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SUPERIOR COURT OF THE STATE OF CALIFORNIA

COUNTY OF LOS ANGELES

SANTA BARBARA CHANNELKEEPER, Petitioner, **v.** **STATE WATER RESOURCES CONTROL BOARD, a California State Agency; CITY OF BUENAVENTURA, a California municipal corporation,** Respondents,	Case No. 19STCP01176 **STATE AGENCIES' REQUEST FOR JUDICIAL NOTICE IN SUPPORT OF SUPPLEMENTAL BRIEFING ON THE PHYSICAL SOLUTION DOCTRINE** Date: March 15, 2021 Time: 1:30 p.m. Dept.: 10 Judge: Honorable W. Highberger Trial Date: None Set Action Filed: September 19, 2014

CITY OF SAN BUENAVENTURA, a California municipal corporation,

Cross-Complainant,

v.

DUNCAN ABBOTT, an individual; et al.,

Cross-Defendants.

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Respondent and intervenor State Water Resources Control Board (the "State Water Board"), intervenor California Department of Fish and Wildlife (the "Department"), and cross-defendant California Department of Parks and Recreation ("Parks") (collectively, the "State Agencies") respectfully request that the Court take judicial notice pursuant to Evidence Code section 452, subdivision (d) of the statement of decision in the following state court matter:

1. *Environmental Defense Fund, Inc. et al., v. East Bay Municipal Utility District et al.* (Superior Court Alameda County Case No. 425955) – attached hereto as Exhibit 1.

Under Evidence Code section 453, this Request for Judicial Notice is conditionally mandatory and must be granted if sufficient notice is given to an adverse party and if the court is furnished with sufficient information to enable it to take judicial notice of the matter (*People v. Maxwell* (1978) 78 Cal.App.3d 124, 130). By this request, the State Agencies give the Court and all parties sufficient notice and information to enable the Court to take judicial notice of the document attached hereto.

Pursuant to Evidence Code section 452, subdivision (d), this Court may take judicial notice of "Record of (1) any court of this state [...]." Therefore, the State Agencies request the Court take judicial notice of the attached statement of decision that are relevant to this Court's consideration of this Ventura River watershed adjudication.

Dated: March 10, 2021

Respectfully Submitted,

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Dated: March 10, 2021

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Exhibit 1

IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA

IN AND FOR THE COUNTY OF ALAMEDA

ENVIRONMENTAL DEFENSE FUND, INC., et al., Plaintiff, v. EAST BAY MUNICIPAL UTILITY DISTRICT, et al., Defendants.	No. 425955 STATEMENT OF DECISION
COUNTY OF SACRAMENTO, et al., Intervenors.	

I.

The single issue, which has spawned 17 years of litigation to date, is whether, pursuant to a 1970 contract with the Bureau of Reclamation, EBMUD may divert 150,000 acre-feet annually (AFA) from the Folsom Reservoir at the Folsom-South Canal or whether the mandates of Article X, section 2 of the California Constitution and public trust doctrine require that the diversion occur

below the confluence of the American River and Sacramento River. Plaintiffs and intervenors[1] contend that the EBMUD diversion and consequent diminution of instream flows will cause substantial ecological harm to riparian habitat, fisheries, and recreational resources. Plaintiffs and intervenors further direct their concern to the cumulative impact of the EBMUD diversion in combination with projected appropriation and diversion of American River water in response to expanding urbanization and population growth.

EBMUD contends that the evidence is insufficient to demonstrate any appreciable harm to public trust values; that principles of California Water Law require the recognition and implementation of its contract rights; that sound public policy requires that high quality drinking water be obtained from the best available source; and that the Folsom Dam was constructed pursuant to objectives and purposes that preempt state interference. Each side has advanced a number of subordinate and corollary issues, each of which will be considered in turn.

The Court has concluded that providing high quality drinking water is a significant public policy objective that is furthered by EBMUD's diversion at the Folsom-South Canal. The evidence has demonstrated persuasively, however, that specific conditions must attach to that diversion in order to protect sensitive public trust values. Accordingly, the Court has fashioned a physical solution designed to accommodate the competing concerns which have emerged.

Finally, the evidence is overwhelming that the cumulative impact of EBMUD's diversion along with those consumptive demands projected over the next few decades would cause irreparable damage to the American River, its fisheries and its riparian habitat. Consequently, both Article X, section 2 and public trust doctrine require that this court's physical solution be considered a base line against which any future diversion or appropriation is to be measured.

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[1] The terms "plaintiff(s)" and "intervenor(s)" are sometimes used interchangeably. It is possible that some arguments or positions may be attributed to a party who did not advance them, and vice versa.

Cumulative impact inconsistent with the physical solution may compel a cessation of EBMUD's diversion.

II.

In 1944 Congress authorized Folsom Dam as a United States Army Corps of Engineers flood control project. (Pub. L. No. 8-534) In 1949 Folsom Dam was reauthorized as a United States Bureau of Reclamation ("USBR") multiple purpose reclamation project (Pub. L. No. 81-356). As part of the this legislation, Congress also directed the Bureau of Reclamation to conduct studies for disposing of the water and electric power made available by the project, and specifically included Alameda and Contra Costa counties among the areas to be served. Folsom Dam was closed in 1956, and water storage was begun.

In March 1958, the State Water Resources Control Board ("SWRCB") issued Decision 893, granting permits to the USBR for storage of water at Folsom.[2] The USBR's permits were subject to minimum flows for fisheries resources, as provided for in a memorandum between the USBR and the California Department of Fish and Game (250 CFS from January 1 through September 14, and 500 CFS from September 15 through December 31). The USBR's permits were also subject to reduction by future appropriation of water for reasonable beneficial use within the watershed tributary to Folsom Reservoir.

In 1965, the Auburn-Folsom South Unit was authorized by Congress under Public Law 89-161. The main features of the project were Auburn Dam and Reservoir, and the Folsom-South Canal. The legislation states that the principal purpose of the project was to increase the supply of water available for irrigation and beneficial uses. The statute also authorized the Secretary of the Interior to

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2 The decision also granted permits to the City of Sacramento for the diversion of water from the American River. The city holds water rights on the Sacramento River as well. The decision also granted to Sacramento, San Joaquin and Placer counties a 10-year period in which to negotiate with the United States for a contract for American River water before the supply was permanently committed elsewhere.

allocate water and reservoir capacity to recreation and fish and wildlife enhancement.

Construction of the Folsom-South Canal commenced in 1968 and 27 miles of the canal have been completed. Suit was filed in 1972 by certain environmental groups, including SARA and EDF, that challenged the USBR's decision to proceed with the Auburn-Folsom South project on the ground that the EIS was inadequate. (See NRDC v. Stamm, 6 ERC 1525.) In view of the Secretary of the Interior's announcement that no further construction of the Folsom-South Canal would be undertaken pending further studies of the source of supply, the Court determined that the question of further construction of the Folsom-South Canal was not ripe for review and abstained from deciding that question, but retained jurisdiction and imposed conditions requiring that the federal defendants provide at least sixty days notice before commencing construction of the remaining stretches of the Canal, or before entering into any water service contracts for American River water. The Department of the Interior has not completed an EIS for the contracting of additional American River water.

Construction of the Auburn Dam was also begun in 1967, and would have provided 2.3 million acre-feet of additional storage. Concern over the seismic safety of the dam, however, required redesign and brought the project to a standstill. The present estimated cost to complete the dam is far in excess of the authorized cost ceiling, and will require additional authorization and appropriations by Congress if the project is to proceed.

In April, 1970 the SWRCB issued Decision-1356, granting the USBR water rights permits for Auburn Dam. The board also reserved jurisdiction for the purpose of formulating terms and conditions relative to flows to be maintained in the lower American River for recreational purposes, and for the protection and enhancement of fish and wildlife. Such flows were set in 1972 by Decision 1400.

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During the hearing proceedings leading to Decision 1356, the USBR entered into a stipulation, dated January 26, 1967, with the Sacramento River and Delta Water Association. This association represented Sacramento County among other parties. The stipulation extended until 1975 the priority granted to Sacramento, Placer and San Joaquin counties by D-893 to secure a contract with the USBR for American River water.

During this same time period, EBMUD was negotiating with the Bureau for a contract for American River water. Recognizing that the 1967 stipulation could impair any contract that it might obtain, the district entered into negotiations between the Bureau, the Sacramento River and Delta Water Association (representing Sacramento County), and the Central Valley East Side Project Association (representing San Joaquin Valley interests). An agreement was finally reached among these parties on November 21, 1968. Under the terms of that agreement, the 1967 stipulation was amended to provide that EBMUD could contract for 70,000 acre-feet of American River water annually without any conditions. The delivery of an additional 80,000 acre-feet annually was contingent upon construction of the Hood-Clay connection if sufficient bureau contracts had been made by 1976 to warrant such construction. However, the bureau did not enter into such additional contracts, and this condition expired in 1976. The Hood-Clay connection would have diverted water from the Sacramento River eastward into the Folsom-South Canal in order to supply additional water to the San Joaquin Valley. It would have joined the Folsom-South Canal at a point downstream from EBMUD's delivery point, and would not have provided water to EBMUD. The Hood-Clay project was never authorized by Congress.

By virtue of the 1968 agreement, Sacramento County's priority to obtain a bureau contract was confirmed to December 31, 1975, but subject to EBMUD's contract, conditioned as noted. Sacramento County did not exercise its priority.

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The 1968 agreement was submitted to the State Water Resources Control Board as part of the proceedings leading to Decision-1356. The agreement was approved by the board in D-1356, and its terms were included in EBMUD's contract with the bureau. Following such State Board approval, EBMUD executed its bureau contract on December 22, 1970.

EBMUD's contract calls for the delivery of American River water from the Folsom-South Canal at Grant Line Road, a distance of approximately twelve miles from the American River. EBMUD is obligated to construct its own conveyance facilities to take the water from the Folsom-South delivery point to its own service area. The contract is for 150,000 acre-feet, requiring certain minimum payments on a take-or-pay basis. The only other long-term contract on the Folsom-South Canal is held by the Sacramento Municipal Utility District for its Rancho Seco Nuclear Power Plant. That contract provides for 75,000 acre-feet annually, although only about 20,000 acre-feet is now being used.

In 1971, the SWRCB held nine days of hearings pursuant to its reserved jurisdiction in Decision 1356 to determine flows to be maintained in the lower American River for recreation and fisheries. In 1972, the SWRCB issued Decision 1400. Flows for fisheries were set at 1250 CFS from October 15 through July 14, and at 800 CFS from July 15 through October 14. These flows were recommended by the California Department of Fish and Game, and were higher than those under D-893. Minimum recreation flows were set at 1500 CFS. Recreation flows could be eliminated and fishery flows reduced during dry years when the bureau rations deliveries to its customers. The flows in D-1400 were based on the assumption that Auburn Dam would be built and relate only to the bureau's Auburn permits. Since Auburn Dam has not been constructed, the D-1400 flows are not legally binding upon the bureau. However, the bureau still operates to meet such minimum flows if water is available, measuring such flows

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immediately upstream of the City of Sacramento's diversion near "H" Street. These are referred to as modified D-1400 flows.

As part of its Report of Referee in this case, the State Water Resources Control Board indicated that it planned to review the American River water rights of the Bureau of Reclamation, and of the City of Sacramento. The board stated that the purpose of the review "would be to determine the appropriate flow to be maintained in the lower American River." (p. 28) In November, 1988, the board issued a work plan for its review of water rights on the American River. The proceeding is now underway, and is scheduled for a board decision in January, 1991.

As part of the board's American River Water Rights Review, the City of Sacramento is seeking permission to expand its Fairbairn Water Treatment Plant on the American River. The plant presently has a capacity to divert 91 million gallons per day ("mgd"). This is the equivalent of approximately 102,000 acre-feet annually. The City's petition is to increase the capacity of the plant to 200 mgd, or to 224,000 acre-feet annually. The City's basic American River water rights are in the form of four permits from the State Board (Nos. 11358-11361), and a Bureau of Reclamation contract. The combined total of these rights is 245,000 acre-feet annually, taken at a rate not to exceed 675 cubic feet per second. The City also has certain wells and groundwater rights, and a State Board Permit (No. 992) to divert 81,000 acre-feet annually from the Sacramento River. That permit expired December 1, 1988, and an extension application has been filed. The City has a separate water treatment plant on the Sacramento River to treat those diversions.

III.

INTRODUCTION

As early as 1915, the City of Sacramento planned for development of recreational parks within the American River floodplain. The City established the first park in the vicinity of the "H" Street Bridge in the 1920's. The County of

Sacramento also planned for development of recreational sites along the American River. However, the purchase and development of riverfront property proceeded slowly and in piecemeal fashion until the completion of Folsom Dam in 1956. The pressure for urban development adjacent to the river spurred efforts to preserve open space along the river. In 1959 the County of Sacramento established a Department of Parks and Recreation to develop a detailed plan of park needs along the American River. The American River Parkway Plan was approved by the Board of Supervisors in January, 1962, and was incorporated into the recreational element of the County General Plan. A systematic land acquisition program was initiated, and by 1986 Sacramento County had acquired over 4,000 acres of parkway land at a cost of 22 million dollars.

Today the American River Parkway consists of a series of fourteen connected parks comprising a complete riparian corridor along both sides of the American River from Folsom Dam to the confluence of the American with the Sacramento River. The lower 23 miles, from Nimbus Dam to the river's mouth, are administered by the County of Sacramento. In 1981 the Secretary of the Interior also designated the lower 23 miles of the American River below Nimbus Dam as a recreational river under the National Wild and Scenic Rivers Act. (16 U.S.C. § 1271 et seq.) In 1972, the California Legislature included the same segment in the State Wild and Scenic system (Pub. Resources Code §§ 5093.50, 5093.54(e).) The lower American River was statutorily designated as a "recreational" river in the system in 1982. (Pub. Resources Code § 5093.545.)

Recreation

The American River Parkway is unique among urban rivers the United States. Running through the center of the Sacramento metropolitan area, the river and parkway provide a public recreational resource of great value and regional significance; it has no equivalent in California and few equivalents in this country. The parkway provides an outstanding variety and quality of

recreational opportunities in the heart of a major metropolitan area. The parkway is California's largest urban riparian area. The parkway is managed to balance the dual goals of preserving natural, or open space, and protecting environmental quality within the urban environment, and at the same time contributing to recreational opportunities in the Sacramento area.

The California Legislature has declared that "[t]he American River parkway and its environs contribute to the quality of life within the City of Sacramento and the County of Sacramento, enhance the image of the city and the county as desirable places to live, provide for the public safety and welfare of the community, and thereby contribute to the economic well-being of the community." (Pub. Resources Code § 5841.5(a).)

The Legislature has further declared that "[t]he recreation capacity of the American River Parkway is immense, including such diverse activities as hiking, bicycling, picnicking, birding, horseback riding, canoeing, kayaking, rafting, sailing, and power cruising." (Id., at § 5841(c).) Some of the activities in the parkway are water-dependent, such as rafting, canoeing, kayaking, swimming, wading, and fishing; others are water-enhanced, such as biking, hiking, picnicking and sight-seeing.

The parkway contains developed parks such as Discovery, Ancil Hoffman and Goethe parks, as well as areas set aside in their natural condition. The Jedediah Smith Bicycle Trail permits parkway users to bicycle the full 23 miles from the confluence of the Sacramento and American rivers at Discovery Park to Nimbus Dam, crossing the river on the special bicycle bridge between Goethe Park and the William Pond Recreation Area. The bicycle trail then continues along Lake Natoma to Folsom State Park. Separate equestrian trails extend for many miles along the parkway.

A wide range of special activities takes place in the parkway, including nature study at the Effie Yeaw Nature Center, Take-a-Kid Fishing Day, Eppie's

Great Race (triathlon), a kite festival, and other organized programs. The parkway is also an excellent place for those who simply wish to relax in pleasant surroundings.

A 1978 survey listed the various parkway activities and percentages of usage as follows:

Activity	Usage (%)	Activity Cluster	Water Orientation
Fishing	9.5	Fishing	Water-Dependent
Swimming	9.5	Swimming	"
Rafting	10.0	Boating	"
Boating	1.4	"	"
Biking	6.7	Trail Users	Water-Enhanced
Jogging	3.9	"	"
Horseback	0.7	"	"
Hiking	4.3	"	"
Dog Walking	4.9	"	"
Picnicking	5.1	Picnicking	"
Relaxing	7.4	"	"
Nature Study	0.8	Nature Study	"
Photography	0.2	"	"
Archery	0.1	Field Sports	Not Water Oriented
Golf	2.1	"	"
Field Games	2.1	"	"
Other	14.7	Other	"
Total	100.0		

Riparian Vegetation

The riparian vegetation acts as a buffer between the lower American River and the surrounding urban development. This vegetation, together with the river itself, are the most prominent features of the Parkway, and contribute greatly to the recreational experiences there. Many species of wildlife use the riparian vegetation for sources of food, cover, nesting sites, roosting areas and migratory corridors. Riparian vegetation is recognized by ecologists as being among the most productive wildlife habitat in the state.

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The following table summarizes the acreage by vegetation type for the entire lower American River parkway:

	Type	Number of Stands	Total Acres	Mean Area (Acres)	Percent of Parkway
1.	Gravel Bar	4	29	7.3	0.8
2.	Willow Scrub	33	294	8.9	8.0
3.	Alders	18	130	7.2	3.5
4.	Cottonwood-Willow Scrub	27	152	5.6	4.1
5.	Cottonwood-Tree Willow	33	192	5.8	5.2
6.	Cottonwood-Mixed Scrubs	15	103	6.9	2.8
7.	Old Cottonwood	19	167	8.8	4.5
8.	Elderberry-Walnut Assoc.	16	221	13.8	6.0
9.	Valley Oak Assoc.	21	312	14.8	8.4
10.	Live Oak Assoc.	21	708	33.7	19.2
11.	Tailings Riparian	3	99	31.1	2.7
12.	Old Field	35	947	24.6	25.6
13.	Pavement, Bare Tailings	6	62	10.3	1.6
14.	Cultivated	8	279	34.8	7.6
	Total	259	3,695	14.3	100.0

Analysis of the historical aerial photographs dating from 1937 indicates a general increase in the density and extent of the riparian vegetation in some reaches of the parkway. Part of this increase is due to more protective management afforded the parkway in recent decades, restricting activities such as woodcutting and agriculture that served to remove riparian vegetation. Also, part of the increase in vegetation within the parkway can be attributed to the effect of Folsom Dam on decreasing the intensity and frequency of moderate floods, which would otherwise tend to reduce vegetation cover. Gravel mining within the riverbed and banks has served to disrupt much of the riparian zone of the parkway. In some locations, only the barren tailings piles remain that support little vegetation. At many locations, dredge mining created ponds and tailings piles that ponded water, allowing riparian plants to germinate and grow.

Closure of Folsom Dam has deprived the river of much of its sediment supply, and hence the channel of the river has begun to adjust by deepening and

narrowing in some reaches. The time required for the river to reach equilibrium with the new conditions cannot be determined with certainty, but several more decades will be required at the minimum.

Riparian Vegetation and Floodplain Relationships

The parkway's riparian vegetation and the river system are dynamic and interdependent. As the lower American River moves down and across its valley, the river attempts to erode its banks and cut deep channels at the outside of a bend where the water is swift, and to deposit the eroded fines and gravels farther downstream on the inside of a bend where the water is slower. Historically, unconfined Central Valley streams like the Lower Sacramento River formed broad meander belts where the riparian vegetation was up to several miles wide.

When the river overflows its banks, the water slows and deposits its sediment load on the floodplain. Spring runoff ("snowmelt" recession) can leave deposits of moist, nutrient-rich beds upon which riparian plant seedlings can become established, if the timing coincides with the release of ripening willow and cottonwood seeds. However, sediments deposited by the spring runoff, and any seedlings germinated thereby, are susceptible to removal by floods occurring within the next several winter flood seasons.

Winter flood events on the American River rework sediments in the active channel too frequently to allow many seedlings to survive. Floods during December, January and February average 46,000 CFS, and are considerably higher than average spring runoff. Production and survival of the riparian vegetation on the semi-confined lower American River is dominated by these flood processes. The American River watershed produces large floods. A peak flood of 100,000 CFS has a chance of occurring in less than one out of ten years.

Riparian vegetation on the lower American River has adapted its reproduction processes by re-sprouting after damage from floods. The "scour and re-sprout process" is more important on the lower American River than seedling

germination. Following the large 1986 flood (130,000 CFS), this re-sprouting process produced vigorous new stands of cottonwood 25 to 30 feet above the summer low-flow channel. Even the Willow vegetation, adapted to the hostile conditions of the active channel, re-sprouted after that large flood event.

Riparian Vegetation Zones

The riparian vegetation of the parkway is organized in a manner typical of other Central Valley rivers. The typical arrangement of vegetation along the river banks can t,e thought of, in an idealized sequence, extending from the water's edge out into the uplands, and consisting of three distinct zones. However, the actual physical arrangement of these zones along any given reach of the river may deviate from this idealized sequence. The zone nearest to the river is subject to frequent flooding and disruption, and is termed the "active zone." The typical plants which occur here are well adapted to withstand submergence during high flows. They commonly have flexible stems and branches that bend under the force of these flows. If above-ground portions of the plants are scoured off by water driven cobbles or buried by silt and sand, the buried plant parts are able to re-sprout readily. A few trees are found in the active zones, but willow shrubs are more common. Seeds of active zone plants are able to germinate on gravel or sand bars that lack soil development, and would be inhospitable to other riparian species.

Moving back from the active zone, there are areas of the floodplain which are higher and less frequently inundated. There is the border zone, which is marked by a taller and more complex plant community, including tree species, various heights of shrubs, and trailing vines.

Typical of the border zone are Fremont cottonwoods (Populus Fremontii), Gooding's willow (Salix Goodingii), wild grape (Vitis Californica), white alder (Alnus rhombifolia), and Oregon ash (Fraxinus latifolia). Depending on soils and drainage, the border zone vegetation may also include elderberry (Sambucus sp.),

interior live oak (Quercus Wizlizenii), and valley oak (Quercus lobata). This great diversity of plant species creates a very complex and dense canopy, and offers some of the most valuable habitat for wildlife in the parkway.

