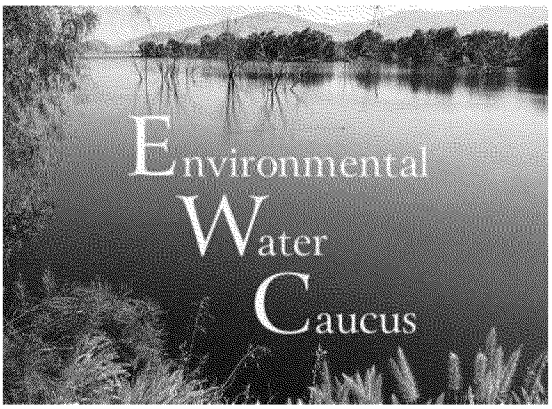


# RESPONSIBLE EXPORTS PLAN

**Developed by the Environmental Water Caucus**
**May 2013**



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# INTRODUCTION

The consensus diagnosis for the Delta estuary is dire. The California Environmental Water Caucus prescribes more river flows and reduced fresh water exports to help the Delta recover. The EWC's plan demonstrates how water supply reliability can be improved while reducing exports from the Bay Delta Estuary. Many of our recommendations have been presented to the Delta Stewardship Council as part of Alternative 2 for the Delta Plan. We have now packaged this series of related actions into a single alternative for evaluation in any future NEPA or CEQA evaluations, or by the State Water Resources Control Board. The actions are largely based on the EWC report *California Water Solutions Now*, (www.ewccalifornia.org), which can be referenced for supporting details. This package of actions ("The RX Plan") represents the EWC alternative to the BDCP.

The RX Plan includes a unique combination of actions that will open the discussion for alternatives to the currently failed policies which continuously attempt to use water as though it were a limitless resource. *The RX Plan is about far more than just reduced exports*. The uniqueness of this Plan is that while it will reduce the quantity of water exported from the Bay Delta Estuary, in order to protect the health of the Estuary's habitat and fisheries with increased inflows and outflows, it also contains actions that will reduce the demand for water and increase supplies for exporters south of the Delta in order to compensate for the reduced south-of-Delta exports. It is the only extant plan that will modernize existing facilities in the Bay-Delta with improved fish screens at the South Delta, levees reinforced above the PL84-99 standard, and significantly increased flows in order to recover habitat and fish stocks, while avoiding the huge infrastructure costs of tunnels under the Delta. It will also provide increased self-reliance for south-of-Delta water users through inter-regional water transfers and south of Delta groundwater storage. The reinforced levees will provide increased reliability of the water supplies through the Delta. And it will accomplish the legislated goals of Estuary restoration and water reliability for billions of dollars less than currently contemplated plans.

California is in the grip of a water crisis of our own making. Like all problems that humans create, we have the potential to use the crisis as an opportunity to make positive and long-lasting changes in water management. The crisis is not a water shortage – California has already developed sufficient water supplies to take us well into this century – the real crisis is that this supply is not used efficiently or equitably for all Californians, nor is it used wisely to sustain the ecosystems that support us.

The opportunity – and the basis for our positive vi sion – is that economically and technologically feasible measures are readily available to provide the water needed for our future. Our vision includes providing clean water for families to drink, providing water to improve the environmental health of our once-magnificent rivers, recovering our fisheries from the edges of extinction, fostering healthy commercial and recreational fisheries and a thriving agricultural industry, ensuring that all California communities have access to safe and affordable



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drinking water, and contributing significantly to the state's largest industries: recreation and tourism.[1] [2]

We need to make significant changes in our water management practices in order to provide the favorable outcomes that we describe in this report. These changes are based on the following Principles for a Comprehensive California Water Policy, developed by the Planning and Conservation League and the Environmental Justice Coalition for Water to guide California water policy reform.[3] They instruct that:

1. California must respect and adjust to meet the natural limits of its waters and waterways, including the limits imposed by climate change.
2. Every Californian has a right to safe, sufficient, affordable, and accessible drinking water.
3. California's ecosystems and the life they support have a right to clean water and to exist and thrive, for their own benefit and the benefit of future generations.
4. California must maximize environmentally sustainable local water self-sufficiency in all areas of the State, especially in the face of climate change.
5. The quality and health of California's water must be protected and enhanced through full implementation and enforcement of existing water quality, environmental, and land use regulations and other actions, and through new or more rigorous regulations and actions as needed.
6. All Californians must have immediate and ready access to information and the decision-making processes for water.
7. California must institute sustainable and equitable funding to ensure cost-effective water reliability and water quality solutions for the state where "cost-effective" includes environmental and social costs.
8. Groundwater and surface water management must be integrated, and water quality and quantity must be addressed on a watershed basis.
9. California's actions on water must respect the needs and interests of California Tribes, including those unrecognized Tribes in the State.
10. California must overhaul its existing, piecemeal water rights policies, which already over-allocate existing water and distribute rights without regard to equity.

A major influencing factor in future California water solutions will be the impact of global climate change. Based on the scientific information available, the natural limits of our water supply will become more obvious, the economics of water policies will change significantly, and our ability to provide sustainable water solutions for all Californians will become more challenging. Unless we manage our water more efficiently and account for the current and future effects of global climate change, the costs of providing reliable water to all users will overwhelm our ability to provide it.

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[1] California's Rivers A Public Trust Report. Prepared for the State Lands Commission. 1993. P. 47. http://www.slc.ca.gov/Reports/CA_Rivers_Rpt.html

[2] California Travel and Tourism Commission. California Travel Impacts by County. 2008 Preliminary State Estimates. Total direct travel spending alone was $96.7 billion in 2008. ES-2. http://tourism.visitcalifornia.com/media/uploads/files/editor/Research/CAImp08pfinal.pdf.

[3] Aquafornia: the California Water News Blog of the Water Education Foundation. http://aquafornia.com/archives/8374.

In addition to the commonly accepted NEPA and CEQA requirements for any Delta Estuary plan, there are five fundamental criteria that any plan for recovering the health of the Bay Delta Estuary and fish species must successfully meet. Those criteria are:

1. A water availability analysis must be conducted to align water needs with availability.
2. A benefit/cost analysis must be conducted to determine economic desirability of any plan.
3. Public trust and sociological values must be balanced against the value of water exports.
4. Existing water quality regulations must be enforced in order to recover the Estuary.
5. The plan must meet the NCCP *recovery* standard for fish species.

All of the current and past plans for the Delta Estuary have failed, partly because the responsible state and federal authorities have refused to apply or to test their projects with these above criteria. The EWC would welcome this Responsible Exports Plan being judged by these pragmatic and acceptable criteria.



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# PREFACE

There are several overarching issues that run through all our efforts to develop sustainable, effective, and equitable water policies. They are: climate change, periodic drought, environmental justice, the preservation of cultural traditions by Native Americans, the precautionary principle, and population pressures. They are covered in this preface to avoid repetition in each of the individual actions described below.

Climate Change. Climate models indicate that climate change is already affecting our ability to meet all or most of the goals enumerated in this report and must be integrated into the implementation of the recommendations. The main considerations are:

- More precipitation will fall as rain rather than snow and will result in earlier runoff than in the past.[4]
- Less snow will mean that the current springtime melt and runoff will be reduced in volume.
- Overall, average precipitation and river flow are expected to decrease. A recent paper in *Frontiers in Ecology and the Environment* [5] predicts that the average Sacramento River flow will decrease by about 20 percent by the 2050s.
- Precipitation patterns are expected to become more erratic including both prolonged periods of drought and greater risks of flooding.
- Sea level rise will impact flows and operations within the Delta, endanger fragile Delta levees, and increase the salinity concentration of Suisun Bay and the Delta, as well as increase the salinity concentrations of some coastal groundwater aquifers.

These changing conditions could affect all aspects of water resource management, including design and operational assumptions about resource supplies, system demands, performance requirements, and operational constraints. To address these challenges, we must enhance the resiliency of natural systems and improve the reliability and flexibility of the water management systems. Specific recommendations are proposed as part of this document.

Periodic Drought. Drought is a consistent and recurrent part of California's climate. Multiple-year droughts have occurred three times during the last four decades.[6] In creating a statewide drought water "bank," there is a clear need for a long-term version of a drought water bank. California's experience of multiple-year droughts should force state and local water and land use authorities to recognize the recurrence of drought periods and to put more effective uses of water

[4] National Wildlife Federation and the Planning and Conservation League Foundation. On the Edge: Protecting California's Fish and Waterfowl from Global Warming. 10-11. www.pcl.org/projects/globalwarming.html.

[5] Margaret A Palmer, Catherine A Reidy Liermann, Christer Nilsson, Martina Flörke, Joseph Alcamo, P Sam Lake, Nick Bond (2008) Climate change and the world's river basins: anticipating management options. Frontiers in Ecology and the Environment: Vol. 6, No. 2, pp. 81-89.

[6] California Drought Update. May 29, 2009. P.5. http://www.water.ca.gov/drought/docs/drought_update.pdf.

in place permanently. The Governor's current policy on water conservation[7] should be mandatory for all water districts and become a permanent part of water policy, rather than a response to current dry conditions. Only by educating the public, recognizing limits, and learning to use the water we do have more efficiently can Californians expect to handle future drought conditions reasonably.

Environmental Justice. It is imperative that water policies and practices are designed to avoid compounding existing or creating new disproportionately adverse effects on low income Californians and communities of color. Conversely, water policies and practices must anticipate and prepare for anticipated disproportionately adverse effects and to provide equitable benefits to these communities, particularly those afflicted by persistent poverty and which have been neglected historically. For example, water moving south through the California Aqueduct and the Delta Mendota Canal flow past small valley towns that lack adequate or healthy water supplies. We know that under conditions of climate change and drought, catastrophic environmental changes will occur in California. Environmental justice requires that water policies and practices designed to account for climate change and drought include a special focus on preventing catastrophic environmental or economic impacts on environmental justice communities. Other, specific environmental justice water issues include:

- Access to safe, affordable water for basic human needs.
- Access to sufficient wastewater infrastructure that protects water quality and prevents overflows and other public health threats.
- Restoration of water quality so that environmental justice communities can safely feed their families the fish they catch in local waters to supplement their families' diets.
- Equitable access to water resources for recreation.
- Equitable access to statewide planning and funding to ensure that in addition to safe affordable water, and wastewater services, environmental justice communities benefit equitably from improved conservation, water recycling and other future water innovations that improve efficiency and water quality.
- Mitigation of negative impacts from the inevitable reallocation of a portion of the water currently used in agriculture – the state's biggest water use sector – to water for cities and the environment. Reallocation will reduce irrigated acreage, the number of farm-related jobs, and local tax revenues.
- Mitigation of third party impacts, including impacts on farm workers, associated with land conversion.
- Ideally, mitigation will be based on a comprehensive plan to transition local rural economies to new industries such as solar farms and other clean energy business models and provide the necessary job training and policies necessary to enable environmental justice community members to achieve the transition.
- Protection from the impacts of floods and levee breaks, including provisions for emergency and long-term assistance to renters displaced by floodwaters.

[7] 20x2020 Water Conservation Plan DRAFT, April 30, 2009. Executive Summary. http://www.swrcb.ca.gov/water_issues/hot_topics/20x2020/index.shtml.

Native American Traditions. Many of California's Historical Tribes have a deep and intrinsic relationship with California's rivers, lakes, streams and springs. This relationship goes to the very core of their origin, cultural, and spiritual beliefs. Many of the Tribes consider the fish that reside in these waters as gifts from their creator, and the fish are necessary to the continued survival of their people and their cultural and spiritual beliefs. Historically, California's water policy has failed to recognize the importance of the needs of one of its greatest natural and cultural resources - its Historical Tribes - and has only sought to manage water for economic gain. California water policies and practices must change to provide sufficient water to support fisheries and their habitats for both cultural and economic sustainability, and provide for the restoration of and access to those fisheries for its Native Peoples.

