CHAPTER 5
SURFACE WATER SUPPLY AND MANAGEMENT

YCWA delivers surface water supplies from the Yuba Project to its Member Units in Yuba County, and also transfers water through additional storage releases or conjunctive use agreements for uses outside the county. Therefore, surface water supply and management actions associated with the alternatives considered in this EIR/EIS could affect local water supply reliability, revenues for local flood control and water supply projects, and water supply management and reliability for state and federal water contractors. This chapter focuses on the surface water supplies of the Yuba Project and use of these supplies within the project study area.

5.1 ENVIRONMENTAL SETTING/AFFECTED ENVIRONMENT

This section describes aspects of the environmental setting and affected environment relating to the supply and management of surface water that may be affected if the Proposed Project/Action or alternatives are implemented. The description of the potentially affected environment is divided into four regions: the Yuba Region, the CVP/SWP Upstream of the Delta Region, the Delta Region, and the Export Service Area.

5.1.1 YUBA REGION

The Yuba Region, which is one of the four regions that make up the project study area, is shown on Figure 2-2. It encompasses storage and hydropower facilities of the Yuba Project, the Yuba River downstream from New Bullards Bar Reservoir, the lower Yuba River downstream from Englebright Reservoir to the confluence with the Feather River, the YCWA Member Unit service areas, the local groundwater basins, and lands overlying the groundwater basins. The principle streams and facilities located in the Yuba Region are shown on **Figure 5-1.**

The Yuba Region is part of the larger Yuba River Basin that drains approximately 1,339 square miles (USGS 2004) of the western slope of the Sierra Nevada Mountains, including portions of Sierra, Placer, Yuba, and Nevada counties. The Yuba River is a tributary of the Feather River, which in turn is a tributary of the Sacramento River. The basin rises from an elevation of about 88 feet to about 8,590 feet above mean sea level (msl). The annual unimpaired flow at the Smartville Gage on the lower Yuba River has ranged from a high of 4.93 MAF in 1982 to a low of 0.37 MAF in 1977, with an average of about 2.37 MAF per year (1901 to 2005).[1] In general, runoff is nearly equally divided between runoff from rainfall during October through March and runoff from snowmelt during April through September.

The upper basins of the Middle Yuba and South Yuba rivers have been extensively developed for hydroelectric power generation and consumptive uses by Nevada Irrigation District (NID) and PG&E. Total storage capacity of about 307 TAF on the Middle Yuba and South Yuba rivers and associated diversion facilities enable both NID and PG&E to export an average of approximately 410 TAF per year from the Yuba River Basin to the Bear River and American River basins. In addition, the South Feather Water and Power Agency exports an average of

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[1] The forecasted seasonal unimpaired flow at Smartville is estimated each year by DWR and reported monthly in Bulletin 120, *Water Conditions in California*. The unimpaired flow at Smartville controls YCWA contractual delivery obligations to senior water right holders on the lower Yuba River, and is used to calculate the Yuba River Index (YRI), defined in RD-1644, and the North Yuba Index (NYI), defined in the Yuba Accord Alternative.

about 70 TAF per year from Slate Creek (a tributary to the North Yuba River) to the Feather River Basin. While these upper basins lie outside of the project study area, the described operations can significantly reduce the water supply available to the lower Yuba River, particularly during dry and critical water years.