The outer zone is dominated by the valley and live oak communities. This more upland area is less influenced by flood flows and sedimentation, but is still under the influence of the river to the extent that the water table may be recharged during high flows. Canopy height, canopy complexity, and species richness are probably greatest at the ecotone, or transition, between the border and outer zones along the parkway.

A breakdown of vegetation by the three zones is shown in the following table:

	Number of Stands Per Zone	Total Acres Per Zone	Approximate Percent of Parkway
Active Zone (Closest to River) Gravel Bar Willow Scrub Alders	55	453	12%
Border Zone(Most Complex) Cottonwood-Willow Scrub Cottonwood-Tree Willow Mixed Cottonwood Old Growth Cottonwood Elderberry-Walnut Association	110	835	23%
Outer Zone (Farthest From River) Valley Oak Association Live Oak Association	42	1,020	28%
Disturbed Tailings Riparian Old Field Pavement, Bare Tailings Cultivated	52	1,387	38%

Riparian Vegetation and Wildlife

The parkway supports a wide variety of birds and wildlife. More than 220 bird species have been recorded in the parkway. Sacramento County estimates that 30 mammal species, 13 reptile species, and 6 amphibian species also inhabit the parkway. The possibility of catching a glimpse of deer, beaver, blue heron, or wild turkeys adds to the pleasure of parkway users. The riparian habitat is important not only as breeding grounds for resident animals, but also as wintering grounds and migratory corridors for nonresident species.

Ponds

The parkway includes a number of off-channel ponds that have high wildlife value. Ponds are found at Sacramento Bar, Arden Bar, Rossmoor Bar, just upstream of Discovery Park, and in Ancil Hoffman Park Golf Course. Bushy Lake is also located within the parkway. These ponds were mostly developed during the late 1960's and early 1970's when tailing mounds from the gold dredging era were excavated for the production of aggregate. Water surface elevations in the ponds are controlled, in large measure, by water surface elevations of the river nearby. However, the depths of the ponds do not require high river flows. Lower river elevations can be easily offset, if needed, by simply deepening the ponds. One of Sacramento County's expert witnesses (Dr. Susan Sanders) testified that the ponds provided the most important riparian habitat for wildlife. Additional ponds could be created within the parkway from former mine tailing areas which have no vegetation.

IV.

FISHERIES

The lower American River has 41 reported species of fish. Of these species, nine are anadromous (they live mainly in salt water but ascend freshwater rivers to spawn). The most abundant anadromous game fish in the river are chinook salmon, striped bass, American shad and steelhead trout.

Of these species, most data collection and research on the relationships between streamflow and the fishery resource have been devoted to chinook salmon. The lower American River chinook salmon run is one of the state's most valuable fisheries, supporting significant commercial and sport fisheries in the Pacific Ocean and in the lower American River. Although some adult salmon may be found in the river year around, the population is mainly the fall-run species. The lower American River's spring-run species of chinook salmon was eliminated by dams. The fall-run adult salmon begin to enter the river in September. Spawning occurs through January and incubation and rearing of juvenile salmon extends through mid-July. A consensus of expert opinion as to the life cycles of the salmon, steelhead and shad is set forth below.

American shad support a popular sport fishery in the lower American River. The shad fishery draws anglers from throughout Northern California. The popularity of the lower American River as a shad fishery is in large part attributable to the fact that the entire length of the river is accessible to the public. Thus, anglers have free access to the fish as they migrate up the river. This accessibility is unique and sets the lower American River apart from the other California rivers which have the significant shad runs.

Adult American shad enter the lower American River in May and June to spawn. Water temperature is a key factor affecting spawning and egg development of American shad. In addition, studies by the Department of Fish and Game found a correlation between the number of shad entering the river and the volume of river flow. Thus, the American River attracts migrant shad as a function of its flow contribution to the total Sacramento River flow in May and June.

Steelhead trout support a popular sport fishery in the lower American River. The main run of adult steelhead enter the river in the winter and early

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spring to spawn. The juvenile steelhead rears in freshwater for at least a year before emigrating to the ocean. The number of juvenile steelhead which naturally rear in the river has not been investigated; however, recent field studies confirm that juvenile steelhead trout in unknown numbers are rearing in the river.

The steelhead trout, like the chinook salmon, is a coldwater fish whose various life stages are affected by water temperature.

V.

PROCEDURAL HISTORY OF THE LITIGATION

Like many water cases, this litigation has a long judicial history. Filed 17 years ago, the case has been before the California Supreme Court on two occasions, and before the United States Supreme Court once, all on pleadings issues. While the trial commenced in 1984, the case was then referred to the State Water Resources Control Board, as referee. The Reference proceedings required three and a half years and resulted in a five-volume report, to which plaintiffs and intervenors took voluminous exceptions.

The original Complaint was filed in 1972 by the Environmental Defense Fund, Save the American River Association, the Oceanic Society, and certain named individuals against EBMUD and its directors. The suit was based on Article XIV, section 3 (now Article X, section 2) of the California Constitution, and Water Code sections 100 and 13500 et seq. Plaintiffs challenged: (1) EBMUD's decision not to develop facilities to reclaim wastewater to supplement its existing water supplies and to assist in meeting its future water requirements; and (2) EBMUD's decision to seek a supplemental supply of water from the American River to be diverted from the Folsom-South Canal above Clay.

Plaintiffs also alleged that EBMUD's actions made a major contribution to the "likelihood" that the Bureau of Reclamation would complete its Auburn-Folsom South project and the East Side Division in the San Joaquin Valley.

Plaintiffs alleged that these projects would have "myriad negative environmental and social effects," including the diminution of lower American River flows, particularly in water-short years.

Approximately three months after the Complaint had been filed, Sacramento County intervened on behalf of the plaintiffs. The county incorporated plaintiffs' causes of action into its own Complaint, and in addition, alleged that the 23 miles of the lower American River were used by the public for scenic and recreational purposes, including boating, swimming and fishing. Furthermore, the county alleged that it had acquired land and expended funds for a parkway along the lower American River; that the 150,000 acre-feet contracted for by EBMUD, if taken from the Folsom-South Canal, would not be available for flows in the lower American River; and that Decision 1400 flows were less than those necessary for optimum conditions for fish and recreation. The county further alleged that "minimum flow of water in the lower American River necessary to provide optimum conditions for fishery purposes" is 1400 cubic feet per second from October 15 through July 14, and 1000 cubic feet per second during the remainder of the year. Flows between 2000 to 2500 cubic feet per second were alleged to be the minimum flows necessary to provide optimum conditions for boating.

A demurrer to plaintiffs' Complaint was sustained, and in December, 1972, plaintiffs filed their First Amended Complaint, incorporating in it the allegations of Sacramento County's Complaint in Intervention. EBMUD again demurred, and on May 1, 1973, the Superior Court sustained the demurrers to both Complaints without leave to amend. Judgment was entered on May 9, 1973, and an appeal followed.

In its first decision in this case, the California Supreme Court affirmed the judgment in favor of EBMUD. (Environmental Defense Fund, Inc. v. East Bay Municipal Utility District (1977) 20 Cal.3d 327.) This decision is often referred to as

"EDF I." The Supreme Court held that the reclaimed wastewater issue must be presented in the first instance to the State Water Resources Control Board. Plaintiffs chose not to do so, and this issue was dropped from subsequent complaints.

The Supreme Court held that the remaining allegations were preempted by federal law. The Court stated:

> "Insofar as the complaints challenge construction of the canal and the choice of diversion point on the basis of state law, they fail to state a cause of action because they attempt to use state law to determine a matter within the authority of the federal agency." (EDF I, 20 Cal.3d at p. 334.)

Furthermore, the Court stated:

> "The allegation of the EBMUD-Bureau contract will facilitate the Bureau's completion of the Central Valley Project on its face represents attempted interference with the Bureau's completion of a project Congress has directed it to undertake." (Id., at p. 340.)

Plaintiffs then filed a petition for Certiorari with the United States Supreme Court. In 1978, the Court vacated the judgment in EDF I. and remanded the case to the California Supreme Court for further consideration in light of the United States Supreme Court's decision in California v. United States (1978) 438 U.S. 645. (Environmental Defense Fund, Inc. v. East Bay Municipal Utility District (1978) 439 U.S. 811.)

On remand, the California Supreme Court reversed the judgment of dismissal following the trial court's sustaining the demurrers without leave to amend. (Environmental Defense Fund, Inc. v. East Bay Municipal Utility District (1980) 26 Cal.3d 183, "EDF II.") The Supreme Court re-affirmed its earlier ruling that to the extent the Complaints challenged EBMUD's contract on the ground that the construction of the Auburn Dam and the Folsom-South Canal would constitute a violation of state law, there was federal preemption. (EDF II, 26 Cal.3d at p. 193.) However, the Court further held that to the extent the Complaints

"challenge the location of the diversion point as being violative of California law, there is no federal preemption." (Id., at p. 193) Accordingly, plaintiffs and intervenor were granted leave to amend their Complaints to "allege that diversion of EBMUD's water through the Folsom-South Canal constitutes an unreasonable method of diversion." (Id., at p. 200)

In the text of its opinion, the Supreme Court discussed D-1400, noting that none of the parties that sought reconsideration of D-1400 "claimed that the required flows for recreational uses were insufficient or that EBMUD should have been required to use a lower diversion point." (Id., at p. 190) Furthermore, the Court pointed out that the County of Sacramento intervened in a mandamus action to review D-1400, "claiming that the decision was lawful." (Id., at p. 191)

Following the decision in EDF II, plaintiffs filed their Second Amended Complaint in September, 1980, and Sacramento County filed its First Amended Complaint in Intervention in November, 1980. Both Complaints alleged that EBMUD's "decision" to seek a supplemental supply of water from the American River to be diverted in a manner which would not allow the water to flow down the lower American River constitutes an abuse of discretion and an unreasonable diversion and use of water; and by virtue of such decision, flows in the American River will be so diminished, "particularly in water-short years, that severe harm will be done to the fisheries of the river, as well as to recreational opportunities on hand near the river." Sacramento County continued to allege that flows of 1400 and 1000 CFS provide minimum flows necessary for optimum conditions for fishery purposes, and that flows between 2000 and 2500 CFS provide minimum flows necessary for optimum conditions for canoeing and kayaking.

EBMUD demurred again to the Amended Complaints, in part on the ground that the federal government was an indispensable party to the suit. By order dated March 4, 1981, the Court overruled the demurrers.

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Trial of the case commenced on April 9, 1984 in the Alameda County Superior Court, with one witness being placed on the stand in order to toll the five-year statute of limitations. At the same time, plaintiff Save the American River Association moved for a continuance, and the County of Sacramento moved for an Order Referring Issues to the State Water Resources Control Board, pursuant to Water Code section 2000 et seq. Following briefing and argument on a number of legal issues, the Order for Reference was entered November 21, 1984. Twenty-one specific issues, including both factual and legal matters, were referred to the State Board as referee.

Beginning in January, 1985, a series of meetings were held by the State Board staff and the parties to receive comments and suggestions for a draft work plan and procedures for the Reference. Meetings were also held with other interested agencies, such as the California Department of Fish and Game, the Department of Water Resources, and the United States Bureau of Reclamation. The work plan and procedures were approved by the board on February 6, 1985. No objections were received from any of the parties or interested persons. The board indicated that it would rely, first and foremost, upon the parties for the production of evidence, and that each party had the burden of producing evidence to support the propositions favoring its case. Initial reports and documentary evidence, together with an identification of expert witnesses, were required by February 15, 1985. The State Board staff interviewed some 60 technical witnesses and reviewed more than 200 exhibits and reports submitted by the parties. EDF and SARA did not submit any exhibits relating to technical matters, but relied upon the County of Sacramento's exhibits.

In November, 1985, the Court granted leave to the California Department of Fish and Game to intervene for the limited purpose of addressing issues related to the protection and enhancement of the State's fish, wildlife resources, and associated recreational activities in the lower American River. On June 16, 1986,

the California state Lands Commission was also granted leave to intervene on a limited basis related to riparian issues.

The State Board staff finally established April 15, 1986 as the deadline for submitting further supplemental or rebuttal exhibits. The staff also requested comments from the California Department of Health Services and the Department of water Resources on certain water quality issues. A Draft Report of Referee was issued in February, 1987, together with procedures for submitting objections to the Draft Report. The Draft Report consisted of five volumes: A Report of Referee, a Technical Report, two appendices, and a legal report. After issuance of the Draft Report, but before the hearing thereon, the County of Sacramento sought to introduce additional exhibits, including its primary report on fishery resources. Over EBMUD's objections, the additional material was allowed.

During May and June of 1987, the State Board itself held 10 days of hearings on the Draft Report. At the hearing, the parties were allowed to make presentations on key issues as well to present evidence to support their objections to the Draft Report. The State Board also held two informal hearings to receive comments and policy statements from interested citizens.

The Final Report of Referee was issued in June, 1988. The Final Report closely followed the Draft Report. The State Water Resources Control Board, as referee, found:

1. That delivery to EBMUD of 150,000 acre-feet from the Folsom-South Canal "will not cause significant harm to reasonable uses made of the lower American River;" further, that the maximum diversion "will not significantly harm reasonable public trust uses of the lower American River." (Final Report of Referee at p. 11.)

2. That under current Bureau of Reclamation operations, "the supply of water available in the lower American River is sufficient to meet existing and

projected demand and to provide a reasonable level of protection to public trust uses." (Id., at p. 11.)

3. That none of the alternatives suggested by plaintiffs is as feasible as the Folsom-South Canal, and that "[s]ubstantial additional effort would be required to determine if any alternative is feasible and cost effective from a social, engineering and environmental standpoint." (Final Report of Referee at p. 13; Final Technical Report at pp. 259, 243.)

4. That of the three sources, namely, the American River, the Sacramento River, or the Delta, "... water from the American River has the highest quality, with the least potential for degradation and the lowest risk to public health;" and further that, "[p]rudence requires that public water suppliers should minimize treatment uncertainties by seeking water from the best available source and as removed from the potential for degradation as possible." (Report of Referee at pp. 14, 15.)

5. Finally, that the Folsom-South Canal diversion point is not unreasonable, within the meaning of Article X, section 2 of the Constitution. (Final Report of Referee at p. 17.)

Plaintiffs and intervenors filed extensive exceptions to the Final Report, and trial on those exceptions began on March 6, 1989.

VI.

Central to a final adjudication of this controversy is the definition and application of the public trust doctrine in conjunction with a consideration of constitutional requirements under Article X, section 2. Probably no party would disagree with Sacramento County that "the focus of this case is on the public trust impacts and constitutional 'reasonableness'" of EBMUD's proposal to take water through the Folsom-South Canal.

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The public trust doctrine protects ecological, recreational, commercial, navigation, and fishery values in the navigable waters of the state. (National Audubon Society v. Superior Court (1983) 33 Cal.3d 419, 434-35.)

In Audubon, the Supreme Court confronted the task of accommodating public trust doctrine and the appropriative water rights system.

> "Ever since we first recognized that the public trust protects environmental and recreational values (citation omitted), the two systems of legal thought have been on a collision course (citations omitted). They meet in a unique and dramatic setting which highlights the clash of values. Mono Lake is a scenic and ecological treasure of national significance, imperiled by continued diversions of water; yet, the need of Los Angeles for water is apparent, its reliance on rights granted by the board evident, the cost of curtailing diversions substantial." (Id., at p. 425.)

Thus could be described the setting for the instant controversy. The American River and its parkway also are "scenic and ecological treasures of national significance," imperiled by prospective diversions of water. Similarly, the need of EBMUD for high-quality water is apparent, its reliance on rights granted by the board and the Bureau of Reclamation "evident," and the cost of diverting water from locations on the Sacramento River or Delta are considerably greater than the cost of diversion at the Folsom-South Canal.

From Audubon, supra, in conjunction with United States v. State Water Resources Control Board (1986) 182 Cal.App.3d 82, EBMUD urges upon the Court the importance of balancing competing public water usages without according "any priority for instream uses" or establishing any "artificially created priorities." (EBMUD Brief Re: Public Trust Doctrine, at p. 6.) Intervenor Environmental Defense Fund ("EDF") argues that Audubon "does not stand for the principle that public trust and consumptive use enjoy parity" and that "protection of the viability of the public trust resource is the first priority of public trust doctrine."

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(EDF Brief at pp. 10, 11.) Thus are the issues joined and the application of Audubon to the instant facts required.

Plaintiff's and intervenors' efforts to compel a semantic conclusion that consumptive uses are not encompassed within public trust usages, and that public trust uses are entitled to a "first priority," do not aid in the analysis required by Audubon. That case explicitly rejected the "first priority" argument. "Plaintiffs ... argue that the public trust is antecedent to and thus limits all appropriative water rights[.] ... We are unable to accept [this] position." (Audubon, supra, 33 Cal.3d at p. 445.)

"The population and economy of this state depend upon the appropriation of vast quantities of water for uses unrelated to instream trust values." Id., at p. 446. The Audubon court specifically recognized the substantial concerns voiced by Los Angeles: "[t]he city's need for water, its reliance upon the 1940 board decision, the cost both in terms of money and environmental impact of obtaining water elsewhere. Such concerns must enter into any allocation decision." (Id., at p. 448, emphasis added.)

It is clear that Audubon encourages and requires the trier of fact to balance and accommodate all legitimate competing interests in a body of water. The Audubon court sought "an accommodation which will make use of the pertinent principles of both the public trust doctrine and the appropriative rights system," id., at p. 445, rather than the "unbalanced structure" that would result from a flat preference for either instream or consumptive values. (Ibid.) The court noted its concern with the Mono Lake diversion in these terms:

> "This is not a case in which the Legislature, the water board, or any judicial body has determined that the needs of Los Angeles outweigh the needs of the Mono Basin, that the benefit gained is worth the price. Neither has any responsible body determined whether some lesser taking will better balance the diverse interests." (Id., at p. 447, emphasis added.)

The essential task, then, is to identify, evaluate, balance, and accommodate the diverse and competing interests which would take American River water. The function of this court, like that of the Water Board, "has steadily evolved from the narrow role of deciding priorities between competing appropriators to the charge of comprehensive planning and allocation of waters." (Audubon, supra, 33 Cal.3d at p. 444.)

Audubon demands that any such decision consider the requirements of Article X, section 2 of the Constitution, along with evolving public trust doctrine. Under Article X, section 2, "all uses of water, including public trust uses, must now conform to the standard of reasonable use. [citations omitted.]" (Audubon, supra, 33 Cal.3d at p. 443.

It is the duty of this court not to protect public trust uses absolutely, but to preserve them "so far as consistent with the public interest." (Id., at pp. 446-47.) The Audubon court recognized that "practical necessity" might warrant appropriations harming the public trust, but that proper consideration of all values could prevent "unnecessary and unjustified" harm to the public trust. (Id., at p. 446.) As one commentator succinctly stated, "[T]he Court appeared to suggest that the public trust doctrine requires consideration of public trust values, but that the constitutional test authorizes the state to balance these values against other public needs." (Walston, The Public Trust and Water Rights, 23 Land and Water Law Review, 701, 719 (1987).)

Water quality cannot be excluded from the analysis simply because it does not fit plaintiffs' and intervenors' conception of a public trust value. Neither, however, can the importance of the public trust be diluted by treating it as merely another beneficial use under Article X, co-equal with irrigation, power production, and municipal water supply. (See H. Dunning, Instream Flows, the Public Trust, and the Future of the West, Proceedings, The Public Trust and the Waters of the American West: Yesterday, Today and Tomorrow (March 31-

April 1, 1988), Natural Resources Law Center, Lewis and Clark Northwestern School of Law.)

No bright line of reconciliation of Article X and public trust values has emerged. Still, while Audubon provided no specific category either for the municipal use of water nor for the health-related quality of that water, it is absolutely clear that Audubon would require that consideration be given to such interests and that they would receive full credit in any constitutional balancing evaluation.

Article X, section 2 itself breaks down into at least three separate albeit related concepts:

First, that the "waste or unreasonable use or unreasonable method of use of water be prevented";

Second, that "the consumption of such waters is to be exercised with a view to the reasonable and beneficial use"; and

Third, a requirement that water resources "be put to the beneficial use to the fullest extent of which they are capable."

It is the third principle -- "fullest beneficial use" -- that must obtain under Audubon. In achieving that fullest beneficial use, Audubon acknowledges the necessity that in some circumstances unavoidable harm may occur to trust uses at the source stream. (Audubon, supra, 33 Cal.3d at p. 446.) The public trust, like other interests in water, is protected only to the extent that interest and that protection are reasonable in light of the public interest. (See id., at pp. 443, 446-47.) The affirmative duty of the Court is to "take the public trust into account in the planning and allocation of water resources, and to protect public trust uses whenever feasible." (Id., at p. 446.)

This analysis does not denigrate public trust values. Public trust doctrine occupies an exalted position in any judicial or administrative determination of water resource allocation. Whether Article X, section 2 "overrides" public trust

considerations, or whether the two concepts operate in harness to provide a context for comprehensive planning really does not require precise adjudication in this case -- just as it was not critical to a determination in Audubon. (Audubon, supra, 33 Cal.3d at p. 447, fn. 28.) Here, as will be shown, the interests can be accommodated to the satisfaction of both Article X, section 2 and public trust doctrine.

In analyzing the issues relating to public trust doctrine, plaintiffs offer the following "argument:"

1. Audubon requires that in the allocation of water resources, the state has a duty "to protect public trust uses whenever feasible," and "to attempt, so far as feasible, to avoid or minimize any harm to those interests";

2. EBMUD has "feasible" alternative diversion sites;

3. Therefore, EBMUD may not divert at the Folsom-South Canal.

The logic is defective. The crux of Audubon is that public trust values require consideration and protection. It is simply not a fact that diversion below the confluence of the American/Sacramento rivers is the only way to achieve that protection. And if protection of public trust values can be accomplished consistently with the diversion at Folsom-South Canal, then plaintiffs and intervenors can have no sustainable complaint. In the absence of an unnecessary diminution of public trust values, plaintiff's demand for a different diversion site has no supportable legal foundation. In the absence of harm, plaintiff is not entitled simply to achieve a different diversion site as a question of policy or preference.