The Precautionary Principle. The Precautionary Principle states that: "Where there is scientific evidence that serious harm might result from a proposed action but there is no certainty that it will, the precautionary principle requires that in such situations action be taken to avoid or mitigate the potential harm, even *before* there is scientific proof that it will occur."[8] Numerous actions recommended in this report fit that criteria and the precautionary principle is therefore implicit throughout the report recommendations.

Population Pressures. California's human population is expected to continue to increase from the current population of more than 37 million to 49 million by 2030 and 59 million by 2050.[9] In 2008, 75 percent of the population growth came from natural growth (births) and 25 percent came from immigration, both foreign and interstate. In each of the data sources utilized in this report, population increases have been factored into the conclusions, unless otherwise noted.

[8] A. I. Schafer, S. Beder. Role of the precautionary principle in water recycling. University of Wollongong. 2006. 1.1.

[9] California Department of Finance, Demographic Research Unit. 2009. Table 1. http://www.dof.ca.gov/research/demographic/reports/#projections.

## THE EWC RESPONSIBLE EXPORTS PLAN ACTIONS

**The main actions included in The Plan are underlined and described below:**

1. **Reduce Exports To No More Than 3MAF In All Years, In Keeping With SWRCB Flows Criteria.**

Numerous scientific and legal investigations have identified Delta export pumping by the state and federal projects as one of the primary causes of the decline of the health of the Delta estuary and its fish. They include the California Fish and Game Commission's 2009 listing of longfin smelt under the Endangered Species Act; the US Fish and Wildlife Service's 2008 Biological Opinion for Delta smelt; the National Marine Service June 4, 2009 Biological Opinion on Central Valley Project (CVP) and State Water Project (SWP) Operations, the State Water Resources Control Board's Bay-Delta Water Quality Control Plan and Water Rights Decision 1641; the CALFED Bay-Delta Program's 2000 Ecosystem Restoration Program Plan; and the Central Valley Project Improvement Act's Anadromous Fish Restoration Program.

The guidelines of the Fish and Wildlife Service's Biological Opinion require reduced pumping in order to minimize reverse flows and the resultant fish kills during times of the year when Delta Smelt are spawning and the young larvae and juveniles are present.

The long-term decline of the Delta smelt coincides with large increases in freshwater exports out of the Delta by the state and federally operated water projects, (Figure 1). CALFED's Ecosystem Restoration Program reminds us that "the more water left in the system (i.e., that which flows through the Delta into Suisun Bay and eventually the ocean), the greater the health of the estuary overall; there is no such thing as 'too much water' for the environment." [10]

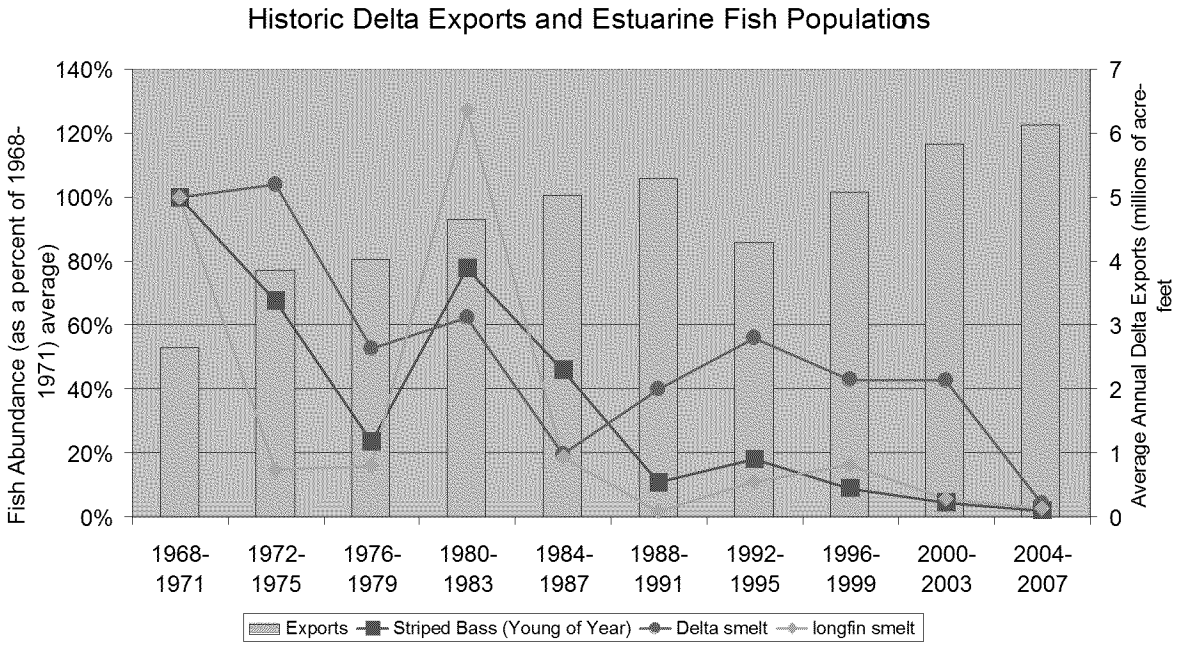
The main input to the Delta – the Sacramento River, which provides 70 percent of Delta inflow in average years[11] – does not provide sufficient water for all the present claimants except in wet years, and climate change is expected to decrease flows in the future. The system cannot provide full delivery of water to the most junior CVP and SWP contract holders in most years. Recent court-ordered water export limits that protect endangered fish species, the continuously deteriorating Delta earthen levees and the potential adverse effects of climate change on water supplies combine to make Delta water supply reliability a roll of the dice.

[10] CALFED Ecosystem Restoration Program. 2008. Stage 2 Implementation Draft. P. 23. http://www.delta.dfg.ca.gov/erp/reports_docs.asp

[11] Delta Vision Final Report. 2008. State of California Resources Agency. P. 41. http://deltavision.ca.gov/BlueRibbonTaskForce/FinalVision/Delta_Vision_Final.pdf .

According to the recent National Marine Services Biological Opinion, the proposed actions by the CVP and SWP to increase export levels will exacerbate problems in the Delta.[12] We do not believe that the water exporters' goals of maintaining or increasing Delta exports are attainable; neither are the junior water rights holders' expectations that they should have a full contracted water supply each year, especially in view of the collapse of the Delta's fisheries and the impacts of climate change.

**Figure 1**




Source: Environmental Defense Fund.[13] Original source is California Data Exchange Center and California Department of Fish & Game - Midwater Trawl Data

***Strategic alternatives to the recent high levels of Delta water exports should now be the highest priority considerations for the state's water planning – especially in tandem with aggressive water use efficiency measures. The two are closely linked.***

Over time, annual Delta outflows have been reduced on average by one half,[14] with associated declines in native fish abundance. Export pumping from the Delta is a major cause of reduced outflows, but not the only one. Diversions for CVP contractors upstream of the Delta,

[12] National Marine Fisheries Service, Southwest Region. June 4, 2009. Biological Opinion And Conference Opinion On The Long-Term Operations Of The Central Valley Project And State Water Project. Page 629. http://swr.ucsd.edu/ocap/NMFS_Biological_and_Conference_Opinion_on_the_Long-Term_Operations_of_the_CVP_and_SWP.pdf.

[13] Environmental Defense Fund. 2008. Finding the Balance. P. 3. http://www.edf.org/documents/8093_CA_Finding_Balance_2008.pdf

[14] CALFED Ecosystem Restoration Program. 2008. Stage 2 Implementation Draft. P. 21. http://www.delta.dfg.ca.gov/erp/reports_docs.asp

combined with "non-project" (that is, non-federal, non-state) diversions, account for a significant portion of the reduction in outflow. In fact, 31 percent of upstream water is diverted annually before reaching the Delta.[15] In the 1990s, under the threat of federal intervention, California increased the required outflow to the Bay, but not enough to restore the Delta ecosystem or prevent further declines.

Over the years, a number of processes have identified the need to dramatically improve outflows in order to recover listed species to a sustainable level and restore ecosystems in the Bay-Delta. From 1988, when the State Water Resources Control Board (SWRCB) proposed – but withdrew without public discussion – standards that would have required an average increase in outflow of 1.5 million acre-feet over the lower diversion levels of the period before the late 1980s, to 2009, when the California Legislature adopted a new policy of reducing reliance on the Delta for water supply uses, the need for greater outflow and reduced exports has been acknowledged – but not achieved. In 2010, the State Board is required to develop flow criteria that will fully protect public trust resources in the Delta. In all these years, no information has been developed that would contradict the Board's 1992 draft finding that maximum Delta pumping in wet years should not exceed 2.65 million acre-feet in order to provide the necessary outflows to protect fish and the Bay-Delta ecosystems.[16] The rebuttable presumption, consistent with the evidence of the last two decades and with the new state policy to reduce Delta water supply reliance, is that a total export number of no more than 3 million acre-feet in all water year types is prudent. The EWC organizations believe that a number at or near this level should now be used by the state and federal governments in planning and permitting future Delta export operations – with or without a Peripheral Canal – i n order to promote the recovery of the Delta's ecology and its fishery resources and to provide healthy Delta outflows to San Pablo and San Francisco Bays.

The Delta Flows Criteria promulgated by the State Water Resources Control Board (SWRCB) clearly indicates that the state has reached – and exceeded – the amount of water that can responsibly be diverted from the Bay Delta and Estuary. As a result, this plan anticipates future limitations on Delta exports below the level of the 2000-2007 time periods in its plan to meet Delta ecosystem restoration goals. The recent PPIC report reinforces this: "given the extreme environmental degradation of this region, water users must be prepared to take less water from the Delta, at least until endangered fish populations recover."

As indicated in the recent SWRCB report,[17] in order to preserve the attributes of a natural variable system to which native fish species are adapted, many of the criteria developed by the State Water Board are crafted as percentages of natural or unimpaired flows. These criteria include:

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[15] CALFED Ecosystem Restoration Program. 2008. Stage 2 Implementation Draft. P. 20. http://www.delta.dfg.ca.gov/erp/reports_docs.asp

[16] California Department of Fish and Game. 1992. Testimony on the Sacramento-San Joaquin Estuary to SWRCB Hearings on Bay Delta Water Quality Hearings. Page 11.

[17] State Water Resources Control Board and California Environmental Protection Agency. DRAFT Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem. July 2010. Pp. 5.

- 75% of unimpaired Delta outflow from January through June;
- 75% of unimpaired Sacramento River inflow from November through June;
- 60% of unimpaired San Joaquin River inflow from February through June.
-

This compares with the historic flows over the last 18 to 22 years, which have been:

- About 50% on average from April through June for Sacramento River inflows;
- Approximately 30% in drier years to almost 100% of unimpaired flows in wetter years for Delta outflows;
- Approximately 20% in drier years to almost 50% in wetter years for San Joaquin River inflows.

In 2014, the State Board is required to develop flow criteria that will fully protect public trust resources in the Delta and Estuary. In all the years since 1988, no information has been developed that would contradict the Board's 1992 draft finding that maximum Delta pumping in wet years should not exceed 2.65 million acre-feet in order to provide the necessary outflows to protect fish and the Bay-Delta and Estuary ecosystems. The rebuttable presumption, consistent with the evidence of the last two decades and with the new state policy to reduce Delta water supply reliance, is that a total export number of no more than 3 million acre-feet in all water year types, except for drought years, is prudent.

