
Governor's Advisory Drought Planning Panel

Critical Water Shortage Contingency Plan

December 29, 2000

FORWARD

This contingency plan was prepared in response to the commitment in the CALFED Bay-Delta Program's Record of Decision that the Governor would convene a panel to develop a "contingency plan to reduce the impacts of critical water shortages primarily for agricultural and urban water users". Panel members met four times between late August and December 2000 to hear informational briefings and to develop this plan.

The Panel's charge and its membership are described in Chapter 1 of the plan. Chapters 2 and 3 provide background information on changes in California water management conditions since the last statewide critical water shortage – the drought of 1987-92 – and describe challenges associated with effective water management in times of shortages. Chapter 4 is the heart of the plan, describing Panel members' recommendations for actions that State government could take to reduce the impacts of critical water shortages.

It is important that California prepare for the possibility of water shortages. The State has experienced a series of unusually wet years since the 1987-92 drought. Wet hydrologic conditions cannot be expected to continue indefinitely. Advance planning will improve our ability to respond to water shortages when they do occur.

THOMAS M. HANNIGAN
Chairman, Advisory Drought Planning Panel

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CHAPTER 1

INTRODUCTION AND BACKGROUND

Introduction

Because potential critical water shortages may severely impact the health, welfare and economy of California, advance planning is crucial. The CALFED August 2000 Record of Decision called for the Governor to convene a Panel to develop a contingency plan for reducing impacts of critical water shortages in the next several years. California has experienced a series of unusually wet years since the time of the last statewide critical water shortages – the 1987-92 drought.

These wet conditions cannot be expected to continue indefinitely. California's population has increased by 6 million people since 1987, and substantial quantities of water have been dedicated to environmental protection purposes. The State's water suppliers bear an increased risk of critical shortages until such time as the water supply reliability measures planned in the CALFED ROD are implemented.

The Panel's contingency plan, building upon experience gained from implementation of the Department of Water Resources' 1991-1994 drought water banks, is to identify available resources and funding mechanisms to reduce the impacts of critical water shortages during initial implementation of the CALFED Bay-Delta program. The Panel's charge and its membership are summarized in the accompanying sidebar. The Panel held four meetings between late August and December to hear informational briefings and develop its report.

The Panel's recommended actions are intended to address measures not explicitly contained in the CALFED ROD, or to accelerate implementation of actions not scheduled to be carried out in the early years of CALFED Stage 1.

The Panel does not intend that its recommendations duplicate actions already scheduled for early implementation in the ROD. The goal of the Panel's recommended actions is to reduce the serious health, welfare, and economic impacts that critical water shortages could cause in California.

Resource materials available to the Panel included: the CALFED ROD and Programmatic Environmental Impact Statement/Environmental Impact Report; DWR's July 2000 *Preparing for California's Next Drought, Changes Since 1987-1992*, which describes California water conditions and regulatory, environmental, and physical changes occurring since the last drought; and the May 2000 report of the National Drought Policy Commission. Information from these documents has been summarized in the plan as background and as the basis for identification of challenges that must be addressed in the Panel's contingency plan.

Excerpt from CALFED ROD

CALFED agencies recognize that in the next several years critical water shortages may occur that severely impact the health, welfare and economy of California. To avoid such serious impacts, the Governor has convened a panel, chaired by the Director of DWR, for the purpose of developing a contingency plan to reduce the impacts of critical water shortages primarily for agricultural and urban water users. The plan will identify all available resources (e.g. water transfers, water exchanges, groundwater programs, local partnerships), building upon the experience gained with Governor's Drought Water Bank, to minimize such shortages. The plan also will recommend appropriate funding mechanisms. In addition, CALFED Agencies commit to facilitate transfers of water and expedite regulatory processes consistent with legal requirements. The Governor's Panel will submit the plan to the Governor by December 2000.

GOVERNOR'S ADVISORY DROUGHT PLANNING PANEL

Tom Hannigan, (Panel Chair), Director, California Department of Water Resources
Rich Atwater, CEO/General Manager, Inland Empire Utilities Agency
Don Bransford, Chairman, Northern California Water Association
Senator Jim Costa, Chairman, Agriculture and Water Resources Committee
Assemblyman Richard Dickerson, Vice-Chairman, Water, Parks and Wildlife Committee
Joel Dickson, VP, New Business Development, American States Water Company
Al Dingle, President, Westlands Water District
Jane Dolan, Chairman, Butte County Board of Supervisors
Brent Hastey, Chairman, Yuba County Board of Supervisors
Senator Dave Kelley, Vice-Chairman, Agriculture and Water Resources Committee
Steve LaMar, Chairman, California Building Industry Association Water Resources Task Force
Tom Levy, President, State Water Contractors, Inc.
Assemblyman Mike Machado, Chairman, Water, Parks and Wildlife Committee
Mike Madigan, Director, San Diego County Water Authority
Sunne McPeak, President and CEO, Bay Area Water Council
Jerry Meral, Executive Director, Planning and Conservation League
Marvin Meyers, Director, San Luis Water District
Barry Nelson, Senior Policy Analyst, Natural Resources Defense Council
Phil Pace, Chairman, Metropolitan Water District of Southern California
Frances Spivy-Weber, Executive Director, Mono Lake Committee
Fred Starrh, President, Kern County Water Agency
Kole Upton, Chairman, Friant Water Users Authority
Greg Zlotnick, Chairman, Santa Clara Valley Water District

Background

The CALFED Framework Document, *California's Water Future: A Framework for Action*, was released in June 2000 and outlined actions that CALFED included in its preferred program alternative. The Panel's contingency plan was one of the specific actions identified in the Framework Document. CALFED member agencies signed a record of decision for implementing the preferred alternative on August 28, 2000.

The ROD identifies many actions to improve water supply reliability, described further in Chapter 2. These actions include:

- **Integrated storage investigations program** – a coordinated series of investigations designed to examine storage as a tool for improving water supply reliability.
- **Water transfer program** - development of an effective market that facilitates water transfers and streamlines the approval process while protecting water rights, environmental conditions, and local economic interests.

- **Environmental water account** – water assets to be acquired by CALFED agencies to provide additional water for fishery purposes beyond the regulatory baseline. An average target of 380 taf is outlined in the ROD.
- **Water use efficiency program** – implementation of cost-effective actions to conserve and recycle water, building upon existing programs. Actions include preparing urban water management plans, implementing urban best management practices, and implementing agricultural efficient water management practices.

The focus of the Panel's contingency plan is on recommendations for actions not contained in the CALFED ROD or recommendations to accelerate implementation of actions not scheduled to be carried out in the early years of CALFED's Stage 1, based on the Panel's charge to address critical water shortages within the next several years. Many of the ROD's programs are focused on longer-term water supply reliability options that will not be available in time to address near-term critical water shortages.

The remainder of this chapter provides a brief background on California water supplies and hydrologic conditions potentially associated with critical water shortages. Chapter 2 describes changed water management conditions since California's most recent statewide critical water shortage -- the six-year drought of 1987-1992. Chapter 3 describes the challenges in dealing with critical water shortages given these changed conditions. Chapter 4 presents the Panel's recommendations for actions, to be undertaken in partnerships among CALFED agencies and local agencies, to address critical water shortages.

Water Supply Conditions in California

Water supply conditions in California vary significantly – from year to year, and from place to place. Since California's last drought, the State has experienced unusually wet conditions – five consecutive wet years and one near-average water year. While it is not possible to predict what the next few years' water supply conditions will be, it is unlikely that California will continue to experience such wet conditions.

Surface Water Supplies

California's average annual surface water supply totals about 78 maf, including interstate supplies, principally from the Colorado River. Figure 1-1 shows the distribution of California's average annual precipitation and runoff. An extensive system of storage and conveyance infrastructure has been constructed to respond to the State's imbalance in the location of water supplies and water demands, as shown in Figure 1-2. The federal Central Valley Project and State Water Project are California's largest surface water projects.

Groundwater Supplies

The amount of water stored in California's groundwater basins is far greater than that stored in the State's surface water reservoirs, although only a fraction of these groundwater resources can be economically and practically extracted for use. Figure 1-3 shows major areas of current and potential groundwater development in California. The greatest amounts of groundwater

Figure 1-1

Figure 1-2

Figure 1-3

extraction occur in the Central and Salinas Valleys and in the Southern California coastal plain. Historically, the response to drought conditions has been to increase groundwater pumping. Under average hydrologic conditions, about 30 percent of California's urban and agricultural water needs are supplied by groundwater. This percentage increases in dry years when water users whose surface supplies are reduced turn to groundwater, if available. During most of the last drought, the number of well construction reports filed annually with DWR increased by about 10,000 reports per year.

Predictability of Hydrologic Drought Conditions

Defining when a drought begins is a function of drought impacts to water users. Hydrologic conditions constituting a drought for water users in one location may not constitute a drought for water users in a different part of the state or with a different water supply. Individual water suppliers may use criteria such as rainfall/runoff, amount of water in storage, or expected supply from a water wholesaler to define their water supply conditions. Water suppliers may also use criteria that take into account non-hydrologic factors, such as regulatory actions affecting diversions, facility outages, or water quality constraints.

DWR's July 2000 report described a variety of hydrologic criteria that can serve to classify water supply or drought conditions. The National Drought Policy Commission's May 2000 report stressed the importance of using monitoring programs to identify the potential onset of drought conditions. Data collected by California's Cooperative Snow Surveys program exemplify some of the information available for drought monitoring purposes. Major sources of the raw data available for drought identification or monitoring include DWR, the U.S. Geological Survey, and the National Weather Service.

Hydrologic droughts exceeding three years are relatively rare in Northern California, the source of much of the State's water supply, although it must be remembered that California's period of historical record is only about 100 years. Multi-year droughts within the State's brief historical record include: 1912-13, 1918-20, 1923-24, 1929-34, 1947-50, 1959-61, 1976-77, and 1987-92. The 1929-34 drought established the criteria commonly used in designing storage capacity and yield of large Northern California reservoirs. The 1987-92 drought was notable for its six-year duration and the statewide nature of its impacts.

Impacts of Recent Droughts

During the brief, but severe, 1976-77 drought, 47 of the State's 58 counties declared local states of emergency. In 1977, annual statewide runoff reached its low of record – only 15 maf, or 21 percent of average. The 1976-77 drought served as a wake-up call to water agencies statewide, spurring implementation of a variety of improvements to water supply reliability, including numerous interconnections among urban water systems, new pipelines serving water-short areas, and implementation of water conservation measures.

In contrast, only 23 counties declared local states of emergency during the longer 1987-92 drought. Impacts of the 1987-92 drought and the responses of water agencies to drought conditions are described in DWR's July 2000 report. Water agencies statewide were forced to institute demand reduction programs, including mandatory urban rationing and land fallowing in agricultural areas. In 1991, the single driest year of the drought, the SWP terminated deliveries to agricultural contractors and provided only 10 percent of requested urban deliveries. The CVP reduced agricultural deliveries by 75 percent and urban deliveries by 25 percent. Among large

urban agencies' water development projects, the City and County of San Francisco experienced the greatest reduction in storage, having only about 22 percent of its total system storage capacity left by 1991. Numerous private domestic wells went dry, as did wells supplying small water systems in rural areas. Small water systems' dry wells and dry surface water sources forced water haulage or emergency pipeline construction in Sierra Nevada and North Coast counties. Among large municipalities, Santa Barbara experienced the largest water supply reductions, and was forced to adopt emergency measures including a 14-month ban on lawn watering and temporary pipeline construction to take delivery of a short-term SWP water transfer.

Other impacts of the 1987-92 drought included significant curtailment of water-based recreation, cutting revenues to recreation concessionaires and to the tourism industry. Hydropower generation dropped from 30 percent of the State's electric supply to 12 percent. Drought, exacerbated by pine bark beetle infestations, devastated Sierra Nevada forests and resulted in an estimated loss of eight billion board feet of timber statewide. Populations of Bay-Delta native fish species and the introduced striped bass declined – dramatically in the case of striped bass and the already minimal remaining population of winter-run Chinook salmon. In response to its declining population, the winter-run was listed pursuant to the Endangered Species Act and a captive broodstock program was initiated to preserve the species' gene pool.

The severity of impacts experienced during this six-year drought lead to issuance of a Governor's Executive Order in 1991. Among other things, the Executive Order directed DWR to implement a water purchasing and allocation program to respond to critical water supply needs. State agencies were also directed to set an example of appropriate water conservation practices; some such requirements were established via legislation, as summarized in the following chapter.

DWR operated its drought water bank three times—during 1991 and 1992, then again in 1994, a critically dry year. Figure 1-4 shows locations of bank transactions in 1991 and 1992. DWR purchased 821 taf under 351 short-term agreements in 1991. About 50 percent of the water came from land fallowing, and about 30 percent from groundwater substitution. The remainder of the water came from reservoir storage. In 1992, about 80 percent of the bank's 193 taf of purchases came from groundwater substitution and 20 percent from reservoir storage. No land fallowing contracts were executed in 1992. The Department of Fish and Game, in a program operated in parallel to the drought water bank, used emergency drought relief funding appropriated during the Legislature's 1991-92 extraordinary session to purchase almost 75 taf for fish and wildlife purposes. Most of the water was used for wildlife refuges.

Planning For Critical Water Shortages

Advance planning improves water agencies' ability to respond to critical shortages such as those occurring during the last drought. The recommendations contained in Chapter 4 of this report suggest actions that the State of California could take to help local agencies and others improve their dry year water supply reliability during initial implementation of the CALFED Bay-Delta program. Although the timing of California's next drought or other critical water shortage cannot be predicted, dry conditions are inevitable at some time in the future. Since the last statewide drought, California was fortunate enough to experience a sequence of unusually wet water years. It is unlikely that such wet conditions will persist through the time period needed for implementation of CALFED actions to improve water supply reliability in the long-term.

Figure 1-4

CHAPTER 2

CHANGES IN WATER MANAGEMENT CONDITIONS SINCE 1987-1992 DROUGHT

Introduction

In the relatively short time since the 1987-92 drought, significant changes in California's water management framework have occurred. These changed conditions include changes in regulatory and institutional conditions affecting use of surface water and groundwater, construction of new water supply facilities, legislative changes, and pending implementation of CALFED actions. This chapter describes these changes and discusses their water management implications. Information in this chapter is summarized from two primary sources: DWR's July 2000 drought preparedness report and the CALFED August 2000 Record of Decision.

Changes In Surface Water Management Conditions

Changed surface water management conditions since the 1987-1992 drought have a significant impact on the operational flexibility and water delivery capabilities of the SWP and CVP. Table 2-1 summarizes changes since the last drought. These and other changes are discussed in more detail below.