There is simply no escape from the administrative and judicial necessity of providing a comprehensive allocation of water rights, considering all factors currently manifest or reasonably to be anticipated, and considering the cumulative impact of all known and anticipated diversions and appropriations. The proposition is not that "if there are feasible alternatives to a particular

diversion, no public trust values may be attenuated in the slightest." This is a semantic proposition, rather than a proposition conducive to comprehensive planning. Audubon, in fact, anticipates the harming of public trust values in certain circumstances of necessity.

> "As a matter of practical necessity, the state may have to approve appropriations despite foreseeable harm to public trust uses. In so doing, however, the state must bear in mind its duty as trustee to consider the effect of the taking on the public trust (citations omitted), and to preserve, so far as consistent with the public interest, the uses protected by the trust."

In assessing appropriation values versus public trust values, it is impossible to avoid a balancing analysis.

The feasibility of protecting a particular public trust value, regardless of the social cost involved, is only a single factor in the balancing process. To prove that diversion of drinking water from the Delta can be physically accomplished does not establish that diversion at the Folsom-South Canal is constitutionally impermissible. Were such the case, this would be a simple matter to resolve. No one disputes the physical feasibility of Delta or Sacramento River diversion. But can it be accomplished at reasonable cost and without compromising in a serious way the long-term health requirements of the East Bay community?

The case has proceeded on a factor-by-factor analysis of all considerations thought relevant by the parties after 17 years of litigation. This court agrees entirely that the factors presented are those which are properly to be placed in the balance, including water quality; costs; fisheries; riparian interests; and so on.

Also, Audubon posited an integration of public trust doctrine with the state's water rights system. The latter is not entirely to be discarded. Here, EBMUD has accomplished a valid contract right and has acted to its considerable detriment upon that right. Audubon permits a reconsideration of prior permits and contracts, but not without at least a recognition of, if not deference to, validly subsisting rights.

Depending upon the evidence, any of the aforestated factors could prove to be of dispositive weight: For example, were it proven that the diversion of EBMUD water could be accomplished at the Folsom-South Canal only by exterminating the fall run of salmon, and with minimal health benefits to the consumer, the balance would shift markedly in favor of plaintiffs. Substantial increase in expenditures of accomplishing a Delta diversion, even to the extent of millions of dollars, would not in such circumstances preclude the absolute protection of that significant public trust value. Again, that would be an easy case.

It has been argued that "where there are feasible alternatives to a proposed diversion which is likely to cause injury to trust uses, those alternatives must be taken and the harm avoided. No balancing of uses is required." Avoiding harm "where feasible" is not the logical equivalent of precluding an appropriation where there are "feasible" alternatives. Plaintiff urges that this is not a "balancing question": that no balancing of uses is required. Such is not the case. The uses must be balanced or evaluated to determine whether the fullest beneficial use of water has been achieved under Article X section 2. Evaluation, or balancing, is implicit in the determination of "fullest beneficial use of water." The point of Audubon is that the Court does not stop with that determination. Having determined the "fullest beneficial use of water," the Court must still be cautious to avoid needless harm to public trust values. And if the harm to those values becomes significant, then the fullest beneficial use of water may be precluded as a violation of public trust.

VII.

EBMUD argues that the public trust doctrine is not available at all to plaintiffs in this case, since the "res" at issue consists of water "stored" behind the Folsom and Nimbus dams. EBMUD urges that the "scope of the public trust doctrine in California is relatively narrow," and has been used to protect the "natural values associated with unique areas." (EBMUD Brief on Public Trust

Doctrine, p. 22.) According to EBMUD, there is no "logical theory" which would permit the application of public trust doctrine to "artificially created flow regimens," and "no court has ever attempted to do so." Audubon, the argument proceeds, re-affirmed the emphasis in Marks v. Whitney (1971) 6 Cal.3d 251, on "natural conditions" and cannot be read to apply "to control the level of storage in an artificially created resource." (EBMUD Brief, Public Trust Doctrine, p. 18.)

The argument is not compelling. Initially, Audubon is not so factually distinguishable as EBMUD would suggest. Audubon involved the construction of facilities and tunnels to divert virtually the entire flow of the five fresh-water streams which fed into Mono Lake. Here, there was the construction of dams and canals for the purpose of regulating, channeling, and diverting the waters of the American River. In each case, the natural and historic instream flow pattern was interrupted by artificial instrumentalities. In each case, the opportunity exists, by administrative and judicial action, to re-evaluate instream uses and to compel the imposition of a public trust upon identified interests. To the extent that the Federal government was granted permission to modify the nature and extent of the already existing trust values of the American River, that grant ". . . is necessarily revocable, and the exercise of the trust by which the property was held by the state can be revoked at any time . . . ." (Audubon, supra, 33 Cal.3d at p. 438, citing Illinois Central Railroad Company v. Illinois (1892) 146 U.S. 387, 455.)

It is not "stored water" which is the res to which the public trust attaches. It is American River water from whatsoever tributary, accretion or source, and whether free flowing or temporarily "stored" behind Folsom or Nimbus dams or elsewhere. The significance of Audubon lies not in its recitation of historical water law, but rather in its emphasis on the necessity for the "comprehensive planning and allocation of water." The position of EBMUD would constitute a serious interference with that objective.

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Public trust value in the lower American River existed prior to the erection of the dam. Those values were necessarily modified, sometimes for better and sometimes for worse. An entire race of spring-run salmon was exterminated as a consequence of the dam. Yet, other fish species have thrived. The Department of Fish and Game, through the operation of the hatchery, has interacted with the changed conditions to develop new salmon and steelhead viability in the lower reaches of the river. At work is continued comprehensive planning at all levels of government, including a "cooperative Federalism." The artificial construct advanced by EBMUD is a throwback to linear concepts of water rights that Audubon would reject. The logical consequence of EBMUD's position, for example, would permit the Bureau of Reclamation to preclude all flows, or to provide flows so minimal that significant destruction of fishery interests would ensue. The entire thrust of Audubon is to preclude the possibility of such wanton ecological destruction.

EBMUD argues that requiring release of minimum flows to protect public trust values "will defeat the purpose for which Folsom Dam was created." To the contrary, this court is satisfied that there is sufficient available water resources to satisfy both the needs of EBMUD and the beneficiaries of the American River public trust.

EBMUD correctly notes the paucity of authority on the issue. Neither Bohn v. Albertson (1951) 107 Cal.App. 738, nor Raiser Aetna v. United States (1979) 444 U.S. 164, provides substantial nourishment for EBMUD's position. More persuasive is State of California v. Superior Court, (Fogerty) (1981) 29 Cal.3d 240. In Fogerty, the Court held that lands occasionally submerged by the damning of Lake Tahoe were impressed with the public trust, notwithstanding shoreline property owners' position that the trust was limited to the "natural" boundary. (Fogerty, supra, at pp. 247-49. Fogerty dealt expressly with the issue whether the people's public trust interests should be measured in terms of Lake Tahoe in its

natural state, or should be measured by the present size of the lake, which was raised approximately six feet by the dam. Quoting State v. Sorenson (1937) 222 Iowa 1248, the Court said:

> "The artificial condition is . . . stamped with the character of a natural condition, and the title to the lands covered by the waters of the lake is deemed to have passed from private ownership to the same trust as that of lands covered by the water of natural navigable lakes." (Fogarty, 29 Cal.3d at pp. 248-49.)

In United States v. State Water Resources Control Board (1986) 182 Cal.App.3d 82, the Court held that the State Water Resources Control Board, under the public trust doctrine, had continuing jurisdiction over the appropriations of the State Water Project and the Central Valley Project for the purposes of protecting fish and wildlife in the Sacramento-San Joaquin Delta and Suisun Marsh. It was clear that these projects regulated flows through the regulation and storage of vast amounts of water, and that at least under its public trust authority the Board could control the storage and release of water. Further, as noted by Justice Traynor in Natural Soda Products Company v. City of L.A. (1943) 23 Cal.2d 193, 197:

> "A change in the flow of a stream that appears to be permanent usually leads to costly adjustments by those interested, as they come to regard the artificial condition as permanent. It is, therefore, reasonable that they should receive as much protection as if the condition weren't natural."

As Professor Sax noted in his article, "Liberating the Public Trust Doctrine From Its Historical Shackles," 14 U.C. Davis Law Review, page 185 (1980):

> "The central idea of the public trust is preventing the destabilizing disappointment of expectations held in common but without formal recognition such as title. The function of the public trust as a legal doctrine is to protect such public expectations against destabilizing changes, just as we protect conventional private property from such changes. So conceived, the trust doctrine would serve not only to embrace a much wider

> range of things than private ownership, but would also make clear that the legal system is pursuing a substantive goal identical to that for the management of natural resources. Concepts like renewability and sustained yield, so familiar to us in fisheries and forest management, are designed precisely to prevent the sort of sudden decline in stocks that is destabilizing and crisis-provoking. The legal system incorporates parallel concerns in protecting expectations, and it remains only to assure the legal principle's application more comprehensively."

The construction of the Folsom Dam was a destabilizing event in the history of the American River. Still, ecological benefits have developed along with manifest detriment. The dam has now been in place for over thirty years. Reasonable and legitimate expectations have arisen with respect to the protection of instream and riparian values. Those expectations are worthy of legal recognition and protection without resort to the niceties of ancient tideland principles, or confused concepts of "res."

> "At its heart, the public trust doctrine is not just a set of rules about tidelands, a restraint on alienation by the government or a historical inquiry into the circumstances of long-forgotten grants. And neither Roman law nor the English experience with lands underlying tidal waters is the place to search for the core of the trust idea." (Sax, supra, p. 186.)

Simply stated, EBMUD's position that the state, for historical or other reasons, is powerless to regulate water resources which have been subjected to artificial damming runs counter to strong administrative and judicial trends favoring comprehensive planning in the allocation of those resources.

EBMUD urges that Golden Feather Community Association v. International Irrigation District, (89 Daily Journal, DAR. 5479 [April 26th, 1989]) "has a significant effect on plaintiff's and intervenors' claims regarding the breadth of public trust doctrine." Nothing could be further from a fair reading of that case.

Golden Feather involved the construction of a dam in 1924 on a waterway conceded by the litigants to be non-navigable. Plaintiffs sought to enjoin the

owners from reducing the level of the water behind the dam to the detriment to fishing and recreational uses which had developed over the years.

The simple answer to EBMUD's reliance on Golden Feather is that court's emphasis on the non-navigable nature of the reservoir. Navigability is "the measure of the public trust doctrine" (id., at p. 5481), and was central to the Golden Feather decision. No further distinction is required.

Apart from that obvious distinction, however, Golden Feather can hardly be construed to provide sustenance for EDMUD's position on the application of public trust doctrine. So far as can be determined from the record, prior to the construction of that dam, the stream not only was non-navigable, thereby precluding resort to public trust doctrine, but also provided no appreciable fishing or recreational value. The reservoir, built by private interests, created in the first instance a recreational resource. Unlike the present case, the destruction of environmental resources was not implicated by the construction of the dam. In these "particular circumstances" the Court of Appeal apparently felt no compelling reasons to launch public trust doctrine onto uncharted and non-navigable waters.

Finally, it is apparent that the Court of Appeal was concerned about the procedural limitations which acted to limit the issues.

> "In contrast to existing authorities, the plaintiffs in this case do not seek protection of a recognized public trust interest since they concede the waters at issue are nonnavigable and the reservoir is an artificial body of water. Moreover, plaintiffs do not seek to enjoin an activity, such as diversion of a stream, which harms a public trust interest. Instead, plaintiffs seek an order which would compel defendants to continue diverting water from a nonnavigable stream but which would preclude them from utilizing the diverted water in order to maintain an artificial reservoir for the recreational benefit of the public. Plaintiffs have not provided, and we have not discovered, authority for applying the public trust doctrine in such a manner."

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Under these circumstances, Golden Feather has but insubstantial value in any of the critical determinations before this court.

VIII.

East Bay MUD urges that to preclude the diversion for municipal/ industrial purposes at the Folsom-South Canal is inconsistent with two distinct congressional directives regarding the Folsom Dam project and thus would violate principles of Federalism enunciated in State of California v. United States (1978) 438 U.S. 645, 57 L.Ed.2d 1018, 98 S.Ct. 2985, and U.S. v. State of California State Water Resources Control Board (9th Cir. 1982) 694 F.2d 1171, East Bay MUD adduces an abundance of legislative history, purporting to demonstrate that Congress had a particularized intention of utilizing the project to satisfy municipal water requirements of the East Bay area and, further, of assuring the financial feasibility of the project through contracts for the sale of such water for municipal/ industrial purposes.

The Folsom project involved a multitude of federal objectives, including flood control, power generation, irrigation, and recreation, as well as municipal and industrial purposes. Whatever the specific congressional intent may have been for the Folsom Dam, however, it is clear that the Federal Reclamation Act provides for an accommodation of state and federal interests.

> " '[N]othing in this Act shall be construed as affecting or intended to affect or to in any way interfere with the laws of any State or Territory relating to the control, appropriation, use, or distribution of water used in irrigation, or any vested right acquired thereunder, and the Secretary of the Interior, in carrying out the provisions of this Act, shall proceed in conformity with such laws, and nothing herein shall in any way affect any right of any State or of the Federal Government or of any landowner, appropriator, or user of water in, to, or from any interstate [438 US 651] stream or the water, thereof: Provided, that the right to the use of water acquired under the provisions of this Act shall be appurtenant to the land irrigated, and beneficial use shall be the basis, the measure, and the limit of the right. 32 Stat 390

(emphasis added).' " (California v. United States, supra, 438 U.S. at pp. 650-651.)

The emphasis on "beneficial" use is mirrored precisely by Article X section 2 of the California Constitution which requires that waters of the State be "put to beneficial use to the fullest extent of which they are capable." Further, the bureau's own operating instructions require that "[p]roject plans" must comply with state legal provisions or priorities for beneficial use of water. (California v. United States, supra, 438 U.S. at p. 675.) From these parallel emphases in state and Federal law, then, one can see the priority accorded to achieving the "highest beneficial use" in water allocation and can further ascertain the necessity of "negotiation" and "mutual accommodation and agreement" in achieving that optimum utilization of water resources. (See United States v. State Water Resources Control Board, supra, 694 F.2d at p. 1178.)

Here, as in the New Melones Dam cases, the issues of Federalism fall short of ripeness for an adjudication by virtue of the role of the United States government. In the New Melones cases, the United States, on remand, inexplicably declined to produce any evidence as to any harmful consequences which might flow from the state-imposed conditions. Here, the Bureau of Reclamation is not a party to the action and did not seek to intervene. Perhaps as a consequence, evidence has not been forthcoming as to the ability of the bureau to meet its water allocation or financial objectives if diversion at the Folsom-South Canal is either precluded or subjected to state-mandated conditions, or if diversion is required at sites other than the Folsom-South Canal.

In any case, this court is satisfied that the public trust and Article X values adduced by plaintiffs and intervenors herein can be reconciled with congressional intent. It bears emphasis that many of the particular environmental and ecological consequences advanced in this case were not evident at the time of the congressional hearings (which were occurring in the late 1940's). Further, much

of the most critical environmental damage became manifest only after the dam was constructed and made operational. Only then, for example, was an entire species of spring-run salmon permanently destroyed. Had these environmental issues been considered by the Congress, it seems entirely probable that the provisions of Section 8 of the Reclamation Act would have been honored by the specific protection of such environmental interests.

In any event, no congressional intent has been divined with respect to construction of the Folsom Dam which would override the principles enumerated in Section 8 of the Reclamation Act. It seems apparent that achieving the fullest beneficial use of American River water resources requires that competing values be accommodated.

Further, in Environmental Defense Fund, Inc. v. EBMUD (1980) 26 Cal.3d 183 ("EDF II"), the California Supreme Court concluded that:

> "[L]ocation of the diversion point downstream on the basis of state law would not be inconsistent with congressional directive. 43 United States Code section 616aaa-616fff authorizing the Auburn-Folsom South Unit, American River division, provides in section 616ddd for the secretary to locate and design the works and facilities giving due consideration to the California Water Plan and consulting with local interests through public hearings. A section requiring the secretary to seek conformity to local wishes does not make state law inapplicable.
>
> "Accordingly, to the extent the complaints challenge the location of the diversion point as being violative of California law, there is no federal preemption." (EDF II, 26 Cal.3d at p. 193, emphasis added.)[3]

Finally, as Sacramento County's brief on Federal Preemption persuasively establishes, the legislative documentation is at best uncertain, and in all probability does not support East Bay's position at all. If anything, the legislative history manifests a priority of interest in "irrigation, hydroelectric power

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[3] In this case, it is unnecessary to determine whether or not this holding of EDF is "the law of the case."

production, and other uses" for the Central Valley area rather than in the municipal/industrial needs of the East Bay.

It bears emphasis that Congress authorized the Folsom Dam only in anticipation of a much more complex system of water development, including the construction of the Auburn Dam. It was anticipated, for example, that the Folsom-South Canal would be supplied with water from both Auburn and Folsom reservoirs. The failure to complete all but the initial phases of the system must cast considerable doubt upon those expressions of congressional intent which anticipated an entirely different system of water delivery and development.

IX.

EBMUD argues that "in enacting section 11265 of the Water Code, the California Legislature 'made an express disposition of lower American trust assets by approving Folsom Dam and the Folsom-South Canal to further trust purposes'" (Defendant's Brief at p. 23). The argument is that in enacting section 11265, the Legislature engaged in a balancing of trust values, and that neither the court nor any administrative agency may now modify nor redress that balance.

In response, plaintiffs note correctly that public law number 81-356, 63 Stat. 853, incorporated into Water Code section 11265, authorizes the construction of the dam and provides for feasibility studies for a diversion canal, but it neither expressly nor by implication purports to grant any rights to use lower American water. Indeed, the act specifically provides that nothing in it "shall be construed by implication or otherwise as an allocation of water . . ." (63 Stat. 853.)

Further, nothing in the federal or state legislative history demonstrates an intent to revoke or limit the state's continuing supervisory powers over the lower American River trust. Such legislation must be strictly construed and an intent to abandon the trust will not be implied if any other reasonable interpretation is

possible. In People v. California Fish Company (1913) 166 Cal 576, 597, the Court stated:

> "Statutes purporting to authorize an abandonment of . . . public use will be carefully scanned to ascertain whether or not such was
>
> the legislative intention, and that intent must be clearly expressed or necessarily implied. It will not be implied if any other inference is reasonably possible. And if any interpretation of the statute is reasonably possible which would not involve a destruction of the public use or an intention to terminate it in violation of the trust, the courts will give the statute such interpretation."

This court agrees with intervenor's position that the more reasonable interpretation of section 11265 is that the State Legislature simply intended to include the American River development in the State Central Valley Project as a facility and did not intend to make a water allocation determination. The Legislature' s reference to Public Law 356, the federal statute authorizing the American River development, supports this interpretation.

In Public Law 356, Congress expressly stated:

> "Nothing contained in this act shall be construed by implication or otherwise as an allocation of water, and in the studies for the purpose of developing plans for the disposal of water as herein authorized, the Secretary of the Interior shall make recommendations for the water in accord with state water laws, including but not limited to such laws giving priority to the counties and areas of origin for present and future needs." (Public Law No. 356, (1949), 63 Stat. 852, Section 1; and Intervenor State Lands Brief, page 17, 18.)

In Audubon, it is observed that no grant is free of public trust unless, inter alia, the Legislature makes clear its intent to so convey (Audubon, supra, 33 Cal.3d at p. 439). Further, such acts are limited only to "rare instances" (Id., at p. 440), and it is unlikely they will apply it to usufructuary water rights. (Id., at p. 445, fn. 25.)

It is not apparent that the California Legislature has expressed any intention to divest the lower American River from the public trust in order to

sustain other public trust purposes. And the continuing supervisory powers bestowed under Audubon are sufficiently broad to permit a comprehensive evaluation of current environmental impacts within the context of current public trust values.

X.

WILD AND SCENIC RIVERS SECTION

Plaintiffs and intervenors urge that the Wild and Scenic Rivers Act precludes EBMUD's diversion at the Folsom-South Canal. In the context of this case, the following provisions of the statute are relevant:

"Section 5093.50. Legislative declaration

"It is the policy of the State of California that certain rivers which possess extraordinary scenic, recreational, fishery, or wildlife values shall be preserved in their free-flowing state, together with their immediate environments, for the benefit and enjoyment of the people of the state. The Legislature declares that such use of these rivers is the highest and most beneficial use and is a reasonable and beneficial use of water within the meaning of Section 2 of Article X of the California Constitution. It is the purpose of this chapter to create a California Wild and Scenic Rivers System to be administered in accordance with the provisions of this chapter."

(Added by Stats. 1972, c. 1259, p. 2510, Section 1. Amended by Stats. 1982, c. 1481, p. 5692, Section 1.)

"Section 5093.52. Definitions

"As used in this chapter:

"(d) 'Free-flowing' means existing or flowing without artificial impoundment, diversion, or other modification of the river. The presence of low dams, diversion works, and other minor structures shall not automatically bar any river's inclusion within the system; provided, however, that this subdivision shall not be construed to authorize or encourage future construction of such structures on any component of the system."

(Added by Stats. 1972, c. 1259, p. 2510, Section 1. Amended by Stats. 1982, c. 1481, p. 5693, Section 2.)

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"Section 5093.53. Classification of rivers

"Those rivers or segments of rivers included in the system shall be classified as one of the following:

"(c) Recreational rivers, which are those rivers or segments of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past."

(Added by Stats. 1972, c. 1259, p. 2510, Section 1. Amended by Stats. 1982, c. 1481, p. 5693, Section 3.)