The current approach of managing the Delta for water supply will almost certainly lead to intense pressures to make increased exports the major goal of a Peripheral Canal or tunnel while the health of the Delta and Estuary will be a lower priority. One of the main objectives of this Responsible Exports Plan is to decrease the physical vulnerability and increase the predictability of Delta supplies, not to increase average annual Delta exports. The current fallacy of the BDCP to increase exports while somehow recovering fish species and ecosystems leads directly to a warped scientific program as pointed out by The Bay Institute in their recent Briefing Paper on the BDCP Effects Analysis.[18]

Recent letters from the EPA and the Bureau of Reclamation indicate that the EPA believes that the (BDCP) EIS/EIR will need to include a significant analysis of alternatives reflecting reduced Delta inflow and reduced exports[19] and that a significant increase in exports out of the Delta is inconsistent with recent state legislation (to reduce reliance on the Delta). [20]

Changing the infrastructure will not solve the problem of a shrinking Delta water supply. A vigorous debate is now underway over whether a new isolated conveyance facility to move water around or under the Delta should be constructed – a revised version of the Peripheral Canal. Even those who support a new facility (and dual conveyance) as a solution to improve

[18] The Bay Institute and Defenders of Wildlife. The BDCP Effects Analysis, Briefing Paper. February 2012. http://www.bay.org/assets/BDCP%20EA%20Briefing%20Paper%2022912.pdf

[19] http://www.epa.gov/region9/water/watershed/sfbaydelta/pdf/EPA_Comments_BDCP_3rdNO_051409.pdf

[20] http://www.epa.gov/region9/water/watershed/sfbay-delta/pdf/EpaR9CommentsBdcpPurpStmt6-10-2010.pdf

environmental conditions and water supply reliability, including the Public Policy Institute,[21] the Delta Vision Blue Ribbon Task Force, and some environmental groups, do not believe that constructing this new facility will generate any new water. Whether or not a new conveyance facility is approved and built, the inexorable trend will be for the reliability of north-to-south water transfers through or around the Delta to decline, and for water users who currently rely on Delta exports to seek alternative sources of supply and to increase their conservation and reuse of that supply.

According to the Bay Delta Conservation Plan,[22] the version of the Peripheral Canal now under consideration would have the capacity to export 9,000 to 15,000 cubic feet of water per second (112,000 gallons per second) from a series of three to five massive intake structures on the Sacramento River north of the Delta. This almost exactly matches the existing capacity of the combined state and federal pumps. The current approach of managing the Delta for water supply will almost certainly lead to intense pressures to make increased exports the major goal of a Peripheral Canal while the health of the Delta will be a lower priority.

Reduced dependence on the Delta by south-of-Delta water users would also obviate the need for new conveyance around or under the Delta (a Peripheral Canal or tunnel) and new surface storage reservoirs, avoiding costs of perhaps tens of billions of dollars for taxpayers and the potential for stranded assets resulting from climate change and sea level rise in the Bay-Delta and Estuary. This reorientation will undoubtedly require some south-of-Delta infrastructure enhancements, but not nearly to the magnitude of costs for a Peripheral Canal or tunnels and a new reservoir north of the Delta.

Climate change projections indicate that over the longer term global warming will reduce the total amount of precipitation, including significant reductions in Sacramento River water. There is no indication that this has been factored into present plans, and it is possible that new conveyance for Sacramento River water may become a stranded asset.

Implementation and Funding. Implementation (and funding, if necessary) for the level of reduced exports will depend on the results of the State Water Resources Control Board hearings on Delta flows, which are scheduled to be completed during 2014. Subsequent to those hearings, implementation and funding plans will most likely fall within the purview of the state legislature.

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[21] Public Policy Institute of California. 2008. Comparing Futures for the Sacramento-San Joaquin Delta. P. 123-124. http://www.ppic.org/content/pubs/report/R_708EHR.pdf

[22] Bay Development Conservation Plan. http://www.baydeltaconservationplan.com/CurrentDocumentsLibrary/Chapter_3_Conservation_Strategy_Combined_v2.pdf

## 2. Expand Statewide Water Efficiency And Demand Reduction Programs Beyond The Current 20/20 Program And Maximize Regional Self-Sufficiency In Accordance With The 2009 Delta Reform Act.

California has developed huge amounts of water for our cities and farms. Urban users consume 8.7 million acre-feet of water, and agriculture uses 34 million acre-feet in a typical year. (An acre-foot of water is the volume of water required to cover one acre of surface area to a depth of one foot, which is 325,900 gallons.) California has 1,400 major reservoirs with a combined storage capacity of 40 million acre-feet, thousands of miles of canals and enormous energy-consuming pumps to move the water around the state.

Despite all this abundance, there are fears of monumental water shortages, amplified by periodic drought conditions and climate change. One-third of water years in California since 1906 are considered "dry or critical" by the California Department of Water Resources; since 1960, dry or critical years have occurred 37 percent of the time, the increased frequency probably reflecting effects of our warming climate.[23] The worst and longest modern droughts have occurred since 1976. Farmers are concerned that they will be driven out of business for lack of water. In response, politicians want to build more major dams and canals to store and move more water at a time when climate change will most likely make less water available. More than 90 percent of our rivers have already been diverted for our use and publicly subsidized farm water has created an insatiable appetite for more. In view of the critical nature of water supply, irrigating water-intensive crops and drainage-impaired lands with huge amounts of water hardly fits a 21st century definition of the "beneficial and reasonable use" criteria called for in state law.

Recommendations made by the Environmental Water Caucus to the Delta Stewardship Council included an aggressive urban water conservation and efficiency program – more aggressive and of longer duration than the 20/20 program – and included both urban and agricultural users as a necessary component for reducing reliance on the Delta and achieving the water supply reliability goals for south-of-Delta users. A more aggressive conservation program also supports the goal of the reduced exports level of this alternative. We intend to continue our advocacy for this type of program with the Delta Stewardship Council.

Overwhelming evidence shows that a suite of aggressive conservation and water efficiency actions will reduce overall demand and provide cost effective increases in available and reliable water supply. These measures will handle California's water needs well into the foreseeable future and will do so at far less financial and environmental cost than constructing more storage dams and reservoirs. This conclusion is reinforced by the current State Water Plan (Bulletin 160-09), by the Bay Institute's "Collateral Damage" report, and by actual experience in urban areas and farms.

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[23] California Data Exchange Center "WSIHIST," Department of Water Resources. http://cdec.water.ca.gov/cgi-progs/iodir/wsihist

Southern California, with its huge urban populations, can provide the major conservation impetus for water savings and demand reduction, as highlighted by the "Where Will We Get the Water?" report produced by the Los Angeles Economic Development Corporation.[24] This report shows a potential savings and demand reduction combination of approximately 1,700,000 million acre feet. These are potential savings that can be achieved through three main measures: urban conservation, recycling, and storm water capture. The potential recycling savings are larger with more investment in recycling facilities and potential future regulations related to outdoor urban usage. Southern California should clearly be the main focus for urban conservation measures.

These water efficiency and water use reduction actions are:

- Urban Water Conservation – including installing low-flow toilets and showerheads, high-efficiency clothes washers, retrofit-on-resale programs, rainwater harvest, weather-based irrigation controllers, reducing water for landscaping via drip and xeriscape, more efficient commercial and industrial cooling equipment, and tiered price structures.[25] According to the 2009 State Water Plan, total urban water demand can be reduced by 2.1 million acre-feet with these measures.[26] The referenced Los Angeles Economic Development Corporation report found that in Los Angeles, Orange, San Bernardino, San Diego, Riverside and Ventura counties, "urban water conservation could have an impact equivalent to adding more than 1 million acre-feet of water to the regional supply" (about 25 percent of current annual use). The same LAEDC report shows that urban conservation is by far the most economical approach, at $210 per acre-foot, and especially compared with new surface storage at $760 to $1,400 per acre-foot.
- Urban Conservation Rate Structures – including the establishment of mandatory rate structures within the Urban Best Management Practices that strongly penalize excessive use and reward low water usage customers with lower rates, with the lowest being a lifeline rate to provide water for low income and low-water-using ratepayers. The savings that result from pricing policies are included in the 2.1 million acre-feet reduction cited above.
- Agricultural Water Conservation – including the continuing trend towards use of drip, micro sprinklers and similar higher technology irrigation, reduced deficit irrigation, transition to less water-intensive crops, reduced overall farmland acreage, elimination of the irrigation of polluted farmland, and tiered price structures. Conservation measures also include the elimination of indirect water subsidies provided to agriculture for Central Valley Project (CVP) water, which will drive some of the efficiencies shown in Figure 1.

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[24] Los Angeles County Economic Development Corporation (LAEDC). 2008. Where Will We Get the Water? Assessing Southern California's Future Water Strategies. P 6. http://www.laedc.org/consulting/projects/2008_SoCalWaterStrategies.pdf.

[25] A detailed treatment of urban water conservation is contained in *Waste Not, Want Not: The Potential for Urban Water Conservation in California*, by the Pacific Institute. http://www.pacinst.org/reports/urban_usage/waste_not_want_not_full_report.pdf.

[26] California Department of Water Resources. Update 2009. California Water Plan Update. Bulletin 160-09. V-2, P3-23. http://www.waterplan.water.ca.gov/docs/cwpu2009/0310final/v2c03_urbwtruse_cwp2009.pdf.

Demand reduction of as much as 5 million acre-feet per year could be achieved by 2030, according to Pacific Institute's *California Water 2030: An Efficient Future* report.[27]

- Recycled Water – including the treatment and reuse of urban wastewater, gray water, and storm water, and achievement of the State Water Resources Board goal of increasing water recycling by at least an additional 2 million acre-feet per year by 2030. The 2009 State Water Plan indicates a figure of 2.25 million acre-feet that could be recovered. The LAEDC report shows recycled water costs $1,000 per acre-foot.
- Groundwater Treatment, Demineralization and Desalination – including the treatment of contaminated groundwater and the use of groundwater desalination. The cost of groundwater desalination ranges from $750 to $1,200 per acre-foot.
- Conjunctive Management – which engages the principles of conjunctive water use (the planned release of surface stored water to recharge groundwater basins), where surface water and groundwater are used in combination to improve water availability and reliability. It also includes important components of groundwater management such as monitoring, evaluation of monitoring data to develop local management objectives, and use of monitoring data to establish and enforce local management policies. Now that the value of maintaining integrated, healthy hydrologic systems for ecological and economic purposes is well known, the use of conjunctive management should give priority to seriously disrupted groundwater basins. Without scientific studies that are needed to support conjunctive water management, or judicial oversight in some cases, many aquifers and surrounding groundwater can be harmed by the biggest users.
- Storm Water Recapture and Reuse – The 2008 Scoping Plan for California's Global Warming Solutions Act of 2006 promotes storm water collection and reuse. The plan finds that up to 333,000 acre-feet of storm water could be captured annually for reuse in urban southern California alone.[28] The LAEDC report also found the potential for "hundreds of thousands of acre-feet" of water from storm water capture and reuse in southern California counties.[29] The Los Angeles and San Gabriel Watershed Council has estimated that if 80 percent of the rainfall that falls on just a quarter of the urban area within the watershed (15 percent of the total watershed) were captured and reused, total runoff would be reduced by about 30 percent. That translates into a new supply of 132,000 acre-feet of water per year or enough to supply 800,000 people for a year.[30]

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[27] Pacific Institute. California Water 2030: An Efficient Future. September 2005. http://www.pacinst.org/reports/california_water_2030/ca_water_2030.pdf

