kit containing retrofit plumbing equipment and instructions on water conservation.⁹⁶ The program was expected to retrofit more than 900,000 households.⁹⁷ In 1992, California joined many other states in setting low-flow standards for new toilets.⁹⁸ The savings added up. During the height of the drought, Los Angeles surprised state water planners by reducing consumption by nearly thirty percent.⁹⁹ Santa Barbara, hit worse by the drought, proved that a city could function indefinitely with a forty percent reduction in personal water consumption.¹⁰⁰

Other urban water conservation measures also can make a significant savings. In large cities with old water distribution systems, more than half of the municipal water supply may simply disappear from the network.¹⁰¹ Leak detection and repair pro-

94. Overall, the program collected about \$20 million in fines. After rains in the spring of 1992, the city rescinded the mandatory conservation levels, but continued the ban on wasteful watering practices. Frederick M. Muir, *L.A. Ends Water Rationing but Asks Users to Conserve*, L.A. TIMES, Apr. 1, 1992, at B4.

95. Incorporated in 1928, the MWD currently encompasses 5200 square miles. Through its 27 member agencies, MWD delivers water for municipal and industrial use in six counties: San Diego, San Bernardino, Riverside, Orange, Los Angeles, and Ventura. METROPOLITAN WATER DIST. OF SOUTHERN CAL., ANNUAL REPORT 1, 25 (1991) [hereinafter MWD ANNUAL REPORT].

96. In 1991, MWD approved \$13 million for the largest urban conservation program in California history. Through the 'Water-Wise '91' program, MWD participated in fairs and other educational activities and distributed retrofit kits throughout its service area. The retrofit kits contained 'low-flow showerheads, toilet tank water displacement bags, leak-detection dye tablets, refrigerator magnets with the top 10 tips for water conservation, and literature on how . . . home residents could save water inside and outside the home. . . .' *Id.* at xxxiii-iv, 55.

97. *Id.* at 55.

98. Under the new California law, 'On or after January 1, 1994, all water closets sold or installed in this state shall be water closets . . . which use no more than an average of 1.6 gallons per flush. . . .' 1992 Cal. Adv. Legis. Serv. 1347 (Deering). See POSTEL, *supra* note 5, at 157, 158 & n.22 (listing states with new plumbing efficiency standards).

99. Jennifer Warren & Frederick M. Muir, *Is Drought History? Yes and No*, L.A. TIMES, Apr. 5, 1991, at A1.

100. Lou Cannon, *Is It Taps for Water Rationing?*, WASH. POST, Oct. 4, 1991, at A3.

101. POSTEL, *supra* note 5, at 159.

grams can quickly and inexpensively increase total water availability.¹⁰² The MWD began a pilot program in 1991 to study the potential savings from leak detection.¹⁰³ The MWD also began a program of cash incentives to its member water districts offering \$154 for every acre-foot saved.¹⁰⁴ Through various conservation programs implemented by the member water districts, enough water was saved to supply 885,000 households.¹⁰⁵

B. Agricultural Efficiency

While reductions in residential consumption may result in significant savings of cost and water, adjustments ultimately must be made by agriculture, which consumes about ninety percent of the water in California.¹⁰⁶ It has been estimated that less than fifty percent of the vast quantity of water diverted for agricultural use actually reaches the intended crops.¹⁰⁷ Much of the water is lost to evaporation from inefficient sprinkler systems which can be countered with existing sprinkler technology. Drip irrigation systems, pioneered by the Israelis, often achieve efficiencies of ninety-five percent by delivering water through porous piping directly to the plant roots.¹⁰⁸ Initial costs of drip systems are rather high making retrofitting a viable alternative only for higher-valued fruit and vegetable crops.¹⁰⁹ Cheaper versions of the same concept are available. One new sprinkler design, low-energy precision application (LEPA), in conjunction with other water conservation practices has shown efficiencies up to ninety-five percent. This system uses drop tubes hanging from sprinkler

102. With an investment of \$2.1 million, Boston's leak detection program cut system-wide demand by about 10%. *Id.* at 160.

103. MWD ANNUAL REPORT, *supra* note 95, at 55.

104. *Id.* at 54.

105. POSTEL, *supra* note 5, at 148.

106. MARC REISNER & SARAH BATES, OVERTAPPED OASIS 30 (1990).

107. POSTEL, *supra* note 5, at 99-100. See also Robert A. Pulver, *Liability Rules as a Solution to the Problem of Waste in Western Water Law: An Economic Analysis*, 70 CAL. L. REV. 671 (1988) (suggesting tort-like liability to prevent waste of water by agriculture).