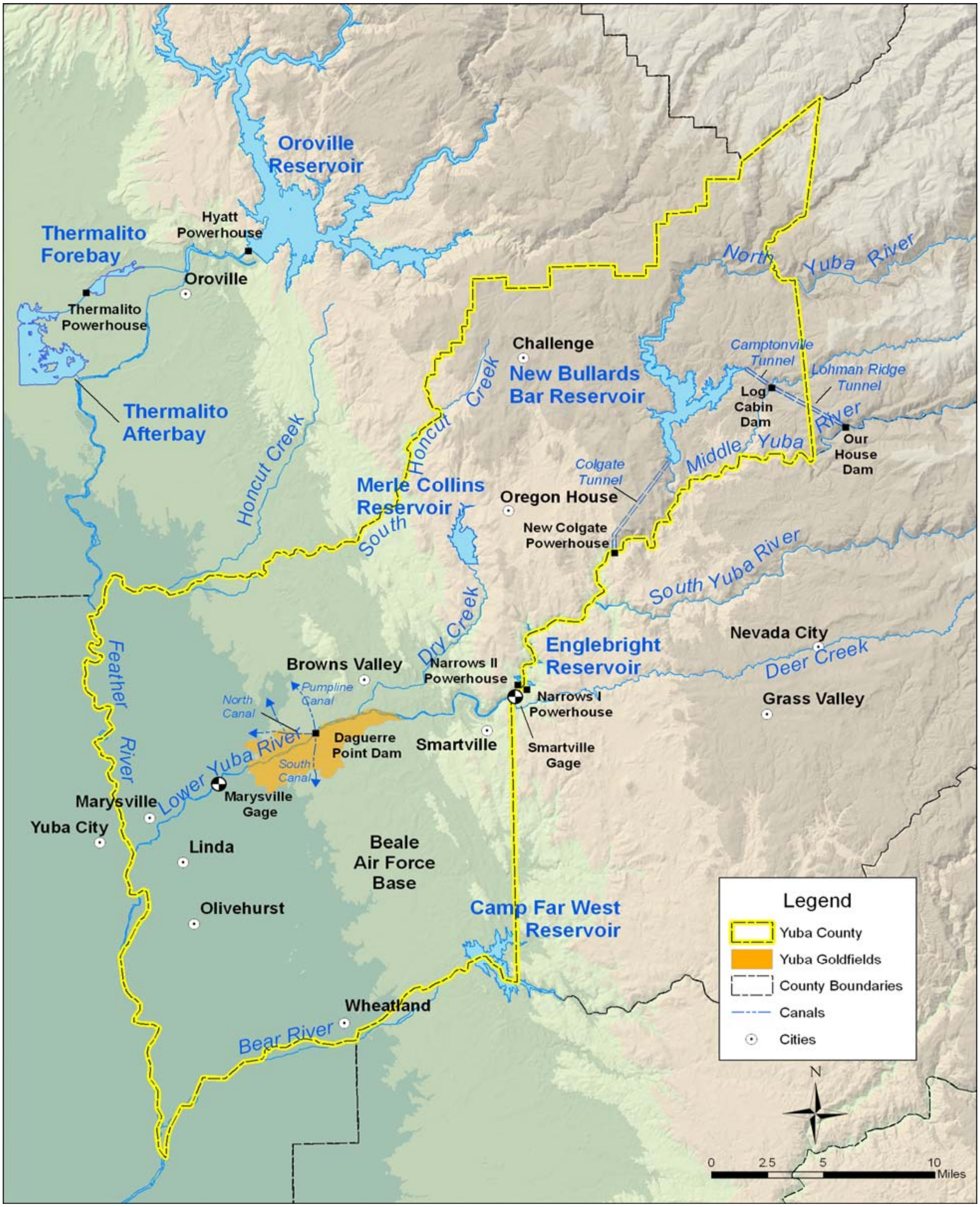

Figure 5-1. Yuba River Basin in Yuba County

The Corps and YCWA own storage facilities in the Yuba Region. Englebright Dam and Daguerre Point Dam were originally constructed by the California Debris Commission, a unit of the Corps, for debris control and now are operated and maintained by the Corps. The Yuba Project, constructed and operated by YCWA, is a multiple-use project that provides flood control, power generation, irrigation, recreation, and protection and enhancement of fish and wildlife. It includes New Bullards Bar Reservoir, New Colgate Powerhouse, and Narrows II Powerhouse. Englebright Dam and Reservoir and Daguerre Point Dam are not parts of the Yuba Project. However, Englebright Dam and Reservoir are used to regulate power peaking releases from the New Colgate Powerhouse, and Daguerre Point Dam is used by YCWA to divert water to its Member Units. The elements of the Yuba Project are described in more detail in the following subsections.

5.1.1.1 NEW BULLARDS BAR RESERVOIR

New Bullards Bar Reservoir, located on the North Yuba River, is the principal storage facility of the Yuba Project. The reservoir has a total storage capacity of 966 TAF with a minimum pool of 234 TAF (as required by YCWA's FERC license), thus leaving 732 TAF of capacity that can be regulated. A portion of this regulated capacity, 170 TAF, normally must be held empty from September through April for flood control.

The North Yuba River inflow to New Bullards Bar Reservoir is augmented by diversions from the Middle Yuba River to Oregon Creek through the Lohmann Ridge Tunnel, and by diversions from Oregon Creek into the reservoir through the Camptonville Tunnel. The average total inflow to New Bullards Bar Reservoir from the North Yuba River and diversions from the Middle Yuba River and Oregon Creek is about 1.2 MAF per year.[2] Releases from New Bullards Bar Reservoir are made through the New Colgate Powerhouse, which has a capacity of 3,700 cfs, or through the dam's bottom outlet, or gated spillway.

Operations of New Bullards Bar Reservoir can be described in terms of(1) water management operations (i.e., baseflow operations), (2) storm runoff operations, and (3) flood control operations.

Baseflow operations describe normal reservoir operations when system flows are controlled through storage regulation. These operations occur outside periods of flood control operations, spilling, bypassing uncontrolled flows into Englebright Reservoir, or outside periods of high unregulated inflows from tributary streams downstream from Englebright Dam.

Storm runoff operations occur during the storm season, typically between October and May. Storm runoff operations target Englebright Reservoir operations, because it is the downstream control point for releasing water into the lower Yuba River. Storm runoff operations guidelines for Englebright Reservoir specify target storage levels and release rates.

During flood control operations, the seasonal flood pool specified in the Corps flood operation manual for New Bullards Bar Reservoir is kept evacuated for flood protection, and to avoid unnecessary flood control releases. Reservoir releases may be required to maintain flood control space between September 15 and June 1.

[2] Based on model simulations of current facilities for the 1922 to 1994 period, and estimated historical inflows for the 1995 to 2005 period.

5.1.1.2 ENGLEBRIGHT RESERVOIR

Englebright Dam and Reservoir were constructed in 1941 to capture sediment produced by upstream hydraulic mining activities. The reservoir is situated downstream of New Bullards Bar Dam, at the confluence of the Middle and South Yuba rivers. The average annual inflow to Englebright Reservoir, excluding releases from New Bullards Bar Reservoir, is approximately 400 TAF. Englebright Reservoir has a total storage capacity of approximately 70 TAF, but provides limited conservation storage because the reservoir is used to attenuate power peaking releases from New Colgate Powerhouse.[3] Englebright Reservoir is used extensively for recreation.

Englebright Dam has no low-level outlet. Water from Englebright Reservoir is released for power generation at the Narrows I and Narrows II powerhouses, or spilled over the top of the dam. Narrows I Powerhouse, owned by PG&E, is a 12 MW facility, with a discharge capacity of approximately 730 cfs and a bypass flow capacity (when the generator is not operating) of 540 cfs. Narrows II, which is part of the Yuba Project, is a 50 MW facility, with a discharge capacity of approximately 3,400 cfs and a bypass flow capacity of 3,000 cfs. YCWA and PG&E coordinate the operations of Narrows I and II for hydropower efficiency and to maintain relatively constant flows in the lower Yuba River. The Narrows I Powerhouse typically is used for low-flow reservoir releases (less than 730 cfs), or to supplement the Narrows II Powerhouse capacity during high flow reservoir releases.

Annual maintenance requires the Narrows II Powerhouse to be shut down for a two- to three-week period, or longer if major maintenance is performed. Maintenance is typically scheduled for the beginning of September, or during the winter months. The recently completed Narrows II Bypass Project provides a 3,000 cfs bypass to Narrows II that can be used during maintenance and emergency shutdowns.

Under existing water rights and agreements, PG&E may release up to 45 TAF from Englebright Reservoir storage, although only about 10 TAF of storage normally are used. Fluctuations in Englebright Reservoir storage principally occur for daily or weekly regulation of winter inflows and New Colgate Powerhouse releases. Because of the recreational and power generation needs, the storage level within the reservoir seldom drops below 50 TAF.

