Chapter 22
Cumulative Effects

Cumulative effects analyses are an important component of the environmental documentation and approval process and are required by both the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). Both CEQA and NEPA require the cumulative effects analysis to include future actions and projects that can be reasonably predicted to occur within the term of the proposed project. The cumulative effects analyses in this Environmental Impact Statement/Environmental Impact Report (EIS/EIR) evaluate the combined effects of the Environmental Water Account (EWA) and other water acquisition programs that could engage in water transfers similar to those of the EWA. The cumulative effects analyses also consider projects proposing physical changes to storage, export, or conveyance facilities in the Delta. The timeframe of the cumulative analyses extends through 2007, which coincides with the completion of Stage 1 of the CALFED Bay-Delta Program implementation.

Sequentially, this chapter first introduces the general methodology for evaluating cumulative effects to resources, then describes the additional future programs and projects considered in the cumulative analysis. The cumulative condition is then summarized as a whole in regards to water acquisition programs and Delta improvement projects. Each resource chapter includes a cumulative effects assessment that discusses the cumulative effects of the particular resource. Section 22.4 briefly summarizes these resource cumulative analyses.

22.1 Cumulative Effects Methodology

The major cumulative actions considered in the analysis fall into two categories:

- Water acquisition programs; and
- Water storage, conveyance, or export facility improvement projects, mainly concentrated in the Delta.

The sections below discuss the cumulative assessment methods for each category. Each resource chapter may discuss additional programs in the cumulative analysis section that pertain specifically to the resource. This chapter does not discuss these additional programs. In general, the cumulative effect analyses rely upon hydrologic modeling and other quantitative and qualitative assessments to determine the potential combined effect of the EWA and other related programs over the projected timeframe.

22.1.1 Other Water Acquisition Programs

The evaluation of the cumulative effects of all water acquisition programs considered addresses three primary issues:

1. *The effects of transferring the total quantity of water through the Delta that all programs may purchase.* The available capacity of the Central Valley Project (CVP) and State Water Project (SWP) Delta pumps to export water and the amount of water available for purchase would limit the total quantity of water for transfer.

   In most instances the cumulative analyses are similar to the Flexible Purchase Alternative analyses. The Flexible Purchase Alternative analyses examine a "worst–case scenario" that maximizes the utilization of available export capacity of Delta facilities that limits transfers for all the acquisition programs. As a consequence, implementation of one or more of the programs in conjunction with the EWA would alter the beneficiary of the transferred water, but the total supply of water from upstream sources would not be any greater than that analyzed for the Flexible Purchase Alternative.

2. *The interrelationship between the water purchase programs*. Some of the programs have higher priority for conveyance and/or pumping capacity than others. According to the 2003 Protocols for the Operation of the EWA, the following is the priority for pumping at SWP and CVP pumps (from highest to lowest priority):

   SWP:
   - SWP Pumping
   - Water transfers for SWP contractors
   - Joint Point of Diversion (JPOD) use for specific CVP contractors
   - Wheeling for CVP and EWA (split 50-50 between CVP and EWA/Refuge Level 4 purchases)[1]
   - Water transfers for others

   CVP:
   - CVP Pumping
   - Refuge Level 4
   - Cross Valley Canal
   - EWA
   - Water transfers for others

   Because of the relaxation of the Section 10 constraint of the River and Harbors Act, EWA has been dedicated 500 cfs of pumping capacity at Banks Pumping Plant in July to September. The conveyance capacity would yield approximately 50,000 – 60,000 acre-feet per year, depending on operational restrictions (refer to Chapter 2).

3. *The likely locations, types, and purchase amounts of the water transfers.* In some years, other water acquisition programs would compete with the EWA for water. The exact locations, type and amounts of other programs' transfers are not yet known, so the cumulative analysis examines these effects qualitatively.

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[1] Wheeling is defined as the transportation of water, as the result of ad hoc contracts or other arrangements, in conveyance facilities which the transferring party does not otherwise have the authority to use (Water Education Foundation 2000).

In general, EWA agencies are committed to reducing any potential cumulative effects. When possible, EWA agencies would work cooperatively with other acquisition programs to avoid water purchases if it would result in a cumulative effect. This coordination would take place through the CALFED Water Transfers Program.

22.1.2 Facility Improvement Projects

Another factor of the cumulative condition is that various proposed projects may alter current water storage, conveyance, or export abilities. Depending on the time needed to plan, design, and construct these facilities, they may affect the cumulative condition within the timeframe of the EWA. Therefore, this chapter (Section 22.2.3) includes with the project descriptions a qualitative assessment of the potential cumulative effects.

22.2 Cumulative Programs and Projects

This section describes future water acquisition programs and facility improvement projects considered in the cumulative analysis and their interrelationship with one another. Other water acquisition programs relevant to the analysis include:

- Sacramento Valley Water Management Agreement (SVWMA);
- Dry Year Water Purchase Program;
- The Governor's Drought Risk Reduction Investment Program (DRRIP);
- Central Valley Project Improvement Act (CVPIA) Water Acquisition Program (WAP); and
- Environmental Water Program (EWP).

Delta facility improvement projects relevant to the cumulative analysis include:

- South Delta Improvement Project (SDIP);
- North Delta Improvements Project (NDIP);
- In-Delta Storage Program; and
- SWP/CVP Intertie.

22.2.1 Other Water Acquisition Programs

The sections below summarize the program descriptions and relevance to the cumulative condition.

22.2.1.1 Sacramento Valley Water Management Agreement (Phase 8)

Over the past several years, the State Water Resources Control Board (SWRCB) has been engaged in seven phases of proceedings regarding the responsibility for meeting the flow-related water quality standards for the Delta established in the 1995 Delta Water Quality Control Plan (Delta WQCP), resulting in Decision 1641. The flow-related standards provide requirements for the amounts of water flowing out from the Delta into the San Francisco Bay to maintain quality parameters within the Delta. The SWRCB hearings have focused on which users should provide this water, and the eighth phase of these proceedings focused on the water users in the Sacramento Valley. Senior water rights holders and water users throughout the Sacramento Valley felt that water releases for Delta water quality could infringe upon their water rights.