"5093.54. Components of system

"The following rivers and segments thereof are designated as components of the system:

"(e) American River. The North Fork from its source to the Iowa Hill Bridge; the Lower American from Nimbus Dam to its junction with the Sacramento River."

(Added by Stats. 1972, c. 1259, p. 2510, Section 1. Amended by Stats. 1982, c. 1481, p. 5694, Section 4.)

"5093.55. Restrictions on construction of dams, reservoirs, diversions, other impoundments, or water diversion facilities

"Except as provided in subdivision (d) of Section 5093.54, no dam, reservoir, diversion or other water impoundment facility, other than temporary flood storage facilities permitted pursuant to Section 5093.57, shall be constructed on any river designated in Section 5093.54 after the effective date of this chapter; nor shall any water diversion facility be constructed on any such river unless and until the secretary determines that such facility is needed to supply domestic water to the residents of the county or counties through which the river flows, and unless and until the secretary determines that facility will not adversely affect its free-flowing condition and natural character."

(Added by Stats. 1972, c. 1259, p. 2510, Section 1. Amended by Stats. 1982, c. 1481, p. 5707, Section 8.)

"5093.56. Prohibition against governmental cooperation in projects affecting system

"No department or agency of the state shall assist or cooperate, whether by loan, grant, license, or otherwise, with any department or

agency of the federal, state, or local government, in the planning or construction of any dam, reservoir, diversion, or other water impoundment facility that could have an adverse effect on the free-flowing condition and natural character of the river segments designated in Section 5093.54 as included in the system."

(Added by Stats. 1972, c. 1259, p. 2510, Section 1. Amended by Stats. 1982, c. 1481, p. 5707, Section 9.)

The Wild and Scenic Rivers Act (hereinafter "the act") was enacted in 1972. In 1972, the lower American River ". . . from Nimbus Dam to its junction with the Sacramento River" was added to the system. The Referee concluded that the act has in no application to this case, since the point of diversion lies upstream of the "designated segment." The Referee further relied on statutory construction, noting that prior to 1982 section 5093.55 prohibited the construction of any dam, reservoir, diversion or other water impoundment facility "on or directly affecting a designated stream," and that the deletion of the underlined phrase manifests an intention to permit the EBMUD diversion. Intervenors also argue that any interpretation of the provision is "inconsequential" since section 5093.53(e), by its language, is intended to include the area behind the Nimbus Dam and therefore the point of origin of the Folsom-South Canal.

As to the latter point, it seems apparent that the segment intended for protection is that portion of the river commencing at the Nimbus Dam and lying downstream therefrom. It makes no sense in describing and protecting "free flowing rivers" to extend that protection to a manmade lake. Common English usage further suggests that section 5093.54(e) intends to make the dam structure itself the point of origin for the protection of the free-flowing river waters. Had the intent been otherwise, section 5093.54(e) would have described the protected segment as "from Folsom Dam to its juncture with the Sacramento River." The clear language does not support the intervenor's interpretation.

Plaintiff's other arguments are more persuasive. Whatever the Legislature may have intended by deleting the language "on or directly affecting a designated

stream," reason suggests that it did not mean to sanction diversions upstream of the Nimbus Dam, the effects of which would destroy public trust values in the "designated segment." EBMUD's position that section 5093.55 "only prohibits facilities constructed on a protected segment" ignores the larger purposes of the act. The objective is not simply to preclude unsightly facilities, but rather to preserve the collective public trust values of the designated stream. Section 5093.50 could scarcely be more clear in its specific adoption of Article X, Section 2 values as the underlying rationale for the statutory scheme.

The Court agrees with intervenors that section 5093.50 is "intended as a directive to preserve public trust values and is thus a codification of the State's public trust authority" (Department of Fish and Game and State Lands Commission's Trial Brief on Wild and Scenic Rivers Legislation, p. 5). Further, the Court agrees with intervenor's position, contrary to that proposed by EBMUD, that the "recreational" classification refers only to factors of accessibility, past diversions, and existing development rather than a limitation on the values intended for statutory protection.

Accepting the application of the act to the instant controversy does not justify the conclusion that EBMUD's diversion must necessarily be prohibited. As emphasized throughout this opinion, if public trust values can adequately be protected in the context of a physical solution, then no sound rationale exists for depriving defendants of the best available source for drinking water. Without minimizing the principle of statutory construction that later, specific statutes supersede more general enactments, it nonetheless bears comment that section 106 of the Water Code provides a hierarchy of values somewhat different from the act. Section 106 provides as follows:

> "It is hereby declared to be the established policy of this state that the use of water for domestic purposes is the highest use of water and that the next highest use is for irrigation."

Both statutes, it should be noted, draw specifically upon Article X, section 2 for their "authority." "Highest and most beneficial use" is only a more precise borrowing from Article X, section 2 than the section 106 reference to "the highest use." In the complex arena of water law, it is reasonable to suppose a legislative intent to accommodate those conflicting interests, wherever such accommodation can reasonably be accomplished.

The act can only be read with emphasis on the 1972 legislation which brought the lower American River into the system, with reference to section 106 of the Water Code, and in the spirit of comprehensive planning and resource management required by Audubon. As thus considered, the physical solution protects the public trust resources, while at the same time permitting that diversion by EBMUD of which the Legislature must have been aware in 1972.

Section 5093.56 offers a further basis for determining that the act applies to diversions other than those constructed within the geographical confines of the designated segment. In the context of the instant litigation, however, the result is not different. Again,the physical solution is designed to preclude adverse effects of diversion, as well as to accommodate competing interests.

Nor does the federal Wild and Scenic Rivers Act (16 USC § 1271 et seq.) provide any avenue of relief for plaintiffs which is more accessible than Article X, section 2 and the Doctrine of Public Trust. Indeed, the preservation objectives of the federal act recognize the necessity to accommodate, where possible, conflicting interests and values.

> "Each component of the national wild and scenic rivers system shall be administered in such manner as to protect and enhance the values which caused it to be included in said system without. insofar as is consistent therewith, limiting other uses that do not substantially interfere with public use and enjoyment of these values. In such administration, primary emphasis shall be given to protecting its esthetic, scenic, historic, archaeologic, and scientific features. . . ." (Section 1281(a); emphasis added.)

Thus, neither the state nor federal acts provide obstacles to the balancing approach of Audubon, nor to the fashioning of a physical solution designed to protect and enhance public trust values.

XI.

East Bay MUD urges that intervenor, Sacramento County, is estopped to deny the legal efficacy of the East Bay MUD contract with the Bureau of Reclamation for the diversion of water at the Folsom-South Canal, based upon a history of negotiation and contract in which Sacramento County allegedly agreed to East Bay MUD's diversion in return for East Bay MUD's reducing the amount of water which it was seeking from the bureau and in return for defendant's acceding to an extension of a previously granted priority on behalf of Sacramento County to enter into water contracts with the bureau.

Specifically, defendant alleges that the contractual foundation for estoppel arose from hearings in the mid-1960's, wherein the bureau was applying to the State Water Rights Board for a permit to appropriate water at the proposed Auburn Dam. It was a time of competition, negotiation and compromise among those who would appropriate the water, including the Sacramento River and Delta Water Association ("SRDWA"), the Sacramento Municipal Utility District ("SMUD"), the Central Valley East Side Project Association ("CVESPA"), and others. Sacramento County, in 1958, had received a priority to obtain water contracts from the bureau for American River water. Defendant's attempts to negotiate a contract were tempered by this pre-existing priority. In 1968, the bureau, East Bay MUD, CVESPA, and SRDWA executed a finalized agreement (the "four-party agreement"; Exhibit E to EBMUD's Brief Re: Estoppel) by which Sacramento County agreed to allow the bureau to contract with East Bay MUD for 70,000 acre feet, and for 80,000 acre feet more when the Hood-Clay Connector was completed. Based on this proposal, East Bay MUD agreed to reduce the amount of water it sought from 225,000 acre feet to 150,000 acre feet. Furthermore, in the

1968 agreement, Sacramento County gained the approval of East Bay MUD, the bureau, and the San Joaquin interests for an extension to December 31st, 1975, of Sacramento's priority to contract with the bureau.

Furthermore, in current bureau EIS marketing proceedings, Sacramento County has requested from the bureau the right to appropriate an additional 243,000 acre feet annually from the American River. Apparently, Sacramento County has kept open its option to take delivery of that water at the Folsom-South Canal. In 1978, Sacramento County adopted a "Sacramento County Water Plan," calling for the delivery of 260,000 acre feet annually to Sacramento County through the Folsom-South Canal. And, of course, all the Sacramento County hydrology projections in this case have assumed a diversion of 218,000 AFA by Sacramento County at the Folsom-South Canal.

In different circumstances, defendant's estoppel argument could well be dispositive. There is a unseemly aspect to Sacramento County's position in this case as they conjure a parade of environmental horribles were any of the American River water to be diverted to the Folsom-South Canal, while at the same time maintaining an option to divert the same water at the same location.

Admittedly, Mr. Somach, Sacramento County's attorney, has, in court, offered to defendant a quid pro quo: Sacramento County would not divert at the Folsom-South Canal if East Bay MUD will abandon its contract for diversion at that point.

One flaw in defendant's estoppel argument, however, is that the 1968 agreement and their antecedents were in the context of the construction of the Auburn Dam. It was in expectation of the Auburn Dam that the negotiations were entered, the decisions made as to how respective water allocations were to be made, and the contracts finalized which set forth the agreed-upon conditions of water allocation. The Auburn Dam was never constructed, however. As a consequence, no party can be faulted for reevaluating its position, nor may

Sacramento County be precluded from advancing its view that at this time environmental interests can be protected only by a complete absence of diversion at the Folsom-South Canal.

While no aspect of the litigation is without a measure of gravity, EBMUD's pursuit of the estoppel argument could scarcely be characterized as "spirited." EBMUD has not pled estoppel or unclean hands in its answer, nor has any appreciable evidence been advanced to demonstrate facts necessary to support such a conclusion.

From the exhibits alone, it would appear that Sacramento County was not a signatory to the four-party agreement. SRDWP was, at the time of the agreement, an association of over 50 water users, including some of the largest commercial and corporate farmers in California. The county's Reply Brief on Estoppel correctly notes that SRDWA presumably could bind the county only if specifically authorized to do so by the Board of Supervisors. (See City of Redwood City v. Moore (1965) 231 Cal.App.2d 563; Lehane v. City and County of San Francisco (1972) 30 Cal.App.3d 1051, 1054, app. dism., 410 U.S. 962.)

In opposition to EBMUD's motion, the county makes the following observations:

> "The relationship between Sacramento County and SRDWA was limited. SRDWA was authorized to negotiate proposed terms and form of settlement, 'it being specifically understood that said board does not commit itself to acceptance of any settlement which may be proposed . . .' (Sacramento County Board of Supervisors, Resolution No. 65-1168, copy attached as Exhibit A.) On March 13, 1968, the County Board of Supervisors, acting ex officio as the Board of the Sacramento County Water Agency, adopted Resolution No. 85, in which it formally recorded its opposition to the then-proposed contract between EBMUD and USBR and to the proposed agreement unless certain conditions were met, among them that EBMUD's point of diversion would be below the Hood-Clay Connection. (A copy of Resolution 85 is attached as Exhibit B.) EBMUD has failed to produce any resolution by Sacramento County approving the four-party

> agreement or authorizing SRDWA to execute it on the County's behalf. The County cannot be bound absent such approval."

From a review of the exhibits, it would appear that Sacramento County is correct in demonstrating a failure of county approval to the four-party agreement. The critical point, however, is that from an evidentiary standpoint, EBMUD has not pled nor proved the contrary.

Had EBMUD been successful in establishing the unlimited authority of SRDWA to act for and bind the county with respect to the full panoply of American River interests, estoppel would still be an inappropriate remedy on the facts of this case. It is a "well-established proposition that an estoppel will not be applied against the government. To do so would effectively nullify 'a strong rule of policy' adopted for the benefit of the public." (City of Long Beach v. Mansell (1970) 3 Cal.3d 452, 493; State of California v. Superior Court (Fogerty) (1981) 29 Cal.3d 240.) Here, both Article X section 2 and public trust values represent significant public policies that, on the facts of this case, would preclude estoppel as a matter of law.

> "Estoppel will not be applied to the government if the result would be to nullify a strong rule of policy adopted for the benefit of the public (Mansell, 3 Cal.3d at p. 294), and we entertain no doubt that this would be the result if we were to hold that the People are barred from asserting the public trust in the lands at issue." (State of California v. Superior Court (Fogerty), supra, 29 Cal.3d at p. 244.)

Finally, while EBMUD might claim some strategic benefit from proceeding against Sacramento County on this issue, estoppel would not be applicable to plaintiffs or other intervenors in this action and, consequently, would have little impact on the outcome of this litigation.

XII.

Considering the complexity of this litigation, EBMUD's ultimate legal position is exquisitely simple: The contract of December 22nd, 1970 was executed

in full compliance with all state and federal requirements; the federal government holds the necessary water rights to divert American River water and supply it through the Folsom-South Canal; EBMUD's contract has priority over other subsequent appropriations, and in the absence of demonstrable harm to public trust values, must be enforced. First and foremost, EBMUD maintained that its diversion alone would not cause harm. Still, apparently concern that Audubon invites an extended process of balancing competing interests and values, a major EBMUD evidentiary focus has been on the issue of water quality. Apart from singular reliance on its existing contract and alleged lack of harm, EBMUD advanced the proposition that the superior quality of water obtainable at the Folsom-South Canal is a sufficiently strong "value" to outweigh plaintiffs' concerns about fishing and riparian habitat values. Throughout this proceeding, in fact, the Court has been invited to engage in a process of balancing such interests.

Issue 10 of the Order of Reference directs the board to determine: "Is there a significant difference in water quality, with or without available treatment technologies, between the flows of the American River available through the Folsom-South Canal, and waters available from the Sacramento River below the confluence with the American River, and from the Delta?" The Board considered the Okun report, the critique of that report by the Department of Water Resources (DWR), the comments of the Department of Health Services (DOHS), and the testimony from various experts, including Dr. Greenberg, as well as other sources referred to on page 196 of the Technical Report. From these sources, the Board was able to analyze, to some degree, the impact on public health of THMs, brominated THMs, pesticides, herbicides, NVTOC, TOC, TOX, sodium, asbestos, selenium, microbiological contaminants, and turbidity.

The Court has found no basis in the testimony for discounting the accuracy of the board's survey of the evidence presented in the water quality section

(Technical Report at pp. 192-239). The problem for the Board, as well as for this court, is synopsized in the board's conclusion:

> "It is difficult -- perhaps impossible -- to determine accurately the public health risks due to drinking treated water from alternative sources. As described above, the scientific methodology and data used to assess public health risks are limited. There are significant differences in expert opinion regarding the risks posed by drinking water from the alternative sources ."

The Okun report was produced in response to the demands of litigation before the Board, and on the basis of evidence then available, as were the responsive reports of DWR and DOHS. Still, it would appear from testimony before this court that very little definitive, scientific research has occurred since the board hearings, and the scientific opinions and interpretations of available data, while perhaps more sophisticated at this point, are no less irreconcilable.

The testimony with respect to water quality consisted of plaintiff ' s experts, Dr. Lester Lave and Dr. Alvin Greenberg; and defendant' s experts, Dr. Daniel Okun, John Gaston, Dr. Robert Harris, and Dr. A. Karim Ahmed. [4]

Dr. Greenberg presented testimony regarding various alleged health hazards relative to the Mokelumne, American and Sacramento rivers, as well as the Delta. Noting that waterborne diseases of the sort which had historically beset human populations had largely been controlled through current water treatment modalities, particularly chlorine, he addressed various of the chemicals and pollutants whose presence was suspected or found in various waterways. He noted his agreement with the Okun report (Exhibit 25) that the following inorganic chemicals would pose no significant health risk if any of the available water sources were used for potable water:

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[4] The qualifications of each of these eminently qualified scientists will not be recited here. In no instance did the court consider the absence of professional qualifications a factor in determining credibility.

Arsenic, barium, cadmium, chromium, lead, mercury, nitrate, selenium, silver and fluoride.

Dr. Greenberg testified that waterborne asbestos posed no particular risk in any of the water sources under consideration. As to sodium, Dr. Greenberg found no risks in the American or Sacramento River, and only insignificant risk in the Delta.

With respect to pesticide pollution, Dr. Greenberg agreed with the report of the Department of Water Resources (DWR) Report (Exhibit 2012, page 9) which criticized the Okun Report as follows:

> "On page 21 (Okun Report), the statement is made that 'pesticides in fertilizers applied within a drainage basin find their way into surface waters within the basin, impact on the water quality, and present potential health risks to the population served by the water from that watershed.' This generalization was not, however, supported by data."

Dr. Greenberg felt there was no ascertainable health hazard from any of the three water sources as a result of pesticide pollution. He testified that pesticides were frequently "nonmobile," migrating into the soil; that they degrade after application; that they bind to the soil; and that settlement occurs after the pesticides reach the water sources.

Dr. Greenberg addressed a particular herbicide problem which has developed along the Sacramento River. In recent years, the existence of unpleasant taste and odors in Sacramento drinking water led to an investigation by DHS which uncovered the discharge of rice herbicides into the Sacramento River. These herbicides, which have been present in raw water for a brief time in the spring, have broken down completely in the treatment process and do not occur in drinking water. But the breakdown components produce an unpleasant taste, detectable by 10-25 percent of consumers, when mixed with chlorine. Dr. Greenberg concluded that no significant health problem has arisen from these herbicides. Basagran, while suspected of being a carcinogen in rats, could be

regulated by Proposition 65, and in any event, is being discontinued. Dr. Greenberg felt that administrative regulations should be sufficient to keep the rice herbicide discharges at levels which are not hazardous. Mr. Sequeira, the Manager of the Water Division for the City of Sacramento, echoed Dr. Greenberg's conclusions, and pointed out that the highest levels of these herbicides ever detected in raw water are below the maximum contaminant levels for finished water set by the Department of Health Services.

One critical area of concern, as seen by EBMUD, is the presence in drinking water of trihalomethanes (THMs) and non-volatile total organic halogens (NVTOX). THMs are halogenated organic compounds that are found when naturally occurring organic substances are exposed to chlorine during the disinfection process (Exhibit 2010, page 18) . Chloroform is one type of THM which occurs in treated water from the Mokelumne as well as the other three potential sources. Other "brominated THMs," formed from the reaction of THM to bromide salts, occur certainly in the Delta, and according to EBMUD experts, in the Sacramento River. According to the DWR report (Exhibit 2012):

> "Trihalomethanes are of concern because research has indicated that THMs can cause cancer in test animals, and possibly in humans. The research is still inconclusive, but there is a possibility that brominated methanes are more mutagenic than chloroform."

In general, Dr. Greenberg found no significant risk from THM or NVTOX from drinking chlorinated water, noting the agreement in that regard of the E.P.A. Report to Congress (Exhibit 5008), which found such a risk to be not large. Dr. Greenberg also emphasized that, in this case, the issue is not whether a risk exists; rather, the issue is the difference between two risks, each of which is itself small.

In exhibits 5010-5012, Dr. Greenberg presented his risk assessment of relative cancer risk from THM' s associated with chlorinated drinking water from

the targeted water sources. He utilized a potency slope (that is a rate of expected cancer from a unit dose) for chloroform which is recommended by the E.P.A. He assumed that brominated THMs would have potencies equivalent to chloroform. He further assumed that operationally EBMUD would cause Mokelumne River water to be blended with Sacramento River and Delta water. On these bases, his assessment concluded that there was no cognizable nor appreciable difference between chlorinated water from the available water sources. Dr. Greenberg's methodology was severely criticized on cross-examination, and through defendant's experts, partially on the following grounds:

1. His assumption regarding the blending of Mokelumne River with other sources was entirely speculative;

2. Some of his data derived from Mokelumne River water stored in the San Leandro Reservoir was necessarily skewed by unusual conditions in which Delta water had been stored there during a particularly dry year;

3. His use of chloroform as a surrogate on the assumption that brominated THMs were not more potent;

4. The assumption that brominated THMs were not present in the Sacramento River;

5. His use of a potency slope shown to be outdated by subsequent E.P.A. requirements.

Dr. Greenberg defended his position against such criticism, contending, for example, that recent studies by the National Toxicology Program (unconsidered by EBMUD's experts) and the opinions of other scientists demonstrate that chloroform is approximately as potent (or perhaps slightly less so) as one of the brominated THMs, and more potent than the other two. In any event, he emphasized the "conservative assumptions" inherent in his calculations, and that actual risks are probably much lower than those derived in the quantitative assessments.

With respect to NVTOX, including (3-Chloro-4(dichloromethyl)--5-hydroxy-2(5H)-furanone[MX]) (MX) and (E-2-Chloro-3-(dichloromethyl)-4-oxo-butenoic acid [E-MX]) (E-MX), Dr. Greenberg expressed his agreement with the E.P.A. Report (Exhibit 5008), concluding that carcinogenic and mutagenic risks from chlorinated drinking water "are probably not large." On the basis of epidemiological evidence, Dr. Greenberg expressed general agreement with the E.P.A. report that:

> "According to epidemiological evidence, chlorination of drinking water may cause a slight increase in the risk of cancer." (Exhibit 5008, p. 3-33)

Dr. Lave, relying almost entirely upon information provided to him by Dr. Greenberg, provided testimony about the disciplines of risk assessment and risk management.

> "As recently defined by the National Academy of Sciences, risk assessment is the scientific activity of evaluating the toxic properties of a chemical and the conditions of human exposure to it in order both to ascertain the likelihood that exposed humans will be adversely affected, and to characterize the nature of the effects they may experience.
>
> "The academy distinguishes risk assessment from risk management; the latter activity concerns decisions about whether an assessed risk is sufficiently high to present a public health concern and about the appropriate means for control of a risk judged to be significant." (Exhibit 995, "Principals of Risk Assessment," p. II-2.)