108. Drip systems also save energy by delivering water at lower pressure, and preventing the accumulation of salts which often occurs with traditional field flooding. See Postel, *supra* note 5, at 103-04.

109. Used on half the irrigated land in Israel, drip systems are currently used by only three percent of U.S. irrigated land. However, the percentage is growing. *Id.* at 105-06.

arms which, like the drip systems, deliver water close to the crops.¹¹⁰ Retrofit to LEPA roots system is estimated to recoup costs in two to four years.¹¹¹

Aside from of sprinkler technology, many other measures may be taken to conserve agricultural water. Implementing 'surge' irrigation techniques can improve the efficiency of traditional gravity methods by fifteen to fifty percent.¹¹² Improved maintenance of canals,¹¹³ and more careful monitoring of the water needs of crops,¹¹⁴ also can produce substantial water savings.

C. Intrastate Water Transfers

Over the last twenty years, the potential value of water transfers has been recognized by economists, environmentalists, and other concerned commentators.¹¹⁵ While the grand schemes for transferring water from the Pacific Northwest may be economically and environmentally suspect, water transfers on a small scale may prove to be efficient and environmentally benign. Through fallow or water conservation, tremendous quantities of water can be freed in the Southwest for municipal, industrial, and environmental uses.¹¹⁶ Often such water transfers can be con-

110. Records from one two-year trial with a LEPA system in Texas showed a 47% reduction in water use, a 32% reduction in power requirements, and nearly a 33% increase in crop yield. Overall water productivity rose by 150%. *Id.* at 102-03.

111. *Id.* at 102.

112. *Id.* at 101. Under the surge method, an initial wetting of field rows acts to seal the soil so that the next application of water flows more quickly down the furrow instead of percolating at the head of the field. Initial costs of the necessary valves and timers are usually recouped in the first year. *Id.*

113. POSTEL, *supra*, note 5, at 108-10.

114. In California, the state-run California Irrigation Management Information System (CIMIS) helps farmers calculate their water needs by gathering information from weather stations, soil conservation offices, and other farmers. Use of this information reportedly allowed one fruit tree farm near Fresno, California to reduce watering by 35%. *Id.* at 112. See also MWD ANNUAL REPORT, *supra* note 95, at 57.

115. See generally Postel, *supra* note 5, at 165-82 (open markets can allow water to be purchased and dedicated to ecological systems); REISNER & BATES, *supra* note 106, at 58 (water transfers offer the most efficient and least disruptive means of solving future water shortages in the West); WAHL, *supra* note 15, at 130-31, 147-91 (voluntary water transfers provide one means to allow water to be used where most needed).

116. 'The savings possible in agriculture constitute a large and mostly unex-

ducted within California using existing distribution facilities,¹¹⁷ certainly at much less monetary and ecological cost than would be incurred through construction of an interbasin water project.

Historically, legal barriers obstructed the transfer of water from agriculture to urban use. The prior appropriation doctrine of western water law forced water appropriators to 'use it or lose it.' Under this doctrine, a farmer who transferred water to urban use might reasonably have feared losing the rights to the transferred water. This barrier to transfer largely has been dissolved through recent California legislation.¹¹⁸ A 1991 state law specifically authorizes leasing of water for a period up to five years, while preserving the lessor's underlying water rights.¹¹⁹ The law therefore assures that farmer's water rights will not be cut off by the lease of the water to urban users, encouraging the farmer to consider the potential benefits of the transfer.

In addition to the restrictions imposed by the doctrine of prior appropriation, some restrictions on the transfer of water were historically imposed by the federal government. Recipients of water from the Bureau of Reclamation's Central Valley Project (CVP) in California¹²⁰ were restricted by contract from transferring this subsidized water to municipalities. In 1989, the Bureau of Reclamation acted to remove these barriers to water transfers by establishing a formal policy supporting transfers of federal rec-

ploited new source of supply—the biggest pool in the 'last oasis.' Reducing irrigation needs by a tenth, for instance, would free up enough water to roughly double domestic water use worldwide." POSTEL, *supra* note 5, at 99.

117. See REISNER & BATES, *supra* note 106, at 58.

118. Professor Charles Wilkinson of the University of Colorado announced the death of Prior Appropriation in 1991, at the age of 152, from multiple causes including environmentalists, Indian water settlements, and state water planning. Charles F. Wilkinson, *In Memoriam: Prior Appropriation*, 21 ENVTL. L., No. 3, at v (1991).

119. 1991 Cal. Stat. ch. 847, § 3 (codified at CAL. WATER CODE § 1020 (West Supp. 1993)).