In response, the Department of Water Resources (DWR), Bureau of Reclamation (Reclamation), Sacramento Valley water interests, and export water users entered the SVWMA in April 2001, providing an alternative to the Phase 8 proceedings. The SVWMA establishes a process by which local parties are to develop and implement a variety of local water management projects that will increase water supplies cumulatively, meeting both in-basin demands and the Delta water quality requirements set forth in the Delta WQCP. SVWMA proponents plan to implement the SVWMA in water year 2003. In 2005, Phase 8 upstream users are to provide 185,000 acre-feet of water to meet water quality standards through implementation of conjunctive management projects (SVWMA 2002). Current preparations are underway for an EIR/EIS for the program.

The agreement includes a series of work plans that are to be implemented over an 8--year period. Currently, the short-term work plan consists of over 50 locally managed, publicly funded projects that are to be initiated within the 2002-03 calendar years. These projects incorporate the following benefits:

- Facilitation of groundwater management and planning;
- Water conservation and efficiency through facility improvements;
- Fish passage improvements;
- Provisions for water transfers and exchanges;
- Flood protection;
- Conjunctive water management opportunities; and
- Environmental improvements (SVWMA 2002).

An offstream storage project north of the Delta is a key component of the long-term plan. This storage is intended to provide additional water quality benefits to the Delta and provide additional storage space with other environmental benefits.

SVWMA could contribute to the cumulative condition in normal, dry, and critical water years. Signatories to SVWMA would initially seek water during below normal, dry, and critically dry years from reservoirs, groundwater pumping, and groundwater substitution opportunities upstream from the Delta. SVWMA agreement would purchase up to 185,000 acre-feet (SVWMA 2002). SVMWA has conveyance capacity priority over the EWA program. In the long term (5 to 10 years), outside of the EWA program timeframe, the water for SVWMA would likely come from new facilities, eliminating potential conflicts with EWA acquisitions.

22.2.1.2 Dry Year Water Purchase Program

In mid-January 2001, several SWP and CVP contractors requested that DWR and Reclamation initiate planning for a dry year water acquisition program, based on the dry year hydrology to date. DWR announced the 2001 Dry Year Water Purchase Program (Dry Year Program) in March 2001. This program represented the first dry year acquisition program by DWR since the 1991, 1992, and 1994 Drought Bank programs. The Dry Year Program was implemented again in 2002 and 2003, and may be activated in the future to help public agencies throughout California supplement their water supplies in dry years.

The program intends to reduce the possibility of any hardship associated with water shortages through the facilitation of water transfers and is open to SWP contractors, CVP contractors, and third party users. In 2001, DWR provided 138,800 acre-feet of water from willing sellers in northern California to eight SWP contractors (DWR 2002). In 2002, DWR secured 22,000 acre-feet of water from willing sellers in Northern California and provided it to four water agencies throughout the State. In 2003, four public agencies and two private parties have requested a total of 63,000 acre-feet from the program (DWR 2002a). Transfers negotiated between CVP and SWP contractors and other water users, such as the Forbearance Agreement with Westlands Water District and the recent crop idling acquisition by Metropolitan WD from water agencies upstream from the Delta, are considered part of the Dry Year Program. The mandatory reduction in California's use of Colorado River water, discussed in Chapter 2, could increase demand for water upstream from the Delta and increase acquisitions under the Dry Year Program.

During dry years, DWR and Reclamation would likely initiate water acquisitions first from reservoirs upstream from the Delta, followed sequentially by groundwater substitution, crop substitution, and crop idling in areas upstream from the Delta. This acquisition sequence is expected to compete with other programs, including EWA, for available water and pumping capacity. In years that EWA and the Dry Year Program are active, the CALFED agencies would coordinate to provide the needed water amounts for both programs. Conveyance of the Dry Year Program acquisitions for SWP contractors has priority over EWA conveyance.

22.2.1.3 The Governor's Drought Risk Reduction Investment Program

As part of the implementation of the CALFED Plan, the Governor convened a panel to develop plans for California to respond to a future drought. In December 2000, the panel published its report, entitled the Critical Water Shortage Contingency Plan, which is now referred to as the DRRIP. The plan recommended a multi-pronged set of preparations and responses to future water shortages. The water acquisition element of the plan is the Critical Water Shortage Reduction Marketing Program, or CWSRMP. CWSRMP is an as-needed water purchasing and allocation program and is activated whenever parts of the State are suffering from critical water shortages.

The CWSRMP consists of the following three tiers that consider the severity of water shortages and a varying level of State response:

> **Tier 1** applies throughout CALFED Stage 1 and consists of water shortage preparedness activities undertaken by the State and local agencies. These activities would include State actions necessary to prepare for CWSRMP operation, including drafting a PEIS/EIR and developing contract formats for program water purchases. Local agency preparedness activities could include measures for water use efficiency, development of local facilities to enable water transfers, or development of local groundwater management programs. Members on the Governor's panel differed on whether DWR should operate a water purchasing program in Tier 1 (GADPP 2000).
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> **Tier 2** applies in the early stages of a hydrologic drought or other critical water shortage and includes water transfers. 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. Participants would then pay a price for the water that recovers program implementation costs, including costs for mitigating third-party impacts and environmental impacts identified through the CEQA process (GADPP 2000).
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> **Tier 3** applies 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 measures needed to protect public health and safety. These protection measures could include State financial assistance to small water systems for emergency water acquisitions, including water hauling, pipeline construction, or well drilling (GADPP 2000).