5.1.1.3 LOWER YUBA RIVER

The lower Yuba River refers to the 24-mile section of the river between Englebright Dam and the confluence with the Feather River southwest of Marysville (Figure 5-1). Instream flow requirements are specified for the lower Yuba River at the Smartville Gage (RM 23.6), located approximately 2,000 feet downstream from Englebright Dam, and at the Marysville Gage (RM 6.2). Below the Smartville Gage, accretions, local inflow, and runoff contribute, on average, approximately 200 TAF per year to the lower Yuba River. Deer Creek flows into the Yuba River at approximately RM 22.7. Dry Creek flows into the Yuba River at RM 13.6, approximately two miles upstream of Daguerre Point Dam. The flow in Dry Creek is regulated by BVID’s operation of Merle Collins Reservoir, located on Dry Creek about 8 miles upstream from its confluence with the Yuba River. In recent years, irrigation diversions from the lower Yuba River at Daguerre Point Dam and upstream at BVID’s Pumpline diversion facility have totaled approximately 300 TAF per year.

[3] Bathymetric surveys performed by USGS in 2001 indicate a reduced storage of 52 TAF due to sedimentation.

5.1.1.4 YUBA COUNTY WATER AGENCY

YCWA was created by the Yuba County Water Agency Act (California Water Code Appendix, Sections 84-1 to 84-28). This act authorizes YCWA to develop and promote the beneficial use and regulation of the Yuba River water resources. The act provides for development of water conservation facilities, flood control, hydroelectric power generation, water supply, fisheries protection and enhancement, and related recreation.

YCWA releases water for power generation at the New Colgate Powerhouse and at the Narrows I and II powerhouses. Hydroelectric power is generated at these locations under YCWA's FERC license and eight water right licenses issued by the SWRCB.

YCWA is a major water right holder on the Yuba River. YCWA diverts water for consumptive uses under Permits 15026, 15027, and 15030. YCWA's permits authorize direct diversion up to a total rate of 1,593 cfs from the lower Yuba River from September 1 to June 30 for irrigation and other uses, and diversion of up to 1,250,000 AF from October 1 to June 30 to storage in New Bullards Bar Reservoir.

Various water districts, irrigation districts, and mutual water companies have contracts with YCWA for delivery of water. Some of the parties that receive water from YCWA also have their own appropriative rights for diversion of water from the Yuba River. Other agencies and districts providing surface water for irrigation in Yuba County include the North Yuba Water District, Camp Far West Irrigation District,[4] and Plumas Mutual Water Company.[5]

5.1.1.5 YUBA COUNTY WATER AGENCY MEMBER UNITS

Water diverted under YCWA's water right permits is delivered to BWD, BVID, CID, DCMWC, HIC, RWD, and SYWD. BVID receives water at the Pumpline Diversion Facility, located one mile upstream from Daguerre Point Dam. CID, HIC, and RWD receive water through the Hallwood-Cordua Canal (North Canal), located on the north abutment of Daguerre Point Dam. BWD, SYWD, and DCMWC receive water through the South Yuba Canal (South Canal), located on the south side of the Yuba River slightly upstream of the south abutment of Daguerre Point Dam. YCWA also delivers surface water to the City of Marysville for use at Lake Ellis. When the Wheatland Project is completed, YCWA will provide water to WWD in southern Yuba County through the South Canal. Contract allocations for each of the Member Units are summarized in **Table 5-1**.

BVID, CID, and HIC have water rights on the lower Yuba River. Under YCWA water right settlement contracts, CID and HIC receive surface water supplies as part of Yuba Project operations. However, dry year deficiency criteria under these contracts are different than the deficiency criteria in YCWA contracts with other Member Units. Provisions in YCWA water right settlement contracts preclude deficiencies in water-right settlement deliveries unless the DWR April forecast of unimpaired runoff (measured at the Smartville Gage) is less than 40 percent of average. No deficiencies in such deliveries may be imposed on BVID. Contract shortage provisions are presented in **Table 5-2**.

[4] Camp Far West Irrigation District diverts water from the Bear River below Camp Far West Reservoir.

[5] Plumas Mutual Water Company diverts water from the Feather River downstream of the confluence of the Yuba and Feather rivers.

Table 5-1. Yuba County Water Agency Annual Contract Amounts

Water Diversion Point and Member Units	Base Contract (AF)	Supplemental Contract (AF)	Total Contract (AF)	District Water Rights (AF)	Total Contract and Water Rights (AF)
Brown's Valley Irrigation District Pumpline Diversion Facility					
Browns Valley Irrigation District	9,500	-	9,500	24,462[b]	33,962
South Canal					
Brophy Water District	43,470	32,177	75,647	-	75,647
South Yuba Water District	25,487	18,843	44,330	-	44,330
Dry Creek Mutual Water Company	13,682	3,061	16,743	-	16,743
Wheatland Water District [a]	23,092	17,138	40,230	-	40,230
North Canal					
Cordua Irrigation District	12,000	-	12,000	60,000	72,000
Hallwood Irrigation Company	-	-		78,000	78,000
Ramirez Water District	14,790	10,311	25,101	-	25,101
Other					
City of Marysville	-	2,500	2,500	-	2,500
Total	**142,021**	**84,030**	**226,051**	**162,462**	**388,513**

[a] Includes both Phase 1 and Phase 2 of the Wheatland Project.
[b] As specified in RD-1664

YCWA contract allocations are based on the gross acreage served by each Member Unit. The maximum "Base Project Water" allocation is computed by multiplying 90 percent of the gross acreage by 2.87 AF per acre. The maximum "Supplemental Water Supply" is computed by multiplying 90 percent of the gross acreage by 2.13 AF per acre. For Member Units that have water rights senior to YCWA, their contract allocations are based on their water right amounts.

Table 5-2. Yuba County Water Agency Water Supply Contract Deficiency Provisions

Category	Unimpaired Runoff Forecast (f) [a]	Percentage of Settlement/ Contract Allocation Available
Pre-1914 Rights Settlements		
Cordua Irrigation District, Hallwood Irrigation Company	$f \geq 40\%$	100%
	$f < 40\%$	80%
Browns Valley Irrigation District	All	100%
YCWA Supply Contracts		
Base Project Water	$f > 85\%$	100%
	$50\% < f \leq 85\%$	85%
	$40\% \leq f \leq 50\%$	70%
	$f < 40\%$	50%
Supplemental Water	All forecasts	Determined annually by YCWA in its reasonable discretion considering forecasted runoff and operational conditions.