—TABLE 2-1—
Recent Actions Affecting California Water Supplies

Action	Year	Description
SWRCB Orders WR 90-05 and WR 91-01	1990 and 1991	Water rights orders that modified CVP water rights to incorporate temperature control objectives in Upper Sacramento River.
National Marine Fisheries Service Biological Opinions	1992, 1993, and 1995	Established criteria for operations to protect winter-run Chinook salmon
Public Law 102-575, Title 34	1992	Mandates changes in management of the CVP, particularly for the protection, restoration, and enhancement of fish and wildlife.
Monterey Agreement & Amendments	1994	Modified SWP water contracts to facilitate contractors' management of project and non-project supplies available to them.
SWRCB Decision 1631	1994	Modified water rights for diversions from Mono Lake.
U.S. Fish and Wildlife Service Biological Opinions	1993, 1994, and 1995	Established operational criteria to protect Delta smelt.
Bay-Delta Plan Accord and SWRCB Order WR 95-06	1994 and 1995	Agreement and associated SWRCB order to provide for operations of the CVP and SWP to protect Bay-Delta water quality. Also provided for further evaluation of Bay-Delta operations, which is being pursued under the CALFED process.
NMFS Biological Opinions	1996 and 1997	Established criteria to protect coho salmon and steelhead in coastal streams.
NMFS ESA listing	1999	Spring-run Chinook listing.
USFWS ESA listing	1999	Splittail listing

- In 1992, the National Marine Fisheries Service issued its first biological opinion for winter-run Chinook salmon, then listed as threatened under the Endangered Species Act. NMFS followed with a 1993 long-term biological opinion; winter-run were reclassified to endangered status in 1994. Both biological opinions incorporated changes to CVP operations to provide additional cold water in spawning areas downstream from Shasta Dam, and closures of Delta Cross-Channel gates. The 1993 opinion also provided numerical take limits at Banks and Tracy Pumping Plants, and for further temperature control operations at Lake Shasta. The CVP was required to maintain a minimum Shasta September storage of at least 1.9 maf, except in the driest years. (Shasta storage declined to 0.6 maf during the 1976-77 drought and to 1.3 maf during the 1987-92 drought.)
- The Central Valley Project Improvement Act of 1992 reallocated 800 taf of CVP water supply from project contractors to fishery purposes, plus additional project supply to provide firm water for wildlife refuges. Annual Trinity River instream flows of at least 340 taf were to be provided until a flow study conducted by the U.S. Fish and Wildlife Service was completed, at which time new flow requirements would be established. (The Secretary of Interior signed a ROD establishing new Trinity River flows in December 2000, as described in more detail below). The act directed the Secretary to carry out structural and nonstructural environmental restoration actions, including water acquisition for fishery and wildlife refuge purposes. One completed major structural restoration project is the \$80+ million Shasta Dam Temperature Control Device, which reduces the need to forgo power generation at Shasta to provide cold water for salmon. CVPIA also authorized transfers of project water outside the CVP's service area, subject to specified conditions.
- Delta smelt were listed as threatened in 1993. The primary water management action associated with their listing has been reduction of CVP and SWP exports from the Delta when the smelt are present near the pump intakes and forebays.
- The Monterey Agreement, signed by the Department and SWP contractors in 1994, established principles to be incorporated in contract amendments (the Monterey Amendments) to be offered to the contractors. All but two contractors (Plumas County Flood Control and Water Conservation District and Empire West Side Irrigation District) subsequently accepted the amendments, which are described in detail in Chapter 3. The amendments changed the prior method of allocating water supply deficiencies, which reduced supplies to agricultural contractors before those of urban contractors were cut. Supplies are now allocated among contractors in proportion to their contractual entitlements. The amendments also reduced the SWP's total contractual commitment as part of the transfer of the Kern Water Bank to two SWP contractors, and further provided that 130 taf of agricultural contractors' entitlements could be sold to urban contractors. Contractors are allowed to store project water outside their service area boundaries and to have access to project facilities for wheeling non-project water. The amendments also created a turnback pool for internal annual reallocation of project water among project contractors, and provided dry-year rate relief for agricultural contractors. Implementation of the Monterey Amendments has been the subject of litigation regarding CEQA compliance. In December 2000 the State Supreme Court declined to hear DWR's petition seeking review of lower court decisions, and the case has been returned to Superior Court.
- SWRCB adopted Decision 1631 in 1994, amending the City of Los Angeles' rights to divert from the Mono Lake Basin, in order to increase Mono Lake levels. The decision restricted

diversions from the basin to 16 taf/year until the lake level reached elevation 6391, at which time diversions would be allowed to increase to about 31 taf/year, about one-third of historical diversions. Los Angeles implemented an aggressive water conservation program emphasizing plumbing fixture retrofits—with substantial State financial assistance—to help compensate for the shortfall. The City estimated that it replaced 750,000 toilets during the 1990s. Between 1994 and 1999, the Legislature appropriated \$17.5 million out of an authorized \$36 million to help Los Angeles implement demand reduction measures.

- The Bay-Delta Accord, executed as a three-year agreement in 1994 and then subsequently extended, set forth the State-federal CALFED Bay-Delta Program’s three chief activities—establishing water quality standards, coordinating operations of the CVP and SWP to meet water quality and environmental protection requirements, and developing a long-term solution to Delta problems. In 1995, SWRCB adopted a water quality control plan incorporating concepts contained in the Accord, followed by an interim order. Order WR 95-6 provided that the CVP and SWP would meet Bay-Delta Accord standards while SWRCB developed a new water right decision to apportion the responsibility for meeting standards among all users of Delta water. SWRCB’s process to develop a new decision remains ongoing. Table 2-2 summarizes the major changes from the former D-1485 to WR 95-6.

—TABLE 2-2—

Major Changes in Delta Operations Criteria between D-1485 and SWRCB Order 95-06

Delta Operations Criteria	Primary Changes
Water Year Classification	D-1485: Sacramento River Index WR 95-06: 40-30-30 Index
Sacramento River Flows	Flows at Rio Vista are higher from September to December under WR 95-06
San Joaquin River Flows	Minimum flows and pulse flows are included under WR 95-06
Vernalis Salinity Requirement	Salinity requirements are more restrictive during the irrigation season and less restrictive during other months under WR 95-06
Delta Outflow	Outflow criteria required to maintain 2 parts per thousand salinity under many precipitation conditions from February through June under WR 95-06.
Export Limits	A 35% - 65% export to Delta inflow ratio from April 15 to May 15 under WR 95-06

- CALFED released a first draft programmatic environmental impact report/environmental impact statement for a long-term Delta solution in 1998, followed by a redraft in 1999. The record of decision was signed on August 28, 2000, marking the end of CALFED’s planning phase and a transition to initial implementation of some CALFED actions, including its environmental restoration program. A discussion of pending CALFED implementation actions is included at the end of this chapter. Since 1994, the CALFED Operations Group has been serving as the forum for coordinating day-to-day CVP and SWP operations with requirements for protecting listed species. Decisions have been based on use of near-real-time monitoring data to identify locations of listed migratory and resident species in the Delta and upstream rivers, together with take data at the pumping plants.

- A 1996 Federal Energy Regulatory Commission settlement agreement among the City and County of San Francisco, Modesto Irrigation District, Turlock Irrigation District, DFG, and others provided for increased instream flows in the Tuolumne River. The agreement reduces water supplies available to MID and TID. A 1998 FERC settlement agreement among East Bay Municipal Utility District, DFG, and USFWS similarly provided for increased instream flows in the Mokelumne River. According to EBMUD, its reduced Mokelumne River supplies correspond to a supplemental water need of about 180 taf per year.
- In 1996 and 1997, NMFS listed coho salmon in two coastal areas as threatened. In 1997, NMFS listed two coastal steelhead populations as threatened and one as endangered, followed by 1998 listing of Central Valley steelhead as threatened. In 1999, Central Valley spring-run Chinook and coastal Chinook were listed as threatened. USFWS listed Sacramento splittail as threatened in 1999, but a July 2000 federal district court decision found that listing to be arbitrary and capricious. The court subsequently ordered that USFWS re-examine the listing decision, during which time period the CVP and SWP were not to bear any increased reductions in water deliveries resulting from splittail listing.
- In May 2000, the Colorado River Board released its latest draft of a plan outlining steps to reduce California's use of river water to the State's basic 4.4 maf apportionment, in years when surplus river water is not available. California water users have historically exceeded the basic apportionment by as much as 900 taf due to availability of surplus water and Arizona's and Nevada's unused apportionments. MWD is the most junior California water user; if the interstate apportionments enforced in a year when surplus water was not available, the Colorado River Aqueduct would be only half full. Work to complete California's draft Colorado River Water Use Plan is continuing. The plan is based on the concept that the CRA will be kept full by transfers of conserved agricultural water (such as the Imperial Irrigation District/SDCWA transfer), by water saved through lining the All American and Coachella Canals, by implementing new groundwater storage projects, and by implementing interim Lake Mead operations criteria. The groundwater storage projects would take surplus river water, when available, and recharge it in groundwater basins near the aqueduct. The draft plan will be finalized subsequent to the completion of the environmental reviews and execution of agreements associated with the plan.
- In December 2000, the Secretary of Interior signed a ROD establishing higher instream flows in the Trinity River. From 1981 to 1990, USBR provided annual instream flows of 287 taf in drought years and 340 taf in wet years, corresponding to roughly 25 percent of the river's average annual flow. In 1991, the Secretary directed that flows be increased to 340 taf annually, the amount subsequently required by CVPIA pending completion of USFWS' instream flow studies. The new ROD establishes instream flows ranging from 369 taf to 815 taf, depending on water year type, and results in an estimated 48 percent of average annual river flow remaining in the river. Exports of Trinity River water to the CVP service area will be correspondingly reduced.

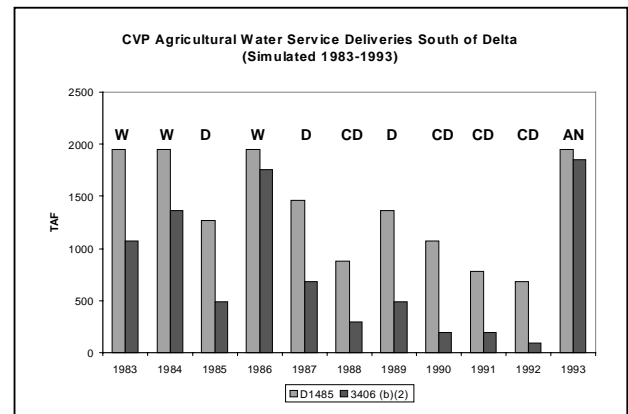
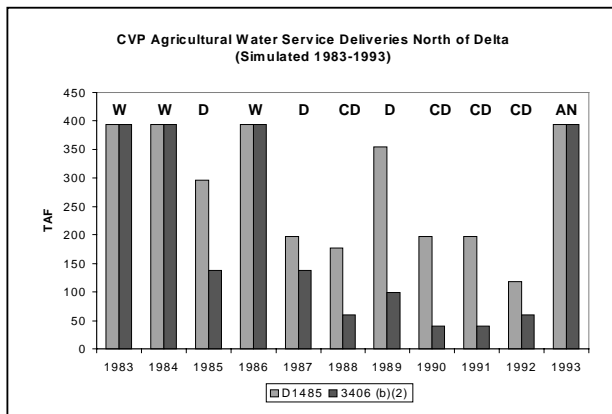
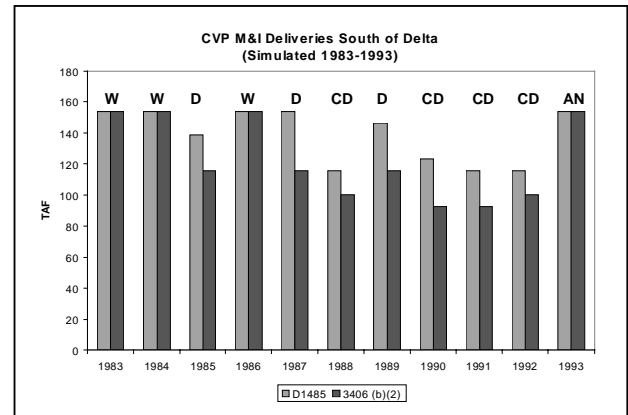
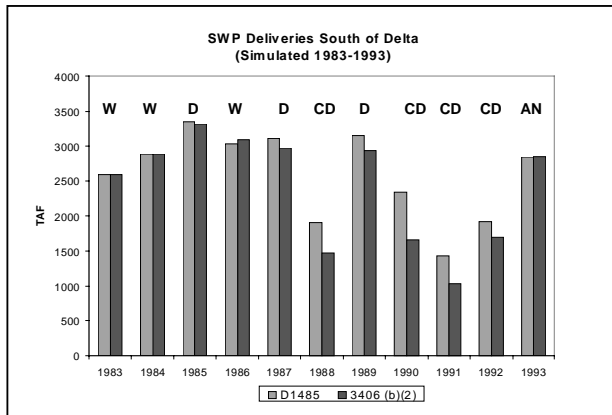
Many of these changes in laws, regulations, and institutional conditions reduce water supplies historically available to agricultural and urban water users, as detailed in the accompanying sidebar. The loss of historically available Colorado River water will further reduce supplies, unless actions now in planning are implemented.

Estimated Water Cost of Changed Conditions

DWR and USBR conducted a joint modeling effort in February 2000 to estimate changes in SWP and CVP deliveries due to changes in regulatory conditions since the last drought. The analysis was based on the 1983 – 1993 hydrologic period, which includes wet years and the 1987 - 1992 drought. Two scenarios were developed to compare before and after conditions. Both scenarios assumed existing land use, implementation of the winter-run salmon biological opinion, and minimum in-stream fish flows of 340,000 acre-feet every year for the Trinity River. The before scenario assumed Delta operations under D-1485. The after scenario assumed implementation of SWRCB Order 95-06 (based on the Bay-Delta Accord) and CVPIA (including Section 3406(b)(2) for the Anadromous Fish Restoration Program). The after scenario did not include a quantitative analysis of the CALFED ROD (including the Environmental Water Account) or changes in exports due to ESA take limits.

The comparison of the before and after scenarios is only a simulation and may overestimate or underestimate actual changes in deliveries, due to real-time actions that cannot be modeled. However, the overall results indicated an average annual reduction in total SWP and CVP deliveries of 900,000 acre-feet over the 1983 - 1993 period. During the drought, there was a reduction of 1,200,000 acre-feet in average annual deliveries. The largest single year impact was a total delivery reduction of 1,800,000 acre-feet to SWP and CVP water contractors. There were no changes in deliveries to CVP water rights settlement contractors.

The year-to-year comparison in before and after conditions is shown in the accompanying figures. Deliveries to CVP agricultural and municipal and industrial water contractors are shown separately, because the CVP uses different deficiency provisions for the two types of users. The SWP formerly used different deficiency provisions for agricultural and urban contractors, but under the Monterey Amendments, contractors now share shortages equally.



Water Year Type

W: Wet

D: Dry

CD: Critically Dry

AN: Above Normal

The long-term outcome of the CALFED Bay-Delta process is difficult to predict at this time. It is conceivable that fishery restoration and enhancement actions planned in the CALFED program, together with those mandated by CVPIA, could improve fishery conditions over the long-term to the point that water users would not experience further water costs due to environmental regulatory actions. In the near-term, CALFED's proposed environmental water purchase program is intended to lessen the impacts of fishery-related operational decisions on CVP and SWP water deliveries. As described later in this chapter, the CALFED ROD commits that in the first four years of CALFED Stage 1 there will be no reductions in CVP and SWP Delta exports beyond baseline regulatory levels due to fishery protection measures.

A significant CALFED-related uncertainty with regard to drought preparedness is the process for coordinating CVP and SWP operations in the Delta with environmental protection requirements (see sidebar). Since its inception, the CALFED Operations Group has experienced a series of unprecedented wet years. Its ability to simultaneously manage water and fishery goals has not been tested in a time of water shortage. Wet conditions have allowed CALFED to rely on short-term adaptive management techniques for fishery purposes, an approach not consistent with drought water operations, when multi-year operating plans for conserving reservoir storage are necessary.