DRRIP is designed to reduce the impacts to agriculture and urban users during critical drought periods. DRRIP is expected to acquire water from the Upstream from the Delta Region and the Export Service Area during dry years by first seeking water from reservoirs, then by groundwater substitution, and lastly through crop idling

(DWR 2002). Although DRRIP has not yet defined the details of its water acquisition strategies, the schedule dictates implementation in the next severely dry year after 2002. The Dry Year Purchase Program and DRIPP could combine into one program upon completion of a programmatic document in October 2004 (Jones 2002).

The options are similar to--and potentially in conflict with--those available for EWA upstream water purchases. When both programs are active, the CALFED agencies would work together, seeking to provide the needed water amounts for both programs. DRRIP would have pumping/conveyance priorities similar to the Dry Year Acquisition Program.

22.2.1.4 CVPIA Water Acquisition Program

Section 3402 of the CVPIA identifies the purposes of the CVPIA as protection, restoration, and enhancement of fish, wildlife, and associated habitats in the Central Valley. A requirement of the CVPIA is the acquisition of water for protecting, restoring, and enhancing fish and wildlife populations. To meet water acquisition needs under CVPIA, the U.S. Department of the Interior (Interior) has developed a joint Reclamation and U.S. Fish and Wildlife Service (USFWS) Water Acquisition Program.

The CVPIA requires the provision of firm water supplies to specified National Wildlife Refuges, State Wildlife Areas, and private wetlands in the Grassland Resource Conservation District for the purpose of optimum habitat management on the refuge lands.[2] CVPIA Section 3406(d)(1) requires that the Secretary of the Interior immediately provide specific quantities of water to the refuges and indicates that long-term contractual agreements should be developed for water provided. These are referred to as "Level 2" supplies,[3] for which Reclamation and Interior entered into long-term water supply agreements/contracts with USFWS and California Department of Fish and Game (CDFG). The CVPIA requires delivery of this water in all year types except critically dry water year conditions, as determined by Reclamation for allocation of CVP water. In the case of a critically dry water year, the Secretary of the Interior may reduce Level 2 refuge water supplies by up to 25 percent (USFWS 1998).

Section 3406(d)(2) of the CVPIA refers to "Level 4" refuge water supplies, which are the quantities required for optimum habitat management of the existing refuge lands identified in the "1989 Report on Refuge Water Supply Investigations." The CVP must acquire the increment of water between Level 2 and Level 4 supplies from willing sellers. Section 3406(d)(2) requires that, upon enactment of the CVPIA, Level 4 water be provided in 10 percent cumulative increments per year with provision of full Level 4 supplies after 10 years. Reclamation has been acquiring Level 4 water on a short-term basis from willing sellers since 1992; 2002 is the first year that Reclamation is expected to provide full Level 4 supplies to the refuges. Level 4 water

[2] CVPIA Sections 3406(d)(1) and 3406(d)(2).
[3] See also Chapter 2.

supplies amount to an additional 163,259 acre-feet above Level 2 water supplies (USFWS 1998).

Like EWA acquisitions, CVPIA water acquisitions must not create an involuntary reallocation of CVP yield for refuges. Priority resources for water acquisitions are primarily reservoirs and secondarily groundwater substitution opportunities throughout the State. Idling is also a secondary source of water for CVPIA acquisitions. Strategies for water transfers include use of options, 1-year transfers, groundwater banking, and carryover into the San Luis Reservoir. The CVPIA will purchase up to 120,000 acre-feet from willing sellers during wet and dry years. CVPIA has higher pumping and conveyance capacity priority than the EWA at the CVP pumps, and capacity is shared equally at the SWP pumps (DWR 2002). Detailed coordination among the CVPIA Water Acquisition Program, the Environmental Water Program, and EWA requires Reclamation, USFWS, and other CALFED agencies to determine how to address individual program goals while pursuing joint acquisitions.

22.2.1.5 Environmental Water Program

CALFED agencies created the EWP to carry out flow-related goals of the Ecological Restoration Program (ERP) Plan. The EWP will acquire water from sources throughout the Bay-Delta watershed and provide flows to facilitate:

- Improvement in habitat conditions for fishery protection and recovery;
- Restoration of critical instream and channel-forming flows in Bay-Delta tributaries;
- Improvement in Delta outflow during critical periods; and
- Improvement of salmon spawning and juvenile survival in upstream tributaries as defined by the ERP and ERP Strategic Plan, by purchasing up to 100,000 acre-feet of water per year by the end of Stage 1.

Some of these EWP assets will compliment the EWA. While the EWP focuses on enhancing instream conditions, program managers would also consider potential benefits to offstream resources. The EWP intends to purchase water from willing sellers in its effort to meet program objectives. CALFED agencies intend to first try the program with pilot water acquisitions. CALFED agencies will then evaluate the results to determine the program effectiveness and to refine the EWP framework (CALFED 2002a). Once the CALFED agencies gather sufficient information, they will prepare an environmental document that covers full implementation of the EWP.

The EWP will be operational through the end of the 30-year CALFED Bay-Delta Program (CALFED 2002a). The EWP is designed to make long-term surface water purchases, while EWA is designed to make short-term water purchases from a variety of acquisition sources. It is anticipated that the EWP would focus water acquisitions on Central Valley rivers and streams, with reservoirs upstream from the Delta as

priority sources. Expansion of this geographic area is dependent upon coordination with the CALFED Science Program and other water acquisition programs.

The EWA and EWP programs plan to coordinate efforts to achieve mutual benefits with single acquisitions. These single acquisitions may include joint acquisitions, with funds contributed both by the EWA and EWP, as well as sequential acquisitions, in which assets acquired by one program are sold to the other after the assets have served the initial purpose. Of additional consideration is use of EWP funds to time EWA acquisitions so that water is transferred during ecologically beneficial periods. Additional strategies for water transfers include groundwater banking and long term purchases.