[a] April 1 DWR forecast of unimpaired Yuba River runoff near Smartville, in percentage of 50-year average.

BROPHY WATER DISTRICT

Since 1985, all water from the lower Yuba River used by BWD has been delivered through the South Canal under contract with YCWA. BWD's contract with YCWA provides for a Base Project Water allocation of 43,470 AF and a Supplemental Water allocation of 32,177 AF.

BROWNS VALLEY IRRIGATION DISTRICT

BVID holds a pre-1914 appropriative water right to divert up to 47.2 cfs of water year-round from the Yuba River for agricultural use. In addition, BVID holds post-1914 appropriative water rights on Dry Creek. These post-1914 appropriative rights allow for direct diversion and storage of water in Merle Collins Reservoir. BVID also has a contract with YCWA authorizing diversions of 9.5 TAF per year at its Pumpline diversion facility on the lower Yuba River to supplement BVID's diversions under its pre-1914 appropriative right when North Yuba River flows decrease below 47.2 cfs.

CORDUA IRRIGATION DISTRICT

CID holds a pre-1914 appropriative right to divert up to 75 cfs from the Yuba River for agricultural use, and 1940 and 1948 appropriative rights to divert an additional 90 cfs. CID also has a contract with YCWA for 12 TAF of Base Project Water. CID diverts all of its Yuba River water from Daguerre Point Dam through the North Canal.

DRY CREEK MUTUAL WATER COMPANY

DCMWC receives all surface water deliveries from the South Canal under contract with YCWA. DCMWC began receiving water from YCWA in 1998; prior to 1998, the only water available to DCMWC was groundwater. DCMWC's contract with YCWA provides for a Base Project Water allocation of 13,682 AF and a Supplemental Water allocation of 3,061 AF.

HALLWOOD IRRIGATION COMPANY

HIC has a pre-1914 appropriative right to divert 150 cfs from the Yuba River, and a 1940 appropriative right to divert 100 cfs from the Yuba River. In a settlement agreement with YCWA regarding its water right, HIC agreed to receive a Base Project water allocation of 78 TAF per year from YCWA from the North Canal at Daguerre Point Dam.

RAMIREZ WATER DISTRICT

RWD received water from CID from 1978 to 1992. Since 1992, RWD has received contract water from YCWA. RWD's contract with YCWA provides for a Base Project Water allocation of 14,790 AF and a Supplemental Water allocation of 10,311 AF. RWD receives water from the North Canal at Daguerre Point Dam.

SOUTH YUBA WATER DISTRICT

Areas of SYWD began receiving surface water from the South Canal in 1985 with an original contract amount of 33.9 TAF per year. Since 1992, SYWD has received all of its surface water deliveries from the South Canal under contract with YCWA. Since 1996, SYWD's contract with YCWA provides for a Base Project Water allocation of 25,487 AF and a Supplemental Water allocation of 18,843 AF.

WHEATLAND WATER DISTRICT

WWD currently relies on groundwater for irrigation water. However, the Wheatland Project will provide for the conveyance of water, diverted by YCWA at Daguerre Point Dam, to WWD through the existing South Canal. The project will be constructed in two phases. Phase 1, which is expected to begin construction in 2007, will provide for delivery of surface water to WWD and the immediate irrigation of approximately 7,750 acres of the approximately 9,200 acres to be served upon completion of both phases. Under Phase 1, WWD's contract with YCWA will provide for a total allocation (base and supplemental) of 23,092 AF per year. The completion of Phase 2 will provide WWD with a total of 40,230 AF per year.

5.1.1.6 *SURFACE WATER DEMANDS*

Agricultural diversion requirements for the YCWA service area have been estimated for current and future projected level of development conditions in Yuba County (YCWA 2000). The 12-month schedules of diversion requirements are based on crop acreages and applied crop water rates within the service area (as limited by contract allocations). The diversion requirements also account for fall flooding of rice fields for waterfowl habitat and rice straw decomposition. The current level of demands presented in **Table 5-3** is for water purveyors that have existing contracts with YCWA and developed distribution systems to convey Yuba River water to the purveyor's service area. The table also includes 400 AF per month for seepage losses from the lower Yuba River upstream of the Marysville Gage. The estimated post-2007 demands that include WWD are presented in **Table 5-4**.

Table 5-3. Irrigation Demand at Daguerre Point Dam, Current Level of Development (2006 through 2007)

Water Year Type (YRI)	Irrigation Demand (AF)												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Wet	18,692	10,441	5,210	400	400	1,226	13,055	59,187	54,170	63,869	53,743	17,705	298,098
Above Normal	18,692	10,441	5,210	400	400	1,226	13,055	59,187	54,170	63,869	53,743	17,705	298,098
Below Normal	18,692	10,441	5,210	400	400	2,753	17,311	59,187	54,170	63,869	53,743	17,705	303,881
Dry	18,692	10,441	5,210	400	400	2,753	17,311	59,187	54,170	63,869	53,743	17,705	303,881
Critical	18,692	10,441	5,210	400	400	2,753	17,311	59,187	54,170	63,869	53,743	17,705	303,881
YRI – Yuba River Index													

Table 5-4. Irrigation Demand at Daguerre Point Dam, Projected Level of Full Development (2008 through 2025)

Water Year Type (YRI)	Irrigation Demand (AF)												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Wet	20,543	10,717	5,338	400	400	2,191	17,625	65,600	62,174	72,780	60,519	20,201	338,488
Above Normal	20,543	10,717	5,338	400	400	2,191	17,625	65,600	62,174	72,780	60,519	20,201	338,488
Below Normal	20,543	10,717	5,338	400	400	3,835	22,230	65,600	62,174	72,780	60,519	20,201	344,736
Dry	20,543	10,717	5,338	400	400	3,835	22,230	65,600	62,174	72,780	60,519	20,201	344,736
Critical	20,543	10,717	5,338	400	400	3,835	22,230	65,600	62,174	72,780	60,519	20,201	344,736

The estimated demands have been refined to adjust for water year type classifications based on the Yuba River Index (YRI). This refinement reflects an estimated reduction of demand in wet and above normal years resulting from higher than normal soil moisture at the start of the irrigation season and reduced pre-irrigation water requirements. Water demands for grains, pastures, and orchards are reduced by 0.4 feet during March and April in these water year types.