Changes In Groundwater Management Conditions

Historically, methods for local agency management of groundwater resources were limited to basin adjudications through the court system and legislative authorizations for individual special districts. Two additional methods have become available. The 1992 enactment of AB 3030 (Water Code Section 10750 *et seq.*) provided broad general authority for local agencies to adopt groundwater management plans and to impose assessments to cover the cost of implementing the plans. To date, more than 150 agencies have adopted AB 3030 groundwater management plans. Quantifying the number of plans adopted is somewhat uncertain, since there is no requirement in the statute that agencies adopting plans file copies of those plans with DWR or SWRCB. The CALFED ROD commits CALFED to work with local agencies and stakeholders to “develop legislation to strengthen AB 3030 and provide technical and financial assistance”.

San Luis Reservoir Drawdown

In three of the last four years (under generally wet hydrologic conditions) operations forecasts for San Luis Reservoir, a joint-use facility of the CVP and SWP, have projected that late summer storage in the 2 maf reservoir would drop below about 300 taf. The steep projected drawdowns were due to reduced Delta exports to prevent take of Delta smelt at Banks and Tracy Pumping Plants. Projected drawdowns of this magnitude create operational problems for CVP and SWP contractors.

Algal blooms occur when the reservoir reaches the 300 taf storage level. The blooms create taste and odor problems for Santa Clara Valley Water District customers, and could shut down SCVWD's treatment plants. Spikes in service area water quality additionally create problems for local high-technology manufacturing facilities. SCVWD's raw water intake is located at the 100 taf storage level.

A potential interruption in CVP deliveries during peak summer demand periods requires that SCVWD take contingency actions such as terminating groundwater recharge and maximizing deliveries from more costly sources. The large projected drawdowns have to date been averted through a combination of actions by the CVP, SWP, and SWP contractors, and by cool weather conditions that lessened peak demands.

The San Luis Reservoir low-point also creates challenges for operation of groundwater banking projects in Kern County. Roughly 3 maf of groundwater is currently banked in the Central Valley portion of the county, about 70 percent of which is earmarked for local interests. During drought conditions, the capacity of groundwater banking projects' recovery wells is insufficient to meet service area peak demands. Historically, water has been borrowed from San Luis storage to meet peak demands, and has then been repaid over a three to five month period, after the peak period has passed.

The 1994 *Baldwin v. Tehama* decision affirmed the rights of cities and counties to adopt local ordinances controlling groundwater extractions, encouraging other counties to consider this approach. The numerous groundwater substitution transfers implemented as part of the Department's 1991 and 1992 drought water banks served to heighten local interest in use of county ordinances to control groundwater exports. County groundwater management ordinances adopted in 1999 increased the percentage of California's counties with such ordinances to almost 30 percent. Most of the ordinances post-date the last drought. The majority of county ordinances regulate, among other things, groundwater exports from a county, typically by requiring a conditional use permit before export can occur. Permit issuance may be conditioned on findings that export will not result in groundwater overdraft, degrade groundwater quality, or otherwise impact local groundwater resources. Table 2-3 provides a summary of current county groundwater management ordinances.

—TABLE 2-3—

Counties with Groundwater Management Ordinances

County	Year Enacted or Amended	Restriction on Groundwater Exports From County*	Comments
Butte	1996	yes	
Colusa	1998	yes	
Fresno	2000	yes	
Glenn	2000	no	No export restrictions as long as local basin management objectives are met.
Imperial	1998	yes	
Inyo	1998	yes	
Kern	1998	yes	
Lake	1999	yes	
Madera	2000	yes	
Napa	1999	no	
Sacramento	1985	no	
San Benito	1995	yes	No groundwater to be exported
San Diego	1991	no	
San Joaquin	1996	yes	
Shasta	1998	yes	
Tehama	1994	yes	Mining of groundwater for export is prohibited. Permit required for use off-parcel.
Yolo	1996	yes	

* Unless otherwise indicated a conditional use permit is required for groundwater export.

Changes In Water Supply Facilities

California's extensive system of water supply infrastructure helps reduce drought impacts, by providing multi-year storage of water supplies and facilitating water transfers and exchanges. Most of California's major urban and agricultural production areas—with the exception of the Salinas Valley—are within reach of a regional conveyance facility or natural waterway that would provide access for water transfers. Table 2-4 shows major conveyance facilities constructed or under construction since the last drought. DWR's Coastal Aqueduct brings a new supply of imported SWP water into the Santa Barbara area. Coastal Aqueduct deliveries began in 1997. Mojave Water Agency's two new pipelines convey SWP supplies into parts of its service area previously dependent entirely on limited groundwater resources. MWA additionally augmented its SWP supplies by purchasing 25 taf of entitlement from KCWA, pursuant to Monterey Amendment provisions. When completed in 2004, MWD's Inland Feeder pipeline will help improve water quality in parts of its service area.

—TABLE 2-4—

Large-Scale Conveyance Facilities Constructed Since the Last Drought

Facility	Agency	Length (miles)	Maximum Capacity (cfs)
Coastal Branch Aqueduct	Department of Water Resources	100	100
Eastside Reservoir Pipeline	Metropolitan Water District of Southern California	8	1,000
East Branch Enlargement	Department of Water Resources	100	2,100 (this phase increased existing capacity by approximately 750 cfs)
Mojave River Pipeline	Mojave Water Agency	70	94
Old River Pipeline (Los Vaqueros Project)	Contra Costa Water District	20	400
East Branch Extension (under construction)	Department of Water Resources	14	104
Inland Feeder Project (under construction)	Metropolitan Water District of Southern California	44	1,000
Morongo Basin Pipeline	Mojave Water Agency	71	100
New Melones Water Conveyance Project (Farmington Canal)	Stockton East Water District and Central San Joaquin Water Conservation District	21	500

Two large reservoirs designed to improve water supply reliability were constructed since the last drought—MWD's 800 taf Diamond Valley Lake and CCWD's 100 taf Los Vaqueros Reservoir. Both reservoirs are offstream storage facilities that provide emergency water supplies in or near the agencies' service areas, in the event that an earthquake or other natural disaster makes the agencies' imported supplies unavailable. Half the capacity of MWD's Diamond Valley Lake is planned to be reserved for emergency storage. Initial filling of Diamond Valley began in late 1999.

There has been an expansion in groundwater recharge/storage capacity since the last drought. Figure 2-1 shows some of the larger groundwater recharge/storage projects operating in California today; the projects are described in Table 2-5. Projects becoming fully operational since the last drought are those operated by SWSD, Arvin-Edison Water Storage District, Kern Water Bank Authority, MWA, and Calleguas Municipal Water District. These new projects rely either wholly or in part on recharge supplies exported from the Delta. Projects' operations are thus subject to Delta export restrictions as well as to the availability of conveyance capacity. If water transfers provide a component of recharge supplies, availability of SWP conveyance capacity becomes a limiting factor on the projects' operations.

—TABLE 2-5—

Examples of Groundwater Storage Projects

Agency and Project Location	Comments
Alameda County Water District Niles Cone, Alameda County	Seawater intrusion management and conjunctive use. District recharges local runoff and imported surface supplies from its SWP 42 taf annual contractual entitlement. Average annual recharge of 25 taf.
Arvin Edison Water Storage District Kern County	A 350 taf banking program is being developed with MWD. Estimated extraction capability is 40-75 taf/year.
Calleguas Municipal Water District Las Posas Basin, Ventura County	Uses injection wells to recharge its imported MWD supplies. Maximum storage capacity of 300 taf. At full implementation, maximum annual extraction rate estimated to be 72 taf. Providing local emergency storage is a major project purpose.
City of Bakersfield Kern River Fan Area, Kern County	Initial operation of 2,800-acre recharge facility began in 1978. City has rights to Kern River water, and long-term contracts with three water agencies, who store and extract water in coordination with the city.
Coachella Valley Water District Upper Coachella Valley, Whitewater River Channel Area	Recharge from local Whitewater River supplies and from MWD's imported Colorado River Aqueduct water exchanged for SWP contractual entitlements of CVWD and Desert Water Agency.
Kern Water Bank Authority Kern River Fan Area, Kern County	6,800 acres of recharge basins. The Authority is a joint powers agency which operates the project on behalf of local water agencies. Recharge supplies may be local surface water or imported supplies.
Los Angeles County Department of Public Works, Los Angeles River and San Gabriel River watersheds, Los Angeles County	Extensive recharge facilities employing about 2,400 acres of spreading areas, and injection wells at three seawater intrusion barriers (Alamitos, Dominguez Gap, and West Coast). County operates the river systems for the dual purpose of flood control and groundwater recharge, and also recharges imported and recycled water provided by others.
Monterey County Water Resources Agency Salinas River Valley, Monterey County	Releases from MCWRA's Nacimiento and San Antonio Reservoirs are managed to provide recharge for upper valley. MCWRA distributes recycled water produced by the Monterey Regional Water Pollution Control Agency for in-lieu recharge in the lower valley, to help reduce seawater intrusion. MCWRA's 45-mile distribution system can convey 19.5 taf of recycled water.
Mojave Water Agency Mojave River Basin, San Bernardino County	Basin has been adjudicated by court. The ephemeral Mojave River is the only local surface supply. To reduce overdraft, MWA's two new 71-mile pipelines import SWP supplies for recharge in spreading areas in the river channel. MWA's initial SWP contractual entitlement of 50.8 taf annually was augmented by the 1997 purchase of an additional 25 taf of annual entitlement.

—TABLE 2-5—

Examples of Groundwater Storage Projects

Agency and Project Location	Comments
Pioneer Project, Kern County Water Agency Kern County	Recharge project with 1,200 acres of ponds capable of recharging 146 taf per year. Annual recovery capacity of 98 taf. Estimated storage of 400 taf. Project began operation in 1995.
Orange County Water District Santa River Watershed, Orange and Riverside Counties	Recharges Santa Ana River water regulated at Prado Dam, also recharges recycled water. Operates series of recharge basins along lower river and two seawater intrusion barriers. One barrier is jointly operated with Los Angeles County. Typically recharges about 300 taf annually.
Santa Clara Valley Water District Santa Clara County	District formed in 1929 to combat declining groundwater levels and associated land subsidence. Has 20 recharge basins covering about 390 acres, and also recharges in stream channels. District typically recharges over 100 taf annually, with a combination of local and imported supplies. Estimated operational storage is 550 taf.
Semitropic Water Storage District Kern County	Banking (in-lieu recharge) program with 1 maf storage capacity. Banking partners include MWD (350 taf), Santa Clara Valley WD (350 taf), Alameda County WD (50 taf), Zone 7 Water Agency (65 taf), and Vidler Water Company (185 taf).
United Water Conservation District Santa Clara River Watershed, Ventura County	Operates Lake Piru on Piru Creek and Freeman Diversion Dam on the Santa Clara River in conjunction with spreading areas at Saticoy, El Rio, and Piru.
Zone 7 of Alameda County Water Conservation and Flood Control District Alameda County	Recharges imported SWP water (46 taf annual contractual entitlement) in local stream channels.

The 1987-92 drought enhanced local agency interest in constructing water recycling projects. The increased interest, combined with availability of substantial federal funding through PL 102-575 and PL 104-266, is being reflected in plans to implement projects of regional scale in the State's densely urbanized coastal areas. Accurate data on the statewide increase in new water supplies from recycling since 1990 are not available, but an order of magnitude value would be in the vicinity of 100 taf. Results of a survey of 1995-level recycled water use performed for the Department indicated that agricultural or landscape irrigation amounted to 49 percent of statewide use, and that groundwater recharge amounted to 27 percent.

Changes In Environmental Conditions Affecting Water Management

CALFED's ecosystem restoration program, planned at about \$1 billion of expenditures during Stage 1, is intended to help recover the populations of Bay-Delta fish species whose ESA listings have complicated water project operations. As previously indicated in Table 2-1, several fish species having significant impact on water management decisions – winter-run Chinook salmon, Delta smelt, coho salmon, steelhead trout, spring-run Chinook salmon, and Sacramento splittail – were listed under the federal ESA or had a new ESA biological opinion issued since the last drought. Figure 2-2 provides historical abundance data compiled via the Interagency Ecological Program for some Bay-Delta resident or migratory species.

Figure 2-1

Figure 2-2

The estimated water costs associated with increased dedications of water for environmental purposes were described earlier in the section on changed surface water management conditions. Those water costs did not take into account reductions in CVP and SWP deliveries due ESA take limits for listed fish species, because the inherent nature of the take limits prevents their being incorporated in the operations models used to simulate project operations. Take limits for anadromous fish migrating through the Bay-Delta system and for resident Delta species constitute significant constraints to CVP and SWP operations during some times of the year, as illustrated by the San Luis Reservoir drawdown problems described earlier. From a water operations standpoint, the take limits create uncertainties. The timing and duration of the presence of listed fish species near the CVP and SWP intakes cannot be predicted in advance, and hence do not permit quantification of operational modifications and impacts. Challenges associated with operating the projects under today's regulatory conditions are discussed in more detail in Chapter 3.

Another complicating factor in Bay-Delta fishery management is the continued introduction of non-native aquatic species into the estuary, and their impact on native fish species of concern. Most bottom-dwelling invertebrates now inhabiting the Bay-Delta have been introduced from other estuaries. CALFED has estimated that a new introduced species is identified in the Bay-Delta every 15 weeks. The magnitude of introduced species impacts was graphically demonstrated in 1998, when tens of thousands of Chinese mitten crabs per day clogged fish salvage facilities at the CVP and SWP pumping plants. CALFED's ecosystem restoration program contains an invasive species element, planned to include prevention of new introductions, control of existing species, and eradication where desirable and feasible. Recent State and federal ballast water management legislation should help reduce the number of new introductions.

Changes In Legislation Affecting Water Management

Public interest in droughts fosters heightened awareness of water supply reliability issues in the Legislature. More than 50 drought-related legislative proposals were introduced during the severe, but brief 1976-77 drought. About one-third of these eventually became law. Similar activity on drought-related legislative proposals was observed during the 1987-92 drought.

Selected drought or water supply reliability legislation from the 1987-92 drought is summarized below, followed by a summary of the proposed State Drought Emergency Relief and Assistance Act of 1991. The Legislature took action on the provisions contained in this proposal during an extraordinary session held in 1991-92.

Drought or Water Supply Reliability Legislation

- Various technical and clarifying changes were made to Water Code provisions governing temporary and long-term water transfers.
- The use of potable water for specified non-potable purposes was declared to be a waste or unreasonable use of water if suitable, cost-effective reclaimed water supplies were available. Several measures expanding the types of applicable non-potable purposes were enacted.
- Leases of water for up to five years, with specified limitations, were exempted from SWRCB jurisdiction over water transfers. (Chapter 847-91).

- Groundwater substitution transfers were explicitly authorized; related findings were made. (Chapter 779-92).
- The Water Conservation in Landscaping Act directed the Department to draft and adopt a model water efficient landscape ordinance by July 1992. Local agencies not adopting their own ordinances by January 1993 were required to begin enforcement of the model ordinance as of that date. (Chapter 1145-90).
- The Agricultural Water Suppliers Efficient Management Practices Act required the Department to establish an advisory committee to review efficient agricultural water management practices, and to offer assistance to agricultural water suppliers seeking improved efficiencies. (Chapter 739-90).
- The Water Recycling Act of 1991 set a statewide goal of recycling 700 taf/year by 2000 and 1 maf/year by 2010. (Chapter 187-91).
- The Agricultural Water Conservation and Management Act of 1992 authorized agricultural water suppliers to institute water conservation or efficient water management programs. (Chapter 184-91).
- DWR was required to develop standards for installation of graywater systems in residential buildings. (Chapter 226-92).
- Effective January 1992, water purveyors were required to meter new connections. (Chapter 407-91).
- Caltrans was required to implement drought-resistant freeway landscaping, and to allow local agencies to place recycled water pipelines in highway rights-of-way. Another measure urged the Department of General Services to use drought resistant plants in new landscaping.
- The Urban Water Management and Planning Act, in effect since 1983, was amended in multiple sessions. Amendments in 1991 required water suppliers to estimate available water supplies at the end of one, two, and three years, and to develop contingency plans for shortages of up to 50 percent.
- DWR and DFG were directed to submit various reports to the Legislature describing water supply availability and drought-related water needs for fish and wildlife.