Dr. Lave testified regarding the processes by which chemicals are determined to be carcinogenic. He noted the physical limitations of epidemiological studies and the necessary reliance on rat studies (rodent bioassays) to provide scientific data relating chemicals to the development of cancer. One thrust of his testimony was the exceptionally conservative approach of these studies, the consequence of which is that very few known carcinogens are

underestimated in the scientific process. The very purpose of the studies is to guarantee that cancer risks are not underestimated. The corollary of this conservative approach, however, is the considerable doubt that must exist as to whether a particular result from a rodent bioassay can be extrapolated to humans. Risk management requires that various governmental agencies determine appropriate risks significant enough to justify regulation. In California, for example, Proposition 65 uses a "significant risk" factor of 10 in 1 million. The F.D.A. uses a standard of one in one million (Exhibit 999).

In the context of the present case, Dr. Lave testified that T13Ms in the water currently utilized by EBMUD from the Mokelumne River would cause a "theoretical" .03 day's reduction in life expectancy for EBMUD customers, based on risk analysis methods and the assumption that a cancer caused by THMs would shorten a life by 20 years. The same analysis applied to Sacramento River water, would change the reduction to .04 days. Similarly, Dr. Lave presented Exhibit 5004, demonstrating THM risk from Mokelumne River water alone, and from 50-50 blends of Mokelumne River water with Sacramento River water, at various frequencies. Mokelumne water alone, over 70 years of exposure, creates a risk of 2.4 cancers per million lifetimes due to THM ingestion. A 50-50 blend with Sacramento River water creates a calculated risk of 2.89 cancers per million over the same period.

Dr. Lave offered no judgment as to whether the aforementioned statistical differences are significant or not in terms of social policy. Apart from his personal opinion that EBMUD's diversion at the Folsom-South Canal represents a "beggar thy neighbor" policy, his testimony was simply an elaboration of Dr. Greenberg's testimony in terms of risk management principles. His analysis concluded that EBMUD could divert waters from the Sacramento River (assuming a blending of the waters) with a statistically insignificant increase in carcinogenic risks to the general population from THMs. His presentation was largely statistical in nature

and did not consider the consequences of pesticide pollution as well as any number of other degradation factors. As indicated, his assessment was limited to an analysis of THM, only one of the many pollution problems developed in the testimony. He agreed that tine value of his testimony was entirely dependent upon Dr. Greenberg's initial analysis. Finally, Dr. Lave readily conceded that there are an abundance of "unknowns" in his analysis, including the synergistic effect of unknown and unquantifiable chemicals within the waterways, as well as the continual introduction of new chemicals into industrial and agricultural commerce. The presence of some uncertainty did not, however, alter his conclusions with respect to the water quality or the risk management issues that inhere in this case.

For EBMUD, Dr. Harris testified generally about the genesis of concerns regarding health hazards in drinking water. He testified that there are over 60,000 manmade chemicals in the environment, with a thousand or more added each year. While the Federal Safe Drinking Water Act Amendment of 1986 mandates the E.P.A. to promulgate regulations for 83 new chemicals in 1989 and for an additional 25 chemicals each three years thereafter, it is highly improbable that this can be accomplished given bureaucratic and scientific limitations. Further, it is expected that the E.P.A. will lower THM standards from 100 parts per billion to between 25 and 50 parts per billion. As other experts noted, this will have a dramatic effect in water treatment, requiring that facilities in many cases will have to switch from chlorination to ozonation or granular activated carbon (GAC), perhaps in conjunction with chlorine or chloramine additives as "residual" disinfectants in the distribution system.

Dr. Harris focused on the health threat posed by organics in drinking water and drinking water source supplies. He testified that organics enter a water supply through many sources, including urban runoff, agriculture, sewage treatment,, industry, and pulp mills (Exhibit 4150). Dr. Harris opined that

attempts to regulate these discharges have "almost been a dismal failure." Through toxic tort liability, industries are becoming more careful, but regulatory strictures are not adequate to control organic discharges. Organics react with chlorine during treatment to produce chlorine "by-products," many of which are highly mutagenic and probably carcinogenic. Dr. Harris testified that chlorine treatment cannot be abandoned with present technology because the health risk posed by waterborne infectious disease is significant. Nonetheless, he cautioned that the amount of chlorine added during treatment should be minimized, and that this can only occur with the selection of a pure water supply.

Dr. Harris testified that knowledge of types and toxicity of chlorinated by-products is increasing. Over 30 of the 100 known compounds have now been identified (through gas chromatograph technology). THMs (Exhibit 4153), which during the 1970's were thought to represent the entirety of the risk from chlorination, are now seen as representing only the "tip of the iceberg," with chloroform THMs representing only the tip of the tip of the iceberg (Exhibit 4152). Recent discovery of MX and E-MX (Exhibit 4154) in the non-volatile fraction of the "iceberg" has led to increasing concern over the toxicity and health risks associated with the "unknowns" of this NVTOC fraction. Dr. Harris testified that MX is the most potent mutagen ever tested. E-MX is one/tenth as potent as MX, and is also considered a highly potent mutagen.

THMs, MX and E-MX are by-products of the reaction between organics in the water supply and chlorine applied during treatment. The higher quality the water source, the fewer organics ("precursors") in the water supply. Water supplies with fewer "precursors" produce fewer chlorine by-products. Furthermore, a higher quality source requires less chlorine for adequate treatment. A higher quality source thus has fewer "precursor" organics and requires less chlorine for treatment. The finished water from a higher quality

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source will thus contain fewer chlorinated by-products such as THMs, MX and E-MX.

Dr. Harris testified that the trihalomethane formation potential (THMFP) of the three alternative sources varies. The THMFP of a source is calculated by adding chlorine to a sample from the water source in a laboratory and measuring the resultant THMs. While it may not exactly predict the THMs which will be present in the finished water, it is indicative of the organics present in the water source and the likely challenges facing the treatment process. It provides a means of comparing the relative qualities and potential relative risks of various sources. Dr. Harris testified that the THMFP for chloroform may be 50 percent higher than the chloroform which actually occurs in finished water. Dr. Harris testified that the THMFP for the brominated compounds, however, is less than the levels occurring in finished water. Thus, for sources with higher percentages of chloroform THMs (such as the Mokelumne River and the American River), THMFP may overpredict the actual risk; whereas, for sources with higher percentages of brominated THMs (such as the Sacramento River and the Delta), THMFP may underpredict the actual risk.

Dr. Harris presented a comparison of the THMFP of the Mokelumne River, American River, Sacramento River and Delta. He compared the risks presented by chloroform THMs (Exhibit 4156), bromoform THMs (Exhibit 4157), bromodichloromethane THMs (Exhibit 4158), and dibromochloromethane THMs (Exhibit 4159). In each case, the Sacramento River and the Delta waters contain much higher concentrations of THMs than either the Mokelumne River or American River.

Dr. Harris testified on the "reservoir effect" of placing different source waters in reservoirs for storage (Exhibit 4160). Dr. Harris testified that the reservoir storage adds THMs to the finished water. Fertilizers, particularly nitrogen and phosphorus, present in agricultural watersheds, wash off into the

water and collect in the reservoirs (Exhibit 4161). Dr. Harris stated that both nitrogen and phosphorus act as growth enhancing nutrients to biological organisms present in the watershed, thus increasing the total organic content in the reservoir. When the water is treated, the added organic materials combine with the chlorine to form by-products such as THMs, MX, and E-MX. Thus, by storing water with high fertilizer runoff, THMs levels i;n finished water are increased (Exhibit 4162, Exhibit 4163). Dr. Harris testified that while the reservoir effect should be considered in source selection, the risk analysis presented by Dr. Karim Ahmed for EBMUD would not attempt to quantify this effect.

Dr. Harris stated that he and his colleagues had confirmed that this process is operating in EBMUD's reservoirs. This process was especially evidenced in the late 1970's - early 1980's when Delta water was added to the reservoirs during emergency drought conditions. The THM levels in the reservoirs took several years to return to normal. Dr. Harris calculated the predicted THMFP for the EBMUD's reservoirs using water from the alternative sources, and found a significant increase in THMFP with the use of Sacramento River and Delta water during average (Exhibit 4164) and dry years. During wet years, the effect is lessened because runoff from the reservoir watershed dilutes the reservoirs.

Dr. Harris testified on MX, a by-product of chlorination and a very powerful mutagen. MX is thought to comprise one-half of the mutagenicity of the chlorinated by-products. Because MX is so potent, Dr. Harris testified that it cannot be ignored in conducting a risk assessment. Dr. Harris noted that because MX has been so recently discovered, there are no long-term definitive tests of its toxicity. Dr. Harris calculated MX through a correlation with TOC (Exhibit 4165). By using actual TOC figures, Dr. Harris derived the MX concentrations which will likely occur in the three proposed sources (Exhibit 4166). The TOC data used by Dr. Harris was derived from recent monitoring by EBMUD. It is consistent with

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the DWR data presented in the DWR report (Exhibit 2012) at page 24. The data is as follows:

	American River	Sacramento River	Delta
1985-86	3.88 ppm	6.1 ppm	9.15 ppm
1987-88	1.64 ppm	1.98 ppm	3.43 ppm
average 1985-88	2.62 ppm	3.85 ppm	5.96 ppm

Dr. Harris found that MX levels in the Sacramento River and the Delta are significantly higher than in the American River, whether considering observed TOC alone (the orange bar of Exhibit 4166), or potential TOC resulting from reservoir storage of the source waters (the red bar of Exhibit 4166). Dr. Harris testified that the brominated THMs, MX and E-MX are significant public health risks and must be considered in any assessment of risk due to alternative drinking water sources. He noted that because this data was not available in 1985, it was not included in the Okun report (EBMUD Exhibit 25). Since there is more information today, including cancer potency factors for the brominated THMs, the source selection process can be assisted through the performance of a quantitative risk assessment.

Dr. Harris testified that a risk assessment of drinking water sources should take into account pesticide contamination. Quantitative information on actual pesticide contamination is difficult to obtain, notwithstanding monitoring efforts conducted by the state. Dr. Harris testified that monitoring efforts are hindered by significant limitations, including different analytical methods required to measure different chemicals; the sporadic application and washoff of pesticides makes the timing of the monitoring crucial; and many of the detection limits for pesticides are above their toxic thresholds (Exhibit 4167). Despite these problems, the E.P.A. has developed health advisories for 50 pesticides, and is expected to follow up with regulations (Exhibit 4223).

Dr. Harris testified that of the carcinogenic pesticides known to be used in the watersheds of the American River, the Sacramento River and the Delta, only 10 are being monitored. For those 10, actual sampling occurs only 4 to 8 days per year. Dr. Harris concluded that monitoring is inadequate for pesticides that may pose a risk.

Dr. Harris testified that although pesticides are not detected through monitoring, their presence in water has been proven by their accumulation in fish (the Department of Fish and Game has been sampling for pesticides in fish tissue and the pesticides are showing up in fish tissue from the Sacramento River and the Delta), the detection of Basagran, Ordram and Bolero in the Sacramento River (daily monitoring is conducted), and the demonstrable reservoir storage phenomena.

Dr. Harris testified that in 1985, at the time of the Okun report (Exhibit 25), there was not sufficient data on which to base a quantitative assessment of risk presented by the three sources. There was sufficient information to do a sanitary survey, as has been historically done by sanitary and environmental engineers on drinking water source selection. In 1989, there is still relatively little information regarding the vast range of chlorinated by-products known to exist. Dr. Harris testified that there are, however, sufficient data on brominated THMs and some data on MX and E-MX which would permit a risk analysis to be conducted based on those compounds.

Dr. Harris testified that while the risks from THMs, and to a limited extent, pesticides, can be quantified, there are many other chemicals affecting water quality and posing a threat to public health, that cannot be quantified in a risk assessment. Industrial discharges (including dioxins which have been found in fish downstream from paper mills), landfills, urban runoff, and some pesticides cannot be quantified, and have to be analyzed qualitatively; i.e., with the technical judgment of sanitary engineers. In these cases, preliminary toxicological data and

potential vulnerability of the watersheds must come into play. These are assessed through a sanitary survey, such as was done in the Okun report Exhibit 25). Dr. Harris testified that with respect to these qualitative factors, the American River presents the cleanest or "best" source, with the Sacramento River and the Delta being less desirable sources (Exhibit 4171).

Dr. Harris testified regarding the efficacy of alternative treatment techniques, and whether treatment could be considered as an alternative to "best available source" (Exhibit 4172). Dr. Harris testified during his cross-examination that the treatment of Sacramento River or Delta water would not result in water of the same low risk as that of treated American River water. Dr. Harris further stated that alternative treatment methods should be approached with caution, since there is only limited information on the health risks associated with their by-products .

On direct examination, Dr. Harris addressed certain criticisms of the Okun report (Exhibit 25) by the report of DWR (Exhibit 2012). For example, the DWR report criticized the Okun report for failing to show that treatment would not meet existing drinking water standards. Dr. Harris responded that in 1985, standard treatment may have met the minimal standards which existed. He stated, however, that new standards arising from the 1986 congressional amendments will be much harder to meet, and that new treatment systems may have to be built to comply with the new standards.

The DWR report criticized the Okun report for failing to show "'actual harm." Dr. Harris responded that it is not prudent public policy to wait until actual harm is shown (the "falling bodies approach"). He stated that you have epidemiological evidence available upon which to make basic public policy determinations, emphasizing a continued viability of the "best available source" as the key to meeting changing governmental standards.

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The DWR report criticized the Okun report for dealing only with a sanitary survey and failing to demonstrate quantitative information. Dr. Harris responded that prior to 1985, a valid quantitative analysis could not be done, because:

A. No cancer data on brominated THMs existed;

B. No quantitative data on NVTOC or MX existed;

C. There was considerable uncertainty regarding epidemiological studies; and

D. Pesticides were not monitored.

He noted that the inadequacy of pesticide monitoring continues to be a problem.

Dr. Harris testified that the sanitary survey prepared in 1985 and presented in the Okun report was just as valid today. He stated that the quantitative risk assessment prepared by Environ for these proceedings has not modified his opinion as to the health risks associated with the three targeted water sources.

Dr. Harris testified during cross-examination that although individual chemicals may seem to pose slight risks, cancer risks are at least additive, perhaps synergistic, and pose a very real health threat.

In conjunction with Dr. Harris' testimony, Dr. A Karim Ahmed testified as to his formalized risk assessment of the health hazards present in the three sources. He relied upon known epidemiological data, rodent bioassays, short-term test data ("Ames test"), and other studies, such as metabolic data and structure/activity relationships.

Dr. Ahmed testified regarding the relative risks presented by pesticides in the three watersheds. He stated that the Sacramento River watershed has 10 times the pesticide use of the American River watershed, and that the Delta is even higher (Exhibit 4201). Dr. Ahmed showed the substantial differences in

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pesticide use per square mile (Exhibit 4203); and the differences in carcinogenic (either B2 or C) pesticide use (Exhibit 4204).

Using 1,3-Dichloropropene as an example (Exhibit 4205), Dr. Ahmed estimated the lifetime cancer risk presented by the various sources (Exhibit 4206). The actual risk presented from 1,3-Dichloropropene alone by the Delta water is 3 cancers per lifetime per million; the Sacramento River water presents a risk of .36 cancers per lifetime per mil].ion; and the American River water presents a risk of .001 cancers per lifetime per million. Dr. Ahmed noted that only the Delta is above the "de minimis" risk of 1 in 1,000,000, and that all three sources are present below the detection limit set for current monitoring devices (Exhibit 4207). Dr. Ahmed testified that of the carcinogenic pesticides known to be used in the watershed, 7 pose a carcinogenic cancer risk of 1 in 1,000,000 at levels below the detection limit (Exhibit 4208). Thus, even if year-round monitoring existed, these compounds could not be detected, but would still pose a significant cancer risk.

Fish bioaccumulation evidence is commonly used to derive the pesticide contamination level in a water source. The E.P.A. has determined that water source contamination risk levels can be calculated by dividing the fish data by 5,000. The risk presented by the Sacramento River for dioxin, for example, has been calculated by this method to pose a risk of 10 in 1,000,000 .

Sacramento County Exhibit 5045, presented during the "alternatives" testimony of Dr. Chen on April 28, 1989, confirms the widespread use of this methodology. At page 4-48, plaintiffs' Exhibit states:

> "Although pesticides are currently not often detected in Delta waters, there is evidence from the accumulation of organics in fish tissues that pesticides are present and may pose a drinking water quality problem in the future (DWR, 1987)."

Dr. Ahmed presented a risk assessment of chlorination by-products. He offered criticisms of Dr. Greenberg's analysis, objecting to his use of chloroform as a surrogate, opining that brominated THMs are together significantly more potent

than chloroform. He opined that the brominated species contribute a significant portion of the total risk for THMs in each water source. He testified that, under his calculations, in the Mokelumne and American rivers, the risk posed by the brominated types is approximately 2/3 of the total risk (Exhibits 4190 and 4191); in the Sacramento River the brominated species represents 3/4 of the total THM risk (Exhibit 4192); and in the Delta, almost the entire THM risk (Exhibit 4193). The numerical calculations are presented in Exhibit 4194.

Dr. Ahmed testified that the estimated lifetime cancer risks for THMs per million population posed by the various sources are as follows:

Mokelumne River:	18 cancers
American River:	22 cancers
Sacramento River:	51 -cancers
Delta:	430 cancers

Dr. Ahmed testified that the different cancer risks result from the different concentrations of organics (total organic carbon, or "TOC") in the water sources, and the consequential differing amounts of chlorine required for treatment. He noted that the risks posed by the Sacramento River are double those for either the American or Mokelumne sources. The risk posed by the Delta is, under the calculations Dr. Ahmed performed, 20 times greater than the American or Mokelumne rivers, and 8 times greater than the Sacramento River.

Dr. Ahmed expressed considerable concern about MX, "a very potent mutagen" when tested by the Ames test. Employing a methodology not utilized by the E.P.A., and extrapolating from the Ames test and observed TOC levels, he concluded that there might be a significantly increased carcinogenic risk for the Delta and Sacramento River sources compared with the American.

Just as defendants were critical of plaintiff's experts, so did plaintiffs reciprocate in their attacks on Dr. Ahmed (and Harris). For example, plaintiffs urge that the quantitative risk assessment for THM was seriously flawed by

Dr. Ahmed's assumption that THM formation potential was the equivalent of THM, an error which, according to plaintiffs, would dramatically inflate the figures relating to carcinogenic risk. More critically, plaintiffs attacked the entirety of Dr. Ahmed's assessment of risk from MX as being largely speculative, supporting that conclusion with a step-by-step critique set forth in Sacramento County's Closing Brief on Alternatives Including Water Quality at pages 32-35.

Despite the criticisms, Dr. Ahmed concluded that the Delta and Sacramento River sources presented significantly higher public health risks than the Mokelumne River or American River water diverted at the Folsom Dam.

John Gaston, formerly with the Department of Health Services and currently chairman of the E.P.A. National Drinking Water Advisory Council, provided an overview of pollution problems for the three targeted water sources. For example, he noted that while the American River collects 6 million gallons of sewerage daily, the Sacramento River accumulates 255 million gallons, and the Delta over 600 million gallons per day. Rice herbicides also constitute a "major pesticide insult" to the Sacramento River and Delta, which has led to litigation by City of Sacramento and environmental groups for more stringent regulations. In fact, DHS has adopted strict regulations which recently became effective. In the past, however, farmers have disregarded the regulations in light of agricultural necessities.

Current estimates establish that millions of pounds of herbicides are applied annually in the Sacramento River watershed and Delta. According to Mr. Gaston, the Delta is not monitored with sufficient regularity to identify the various pesticides, nor is laboratory technology adequate to the task of testing for the full range of- pesticides. Over 284 pesticides are currently in use in the Sacramento and San Joaquin River watersheds.

Based on these and myriad other water quality considerations, Mr. Gaston concluded that water treatment, even as enhanced by new technologies such as

ozonation and granular activated carbon (GAC), "is absolutely not" a substitute for the best available source.

Dr. Daniel Okun testified as to the history of the "sanitary survey" as the favored method and "best available source" as the favored objective of water source selection. In specific terms, Dr. Okun's testimony was mirrored in large part by the Okun report (Exhibit 25) and was covered by other of the East Bay MUD witnesses who testified.

During cross-examination especially, each side made effective use of the numerous documents and reports addressing the issues of water quality. For example, during the cross-examination of Dr. Harris on the issue of the health hazards of chlorinated by-products, Sacramento County noted the conclusion from a series of studies that, "While these data do not prove the chlorination of drinking water fails to increase carcinogenic and mutagenic risks, they do indicate that the risks are probably not large." (E.P.A. Report to Congress: "Comparative Health Effects Assessments of Drinking Water Treatment Technologies [1988]; Exhibit 5058.)

In fact, the E.P.A. report reflects throughout the fundamental public health policy controversies which are at issue before this court. Consider, for example, the following epidemiological section of the E.P.A. report:

> "Since 1974, when the use of chlorine as a disinfectant was shown to lead to the formation of trihalomethanes in finished drinking water (Bellar et al., 1974; Rook, 1974), a great deal of effort has gone into identifying other chlorine by-products and assessing the hazards these chemicals present to human health. According to epidemiological evidence, chlorination of drinking water may cause a slight increase in the risk of cancer. In particular, cancers of the bladder, colon, and rectum seem implicated (Craun, 1985).
>
> "The early studies in this area were reviewed by the National Research Council (NAS, 1980) and found to have a number of methodological problems -- primarily lack of control over potentially confounding variables, small and variable increases in the relative risk, and inadequate documentation of exposure. However, more rigorous studies conducted since the

NRC review (Cantor et al., 1985; Cragle et al., 1985; Young et al., 1986) confirm some of the observations in the early studies.

"In the Cragle et al. (1985) case-comparison study of colon cancers and hospital-comparison subjects among North Carolina white residents, odds ratios of 1.38, 2.15, and 3.36 were observed for home consumption of chlorinated water for 16 or more years and colon cancer in 60-, 70-, and 80-year olds. These odds ratios suggest a weak-to-moderate association between water chlorination and colon cancer in the study population.