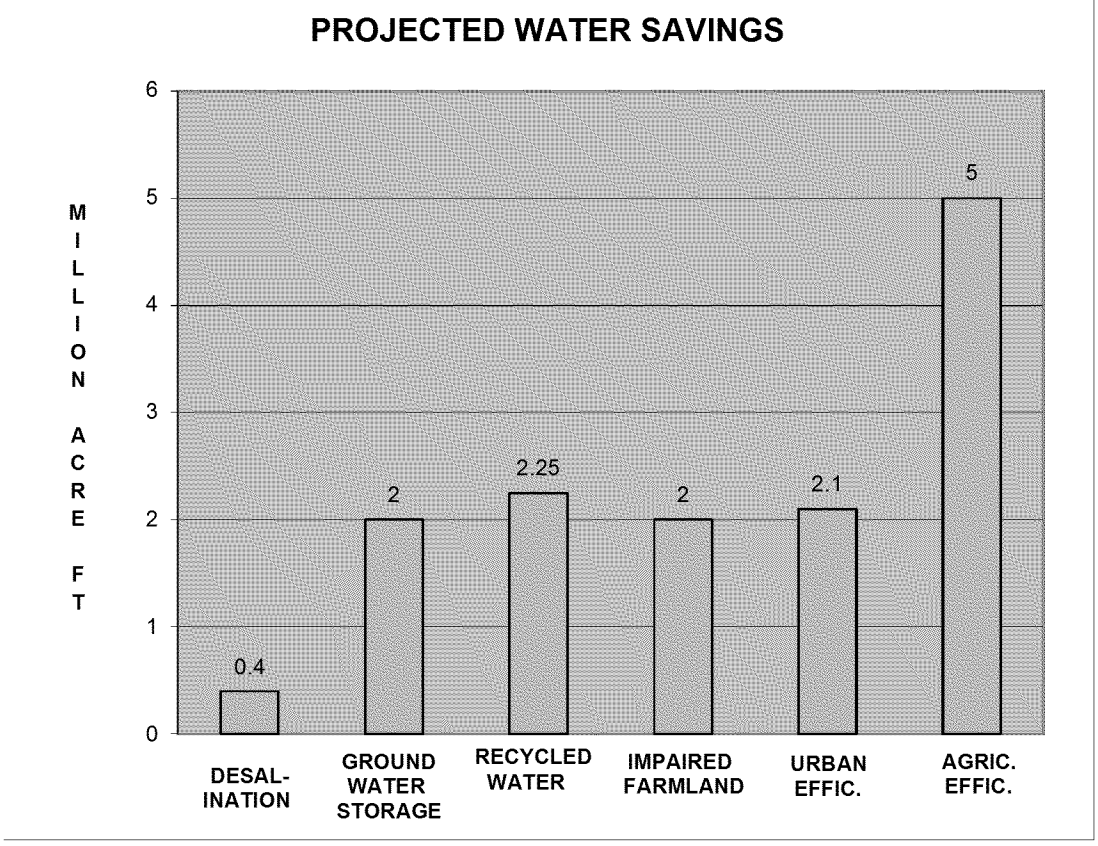
[28] Climate Change Scoping Plan Appendices Volume I. December 2008. Pursuant to AB 32 The California Global Warming Solutions Act of 2006. C-135. http://www.arb.ca.gov/cc/scopingplan/document/appendices_volume1.pdf.

[29] Los Angeles County Economic Development Corporation (LAEDC). 2008. Where Will We Get the Water? Assessing Southern California's Future Water Strategies. P 32-33. http://www.laedc.org/consulting/projects/2008_SoCalWaterStrategies.pdf.

[30] California Department of Water Resources. Update 2005. California Water Plan Update. Bulletin 160-05. P..21-3. http://www.waterplan.water.ca.gov/previous/cwpu2005/index.cfm

Based on data from the State Water Plan (Bulletins 160-05 and 160-09),[31] the Planning and Conservation League (PCL)[32] and the Pacific Institute, [33] the savings that can be achieved from these efficiency scenarios are estimated to be 13 million acre-feet per year (Figure 2). Perhaps the most authoritative report on the subject, the Pacific Institute's *California Water 2030: An Efficient Future* shows that overall statewide water usage can be reduced by 20 percent below 2000 levels – given aggressive efforts to con serve and reduce usage with readily available

**Figure 2**




technology and no decrease in economic activity. The urban water savings of approximately 5 million acre-feet a year (when including recycled municipal water and part of the groundwater

[31] California Department of Water Resources. Update 2005. California Water Plan Update. Bulletin 160-05. V2 1-5. http://www.waterplan.water.ca.gov/previous/cwpu2005/index.cfm

[32] Planning and Conservation League. 2004. Investment Strategy for California Water. P. 8-11. http://www.pcl.org/projects/investmentstrategy.html

[33] Pacific Institute. 2005. California Water 2030: An Efficient Future. ES-2. http://www.pacinst.org/reports/california_water_2030/ca_water_2030.pdf

storage) shown in Figure 1 is enough water to support a population growth of almost 30,000,000 people. According to the California Water Plan Update 2009, the state's population can be expected to increase by 22,000,000 over the next 40 years if current population trends hold. Clearly, a well-managed future water supply to take us to 2050 is within reach with current supplies and with an aggressive water conservation program.

In order to translate these aggressive efficiency measures into actual demand reductions, we need heightened public awareness of these targets and focused state oversight and coordination of local and statewide actions. Existing success stories from urban communities and on-farm operations reinforce the savings potentials and the need for efficiency-driven policies; they are described in detail in a number of the references cited in this report. The Governor's recent mandate for a 20 percent reduction in per capita urban water use by 2020 is the kind of action that will help this effort, although it may prove insufficient in view of projected population growth. Under the Governor's plan, per capita urban use would be reduced from the current 192 gallons per capita daily to 154 gallons, resulting in an annual savings of 1.74 million acre-feet. The projected water savings shown in Figure 1 are more aggressive than the Governor's plan. A similar mandate should be extended to agriculture, since agriculture uses more than three quarters of the state's developed water supplies. Water savings through efficiency measures can result in direct reductions in the volume of Delta exports since most of the savings would occur in cities and farms south of the Delta. These water savings are necessary to reduce the exports and to restore the stream flows called for in this plan.

The Natural Resources Defense Council's report *Transforming Water Use: A California Water Efficiency Agenda for the 21st Century* cites the state's successes in energy efficiency as a model for water efficiency while noting that the state lags far behind in water efficiency policies, programs, and funding. A key component of the success in energy efficiency has been the development of a priority system called a Loading Order.[34] As applied to water policy, a Loading Order system would require demand reductions through improved water efficiency to be the first priority in addressing water supply, the second priority would be developing alternative sources including water recycling, groundwater clean-up and conjunctive use programs (with priority going to seriously disrupted hydrologic systems or where judicial oversight occurs), and third would be the use of more traditional supply options. A Loading Order approach, if applied to statewide, regional, and local water plans, would shift the emphasis to the more efficient and cost effective approaches advocated in this report. Reducing water use through conservation efficiencies or water recycling also has a favorable impact on energy use, as pointed out by *Energy Down the Drain*, a report produced by the Natural Resources Defense Council and the Pacific Institute.[35] The report makes a strong case for the link between water and energy efficiencies. All of these conservation and efficiency methods are known to produce available water at significantly less cost than constructing new storage dams and reservoirs—the third

[34] Natural Resources Defense Council. 2007. Transforming Water Use: A California Water Efficiency Agenda for the 21st Century. P. 2. www.deltavision.ca.gov/BlueRibbonTaskForce/Feb28_29/Handouts/BRTF_Item_5A_HO2.pdf.

[35] Natural Resources Defense Council and Pacific Institute. 2004. Energy Down the Drain. ES-v. http://www.pacinst.org/reports/energy_and_water/index.htm.

option in the Loading Order. According to the Los Angeles County Economic Development Corporation (LAEDC) report,[36] water produced from the proposed Sites and Temperance Flat Reservoirs would cost $760 to $1,400 per acre-foot, while conserved or recycled water typically costs between $210 and $1,000 per acre-foot. New surface storage is by far the highest cost alternative per acre-foot of water for all the alternatives examined by the Legislative Analysts Office (LAO) report *California Water: An LAO Primer*,[37] while providing less total annual yield than most alternatives. Statewide, the costs of all of these efficiency measures will in all probability not exceed the potential $78 billion price tag for the various Peripheral Canal and new surface storage proposals.[38] For all of these reasons – as well as the historically ecosystem damaging impacts of major dams – EWC member organizations oppose the construction of Sites and Temperance Flat Reservoirs and the raising of Shasta Dam in favor of the more effective efficiency measures described above. Raising Shasta Dam on the Sacramento River would also be illegal because of its impact on the Wild River status of the McCloud River and its damaging impact on Winnemen Wintu sacred areas.

Implementation Considerations. Implementation requires legislative to accomplish the following:

- Establish a statewide oversight unit responsible for the coordination of the level of supply enhancements and demand reductions called for in this report. This measure can be accomplished with little additional cost to the state by utilizing some of the existing DWR staff, supplemented with additional funding to coordinate the water efficiency program targets.
- Pass legislation and provide funding to establish a California water efficiency education and publicity program, similar to other health and safety programs that are sponsored and publicized by the state. The program must ensure the equitable distribution of conservation investments among rural and low income communities.
- Adopt the Natural Resources Defense Council's recommendations to the Delta Vision Commission regarding water efficiency Loading Order. That would include a Loading Order policy through the State Water Control Resources Board, the State Public Utilities Commission and the Legislature that establishes water use efficiency as the top priority as well as a public goods surcharge on every acre-foot of water delivered in California, with the proceeds used to fund or subsidize efficiency programs.

Implementation and Funding for the above actions can come from existing or future bond funds, from Title 16 funding, or through regulatory changes. Additionally, since rate payers will bear the ultimate costs of these and other types of changes, rate payers will have to be given a voice in the choices made. Based on the LAEDC report, estimated costs for a statewide program along

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36 Los Angeles County Economic Development Corporation (LAEDC). 2008. Where Will We Get the Water? Assessing Southern California's Future Water Strategies. P 32-33. http://www.laedc.org/consulting/projects/2008_SoCalWaterStrategies.pdf.

37 Legislative Analyst's Office. 2008. California's Water: An LAO Primer. P. 67. http://www.lao.ca.gov/2008/rsrc/water_primer/water_primer_102208.aspx.

38 Strategic Economic Applications Company. 2009. The Sacramento San Joaquin Delta – 2 0 0 9, An Exploration of Costs, Examination of Assumptions, and Identification of Benefits, Draft.

the lines shown in Figure 2 might range up to $2.7 billion (through 2025), with most of the costs occurring in Southern California urban areas.

### 3. Provide Public Trust Protections And Thorough Economic And Sociological Analyses Of Reasonable Alternatives To Various Export Levels.

The California Supreme Court, in the Mono Lake decision, explicitly set forth the state's "affirmative duty to take the public trust into account in the planning and allocation of water resources and to protect public trust uses whenever feasible." Planning and allocation of limited and oversubscribed resources imply analysis and balancing of competing demands. So far we find little effort to balance the public trust obligations and resolve competing demands within the current planning processes (BDCP).

One of the significant flaws of previous and unsuccessful Bay-Delta proceedings has been the absence of a comprehensive economic evaluation of the benefits of protecting the estuary and in-Delta beneficial uses compared to the benefits of diverting and exporting water from the estuary. This absence has deprived decision makers and the public of critical information fundamental toreaching informed and difficult decisions on balancing competing demands.

Beyond protecting California's common property right in public trust resources, the balancing of limited water supplies must address the relative economic value of competing interests. For example, what is the societal value in providing Kern County, comprising a fraction of one percent of the state's population and economy, the same quantity of Delta water as the South Coast, with half the state's population and economy? What is the value to society of using public subsidies to irrigate impaired lands to benefit some 600 landowners, and that, by the nature of being irrigated, discharge harmful quantities of toxic waste that impairs other beneficial uses? What is the economic value of using twice the amount of water to irrigate an orchard in the desert than is required elsewhere? What are the costs and benefits of reclamation, reuse, conservation, and development of local sources? The preceding are only examples of the difficult questions that must be addressed in any allocation of limited resources and balancing of the public trust. Economic analysis is crucial to providing the insight and guidance that will enable and Delta plan to meet its mandate. Without such analysis, we do not believe a Delta plan can successfully or legally comply with its legislative and constitutional obligations.