120. The Bureau of Reclamation's CVP involved the construction of the Shasta Dam on the Sacramento River; Friant Dam on the San Joaquin River; and a dam on the Trinity River, a tributary of the Klamath River in northern California; plus miles of canals throughout the Central Valley of California. Act of August 26, 1937, ch. 832, 50 Stat. 850 (1937). See REISNER, *supra* note 15, at 158-59. The CVP began delivering water in 1951. Today, it supplies an average of 3.75 million acre-feet of water annually. Brian E. Gray, et al., *Transfers of Federal Reclamation Water: A Case Study of California's San Joaquin Valley*, 21 ENVTL. L. 911, 914 (1991).

lamation water and by providing criteria to facilitate such transfers.¹²¹ Based in part upon this new federal policy and a review of applicable California law, a recent study concluded that 'CVP contractors and individual farmers may transfer project water.'¹²²

Congress declared its support for water transfers in the CVP Improvement Act, part of the Omnibus Water Act passed by Congress in October, 1992.¹²³ One purpose of the CVP Improvement Act is to expand the use of voluntary water transfers from the CVP.¹²⁴ To this end, the Act expressly authorizes 'all individuals or districts who receive Central Valley Project water' to transfer this water 'to assist California urban areas, agricultural water users, and others in meeting their future water needs . . .'¹²⁵

The major remaining obstacle to intrastate water transfers may be convincing farmers to act in economic self-interest where the price of water so provides. This, in reality, should not pose a major problem. In the spring of 1991, California Governor Pete Wilson established an emergency water bank to deal with the ongoing drought, and offered farmers \$125 per acre-foot of water.¹²⁶ At this price, the state water bank was able to pool 800,000 acre-feet in just a few months,¹²⁷ which is enough water to satisfy the annual consumptive needs of more than eight million residents.¹²⁸ Intrastate transfers of water from agricultural to

121. BUREAU OF RECLAMATION, U.S. DEP'T OF INTERIOR, VOLUNTARY WATER TRANSACTIONS: CRITERIA AND GUIDANCE 1 (1989).

122. Gray et al., *supra* note 120, at 916.

123. Pub. L. No. 102-575, §§ 3401-3412, 106 Stat. 4600, 4706-4731. See Harrison Dunning, *Confronting the Environmental Legacy of Irrigated Agriculture in the West: The Case of the Central Valley Project*, 23 ENVTL. L. 943 (1993).

124. Pub. L. No. 102-575, § 3402, 106 Stat. at 4706.

125. *Id.* § 3405(a), 106 Stat. at 4709-4712. Such transfers are subject to disapproval by the Secretary of the Interior or the relevant water district or agency acting within ninety days. *Id.* § 3405(a)(1)-(2), 106 Stat. at 4710-4711.

126. Jennifer Warren, *Water Rich Farmers Get a Flood of Sale Calls*, L.A. TIMES, Mar. 4, 1991, at A3.

127. Lori Olszewski & Elliot Diringier, *How to Solve Crisis over Scarce Water*, S.F. CHRON., Apr. 19, 1991, at A1. While the state was offering \$125 per acre-foot, independent water buyers provided a healthy competition from the farmers' perspective. Warren & Muir, *supra* note 99. Responding to the 1992 Act, urban water districts, such as the MWD, are expected to offer about \$160 per acre-foot for which the typical farmers currently pays \$20. Robert Reinhold, *New Age for Western Water Policy: Less for the Farm, More for the City*, N.Y. TIMES, Oct. 11, 1992, at A12.

128. See *supra* text accompanying note 90.

urban use are already proceeding under a pilot program in which the MWD is paying \$135 per acre-foot.¹²⁹ A ten percent total shift of CVP water from present agricultural uses could satisfy municipal and industrial water needs for the next twenty years.¹³⁰

D. Developing Technologies

The 1992 Omnibus Water Act mandated federal activities in research and development of new technologies for water conservation continue. As part of the Omnibus Water Act, Congress passed the Western Water Policy Review Act of 1992,¹³¹ which established an Advisory Commission charged with the broad mission of identifying 'alternative ways of meeting [future] water requirements' in the western states. The Commission is specifically directed to consider 'conservation and more efficient use of existing supplies,' as well as 'recent technological advances.'¹³² With a focus on agriculture, the 1992 CVP Improvement Act also requires consideration of water conservation practices and technologies. The Act directs the Secretary of Interior to establish and administer an office on CVP water conservation practices. This office shall develop criteria for evaluating water conservation plans to 'promot[e] the highest level of water use efficiency reasonably achievable by project contractors.'¹³³ In another part of the Omnibus legislation, the Reclamation Wastewater and Groundwater Study and Facilities Act¹³⁴ directs the Bureau of Reclamation to investigate the reclamation of wastewater. Such investigations shall include research and demonstrations on the reuse of 'municipal, industrial, domestic and agricultural wastewater.'¹³⁵ The investigations shall also include research on desalting wastewater and 'naturally impaired ground and surface

129. Letter from Don L. Adams, Chief of Operations, Metropolitan Water District of Southern California, to Clifford J. Villa, (Jan. 8, 1993) (on file with author) (farmers in the Palo Verde Irrigation District following portions of their land according to terms of a two-year test program).