"In an analysis of his 1978 epidemiological data, Cantor et al. (1987) found that, for one subgroup, i.e., those drinking greater than average amounts of water and exposed to chlorinated surface water for more than 40 years, there was an association (odds ratio of 3.1) with a small increased risk of bladder cancer.

"Attempts to associate the development of cancer with specific chlorination by-products (e.g., trihalomethanes) have not been particularly successful (Young et al., 1987). This is not surprising given the large variety of disinfection by-products with carcinogenic and/or mutagenic properties that are known to be generated at small concentrations Bull, 1986). Therefore, it is unlikely that one by-product would stand out as solely responsible for these small increases in cancer risk." (E.P.A. Report 3.33,3.34.)

To plaintiffs, the operative words with respect to the foregoing identified health hazards are: "Slight increase," "weak-to-moderate association," "small increases in cancer risk," and so on. To plaintiff, "EBMUD's approach to the water quality issue consists of slogans, speculation, and arm waiving." (Sacramento County: Closing Brief on Alternatives, Including Water Quality, at p. 5:7.) Plaintiffs urge, in effect, that the mere potential of increased health hazards is not sufficient to justify the diversion of water from the best available source at the expense of the identified environmental interests in the American River watershed.

Page 6 of the East Bay MUD brief on water quality synopsizes their position and in the process underlines the basis for plaintiff's argument that East Bay MUD cannot justify its position in terms of provable detriment. East Bay MUD argues that:

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1. Sacramento River and Delta water contain substantially higher levels of identifiable pollutants, and both sources carry a "higher potential for contamination by undiscovered, unmeasured and new toxic and carcinogenic compounds;"

2. Drinking water standards are becoming progressively stricter and more difficult to meet;

3. Conventional treatment does not remove many of the known harmful chemicals and does not address those which remain unknown;

4. The addition of chemicals during the treatment process produces many toxic and carcinogenic by-products.

The joinder of issues over water quality is further demonstrated by the conclusion of the Okun report in comparison with the criticism of that report by the DWR.

> "Our conclusions are (1) that to provide the greatest public health protection, drinking water should be taken from the best available source, and (2) that the American River at Nimbus is the best available source, far better than either the Sacramento River or the Delta.
>
> "The first conclusion is based primarily on three points:
>
> "1. The principle of 'best available source' is and long has been the fundamental policy underlying the provision of safe drinking water supplies;
>
> "2. With the continuous introduction to commerce of new chemicals and the development of new methods for detecting contaminants in drinking water, an increasing number of potentially harmful substances have been found in drinking water drawn from polluted sources so that there is today even a greater need to adhere to the best available source principle; and
>
> "3. Water treatment is not a reliable substitute for obtaining water from the best available source.
>
> "The second conclusion, that the American River is the best available source, is based on two points:
>
> "1. The industrial, agricultural and urban character of the American River watershed, as compared to the other watersheds considered, indicates conclusively that activities in the American River watershed represent far less of a public health threat to drinking water supplies both today and in the future; and

"2. Water quality data, based on samples from the several possible sources, demonstrate that water from the American River is of much higher quality today than water from the other sources considered."

In response, DWR . . .

> "did not find sufficient evidence in the Okun report to support the stated conclusions that American River water provides the greatest public health protection and is far better than either the Sacramento River or Delta diversion sites. The department acknowledges that American River source water is less exposed to pesticides, fertilizers, and industrial and municipal waste discharges than waters of the Sacramento River and Clifton Court. However, the Okun report did not present evidence demonstrating actual adverse effects from these sources of pollutant input on waters of the three candidate diversion sites. In fact, the differences in raw water composition at the diversion sites have not prevented modern treatment facilities from treating these sources to meet drinking water quality standards."

The essence of the water quality controversy resides in the element of uncertainty. After extended analysis, the board could only conclude that the public health data were "inconclusive" and that prudence required that EBMUD seek its municipal water supply from the American River (Technical Report, at p. 239). For this trial, each side has honed its scientific testimony, and reached out for an "edge" in scientific certainty through various risk assessments and quantitative evaluations which were not available at the board hearings. Unfortunately, neither the fine-tuning of the testimony of Doctors Harris and Greenberg, nor the additional testimony of Doctors Ahmed and Lave has achieved the desired result. Absolute certainty cannot be divined.

In another scientific context, specifically that relating to the greenhouse effect which has been linked to the discharge of synthetic chemicals into the atmosphere, Professor Ramanathan made the following observations:

> "The problem is unique in the sense that it's a scientific debate right in the center of a public policy question. For many scientists . . . our biggest dilemma is whether to emphasize the uncertainty surrounding our current research or the potential dangers involved if the problem develops and we ignore it. It's a

> delicate path to straddle, but one thing is certain, and that is if the predictions of a global warming are correct, then we are running out of time, and what we decide to do in the next few decades may be very critical to the future of the planet." (Tim Obermiller, "A Delicate Balance," University of Chicago Magazine, Spring 1989.)

It is ironic, as EBMUD emphasizes, that in other litigation, plaintiff EDF has seized upon the same "potential" problems as a basis for establishing stricter controls in water quality. As a single example, consider the EDF argument made in Bridgeport Hydraulic Company v. Council On Water Company Lands of the of Connecticut (1977) 453 F.Supp. 942.

> "To the traditional biological agents such as the pathogens and bacteria measured in terms of coliform and other traditional water quality parameters, such as suspended solids and turbidity, are now added chemical contaminants associated with development, including the pesticides, the fertilizers, heavy metals, salts and nitrates associated with agricultural and urban and street runoff, and a whole range of soluble toxic and carcinogenic organic compounds. The enormous enforcement and control difficulties associated with these so-called 'non-point' sources of pollution once they enter water courses in a water supply watershed have raised considerable alarm and uncertainty on how most appropriately to deal with these contaminants. . . . Further doubts [exist] over the effectiveness of water treatment methods, such as filtration (as distinct from preventable policies as land retention) to treat adequately these non-point source pollutants. . . ." (Emphasis added.)

From the evidence presented, this court is satisfied that the health risk concerns of EBMUD are well-founded. There is much more to EBMUD's case than "slogans, speculation and arm waiving." Scientific uncertainty as to the parameters of risk, yes. But, no credible uncertainty at all as to the existence of risk itself.[5]

To this court, the establishment of "slight" or "moderate" risks with respect to certain pollutants assumes a higher level of significance given the substantial

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5 Risk, after all, is defined as "the chance of injury, damage or loss."

unknown factors which have also been demonstrated. Developing chemical technologies continue to increase the pollutant load on the waterways, while the technology of effective detection has not kept apace. Further, it entirely likely that the existence of deadly carcinogens may first be conclusively determined only through epidemiological studies which are successful in charting patterns of illness only after substantial illness has occurred throughout the population. It is the respect for the unknown which dictates the continuing validity of the sanitary survey as one of the legitimate bases for public health decisions. And if defendant's risk assessment proves prophetic, then it would have been a judicial act of exceptional irresponsibility not to have taken the safer course. This is particularly true given the formulation of a physical solution which can, in this court's view, protect the public trust values which have been advanced as the other side of the equation.

It does bear emphasis, however, that the essence of East Bay MUD's position in this case is the importance of drinking water of the highest quality and not merely the convenient availability of that water. Without the issue of water quality, East Bay MUD's position would be greatly attenuated, and possibly could not withstand the logic of plaintiff's position that multiple uses of the American River water constitute the most reasonable and highest beneficial use under Article X, section 2. Thus, it needs to be emphasized that the diversion of water to East Bay MUD is for the use of East Bay MUD customers only, and shall not be used as a "marketable commodity" for transport to agricultural or other uses. As will be emphasized in the court's order, any diversion permitted in this case will be strictly conditioned upon utilization of the water by East Bay MUD customers for urban uses and only under circumstances where the water can be used for those intended purposes. Were it possible to further limit the utilization for drinking water purposes, the Court would seriously consider that as an option.

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XIII.

Having determined that water quality for municipal purposes is appreciably superior when drawn directly from the reservoir at the Folsom-South Canal, it remains to be determined if any resulting harm to American River public trust values is of sufficient magnitude to preclude the diversion.

A determination of the effect of the EBMUD diversion at the Folsom-South Canal requires a comprehension of the relevant hydrology. The board utilized hydrologic models which, in essence, applied current operating conditions (including modified D-1400), and attempted to determine the percentage of time those flows could be achieved with and without the diversion of 150,000 acre-feet at the Folsom-South Canal. The Board presented the results of its evaluation in terms of "exceedence analysis," which can be demonstrated by figure 5-10 from the Technical Report. The figure demonstrates that 3000 CFS (the Department of Fish and Game recommended flow for rearing chinook salmon) is equaled or exceeded in March in 32 percent of the years in which EBMUD takes from the Folsom-South Canal, and in 36 percent of the years if EBMUD takes from the Sacramento River. The difference (D) is indicated in the table as 4 percent. These model studies showed the incremental addition of EBMUD's diversions, assuming that other projected year 2020 uses of American River water were being met first.

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TABLE 5-10

Effects of EBMUD's Proposed Diversion on Flows
Recommended for Rearing of Juvenile Chinook Salmon
(Exceedence of recommended rearing flows below Nimbus Dam)

Agency	Recommended Flow (cfs)	% Exceedence											
		Mar			Apr			May			Jun		
		FSC	SR	D	FSC	SR	D	FSC	SR	D	FSC	SR	D
DFG	3000	32	36	4	45	57	12	55	61	6	56	64	8
USFWS	1250	93	95	2	84	84	0	86	88	2	86	88	2
EBMUD	750,750												
	750&2000	94	96	2	92	94	2	92	94	2	60	65	5
Sac Co	4000,4500												
	4500&4000	25	25	0	28	31	3	42	45	3	48	55	7

Criteria:

FSC: EBMUD diversion at Folsom-South Canal - Study S-237
SR: EBMUD diversion below American River confluence - Study S-79
D: difference (D)

This exceedence analysis was roundly criticized by plaintiff's experts. Mr. Steiner testified that the Board used planning rather than operational models; that by targeting only D-1400 flow objectives, the analysis was very limited, and permitted no analysis of other preferable flow patterns, nor their impact; that tables such as 5-10 ignore entirely all those times in which flows are already too low and where EBMUD's diversions would cause them to go lower, thus exacerbating environmental degradation; and give no indication of the magnitude of reduction in flows below environmentally acceptable rates.

Defendants counter that using Modified D-1400 flows simply mirrored the current actual operations of the dam. "They simply show how much water would be in the river under present operating criteria, including Modified D-1400, assuming a repeat of 1921-78 hydrology, and under varying conditions of

demand." (EBMUD Reply to Sacramento County's Summation Re: Hydrology and Fishery, at p. 2.)

Plaintiffs concern was that the court would make too much of the board's model studies analysis, concluding from Table 5-10, for example, that the demonstrated difference of 4 percent would be insignificant in determining the effects of EDMUD's diversion on public trust values. The concern was understandable, given the board's reliance on the various studies, particularly Studies 79 and 2:37.[6] For example, the board draws the following conclusions from the studies at projected 2020 levels of development:

> "These studies show that EBMUD's diversion causes a reduction of flow in the river.
>
> "As shown on figure 4-29, for the 2020 development level (Studies 79 and 237) the average flow during the peak runoff period (February to June) is reduced about 1000 CFS. D-1400 full recreational flow was provided in 45 of the 57 years (79 percent) with EBMUD diverting via the Folsom-South Canal and 47 years of the 57 years (82 percent) without EBMUD diverting from the canal [table 4-19]
>
> "Of prime concern is the flow in the river during the low-flow period (July through October). Comparison of these four studies in table 4-17 shows that EBMUD's maximum diversion would result in a reduction of the flow in the river in 4 of the 57 years of record, or about once each 14 years at the 2020 development level . . . ."

While noting that these hydrologic studies "provide a reasonable estimate of future conditions and allow adequate assessment of the specific issues in this case," the board also notes the following limitations:

> "The hydrologic studies are based on historical stream flow records, estimated projected water needs, current bureau operational criteria for Folsom Dam, numerous assumptions, and a strict set of operational conditions in the computer model."

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6 In Study 79, SMUD diverts its full 75,000 AFA from Folsom-South Canal, and EBMUD takes nothing; in Study 237, based upon 2020 projections, EBMUD takes 150,000 acre-feet and SMUD takes 85,000 AFA.

The board further qualified its conclusions by noting, again:

> "Depending on the unique hydrologic conditions that occur in any given year, a large measure of human judgment would be required to manage effectively the water resources of the American River, including provision of adequate instream flow, maintenance of an adequate reservoir level and supply for consumptive water demands."

While accepting the view that the model studies are quite useful in certain prospective evaluations, the court has concluded that the stated limitations compromise the ultimate value of these studies in the context of the instant litigation. First, as will be emphasized in the next section evaluating plaintiff's RMI studies, the assumptions of the models are based upon a projected consumptive demand that is entirely inconsistent with the maintenance of public trust values in the lower American River. Second, the models do not adequately forecast short-term impacts which may have devastating and permanent effects on public trust values. Finally, in the long run, it is a large measure of human judgment" that will be required to guarantee the protection of public trust values. A framework for the exercise of that judgment is one objective of these proceedings.

In summary, the court agrees with plaintiff's position that the board's hydrologic studies provided insufficient basis for conclusively determining the real impact of EBMUD or other diverters upon the ability to meet flows necessary to protect instream and public trust values in the lower American River.

While criticizing the board's analysis and projections based on planning models and exceedence analysis, plaintiffs until this trial provided no modeling alternatives. To crystalize their criticism of the board's analysis and conclusions based upon D-1400 operational flows, plaintiffs have countered with their own models, designed by RMI. A predicate for the RMI model was the evaluation of various flow rates (rather than just D-1400 flows). Noting that the validity of model depends upon its assumptions, Mr. Link testified that he sought out the

advice of County fishery experts (BEAK) and the Department of Fish and Game to ascertain those "preferred flows" which would protect fishery interests. Provided with preferred flows ranging from 2500 to 3500 CFS, it was apparent that such flows simply could not be met in an operational context. Accordingly, lower flows were accommodated to the model. It was determined that 1750 CFS was the pattern which could be met most consistently given other consumptive demands. The projected 2020 A.D. study utilized 1000 CFS on the assumption that the system by that time could not consistently meet a flow of 1750 CFS.

Without considering the entire range of assumptions and diversions in the models run by RMI, their general approach can be seen by the 1980-50A study, compared with the 2020-590A study, which was described in the RMI report as follows:

> "1980-50A Study: This simulation uses the 1980 level of American River Basin development, and Folsom-South Canal diversions of 50 ,000 acre-feet (AF) of water per year. Pertinent information includes:

Diversions above Folsom Dam:	80,000	AF/Year
Folsom South-Canal Diversions:	50,000	AF/Year
Sacramento City Diversions:	91,000	AF/Year
Accretions/Depletions:	74 ,000	AF/Year
Preferred River Flow (Fall):	1,750	CFS
Preferred River Flow (Summer):	1,750	CFS
Preferred Maximum River Flow:	10,000	CFS
End of September Target Storage:	610,000	AF

> "In this simulation an attempt is made to establish a preferred release of 1,750 cubic feet per second (CFS) to the Lower American River at Nimbus Dam on October 1 of each year. If it is determined that storage in Folsom Reservoir on September 30 or at the end of each succeeding month through February is too low to maintain releases of this size, then a relaxation in the magnitude of the release is allowed. Releases required for the evacuation of flood control space in Folsom Reservoir overrides any flow level otherwise determined for this period.

> "On March 1, a determination of the available water supply is calculated based on a March through September river flow

criteria in May and June, is released evenly during the July through September period.

"2020-590A Study: This simulation uses the 2020 level of American River Basin development, and Folsom-South Canal diversions of 590 ,000 acre-feet of water per year. Pertinent information includes:

Diversions above Folsom Dam:	421,000	AF/Year
Folsom-South Canal Diversions:	590,000	AF/Year
Sacramento City Diversions:	226,000	AF/Year
Accretions/Depletions:	74,000	AF/Year
Preferred River Flow (Fall):	1,000	CFS
Preferred River Flow (Summer):	1,000	CFS
Preferred Maximum River Flow:	10,000	CFS
End of September Target Storage:	610,000	AF

"In this simulation an attempt is made to establish a preferred release of 1,000 CFS to the Lower American River at Nimbus Dam on October 1 of each year. The same water supply forecasting and flow establishment routines are used in this study as were used for the 1980-50A study. However, if the supply of water is insufficient to meet the preferred river flow, then the available water for release below Nimbus is evenly released over the March through September period subject to D-893 flow requirements below H Street or 100 CFS flow in the Lower American River at all locations, whichever is greater."

Without an extended analysis of the strengths and weaknesses of the RMI study, some basic observations are required. It must be remembered that the RMI model was developed by plaintiffs at least partly in response to plaintiff's criticism that the board's exceedence analysis was limited and misleading as to the effects of the EBMUD diversion, along with other consumptive demands, in the year 20,'0. By contrast, the RMI 1980 study assumes no EBMUD diversions off the Folsom-South Canal, and the 2020 study assumes EBMUD to utilize its full complement of 150,000 AFA. The RMI 2020 study assumes a total diversion off the Folsom-South Canal of 590,000 AFA, with substantial upstream (above Folsom Dam) and downstream diversions as well to accommodate increased urban, industrial and agricultural demand.

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To the court, it seems that the RMI model, while correcting certain deficiencies of the board models, is replete with difficulties of its own, particularly as it is intended to provide a framework for analyzing fishery needs of the river. While the board's exceedence analysis may be too facile, the RMI model does not show the effect of the EBMUD diversion alone. Any effect is masked by the RMI assumptions about the other prospective demands fed into the model. The 590,000 AFA diversion assumed for the Folsom-South Canal in 2020, for example, includes a 218,000 AFA allocation for Sacramento County, 225,000 AFA for San Joaquin County, and 75,000 AFA for SMUD to accommodate the Rancho Seco Nuclear Power Plant. While these assumptions may have a sound basis in mathematics, they have no basis at all in social, political, and legal reality. Rancho Seco is a highly controversial project, which has never utilized its full complement of water allocation and probably never will. Any new contracts for American River water are subject to the conditions in NRDC v. Stamm, and the Department of the Interior has not completed an EIS on such contracts. As to the proposed diversion by Sacramento County of 218,000 AFA from the Folsom-South Canal, that irony has not only placed the intervenors in an awkward position in this litigation, it also has compromised the validity of the RMI assumptions.

The RMI assumptions re 2020 consumptive demand on the American River illustrate a critical issue which has evolved with the presentation of evidence. The board's report, in several different contexts, expressed a frustration at the absence of the Bureau of Reclamation as a party, concluding that no effective relief could therefore be fashioned. The board, for example, expressed its view that if EBMUD's diversion were precluded, nothing could keep the bureau from simply allocating that body of water to some other appropriator at the Folsom-South Canal. It was further assumed that the bureau could, with

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impunity, ignore any board or court order pertaining to required flows in this case.

These are, of course, valid concerns. This court, however, is here confronted with the fundamental problem of ensuring the protection of public trust values now, and in the future, against any depredations which might occur from the water diversion by EBMUD. The court's charge is to protect those public trust values, wherever feasible, and in the context of a long-term and comprehensive plan for the entire American River. Any other approach would be to trivialize this trial in which 17 years of litigation has finally been considered by a trier of fact. The point is that any assumption about future contracting or appropriation of American River water, whether by operational modelers or by those who would contract for or appropriate the water, can only be considered in the context of protecting public trust values of the river and can therefore be considered only in the context of this litigation.

The RMI models are not adequate to predict the harm to public trust values which might ensue from the EBMUD diversions alone. From the evidence presented, it is abundantly clear that the public trust values, particularly fishery interests, are at serious risk if the total diversions which form the basis for the RMI assumptions were permitted to occur.

Around the issue of models and their efficacy, certain larger issues have been joined by the parties. To EBMUD, plaintiff's inability to show substantial harm to fishery and other public trust values precludes the requested relief. Audubon acknowledges the importance of municipal water interests, while also extolling the importance of protecting public trust values. Since the EBMUD diversions in isolation cannot be shown to be harmful, according to EBMUD, they must prevail. To plaintiffs and intervenors, the projected consumptive demand will lead inexorably to the degradation of fishery and public trust values so that the only rational course is to preclude all diversions from the Folsom-South

Canal. Implicit in plaintiffs'/intervenors' argument is the value judgment that if future appropriations or contracts are to be foreclosed from the river, then it is not fair to permit the EBMUD diversion. Water from the Delta is good enough for 17 million Californians, this court has been repeatedly reminded, so why shouldn't it be good enough for EBMUD?

The latter question begs the issue. Water quality is a significant factor worthy of substantial weight in the balancing of competing interests. Further, comprehensive planning requires stability and predictability in the process itself. Extended litigation can itself be a negative value in the planning process.

In this case, EBMUD is in possession of a valid and subsisting contract from the Bureau of Reclamation to divert water at the Folsom-South Canal. That contract, combined with a strong societal interest in obtaining high quality drinking water from uncontaminated sources, affords EBMUD valuable rights to water. Audubon integrated the appropriative water rights system with public trust doctrine; it did not eliminate the former. Most simply, EBMUD is entitled to its validly obtained contract rights with the critical caveat that those rights may not unnecessarily harm or compromise public trust values.

It is not an option of this court to determine if other possible appropriators are more worthy than EBMUD, nor if EBMUD ought not to share its allocations with others. It is the Court's duty to protect the public trust values whenever feasible. Given the proposed continuing diversions of EBMUD, and the possibility of future diversions by third parties, the protection of these values requires a comprehensive evaluation of current and future diversions, and an evaluation of the cumulative impact of EBMUD's diversion with other appropriations.

Accordingly, there is no realistic option but to determine, if possible, what flows of the American River must be maintained in order to protect those public trust values.

XIV.