An excellent description of the public trust type of issues caused by the current operations in the Delta and Estuary are contained in the Bay Institute report "Collateral Damage."[39]

Implementation and Funding for a balancing of the public trust values will depend on the results of the State Water Resources Control Board hearings on Delta flows, which are

[39] The Bay Institute. Collateral Damage. March 2012. http://www.bay.org/publications/collateral-damage

scheduled to be completed during 2014. Subsequent to those hearings, implementation and funding plans will most likely fall within the purview of the state legislature.

## 4. Reinforce Core Levees Above PL84-99 Standards.

This plan accepts and supports the Delta Protection Commission's recommendation in their Economic Sustainability Plan to: "Improve many core Delta Levees beyond the PL 84-99 standard that addresses earthquake and sea-level rise risks, improve flood fighting and emergency response, and allow for vegetation on the water side of levees to improve habitat. Improvement of most core Delta levees to this higher standard would cost between $2 to $4 billion." [40]

There is a plausible public interest in providing public funds to Delta reclamation districts and other Delta interests for levee upgrades since the Delta serves as the water conveyance facility for much of California. Water exporters should be required to identify which levees, if any, ***they want to fund to a higher standard*** (for example more earthquake resistant) to protect their water supply, beyond the current standards. Recommendations should also include assisting Delta counties and communities in meeting FEMA/NFIP programs. The plan should also contain a recommendation to support and increase public funding for permanent continuation of existing and highly successful statutory cost-share formula and funding for Delta (Subventions) Levee
Program. Public safety and flood protection must remain the top priority of the State Plan of Flood Control, including its levees and bypasses. The levees should be vegetated with native species to help stabilize the levees and support endangered species.

Because earthquake risks to the levees are one of the main justifications for a Peripheral Canal or Tunnel in the Delta, and there is evidence that the earthquake risks to the Delta levees may have been exaggerated in previous drafts of the Economic Sustainability Plan, the comparison of costs of the two alternatives ($2 to $4 billion for levee strengthening versus $15-$16 billion for new conveyance) is significant and should be incentive enough to immediately initiate this levee reinforcement program and make catastrophic levee failure a questionable justification for new conveyance.

Implementation and Funding would be in keeping with the Delta Protection Commission's Economic Sustainability Plan, between $2 to $4 billion.

[40] Draft Executive Summary, Economic Sustainability Plan for the Sacramento-San Joaquin River Delta, March 10, 2011 http://www.delta.ca.gov/res/docs/ESP_ESUM.pdf

5. **Install Improved Fish Screens At Existing Delta Pumps.**

A recent report by Larry Walker Associates indicates that a 1996 report by DWR and DFG concluded that for every salmon salvaged at the fish protection facilities more than three are lost to predators or through fish screens.[41] The same report also indicated that over a 15 year period (1979-1993), 110 million fish were reported to have been salvaged at the Skinner Fish Facility, the fish protection facility at the SWP. In 2000, the CALFED Record of Decision highlighted the need to improve the fish screens at the South Delta pumps. Between 2000 and 2011, more than 130 million fish have been salvaged at the State and Federal Project water export facilities in the South Delta, according to a more recent DFG report.[42] Actual losses are far higher. For example, recent estimates indicate that 5-10 times more fish are lost than are salvaged, largely due to the high predation losses in and around water project facilities.[43] Additionally, the fish screens are unable to physically screen eggs and larval life stages of fish from diversion pumps.[44] The losses of eggs and larval stages of fish, as well as the enormous losses of zooplankton and phytoplankton that comprise the base of the aquatic food chain, go publically unacknowledged and uncounted.

As pointed out in the Walker Associates report, the fish protections at the South Delta pumps, including the fish screens and salvage facilities, remain largely unchanged since they were first engineered more than 40 years ago.[45] Currently only about 11-18% of salmon or steelhead entrained in Clifton Court Forebay survive. Based upon numerous studies by DFG, DWR and academic researchers, 75% of fish entering Clifton Court Forebay are lost to predation, 20-30% of survivors are lost at the salvage facility louvers, 1-12% of salvaged fish are lost during handling and trucking plus an additional 12-32% lost to post-release predation.[46] As related above, losses to other species, such as Delta smelt or the egg and larval stages of pelagic species and salmon fry, are believed to be much higher. For example, some species, like Delta smelt, cannot survive salvage transport, and the losses approach 100%.

According to the draft BDCP Effects Analysis' Summary of Effects of BDCP on Entrainment of Covered Fish Species, South Delta export facilities could potentially increase entrainment of:

- Juvenile steelhead in dry and critical dry years,
- Juvenile Winter-run Chinook salmon in above normal & below normal years,

[41] Larry Walker Associates. A Review of Delta Fish Population Losses from Pumping Operations in the Sacramento-San Joaquin River Delta. January 2010. http://www.srcsd.com/pdf/dd/fishlosses.pdf. Page

[42] California Department of Fish and Game annual salvage reports for the State Water Project and Central Valley Project's fish facilities, 2000-2011.

[43] Larry Walker Associates. A Review of Delta Fish Population Losses from Pumping Operations in the Sacramento-San Joaquin River Delta. January 2010. P. 2. http://www.srcsd.com/pdf/dd/fishlosses.pdf

[44] DWR. Delta Risk Management Strategy, final Phase 2 Report, Risk Report, Section 15, Building Block 3.3: Install Fish Screens. June 2011. P. 15-18.

[45] Ibid, Larry Walker Associates,

[46] Larry Walker Associates. A Review of Delta Fish Population Losses from Pumping Operations in the Sacramento-San Joaquin River Delta. January 2010. P. 2.

- Juvenile Fall-run Chinook salmon in all below normal & dry years and Fall-run smolts in all years,
- Juvenile late fall-run Chinook salmon in dry and critical dry years,
- Juvenile Longfin smelt in above normal, below normal, and dry years and adults in critical dry years, and
- Juvenile Sacramento splittail in all years.[47]

Because of flow requirements and biological constraints affecting diversions from the Sacramento River, exports from the South Delta pumps will remain a significant percentage of total water exports with BDCP. BDCP currently estimates that 50% of State and Federal Project exports would come from the existing South Delta diversion facilities in average water years and as much as 75-84% in dry and critical water years.[48] In fact, BDCP modeling suggests that exports and fish entrainment from South Delta diversions could potentially increase in certain water year types and for critical life stages of certain species.[49]

The *CALFED Bay-Delta Program Programmatic Record of Decision* and associated Biological Opinions required the construction of new state-of-the-art fish screens at existing South Delta export facilities in 2000.[50] A funding plan was to be completed by early 2003, facilities design completed by the middle of 2004, and operations and performance testing to begin by the middle of 2006.[51] However, the explicit commitment to construct new screens was put on hold in 2003 after the State and Federal Project Contractors indicated that they would not pay for them. New South Delta screens are not included as part of the BDCP. As BDCP will continue to rely on the South Delta pumps for a substantial percentage of project exports, new screens must be required to mitigate for project impacts.

DWR's *Delta Risk Management Strategy (DRMS) Phase 2 Report* found that the South Delta pumping facilities could be successfully screened by multiple in-canal vee-type screens of about 2,500 cfs capacity in each module. These new state-of-the-art South Delta screens, placed

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[47] ICF International. BDCP Effects Analysis, Entrainment, Appendix 5.B, Entrainment, Administrative Draft Bay Delta Conservation Plan. March 2012. PP. B.7-2 – B .7-4.
48 NRDC. A Portfolio-Based BDCP Conceptual Alternative. February 2013. http://switchboard.nrdc.org/blogs/bnelson/Portfolio%20Based%20BDCP%20Conceptual%20Alternative%201-16-13%20V2.pdf
ICF International. BDCP Effects Analysis, Appendix 5.B, Entrainment, Administrative Draft Bay Delta Conservation Plan. March 2012. P. B.0-8. http://baydeltaconservationplan.com/Libraries/Dynamic_Document_Library/BDCP_Effects_Analysis_-_Appendix_5_B_Entrainment_3-30-2012.sflb.ashx
[49] ICF International. BDCP Effect Analysis, Appendix 5.B, Entrainment, Administrative Draft Bay Delta Conservation Plan. March 2012. PP. B.0-4 – B.0-11.
[50] CalFed. Programmatic Record of Decision. August 2000. P. 49. Including Attachment 6A, U.S. Fish and Wildlife, Programmatic Endangered Species Act Section 7 Biological Opinion, P. 36 and Attachment 6B, National Marine Fisheries Service, Programmatic Endangered Species Act Section 7 Biological Opinion, P. 27. http://www.calwater.ca.gov/content/Documents/ROD.pdf
[51] Larry Walker Associates. A Review of Delta Fish Population Losses from Pumping Operations in the Sacramento-San Joaquin River Delta. January 2010. P. 18.

at the entrance to Clifton Court Forebay, would eliminate the 75% predation in the Forebay and successfully protect fish longer than about 25 mm in length.[52] While new screens would be expensive, still require transport of salvaged fish, not totally resolve debris removal issues or eliminate all fish entrainment, they would dramatically reduce the appalling fish losses that occur at present.[53]

Modernizing the fish screens at the South Delta facilities is an integral part of the EWC's RX Plan in order to reduce fish killing at the pumps. The South Delta pumps will continue to be the primary diversion facilities under this RX Plan.

While experience with the existing fish screens at the South Delta have yielded much data on how to design more effective fish screens, modernizing the fish screening designs and operations would also require hydraulic and physical modeling, dimensional testing of dynamic baffling systems, and consideration of future hydrologic conditions associated with climate change.

The EWC supports the development and implementation of significantly modernized, new fish screening facilities with the best available technology, in keeping with original CALFED plans, and at other existing in-Delta diversions. This would include installation of positive barrier fish screens on all diversions greater than 250 cfs in both the Sacramento and San Joaquin River Basins as well as a significant percentage of smaller and unscreened diversions in these ecosystems.

An alternative possibility is the use of non-physical barriers to deter fish from entering the intake zones of the South Delta pumps. Non-physical barriers include the use of the following methods: electrical barriers; strobe lights; acoustic fish deterrents; bubble currents; velocity barriers; chemical toxicants; pheromones; and magnetic fields. In view of the criticality of recovering fish populations through reduced mortality at the pumps, the feasibility of these types of non-physical barriers should not be overlooked. The Bureau of Reclamation has recorded some research results of the use of non-physical barriers.[54]

Implementation and Funding. Based on unpublished CALFED cost estimates improved fish screen facilities at the Banks Pumps would be more than $1 billion in 2007 dollars; the cost estimate for Tracy would be $290 million.[55]

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[52] DWR. Delta Risk Management Strategy, final Phase 2 Report, Risk Report, Section 15, Building Block 3.3: Install Fish Screens. June 2011. P. 15-18. http://www.water.ca.gov/floodsafe/fessro/levees/drms/docs/DRMS_Phase2_Report_Section15.pdf

[53] Id. 15.5.2.1 Conclusion at PP. 15-19 & 15-20.