Historical deliveries provided by YCWA to its Member Units since 1971 are presented in **Figure 5-2**. The current level of development demands also shown in Figure 5-2 do not include estimated demands for riparian diverters within the Dantoni Area, or demands for the City of

Marysville. Preliminary demand analyses indicate that opportunities for further water use efficiencies or water conservation measures within Yuba County currently are limited.[6] Water users in Yuba County already are implementing state-of-the-art water conservation practices, including drip-irrigation systems, laser leveling of fields, and water-reuse and recirculation systems. However, additional opportunities for conservation may improve over time as new technologies evolve.

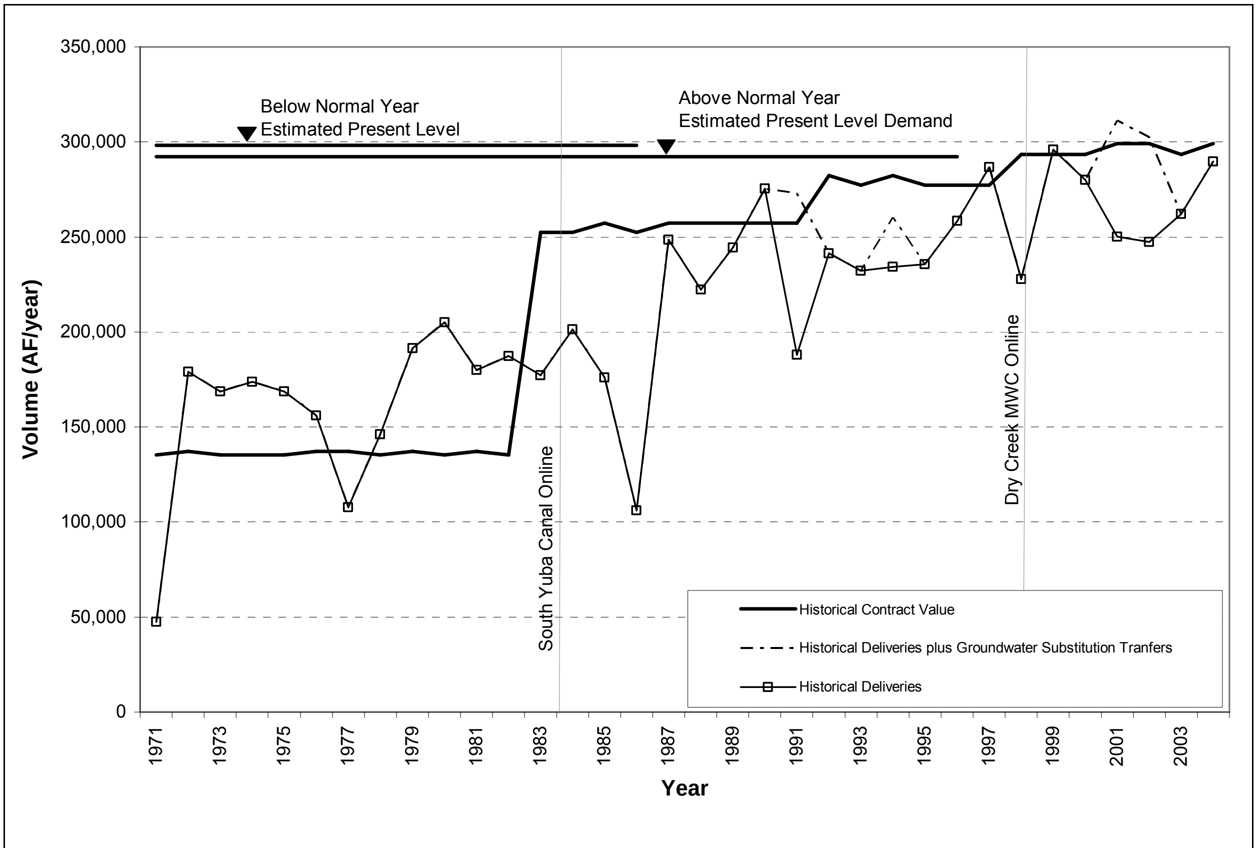

Figure 5-2. Historical Deliveries to YCWA Member Units

5.1.1.7 YUBA COUNTY WATER AGENCY WATER TRANSFERS

Water transfers are an important component of Yuba Project operations. In the 18 years between 1987 and 2004, YCWA transferred water in 12 years, averaging about 120 TAF in each transfer year. Details of individual transfers are presented in **Table 5-5**. Stored water transfers were made by YCWA from storage releases from New Bullards Bar Reservoir. Groundwater substitution transfers were made by YCWA in coordination with its Member Units.

STORED WATER TRANSFERS

Typically, individual one-year stored water transfers may occur when the projected end-of-September storage in New Bullards Bar Reservoir is sufficient for YCWA to ensure 100 percent deliveries to Member Units in the following year under a drought event with a 1-in-100-year

[6] Consideration of increased water conservation was included in development of the alternatives considered in this EIR/EIS; the Yuba Accord Alternative includes implementation of water use efficiency measures as an integrated element of the Conjunctive Use Agreements.

return period. In addition, for cross-Delta water transfers to service areas south of the Delta, the Delta must be in balanced water conditions[7] and available conveyance capacity must exist at Banks or Jones pumping plants. Stored water transfers have typically occurred from July through September.