130. Reinhold, *supra* note 127.

131. Pub. L. No. 102-575, §§ 3001-3009, 106 Stat. 4600, 4693-4698.

132. *Id.* § 3005, 106 Stat. at 4695-4696.

133. Initial criteria, due April 1993, must be reviewed at least every three years to keep informed of best available cost-effective technology and best management practices. Pub. L. No. 102-575, § 3405(e)(1), 106 Stat. 4600, 4713.

134. Pub. L. No. 102-575, §§ 1601-1609, 106 Stat. 4600, 4663-4669.

135. *Id.* § 1605, 106 Stat. at 4665.

waters.”¹³⁶ In conjunction with the State of California and local entities, the Bureau is authorized to conduct a comprehensive study of the potential for reclamation and reuse of water in southern California.¹³⁷

The MWD has already been working with the Bureau of Reclamation to develop water conservation technology. In March 1991, the MWD and the Bureau funded a project to test whether earthen canals could be lined with concrete without interrupting operation.¹³⁸ Lining earthen canals prevents substantial losses to seepage.¹³⁹ The MWD also has funded a number of other programs to encourage reuse of wastewater and reclamation of contaminated groundwater.¹⁴⁰

Seawater desalination holds potential for meeting long-term water requirements. Converting seawater for consumptive uses has long been viewed as the ultimate solution for arid environments.¹⁴¹ Unfortunately, the high amounts of power required for desalination processes have prevented wide use of desalination as

136. *Id.* § 1602(a), 106 Stat. at 4664.

137. *Id.* § 1606, 106 Stat. at 4665-4666. The Act limits the federal share of the costs of the water reclamation and reuse studies to 50% percent of the total.

138. Preliminary results of the test, appeared favorable. The contractor demonstrated the ability to line up to 2200 feet of one canal in one day while the canal continued deliveries of water. MWD ANNUAL REPORT, *supra* note 95, at 53.

139. The MWD's lining of the All-American Canal, which transports water from the Colorado River to southern California, is expected to save 100,000 acre-feet of water annually. However, this particular project is not without its drawbacks. Stopping seepage from the Canal—which parallels the Mexican border—may endanger water supplies for cities and farms in northern Mexico. See generally Douglas L. Hayes, *The All-American Canal Lining Project: A Catalyst for Rational and Comprehensive Groundwater Management on the United States-Mexican Border*, 31 NAT. RESOURCES J. 803 (1991).

140. Under one program, the MWD pays local water agencies \$154 per acre-foot of water reused. This payment, plus the avoidance of purchasing another acre-foot of water and the avoidance of transportation costs, creates an incentive of over \$476 per acre-foot. Letter from Don L. Adams to Clifford J. Villa, *supra* note 129. Reclaimed water can be used for various nonpotable purposes such as landscape or industrial applications. See MWD ANNUAL REPORT, *supra* note 95, at xxxiv. Under another program, MWD pays local water agencies up to \$250 per acre-foot for desalination of groundwater, creating a total incentive of over \$572 per acre-foot. Letter from Don L. Adams to Clifford J. Villa, *supra* note 129. This groundwater recovery program is expected to provide an annual supply of 200,000 acre-feet by the year 2000. MWD ANNUAL REPORT, *supra* note 95, at xxxiv.

141. BUREAU OF RECLAMATION, *supra* note 17, at 149.

a source of fresh water.¹⁴² Nevertheless, desalination technology has proved effective through the more than 7500 plants operating today.¹⁴³ During the drought, three desalination plants were built in California, including a plant in Santa Barbara which has the largest capacity in the United States.¹⁴⁴ At approximately \$2000 per acre-foot of water, the Santa Barbara plant demonstrated that desalination is presently an uneconomical source of fresh water.¹⁴⁵ Still, the MWD, the Bureau of Reclamation, and other public and private entities continue to investigate desalination technologies¹⁴⁶ and expect the costs to decline.¹⁴⁷

As this Section suggests, there are many relatively inexpensive means for satisfying present and future water demands in the West. The least expensive of the recent interbasin water transfer proposals, the \$4 billion Multinational plan, estimates it could deliver water to southern California profitably at \$1000 per acre-foot.¹⁴⁸ However, southern California can presently tap enormous

142. For brief descriptions of two of the most common desalination processes, distillation and reverse osmosis, and for statistics on international use of these processes, see VAN DER LEEDEN ET AL., *supra* note 78, at 700-06.