22.2.1.6 Water Acquisition Program Interrelationships

Implementation of the programs above represents the cumulative condition for water acquisitions through 2007. Several relationships among the programs are important to discuss. First, the major constraint on the cumulative condition is the limited Delta pumping capacity. Maximum transfers in the Upstream from the Delta Region by all water acquisition programs would be approximately 600,000 acre-feet in a dry year. Because of conveyance limitations, priority at the Project pumps becomes critical. Several programs, including SVWMA, the Dry Year Program, DRRIP, and, at times, CVPIA WAP, have pumping priority over EWA. If pumping capacity is not available for EWA purchases, the EWA agencies would acquire water from sources in the Export Service Area. Therefore, the location and type of acquisition becomes a factor for operation of these programs. Table 22-1 further illustrates the relationships among the programs.

Table 22-1
Summary of the Cumulative Condition of Water Acquisition Programs

Program	*Frequency/ Year Type for Implementation*	*Status*	*Location Relative to Delta*		*Potential Acquisition and Management Actions*					
			Upstream	*Export Service Area*	*Surface Water Purchase*	*Ground-water Purchase*	*Ground-water Substitution*	*Ground-water Storage*	*Crop Idling*	*Source Shifting*
EWA	Annual	Current	X	X	X	X	X	X	X	X
SVWMA	Critical, Dry, Below Normal	Future	X		X	X	X			
Dry Year Water Purchase Program	Critical, Dry	Current	X		X		X		X	
DRRIP	Critical	Future	X	X	X	X, *Export Service Area*	X		X	
CVPIA WAP	Annual	Current	X	X	X		X		X	
EWP	Annual	Future	X		X	X	X		X	

The preferred location and type of water acquisition is similar among most programs and is based mainly on costs. Water purchases in the Upstream from the Delta Region tend to be less expensive than purchases in the Export Service Area. Typically, the first acquisition priority would be non-Project surface water because

surface water is usually the least expensive source. When surface water is no longer available for purchase, the water acquisition programs would look to groundwater substitution and direct groundwater purchases to acquire water. Temporary crop idling would be the last water acquisition option utilized by most programs.

Furthermore, as indicated in Table 22-1, all the acquisition programs could be operated in a critical water year and most in a dry year. Because surface water transfers in the Upstream from the Delta Region are the least expensive, surface water supplies would not likely provide enough water for needs of all programs during a dry year. Other types of acquisitions, including crop idling, would likely be used. Thus, total water acquisitions from all programs would maximize pumping capacity in the Delta. Therefore, the potential for cumulative effects to occur during dry years is the greatest, as all programs seek to acquire water in the Upstream from the Delta Region through all acquisition types. The Flexible Purchase Alternative analysis evaluates this "worst-case" scenario.

In many instances, the same agencies (DWR and Reclamation) will be involved in the acquisitions or approval of the acquisitions; therefore, agencies would coordinate purchases. Coordination of the programs will be particularly crucial during critical and dry years, when all programs are in operation. Coordination would be facilitated through the CALFED Water Transfer Program.

22.2.2 Delta Facility Improvement Projects

The CALFED ROD identifies potential actions to be implemented or considered during Stage 1 to improve storage and conveyance. Several of the actions are included in the cumulative analysis. This section contains brief descriptions of the projects and their relevance to the cumulative condition.

22.2.2.1 South Delta Improvements Project

The CALFED ROD identifies the South Delta Improvements Project (SDIP) as a way to improve the use of the Delta for conveyance purposes. The intention of the SDIP is to increase conveyance capacity at the SWP Delta export facility to meet water supply demands in the Export Service Area. The SDIP includes several projects intended to maximize diversion capability into Clifton Court Forebay, while providing an adequate water supply for the South Delta Water Agency (SDWA) and reducing the effects of SWP exports on aquatic resources. The major components of the SDIP are:

- increasing the maximum allowable diversion capacity at the SWP Clifton Court Forebay;
- dredging a portion of Old River to improve conveyance capacity;
- constructing permanent operable barriers to improve water supply reliability and water quality;
- dredging local channels to reduce the frequency of barrier operations and to accommodate improvements to existing agriculture; and

- constructing a permanent operable fish control structure at the head of Old River to improve conditions for salmon migrating up and down the San Joaquin River.

CALFED agencies determined that the objectives outlined in the PEIS/EIR could not be met without some of these South Delta improvements (DWR and Reclamation 2002).

22.2.2.1.1 Banks Pumping Plant Increase to 8,500 cfs

This project would involve increasing SWP pumping at the Banks Pumping Plant from the current limit of 6,800 cfs to 8,500 cfs from March 15 to December 15 and modifying existing pumping criteria from December 15 to March 15 to allow greater use of SWP export capacity (CALFED 2000a). The proposed increase in export capacity to 8,500 cfs would allow more water to be moved through the Delta by all acquisition programs during the summer months. Because purchases in the Upstream from the Delta Region are less expensive per acre-foot than purchases in the Export Service Area, water programs could purchase more water with a fixed amount of money in the Upstream from the Delta Region.

Therefore, under the cumulative condition, if an EWA action reduces pumping, the lost opportunity for conveyance would be greater with the increased export capacity than it would be with the existing capacity. Because the EWA must repay export users for water that was not delivered during pumping reductions, EWA would have to repay more water if pumping were reduced from the higher capacity than it would if pumping were reduced at the existing capacity. However, because increased export capacity would be available, EWA agencies could purchase more water upstream from the Delta at lower costs. Presumably, on average, the cost savings available with less expensive upstream purchases would offset the costs of EWA repayments required when reducing pumping at the larger export capacity.

Though not a direct part of SDIP, the CALFED ROD discusses the potential to increase SWP pumping capacity to a maximum capability of 10,300 cfs. This action would be taken only after the increase to 8,500 cfs. The CALFED ROD identifies that new fish screens at the Clifton Court Forebay and Tracy pumping plants should accompany a capacity increase to 10,300 cfs. The ROD indicates 2006 as the starting year for operations and performance testing of the new screens. Pumping capacity would not likely increase to 10,300cfs within the timeframe of the EWA.