Proposed State Drought Emergency Relief and Assistance Act of 1991

The Governor's Drought Action Team, established by Executive Order in 1991, supported introduction of this legislative proposal to enhance the State's ability to respond to drought conditions and to provide funding for local assistance activities. As proposed, the measure included the following provisions.

- Appropriate \$34.8 million from the General Fund to DWR for financial assistance to local water suppliers for emergency drought-relief water supply, technical water conservation assistance, and operation of DWR's Drought Information Center. Would also secure legislative approval of projects potentially eligible for funding from 1988 water conservation bond monies (legislative approval of projects eligible for 1988 bond funding enacted as Extraordinary Session Chapter 10-91).

- Authorize DWR to obtain short-term commercial financing, backed by State Water Project revenues, to fund drought-relief measures for SWP contractors (enacted as Extraordinary Session Chapter 5-91).
- Give the governing body of a water supplier explicit authority to enter into contracts with the drought water bank or with other water suppliers for transfer of water outside the service area of the water supplier (enacted as Extraordinary Session Chapter 1-91).
- Declare that no temporary transfer of water under any provision of law for drought relief in 1991 or 1992 would affect any water rights (enacted as Extraordinary Session Chapter 2-91).
- Authorize water suppliers to contract with and pay their customers for water when customers voluntarily reduce or eliminate use of water (enacted as Extraordinary Session Chapter 3-91).
- Appropriate \$1 million from the General Fund to SWRCB for expedited and expanded efforts to process petitions for temporary changes to water rights to accommodate drought-relief water transfers.
- Appropriate \$10 million from the General Fund to SWRCB for financial assistance to local water suppliers for water recycling projects that could be completed by June 30, 1992 (failed passage).
- Appropriate \$24.2 million from the General Fund to DFG to maintain and protect populations of fish and wildlife and offset revenue losses. Priority would be placed on threatened and endangered species (as enacted, appropriated \$16.38 million.).
- Appropriate \$1.2 million from the General Fund to the Department of Health Services for augmentation of the Emergency Clean Water Grant Fund.
- Appropriate \$2.6 million from the General Fund to the California Conservation Corps to increase corps membership by 300 to assist state agencies with drought-relief activities (as enacted, appropriated \$2.29 million).
- Appropriate \$33.6 million from the General Fund to the Department of Forestry and Fire Protection for increased fire protection activities and for capital outlay purposes involving installation or rehabilitation of wells and pipelines to restore water supplies to fire stations and conservation camps (failed passage).

Other Changes

Population

California's population has increased by more than 6 million people since 1987, the first year of the last drought. The Department of Finance projects that California's population will increase by almost 30 percent between 2000 and 2020, with the population increasing from 35 million to 45 million. Regions expected to have the highest growth rates over the next 20 years are the Inland Empire, Central Valley, and Sierra Nevada foothills.

According to DOF, California's population growth is shifting from the State's densely urbanized coastal areas to more rural inland regions. Urban per capita water use is higher in the State's

inland regions than it is in coastal areas, reflecting higher landscape water use due to warmer and dryer climatic conditions. Past drought experience demonstrated that genuine health and safety problems (running out of water for drinking, sanitation, and fire fighting) are most likely to occur in small, rural communities relying on marginal water sources, and for individual rural homeowners who rely on groundwater.

Acreage of Permanent Plantings

Since the 1987-1992 drought, the acreage of permanent plantings has increased in response to recent market conditions favoring production of grapes, almonds, and pistachios. From a water shortage planning perspective, two classes of permanent plantings stand out -- vineyards planted in areas historically having limited agricultural water supplies, and permanent plantings in the San Joaquin Valley. Vineyard acreage in Amador and San Luis Obispo Counties, for example, is up by 36-37 percent since the last drought. Agricultural water users in the San Joaquin Valley rely significantly on Delta exports and on overdrafted groundwater basins. The San Joaquin Valley is also the area experiencing the greatest increase in acreage of permanent plantings since the last drought-- more than 230,000 acres. Much of this increase has occurred on the Westside, within the water-short CVP Delta export service area. Growers have traditionally fallowed row crop and field crop plantings during times of water scarcity. Fallowing permanent plantings would normally be a grower's action of last resort, due to the resultant loss of the capital investments associated with these plantings.

Water Conservation Programs

Urban and agricultural water suppliers have continued to implement water conservation programs. More than 200 urban water suppliers have signed a memorandum of understanding obligating themselves to implement specified best management practices, unless a cost-benefit analysis shows individual BMPs to not be cost effective, or unless there is a legal barrier to implementation. Urban BMPs include actions such as residential water audit programs, residential plumbing retrofits, system water audits, leak detection programs, and metering. Agricultural water agencies which collectively serve more than three million acres of irrigated lands have signed an MOU to implement specified efficient water management practices, based on their evaluation of the benefits and cost-effectiveness of each practice. As described in the following section, CALFED program implementation will include implementation of demand reduction measures beyond those covered in these existing MOUs, which essentially constitute a base level of CALFED water use efficiency.

To the extent that demand reduction programs implemented in recent years have made permanent reductions in water use by, for example, retrofitting plumbing fixtures or installing low water use landscaping, the measures have lessened agencies' ability to impose rationing during droughts without creating significant impacts to their customers. Several Panel members noted that the impact of demand hardening in reducing water agencies' flexibility to respond to water shortages must be recognized. For example, the extensive plumbing retrofit program implemented by the City of Los Angeles has helped the city maintain reductions in per capita water use it achieved during the last drought. However, these permanent reductions in water use will make it more difficult for the city to duplicate the mandatory conservation savings it achieved as a drought response measure during 1987-92.

Electric Utility Deregulation

Deregulation of electric utilities in California has created substantial upheaval in the State's power market. Adding dry hydrologic conditions to this situation would exacerbate the present risks of power outages. Hydroelectric power production would decrease, and power usage could increase as a result of the increased groundwater extraction normally occurring during dry periods. In today's deregulated market, power costs can be an increasingly large component of the costs of conveying water – whether SWP water or non-project water – via the California Aqueduct to Southern California.

Pending CALFED Implementation Actions

The August 28, 2000 signing of the CALFED ROD marked the beginning of implementation of the 30-year program. The ROD details implementation actions during Stage 1 (the first 7 years of the implementation). The preferred program alternative includes many tools to improve water supply reliability and provide for ecosystem restoration. The following primary tools are included in the preferred alternative.

- Water use efficiency program (agricultural, urban, and wetland water conservation and water recycling)
- Water transfer program
- Conveyance, including South Delta improvements
- Surface and groundwater storage
- Operational strategies, such as real-time diversion management through use of the Environmental Water Account

Other CALFED tools can also provide water supply reliability benefits. These include the watershed program, water quality program, and real-time monitoring through the science program. Table 2-6 summarizes Stage 1 implementation actions.

CALFED's goals for water supply reliability include:

- Increase the utility of available water supplies (making water suitable for more uses and reuses).
- Improve access to existing or new water supplies, in an economically efficient manner, for environmental, urban and agricultural beneficial uses.
- Improve flexibility of managing water supply and demand in order to reduce conflicts between beneficial uses, improve access to water supplies, and decrease system vulnerability.

Many of the CALFED actions require local partnerships. All actions require coordination and are influenced by ongoing local efforts. For example, signatories to the urban water conservation MOU must consider BMPs and implement those that meet certain criteria. These actions have a direct influence on CALFED's water use efficiency program.

—TABLE 2-6—
CALFED ROD Major Implementation Actions

Programs	Action
Governance	CALFED's August 28, 2000, Implementation MOU is the current mechanism for CALFED program implementation. The ROD contemplates that CALFED agencies will seek State and federal legislation to establish a permanent joint State-federal commission. No date is specified.
Ecosystem Restoration	<p>Numerous site-specific projects and general programs are listed in the ROD. Those with identified target dates include:</p> <ul style="list-style-type: none"> ➤ Establish 8,000 to 12,000 acres of "wildlife friendly agricultural lands" in the area of the Delta, San Pablo & Suisun Bays, Suisun Marsh, and Yolo Bypass during Stage 1. ➤ Determine scope and feasibility of restoring Frank's Tract habitat by 2002, and begin implementation by end of Stage 1. ➤ Purchase up to 100 taf/year for salmon habitat in upstream tributaries by end of Stage 1. ➤ Acquire easements on, or purchases of, 15,000 acres of Sacramento River meander corridor lands by end of Stage 1. ➤ Assess need for additional fish contamination monitoring in Bay-Delta watershed and respond as needed by end of Stage 1. ➤ Finalize total maximum daily loads for constituents causing low dissolved oxygen in the San Joaquin River near Stockton and implement source control measures by end of 2002. ➤ Invest over \$1 billion in ERP projects during Stage 1.
Watersheds	Establish a grant program in Year 1 to fund local projects contributing to CALFED goals.
Water Supply Reliability	<p>Commit that there will be no reductions, beyond baseline regulatory levels, in CVP and SWP Delta exports in first four years, through EWA implementation.</p> <p>Seek SWRCB approval of joint CVP/SWP point of diversion in Stage 1.</p> <p>Allocate Proposition 13 funds dedicated to interim water supply reliability and water quality during Stage 1.</p> <p>Implementation of CVP/SWP joint point of diversion, EWA, operational flexibility, and other actions are expected to result in a normal water year increase to CVP Delta export agricultural water contractors of "15 percent (or greater) of existing contract totals to 65 to 70 percent".</p>
Storage	<p>Pursue expansion of two existing surface reservoirs and construction of a new offstream reservoir. Dates for beginning construction, if projects are feasible, are: In-Delta storage (2002), enlarge Shasta Lake (2004), and enlarge Los Vaqueros Reservoir (2005). Also in Stage 1, perform further studies, in partnership with local agencies, of two additional potential surface storage sites to determine if they should be implemented as part of CALFED program.</p> <p>Facilitate and fund local groundwater/conjunctive use projects totaling 500 taf to 1 maf of storage capacity by 2007. Implement early stages of most promising projects by 2004 (includes Proposition 13 funding). Agreements with local agencies for joint studies to be completed by February 2001.</p> <p>Condition future State funding for water programs on the development of local groundwater management plans (e.g., AB 3030 plans) by 2004.</p> <p>Work with local agencies to develop legislation to strengthen AB 3030 – no date specified.</p>

—TABLE 2-6—

CALFED ROD Major Implementation Actions

Programs	Action
Conveyance	<p>Complete environmental review by 2002 of South Delta actions that will over time allow an increase in SWP pumping capacity (to maximum capability of existing facilities, 10,300 cfs). Seek permits by mid-2003 to increase pumping to 8,500 cfs during periods that are currently restricted. Includes new fish screening at Clifton Court Forebay and Tracy Pumping Plant (begin operations by 2006), and barriers in South Delta channels. Also construct floodway improvements on the lower San Joaquin River by mid-2005.</p> <p>Complete studies of improved operational procedures for the Delta Cross Channel by end of 2003.</p> <p>Begin construction of a 4,000 cfs screened through-Delta facility on the Sacramento River, if found to be feasible – end of 2007.</p> <p>Construct North Delta floodway improvements (e.g., lower Mokelumne River, Georgiana Slough). Complete environmental review by early 2003.</p> <p>Complete environmental review/design for an intertie between the CVP and SWP near Tracy by mid-2004.</p> <p>Construct a bypass canal and related facilities for the San Felipe Unit at San Luis Reservoir, to alleviate San Luis “low point” problem. Complete environmental review/preliminary design by end of 2003. To be performed by Santa Clara Valley Water District with Proposition 13 funding.</p> <p>Complete feasibility studies of water quality exchanges (Sierra Nevada water to Southern California), and implement demonstration projects by end of 2001. To be done by MWD/Friant Water Users Authority.</p>
Environmental Water Account	<p>“Establish an EWA with an average of 380 taf set aside annually in the first years”.</p>
Water Use Efficiency	<p>Prepare implementation program, including implementation of loan/grant program, by December 2000. Develop detailed financing proposal, including local cost-sharing, for Stage 1 by July 2001.</p> <p>Provide \$34 million in technical assistance in first four years to urban and agricultural agencies developing/implementing conservation plans. Provide an estimated \$500 million in State/federal financial assistance in the first four years. By mid-2004, determine additional Stage 1 needs, based on evaluation of program’s progress. “Future funding, if necessary, may be sought through a bond measure.”</p> <p>By December 2004, perform comprehensive evaluation of program implementation.</p> <p>Establish a Federal Advisory Committee Act-chartered public advisory committee by December 2000 to advise CALFED agencies on program implementation.</p> <p>Develop a proposal for the Legislature’s 2003 session on measurement of water uses (surface and groundwater) throughout California.</p>
Water Quality	<p>Central Valley Regional Water Quality Control Board is to establish a comprehensive drinking water policy for the Delta and upstream tributaries by the end of 2004. Begin implementing source control measures by end of 2006.</p> <p>Fund treatment technology demonstration projects (ultraviolet disinfection and regional desalting) by end of 2002.</p> <p>Complete studies of structures needed to prevent runoff from entering major conveyance facilities by end of 2001. By end of 2003, study feasibility of relocating North Bay Aqueduct intake. Begin implementing watershed programs to reduce runoff into conveyances by early 2004.</p>

—TABLE 2-6—
CALFED ROD Major Implementation Actions

Programs	Action
	<p>Provide a recommendation to the CALFED governing body by the end of 2002 on the use of export water to reduce salinity and improve dissolved oxygen in the San Joaquin River.</p> <p>Implement a project with Bay Area water agencies to facilitate water quality blending and water exchange actions among the agencies. Complete feasibility study by July 2002, environmental review and preliminary design by the end of 2003.</p> <p>Facilitate local agency water quality exchanges. Complete feasibility studies and identify "initial projects, if any" by end of 2001.</p> <p>Develop within two years a plan to meet all existing water quality standards/objectives for which the CVP and SWP have responsibility.</p>
Water Transfers	<p>State Administration will sponsor wheeling legislation in 2001.</p> <p>Take actions to streamline approval process for certain types of transfers, including convening a stakeholder panel by December 2000 and introducing legislative changes by April 2001.</p> <p>Provide "On-Tap" website by end of 2000. Establish water transfers information clearinghouse by end of 2001.</p>
Levees	<p>Provide funding to bring about 200 additional miles of levees up to base level of protection.</p> <p>Develop a Delta risk management strategy and BMPs for reuse of dredged materials by 2001.</p> <p>Use 2 million yards of dredged material to repair Delta levees and restore habitat by end of Stage 1.</p>
Science Program	<p>Appoint a science board for CALFED program and for EWA by mid-2001.</p> <p>Refine set of models to be used for program evaluations and prepare first annual report by end of 2001</p>

The CALFED Final Programmatic EIS/EIR shows that on an annual basis, without additional storage, the preferred program alternative would increase long-term period Delta exports by an additional 250-380 taf over the no action alternative. With additional storage, the preferred program alternative would increase annual Delta exports by 490-900 taf over the no action alternative.