143. POSTEL, *supra* note 5, at 45. As a result of the high costs involved, some 60% of these desalination plants have been built in the arid but wealthy nations of the Middle East. *Id.* at 46.

144. Maria Cone, *Focus on Sea as Tap Water Stirs Talk of Risk*, L.A. TIMES, Nov. 30, 1992, at A3.

145. Letter from Don L. Adams to Clifford J. Villa, *supra* note 129.

146. POSTEL, *supra* note 5, at 46. *See also* Cone, *supra* note 144 (describing several planned desalination projects).

147. The results of a nine-month feasibility study by the MWD, released in December 1991, showed that a desalination plant could produce an acre-foot of water for about \$1600. Amy Wallace, *Costs May End Plan for Water Plant in Baja*, L.A. TIMES, Dec. 13, 1991, at B1. While the price turned out higher than project sponsors had hoped, it still showed a marked decline from the anticipated \$2000 per acre-foot fresh water produced by the recently completed Santa Barbara desalination plant.

148. MULTINATIONAL WATER & POWER INC., *supra* note 79. In 1991, Fluor Daniel estimated that the proposed Alaska Water Pipeline could deliver four million acre-feet annually at a total project cost of \$110 billion. *See supra* note 70-73. Repaid over 30 years, this would represent approximately \$900 per acre-foot. However, the Office of Technology Assessment strongly questioned the validity of this estimate. *See supra* note 73. The MWD suggested a ballpark estimate for Alaska water at \$4000 per acre-foot. Letter from Don L. Adams to Clifford J. Villa, *supra* note 129. Kenneth Hahn's \$10 billion Columbia River proposal, delivering 3.4 million acre-feet annually, could be repaid in 30 years at a cost of \$100 per acre-foot. *See supra* note 64. It should be noted, however, that Hahn offered no written calculations to support his estimates.

agricultural reserves of water for \$135 per acre-foot. It can reclaim local wastewater for \$154 per acre-foot or contaminated groundwater for \$250 per acre-foot. Beyond these additional supplies, California can simply do with much less, as demonstrated through the rationing during the drought, and as promised by the developing conservation technologies in agriculture. Thus, the National Water Commission's first criterion for evaluating proposed interbasin water transfers would recommend against each of the recently proposed projects: none of these projects represents the least-cost solution to California's water needs.¹⁴⁹

IV. COSTS AND BENEFITS

Even though there may be less costly solutions to California's water needs, it cannot be doubted that transferring water from the Pacific Northwest to California would provide substantial benefits to many parties. Ambitious developers might profit by constructing a project and charging for delivery of water.¹⁵⁰ States or provinces could profit by selling water as they have profited by selling other natural resources such as timber and oil.¹⁵¹ Construction and operation of water transfer facilities would also provide many local employment opportunities.¹⁵² Other political circumstances may also support construction of an interbasin water transfer project even if the project does not offer the least expensive means to satisfy water demands.¹⁵³

149. After studying the 1991 Alaska Water Pipeline proposal, the Office of Technology Assessment reached the same conclusion:

[T]he supply options available to [California] (including wastewater reclamation, water banking, and desalination), the variety of opportunities available to reduce demand through urban and agricultural conservation, and the possibility of reallocating some supplies from agriculture to the urban sector . . . appear adequate to meet California water demands for the foreseeable future.

OFFICE OF TECHNOLOGY ASSESSMENT, *supra* note 74, at 10.

150. Multinational estimates that it could capture a net income of \$600 million annually by selling water at \$1000 per acre-foot with a 30-year debt repayment. KVA RESOURCES INC., *supra* note 81, at 14.

151. See, e.g., James Fallows, *Nigeria of the North*, ATLANTIC, Aug. 1984, at 18.

152. See, e.g., MULTINATIONAL WATER & POWER INC., *supra* note 79, at 6.

153. See REISNER, *supra* note 15, at 176-221 (political egos, private favors, plus rivalry between Corps of Engineers and Bureau of Reclamation drove construction of numerous cost-ineffective water projects).