Table 5-5. Yuba County Water Agency Historical Sales 1987 to 2004

Year	Water Year Type Sacramento Valley 40-30-30 Index	Buyer	Stored Water Transfer (AF)	Groundwater Substitution Transfer (AF)
1987	Dry	California Department of Water Resources	83,100	
1988	Critical	California Department of Water Resources	135,000	
1989	Dry	California Department of Water Resources	90,000	
		California Department of Water Resources for California Department of Fish and Game	110,000	
		City of Napa	7,000	
		East Bay Municipal Utility District	60,000[a]	
1990	Critical	City of Napa	6,700	
		California Department of Water Resources	109,000	
		Tudor Mutual Water Company/Feather Water District	2,951	
1991	Critical	State Water Bank	99,200[b]	84,840
		State Water Bank - California Department of Fish and Game	28,000	
		City of Napa	7,500	
1992	Critical	State Water Bank	30,000[c]	
1994	Critical	California Department of Water Resources		26,033
1997	Wet	Bureau of Reclamation for Refuge Water	25,000[d]	
		Sacramento Area Flood Control Agency for American River Fishery	48,857	
2001	Dry	Environmental Water Account	50,000[e]	
		California Department of Water Resources	52,912	61,140
2002	Dry	Environmental Water Account	79,742	55,248
		California Department of Water Resources	22,050	
		Contra Costa Water District	5,000	
2003	Above Normal	Environmental Water Account	65,000[f]	
		Contra Costa Water District	5,000	
2004	Below Normal	Environmental Water Account	100,000[g]	
		California Department of Water Resources	487	
2005	Above Normal	Environmental Water Account	6,086	
Total			**1,228,585**	**227,261**

[a] Sold but not delivered.
[b] In 1991, BVID transferred an additional 5.5 TAF to the State Water Bank through conservation.
[c] In 1992, BVID transferred an additional 5.5 TAF to the State Water Bank through conservation.
[d] In 1997, the transfer included 5 TAF from BVID.
[e] In 2001, BVID transferred an additional 4.5 TAF to DWR (stored water transfer) and 3.5 TAF to the EWA (groundwater substitution pumping).
[f] In 2003, BVID transferred an additional 3.1 TAF to SCVWD through conservation.
[g] In 2004, BVID transferred an additional 3.1 TAF to SCVWD through conservation.

GROUNDWATER SUBSTITUTION TRANSFERS

Groundwater substitution transfers are implemented through agreements between YCWA and its Member Units. Member Units forego parts of their surface water deliveries at Daguerre Point Dam; irrigation needs are met through additional groundwater pumping. Water not

[7] Balanced water conditions are periods when it is agreed that releases from upstream reservoirs plus unregulated flows approximately equal the water supply needed to meet Sacramento Valley in-basin uses plus required Delta outflows and exports (Reclamation and DWR 1986).

delivered at Daguerre Point Dam is temporarily stored in New Bullards Bar Reservoir, and subsequently released to meet transfer demand. Transfer water may also be pre-delivered from New Bullards Bar Reservoir, and replaced by groundwater substitution pumping later in the year.

The monthly pattern of recent historical groundwater substitution pumping, as measured at transfer wells, is presented in **Table 5-6**.

Table 5-6. Yuba County Water Agency Historical Groundwater Substitution Pumping

Member Unit	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2001 Pumping Volumes (AF)										
Brophy Water District	-	-	-	-	-	-	-	-	-	-
Browns Valley Irrigation District	-	-	-	-	-	-	-	-	-	-
Cordua Irrigation District	-	1,606	2,887	2,935	2,965	1,293	2,314	-	-	14,000
Dry Creek Mutual Water	104	1,131	2,364	2,006	2,888	668	-	-	-	9,161
Hallwood Irrigation Company	492	1,879	2,075	2,618	2,056	900	1,999	-	-	12,020
Ramirez Water District	712	2,228	2,627	2,229	2,057	1,373	2,149	2,102	1,532	17,009
South Yuba Water District	91	2,758	2,955	3,196	-	996	-	-	-	9,996
Subtotal	*1,398*	*9,602*	*12,909*	*12,983*	*9,967*	*5,229*	*6,463*	*2,102*	*1,532*	*62,184*
2002 Pumping Volumes [a] (AF)										
Brophy Water District		187	1,350	4,965	2,938	411	1,440	-	-	11,292
Browns Valley Irrigation District	-	349	307	739	832	810	868	992	-	4,897
Cordua Irrigation District	-	957	1,927	3,912	-	2,325	938	-	-	10,059
Dry Creek Mutual Water	-	747	562	1,971	1,632	964	-	-	-	5,876
Hallwood Irrigation Company	-	728	947	2,884	2,029	794	-	-	-	7,382
Ramirez Water District	-	615	1,345	2,926	1,257	717	1,952	-	-	8,812
South Yuba Water District	-	434	-	5,919	1,676	-	739	-	-	8,767
Subtotal	-	*4,017*	*6,438*	*23,316*	*10,364*	*6,021*	*5,937*	*992*	-	*57,084*
2001 Pumping Volumes + 2002 Pumping Volumes										
Monthly Volume (AF)	1,398	13,619	19,347	36,299	20,330	11,250	12,400	3,094	1,532	119,268
Monthly Distribution (%)	1%	11%	16%	30%	17%	9%	10%	3%	1%	100%

[a] Includes 1,826 AF of excess groundwater pumping.

The start of groundwater substitution pumping is dictated by New Bullards Bar Reservoir operations. Water can be backed up in storage under base flow operations when releases from New Bullards Bar Dam are not controlled by minimum flow requirements at the Smartville Gage. Groundwater substitution pumping ceases once the transfer volume has been achieved, or at the onset of flood control operations for New Bullards Bar Reservoir or storm runoff operations.

The total groundwater substitution transfer capacity of YCWA Member Units is the groundwater volume that can be pumped to substitute for surface water deliveries forgone by willing participants using existing wells. A 2005 survey (YCWA and MWH unpublished data) estimated available pumping capacity for YCWA Member Units, not including WWD, at approximately 98 TAF. Of that volume, 77.5 TAF is from electric-powered wells, and 21.5 TAF from diesel-powered wells. About 60 percent of the groundwater pumping capacity is available from Member Units north of the lower Yuba River, while the remaining 40 percent is from Member Units south of the lower Yuba River.

RELEASED TRANSFER WATER

The historical monthly pattern of released transfer water for the 2001, 2002, and 2003 transfers is summarized in **Table 5-7**. Because of Delta export limitations, the preferred transfer period is from July 1 to September 30[8]. As part of a water transfer program, YCWA may make available supplemental fisheries flows, typically in May and June, for flow stability.