In determining whether public trust values will be compromised by diversion at the Folsom-South Canal, the attention of all sides has tended to focus on the effects of such diversion on fishery interests, and in particular on the chinook salmon. The focus is appropriate, since,

1. As an anadromous fish species, the life cycle of the chinook salmon is particularly affected by the vicissitudes of water flow, temperature, and composition;

2. Its economic role for commercial fishermen is substantial. The lower American chinook salmon constitutes the 5th most productive run in California, comprising 10 percent of the ocean harvest, and having a commercial fishing economic value of over 9 million dollars annually;

3. Its recreational role for sport fishermen is important. The sport fishing value of the species was found by the Referee to be over 6 million dollars annually;

4. Unlike most other fish species in the American River, its life cycle, habits and environmental requirements have been extensively studied.

The threshold issue can be posed in one of two ways:

1. Will the diversion of 150,000 acre-feet annually at the Folsom-South Canal have harmful environmental consequences for the chinook salmon?; or

2. What instream flows are required to minimize the possibility of harmful ecological consequences for the salmon?

In fashioning a physical solution, the second formulation gets to the point more quickly. Once an instream flow is established which will protect salmon,then an appropriate corollary is to preclude any diversion of water which would endanger them. While plaintiff would preclude any diversion whatsoever of water at the Folsom-South Canal, a physical solution which requires the

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protection of the salmon is simply not subject to objection on public trust grounds.

The issue of what instream flow is necessary to protect public trust values is critical to a final adjudication of this matter. The board concluded, on the basis of then available information, that the diversion of water by EBMUD at the Folsom-South Canal would have only a minimal impact on critical elements of the chinook salmon life cycle: A "small effect" on the amount of spawning habitat; "little, if any effect on temperatures causing chinook salmon egg mortality"; "a small effect on natural salmon rearing and smolt production"; and so on (Technical Report, at p. 154).

In making those determinations, the board offered the following broad caveat:

> "Within the past few years, USFWS, EBMUD and Sacramento County have conducted field studies that have contributed to knowledge of habitat use, habitat/flow relationships, temperature requirements, food habits and migration of chinook salmon in the Lower American River. EBMUD's consultants, Sacramento County's consultants, and DFG would all like to study the river's fisheries for several more years before making final streamflow recommendations. Additional studies may ultimately contribute to wiser water and fisheries management of the Lower American River, and should be encouraged. However, given the limited nature of this proceeding and the high likelihood that a few more years of study would not provide more definitive answers to the questions posed by the court, this reference is being completed on the basis of existing information."

Intervenor Sacramento County provides an accurate synopsis of the immediate problems which beset the board and this court in determining what the flow regimes will protect various of the fishery interests:

> "It is without controversy that there are existing gaps in scientific knowledge concerning the biological requirements of the river's fishery resources. Even EBMUD's witnesses refuse to go beyond hypothetical flow scenarios suggested for testing over several years' time. (See, e.g., Trial Testimony of Donald Kelley, p. 195, 1. 21 to p. 196, 1. 13, p. 198, 11, 17-23, p. 215, 1. 21 to p. 221, 1. 19.)

"Establishment of flows for fishery needs is complicated by a number of uncertainties. There is lack of knowledge concerning the effects of flows and temperatures on food abundance, juvenile salmon emigration timing and the temperature effects of the American River on the temperatures in the Sacramento River. There is disagreement over the optimum water temperatures for juvenile rearing, disagreement over the use of the lower river as juvenile rearing habitat, disagreement over the impacts of water temperature upon salmon and steelhead smoltification and disagreement over the existence of naturally reproducing and rearing steelhead in the river. In addition, there has been little study of the impact of diversions upon carry-over storage and the cold water pool available to meet fishery needs. These and other issues have been identified by the various biologists for further study before diversion commitments are made. Thus, the Referee's determination that gaps in scientific knowledge prevent selection of any flow scenario other than existing flows to protect fishery resources was well founded."

The real tragedy of this environmental controversy has been the extent to which scientific resources have been directed more to litigation than to a resolution of critical fishery and hydrologic issues. In these areas, much of the expert testimony has consisted of attack and criticism of opposing experts, without the offering of affirmative scientifically-based solutions. The designation of "new" experts -- all distinguished and highly qualified -- has been a most disturbing aspect of this trial.

In response to that concern, the court suggested a protocol to which counsel have acceded, by which experts on both sides of the fishery/hydrology issues met in closed session, without attorneys, to attempt the resolution of differences. As a result, the parties submitted the following "Report on Agreements and Recommendations.

"Consensus was reached by the meeting participants on the following language:

"FISH HABITAT MANAGEMENT OBJECTIVES FOR THE LOWER AMERICAN RIVER

"1. To maximize the in-river production (i.e., spawning, juvenile survival) of chinook salmon in the lower American River.

"2. To maximize the in-river production of steelhead trout to the extent that it does not interfere with chinook salmon management.

"3. To manage American shad in the lower American River for reproduction and sport fishing purposes.

"4. To maintain a diverse and naturally reproducing fish fauna in the lower American River.

"LIFE HISTORY PERIODICITIES

"1. Adult fall run chinook salmon are known to enter the lower American River from approximately mid-September through January. There is a high year-to-year variability, however, the bulk of the migration occurs from approximately mid-October through December.

"2. Adult chinook salmon are known to spawn in the lower American River from approximately mid-October through early February. There is high variability from year-to-year, however, the bulk of the spawning occurs from approximately mid-October through December.

"3. Chinook salmon egg and alevin incubation is known to occur in the lower American River from approximately mid-October through mid-April. There is high variability from year-to-year. however, most incubation occurs from approximately mid-October through February.

"4. Chinook salmon fry emergence is known to occur in the lower American River from January through mid-April.

"5. Chinook salmon young-of-the-year juvenile rearing is known to occur in the lower American River from January to approximately mid--July. There is high year-to-year variability, however, the bulk of the juvenile rearing occurs from February through May. During March 1989, a few yearling chinook salmon were collected in the lower American River, suggesting that some fish may rear in the river year round.

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"6. Adult fall and winter run steelhead trout migrate into the lower American River from August through April. The bulk of the migration occurs from mid-September through February.

"7. Fall and winter run steelhead spawn in the lower American River from November through April. The bulk of the spawning occurs from December through February.

"8. Fall and winter run steelhead incubation in the lower American River occurs from November through May. The bulk of the incubation occurs from December through mid-April.

"9. Large numbers of juvenile steelhead rear in the lower American River during the spring and early summer. Their survival depends upon rearing in freshwater until at least the following late winter or early spring. During March 1989, a few yearling steelhead were captured in the lower American River, suggesting that some of the juveniles do survive their first summer and fall. The degree to which year round rearing occurs is presently unknown. They probably emigrate from the lower American River from February through May.

"10. The period of American shad use of the lower American River is from late April through early July, during which time adult migration and spawning occurs. Juvenile rearing is not known to occur in the lower American River.

"WATER TEMPERATURES

"1. Based on the scientific literature, the range of water temperatures for highest survival of incubating chinook salmon eggs appears to be between 43 degrees F. to 58 degrees F. Prolonged (i.e., more than a few days) exposure of eggs to temperatures in excess of 58 degrees F. results in high egg mortality. 62 degrees F. should be avoided.

"2. Any definition of an 'optimum' water temperature or temperature range for juvenile chinook salmon should include a synthesis of information on the effects of temperature on: 1) growth rates; 2) effects on and availability to fish of the food supply (ration); 3) predation; 4) disease; 5) stimulation of emigration; 6) physiological transformation to endure seawater; and, 7) acclimation to the waters of the Lower Sacramento River and Delta when warmer than the American River.

"Consensus on the optimum temperature (or range) could not be reached.

"FLOW NEEDS

"1. SWRCB Decisions 893 and 1400 are inadequate to meet the chinook salmon spawning habitat management objective for the lower American River.

"2. The group could not reach consensus on the optimum spawning flow (or range of flows) needed to meet the fishery habitat management objective for chinook salmon in the lower American River.

"3. Consensus could not be reached on the levels of flow required to provide optimum rearing habitat needed for juvenile chinook salmon in the lower American River.

"4. SWRCB Decision 893 does not provide adequate rearing flows to meet the fish habitat management objective of maximizing the in-river production of juvenile chinook salmon in the lower American River."

Perhaps the most salient aspect of the fishery/hydrology testimony consists of its large area of remaining uncertainty. A brief analysis of that testimony is appropriate to crystallize the issues and the information which is available as a basis for making judgments about the flow regimes which are required to protect public trust fishery values.

Don Kelley occupies a central position among the experts, having testified extensively before the board, and being the only expert to have conducted field studies in the lower American River. Kelley's work combined field studies with modeling projections, and was designed, among other objectives, to predict the population density for salmon at various flow regimes, taking into account the variables and interplay of velocity, depth and substrate (Second Report, October, 1985, Exhibit 68). The preliminary data were acquired by divers making a physical count within a roped grid area, divided into cells, located at Sailor Bar. Fish were counted in each cell by divers pulling themselves upstream by rope. The depth and mean velocity of cells within the grid were measured. Regression analyses

were then performed "of the way velocity, depth and substrate in those grids interacted to affect the number of juvenile salmon" (Exhibit 68, at p. 10).

Kelley provided a range of "best flows" in his January, 1985 report (Exhibit 17), a modified range in his October, 1985 addendum (Exhibit 68), and a still further refined range in this trial. His October, 1985 recommendation was offered "for criticism and analysis." There, he recommended further field testing and a proposal for "trying out recommended flows and monitoring the results." Still adhering to the tentative nature of his conclusions, Mr. Kelley at trial recommended the following flow regimes:

1. Spawning flows from 1500 CFS to 2000 CFS from October 15th through December;

2. Egg incubation flows of 1250 CFS;

3. Juvenile rearing flows of 750/1250 CFS from March to May;

4. Juvenile rearing and migration flows at 2000 CFS from May 16th-June. This flow should be modified to assure daily average temperature not to exceed 65 degrees Fahrenheit at the mouth of the river.

Throughout his testimony, Mr. Kelley emphasized the importance of the interrelationship of numerous factors, including velocity, depth, substrate; water flows sufficiently high to cover the eggs, but not so high that they are scoured away; flows which provide upstream migration at a moderate pace to discourage too rapid an entry into the reservoir; flows which allow food availability and prevent the stranding of late spawners; et cetera. And superimposed over all of these and numerous other considerations is the issue of temperature.

Kelley emphasized that increased flows per se are not necessarily helpful to the salmon at particular stages of their development. For example, the October 1985 study noted that:

> ". . . flows of 750-1,000 CFS maximized the area covered with the best combination of velocities, depths and substrate in the upper

16 miles of the lower American River. Higher flows raised velocities so that juvenile salmon can remain and feed only in limited parts of the channel."

The point is that simply disgorging all available water into the American River may well not provide the best protection for chinook salmon. Exhibit 310 and figures 11 and 12 from exhibit 311, for example, suggest that salmon prefer certain water velocities which, when significantly increased, result in diminution of the population. Kelley noted that the interrelationship of all of the above-mentioned factors must be thoroughly understood and investigated prior to any final determination as to those flow levels which will protect and enhance the fishery interests.

Mr. Kelley, in general, views the American River as a story of successful management by the Department of Fish and Game, noting that returning spawners now number 47,000 per year compared to 26,000 pre-Folsom Dam. While emphasizing the necessity of maintaining a natural run of salmon, to maintain genetic strength and diversity, he estimated that approximately 80 percent of the current salmon run is hatchery originated.

A substantial part of Mr. Kelley's testimony was given to answering the criticisms of Dr. Hankin as to his methodology and conclusions. While acknowledging certain problems in the study, and emphasizing the necessity for extended further study and research, Mr. Kelley maintained the essential validity of his observations and recommendations .

Dr. Hankin found Dr. Kelley's testimony vulnerable at every point: Field sampling, statistical analyses, and predictions. The diver counts were not verified or calibrated; the count was contaminated by the presence of hatchery fish; the grid sizes varied from survey to survey, et cetera. The raw data, therefore, were unreliable. The study was flawed at inception by selection of a single reach for study, where other reaches have substantially different characteristics. The

statistical analysis was flawed by its assumption that the habitat was "fully seeded," and by the inappropriate use of polynomial fittings, which Dr. Hankin described in vivid detail (Exhibit 928, at pp. 16-18). Figure 12 of Kelley's January, 1985 report, for example, attempted to fit high--order polynomials to diffuse "clouds" of data points. It does seem apparent that there is, in fact, no statistically valid "fit." Dr. Hankin criticizes the methods employed for predicting rearing capacity (see Exhibit 328, at pp. 21-22), and finally condemns the "rather bizarre correspondence between reach location an miles assumed represented by a particular reach" (Exhibit 928, at p. 23). Dr. Hankin notes that:

> "The so-called 'representative reach' approach has been used elsewhere in stream research in fisheries. The difficulty with this approach is that choice of 'representative reach' is subjective, may result in serious errors of extrapolation, and, most importantly, allows no assessment of possible errors that result from extrapolation. This approach may be contrasted with statistically valid sampling designs recommended by Hankin (1984, 1985) and Hankin and Reeves (1988). Unless statistically valid sampling designs are used to obtain alternative estimates of the proportions of river habitat that may belong to certain habitat type categories, however, it is impossible to specify the extent of errors that may result from use of the mileage figures assume[d] for each reach."

Without detailing Dr. Hankin's extensive analyses, it seems apparent that his criticism has a substantial basis. Mr. Kelley himself urges the necessity for a much expanded and precise study of the American River fishery. From the testimony, it's clear that older technologies, dependent more on observation and judgment, are giving way to more refined technologies and statistical methods. The unfortunate aspect is not that Mr. Kelley's analysis is vulnerable to methodological criticism, but rather that Dr. Hankin's report did not offer its illumination until December, 1988. This litigation, it seems, has been the impetus for inspired criticism. But, in the absence of applying Dr. Hankin's recommended methods to an actual study of the river, very little has been accomplished except to maximize uncertainty. As with the water quality issue, it is the fact of

uncertainty which is left with the Court. There is simply no basis in the evidence for a reasoned selection among various of the competing positions. This represents not an abdication of court responsibility, but, rather, a recognition of existing scientific reality.

The issue of water temperature which, as noted before, is superimposed over all other issues of depth, velocity, substrate, habitat, et cetera, illustrates the point. Dr. Coutant testified that, optimally, temperatures for spawning and incubation should not exceed 56 degrees, with egg mortality increasing at 58 degrees, and with 100 percent mortality at 62 degrees. For growth and survival of juvenile salmon, the optimal temperatures are 55-59 degrees Fahrenheit. Dr. Coutant testified at length about the dynamics of water temperature as affecting the growth of fish, and consequently, their time of emigration from the American River, and how increasing temperatures in the fall spawning period push the onset of birth and emigration into later and warmer months, causing increased mortality. Dr. Coutant's view was that the current river temperatures often exceed appropriate biological limits, and that temperature conditions are frequently "marginal." Based on 2020 projections of diversion, Dr. Coutant foresaw major adverse impacts with increasing diversions of water.

Dr. Kerstetter echoed Dr. Coutant's views about temperature, but centered his concern on smoltification, the process by which steelhead trout and juvenile salmon modify their biological features to adapt to salt water. It was Dr. Kerstetter's opinion that the optimum temperatures for juvenile salmon smolting are 55-59 degrees F. The optimum temperatures for steelhead trout smoltification are below 55 degrees F. Dr. Kerstetter explained thermal load as the measurement of the magnitude and duration of harmful temperature. He concluded that both existing and 2020 conditions result in significant thermal loading which can inhibit successful smolting of juvenile salmon.

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Dr. Charles Hanson testified for EBMUD on the question of whether salmon populations in the lower American River are currently stressed by elevated water temperatures. He also considered the question whether temperature changes caused by diversions will significantly impact salmon spawning and rearing success in the river.

Dr. Hanson reached several conclusions regarding the present effect of temperature on salmon. First, he testified that during the period from mid- to late November and into December and January, temperatures are almost always within the limits that have been established for successful spawning and egg incubation. He also testified that juvenile salmon rear principally in the upper reaches of the river and that temperatures in those areas are generally within a range acceptable for juvenile salmon rearing through the month of June. Dr. Hanson also testified that warmer water temperatures during the egg incubation and juvenile rearing period may result in a situation where young salmon are induced to emigrate early from the lower American River, before water temperatures in the lower Sacramento River rise to lethal levels. From his analysis of other studies, Dr. Hanson concluded that lower water temperatures in the winter and early spring months could place a "biological squeeze" on American River fisheries, by causing fish to emigrate later when Sacramento River temperatures are higher.

Finally, Dr. Hanson testified that he compared temperatures predicted by the County's temperature model to exist in the lower American River at a diversion level of 50,000 acre-feet through the Folsom-South Canal (1980 conditions) with temperatures predicted to exist assuming a diversion level of 590,000 acre-feet through the Folsom-South Canal (2020 conditions). He found predicted temperatures to be generally within 2°F to 3°F under the different scenarios throughout the year. He concluded that changes of this magnitude

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would be unlikely to impact the success of salmon spawning, egg incubation, juvenile growth or survival.

One conclusion which plaintiffs would invite from the testimony of Dr. Humphrey, Coutant and Kerstetter is that water temperature is both critical to salmon survival and that any diversion of water is an invitation to environmental disaster. The problem is that the evidence does suggest that the American River fishery is currently surviving and, by some accounts, even thriving.

The experts, while agreeing to very little about temperature requirements, did agree to the following:

> "Any definition of a 'optimum' water temperature or temperature range for juvenile chinook salmon should include a synthesis of information on the effects of temperature on:
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> "1. Growth rates;
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> "2. Effects on availability to fish of the food supply (ration);
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> "3. Predation;
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> "4. Disease;
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> "5. Stimulation of emigration.
>
> "6. Physiological transformation to endure sea water; and,
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> "7. Acclimation to the waters of the Lower Sacramento River and Delta when warmer than the American River."

Thus is required an analysis of complex, interrelated phenomena as to which little definitive evidence has been advanced. The evidence which has been produced is largely derived from laboratory studies, or studies of streams of much less magnitude than the American River. The Rich experiments, for example, may or may not predict the biology of fish in natural circumstances -- and the experiments may have been flawed by the variations in population density over the course of the experiment. Further, some experts have testified that maximum

flow patterns can be harmful to fish survival, for example, during juvenile rearing and emigration. And while absolute temperature considerations are a useful tool, they do not account for the propensity of salmon to seek out cooler parts of the stream, nor for the natural adaptation of these particular species of salmon, to changing environmental conditions.

The task for this court is to recognize the fundamental inadequacy of existing studies as they relate to the American River, to extract from the "consensus" and from the testimony those factors which can provide a guide for protecting fishery values, and significantly, to retain jurisdiction until the scientific community can provide definitive answers. For the first time, instead of simply objecting to any flow patterns short of a flow of 100 percent of the available water, plaintiff and intervenors may be encouraged to provide an effective and constructive response to a comprehensive planning model which includes the EBMUD diversion.

The Court's purpose here is to set a flow standard which shall be maintained until evidence can be adduced, pursuant to the court's reserved jurisdiction, which will dictate the necessity for modifying that pattern to accommodate public trust values. While in general the experts in conference could not reach a consensus on optimum flows for spawning and rearing habitat, they do offer the important stipulation that D-1400 is inadequate to meet the chinook salmon spawning habitat objectives of the lower American River. The parties have prepared an unmarked Exhibit which is included here for reference, and which is a chart of the various flow recommendations of various parties and agencies:

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Again, accepting the expert's agreement that salmon spawn from mid-October through early February, it should be beyond dispute that higher flows are indicated for that period. Therefore, the Court requires a flow regimen of 2000 CFS from mid-October through February.[7] The Court accepts the "low" flow recommendation of the Department of Fish and Game of 3000 CFS for March through June, representing a substantial part of the juvenile rearing out migration period as to which there has been an abundance of testimony demonstrating the dangers of high temperatures. From July through October 15th, the court sets a flow requirement of 1750 CFS, as a compromise between the several figures advanced for various recreation uses as, for example, the EBMUD proposals in the footnote to the flow chart.

Additionally, the Court will require that 60,000 AFA will be maintained in reserve from mid-October through June for releases in accordance with the demands of DFG in response to specific fishery needs arising from climatic or other environmental factors.

In the water quality section of this opinion, the Court relied on proven uncertainty as a basis for articulating a safe and prudent course of water resource management. Here again, the fact of uncertainty dictates what is intended as a safe and prudent course designed to protect public trust values. It is anticipated that, over a reasonable period of time, expert consensus will develop as to the flows required to protect public trust values. The diversion of water at Folsom-South Canal by EBMUD would at all times be subject to modification in light of developing scientific consensus.

Implicit in the foregoing analysis is an acceptance, to some considerable degree, of the criticism of the board's flow analysis by Roy Leidy. To summarize:

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[7] 2000 CFS is the flow recommended by the Fish & Wildlife Service for a significant part of that period, and the FWS recommendation was based largely upon an analysis of habitat.

"Describing changes in the exceedence of identified flows or temperatures does not constitute an impact analysis because it tells us nothing of the nature or extent of the biological impact.

"Exceedence only counts the frequency of events, not their timing duration, or magnitude - all of which are essential to assessing biological impacts.

"The 'temperature' exceedence tables are based upon mean monthly data and, consequently, mask biological impacts that may occur over shorter time periods."

Further, board models relied on D-1400 flows, which all experts in this case have now agreed to be inadequate.

It bears emphasis that the foregoing analysis was not intended to ignore or to denigrate the importance of other fish species, particularly the steelhead trout and shad. Protection of these species will require a development of knowledge from scientific inquiry which, compared to that available for the chinook salmon, is in its merest infancy. The "consensus" establishes the existence and importance of those species. Again, the reservation of jurisdiction is intended to encourage the required scientific inquiry.

The foregoing analysis manifests this court's adoption of the board's approach of imposing a "physical solution." It is perhaps appropriate to set forth briefly the legal basis for that approach.