Applying the second criterion of the National Water Commission for evaluating interbasin water transfers, one would consider whether, even if not the least expensive solution, an interbasin project might still provide benefits which outweigh the likely costs. The National Water Commission noted that efforts to determine costs and benefits from an interbasin water transfer project would be inherently difficult.¹⁵⁴ Benefits from such a project would be obscured by 'changing consumer preferences, developing technology, and uncertain population growth and distribution'¹⁵⁵ Cost estimates would be unreliable.¹⁵⁶ Moreover, the method for measuring costs and benefits may influence the results: while a project may provide net benefits in water and jobs at the regional level, it may disguise the greater costs in federal taxes to the nation.¹⁵⁷

Clouding the calculation of costs and benefits are the externalities involved with a project to transfer water from the Pacific Northwest.¹⁵⁸ No ready market can determine the value of one million acre-feet of water to the fish and wildlife, or the farmers, fishermen, and recreationalists in and along the Stikine River in Alaska or the North Thompson and Fraser Rivers in British Columbia.¹⁵⁹ No market can translate into dollars the environmental

154. NATIONAL WATER COMM'N, *supra* note 88, at 321.

155. *Id.* The Commission emphasized the point that 'once a large-scale interbasin transfer is undertaken, a long-term commitment of large sums of capital to a relatively inflexible scheme of resource allocation is required.' *Id.* Assessing the uncertainty of benefits from interbasin water transfers, the Commission counselled, 'the Nation should proceed with extreme caution before entering upon such enterprises.' *Id.*

156. The National Water Commission cited the Bureau of Reclamation's experience with the Colorado-Big Thompson project, which pulls water over the Continental Divide to arid parts of eastern Colorado. In 1937, the Bureau of Reclamation estimated the project would cost \$44 million. When completed after World War II, the total costs had almost quadrupled, reaching \$161.6 million. *Id.*

157. See Charles W. Howe, *Project Benefits and Costs from National and Regional Viewpoints: Methodological Issues and Case Study of the Colorado-Big Thompson Project*, 26 NAT. RESOURCES J. 77 (1986).

158. Externalities represent the 'costs or benefits of market transactions not reflected in prices.' DAVID N. HYMAN, PUBLIC FINANCE 82 (1987).

159. Acre-feet of water can be priced, as the activities of the MWD have ably demonstrated. See, e.g., *supra* text accompanying note 129. However, such transactions only indicate willingness and ability to pay, not the total value of such water. Environmentalists and others interested in use of the water may value the water much more highly according to other measures, but may lack the information, resources, and individual incentives to express such value in the market sys-

harm caused by laying 314 miles of pipeline across central Oregon, or 1400 miles of pipeline along the Continental Shelf. These external costs of measurable magnitude, would deny accurate comparison of the costs and benefits from an interbasin water project. However, consideration of these costs would be commanded by modern environmental laws.

In 1950, when the Bureau of Reclamation mapped out its grand schemes for moving water across the American west, the Bureau did not have to consider the application of the Wild and Scenic Rivers Act,¹⁶⁰ National Environmental Policy Act,¹⁶¹ the Coastal Zone Management Act,¹⁶² the Marine Mammal Protection Act,¹⁶³ the Endangered Species Act,¹⁶⁴ or the Columbia River Gorge National Scenic Area Act.¹⁶⁵ It did not have to prepare an environmental impact statement,¹⁶⁶ protect marine mammals,¹⁶⁷

tem. See Michael Blumm, *The Fallacies of Free Market Environmentalism*, 15 HARV. J.L. & PUB. POL'Y 371 (1992).

160. 16 U.S.C. §§ 1271-1287 (1988 & Supp. III 1991).

161. 42 U.S.C. §§ 4321-4370a (1988 & Supp. III 1991).

162. 16 U.S.C. §§ 1451-1464 (1988 & Supp. III 1991).

163. 16 U.S.C. §§ 1361-1407 (1988 & Supp. III 1991).

164. 16 U.S.C. §§ 1531-1543 (1988 & Supp. III 1991).

165. 16 U.S.C. §§ 544-544p (1988 & Supp. III 1991).

166. The primary requirement of the National Environmental Policy Act is the preparation of a 'detailed statement' on the environmental impact of any proposal for 'major Federal actions.' 42 U.S.C. § 4332(2)(C). Even if the water transfer project were funded privately, it would nonetheless constitute a 'Federal action' because of the federal permits that would be necessary to obtain before construction. See Patrick A. Parenteau, *Small Handles, Big Impacts: When Do Corps Permits Federalize Private Development?*, 20 ENVTL. L. 747 (1990). Sufficient evaluation of the environmental impacts of one of the proposed interbasin water projects could delay construction by several years. Before construction of the Trans-Alaska Pipeline commenced in April 1975, work was held up for years as environmental groups contested the sufficiency of the EIS completed by the Department of the Interior. Incited by the efforts of OPEC to limit the flow of foreign oil, Congress specifically directed that the 'trans-Alaska oil pipeline be constructed promptly without further administrative or judicial delay or impediment.' Trans-Alaska Pipeline Authorization Act, Pub. L. No. 93-153, § 203, 87 Stat. 576 (1973).