22.2.2.1.2 Constructing Permanent Operable Barriers

The SDIP also proposes to dredge and install permanent and operable barriers to ensure adequate quantity and quality to agricultural diverters within the South Delta. The existing temporary barriers have a limited ability to respond to the continually changing hydraulic and environmental conditions in Delta Channels. It is anticipated that if permanent barriers were installed and continuously operated to address Delta concerns, water supply and quality would be improved. If the barriers were in place, water could be transferred, lessening the potential to affect the water quantity, quality, and channel water level needs of water users in the South Delta. Export

capacity could not be increased to 8,500 cfs unless the channels in the South Delta are dredged and the permanent operable barriers are installed.

22.2.2.2 North Delta Improvements Project

The ROD includes components of the North Delta Improvements Project (NDIP) to address flood control, ecosystem restoration, water quality, fisheries, and water supply reliability concerns in the North Delta. Several parts of the CALFED Ecosystem Restoration Program highlight opportunities for ecosystem restoration and flood protection in the area. The North Delta (particularly along the Mokelumne River and Lost Slough) has a lack of river channel capacity for conveying flows from the Sierra Nevada watersheds safely through the North Delta to the San Joaquin River. The following NDIP actions have been identified to address these issues: 1) dredging and setback levees along the north and south forks of the Mokelumne River, 2) providing flood control and habitat restoration benefit on McCormack-Williamson Tract, 3) restoring wildlife and fisheries habitat along the Georgiana Slough, and 4) conducting a study of modifying operating rules for the Delta Cross Channel (DCC) and of the feasibility of constructing a zero to 4,000 cfs screened diversion in the Sacramento River. A project-level EIR/EIS will analyze the first three actions, which will be implemented as a single project. The fourth action will be addressed in a feasibility study (CALFED 2000).

The NDIP action to design and construct floodway improvements in the North Delta would provide conveyance, flood control, and ecosystem benefits. This action includes enlargement of the South Fork of the Mokelumne River to increase conveyance abilities in summer months when the DCC gates are open, enabling more water to be moved through the DCC without the potential of flooding. During periods of high exports, the DCC waters mix with and improve the quality of the San Joaquin flow. When the gates are closed, Delta water quality worsens (CALFED 2000).

This action could affect water acquisition program operations under the cumulative condition. For example, currently, the EWA is required to buy additional carriage water[4] to meet Delta water quality standards. If the Mokelumne River channel were enlarged, more water could move through the DCC, and the EWA would not be required to purchase additional carriage water to maintain water quality standards. EWA Management Agencies would be able to use the money saved from decreased carriage water acquisitions to purchase water for environmental and supply purposes.

22.2.2.3 In-Delta Storage Project

The CALFED agencies have researched various in-Delta storage projects. As part of the investigations, CALFED agencies have explored the lease or purchase of the Delta Wetlands Project, a private proposal by Delta Wetlands Properties Inc. to develop and market a water storage facility in the Delta. The Delta Wetlands Project includes 1) conversion of Webb Tract and Bacon Island into storage reservoirs, termed

[4] See Chapter 5, Water Quality.

"reservoir islands" and 2) conversion of Bouldin Island and Holland Tract into "habitat islands" for wetland and wildlife management and enhancement for environmental mitigation. The storage capacity of the "reservoir islands" is estimated to be 217,000 acre-feet, with a designated water surface elevation at 4 feet above mean sea level (CALFED 2002).

The purpose of in-Delta storage is to help meet the ecosystem needs of the Delta and EWA and CVPIA goals; to provide water for use within the Delta; and to increase reliability, operational flexibility, and water availability for the SWP and CVP water use south of the Delta water. Improved operational flexibility would be achieved by providing an opportunity to change the timing of Delta exports. In-Delta storage would provide a location to which water acquisition programs could convey and store water during pumping restrictions. The Delta Wetlands Project would divert water from the Delta to in-Delta storage during periods of high flow and low impacts on fish and create new points of diversion that could be used selectively to minimize impacts on aquatic resources. Any water stored in the Delta would be readily available for export when restrictions are relaxed.

The In-Delta Storage Program Draft Summary Report, completed in May 2002, evaluated the Delta Wetlands Project for technical and financial feasibility for public ownership. It was the conclusion of DWR that for ownership by DWR or Reclamation, the project as proposed by Delta Wetlands requires modification and additional analyses before it is appropriate to "initiate negotiation with Delta Wetland owners or other appropriate landowners for acquisition of necessary property" (CALFED 2000). The environmental review and documentation, necessary authorization, and funding are expected to be completed in 2005.[5]

The potential effects of the Delta Wetlands Project on water quality and water supply are unknown. Several water quality requirements in SWRCB Decision 1643 are intended to ensure that the Delta Wetlands Project will not create significant water quality impacts. Specific criteria were developed for total organic carbons (TOC), chloride, disinfection byproducts (DBPs), dissolved oxygen, and temperature (CALFED 2002). It is possible that TOCs could increase in the stored water above Delta quality standards and, therefore, constrain the supply available from the Delta Wetlands Project.

The actual operations of the project, including who would operate it and how, are still unspecified. Therefore, it is unknown how the Delta Wetlands Project would affect the cumulative condition. Any water exported through the pumps from the Delta Wetlands Project is expected to have lower priority than the EWA (CALFED 2002).

[5] The ROD deadlines for the In-Delta Storage Program no longer apply, because the CALFED agencies decided to pursue the Re-engineered Delta Wetlands Project instead of the Delta Wetlands Project as proposed by Delta Wetlands Properties, Inc.