On an annual basis, without additional storage, the preferred program alternative would increase dry and critical year Delta exports by an additional 50 to 180 taf over the no action alternative. With additional storage, the preferred program alternative would increase annual Delta exports from 180 to 670 taf over the no action alternative.

In addition, water conservation and recycling will save additional water for use. Water use efficiency potential varies significantly in California, depending on the region of the State and the sector involved. Working with the stakeholder steering committees and other technical experts, CALFED agencies have developed ranges of estimated water savings during Stage 1. These estimates include only water that is currently unavailable for other uses because it is lost to excessive evaporation or drains to the ocean or some other unusable destination. In addition

water can be made available through water recycling projects. These water savings would be generated as follows:

- 520 to 688 taf in the urban sector
- 260 to 350 taf in the agricultural sector
- 225 to 310 taf in water recycling projects

Actions initiated in the first four years of Stage 1 to improve storage and conveyance capacity will substantially increase water supply reliability in the later years, but these benefits will not be realized until the new facilities come on line. Similarly, it will take years to implement and fully realize the water supply benefits of water use efficiency, recycling and other conservation measures. Therefore the greatest challenge to improving water supply reliability lies in the first four years of Stage 1. To address these water supply reliability challenges in this short period, the ROD outlines the following actions.

- Establishing an Environmental Water Account with an average of 380 taf of water set aside annually in the first years to provide additional water for fishery purposes beyond the regulatory baseline. Water will be acquired by CALFED agencies, consistent with the goals of the CALFED water transfer program.
- Establishing a regulatory baseline by delineating existing regulatory requirements and clarifying implementation of specific regulatory actions.
- Providing a commitment that there will be no reductions due to fishery protection measures, beyond baseline regulatory levels, in CVP or SWP Delta exports. This commitment will initially be provided for the first four years of Stage 1.

In addition, CALFED Agencies will take the following actions in Stage 1.

- Seek SWRCB approval of a joint point of diversion and share water derived from the joint point of diversion between the CVP and the EWA.
- Implement conjunctive management projects, water conservation measures and water transfers.
- Begin implementation of storage projects.
- Allocate Proposition 13 funds dedicated to interim water supply reliability and water quality. Proposition 13 contains over \$630 million for these purposes, including the following:
 - \$200 million for groundwater storage projects.
 - \$250 million for Stage 1 water quality actions and water management actions.
 - \$180 million for water supply and water quality infrastructure projects in areas that draw supplies from the Delta.

The ROD also concludes that these actions in the first four years are likely to improve Delta exports for CVP south-of-Delta agricultural water service contractors.

In the first four years of Stage 1, the ROD anticipates that water deliveries will remain at recent levels for most entities receiving water from the CVP -- including exchange contractors, north-

of- Delta CVP agricultural contractors, refuges, and urban contractors -- as well as for SWP contractors and non-project water users. It is also anticipated that implementation of the joint point of diversion, operational flexibility, interagency cooperation, EWA, and other cooperative water management actions will bring normal year CVP south-of-Delta agricultural water contractors to 65 to 70 percent service levels. This normal year supply improvement may not be achieved in all years due to annual hydrologic variability and its impact on carryover storage. Substantial progress toward implementation of other program elements, such as development of EWA assets, is also necessary. Water supplies in dry years are likely to be less than the anticipated amounts. As discussed in the ROD, CALFED agencies are committed to working with local agencies to implement these regional supply actions and to support local water management actions including conservation and other local measures. Part of this effort will include development of a plan for alternative refuge supplies and conveyance.

CHAPTER 3

CRITICAL WATER SHORTAGE MANAGEMENT CHALLENGES

Introduction

Panel members identified a variety of physical, regulatory, and institutional challenges to effective water management during times of critical water shortages. These challenges complicate management actions such as water purchasing programs or groundwater storage programs. Challenges include constraints on availability and capacity of conveyance and storage facilities, regulatory restrictions and uncertainties, competition for limited water supplies among existing water purchasing programs, identification and mitigation of third party impacts, availability of financial assistance programs, and coordination with county groundwater ordinances. This chapter describes these challenges.

Access to Conveyance Capacity

Limitations on the ability to convey water from one location to another affect water suppliers' implementation of water transfers and groundwater storage programs. The ability of California's water supply and conveyance infrastructure to deliver reliable water supplies has been affected by changed conditions, as described in Chapter 2. These changes restrict the ability of the system to convey water across the Delta and throughout the State. The Water Code requires that public agencies make available unused conveyance capacity of their facilities, subject to payment of fair compensation and other conditions. However, availability of unused SWP capacity is significantly constrained, and the amount and timing of future Delta export capacity for wheeling non-project water cannot be predicted with certainty.

Potential water transfers could involve conveyance of water across the Delta, either south to the San Joaquin Valley and Southern California or west to areas within Alameda, Contra Costa, San Francisco, Solano, and Santa Clara Counties. These transfers would of necessity depend on conveyance via either the CVP or SWP. In order to facilitate such transfers, potential transferors must be able to know when wheeling capacity might be available. Currently it is not possible to quantitatively predict the availability of wheeling capacity beyond about two weeks in advance. Use of California Aqueduct capacity is first reserved for delivering SWP water; the SWP also has existing contractual commitments for wheeling water for the CVP and for the Cross-Valley Canal contractors. Aqueduct capacity will additionally be needed by the EWA; the CALFED ROD specifies EWA operational criteria. Quantities of SWP water to be delivered are established through an iterative process of matching contractors' requested delivery schedules against hydrologic conditions and facility delivery capabilities. This process is then balanced against constraints on moving water across the Delta—such as Order WR 95-6 export limits, incidental take provisions for ESA listed species, and other requirements of ESA biological opinions.

A decade ago the availability of California Aqueduct wheeling capacity, at least in dry years, would have been both expected and predictable. As a result of changed regulatory conditions, this level of certainty no longer exists. The unpredictable nature of wet year pumping curtailments associated with ESA take limits has been demonstrated by recent experience with Delta smelt export restrictions and the resultant San Luis Reservoir drawdown. While the CVP and SWP have not yet operated under current regulatory conditions coupled with dry hydrology, there is nothing to suggest that pumping curtailments associated with take limits would become more predictable under these circumstances. Additional uncertainties include the outcome of the Superior Court's decision regarding the SWP's Monterey Amendments. Provisions in the Monterey Amendments affect conveyance of project and non-project water for SWP contractors, as described later in this chapter.

To provide operational flexibility for meeting CVP and SWP water delivery (or water quality, as applicable) commitments and at the same time protect fish species of concern, project operators will need to work closely with State and federal resource agencies to optimize deliveries of project water and to facilitate conveyance of non-project water. The CALFED program and local agencies wishing to make use of water transfers must likewise work closely together to identify and address infrastructure modifications needed to facilitate water transfers. For example, the San Luis Reservoir drawdown problem described in Chapter 2 is to be addressed by provision of a bypass canal and related expansion of local storage. SCVWD and the City and County of San Francisco are also constructing an approximately \$9 million intertie between parts of their systems, to enhance their emergency response capabilities.

Water suppliers in the urbanized Bay Area, Southern California coastal plain, and parts of the San Joaquin Valley are physically best situated to take advantage of water purchasing programs, because they have the greatest extent of water system interconnections as well as access to supplies conveyed through the CVP and SWP. Some of California's water users have no access to the State's major water infrastructure and very little in the way of system interconnections – for example, water users in the Salinas Valley and rural areas throughout the Sierra Nevada foothills.

Competition for Limited Water Supplies and Conveyance

Water marketing programs and groundwater storage programs can be affected by competition for water acquisitions and conveyance capacity. Purchasing programs now in existence or in a start-up stage include: CVPIA water acquisitions for wildlife refuges and for fishery purposes, CALFED EWA, acquisitions for other CALFED programs, and MWD's California Aqueduct dry year transfer program. A new DWR water acquisition program for mitigating critical shortages would be competing with these programs. As Panel members pointed out, priorities for access to Aqueduct conveyance are an important consideration, particularly given the limitations created by current Delta export restrictions. It is possible that a DWR program's acquisition intended to mitigate critical shortages could be in competition for conveyance capacity with a similar purchase of a local agency not participating in the DWR program.

The largest potential sources of water acquisitions include surface water stored in local reservoirs, groundwater substitution transfers, and land fallowing. Experience gained in DWR's 1991–1994 drought water banks demonstrated that there are practical limits to the quantities of water available from each source, and significant concerns over third-party impacts (described below) associated with concentrating acquisitions in a single geographic area or from a single

type of source. If a new DWR water acquisition program purchased water when much of the State was experiencing critical shortages, competition among purchasing programs could increase water prices to the point where agricultural water users and smaller urban water users could not afford to participate in the program. There are also limits on access to SWP conveyance capacity for wheeling. Although California Aqueduct capacity has historically been available during drought years (due to reduced supplies available to the SWP), reduced export capabilities caused by changed Bay-Delta regulatory requirements and the unpredictable nature of ESA take limits could limit or preclude use of otherwise available wheeling capacity.

In its 1991 drought water bank, DWR purchased 821 taf of water, about 20 percent from reservoir storage, 30 percent from groundwater substitution, and 50 percent from land fallowing. At this time, DWR's program was the only large water purchasing program in operation. The land fallowing and groundwater substitution purchases tended to be concentrated in limited geographic areas and to affect a limited number of crop types. Due to the potential for concentrating third-party impacts, it is unlikely that DWR would repeat this purchase pattern in the future. About 80 percent of the water for DWR's 1992 drought water bank (193 taf in total purchases) came from groundwater substitution. Bank operations predated most of the now-extant county ordinances controlling groundwater exports.

Apart from past experience with the drought water bank, the CVPIA water acquisition programs (for fishery and wildlife refuge purposes) have been the only other large-scale operating water transfer programs. (There have historically been extensive exchanges of water allocations among CVP and SWP contractors, but these arrangements are not transfers in the classic sense of change in ownership or purpose/place of use of a water right.) Pending water acquisition programs include CALFED's EWA (380 taf/year) and MWD's California Aqueduct dry year option program (up to 380 taf/year in dry years). It is not possible at this time to estimate the quantity of water that might be involved in a new DWR water purchasing program to address critical shortages.

Regulatory Restrictions and Uncertainties

Panel members discussed at length SWP and CVP water users' concerns about the challenges and uncertainties associated with operation of the two projects under today's regulatory environment. Agricultural water users in the CVP water service area south of the Delta characterized their water supplies as being in a state of permanent drought – a regulatory drought. The operational difficulties of relying on Kern County groundwater banking projects to provide supplies during multi-year droughts were outlined in a presentation to Panel members by KCWA. Both agricultural and urban water contractors experienced the uncertainties associated with the impacts of ESA take limits on San Luis Reservoir operation in the last two years. Urban SWP water users were concerned about impacts of regulatory restrictions on their ability to meet drinking water treatment requirements in a cost-effective manner.

As described in Chapter 2, the CALFED ROD commits that there will be no Delta export reductions to CVP and SWP water users in the first four years of CALFED implementation, beyond specified baseline levels, due to fish protection measures. The ROD further anticipates that “water deliveries will remain at recent levels for most water users who depend upon water from the CVP, including Exchange Contractors, North of Delta agricultural contractors, refuges, and M&I contractors, as well as for SWP contractors and non-project water users” during this time period. This expectation is predicated on implementation of the EWA, SWP-CVP joint

point of diversion, operational flexibility, interagency cooperation, and other water management actions.

Presently, the EWA is seeking to acquire water and storage capacity for the initial year of program operation, and is beginning preparation of an EIR covering longer-term operations. Table 3-1, excerpted from the CALFED ROD, shows the assets available to/to be acquired by the EWA to provide water delivery assurances for the CVP and SWP. As of mid-December 2000, the EWA had executed contracts for initial year water purchases with two sellers and was engaged in contract negotiations with more than 25 additional potential sellers. Acquisition of up to 200 taf of groundwater storage capacity and groundwater in storage is one of EWA's initial year goals

—TABLE 3-1—
EWA Assets Specified in ROD

Action Description	Average Water Available Annually (acre-feet)
SWP Pumping of (b)(2)/ERP Upstream Releases ¹	40,000 ²
EWA Use of Joint Point ³	75,000
Export/Inflow Ratio Flexibility	30,000
500 cfs SWP Pumping Increase	50,000
Purchases – South of Delta	150,000
Purchases – North of Delta ⁴	35,000
Total	380,000

¹ The EWA and the SWP will share equally the (b)(2) and ERP upstream releases pumped by the SWP after they have served their (b)(2) and ERP purposes.

² The amount of water derived from the first four actions will vary based on hydrologic conditions.

³ The EWA will share access to joint point of diversion, with the CVP receiving 50% of the benefits.

⁴ This is the amount of water targeted for the first year; higher amounts are anticipated in subsequent years.

Panel members were concerned that CALFED might not be able to meet conditions precedent, such as successfully buying and conveying EWA water, or that implementation of CALFED actions to improve water supply reliability would take longer than planned, leaving water users with no protections against additional regulatory reductions in their water supplies. Panel members also suggested that the uncertain availability of future State and federal funding for CALFED, or the absence of sufficient funding, could hinder actions intended to improve water supply reliability.

The impact of regulatory restrictions on access to the California Aqueduct for wheeling non-project water was also a concern to Panel members. As indicated above, several water purchasing programs are now potentially in competition for access to Aqueduct capacity. As illustrated in Figure 3-1, annual Aqueduct wheeling has rarely exceeded 600 taf, an amount less than the quantities of water being considered in current purchasing programs. Future restrictions on Delta exports, as well as ongoing application of ESA take limits, would constrain availability of wheeling capacity.

Figure 3-1

Panel members urged that CALFED Agencies maximize their use of operational flexibility and interagency coordination to minimize water supply reliability impacts of regulatory restrictions and uncertainties. The Panel heard examples of successful application of agency flexibility during discussions on the SCVWD/WWD water reallocation agreement and on MWD's water quality exchange with water users on the east side of the San Joaquin Valley.

Identification and Mitigation of Impacts of Water Purchasing Programs

Water purchasing programs can have direct and indirect impacts to water sellers and others in the selling region. Impacts to water sellers are normally compensated through the purchase price for the water and through related contractual arrangements for the purchase. Impacts to third parties (entities exclusive of buyers and sellers in a transfer) and to the environment are a subject of significant concern in water selling regions.

During DWR's past drought water banks, for example, water users and residents in regions of bank purchases expressed concerns about third-party impacts of the land fallowing and groundwater substitution associated with the 1991 and 1992 banks. Some private groundwater users in Butte County not participating in the bank filed claims against DWR alleging impacts to their wells. DWR conducted extensive groundwater monitoring programs in areas of groundwater substitution purchases, including installing extensometers to measure subsidence. DWR also paid Yolo and Butte Counties amounts equivalent to two percent of the value of the groundwater substitution contracts in their counties, to fund preparation of county water management plans or to update existing plans. DWR also funded external reviews of the 1991 and 1992 banks, including economic evaluation of third-party impacts.

The future success of water purchasing programs is tied to the ability to address real or perceived third-party impacts. A variety of techniques for doing so are described in the technical appendix for CALFED's programmatic EIS/EIR. Examples include:

- Conduct surface and groundwater monitoring programs in water acquisition areas.
- Avoid concentrating acquisitions in limited geographical areas. For acquisitions that would entail taking cropland out of production, ensure that purchases are not so large to affect the market for any given crop.
- Compensate local governments for increased services resulting from labor displacement, via a fee levied on transfers.
- Compensate displaced workers through augmenting unemployment insurance benefits, providing job referral and placement services, and job training, again via a fee levied on transfers.
- Limit groundwater substitution purchases to areas where local agencies are actively implementing AB 3030 plans, and where substantial information on groundwater basin characteristics already exists.