Table 5-7. Monthly Pattern of Historical Water Transfers

Year	Transfer Volume (AF)						
	May	Jun	Jul	Aug	Sep	Oct	Total
2001	-	-	77,623	71,690	19,239	-	168,552 [a]
2002	-	23,872	72,452	58,864	6,910	-	162,098
2003	-	-	20,886	34,384	14,937	-	70,207
Total (AF)	-	23,872	170,961	164,938	41,086	-	400,857
Total (%)	-	6%	43%	41%	10%	-	100%

[a] Includes a 4.5 TAF BVID transfer to DWR.

5.1.2 CVP/SWP UPSTREAM OF THE DELTA REGION

The area of analysis for the surface water resources impact assessment includes streams, water bodies, and facilities that could be affected by changes in Yuba River outflow to the Feather River, and the transfer of Yuba River water across the Delta for export at Banks and Jones pumping plants. Water bodies and facilities identified as part of the CVP/SWP Upstream of the Delta Region that are addressed in the surface water supply impact assessment include: (1) the SWP Oroville-Thermalito Complex and the Feather River downstream of Oroville Reservoir; and (2) the Sacramento River downstream of its confluence with the Feather River.

The Oroville-Thermalito Complex is included in the CVP/SWP Upstream of the Delta Region because Oroville Dam and Reservoir could be used to reregulate released transfer water from the lower Yuba River. Releases from Oroville Dam also may need to be adjusted to maintain minimum flows in the lower Feather River and water supplies to Feather River water right holders.

CVP divisions upstream of the Delta include the Shasta, Sacramento River, and American River divisions. The CVP Shasta Division includes Shasta Dam, Reservoir and Power Plant, and Keswick Dam, Reservoir and Power Plant. The CVP American River Division includes Folsom Dam, Reservoir, and Power Plant; Nimbus Dam; Lake Natoma; Nimbus Power Plant; and the Folsom South Canal. As described in Chapter 4, Reclamation does not anticipate modifying Shasta Reservoir, Shasta Dam, or upper Sacramento River operations as a result of the Proposed Project/Action and alternatives. Similarly, Reclamation does not anticipate modifying Folsom Reservoir, Folsom Dam, or lower American River operations as a result of the Proposed Project/Action and alternatives. Therefore, Shasta Reservoir and the Upper Sacramento River, Folsom Reservoir, and the lower American River are not included in the study area.

CVP and SWP facilities and operations span three of the four study regions: the Upstream of the Delta Region, the Delta Region, and the Export Service Area. The CVP and SWP are described in the sections below.

5.1.2.1 CENTRAL VALLEY PROJECT

The CVP, constructed by the federal government and managed by Reclamation, is the largest surface water storage and delivery system in California, with a geographic scope covering 35 of

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[8] For the months of July, August, and September, the EWA Program has historically had 500 cfs of dedicated diversion capacity at the Banks Pumping Plant. EWA Program actions and CVPIA (b)(2) actions restrict pumping at Banks and Jones pumping plants in April, May, and June. During these months, the maximum allowable E/I ratio is 0.35. Pumping capacity under the JPOD may be limited in October due to water quality concerns in the Delta.

the state's 58 counties. The CVP initially received federal authorization through the Rivers and Harbors Act of 1935, and construction began in the late 1930s. Since then, several reauthorizations have directed Reclamation to operate the CVP to meet various goals (Reclamation and DWR 2005). For example, the amended Rivers and Harbors Act of 1937 provided that dams and reservoirs of the CVP "*…shall be used, first, for river regulation, improvement of navigation, and flood control; second, for irrigation and domestic uses; and, third, for power*." In 1992, CVPIA Section 3406(b)(2) reauthorized the 1937 Act and amended CVP authorizations (Section 3406(a)) to include fish and wildlife mitigation, protection, and restoration as purposes equal in priority to irrigation and domestic uses, and fish and wildlife enhancement as a purpose equal in priority to power generation.

The CVP includes 20 dams and reservoirs, with a combined storage capacity of approximately 11 MAF; 11 power plants, of which two are pump-generating plants; and approximately 500 miles of major canals and aqueducts. The CVP has nine divisions; only the Delta Division and West San Joaquin Division are located within the study area. There are no CVP facilities in the Upstream of the Delta Region.

Reclamation supplies CVP water to more than 250 long-term water contractors in the Central Valley, Santa Clara Valley, and San Francisco Bay area (Reclamation 2004). Collectively, the maximum total annual amounts of these contracts exceed 9 MAF. Contract allocations vary from year to year depending on hydrologic conditions. The maximum annual CVP contract amounts, excluding the Friant Division, which is not part of the study area, are summarized in **Table 5-8**.

Table 5-8. Summary of Central Valley Project Maximum Annual Contract Amounts

	Maximum Contract Amount (MAF)	
	Upstream of the Delta	**Export Service Area**
Settlement/Exchange Contractors		
	2.3	0.9
Water Service Contracts		
Agriculture	0.4	2.0
Municipal and Industrial	0.5	0.2
Refuges (Level 2)	0.2	0.3
Total CVP Contract Amounts	**3.4**	**3.5**

Historically, approximately 90 percent of CVP water has been delivered to agricultural users, including senior water right holders. However, increasing quantities of water are being provided to municipal customers, including the cities of Redding, Sacramento, Tracy, Folsom, and Fresno; parts of Santa Clara County; and the northeastern portion of Contra Costa County.

5.1.2.2 STATE WATER PROJECT

The SWP, operated by DWR, is the largest state-built, multipurpose water project in the country. The SWP delivers water for municipal and agricultural purposes, provides flood control, generates power, provides recreational opportunities, and is operated to enhance habitats for fish and wildlife. SWP facilities include 28 dams and reservoirs, 26 pumping and hydroelectric power plants, and approximately 660 miles of aqueducts. The SWP provides water to 29 long-term contractors in Northern California, the San Joaquin Valley, the San Francisco Bay area, the Central Coast, and Southern California. In these areas, the SWP provides water to an estimated population of more than 23 million people and approximately 755,000 acres of irrigated farmland (DWR Website 2006).