167. The Marine Mammal Protection Act generally prohibits the harassment, hunting, capture, kill or importation of marine mammals without a federal permit. 16 U.S.C. §§ 1362, 1371 (1988 and Supp. III 1992). Such a permit would be required to construct a pipeline along the Continental Shelf, the habitat of numerous marine mammals. Finding "twenty-nine species of marine mammals . . . breed, rest, or migrate through" the waters off the Olympic Peninsula, the National Oceanic and Atmospheric Administration in 1991 proposed to designate 2605

or consult with other agencies on the presence of endangered or threatened species.¹⁶⁸ It operated under a different set of values, where undiverted water 'waste[d] into the ocean'¹⁶⁹ and wild salmon could be replaced satisfactorily with stocked bass.¹⁷⁰ The

square nautical miles in this area as a National Marine Sanctuary pursuant the Marine Protection, Research and Sanctuaries Act of 1972, 16 U.S.C. §§ 1431-1439 (1988). 56 Fed. Reg. 47,836, 47,838 (1991).

168. The Endangered Species Act (ESA) § 7 requires that all federal agencies 'insure that any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize the continued existence of any endangered species or threatened species' or result in the adverse modification of designated critical habitat. 16 U.S.C. § 1536(a)(2) (West. 1990). To comply with this mandate, the agency must consult with either the Fish and Wildlife Service (FWS) for terrestrial species or the National Marine Fisheries Service (NMFS) for marine species. *Id.* ESA § 9 establishes a further requirement, prohibiting any 'person' subject to U.S. jurisdiction from harassing or harming any listed species. 16 U.S.C. §§ 1538(a)(1), 1532(19). *See generally* James C. Kilbourne, *The Endangered Species Act Under the Microscope: A Closeup Look from a Litigator's Perspective*, 21 ENVTL. L. 400 (1991). These two sections of the ESA would create ubiquitous problems for construction of any of the recently proposed projects to transfer water from the Pacific Northwest. On November 15, 1991, NMFS listed the Snake River sockeye salmon as an endangered species. 56 Fed. Reg. 58,619 (1991). On April 22, 1992, NMFS listed two other species as threatened: the Snake River fall and spring/summer chinook salmon. 57 Fed. Reg. 14,653 (1992). Consequently, diversion of any water from the habitat of these listed species, which includes the length of the Columbia River from the Snake to the Pacific Ocean, would require consultation between the federal permitting agencies and NMFS to insure the diversion did not jeopardize the survival of these species. Further assurance would have to be made that the diversion did not create any unpermitted 'taking' under § 9. Aside from diversion, transportation of the water may present its own problems under the ESA. For example, the pumping stations along the coast required to operate an undersea pipeline from Alaska may interfere with the habitats of the threatened northern spotted owl, 50 C.F.R. § 17.11 (1990), or the threatened marbled murrelet, 57 Fed. Reg. 45,328 (1992).

169. *See* Letter from Michael W. Straus, Commissioner, Bureau of Reclamation, to Oscar L. Chapman, Secretary of the Interior (Dec. 15, 1952) *reprinted in* BUREAU OF RECLAMATION, *SUPRA* note 17 at 1. The intensive efforts now underway to allocate water in the Columbia Basin among the competing uses for fish and wildlife protection, hydropower, and irrigation assure the absence of any 'wasted' flows. Quite contrary to the congressional attempts in the 1960s to augment the flow of the Colorado River with water from the Columbia Basin, *see supra* note 48, the Bureau of Reclamation is currently augmenting the flows of the Snake and Columbia Rivers. DEPARTMENT OF THE ARMY, CORPS OF ENGINEERS, INTERIM COLUMBIA AND SNAKE RIVER FLOW IMPROVEMENT MEASURES FOR SALMON FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT 1-9 (Dec. 1992). *See generally* THE COLUMBIA RIVER SYSTEM, SCREENING ANALYSIS: A SUMMARY (1992).

170. The UWI recognized that construction of the necessary dam near the mouth of the Klamath River 'would result [in] elimination of migratory fish.'

shift in values has increased the costs of such projects relative to the perceived benefits. Thus, while the costs and benefits resist measurement in price, the total costs of transferring water from the Pacific Northwest seem likely to eclipse the total benefits.