[54] Bureau of Reclamation. Non-Physical Barrier (NPB) for Fish Protection Evaluation: Can an Inexpensive Barrier Be Effective for Threatened Fish? http://www.usbr.gov/research/projects/detail.cfm?id=8740

[55] http://www.water.ca.gov/floodmgmt/dsmo/sab/drmsp/docs/DRMS_Phase2_Report_Section15.pdf

## 6. Keep Water Transfers Within The Revised Delta Export Limits.

Since the early 1990s, water transfers via market transactions have been used to overcome what some economists and water managers feel is the inflexibility of California water rights priorities—first in time, first in rig ht. Such transfers typically become most visible to the public during drought years, when junior water rights holders like the federal Central Valley Project and the State Water Project face cutbacks as more senior water right holders exert their priority to what water that remains. Junior water rights holders attempt to obtain more surface water supplies by offering to purchase water directly from willing sellers, who are usually holders of senior water rights. With groundwater unregulated in California, these willing sellers are able to make large profits by pumping groundwater to irrigate their crops to substitute for the surface supplies they sold to other users.

This is a recipe for ecological disaster in the Delta and both ecological and economic disaster in the Sacramento Valley. Water transfers are intended to overcome water rights priorities, but they also have the potential to cause falling groundwater elevations, overdraft (pumped supplies outracing the rate of recharge to the aquifer), land subsidence (where the elevation of the land surface actually falls as emptied aquifers collapse and lose storage capacity), and increased stream flow losses (chasing a falling groundwater table). This has been the experience of agricultural regions in the Santa Clara Valley (before it urbanized into Silicon Valley) and the San Joaquin Valley, as well as in urban groundwater basins of the Los Angeles region. These conditions (falling groundwater elevations, overdraft, land subsidence, and stream flow losses) combined to destabilize once healthy hydrologic systems, which created the exploited conditions that make "conjunctive use" wa ter strategies possible. This must not be repeated in the Sacramento Valley.

The State of California during past droughts has operated a "drought water bank" program which arranges the sales of Sacramento Valley region surface water to buyers south of the Delta. Two environmental problems arise from this program: First, the water that is sold must be moved through the Delta to be pumped by the dangerous export pumps of the CVP and SWP. Second, landowners selling their surface water may then pump groundwater to irrigate their crops, which causes groundwater elevations to fall for all users. If these conjunctive use programs continue in the Sacramento Valley, its aquifers are in jeopardy. This Valley's agricultural economy, ecology, and surface waters are highly dependent on its natural groundwater abundance.

No net new water transfers should be exported from north of the Delta beyond those of the most senior water rights of the San Joaquin River Exchange Contractors in the San Joaquin Valley. Their supplies are already imported to the San Joaquin Valley as part of normal export operations of the Central Valley Project from the Delta, and the Exchange Contractors have already begun operating a water transfer program consisting of a maximum of 150,000 acre-feet for sale (about 5 percent of EWC's recommended cap on Delta exports). This policy protects the Delta from new export pumping impacts, but it also protects for the long term the groundwater supplies of the Sacramento Valley. Having such a policy in place is the only way

for the Valley's farmers to avoid having their groundwater usage go the way of the San Joaquin Valley's in the 19th and 20th centuries. There are other senior water rights holders in the San Joaquin River Basin who are also being approached for dry year water supplies, such as San Francisco seeking to purchase water from irrigation districts along the Tuolumne and Stanislaus rivers.

Water transfers through the Sacramento-San Joaquin-San Francisco Delta and Estuary – which include individual water sales transactions, Article 21 State Water Project pumping and the pumping of the Central Valley and the State Water Projects' contracts – play, at times, a significant role in the movement and transfer of water throughout the state and have significant impacts on the ecology of the Estuary. The two latter projects provide the largest percentage of transfers through the Delta while water sales and Article 21 pumping in some years is significant.

A new paradigm is needed in California water policy that would simultaneously reduce the transfer pumping through the Delta to a level that maintains a healthy ecosystem and is consistent with the most senior water rights of the Exchange Contractors while providing more logical and reliable sources of water for south-of-Delta water users. Instead of continuing to export extraordinary amounts of water from the Delta, south-of-Delta water users could obtain significant amounts of water from localized south-of-Delta sources in the San Joaquin Valley region. Such "south-to-south" of Delta trades would avoid the impacts on fish and wildlife species, water quality, ecosystem conditions, flow volumes and directions, and groundwater in the Sacramento Valley that come with excessive Delta export pumping. It would also avoid the groundwater substitution transfers that could ruin the agricultural economy of the Sacramento Valley and the vital streams necessary for already struggling aquatic and terrestrial species. This type of move toward regional self-sufficiency is now state law from passage of the Delta Reform Act of 2009. As of early 2012, however, pending federal legislation would go in the opposite direction and allow more dependence on Delta exports through water sales and "surplus" water pumping.

A more favorable scenario than the present and contemplated heavy north-to-south Delta pumping consists of the following changes in supply orientation:

- San Joaquin Valley water users could be incentivized to voluntarily share resources by providing southern Sierra water to south-of-Delta water users through new interties with existing infrastructure, or by providing for the movement of agricultural water from the east side of the San Joaquin Valley, where water is more abundant, to west side agriculture, where the water supply is more limited. This kind of change can be facilitated with efficiency incentives for east side water users and might result in as much as 500,000 acre-feet of additional water for the west side. Although politically difficult, this is an elegantly simple and effective solution for regional self-dependency for south-of-Delta agriculture users and for all of California. This kind of change would have to consider the required outflows to the Delta Estuary from the San Joaquin River.

- Supplies for the Metropolitan Water District and other south-of- Delta users could be sourced from the natural reservoir that is Tulare Lake by allowing flows from the Kern, Kings, Kaweah, and Tule Rivers to flow into the Tulare basin. This option is being advocated by the San Joaquin Valley Leadership Forum, which has determined that surface storage capacity in the Tulare Lake Basin could be more than 2.5 million acre-feet. This option may require a new Kern-San Joaquin intertie. Reorienting water transfer policies to benefit south-of-Delta water users will require further detailed analysis to confirm its feasibility; however, the potential for these measures to comply with the state requirement to reduce reliance on the Delta to the level recommended above deserves serious consideration.

A Water Transfer Matrix and a set of Water Transfer Principles are included in the referenced EWC report *California Water Solutions Now*.

As called for in the California Water Code, transfers that use State, regional or a local public agency's facilities require that the facility owner determine that the transfers not harm any other legal user of water, not unreasonably affect fish and wildlife, and not unreasonably affect the overall economy of the county from which the water is transferred. Unfortunately, there is no enforcement mechanism except litigation, which is an onerous burden for the public. This is a particular concern in the Sacramento Valley, where existing healthy aquifers could be over drafted by willing sellers in order to supply the same San Joaquin irrigators who caused the existing overdraft conditions in the San Joaquin areas. In addition, the State Water Plan points out that "some stakeholders worry that State laws and oversight of water transfers may not be adequate to protect the environment, third parties, public trust resources, and broader social interests that may be affected by water transfers,…. and transfers that involve pumping groundwater, crop idling, or crop shifting." The EWC plan would come down on the side of county of origin protections and the "precautionary principle" in order to protect existing healthy groundwater aquifers north of the Delta Estuary.

Implementation and Funding. No estimates available

## 7. Eliminate Irrigation Water On Drainage-Impaired Farmlands Below The Bay Delta.

Selenium, boron, molybdenum, mercury, arsenic and various other salts and minerals are highly concentrated in the soils of the Delta-Mendota Service Area and the San Luis Units of the CVP, as well as portions in the Kern and Tulare basins served by the SWP. Descriptions of these soils are presented in the 1990 joint federal and state report known as "The Rainbow Report."[56]

[56] U.S. Department of the Interior, California Resources Agency. September 1990. A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley. P. 2-3. http://www.water.ca.gov/pubs/groundwater/a_management_plan_for_agricultural_subsurface_drainage_and_related_problems_on_the_westside_san_joaquin_valley/rainbowreportintro.pdf

The San Luis Act of 1960 requires a drain system as a condition of approval of the San Luis Unit CVP contracts, which includes the Westlands Water District. Initially, the Bureau of Reclamation planned to build a San Luis Master Drain to the Bay-Delta from these lands, but construction of the drain to the Delta was stopped after 93 miles were completed to the Kesterson Reservoir near Los Banos. The US Geological Survey recently estimated that even if the San Luis Drain were completed, irrigation of the San Luis Unit of the CVP were halted, and 42,500 pounds of selenium a year were discharged into the Delta, it would take 65 to 300 years to eliminate the selenium already built up in valley groundwater.[57]

Since the late 1960s and 1970s, the State Water Project and Central Valley Project have been supplying water to approximately 1.3 million acres of drainage impaired land on the west side of the San Joaquin Valley; this is a clear violation of the State Constitution's prohibition against unreasonable use of the state's water.[58] Eliminating or reducing the irrigation of this land would save up to 2 million acre-feet of water in most years. [59]

Farmers and water districts throughout the Western San Joaquin Valley try to reduce their drainage water. However, retiring these lands from irrigated agriculture remains by far the most cost-effective and reliable method to eliminate harmful drainage discharges to water bodies and aquifers. The Westlands Water District has already retired 100,000 acres; a recent federal report discusses an option to retire 300,000 acres of drainage-impaired lands. [60] Any long-term solution to the west side's drainage problem must be centered on larger-scale land retirement, complemented by selective groundwater pumping, improved irrigation practices, and application of new technologies where appropriate. Any approach that is not founded on land retirement will ultimately continue to store and concentrate selenium and salts in the shallow aquifers, where they may be mobilized by flood events or groundwater transport.

Taking much of these "badlands" out of production would reduce demand for Delta water diversions and significantly improve water quality in the San Joaquin River. A planned program of land retirement and other drainage volume reduction actions should also provide for mitigation for impacts to the farm labor community. Even if irrigation deliveries continue, these lands will ultimately go out of production because of drainage impairment, as pointed out in the federal "Rainbow Report." A far better use of these impaired farmlands would be to provide state or federal incentives for the production of solar energy farms.

Implementation and Funding. No current estimates available.

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[57] Presser, Theresa S. and Samuel N. Luoma. 2007. Forecasting selenium discharges to the San Francisco Bay-Delta Estuary: Ecological effects of a proposed San Luis Drain Extension.The US Geological Survey,Professional Paper 1646. Abstract P. 1. http://pubs.usgs.gov/pp/p1646/

[58] California Constitution. Article 10, Section 2. http://www.leginfo.ca.gov/.const/.article_10.

[59] Pacific Institute. 2008. More with Less: Agricultural Water Conservation and Efficiency in California. P.7. http://www.pacinst.org/reports/more_with_less_delta/index.htm

[60] U.S. Geological Survey. 2008. Technical Analysis of In-Valley Drainage Management Strategies for the Western San Joaquin Valley, California

## 8. Restore Delta Estuary and Riverine Habitats and Integrate FloodplainsWith Rivers.

In keeping with the Legislature which has expressly declared that *permanent protection* of the Delta's natural and scenic resources is the *paramount* concern to present and future residents of the state and nation, habitat restoration projects should be aimed at public lands as a first priority. Habitat restoration projects must consider connectivity between areas to be restored and existing habitat areas needed for the full life cycle of species targeted to benefit from the restoration project. Where feasible, restoration should be accomplished along with levee reinforcement and where possible, restoration projects should emphasize the potential for water quality improvement. Restoration projects should also incorporate input from effected Delta landowners.

Priorities for restoration should include the following areas, since they would meet most of the criteria described above:

- Cache Slough Complex
- Cosumnes River–Mokelumne River Confluence
- Cosumnes River ground water basin depletion
- Lower San Joaquin River Floodplain
- Suisun Marsh
- Yolo Bypass

Although the EWC has not estimated the amount of acreage that would be involved in the priority areas, our priorities would go to the 50,000 acres of public lands, and our estimate would be well below the more than 100,000 acres called for in the BDCP plan. That plan is impractical from the viewpoint of costs and from the opposition it will engender among residents and landowners in the Delta. Any resulting plans would need to heavily involve residents of the Delta, something that has not been accomplished to date.