22.2.2.4 SWP/CVP Intertie

The ROD identifies the construction of a number of interties and bypasses in the water system. A proposed intertie between the SWP and CVP facilities at or near Tracy could affect the cumulative condition. Currently, the CVP facility has a maximum pumping capacity of 4,600 cfs. The canal downstream from the pump narrows at the final pools, reducing the maximum capacity that can be delivered to O'Neill Forebay to 4,200 cfs. An intertie would be built between the project facilities to accommodate the additional 400 cfs that cannot be moved through the final pool of the canal. The canal would potentially increase export capacity for the programs. For example, if the CVP allocations to its contractors were less than 100 percent, unused capacity in the intertie could provide additional capacity for the EWA to move water through the Delta, assuming that the CVP is not using the capacity for its own purposes. This capacity would typically be available during summer months, but the exact amounts are unknown.

22.2.3 Delta Improvement Projects Interrelationships

The Delta Improvement Projects would facilitate movement of water through the Delta and increase export capacity at the Delta pumps. These projects could effectively increase the amount of water transfers possible for the water acquisition programs under the cumulative condition. Essentially, these programs would allow more purchases to occur than those described under the Flexible Purchase Alternative, which would increase the possibility that all water types would be acquired during all hydrologic conditions. The pumping capacity priorities discussed above would still apply.

Delta Improvement Projects would improve environmental conditions through various means. Increasing capacity at the SWP pumping plant would require new fish screens to be installed. In-Delta storage would provide an immediate water supply for fish actions. The NDIP would address the need for flood control solutions that are integrated with ecosystem improvements. These projects would improve the environment of the Delta, while also improving conveyance and storage capacity.

Cumulatively, the Delta improvement projects would improve water quality in the Delta and water supply to users south of the Delta. Because conveyance would increase, cumulative effects to fisheries could be possible. However, because the projects are in the planning stages, the potential cumulative effects to water supply, Delta water quality, and fisheries are unknown. The environmental documents for the Delta Improvement Projects must address the projects' contributions to increased water acquisition potentials for the EWA and the other water acquisition programs. Currently, no conclusion can be made regarding cumulative effects of the Delta Improvement Projects; therefore, individual resource cumulative analyses do not discuss cumulative effects of these projects.

22.3 Incremental Contribution of the EWA to the Cumulative Condition

Mitigation measures would minimize the potential for EWA acquisitions to significantly contribute to cumulative effects. Detailed coordination between the water acquisition programs, along with EWA implementation of the mitigation measures, would limit adverse cumulative effects. CALFED agencies must determine how individual program goals will be addressed in the pursuit of joint acquisitions. Coordination would occur through the CALFED Water Transfers Program.

22.4 Summary of Cumulative Effects for Individual Resource Areas

Each resource chapter includes an analysis of cumulative effects. The following sections summarize the resource cumulative analyses. Refer to associated chapter for complete discussion of cumulative effects.

22.4.1 Surface Water Supply and Management

Under the water transfer programs, water in the Upstream from the Delta Region would be purchased from stored reservoir surface water supplies, groundwater supplies, and through groundwater substitution and crop idling practices. It is possible that cumulative purchases could draw reservoirs down below the Baseline Condition, lessen the possibility of refill, and affect future users' water supply. It is anticipated, however, that districts selling water to the programs would manage their supplies responsibly so that SWP, CVP, and non-Project users would not be adversely affected. Therefore, no permanent cumulative effects to surface water supply reservoirs would occur.

Water acquisitions through groundwater substitution and crop idling would not result in flow changes that affect nonparticipating users' water supply; therefore, the acquisitions would not result in a significant cumulative effect.

22.4.2 Water Quality

The Flexible Purchase Alternative analysis evaluated the potential impacts to rivers and reservoirs as a percent change in flow, reservoir storage, and water surface elevation. If additional transfer programs draw reservoirs down or reduce riverflows below the acceptable criteria for water quality management, the effects could be cumulatively significant. To prevent cumulatively significant impacts, water agencies would have to cooperatively set release limits on reservoirs such that the reservoirs would not be drawn down below the levels required to maintain suitable water quality levels within the reservoirs, especially during the summer season when water levels are already low within the reservoirs.

River flow rate would most likely be governed by established regulatory requirements for anadromous and riverine fish, through such agencies as USFWS and

National Oceanic and Atmospheric Administration Fisheries, which would prevent flow rates from increasing or decreasing in a manner that would be considered harmful to the fisheries. The fluctuations in flow caused by the cumulative actions would most likely not increase or decrease flows to cause a cumulatively significant impact to water quality.

With regard to cumulative effects to water quality in the Sacramento-San Joaquin Delta Region, the analysis presented in Section 5.2.4.1.4 is not only an evaluation of the Flexible Purchase Alternative as compared to the Baseline Condition, but is also an evaluation of the Cumulative condition as compared to the Environmental Setting/No Action/No Project condition. Therefore, a cumulative effect would not occur.

In the Export Service Area, source shifting would not be expected to lower reservoir levels in Diamond Valley Lake, Castaic Lake, and Lake Perris beyond the levels of the Baseline Condition. Therefore, a cumulative effect would not occur.

22.4.3 Groundwater Resources

The cumulative effects analysis focuses on the regional programs that may affect groundwater rather than on local projects. Crop idling as a water acquisition method during dry years could result in lower groundwater levels because irrigation water would not percolate into the groundwater basin, resulting in adverse effects. However, the EWA agencies would consider other reasonably foreseeable transfers by all water transfer programs when determining where to acquire water through crop idling. EWA agencies would then only purchase water from idling 20 percent of the rice land in a county, where this 20 percent would include the other, reasonably foreseeable transfers.

During dry years more groundwater substitution transfers may occur in the acquisition programs because there will be a greater capacity for transport at the pumps. These cumulative effects could be potentially significant if these programs are not coordinated. It is assumed that each program will institute similar groundwater mitigation measures as those stipulated under the EWA Program. The EWA's groundwater mitigation measures require a pre-purchase evaluation for areas in which groundwater levels (prior to the transfer) are sufficiently low to warrant potential regional adverse effects. If the evaluation shows that EWA extraction would likely result in regional adverse effects, the EWA Project Agencies would not purchase groundwater from the area of concern. The groundwater mitigation measures require that the local selling agencies establish monitoring and mitigation programs prior to EWA transfers.