Financial Assistance

CALFED includes assumptions for financing programs to improve water supply reliability in response to changes that will occur under environmental protection programs. CALFED assumes that commitments to provide full funding are in place. If these commitments to obtain funding do not materialize, there may be a funding gap that must be filled to allow implementation of these actions.

For example, some Panel members emphasized the importance of timely, or if possible, accelerated, implementation of CALFED's water use efficiency program. The goal of this Program is to implement cost-effective actions to conserve and recycle water throughout the state. Water use efficiency measures are included in the CALFED program because water use efficiency investments can yield water supply benefits to urban and agricultural users in the short term, and water use efficiency investments can generate significant benefits in water quality and timing of instream flows. Water recycling provides additional opportunities to reduce water demand in a relatively cost-efficient and environmentally benign manner, with multiple benefits for efficiency, dry year reliability and discharge water quality. CALFED agencies anticipate that significant investments in water use efficiency and water recycling will be necessary during CALFED Stage 1 and beyond.

CALFED agencies will rely on a competitive grant/loan program as the best mechanism to assure cost-effective investments in water use efficiency. Initial state financial assistance for this program will come from Proposition 13 and Proposition 204. The program would be used primarily as a capitalization mechanism; the ongoing obligations for operation and maintenance would be assumed by the participating agency. Considerations affecting the success of a CALFED grant/loan program include:

- Water agencies must implement water use efficiency measures that are cost-effective and appropriate at the local level. CALFED agencies anticipate that State and federal assistance to local agencies to attain this base level of water use efficiency will generally be in the form of technical assistance and capitalization loans, not grants.
- Additional CALFED investments in water use efficiency are premised on the fact that some water use efficiency measures may not be cost-efficient when viewed solely from a local perspective but may be cost-effective when viewed from a statewide perspective, compared to other water supply reliability options. In this case, CALFED agencies anticipate a larger State and federal assistance share in the form of grants.
- Financial incentives in the water recycling area will recognize the importance of regional water recycling programs, such as the Bay Area regional water recycling program and the Southern California comprehensive water reclamation and reuse study. CALFED agencies will work with stakeholders to create cost-effectiveness criteria, building on approaches that have been previously developed for regional water recycling programs.
- The CALFED agencies will develop a detailed finance proposal for Stage 1, including an evaluation of local cost share potential, no later than July 2001. Recognizing that funding for the water use efficiency program will necessarily come from many different State and federal sources, CALFED agencies will assure that the water use efficiency program has sufficient resources for programs in each of the agricultural, urban, and water reclamation sectors.

This last assumption that funds will be available for the water use efficiency program, or for any of the other CALFED actions intended to improve water supply reliability, is clearly key to CALFED's overall success. The majority of State financial support for specific CALFED actions comes through Propositions 204 and 13; some funding for actions associated with the ecosystem restoration program may also be available through Proposition 12. Tables 3-2 and 3-3 summarize programs funded in Propositions 204 and 13. As CALFED proceeds through its initial years of implementation, the extent to which additional program funding may be needed will become apparent. The CALFED ROD and Implementation MOU commit the CALFED agencies to an annual reporting and budgeting process which would provide a vehicle for tracking potential needs for additional funding.

Local Groundwater Ordinances Restricting Exports

Enactment of local groundwater management ordinances restricting groundwater exports from counties, together with past local opposition to groundwater substitution transfers for the SWP, are indicative of the challenges faced in water purchasing programs. Most county groundwater ordinances regulate groundwater exports from a county, typically by requiring a conditional use permit before export can occur. Permit issuance may be conditioned on findings that export will not impact local groundwater resources. The ability to accurately make such findings may require implementing ongoing groundwater monitoring programs, having access to a body of historical data, and perhaps development of site-specific groundwater models. These activities are not inexpensive, nor can they be quickly become operational. Panel members suggested that counties having export ordinances review their ordinances to determine if permit applicants can complete the permitting process in a reasonable time period, and DWR should be available to provide technical assistance to the counties, if desired. State financial assistance could be provided to counties to help them tailor their ordinances to be responsive to critical water shortage conditions.

Coordination with counties to facilitate the permit process will be important to utilization of additional groundwater during critical water shortage conditions. A major effort in facilitating this permit process would be the development of procedures to monitor, limit, and mitigate the potential third party impacts that these ordinances seek to prevent. These procedures need to provide assurances to counties that their groundwater resources will be protected even when an expedited permit process is essential to helping meet critical period water needs. As a practical matter, proposals for large-scale groundwater transfers facing substantial local opposition are not likely to go forward.

—TABLE 3-2—

Proposition 204 - The Safe, Clean, Reliable Water Supply Act Of 1996
Funding by Administering Agency

Agency	Million Dollars
Department of Water Resources	
CVPIA cost-sharing, state matching funds	\$93
CALFED Category III state matching funds (environmental restoration grants expended via RFP process)	\$60

—TABLE 3-2—

Proposition 204 - The Safe, Clean, Reliable Water Supply Act Of 1996
Funding by Administering Agency

Agency	Million Dollars
Delta levee rehabilitation	\$25
South Delta fishery barrier at Old River	\$10
CALFED administration & Delta recreation	\$5
Feasibility studies, specified water supply projects	\$10
Water conservation & groundwater recharge loan program	\$30
Local water projects, small community loan & grant program	\$25
Sacramento Valley water management program	\$25
Flood control subventions	\$60
State Water Resources Control Board	
Clean Water Act state revolving fund loan program	\$80
CWA small community grant program	\$30
Water recycling loan program	\$60
Agricultural drainage loan program	\$30
Delta tributary watershed grant program	\$15
Seawater intrusion loan program	\$10
Other	
CALFED ecosystem restoration (funds to be appropriated to Resources Agency after completion of CALFED PEIS & execution of state- federal cost-sharing agreement)	\$390
River parkway program (land acquisition projects individually appropriated by Legislature)	\$27
Lake Tahoe water quality (land acquisition/erosion control, appropriated to Tahoe Conservancy)	\$10

—TABLE 3-3—

Proposition 13 - Safe Drinking Water, Clean Water, Watershed Protection, And Flood Protection Act of 2000
Funding by Administering Agency

Department of Water Resources	State Water Resources Control Board	Other Agencies
Floodplain mapping - \$2.5 million	Watershed Protection - \$90 million	Safe Drinking Water - \$70 million (Department of Health Services)
Flood Protection Corridor - \$70 million	Southern California Integrated Watershed - \$235 million	Floodplain Mapping - \$2.5 million (Department of Conservation)
Delta Levee Rehabilitation - \$30 million	Lake Elsinore & San Jacinto Watershed - \$15 million	Yuba Feather Flood Protection -\$20 million (Department of Fish & Game)
Flood Control Subventions - \$45 million	Nonpoint Source Pollution Control- \$100 million	Capital Outlay Flood Protection - \$20 million (Sacramento Area Flood Control Agency)
Urban Streams Restoration - \$25 million	Clean Water Program - \$100 million	Water & Watershed Education - \$3 million (University of California)
San Lorenzo River Flood Control Program - \$2 million	Water Recycling Program - \$40 million	River Protection - \$95 million to be appropriated by Legislature (includes \$12.5 million to be appropriated to DWR)
Yuba Feather Flood Protection - \$70 million	Coastal Nonpoint Source Control Program - \$90 million	Coastal Watershed Salmon Habitat- \$25 million (DFG)
Arroyo Pasajero Watershed - \$5 million	Seawater Intrusion Control - \$25 million	
Water & Watershed Education - \$5 million		
Agricultural Water Conservation - \$35 million		
Groundwater Recharge Facilities - \$30 million		
Infrastructure Rehabilitation - \$60 million		
Urban Water Conservation - \$30 million		
Groundwater Storage - \$200 million		
Bay-Delta Multipurpose Water Management - \$250 million		
Interim Water Reliable Supply & Water Quality Infrastructure & Management Program - \$180 million		
TOTAL \$1,039.5 million	TOTAL \$ 695 million	TOTAL \$235.5 million

Rural Self-Supplied Water Users

Past droughts demonstrated that self-supplied water users in rural areas experience the greatest public and health impacts. There are virtually no existing programs to assist such water users, especially in the case of rural homeowners on wells. These water users have limited financial resources, and are located in low population density areas where connection to other water systems is not feasible. This problem is most prevalent in rural counties that also lack resources to provide assistance. When drought causes a small private water system's wells or marginal surface water sources to run dry, however, it falls to the county emergency services office to respond to the crisis. There is a need for contingency planning by State and local governments to educate and assist rural water users reliant on marginal water sources, to reduce the number of instances when people literally run out of water.

SWP Monterey Amendments

In December 2000, the California Supreme Court declined to hear DWR's appeal of lower court decisions on the Monterey Amendments. The case now returns to Superior Court. The Monterey Amendments provided a number of water management tools that have allowed SWP contractors to maximize their use of locally available supplies. DWR has been operating the SWP in accordance with the amendments, as described below, while the litigation proceeded. SWP contractors now face uncertainties in planning for their use of project supplies and Aqueduct capacity.

The Monterey Agreement among the Department and SWP water contractors was signed in December 1994. This agreement established principles for making changes in SWP water supply contracts, which would then be implemented by contract amendments (Monterey Amendments). The amendments were offered to all SWP contractors; all but two contractors accepted them. Contractors signing the amendments had their water supply contracts administered accordingly. Contractors not signing the amendments were unaffected by them.

- **Changes to SWP Water Allocation Rules.** The Amendments state that during drought years project supplies are to be allocated proportionately on the basis of contractors' entitlements. The Amendments allocate water to urban and agricultural purposes on equal basis, deleting a previous initial supply reduction to agricultural contractors.
- **Permanent Sales of Entitlement.** The Amendments provide for relinquishment of up to 175 taf of annual entitlement by the agricultural contractors. This relinquishment reduces the total SWP contractual commitment. The Amendments further provide that 130 taf/year of the relinquished agricultural entitlement be sold on a permanent basis to urban contractors, on a willing buyer-willing seller basis.
- **Storing Water Outside a Contractor's Service Area and Transfers of Non-Project Water.** This provision allows a contractor to store water in another agency's reservoir or groundwater basin. Examples include water storage programs with Semitropic Water Storage District (a member agency of KCWA). The Amendments also provide a mechanism for using SWP facilities to transport non-project water to SWP water contractors.
- **Annual Turnback Pool.** Prior to the Amendments, water allocated to contractors that was not used during a year would revert to the SWP at the end of the year. No compensation

was provided to the contractor for this water, and no other contractors could make use of these supplies during the year. The turnback pool is an internal SWP mechanism that provides for pooling potentially unused supplies early in the year for purchase by other SWP contractors at a set price. The pool is not intended as a water market, but rather as an incentive to return unneeded water early in the year for reallocation among SWP contractors on a willing-buyer basis. If neither the SWP nor individual SWP contractors wish to use water placed into the pool, that water may then be sold to entities that are not SWP contractors.

- **Other Operational Changes.** The Amendments established a procedure to transfer ownership of DWR's Kern Water Bank property to KCWA and Dudley Ridge Water District. The Amendments allow contractors repaying costs of constructing the Castaic and Perris terminal reservoirs to increase their control and management of a portion of the storage capacity of each reservoir to optimize operation of local and SWP facilities. This is expected, for example, to improve drought year supplies for MWD, Castaic Lake Water Agency, and Ventura County Flood Control and Water Conservation District.

Water Quality Issues

On a site-specific basis, water quality issues may affect some groundwater banking programs or water transfer proposals. In the case of groundwater banking programs, emerging water quality issues reflect, among other things, the potential issuance of new drinking water standards for constituents such as arsenic or hexavalent chromium. One issue, for example, is whether banked groundwater having arsenic concentrations which meet the current maximum contaminant level, but would not meet a potential new MCL, should be extracted and pumped into a conveyance facility that is a source of drinking water. In the case of water transfers, if a proposed water transfer would result in a significant change to the raw water quality at an urban agency's treatment plant, the agency might incur costs associated with increased chemical usage or additional treatment facilities.

CHAPTER 4

RECOMMENDATIONS

Introduction

Experience with past droughts, most notably the 1976-1977 and 1987-1992 events, demonstrated the economic and environmental impacts of critical water shortages throughout California. Long-term implementation of the CALFED Bay Delta Program is intended to help improve water supply reliability throughout much of California, although as Panel members noted, the program is not designed to address extreme or long-term droughts or future State population growth.

Californians are at risk with respect to critical water shortages, as recognized in the CALFED ROD. The Panel believes that there are a variety of actions that State government should take now to reduce the potential impacts of critical shortages. This chapter describes the Panel's recommended actions. The goal of these actions is to help avoid what the ROD describes as the "serious impacts" to California's "health, welfare, and economy" that could stem from "critical water shortages" (see sidebar).

As described in Chapter 2, the CALFED ROD proposes a comprehensive suite of actions for implementation during Stage 1, the program's initial seven years. Many of these actions should help local agencies improve their water management capabilities and should also help avoid serious water supply impacts stemming from regulatory actions. During the initial four years of Stage 1, CALFED expects to: expend some \$500 million in State/federal financial assistance for water use efficiency programs (water conservation and recycling), potentially begin construction of in-Delta storage facilities and of a Shasta Dam enlargement, provide CVP and SWP water users with regulatory stability through implementing the EWA and other actions, begin implementing initial stages of local groundwater storage projects, introduce State legislation to facilitate water transfers and clarify wheeling requirements, and establish a water transfers clearinghouse. By signing the CALFED Implementation MOU, participating State and federal agencies have committed to carrying out the aggressive schedule of actions called for in Stage 1.

As described in the CALFED ROD, one of CALFED's primary goals is to "improve the reliability of California's water supply within the context of unpredictable hydrology and the competing needs of fish and wildlife and water users". The ROD further notes that Stage 1 actions are predicated on the assumption that there will be

Excerpt from CALFED ROD

CALFED agencies recognize that in the next several years critical water shortages may occur that may severely impact the health, wealth, and economy of California. To avoid such serious impacts, the Governor has convened a panel, chaired by the Director of DWR, for the purpose of developing a contingency plan to reduce the impacts of critical water shortages primarily for agricultural and urban water users. The plan will identify all available resources (e.g., water transfers, water exchanges, groundwater programs, local partnerships), building upon the experience gained with the Governor's Drought Water Bank, to minimize such shortages. The plan also will recommend appropriate funding mechanisms. In addition, CALFED Agencies commit to facilitate transfers of water and expedite regulatory processes to assist in implementation of the plan consistent with legal requirements. The Governor's Panel will submit the plan to the Governor by December 2000.

clear and consistent implementation of regulatory decisions and project operations, flexibility and interagency cooperation to avoid water supply/fish/water quality conflicts, water use efficiency, and investment in infrastructure to improve storage and conveyance capacity. Recent examples of interagency cooperation – such as the water reallocation agreement between SCVWD and WWD – illustrate benefits that can be gained through cooperative efforts to resolve water supply reliability problems.