Floodplains benefit the people and ecology of California in numerous ways. Floodplains are extremely productive ecosystems that support high levels of biodiversity and provide valuable ecosystem services.[61] The floodplain of a river is a relatively level area on both sides of the stream channel that carries excess waters the channel cannot handle at various times. During a flood, the floodplain becomes the additional part of the stream to do the extra work for the stream channel. The floodplain allows flood waters to spread out, thus reducing the flood water's potential energy. As a result, less damage occurs downstream. If the flood plain is not allowed to work properly and the channel is narrowed, dredged, or rip wrapped the stream is forced to handle more of the flow and damage occurs. Channelization and dredging have caused the disappearance of the river's healthy sandbars and islands. Flood plains contain wetlands which function to slow and filter flood water, thus improving water quality. Wetlands also provide habitat for a diversity of wildlife. Floodplains, therefore, are extremely productive ecosystems

[61] Postel, Sandra. Richter, Brian. 2003. Rivers for Life. Island Press. P 20-21. http://islandpress.org/bookstore/details.php?sku=1-55963-444-8.

that support high levels of biodiversity and provide valuable ecosystem services. Studies have shown that healthy floodplains can have an extremely high monetary value due to these ecosystem services, which also include flood attenuation, fisheries habitat, groundwater recharge, water filtration, and recreation.

To function properly, floodplains must, by definition, periodically flood. Floodplains store floodwaters that recharge groundwater supplies, maintain proper instream flows, prevent bed-bank scour, are a source of organic carbon, and support a healthy population of aquatic species essential to both ecosystems and our economy. (See photo.[62]) The extent of functional floodplains in California has been dramatically reduced from historical conditions because levees, dams, flood control projects, and development have reduced or eliminated connectivity between rivers and floodplains. To reverse these losses, numerous agencies and organizations have spent significant resources to restore floodplains while simultaneously minimizing future flood risk.

With climate change, we can expect to have less snowpack, quicker spring snow melts, and increased flood pressures. Establishing natural floodplains connected with our rivers and avoiding development in floodplains will become more critical to community sustainability in the future.

The current restoration plans for the Yolo Bypass, including more frequent use of the Yolo Bypass, and similar conservation actions are encouraged as a part of this plan.

The following actions need to be included with any planned floodplain restoration:

- Where possible, remove or at least set levees back from riverbanks to allow for floodwaters to expand into the floodplain.
- Where it is not possible to remove levees, they should at least be vegetated with native riparian vegetation to provide the maximum achievable ecosystems functions.
- Make the purchase of floodplains or flowage easements a top priority for flood

During an experiment comparing the growth of juvenile Chinook in floodplain and river habitats of the Cosumnes River, fish reared in the floodplain (right) grew faster than those reared in the river (left) T.R. Sommer et al. 2001.

Photo by Jeff Opperman; from Cosumnes River field study by Carson Jeffres

[62] Sommer T.R., Nobriga M. L., Harrell B., Batham W., Kimmerer W. J. 2001. Floodplain rearing of juvenile chinook salmon: evidence of enhanced growth and survival. Canadian Journal of Fisheries and Aquatic Sciences. P. 325-333. http://iep.water.ca.gov/AES/Sommer_et_al_2001.pdf

control agencies and prevent new levees from being constructed and development in floodplains.

- Ensure that low-income communities impacted by floodplain restoration are involved in the development of restoration plans, and that any impacts of restoration are fully mitigated.

Implementation and Funding. Costs might be approximately $1.6 billion, based on half of the comparable restoration costs of BDCP from 2010 documentation.[63]

## 9. Return The Kern Water Bank To State Control, Restore Article 18 Urban Preference, And Restore The Original Intent Of Article 21 Surplus Water In SWP Contracts.

The Monterey Amendments changed significant provisions of the original State Water Project and, as an unintended consequence, increased pressure for exports from the Delta and increased pumping beyond healthy limits. The changes that caused these conditions were: the elimination of Article 18a, the "Urban Preference;" the elimina tion of Article 18b, the "Paper Water" safeguard; the change of orientation for Article 21 "surplus water;" and the privatization of the Kern Water Bank.

As a part of this plan, the following changes should be made in order to reduce reliance on the Delta, to assure Public Trust protections for a public resource, and to provide greater reliance for urban water users in the state's largest population centers.

- The "urban preference," that was eliminated as a co mponent of State Water Project contracts due to the Monterey Amendments, must be reinstated. California should return to its original plan of giving priority to the water needs of its bourgeoning population rather than giving farm water equal priority, per the Monterey Amendments changes.
- The contracted amounts of water for CVP and SWP Table A users are unrealistically high and must be brought in line with historic "firm yie ld" experience, as required in the contracts. The overall water supply reductions forecasted with global climate change adds to the urgency to bring these contracted amounts in line with current realities and for future planning.
- The pumping of "Article 21" (so-called surplus) wat er is unnecessary and has proven to be damaging to the fisheries and ecology of the estuary, especially the pumping of this "surplus" water in dry years, which should never be permitted. In reviewing the different types of water transfers that can occur throughout the state, some are more logical and favorable from an ecosystem and cost viewpoint, while others are clearly damaging by the same two criteria.
- The Kern Water Bank – initially a public asset – ha s been inappropriately turned over to private interests as a part of the Monterey Amendments and must be reestablished as a

[63] Highlights of the BDCP, pamphlet published December 2010

state entity under the ownership and operational control of the Department of Water Resources (DWR) for the benefit of all Californians, as it was when DWR purchased the land for the bank in the 1980s. When combined with the reinstatement of the urban preference in the State Water Project, this change would enhance water supply reliability for urban southern California users and would eliminate profiteering from the public's water by private corporate interests.

Implementation and Funding. No cost estimates available.

**10. Conduct Feasibility Study For Tulare Basin Water Storage.**

Supplies for south-of- Delta users and the Metropolitan Water District could be sourced from the natural reservoir that is Tulare Lake by allowing flows from the Kern, Kings, Kaweah, and Tule Rivers to flow into the Tulare basin. This option is being advocated by the San Joaquin Valley Leadership Forum, which has determined that surface storage capacity in the Tulare Lake Basin could be more than 2.5 million acre-feet.[64] The concept would require bi-directional conveyance with both the Kern Canal and the California Aqueduct.

The restoration of the Tulare Lake basin in the San Joaquin Valley is a unique opportunity to provide for the quality, quantity, and reliable regional sourcing and use of water for agricultural, economic development and environmental needs on a self-sufficiency basis. At one time, Tulare Lake was the largest freshwater body west of the Mississippi River storing up to 25 million acre feet. The concept proposal put forth by the San Joaquin Valley Leadership Forum is based upon technical, financial, and environmental analysis which is superior to the only other storage proposal currently under study within the San Joaquin Valley – known as Temperance Flat on the Upper San Joaquin River above Millerton Lake/Friant Dam. As an example, the restoration of just 10% of the historic Tulare Lake would be nearly twice the surface storage capacity of Temperance Flat – let alone the fact that the Tular e Lake basin provides ground water storage capabilities as well – and Temperance does not. An other important distinction between Temperance Flat versus Tulare Lake is the fact that the Tulare Lake basin can support the collection and management of flood waters from at a minimum of four south Sierra river systems – Kings, Kaweah, Tule, and Kern – as well as the up per San Joaquin. Temperance Flat would only support the flood waters of the upper San Joaquin River.

There is a possibility of ground contaminants in the basin that may be at harmful levels. The feasibility study would need to examine this potential issue closely. California does not need another set of impaired lands similar to what already exists in the west side of the San Joaquin.

Implementation. This proposed concept should be evaluated as part of this "Responsible Exports" plan. The preliminary concept described b y the San Joaquin Valley Leadership Forum is estimated to cost $800 million.

[64] San Joaquin Valley Leadership Forum, www.sjvwlf.org

Implementation and Funding. According to the San Joaquin Valley Leadership Forum plan, under $1 billion.

**11. Enforce Water Quality Standards In The Estuary And In Impaired Rivers.**

California's Porter-Cologne Act of 1969 and the 1972 federal Clean Water Act both were enacted with the goal of restoring the quality of our water resources. These resources have been seriously degraded by over a century of heavy industry and agriculture, the indiscriminate extraction of natural resources, and the continued discharge of inadequately treated sewage. Progress in reversing this degradation has been slow. While upgrades to wastewater treatment and discharge requirements for industrial polluters have improved water quality in many areas, the fact remains that almost 700 reaches of California waterways are still unable to support beneficial uses, including providing potable water supply and supporting ecosystem health.

These problems have contributed to ecosystem crashes in San Joaquin Valley rivers and the Delta, severe groundwater depletion and contamination in the San Joaquin Valley[65] and Central Coast that impacts low-income rural communities, and ocean pollution. Though state and federal laws already give regulators ample powers to improve water quality, this authority has not been exercised sufficiently to protect the health of the state's waterways or its residents. The continuing acceptance of agricultural waivers by Regional Water Quality Control Boards is a major contributor to the state's impaired waterways.

Diverting Sacramento River flows for export without significantly protecting existing groundwater basins and increasing the amount of fresh water flow dedicated to reaching San Francisco Bay, as currently planned for BDCP, will only degrade water quality and habitat conditions and aggravate the negative impact on Delta aquatic and terrestrial species. On the other hand, a future scenario that places less emphasis on the Delta as a water supplier and allows more water to be left instream, can dramatically reduce the environmental and water quality effects of exporting water – whether through or around the Delta. Although increasing flows, as described in this "Responsible Exports" alternative, will improve many aspects of Delta water quality, this plan must continue to pursue specific and targeted water quality actions in order to contribute to restoring the health of the Delta.

Implementation and Funding. Implementation will depend on the results of the State Water Resources Control Board hearings on Delta water quality and flows, which are scheduled to be completed during 2014.

[65] National Marine Fisheries Service. 2009. Endangered Species Act Section 7 Consultation Biological Opinion Environmental Protection Agency Registration of Pesticides Containing Carbaryl, Carbofuran, and Methomyl. P. 481-483. http://www.epa.gov/espp/litstatus/effects/comments-2nd-draft.pdf.

## 12. Monitor And Report Statewide Groundwater Usage.

Environmental organizations are generally disappointed with the groundwater monitoring features that were built into the Delta Reform Act of 2009. Earlier drafts of the 2009 legislation required groundwater monitoring and reporting throughout the state, while the final legislation was weakened to make groundwater reporting a voluntary effort. Since groundwater represents 30% of California's water supply in most years, the state must face this politically difficult situation with actions for mandatory groundwater reporting throughout the state.

This action needs to include a discussion of the Water Code's requirement for additional South-of-Delta underground storage, and the ability to meet that requirement through public control and expansion of the Kern Water Bank. The impacts of the additional capacity for Delta exports as provided by a public Kern Water Bank should be considered here. Given its location, size, and relative cost of development compared to surface storage, the Kern Water Bank is a facility which could greatly assist balanced export controls for the Delta and could be the single greatest improvement to overall state-wide water supply reliability. This plan strongly advocates for the return of the Kern Water Bank to state control as a water management conservation measure.

Implementation and Funding. No estimates available.