Consequently, the coordinated implementation of the programs together with the mitigation measures stipulated under the EWA Program would minimize any adverse effects that the EWA Program may contribute to the cumulative effects of all the programs to less than significant.

22.4.4 Geology, Soils, and Seismicity

Water acquisitions through crop idling could potentially affect geology and soils. In the Upstream from the Delta Region, conditions (both existing management practices and weather conditions) are not favorable for erosion of soils. However, loss of surface soils through erosion of bare fields during crop idling is a concern for the Export Service Area where water acquisition programs may acquire water via cotton idling. EWA agencies will require a dust suppression plan to mitigate for significant impacts. Under the cumulative condition, EWA agencies would also require the dust suppression plan; therefore, any effects to the cumulative condition would be less than significant.

22.4.5 Air Quality

In the Upstream from the Delta Region, ozone attainment status is an issue of concern; additional emissions of ozone precursors from other programs would contribute to already high ozone concentration areas, creating a potential significant cumulative effect. Because the EWA is implementing mitigation measures to alleviate a potentially cumulative impact, the EWA's contribution is considered less than significant.

Counties in the Export Service Area are considered severe nonattainment areas for ozone. The production of ozone precursors by several programs could lead to a significant cumulative impact. However, the EWA is implementing mitigation measures listed in Section 8.2.7, which would also alleviate the cumulative impact. Therefore, EWA's contribution is not cumulatively considerable and thus not less than significant.

Crop idling causes increased fugitive dust emissions and associated PM_{10} emissions. Both fugitive dust and PM_{10} are currently at high concentrations in this region. The production of PM_{10} by cumulative crop idling transfers could lead to a potentially significant cumulative impact. However, Fresno, Kern, Kings, and Tulare Counties are within the San Joaquin Valley APCD. The APCD regulates fugitive dust emissions and requires adherence to mitigation measures in the form of a dust suppression plan. Any crop idling transfer program would be required to comply with the APCD regulations; therefore, after mitigation no cumulative impacts would occur.

22.4.6 Fisheries and Aquatic Ecosystems

The analysis of potential cumulative effects to fisheries and aquatic resources is based on a discussion of potential impacts resulting from the comparative analysis of the Flexible Purchase Alternative and the cumulative condition. Implementation of one or more of the water acquisition programs in conjunction with the EWA will not change the total supply of water from upstream sources from that analyzed for the Flexible Purchase Alternative. Because transfers under other programs are managed during the same time periods evaluated for the management of EWA assets, these

increases or decreases in flows would not change, relative to levels identified under the Flexible Purchase Alternative.

Water surface elevation and end-of-month storage levels would not be reduced further than those analyzed for the Flexible Purchase Alternative. Similarly, changes in flow and water temperatures in rivers potentially affected by the EWA cumulative condition also would be similar to those analyzed for the Flexible Purchase Alternative. In the Delta, potential impacts of the Flexible Purchase Alternative were determined by conducting an analysis based on the maximum utilization of available export capacity of Delta facilities, which is the limiting constraint on transfers for the water acquisition programs. Therefore, potential cumulative impacts to reservoir and riverine fisheries and habitats in the Upstream from the Delta Region would be less than significant.

In the Export Service Area, stored reservoir water is not available for purchase, and source shifting would only take place under the EWA Program. Source shifting would not result in reservoir water surface elevations in San Luis, Castaic, Perris, and Diamond Valley Reservoirs lower than those reached under the Baseline Condition. Therefore, potential cumulative impacts resulting from implementation of the Flexible Purchase Alternative in the Export Service Area would be less than significant.

22.4.7 Vegetation and Wildlife

All programs which participate in groundwater substitution will conduct groundwater actions based on individual environmental documents required for the use of CVP and SWP facilities. The oversight of water transfers by Reclamation and DWR would ensure that the effects because of groundwater substitution actions on wetlands and other vegetation communities would be avoided or minimized. Groundwater substitution actions undertaken by other water supply programs would also be limited by water transfer capacities and the same criteria applied to the EWA program. Therefore, groundwater substitution would not present a cumulative effect on vegetation and wildlife resources.

Crop idling by all acquisition programs, including EWA, would be limited by water export capacities. In addition, EWA agencies would consider other reasonable and foreseeable crop idling actions by other water acquisition programs before idling 20 percent of county rice or cotton acreage. These limitations and socioeconomic 20 percent crop idling measure would control the amount of cropland idled for water supply programs. In the Export Service Area, EWA crop idling actions affect cotton crops. Cotton does not provide habitat of value to wildlife; therefore idling of cotton crops under the EWA program would not affect vegetation and wildlife resources. Therefore, crop idling would not present any cumulative effects on vegetation and wildlife resources in both regions.

Stored reservoir water would potentially be purchased in all the cumulative programs. The EWA Flexible Purchase Alternative analysis includes the maximum amount of water available from each reservoir. Therefore, the amount for purchase

either by the EWA or in combination with other projects is the worst-case effect that could occur should all programs purchase stored reservoir water in any single year. Therefore, like the Flexible Purchase Alternative analysis, effects under the cumulative condition would be less than significant.

22.4.8 Regional and Agricultural Economics

Idling of rice fields in the Upstream from the Delta Region and cotton fields in the Export Service Area by all water acquisition programs could result in cumulative economic effects. At the time of the water acquisition, the EWA agencies would consider other reasonably foreseeable transfers when determining where to acquire water through crop idling. EWA agencies would then only purchase water from idling 20 percent of the rice or cotton land. If other water acquisition programs purchase more water through crop idling resulting in greater than 20 percent of rice or cotton acreage, those programs would be responsible for meeting Water Code requirements and addressing the subsequent cumulative effect.

In addition to the EWA, water acquisition programs that purchase water via groundwater substitution would result in further declines of groundwater levels and higher extraction costs for third party users. The EWA would continue to implement its groundwater mitigation measures.