The following Panel recommendations are intended to address actions not explicitly contained in the CALFED ROD or to accelerate implementation of actions not scheduled to be carried out in the early years of Stage 1. The Panel does not intend that its recommendations duplicate actions already scheduled for early implementation in the ROD, but rather suggests that ROD actions and the Panel's recommended actions be coordinated as much as possible to maximize their benefits. The Panel expects that CALFED will expeditiously undertake the actions cited in the ROD and bases its recommendations on that expectation.

The following recommendations are intended to be statewide in scope, applying to any areas of the State that may benefit from them. Nothing in the recommendations is intended to limit their geographical scope to CALFED study areas.

Implementation Actions

A. Water Shortage Reduction Marketing Program

The Panel recognizes that the CALFED ROD makes several commitments with respect to water transfers. These commitments include:

- The CALFED agencies are to provide water transfer information online, and to establish a water transfers clearinghouse.
- The CALFED agencies are to streamline the processes that buyers and sellers must work through to implement certain types of water transfers – intra-regional transfers, short-term transfers, and dry-year transfers.
- The State Administration is to sponsor legislation to clarify wheeling statutes (*i.e.*, Water Code Section 1810) in 2001.

In addition to these actions, the Panel recommends that DWR implement a Critical Water Shortage Reduction Marketing Program, building on experience gained from DWR's past drought water banks. The program would be operated as an as-needed water purchasing and allocation program whenever parts of the State were suffering critical water shortages. DWR would acquire options to purchase water from willing sellers and would exercise the options as needed to make water available for sale to water users experiencing critical water shortages, as described in the criteria below. The Panel further recommends that the Governor propose, and that the Legislature provide, a General Fund appropriation for preparing a programmatic EIR for CWSRMP, and that DWR expeditiously begin work on the PEIR.

The Panel discussed extensively the criteria for program operation and water user participation. One of the major discussion points was whether the program's operation should be limited to times of hydrologic drought. As described in the ROD, the Panel's contingency plan is to address "critical water shortages" - there is no limitation of the Panel's charge to hydrologic droughts. On that basis, it was suggested that a tiered or staged program be developed, taking

into account the severity of critical water shortages and a varying level of State response actions. (Both “tier” and “stage” already have other connotations within the CALFED program. One Panel member suggested that alternative nomenclature be developed to minimize the potential for confusion.) Panel members generally concurred that the CWSRMP should not be a tool of first resort for water users experiencing shortages, but a tool to be used after water users had already made substantial efforts on their own behalf. Criteria for water users to participate in the CWSRMP should reflect the “critical water shortages” concept – the American Heritage Dictionary defines “critical” as: “forming or having the nature of a crisis”. Critical water shortages may reflect water quality, as well as water quantity, considerations.

Tier 1 of CWSRMP would consist of water shortage preparedness activities undertaken by State and local agencies. These activities would include State actions necessary to prepare for CWSRMP operation, including drafting a PEIR and developing contracting formats for program water purchases. Local agency preparedness activities could include actions such as implementing water use efficiency measures, developing local facilities to enable water transfers, or developing local groundwater management programs.

Since Tier 1 activities broadly encompass the water supply reliability and water use efficiency provisions of the CALFED ROD, Tier 1 would in effect be in implementation throughout CALFED Stage 1. The overarching concept would be that State agencies should, in the words of one Panel member, “aggressively facilitate” actions that would improve local agencies’ abilities to respond to critical water shortages, while local agencies would be actively implementing measures to improve their water shortage preparedness.

Some specific State facilitation actions are included later in this chapter as Panel Recommendations C, D, and F. Panel members had a range of opinions as to the extent of State involvement in Tier 1 actions. Members agreed that the State role should focus on helping local agencies do everything possible to prepare themselves for critical water shortage conditions, but differed as to whether or not DWR should operate a water purchasing program in Tier 1. Some members felt that a Tier 1 State purchasing program would be one tool to help local agencies prepare for critical water shortages.

Conceptually, DWR and local agencies would work together during Tier 1 to develop guidelines/criteria/action plans to prepare for Tier 2 and Tier 3 occurrences. Several Panel members suggested that planning should begin now for dealing with regulatory conflicts that would be likely to occur under Tier 2 and Tier 3 conditions. It was also suggested that entities wishing to participate in the CWSRMP should, as part of their Tier 1 preparedness actions, begin setting aside a reserve fund to cover their participation in the program

Tier 2 of CWSRMP – purchasing options and allocating water – would be implemented in the early stages of a hydrologic drought or other critical water shortage. Local agencies making a declaration of probable impending critical water shortages absent a program purchase, and demonstrating that they are maximizing use of their own resources, would be eligible to purchase water. Several Panel members stressed the need for a rapid response from CWSRMP under Tier 2 conditions, to avoid immediate critical water shortage conditions in a purchaser’s service area, as well as to forestall a Tier 2 condition from worsening to a Tier 3 condition. It was recommended that DWR maximize its Tier 1 preparations for operating the program, to ensure timely response to purchasers’ requests.

Participating entities would pay a price for the water that fully recovers the cost of implementing the program, including costs for mitigating purchase-specific third-party impacts and environmental impacts identified through the CEQA process. This beneficiary pays approach is consistent with the approach taken in the CALFED program. Some Panel members noted that this approach would likely make program water too expensive for agricultural water users, and suggested waiver of costs of third-party impacts, or the establishment of a State financial assistance fund to help defray purchasers' costs, beginning in State fiscal year 2001. It was also noted that costs should not be redirected to other program participants, as occurred in DWR's 1991 drought water bank when the SWP absorbed DWR's remaining bank inventory.

Tier 3 of CWRSMMP would be implemented during the later stages of a hydrologic drought or during a water shortage emergency. The trigger for implementing Tier 3 would be a declaration of emergency by a water agency pursuant to Water Code Section 350, by a city or county, or by the Governor. State response to Tier 3 conditions would include continued implementation of Tier 2 actions, plus extraordinary measures needed to protect public health and safety. These measures could include State financial assistance to small water systems for emergency water acquisitions, including water hauling, pipeline construction, or well drilling. A Panel member noted that that the Governor and the Secretary of the Interior should be involved in coordinating State-federal response actions by the time a Tier 3 event was declared, especially with regard to regulatory and operational flexibility needs.

Panel members also noted that critical water shortages could contribute to increased instability in California's deregulated electric power market, a relationship that should be discussed in the PEIR. CWRSMMP triggering mechanisms described above might be influenced or affected by power capacity determinations made by California's Independent System Operator.

Panel members suggested that DWR use an advisory committee/committees to provide external input for administration of this tiered system of responding to critical water shortage conditions. The most commonly suggested advisory committee formulation entailed having two separate committees. One committee would be composed of managers from local water agencies. This committee would assist DWR in making the near real-time decisions associated with physical operations of a water purchasing program, *e.g.*, how to move water from one location to another. The second committee would be a broadly based stakeholder committee that would provide input on overall program management, including making recommendations on potential purchasers' eligibility to receive program water. It was suggested that all PEIR alternatives include the advisory committee concept.

Specific criteria for CWSRMP operations and eligibility for participation should be analyzed as alternatives in DWR's PEIR. The PEIR should incorporate the following subject areas:

A1. Participation in Tier 2 of the CWSRMP should be open to any purchaser – whether a private entity, public agency, or tribal government (to the extent consistent with State law) – expecting to experience critical water shortages and having the financial capability to purchase water from the program. Purchasers must demonstrate that they have made a responsible effort to use their existing water supplies efficiently to be eligible for CWSRMP participation. A range of criteria for purchasers' eligibility would be examined in the CWSRMP PEIR. Some criteria suggested by Panel members include:

- Demonstration by the purchaser that it has taken steps to prepare for critical water shortages, but that the shortage it now faces goes beyond its local response capacity.

- Implementation of water use measures that are cost-effective and appropriate at the local level. The CALFED ROD describes this level of attainment as being demonstrated by compliance with AB 3616 agricultural water management plans (if an agricultural water agency) or implementation of applicable Urban Water Conservation Council best management practices (if an urban water agency). Several Panel members noted that implementing functionally equivalent processes should also qualify.
- Implementation of other water use efficiency criteria now under development for the CALFED program.
- Written certification (by the purchaser) of probable impending critical water shortages likely to cause significant impacts to the “health, welfare, and economy” of the service area, absent the ability to purchase water from the program.
- An affirmative finding of eligibility by the advisory committee described above.
- Purchaser’s ability to pay for the water it requests.

The Panel suggests that a potential purchaser demonstrating probable impending critical water shortages but not currently meeting the other criteria (*e.g.*, water use efficiency criteria) be eligible for a one-time purchase from CWSRMP, subject to an enforceable contractual commitment to implement the criteria as a condition of purchasing CWSRMP water.

Several Panel members noted that the criteria must be flexible enough to take into account specifics of local circumstances, and should explicitly take into account the extent to which a potential purchaser has implemented its own water shortage preparedness actions. In other words, a potential purchaser’s efforts to reduce the risk of critical water shortages in its service area should be acknowledged, not penalized. Potential purchasers should not, for example, be penalized for not being able to achieve an arbitrary numerical rationing target as a result of their implementation of locally cost-effective water use efficiency measures. Several Panel members pointed out that demand hardening has reduced their ability to implement local shortage response actions, thus making access to CWSRMP supplies correspondingly more important to them.

A2. DWR’s CWSRMP should be coordinated with other water purchasing programs being operated at the State and federal levels, most notably transfers for the CALFED Program, CALFED’s EWA, and CVPIA water acquisition programs. The CALFED Implementation MOU provides a basic framework for this coordination through the vehicle of the CALFED Policy Group. The Panel intends that the focus of inter-program coordination be on the acquisition and wheeling aspects of the programs, with each program being responsible for allocation of its own resources. Alternatives for coordinating WSRMP implementation to be addressed in the PEIR should cover both the availability of water to be purchased and the availability of wheeling capacity in the California Aqueduct. One Panel member further suggested that the CWSRMP’s PEIR evaluate program wheeling in the CVP’s Delta-Mendota Canal.

The Panel recommends that a priority be established for CWSRMP’s access to Aqueduct wheeling capacity, although individual Panel members have differing views about the priority of CWSRMP relative to that of other non-SWP/CVP/EWA transfers. Some members felt that allowing CWSRMP to take precedence over other non-project transfers would be contrary to the

concept of the State facilitating local agency water shortage preparedness actions, or to the concept that wheeling priority should reflect the criticality of service area need. As was described in Chapter 3, Aqueduct capacity is first reserved for conveyance of SWP water and for conveyance of CVP water covered by existing contractual arrangements. The CALFED ROD specifies how the EWA will be able to use SWP and CVP conveyance facilities.

Several Panel members expressed concerns about the relationship of other purchasing programs – such as the EWA – to the CWSRMP, with regard to the competition for water purchases and conveyance capacity. The short time period allotted the Panel to complete its report did not allow for quantitative evaluation of this point. The operations studies that would be performed as part of the CWSRMP's PEIR should explicitly evaluate alternatives covering amounts of water available for purchase, and effects of conveyance priorities. The PEIR would also need to evaluate water quality concerns potentially associated with use of the California Aqueduct to convey groundwater extracted from a banking location and discharged into the Aqueduct for delivery. Panel members discussed emerging regulatory issues associated with water quality constituents potentially having new or revised MCLs, but did not make any specific recommendations regarding Aqueduct conveyance.

The Panel recognizes that current litigation on the Monterey Amendments to SWP water supply contracts has created uncertainties with respect to use of the California Aqueduct for the CWSRMP, and that the resolution of these uncertainties is unknown at this time. In December 2000, the State Supreme Court declined to hear an appeal of the case, which now returns to Superior Court. DWR has been operating the SWP under Monterey provisions while the litigation proceeded.

Nothing in the Panel's recommendations is intended to be construed to restrict the ability of a local agency or private entity to operate its own water acquisition program. Participation in the CWSRMP is voluntary. Water agencies or users experiencing critical water shortages may choose to participate in the program or in any other program available to them. In the event that CWSRMP water acquisitions are not sufficient to meet the requests for program participation received by DWR, the Panel recommends that the priority of water allocations favor those participants having the greatest need, but recognizes the special problems experienced by agencies (*i.e.*, the smallest water agencies) having the least ability to negotiate their own water purchasing and conveyance agreements.

A3. Past experience with DWR's 1991-1994 drought water banks illuminated local concerns about third-party impacts (including socioeconomic, environmental, and local government funding impacts) associated with water acquisition programs. The Panel recommends that CWSRMP's PEIR examine and propose implementation of a range of hierarchical techniques to avoid or mitigate third-party impacts. Avoidance would include measures such as widely distributing program acquisitions to avoid concentrating impacts in one community or region. Likewise for acquisitions that would entail taking cropland out of production, the acquisitions should be structured to ensure that purchases are not so large as to drive the market for any given crop. One urban Panel member suggested that there should be general coordination among currently operating water marketing programs to ensure that enough water remains in the agricultural sector to preserve California's agricultural economy.

All acquisitions must be on a willing seller basis. CWSRMP implementation should consider intensive monitoring of surface and ground water resources (as well as other potentially affected related natural resources) in acquisition areas, to ensure operation of the acquisition projects as

designed as well as early detection of any impacts. The CEQA requirement for a mitigation monitoring plan can provide a framework for this activity. Mitigation of acquisitions' third-party impacts, where present, should include mitigation of identified direct impacts as well as monetary compensation to county governments, possibly determined as a percentage of the acquisition price, for indirect socioeconomic impacts. Mitigation of acquisitions' site-specific environmental impacts should be in full compliance with regulatory requirements, including those associated with CEQA and the ESA. The Panel suggests that DWR consider the Williamson Act subventions funds provided to counties as a possible model for mitigating impacts associated with water acquisitions from agricultural water users. Panel members noted that impacts of water purchases are location-specific, and must be evaluated on a case-by-case basis. Members also noted that some purchases might not have third-party impacts, depending on the specifics of the individual transactions.

It was also pointed out that sellers of water should not be penalized in a subsequent regulatory or water rights process for having made water available for sale to CWSRMP. Concern was expressed that current Water Code provisions -- enacted during the 1987-92 drought to ensure that temporary water transfers not impair sellers' water rights -- are not sufficiently protective.

A4. The Panel recommends that DWR perform a detailed review of CWSRMP operations after the second year of program implementation, and annually thereafter. The review should include, among other things, the program's financial condition, its efficacy in alleviating critical water shortages, and its success in mitigating impacts. In the past, DWR performed similar reviews after each year's operation of the drought water bank.

The Panel further recommends that CWSRMP remain in operation beyond the end of CALFED's Stage 1, since the potential for critical water shortages will still exist.

B. Assistance to Small Water Systems and Homeowners in Rural Counties

Past droughts have demonstrated that the water users affected the earliest and to the greatest extent by dry conditions are small water systems and individuals relying on marginal groundwater sources. These small water users bore the brunt of the actual public health and safety impacts -- lack of water for basic domestic, sanitation, and firefighting purposes -- felt during recent droughts. Geographic areas especially affected included the Sierra Nevada foothills and North and Central Coast areas, locations where hydrogeologic conditions often result in limited availability of usable groundwater.

B1. The Panel recommends that DWR develop a technical assistance and education program targeted to rural homeowners and small domestic water systems relying on self-supplied groundwater, to be implemented in consultation with rural county environmental health departments. The Panel further recommends that the Governor propose, and that the Legislature provide, an annual appropriation of at least \$1.5 million from the State General Fund to support this program.