The doctrine of physical solution is a "common sense approach" to water rights litigation, having a long judicial history and based on equitable considerations designed to preclude harsh results in complex water appropriation matters.

The 1928 amendment to the California Constitution, now Article X, section 2, added a second doctrinal basis for the imposition of physical solutions. Furthermore, it elevated the concept to a favored status, and created a duty incumbent upon every trier of fact:

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> "Since the adoption of the 1928 constitutional amendment, it is not only within the power but it is also the duty of the trial court to admit evidence relating to possible physical solutions, and if none is satisfactory to it, to suggest on its own motion such physical solution." (City of Lodi v. East Bay Municipal Utility District (1936) 7 Cal.2d 316, 341, emphasis added; see also Meridian, Ltd. v. San Francisco (1939) 13 Cal.2d 424, 447.)

A number of California decisions have employed a physical solution to resolve complete water rights issues. (See Tulare Irrigation District v. Lindsay-Strathmore Irrigation District (1935) 3 Cal.2d 489, 574; Peabody v. Vallejo (1935) 2 Cal.2d 351, 379-80; Rancho Santa Margarita v. Vail (1938) 11 Cal.2d 501, 561-62; Reclamation District No. 833 v. Quigley (1937) 8 Cal.2d 183; Montecito Valley Water Company v. City of Santa Barbara (1904) 144 Cal. 578; Hillside Water Company v. City of Los Angeles (1938) 10 Cal.2d 677; Allen v. California Water and Telephone Company (1946) 29 Cal.2d 466.)

While an extended analysis of physical solution doctrine is not required for this case, two particular aspects of the doctrine are appropriate for comment. In Peabody v. Vallejo, supra, 2 Cal.2d 351, the court stated:

> "That if a physical solution be ascertainable, the court has the power to make and should make reasonable regulations for the use of the water by the respective parties, provided they be adequate to protect the one having the paramount right in the substantial enjoyment thereof and to prevent its ultimate destruction, and in this connection the court has the power to and should reserve unto itself the right to change and modify its orders and decree as occasion may demand, either on its own motion or on motion of any party." (Id., at pp. 383-384)

Also, in Rancho Santa Margarita v. Vail, supra, 11 Cal.2d 501, 561-62, the court stated:

> "Under this section it has been held that it is not only within the power, but it is the duty of the trial court, to work out, if possible, a physical solution, and if none is suggested by the parties, to work out one independently of the parties. In this connection, if the trial court needs or desires expert assistance or evidence on this, or any other phase of the case, it possesses the statutory

power either to refer the matter to the division of water rights, or to appoint it as an expert." (Id.)

Thus, it is clear that the trial court has broad discretion and responsibility to fashion appropriate physical solutions for complex water appropriation problems. The physical solution doctrine fits hand in glove with the requirements for comprehensive planning elucidated by Audubon. The physical solution doctrine anticipates that the court will reserve jurisdiction, monitor developments through the appointment of masters or referees, and allocate costs and expenses attendant to a fair and comprehensive solution.

While the flow regimens set forth in the preceding section were derived largely from considerations of fishery values, that emphasis should not minimize or trivialize other of the significant public trust interests. As indicated, the July through October flows of 1750 CFS were in large part responsive to recreational interests, since those times are not critical for salmon spawning or rearing. It should be apparent that the Court did consider recreation an important factor in fashioning the physical solution.

The importance of American River recreation is reflected in section 5841.5 of the Public Resources Code:

> "(a) The American River Parkway and its environs contribute to the quality of life within the City of Sacramento and the County of Sacramento, enhance the image of the City and the County as desirable places to live; provide for the public safety and welfare of the community, and thereby contribute to the economic well-being of the community.
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> "(c) The lower American River sustains a myriad of fish populations, including steelhead, king salmon, striped bass, shad, and other fish and wildlife populations, which in turn annually support millions recreation user-days and commercial, scientific, and educational uses and benefits.

"(d) The recreation capacity of the American River Parkway is immense, including such diverse activities as hiking, bicycling, picnicking, birding, horseback riding, canoeing, kayaking, rafting, sailing and power cruising." (Pub. Resources Code § 5841.5.)

Additionally, the Wild and Scenic Rivers Act declares in part that "it is the policy of the State of California that certain rivers which possess extraordinary, scenic, recreational, fishery, or wildlife values shall be preserved in their free-flowing state, together with their immediate environments, for the benefit and enjoyment of the people of the state." (Pub. Resources Code § 5093.50.) As previously noted in this decision, consistent with this policy the lower American River has been designated as a recreational river within the Wild and Scenic River System since 1972. (Pub. Resources Code §§ 5093.54(e), 5093.545(h).)

Substantial evidence was produced at trial about the wide range of water-dependent recreational activities, including fishing, various kinds of boating, swimming, wading, etc. Not all of the interests can reasonably be accommodated on a year-round basis, and those flows which provide maximum enhancement for some activities will interfere with others. It should again be remarked that the flows set forth in the physical solution are minimal requirements only, and that much more substantial flows will occur in response to climatic conditions and sometimes by the operational requirements of the bureau. Sufficient flows are provided for the lazy rafting of summer, and larger spring flows can be anticipated for those who require more adventure.

An important problem is that posed by projected recreation use. Sacramento is one of the fastest growing metropolitan areas in the state; the 1985 population of 890,000 is projected to grow to 1.5 million by 2020. It seems apparent that unfettered recreational use of the river could seriously compromise fishery, wildlife and riparian interests. The fact is that water-dependent recreational interests must occupy a lower position in the hierarchy of public trust values, given the much more environmentally sensitive fishery interests.

XV.

The Order of Reference required an evaluation of the impact of EBMUD's diversion on the riparian habitat of the American River. The environmental values of that habitat are acknowledged by all parties, including the Referee, and was confirmed by the on-site inspection of the Court.

Dr. Jacobs testified as to the wild and scenic designation conferred by the Legislature and that the river has been accorded the highest classification on the Inventory of Significant State Lands prepared by the State Lands Commission pursuant to Public Resources Code Section 6370. Significant to the commission's determination is the unique and greatly diminished nature of riparian woodland in the Sacramento and San Joaquin valleys. Dr. Holland estimated there are approximately 2500 acres of riparian vegetation in the American River Parkway. Approximately 600 to 800 acres consist of mature forest. He testified that in the 1840's, there were approximately 800,000 to 1,000,000 acres of riparian vegetation in the Great Valley; in the 1970's, the Department of Fish and Game estimated that, exclusive of the Delta, there were only 10,000 to 12,000 acres of mature forest type riparian vegetation left. So much riparian vegetation has been lost that the Fish and Game Commission has adopted a policy that any additional loss is unacceptable. The policy calls for "no net loss" in extent or value of the habitat.

Dr. Holland summarized the long-term impacts that may be expected on the riparian corridor from reduced flows. These are:

1. Thinning of canopy and resultant loss of wildlife habitat;
2. Narrowing of the riparian corridor;
3. Fragmentation of the riparian green belt;
4. Encroachment of vegetation into the stream channel; and.
5. Change in species composition, diversity and density (Exhibit 973).

With regard to cumulative impacts, Dr. Holland testified that diversion of 590,000 acre-feet from the Folsom-South Canal (2020 projection) will have even

more of an impact than the diversion of 150,000 acre-feet. It is his view that even the latter diversion will have a negative impact on the riparian corridor. Dr. Holland testified that flow is the most crucial from April to mid-June or mid-July because this is the period of most growth in the riparian corridor.

For defendants, Mitchell Swanson testified in detail about American River geomorphic and riparian phenomena. He examined the historical development and changes in the American River from pre-dam times to the present. He noted the "confined" (as opposed to "meandering") nature of the river, emphasizing that resprouting following flood scour, not seed generation is the predominant mechanism for reproduction of riparian vegetation. He noted, as did plaintiff's experts, the importance of flooding in the life of the river.

Mr. Swanson testified that flooding is both frequent and severe on the lower American River.

The mean average flood is 46,000 CFS (Exhibit 429);

A 23,000 CFS flood is a very common flow on the river

A flood of 85,000 CFS is a "typical winter flood resulting from rain" and occurs about 1 in every 7 years;

A flood of 100,000 CFS is a 1 in 10 year event;

A flood of 130,000 CFS is a 1 in 70 year event;

A flood of 230,000 CFS is a 1 in 100 year event.

A flood event can result in a monthly flow of over 1,000,000 acre-feet of water. In January, 1980, for example, the flooding produced 1,220,000 acre-feet of water. Folsom Reservoir can hold only about 1,000,000 acre-feet of water. Thus, its ability to withstand and control the flooding on the lower American River is substantially limited. Up to the 70-year level (130,000 CFS), Folsom can store enough water to slow flow levels to 115,000 CFS. There are doubts as to whether this target flood level of 115,000 CFS can be met in the event of a lOO-year flood level of 230,000 CFS.

Mr. Swanson presented the following conclusions with respect to the geomorphology and riparian vegetation on the lower American River:

A. The presence of vegetation is the result of its ability to withstand destruction by flooding and sediment transport but remain close enough to the channel to access water in the summer drought season;

B. The lower American River is an intermediate river type closer in character to a confined bedrock stream than a meandering river. Channel and floodplain positions are generally fixed with far less lateral migration of channel and floodplain that is characteristic of meandering river;

C. Damming, dredging, and changes in the management of riparian vegetation have disrupted natural conditions on the lower American River causing both immediate and long-term changes. The impact of these activities will continue to affect riparian vegetation in the future;

D. Scour, erosion and deposition are dominant forces shaping riparian vegetation in the lower American corridor Exhibit 452 shows up to 6 feet of channel lowering at the Southern Pacific Bridge. This is the result of Folsom Dam cutting off sediment replenishment. In the long term, the river is moving toward a deeper, more incised channel;

E. Regeneration of riparian vegetation by the scour and sprout process occurs well above the low flow channel (at least 25 feet) and is a more important mechanism of vegetation than seedling dispersal by spring snow-melt recession floods;

F. The effect of the EBMUD diversion on the flooding regime is minuscule and immeasurable.

Folsom Dam now effectively "irrigates" the riparian corridor in the summer. Exhibits 448-449 show the increase in vegetation which has occurred since 1937 as a result of this water supply.

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Between flows of 500 and 2500 CFS, the water surface of the river changes about 1 inch for each 100 CFS. But at higher flows, the change is less. Between 3600 and 4500 CFS, the change is about .43 inch per 100 CFS, or less than half the surface elevation change at lower flows. Exhibit 463 shows EBMUD's impact on the surface elevation of the river. A 1000 CFS reduction in spring flow would lower the river surface by less than 6 inches.

Exhibit 401 is a final summary of Mr. Swanson's conclusions. EBMUD's impact on water availability is virtually "imperceptible"; and it has no impact on the flooding regime, or on the human factors that affect the river.

Mr. Swanson testified in court that his conclusions, as outlined above, had been presented to both the State Board staff and the State Board (see Exhibit 401, columns 1 & 2). He stated that since the Board hearings, he has tested his conclusions against data derived from the 1986 flood (see Exhibit 401, column 3). Mr. Swanson testified that his studies following the 1986 flood confirmed his original testimony before the State Board staff and the State Board.

From the entirety of the testimony, the Court has concluded that the riparian habitat could be severely endangered were water flows to be significantly lessened on the American River. Further, that the riparian habitat is irreplaceable; that is, that the replacement of riparian by upland habitat will result in significant loss to wildlife who are dependent upon the unique existing vegetation. Plaintiff's trial testimony was not persuasive that the proposed diversion would, in fact, cause a significant diminution in riparian habitat. The Court's physical solution takes into account Dr. Holland's testimony that April to mid-June or mid-July is the most critical part of riparian growth, and accordingly, has provided a minimum flow pattern of 3000 CFS during most of that period. In determining the flow pattern, the Court was also mindful of Mr. Swanson and Dr. Taylor's testimony that the present lower American River riparian structure has become an "irrigated system," which to some extent improves on historical

conditions in which the river frequently would run dry during summer months. The proposed physical solution continues an irrigation regimen, but also recognizes that the natural course of flooding, scouring, regeneration and resprouting will continue.

Finally, the Court would take notice of Dr. Taylor's comments regarding the "passive nature" of the county's management of the riparian habitat. Dr. Taylor suggested that more active management, for example, the planting of cottonwoods and supplementing of other vegetation is, of course, to be preferred. The subject will receive some further attention in the final physical solution.

XVI.

As indicated, this court rejects the logic of plaintiff's position that the existence of feasible alternatives "forbids the utilization of the Folsom-South Canal." (Sacramento County Brief on Alternatives, page 5) Still, in terms of determining if the diversion of water at the Folsom-South Canal for municipal/industrial uses constitutes the "fullest beneficial use" of the resource under Article X, section 2, it is appropriate to consider the feasibility of alternative diversion sites as part of the balancing analysis which is constitutionally mandated.

At the outset, it should be noted that no point of diversion is without ecological consequences. It is simply not the case that diversion at the Folsom-South Canal creates an environmental disaster, while diversion on the Sacramento River or Delta poses only inconsequential hazards. The Delta and Sacramento River waterways are part of a complex natural and artificial water system replete with dikes, channels, aqueducts, pipes and an elaborate pumping system so powerful so that the very flow of the San Joaquin River can be reversed. In some instances, the Delta environment is so precarious for fish survival, that salmon and striped bass from the Nimbus Hatchery must be transported around the Delta and deposited in the Carquinez Straits to ensure their survival.

One major problem of this pumping operation is the loss of fish due to entrainment (the process by which small fish are sucked into diversion works) and impingement (when larger fish are pressed by the current against the screens and suffocate). Dr. Charles Hanson estimated that Delta water diversion by EBMUD would cause the loss of 15 million striped bass larvae (the equivalent of a loss of 7,500 six-inch striped bass) due to entrainment. (See Exhibit 4701). Similarly, Don Kelley testified that diversion from the Delta or Sacramento River would exacerbate existing problems for fish in these areas. He estimated that EBMUD's diversion from the Clifton Court Forebay would cause a loss of 3.5 million striped bass per year and a loss of about 36,000 salmon. While the magnitude of the loss is disputed, the fact of substantial losses cannot be. For these reasons, both Don Kelley and Dr. Charles Hanson recommended that, from a fisheries point of view, the delivery of water to EBMUD through the Folsom-South Canal is preferable to either a Delta diversion or diversion from the Sacramento River.

EBMUD further urges that in assessing alternatives, the Court not ignore the element of cost. It is worthy of more than a passing footnote to state that there may well be construction and maintenance costs exceeding hundreds of millions of dollars, depending upon the point of diversion. EBMUD says that ". . . even the County of Sacramento's conservative estimate that the cheapest alternative to EBMUD's contracted-for American River supply is 129 million dollars more expensive up front and 7 million more costly to operate and maintain each and every year thereafter" (EBMUD's Reply to Public Trust Trial Briefs of Plaintiffs, 2:1-7).

Understandably, there was spirited debate among the experts as to the relative cost estimates. Dr. Chen testified for plaintiffs that EBMUD had substantially overestimated the differential between construction and maintenance costs with Folsom-South Canal diversion compared with diversions

at the various other sites. He felt that EBMUD underestimated Folsom-South Canal costs by neglecting to consider that new E.P.A. standards regarding THM removal will require plant modification, incorporating ozonation, GAC, chloramine addition, and other variations, and that Delta/Sacramento River costs had been overestimated. Even by Dr. Chen's estimations, however, the difference in costs between the diversion sites reaches into the hundreds of millions. A comparison of Dr. Chen's analysis with that of EBMUD's is set forth in Exhibit 5055. The EBMUD figures are derived from exhibit 5043, the Summary Report prepared by CH2M and testified to by Mr. Gaston.

Accepting EBMUD's figures, the magnitude of cost differential is breathtaking. Modulating those figures to take into account Dr. Chen's criticisms does not alter the fundamental fact that the cost differentials are significant and constitute a factor which must be considered in the selection of diversion site.

Just as with the cost differential, plaintiffs would denigrate EBMUD's concerns about the legal and political impediments which could absolutely preclude any of the alternative diversion sites which have been proposed. Extended litigation, unfortunately or not, is an unavoidable consequence of any water diversion project in California. Since 1970, EBMUD has had a validly executed contract pursuant to a validly issued permit held by the Bureau of Reclamation. In contrast, taking water from the alternative sites would require numerous governmental approvals, none of which can be assured. At a minimum, existing water rights permits would require modification. Permits would be required of the Army Corps of Engineers. E.P.A. approval is required, as is the permission of several state agencies, including the Department of Fish and Game. Based on the evidence and legal arguments presented before this court, it is apparent that the selection of any diversion site will meet opposition in the public administrative hearings antecedent to the various required approvals, and in litigation.

The evaluation of "feasible alternatives," then, becomes part of that balancing process by which the proposed diversion of water is tested for compliance with Article X, section 2 requirements. Given the Court's adoption of a Physical Solution which accommodates both water quality and public trust values, however, no specific determination is required as to the feasibility of alternative diversion sites. It is sufficient to observe that in balancing the competing values and interests, and in formulating the Physical Solution, the Court did examine and consider all those factors, including cost and ecological consequences, attendant to diversion sites below the confluence of the American and Sacramento rivers.

Adopting the Board's approach and following well-established judicial precedent, this Court will impose a Physical Solution as a means of accommodating the diverse and conflicting interests which have been addressed. The ultimate objective is to provide for the fullest beneficial use of the water under Article X, section 2, and at the same time, to protect the sensitive public trust values of the lower American River. The Physical Solution presented here is a mandate of Article X, section 2, in conjunction with public trust doctrine, and represents an absolute condition of diversion by EBMUD.

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XVII.

PHYSICAL SOLUTION

Physical Solution shall be accomplished as follows:

1. EBMUD may divert not to exceed 150,000 acre-feet annually (AFA) from the Folsom-South Canal pursuant to its contract of December 22nd, 1970, with the U.S. Bureau of Reclamation.

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2. The following instream flow requirements must be met throughout the lower American River as a condition of diversion:

A. October 15th through February, 2000 CFS;

B. March through June, 3000 CFS;

C. July through October 15th, 1750 CFS;

3. An additional 60,000 AFA will be maintained in reserve at the reservoir from mid-October through June for release upon the recommendation of the Department of Fish and Game in response to specific fishery requirements.

4. EBMUD shall use its best efforts to divert as much water as possible during those times when instream flows are least required for the protection of environmental interests and public trust values.

5. The instream flow conditions set forth above are not intended to constitute operational flows that are to be met in every month of every year without regard to the hydrologic conditions that might prevail at any given time. The court anticipates that operational criteria will need to be established, based upon the various hydrologic year types (critically dry, dry, below normal, above normal, etc.) to ensure that Folsom Reservoir is not emptied and that there are flows available in the river whenever possible. However, the court intends that the instream flow requirements set forth above remain the standard that should be maintained to the fullest possible extent. Moreover, the court intends that the instream flow requirements be an absolute limit on EBMUD's ability to divert water from the Folsom-South Canal. When the instream flow requirements cannot be met, EBMUD may not divert any part of its appropriation.

6. Defendants shall not divert water except to meet the demands for customers within the EBMUD utility district.

7. EBMUD shall not market nor sell any part of its water diverted hereunder to any third party.

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8. All parties hereto shall cooperate in the development and implementation of scientific studies pertaining to the fish, wildlife and habitat issues which have been identified in this litigation. These studies shall be under the supervision of the special master. EBMUD shall contribute its fair share of the cost of programs to maintain a viable fishery and riparian habitat in the lower American River. EBMUD's "fair share" shall be determined by a comparison with contributions by other users and agencies and upon the recommendation of the special master with regard to individual projects.

9. The court retains jurisdiction for the purpose of implementing the Physical Solution and providing for its modification in light of the scientific studies required in paragraph 8, and in light of the studies and information which may be developed by various of the interested governmental agencies as well as the parties.

10. The Court is mindful that the strict adherence to the flow regimen could, in some circumstances, affect carryover storage in Folsom Reservoir and reduce the availability of water for instream public trust uses in subsequent months. It is the intention of the Court, however, to maintain the indicated flow regimen in the absence of convincing evidence, presented through the Special Master, that diversions accomplished during any particular month will adversely affect the ability to meet the Court's mandated flow levels in subsequent months.

11. Notwithstanding any other provision of this Physical Solution, it is anticipated that during certain "dry year" periods, modification of the flow regimens herein may be permitted in limited circumstances to accommodate EBMUD. At such times of crisis, and with the guidance of the special master, the court may temporarily modify the flow regimen if such modification can be effected without substantial harm to the fishery, habitat and other public trust values identified herein. Any such modification will be temporary and only in response to a showing of significant, specific, and immediate health risks to

EBMUD. In evaluating circumstances in which a modification may be indicated, recreational interests identified herein may be accorded a lower priority than they would otherwise obtain.

12. The court appoints John Williams of Carmel Highlands, California, as the special master to aid and advise this court in the implementation of the Physical Solution. His duties shall include the development, coordination and monitoring of scientific research to determine optimum flows, releases, and storage patterns designed to protect the public trust values; the coordination of said studies with those of other agencies; advising the court as to developments affecting the rights of the parties hereto; evaluating dry-year flows and release patterns, and advising the court as to necessary modifications; and such other duties as the parties may request and the court require, consistent with the Physical Solution.

13. Each party may nominate an individual whose responsibility will be to communicate with the Special Master in the implementation of the Physical Solution. Said individuals will communicate regularly with the Special Master and will advance the recommendations of the parties with respect to any matters pertaining to the Physical Solution. Nothing contained in this Physical solution, however, shall limit the right of the parties to file motions directly with the Court pursuant to its continuing jurisdiction.

The foregoing flow regimen is not merely interim in nature. It is intended as a permanent constitutionally mandated prerequisite to diversion, modifiable only upon the presentation of convincing evidence which demonstrates the need for such modification in accordance with the foregoing provisions of the Physical Solution.

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Relief is granted on the pleadings in accordance with the foregoing opinion.

DATED: _____

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RICHARD A. HODGE
Judge of the Superior Court