## 13. Provide Fish Passage Above And Below Central Valley Rim Dams For Species Of Concern.

Dams have made California a well-watered paradise for most of its human inhabitants. Dams are also killers of river habitats. Although California's vast system of water storage, hydropower and flood control dams has provided enormous economic benefits, it is not without downsides. Dams have been a major factor - in many cases the major factor - in the decline and extinction of numerous fish species, especially anadromous fishes that migrate to and from the ocean and must have access to the more favorable upper reaches of rivers to spawn and rear the next generation[66]. Every salmon and steelhead run in Central Valley rivers is either extinct, endangered, or in decline due to the overall habitat destruction and degradation caused by dams.[67] A 1985 California Department of Fish and Game study has indicated that the economic losses due to the declines of salmon, steelhead and striped bass which spawn in the Central Valley tributaries at $116,000,000 per year.[68]

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[66] National Marine Fisheries Service, Southwest Region. June 4, 2009. Biological Opinion And Conference Opinion On The Long-Term Operations Of The Central Valley Project And State Water Project. Page 660. http://swr.ucsd.edu/ocap/NMFS_Biological_and_Conference_Opinion_on_the_Long-Term_Operations_of_the_CVP_and_SWP.pdf.

[67] Friends of the River. 1999. Rivers Reborn: Removing Dams and Restoring Rivers. P 4-16. http://www.friendsoftheriver.org/site/DocServer/RiversReborn.pdf?docID=224&AddInterest=1004.

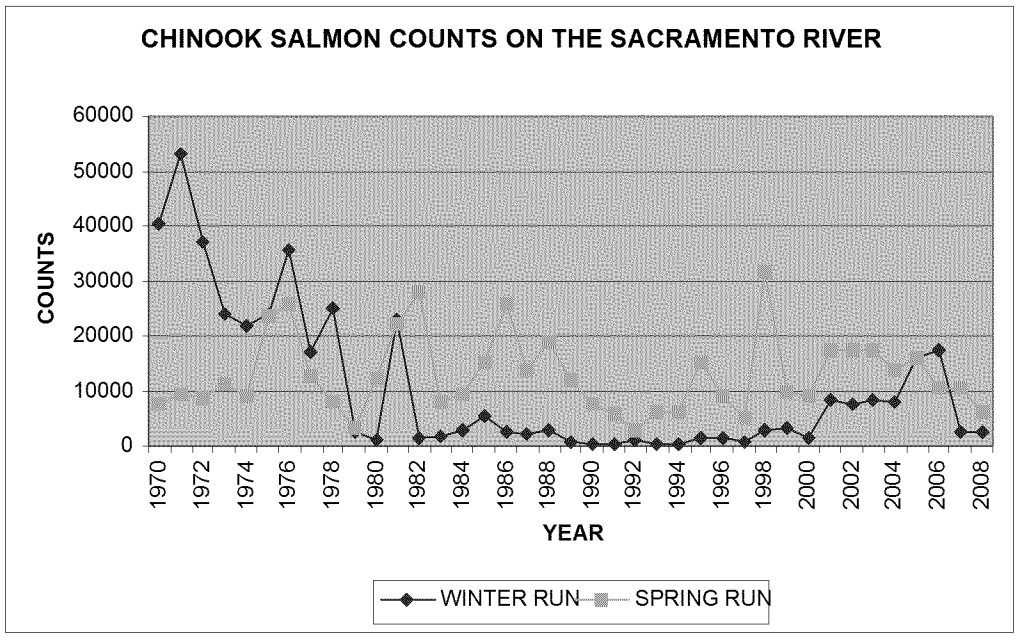
[68] California Department of Fish and Game. 1985. Administrative Report 85-03. http://deltavision.ca.gov/docs/externalvisions/EV8_Allied_Fishing_Group_Vision.pdf

The most serious fishery problem caused by major dams is the blockage of migratory fish passage. Over 95 percent of the historic salmon and steelhead spawning habitat in Central Valley river systems has been eliminated by the construction of large dams on every major river. Fish passage was not a serious consideration in the early part of the last century when most of the major dams were built; there were no Endangered Species Act or National Environmental Policy Act considerations at the time. California Fish and Game Code Section 5937, which mandates that dam operators keep fish in good condition below dams has largely been ignored outside the Mono Basin. The construction of Friant Dam on the San Joaquin River resulted in the extinction of the largest spring-run chinook population in the state. The dam blocked upstream spawning grounds that were known to be the best of the Central Valley rivers. Figure 3 shows the long-term downward trend for Chinook salmon in the Central Valley.

There are numerous solutions available that can provide fish passage around dams. They include construction of fish ladders or upstream fish channels, fish elevators, trap and truck operations, downstream bypasses, removal of smaller fish barriers, and dam removal. All of these techniques have been used at multiple locations with varying success rates. Some of the larger dams on the Columbia River system have been operating fish ladders for many years. While the costs of many of the techniques are substantial, the economics of industries and recreational activities that depend on healthy rivers and fish stocks can justify the investment. The appropriate comparison by which to measure such costs is the sum of agricultural, industrial, and municipal benefits that accrue via the diversion of tens of millions of acre-feet of water annually. Tourism and recreation is now California's largest industry at more than $96 billion annually, and river recreation is a large part of that industry. Recreational fishing generates $1.5 billion annually in retail sales and provides thousands of jobs.[69]

[69] Restore the Delta. April 7, 2009. Press Release. http://archive.constantcontact.com/fs062/1102037578231/archive/1102546423830.html .

**Figure 3**
**Central Valley Chinook Salmon Population**[70]




An important aspect of fish passage above dams is the benefits to Native American Tribes in gaining access to historic cultural resources. These would include: the Winnemen Wintu on the Upper Sacramento, McCloud, and Pit Rivers; the Karuk Tribe on the Klamath; and the California Valley Miwok and Maidu on the American and Feather Rivers.

This plan supports, as a conservation measure, the National Marine Fisheries Service Biological Opinion on CVP and SWP operations that recommends fish passage pilot program plans and analysis for dams connected to the Delta, such as the Sacramento, American and Stanislaus rivers. This plan also encourages the State Water Board to direct the controlling agency of each Central Valley rim dam connected to the Delta to study the feasibility of fish passage for each dam that blocks the passage of listed salmonid species, similar to the NMFS Biological Opinion. [71] Costs should be borne by the dam operators since they are the main beneficiaries of the water storage operations.

Implementation and Funding. No estimates available.

[70] California Department of Fish & Game, Native Anadromous Fish & Watershed Branch. GRANDTAB Data Sets. http://www.calfish.org/IndependentDatasets/CDFGFisheriesBranch/tabid/157/Default.aspx

[71] National Marine Fisheries Service, Southwest Region. June 4, 2009. Biological Opinion And Conference Opinion On The Long-Term Operations Of The Central Valley Project And State Water Project. Page 660. http://swr.ucsd.edu/ocap/NMFS_Biological_and_Conference_Opinion_on_the_Long-Term_Operations_of_the_CVP_and_SWP.pdf

14. **Retain Cold Water For Fish In Reservoirs**.

Salmon, steelhead, and trout need cold water for their existence. As California has grown in size, the dams that have been built on virtually every major river have significantly changed both upstream and downstream river flows; high downstream water temperatures are one of the damaging results. Temperatures of 57-67 degrees Fahrenheit (F) are typically ideal for upstream fish migration and 42-56 degrees (F) are ideal for spawning. Water temperatures over 70 degrees (F) can be lethal to anadromous fish but are common on major rivers in the summer. Some fish populations have been able to adapt and carry on spawning and rearing below these major barriers, though in much smaller numbers than previously. Because farms need the most water in the summer, water behind reservoirs is low by the fall when many of the remaining populations of migrating fish return to the rivers. At that point the lack of cold water is a clear threat to their survival. Many of these fish species are now listed under the federal Endangered Species Act (ESA), and maintaining water temperatures suitable for survival has become a critical part of the actions required under the ESA.

This plan supports, as a conservation measure, the NMFS Biological Opinion recommendations for cold water releases on rivers connected to the Delta, such as the Sacramento, American, and Stanislaus rivers, [72] as well as supporting regulations and legislation to retain sufficient water in other major reservoirs to support fish populations in Delta-connected rivers below dams. The latter would include the Trinity River, so long as the current management plan protections for the Trinity are complied with.

Implementation and Funding. No estimates available.

15. **Fund Agencies With User Fees**.

Agencies that benefit from any new or existing conveyance facilities should pay the full cost of the facilities, including mitigation costs.

Costs of fixing the Delta and Estuary that are related to existing and planned water delivery systems, including related costs of environmental mitigation and restoration, should be financed by the agencies that deliver water and ultimately should be passed on to their retail customers.

Cost responsibilities for land acquisition and restoration of river and Delta floodplains should be distributed 75 percent through a broad-based water use fee (applied to all agencies whose supplies are diverted from a river or the Delta watershed.) and 25 percent through public funds.

[72] National Marine Fisheries Service, Southwest Region. June 4, 2009. Biological Opinion And Conference Opinion On The Long-Term Operations Of The Central Valley Project And State Water Project. Pages 590-620. http://swr.ucsd.edu/ocap/NMFS_Biological_and_Conference_Opinion_on_the_Long-Term_Operations_of_the_CVP_and_SWP.pdf.

Agencies that divert water from the Delta should pay their fair share of maintaining and replacing the Delta levees on which they depend and for protecting water conveyance facilities. The share of Delta levee repair costs assigned to these agencies should reflect the extent to which the levee repairs are essential to ensuring uninterrupted diversions.

In developing funding sources, special care should be taken that low income communities not be impacted by new fees and second, that appropriate set-asides be created to ensure that these communities can access funding needed to comply with new regulations and policies.

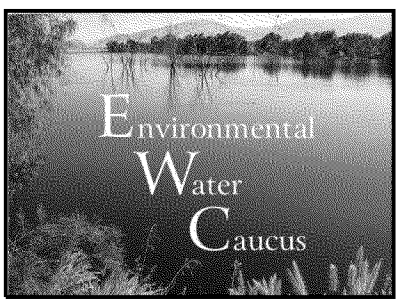
Implementation and Funding. No estimates available.

## IN CONCLUSION

California is at an historic point in the evolution of our water usage. With the onset of global climate change, the natural limits of our water supply have become more obvious and the economics of our solutions are changing drastically. No longer will policy makers be able to advocate for multi-billion dollar bonds that saddle Californians with decades of tax burdens. And no longer will they be able to sell the public on monumental changes to our rivers and bays in the guise of restoring our ecosystems or providing subsidized water to corporate agriculture. The results of decades of those kinds of decisions are now in full view and we know that more effective solutions are available. Intergenerational equity demands better solutions than those of the last century.

Unless we manage our water more efficiently and account for the current and future effects of global climate change, the costs of water to all urban, agricultural, and industrial water users will exceed our ability to provide Californians with reliable, affordable water. The needs of communities of color and the Native American Tribal claims will remain unmet.

The water efficiency and sustainability solutions that are proposed in this report have already proved to be more economical than overtaxing our rivers and bays with more dams and canals. The combination of water efficiency solutions and reduced reliance on the Delta that are recommended in this report obviate the need for increased surface storage and increased conveyance through the Delta. We have shown that water efficiency actions can provide California with the largest increment of future water supply that is currently available to us; the solutions will also provide ample water supplies for population growth, agricultural and industrial growth, and for improving the conditions of our natural landscapes.

The EWC consists of the following member organizations:

AquAlliance
The Bay Institute
Butte Environmental Council
California Coastkeeper Alliance
California Save Our Streams Council
California Sportfishing Protection Alliance
California Striped Bass Association
California Water Impact Network
California Water Research Associates
Citizens Water Watch
Clean Water Action
Desal Response Group
Earth Law Center
Environmental Justice Coalition for Water
Environmental Protection Information Center
Friends of the River
Foothill Conservancy
Food and Water Watch
The Karuk Tribe
Klamath Riverkeeper
Natural Resources Defense Council
Northern California Council Federation of Fly Fishers
Pacific Coast Federation of Fishermen's Associations
Planning and Conservation League
Restore the Delta
Sacramento River Preservation Trust
Save the Bay
Sierra Club California
Sierra Nevada Alliance
Southern California Watershed Alliance
Winnemen Wintu Tribe