B2. The Panel recommends that DWR include in the program a series of workshops designed to educate homeowners with private wells about well construction and maintenance fundamentals. The workshops should be targeted to rural counties having large numbers of individual residences on wells, in locations where the 1976-1977 and 1987-1992 droughts demonstrated the unreliability of these water sources under dry conditions. The goals of the workshops would include raising homeowners' awareness of proper well construction and

maintenance techniques and providing them with informational resources on their options (including connecting to a public water system, if feasible) when dry conditions reduce or eliminate their groundwater supplies.

B3. The Panel also recommends that the program include development of a website containing information on State and county well construction requirements, sources of groundwater level and well yield data, and State and county contacts for obtaining additional information.

B4. The Panel recognizes that problems experienced by private well owners during droughts often stem from the variable reliability typical of many fractured rock groundwater sources. Homeowners moving from urbanized areas served by large-scale public water systems to rural areas are frequently unaware of the reliability issues associated with self-supplied groundwater, regardless of its source. The Panel therefore recommends that the Governor sponsor, and that the Legislature pass, legislation requiring sellers of single-family residential properties served by private wells to give buyers a notice describing the water source, listing potential causes of water shortages associated with supplies from private wells, summarizing typical well maintenance needs, and identifying informational resources such as those developed in Recommendations B2 and B3 above.

C. Local Agency Groundwater Programs

The Panel recognizes that the CALFED ROD commits CALFED agencies to fund and facilitate locally controlled groundwater projects that would provide 500 taf to 1 maf of additional storage capacity by 2007. Feasibility studies of these projects are to begin in March 2001, with early implementation beginning by the end of 2004. Substantial funding for developing local groundwater recharge and storage programs is provided in Proposition 13 and through the State General Fund (CALFED's Integrated Storage Investigations program). Additionally, federal funding will be critical to the success of this program.

The ROD also commits that DWR will adopt regulations for its loan and grant programs conditioning receipt of financial assistance upon local agency possession of an AB 3030 plan or functional equivalent. The ROD further commits that CALFED will work with local governments and stakeholders to develop legislation strengthening AB 3030 and provide financial and technical incentives for AB 3030 plan preparation.

Several Panel members noted that the funding levels shown below represent a bare-bones level of State support for these programs, and urged that additional support be provided. It was noted that these programs form part of the Tier 1 of water shortage preparedness actions described in Recommendation A and that their implementation should thus be maximized. The lack of availability of groundwater data in various areas of the State was pointed out as a significant impediment to fostering cooperative local and regional solutions to water management needs.

C1. The Panel recommends that DWR establish an AB 3030 technical assistance program, following the process established in Water Code Section 10795 *et seq.* The Panel further recommends that the Governor propose, and that the Legislature provide, an appropriation from the State General Fund of at least \$5 million per year to implement the program.

C2. The Panel recognizes that the availability of groundwater hydrologic data in California lags behind that of surface water data, in part due to the inherent nature of the resource and to the absence of a statewide system of permitting and reporting groundwater extractions. The

Panel therefore recommends that DWR expand its Bulletin 118 – related groundwater data compilation. DWR last published a Bulletin 118 data compilation report in 1980; a one-time effort is now underway to prepare a new update. Data compiled for Bulletin 118 can be used for a wide range of federal, State, and local agency water management planning activities; use of the Internet makes it possible to maximize public access to the data.

Specifically, the Panel recommends that the Governor propose, and that the Legislature provide, an appropriation of \$1 million annually from the State General Fund to provide for ongoing statewide groundwater data collection and compilation, and that DWR publish this information every five years as updates to Bulletin 118. The Panel further recommends that the water quality component of data collection and compilation be expanded to a level of effort comparable to that used for water level data. The program should encompass actual field collection of geohydrologic data, including installation of monitoring wells in locations where data gaps exist.

D. Local Agency Integrated Water Management Plans

Long-term water management planning is an essential aspect of drought preparedness. Local agencies must examine a wide range of supply augmentation and demand reduction options to determine the best courses of action for meeting their service areas' water reliability needs and for coping with water shortages. Many of California's largest urban water agencies have already completed extensive integrated water resources management plans that provide a blueprint for meeting their future needs. Additionally, the urban water management plan requirements applicable to agencies serving more than 3,000 af/year or 3,000 customers have helped focus agencies on the need to evaluate means for coping with shortages.

As described in recommendation A, the intent of CWSRMP is to provide assistance to local agencies that have taken steps to be good stewards of the resources available to them, and to encourage others to do likewise. Historically, cost has been a barrier to performing integrated water resources planning for smaller urban water agencies and for many agricultural water agencies. To help these agencies help themselves, the Panel believes that it is appropriate to provide financial assistance to encourage planning that optimizes use of local and regional resources.

D1. The Panel recommends that DWR and other CALFED agencies work in partnership with local water agencies to assist them in developing plans to facilitate integrated management of supplies for agricultural, urban, and environmental purposes. Ensuring optimum use of local areas' water resources improves the areas' ability to manage shortages and helps foster cooperative regional approaches to shortage management. This effort could also help alleviate local concerns associated with third-party impacts of CWSRMP, and will facilitate local agencies' participation in CWSRMP. Integrated water supply planning efforts are also an important component of watershed management planning. Many current watershed management planning efforts are being driven by existing or anticipated water quality regulatory actions. SWRCB administers Proposition 13 funding for such watershed planning efforts.

The Panel further recommends that DWR provide financial assistance, in the amount of at least \$2 million per year from a combination of General Fund, Proposition 204, or Proposition 13, to local agencies for preparing integrated water management plans. Several Panel members commented that this level of funding would support only a minimal effort, and urged greater, but unquantified, State financial support for this action. Disbursement of the State assistance

should be prioritized based upon the applicants' inability to afford performing the work themselves.

E. Drought-Related Research and Public Outreach Activities

Following the 1987-92 drought, California experienced a period of unusually wet conditions, a water supply pattern that is not likely to continue. California's next drought could occur at any time. A variety of evidence from geologic and dendrochronologic (tree ring) sources demonstrates that California is subject to droughts more severe and more prolonged than those witnessed in the State's brief period – no more than a century – of continuously recorded streamflow data. Research and public outreach activities can help California prepare for the inevitable future drought.

E1. The Panel recommends that DWR identify and seek funding for research in the areas of long-range weather forecasting, global climate change, and paleoclimatology. Improved long-range weather forecasting capabilities would be invaluable in operating federal, State, and local water projects to take advantage of expected hydrologic conditions. The goal of paleoclimatology research would be to reconstruct past hydrologic sequences to allow at least qualitative, and preferably quantitative, simulations of present day water operations under hydrologic conditions extending beyond the roughly 100 years of historical record.

E2. The Panel also recommends that DWR compile existing local agency drought watch indices and develop regional hydrologic drought indices for watersheds important to statewide water supply conditions and watersheds supporting significant urban and agricultural development. These indices would be a resource for water managers to use in developing criteria for establishing drought watches in their jurisdictions, and should form the basis for a coordinated statewide monitoring effort modeled after the Cooperative Snow Surveys Program coordinated by DWR.

E3. The Panel recommends that DWR develop a public outreach program to stress the need for drought preparedness, building on the recommendations of the May 2000 report of the National Drought Policy Commission.

F. Accelerate Proposition 13 Financial Assistance to Local Agencies

The ambitious schedule for implementing actions called for in Stage 1 of the CALFED ROD is predicated on the availability of substantial State and federal funding. Neither the State nor the federal Administrations received appropriations for CALFED implementation in the current fiscal year, although implementation funding remains available through sources such as Proposition 13 and Proposition 204 monies. Rapidly disbursing these bond, monies, and obtaining sufficient appropriations for pending fiscal years, are key to timely Stage 1 progress.

Proposition 13, the \$1.97 billion measure enacted by the voters in March 2000, created or provided additional funding for 28 major programs, many of which directly support or complement CALFED implementation. Most of the measure's programs are competitive loan and grant programs, the majority administered by DWR and SWRCB. Actions necessary to put these programs in place include procuring staff resources to administer the programs and developing rules and regulations for disbursement of funds. These actions can be time-consuming – the former complicated by the difficulty of recruiting new staff in a tight labor market and the latter by the requirement for review of State agency rules and regulations by the

Office of Administrative Law. The minimum time normally required for development of new rules and regulations and OAL review is about one year.

F1. The Panel urges the Governor to take all possible actions to ensure rapid disbursement of Proposition 13 funds, including: out-of-State recruitment for new staff, statutory waiver of Water Code requirements for review of DWR rules and regulations by the California Water Commission, and expediting or statutory waiver of OAL review of rules and regulations. The Panel further recommends that bond monies applicable to CALFED actions be budgeted as quickly as possible, so that the potential need for an additional bond measure by year four of implementation (the time at which the ROD's ESA commitments expire) can be ascertained.

F2. In the interest of implementing the CALFED water use efficiency program (water conservation and water recycling actions) as quickly as possible, the Panel recommends that DWR maximize use of grants, rather than capitalization loans, to bring local agencies up to the base level of efficiency contemplated in the CALFED ROD. The Panel recognizes that this recommendation would correspondingly accelerate the need for an additional source of State financial assistance for the water use efficiency program.

APPENDIX

PANEL MEMBERS' LETTERS

Panel members wishing to express a difference of opinion with the recommendations presented in the contingency plan were offered the opportunity to provide letters to be bound with the plan. This Appendix contains the letters received.

Frances Spivy-Weber
Mono Lake Committee

December 26, 2000

To: Mr. Thomas Hannigan
Jeanine Jones
Department of Water Resources

Re Final Version, Chapter 4 Recommendations
Governor's Advisory Drought Planning Panel

Thank you both for your excellent leadership in guiding and accepting guidance from the Drought Planning Panel. The Final Version, Chapter 4 Recommendations reflected the conversation and written comments quite fairly.

The following are a few additional or clarifying ideas that I would appreciate seeing reflected in an attachment to the final document:

1. The most important point to underscore is that the CWSRMP should not be a tool of first resort for water users experiencing critical water shortages. There was substantial emphasis given to ensuring that those needing help had first spent time and money on planning and implementing water efficiency measures. And that the State should not penalize those that had invested in sound water management.

There was also general agreement that DWR should NOT operate a water-purchasing program in Tier 1. It was pointed out correctly that there was not time for an evaluation of the relationship between the EWA and the CWSRMP. Had there been time, I am quite sure the point would have been made and accepted by most that the EWA is the most appropriate Tier 1--and possibly Tier 2--water-purchasing program to improve water supply reliability.

Almost no time was spent on what would be the baseline for determining when a user is experiencing a critical water shortage. It should be made clear in the PEIR that no agency should consider a full entitlement of the State Water Project as the baseline from which a critical water shortage is determined.

2. The Mono Lake Committee strongly supports the points made in F concerning acceleration of funding for Stage 1 implementation. It will be essential that these actions receive strong support from the Governor, the Legislature, and the State agencies charged with implementing the CALFED ROD and with meeting the water needs of California. It is also important that the Federal government meet its full obligation, but if there is to be a temporary gap in federal funding, the State of California must step forward and fill that gap.

Thank you for the opportunity to comment. I look forward to working with you on these and other water resource issues in the future.



KERN COUNTY WATER AGENCY

Directors:

WtrRes/SWP Planning
WtrRes/BayDelta

December 27, 2000

Fred L. Starrh
President
Division I

Mr. Tom Hannigan,
Director, Department of Water Resources
1416 Ninth St
Sacramento, CA 95814

Terry Rogers
Division 2

Peter Frick
Division 3

Dear Tom,

Michael Radon
Division 4

This letter contains my comments on the final version of chapter 4 (Recommendations) of the Drought Panel's report to the Governor.

Adrienne J. Mathews
Division 5

I agree with the concept of "tiering" of the State's efforts to implement a water shortage contingency program as described in this final version. This version discusses the confusion that could arise by use of "tier" and "stage" to describe the levels of effort. These words already have specific meaning within the CALFED Program. I recommend we use "level" in order to avoid any confusion. A global search and replace should be done to replace "tier" with "level," and then delete the discussion on page 3 about possible confusion that might arise.

Henry C. Garnett
Vice President
Division 6

Gene A. Lundquist
Division 7

Paragraph 3 on page 4 mentions the suggestion of some Panel members to establish a State financial assistance fund to help defray purchasers' costs of CWRSMPS supplies. As you know, I was a strong advocate of this approach. I think this paragraph should add the additional concept that government regulations are at least partly responsible for the critical shortages that water users face. Hence the State and federal governments should bear some responsibility for helping water users access affordable CWRSMPS supplies.

Thomas N. Clark
General Manager

John F. Stovall
General Counsel

Page 6, section A2 uses the acronym "WSRMP," whereas "CWRSMPS" is used throughout the document. This should be made consistent.

Page 7 references that implementation of the CWSRMP should consider "intensive" monitoring of surface and ground water resources in acquisition areas. This is a strong word, which could be misread to mean the State will implement new, large-scale ground water monitoring programs prior to acquisition of CWSRMP supplies. I recommend "intensive" be replaced by "appropriate."

I want to pass on to you my highest personal regard for Ms. Jeanine Jones of your staff, who was instrumental in putting this Drought Panel report together. I very much appreciate her dedication in this effort, which took place within a short time frame. Her work products quite accurately reflected the comments that were made at the Panel discussions, which was no easy task considering the sheer number of comments that were made.

Mailing Address:
P.O. Box 58

Bakersfield, CA 93302-0058
Phone: 661/634-1400

I also want to express my appreciation for your efforts to guide this effort to its conclusion. I trust the final version that is transmitted to the Governor will be useful

Mr. Thomas Hannigan

December 27, 2000

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to the Administration as it works to reduce the potentially devastating impacts that may come with the next drought. Considering the SWP's initial allocation is 40%, the timeliness of the Panel's efforts cannot be overstated.

Sincerely,

Fred L. Starrh

President

cc: KCWA Board of Directors
Member Unit Managers

ACRONYMS AND ABBREVIATIONS

AB	Assembly bill
af	Acre feet
BMP	Best management practice
CALFED	State (CAL) and federal (FED) agencies participating in Bay-Delta Accord
CCWD	Contra Costa Water District
CEQA	California Environmental Quality Act
cfs	Cubic feet per second
CRA	Colorado River Aqueduct
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CVWD	Coachella Valley Water District
CWA	Clean Water Act
CWSRMP	Critical Water Shortage Reduction Marketing Program
DEIS	Draft Environmental Impact Statement
DFG	Department of Fish and Game
DOF	Department of Finance
DWR	Department of Water Resources
EBMUD	East Bay Municipal Utility District
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ESA	Endangered Species Act
EWA	Environmental Water Account
EWMP	Efficient Water Management Practice
ERP	Ecosystem Restoration Program
FACA	Federal Advisory Committee Act
FERC	Federal Energy Regulatory Commission
KCWA	Kern County Water Agency

M&I	Municipal and industrial
maf	Million acre-feet
MCL	maximum contaminant level
MCWRA	Monterey County Water Resources Agency
MID	Modesto Irrigation District
MOU	Memorandum of Understanding
MWA	Mojave Water Agency
MWD	Metropolitan Water District
NMFS	National Marine Fisheries Service
OAL	Office of Administrative Law
PEIR	Programmatic EIR
RFP	Request for Proposal
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
SCVWD	Santa Clara Valley Water District
SDCWA	San Diego County Water Authority
SWP	State Water Project
SWRCB	State Water Resources Control Board
SWSD	Semitropic Water Storage District
taf	Thousand acre-feet
TID	Turlock Irrigation District
TMDL	Total maximum daily load
USBR	U.S. Bureau of Reclamation
USFWS	U.S. Fish and Wildlife Service
UWMP	Urban water management plan
WWD	Westlands Water District