V. A NEW DIRECTION

With water transfers from the Pacific Northwest failing to provide the least-cost solution to California's water needs, and with the attendant costs and benefits highly ambiguous, the National Water Commission would advise against federal involvement in such a project. However, the Commission's third criterion for evaluating interbasin water transfers remains for consideration: whether alternative investments of public funds can better assure needed results.¹⁷¹ This inquiry may be answered emphatically, "yes." As shown in Section III, investment in smaller scale existing and developing technologies for water conservation and production can satisfy present and future water needs sooner and more assuredly than large-scale water transfer projects. The collective value of such smaller investments appears to have gained recognition recently from the Bureau of Reclamation.

In 1987, the Bureau of Reclamation reassessed its mission and concluded that 'the era of constructing large federally financed water projects is drawing to a close.'¹⁷² The Bureau acknowledged that '[c]onservation of water and protection of the environment are major public concerns'¹⁷³ and shifted its focus from construction to conservation. Of course, change does not come quickly in any bureaucracy.¹⁷⁴ As a first substantive step, the Bureau, in June 1992, completed a 'Strategic Plan' outlining a new set of goals and the strategies to achieve them.¹⁷⁵

However, '[s]uch detriments might be offset wholly or in part by the introduction and fostering of non-migratory species above the dam.' BUREAU OF RECLAMATION, *supra* note 17, at 116.

171. NATIONAL WATER COMM'N, *supra* note 88, at 321.

172. BUREAU OF RECLAMATION, U.S. DEP'T OF THE INTERIOR, ASSESSMENT '87 A NEW DIRECTION FOR THE BUREAU OF RECLAMATION at i (1987).

173. *Id.* at i.

174. See REISNER & BATES, *supra* note 106, at 48-53 (commenting on the few changes in the Bureau between 1987 and 1990).

175. "The Strategic Plan consists of 25 . . . program elements grouped into 5 sections": 1) Managing and Developing Resources; 2) Protecting the Environment; 3) Safeguarding the Investment; 4) Building Partnerships; and 5) Fostering Qual-

This transition from construction to conservation should gain speed and support under the Clinton Administration. Clinton's Secretary of the Interior, Bruce Babbitt, has openly criticized the Bureau's water development in the West,¹⁷⁶ and led initiatives for water conservation.¹⁷⁷ Under Secretary Babbitt and Vice President Gore,¹⁷⁸ environmental concerns should dissuade investment in future large-scale water projects and encourage investment in water conservation and environmental reparations.

On February 24, 1993, the drought which had punished California for six years reached an official end.¹⁷⁹ The drought left behind fundamental changes in the way water will be viewed in the West. The drought prompted legislation, technology, and personal habits which will assure that water conservation continues beyond the periods of enforced rationing. The western United States is largely arid, and the survival and prosperity of the West requires continued and expanded efforts in water conservation.

The grand schemes for transferring water from the Pacific Northwest, meanwhile, will survive in the minds and charts of private entrepreneurs and will return with the next drought. But when the potential water user considers the numerous, cheaper alternatives, and when society considers the extraordinary external costs, such proposals should again be abandoned.

ity Management. BUREAU OF RECLAMATION, U.S. DEP'T OF THE INTERIOR, STRATEGIC PLAN, Introduction (1992).

176. Bruce Babbitt commented: "We had the bad fortune to invent the Bureau of Reclamation. And what we did when we invented the Bureau of Reclamation was set up an extraordinary powerful, political force composed of the United States Congress, local interest, and a hungry bureaucracy . . ." Address at a CLE Conference on Navigability at Lewis & Clark Northwestern School of Law (November 13, 1992), *reprinted in* 23 ENVTL. L. 933, 934 (1993). *See also* Bruce Babbitt, *Foreword*, in MARC REISNER & SARAH BATES, *supra* note 106, at xii (1990) ("[e]ngineers and promoters . . . turn[ed] the Bureau of Reclamation into a[n unstopppable] . . . political machine that . . . finally became a parody of itself.").

177. Babbitt is past president of the League of Conservation Voters and, as Governor of Arizona, succeeded in obtaining the most comprehensive groundwater management reforms in the nation. *See* Desmond D. Connall, Jr., *A History of the Arizona Groundwater Management Act*, ARIZ. ST. L.J. 313 (1982).

178. Among the Vice-President's particular concerns are global water shortages, which he suggests cannot be solved with schemes such as towing icebergs. Rather, Gore suggests, the answer lies in water reuse and improved agricultural efficiencies. SENATOR AL GORE, *EARTH IN THE BALANCE* 99-114 (1992).

179. Robert Reinhold, *Drought Ends, Having Altered Political Landscapes*, N.Y. TIMES, Feb. 25, 1993, at A1.