Demands for water transfers are expanding the water transfers market.
Any local or government sponsored transfer program would contribute to the cumulative condition. More participants in the market might drive up the price of transfers. Increased prices should increase the long-run supply of water for transfer.

22.4.9 Agricultural Social Issues

Water transfers via crop idling by all water acquisition programs could result in cumulative effects to farm labor. At the time of an EWA water acquisition, the EWA agencies would consider other reasonably foreseeable transfers when determining where to acquire water through crop idling. EWA agencies would then only purchase water from idling 20 percent of the rice or cotton land. With careful coordination, data collection, and verification, crop idling for the EWA would cumulatively not adversely affect farm labor.

22.4.10 Agricultural Land Use

The cumulative effects analysis considers other water transfer programs that utilize crop idling, land retirement programs, and conservation programs that protect agricultural and open space land. Crop idling by these programs would be temporary and would not permanently alter any land use patterns. Furthermore, EWA land use mitigation measures would not decrease the amount of land categorized as prime, statewide important, or unique. Therefore, EWA would not permanently change land use practices and would not contribute to any cumulative effect. Consequently, because crop idling is temporary and EWA would not

contribute to any changes in land use classifications, any potential cumulative effects on agricultural land use would be less than significant.

22.4.11 Recreational Resources

Other programs in combination with the EWA that purchase water from the same agency could draw down reservoirs further than under the Flexible Purchase Alternative. The additional water sold for other programs would reduce the Baseline Condition described and could cause significant cumulative impacts. EWA Management Agencies would not purchase water from an agency if the purchase would cause a cumulatively significant impact on recreation.

Actions such as groundwater substitution and crop idling in the Upstream from the Delta Region would change in the timing and quantity of water released from reservoirs, altering riverflows. Water transfers from other acquisition programs along the same rivers as in the EWA program area could result in a cumulative effect on the change in riverflow. However, it is not anticipated that the riverflow would change to such a level as to cause a cumulatively significant impact on recreation.

22.4.12 Flood Control

There are no other programs that could store water in Lake Oroville between November and March. If DWR did allow such storage, the lake water surface would be higher, and flood releases, if needed, would be initiated sooner. Flood control regulations would be followed regardless of the type of water stored in Lake Oroville. Therefore, the cumulative effects are considered less than significant.

Agencies participating in groundwater substitution and crop idling with various programs would cause reservoirs to release more water than under the Baseline Condition. The USACE flood control guidelines would limit releases such that the releases were within channel capacity. The cumulative effects are considered less than significant.

No other water transfer programs are currently managing water that involves early delivery of water, and none are likely to do so. Therefore, there would be no cumulative effects on flood control because of predelivery.

22.4.13 Power Production

There is a potential for cumulative effects to CVP/SWP power production for other water acquisition programs that alter the timing of water releases from Project reservoirs. In the past, these programs have included specific terms for use of Project power in contractual documents. Recent year EWA water purchases have been facilitated by terms of Interim Protocol documents. Because the other programs remain in the planning stages, or are subject to CVP/SWP policies that are evolving, operational details of the programs cannot be described. Any power impacts of these programs would not constitute environmental effects, but rather economic losses. Power impacts in the cumulative condition are essentially the same as those shown for the Flexible Purchase Alternative and would be less than significant.

22.4.14 Cultural Resources

Cumulative effects analysis for cultural resources focuses on those programs that potentially acquire water through stored reservoir water purchase and crop idling. Cultural impacts in the cumulative condition are essentially the same as those shown for the Flexible Purchase Alternative and would be less than significant. If any additional water were transferred, mitigation would require a cultural resource inventory and evaluation of property within the added drawdown zone and development of appropriate cultural resource protection to reduce impacts to a less-than-significant level.

22.4.15 Visual Resources

Visual resource concerns stem from the early lowering of the water surface elevation within non-Project reservoirs, creating a larger exposed bank area of the reservoir during the summer recreation season. The EWA analyses address the maximum water available from each reservoir. Additionally, other crop idling programs are currently being implemented and may contribute to cumulative effects on visual resources. However, as previously noted, crop idling is a current agricultural practice that is not a permanent action. It is generally not possible to determine the difference between normal crop rotation and fallowing related to a water transfer. In addition, crop idling involves a Class C scenic area. Idling of rice land (seasonally flooded agriculture) will not affect wildlife viewing during the fall, winter, or spring. Rice land idling is a summer action not affecting migration and over-winter periods for migrating birds. Cumulatively there would be no additional visual resource impact than from that described under the EWA analyses.

22.4.16 Environmental Justice

Environmental justice effects stem from crop idling actions that result in the loss of low-income agricultural jobs (employment). The EWA program has selected two crops to idle, rice and cotton, which require fewer field workers than other crops. The other programs that involve crop idling (Dry Year, DRRIP, and the CVPIA WAP) would most likely also idle only rice and cotton. The EWA agencies would consider other reasonably foreseeable transfers when determining where to acquire water through crop idling. EWA agencies would then only purchase water from idling 20 percent of the rice or cotton land. The cumulative effects of these programs on environmental justice would therefore be the same as the effects described for the Flexible Purchase Alternative.

22.4.17 Indian Trust Assets

This ITA cumulative analysis focuses only on those programs that potentially pose incrementally detrimental effects through groundwater substitution in all areas of the State. As discussed in Chapter 6, Groundwater Resources, all are required to have monitoring and mitigation plans that prevent third party effects, similar to those that apply to EWA actions. Careful monitoring and management is necessary to mitigate any potential effects to a less than significant level. Additionally, all EWA

groundwater substitution acquisitions in the vicinity of an ITA require the United States to be notified before such acquisitions are finalized in order for the United States to fully execute its Indian Trust responsibilities. After deliberation by subject matter experts and appropriate tribal consultation, mitigation may reduce effects to a less-than-significant level.

22.5 Mitigation Measures

Refer to each individual resource chapter for a discussion of mitigation measures.

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