Within the SWP, there are five divisions: (1) Oroville; (2) Delta; (3) San Luis; (4) San Joaquin; and (5) Southern Field. Each division contains water control facilities that may include dams, pumping plants, canals, power plants, lakes, and reservoirs. For the purposes of this EIR/EIS, the SWP facilities of primary focus are the Oroville-Thermalito complex on the Feather River, the Harvey O. Banks Pumping Plant in the south Delta, the California Aqueduct, and the San Luis Reservoir, which is a joint federal-state facility.

In the Feather River Basin, SWP water is provided to three water agencies with service areas in Plumas, Butte, and Sutter counties. In addition to meeting in-basin demands, water released from Oroville Reservoir contributes, in part, to maintaining Delta water quality and meeting SWP export demands. The SWP exports water from the Delta at the Banks and North Bay Aqueduct pumping plants. Water pumped through the North Bay Aqueduct at Barker Slough is delivered to two SWP contractors serving portions of Solano and Napa counties. Water diverted into Clifton Court Forebay is pumped into the California Aqueduct at Banks Pumping Plant and flows to Bethany Reservoir, 1.5 miles downstream. At Bethany Reservoir, the South Bay Pumping Station lifts some of the water into the South Bay Aqueduct for delivery to three SWP contractors in Alameda and Santa Clara counties. The remainder of the water flows south in the California Aqueduct to service areas in Kings, Kern, Tulare, San Bernardino, Riverside, Los Angeles, Ventura, Orange, San Diego, and Imperial counties. Water also is delivered to service areas in San Luis Obispo and Santa Barbara counties through the Coastal Branch of the California Aqueduct.

OROVILLE DAM AND RESERVOIR

Oroville Dam and Reservoir was completed in 1968 and is the largest SWP storage facility with a capacity of approximately 3.5 MAF. Associated facilities include the Feather River Fish Hatchery ladder, raceway, and barrier; the Thermalito Forebay and Afterbay; and the Thermalito and Hyatt powerhouses, which allow power generation and pumped-storage operations between the Afterbay and Forebay, and the Forebay and Oroville Reservoir, respectively. The average annual inflow to Oroville Reservoir is about 4 MAF. Releases from Oroville Dam flow into the Thermalito Reservoir Complex, which provides storage for pumped-storage operations at the Hyatt Power Plant and diversions to meet water rights held by Feather River water districts. A release of 600 cfs is made to the Feather River in all months to provide spawning and attracting flows for the Feather River hatchery.

FEATHER RIVER SERVICE AREA

Construction of SWP facilities on the Feather River altered the amount and timing of downstream flows. DWR has signed water right settlement agreements with water right holders who hold riparian or senior appropriative rights to the Feather River. The SWP currently delivers water to 10 non-project agencies (known as the Feather River Service Area) that have water rights to the Feather River. These agencies are Last Chance Creek Water District; Thermalito Irrigation District; South Feather Water and Power Agency (formerly Oroville-Wyandotte Irrigation District); Western Canal Water District; Joint Water Districts Board (including Biggs-West Gridley Water District; Butte Water District; Richvale Irrigation District; and Sutter Extension Water District); Oswald Water District; Tudor Mutual Water Company; Garden Highway Mutual Water Company; Plumas Mutual Water Company; and the Dana Brothers. In addition, the SWP delivers water to the Feather Water District, which is a CVP contractor.

5.1.3 DELTA REGION

The Delta and Suisun Marsh are located where California's two major river systems, the Sacramento and the San Joaquin rivers, converge to flow westward through Suisun, San Pablo, and San Francisco bays. The Delta was formally defined in the Delta Protection Act of 1959 (California Water Code Section 12220). The legal Delta encompasses an area of approximately 851,000 acres (of which approximately 135,000 acres consist of waterway, marshland, or other water surfaces) bordered by the cities of Sacramento, Stockton, Tracy, and Pittsburg.

The Delta has been reclaimed into more than 60 islands and tracts, interlaced with about 700 miles of waterways. About 520,000 acres are devoted to farming. An approximate 1,100-mile network of levees protects the reclaimed land, most of which lies near or below sea level, from flooding. Some of the island interiors are as much as 25 feet below sea level (SWRCB 1999). Water flowing into the Delta is used for urban and agricultural use, recreation, navigation, and wildlife and fisheries. The Delta provides drinking water for about 23 million Californians.

5.1.3.1 DELTA HYDRAULICS

Water movement in the Delta responds to four primary forcing mechanisms: (1) freshwater inflows, (2) Delta exports and diversions, (3) operation of water control facilities such as flow barriers, and (4) tidal movement of brackish water into and out of the Delta. Other meteorological factors, such as wind and barometric pressure, may at times, also affect Delta water levels. In addition, tidal and salinity behavior within the Delta generate a number of secondary currents, which while of low velocity, are of considerable significance with respect to transporting contaminants and mixing different sources of water.

DELTA INFLOW

On average, about 21 MAF of freshwater flows into the Delta annually. The Sacramento River, combined with flood flows in the Yolo Bypass, accounts for about 80 percent of this freshwater inflow. Inflow from the San Joaquin River accounts for 15 percent, with the balance of 5 percent flowing from the eastside tributaries, namely the Mokelumne, Calaveras, and Cosumnes rivers (Delta Protection Commission 2000). Freshwater inflow varies widely from year to year and within each year. For example, in 1977, Delta inflow totaled only 5.9 MAF, while inflow in 1983, an exceptionally wet year, was about 70 MAF. On a seasonal basis, average natural flow to the Delta varies by a factor of more than 10 between the highest flows in the winter or spring and the lowest flows in the fall.

DELTA DIVERSIONS AND EXPORTS

The combined export of water by the CVP and SWP at Clifton Court Forebay, the Jones Pumping Plant, and the North Bay Aqueduct, on average, represents about 30 percent of the Delta inflow. Local agencies, such as CCWD, private entities, and agricultural users divert an additional 10 percent of the Delta inflow. There are an estimated 1,800 agricultural diversions in the Delta. Delta farmers divert water directly from Delta channels for both irrigation and leaching. During the summer, when irrigation of Delta farmland is at a peak, net diversions for Delta farms may exceed 4,000 cfs. This is similar in magnitude to CVP exports from the Delta in summer. Additional major diversion facilities within the legal boundary of the Delta are proposed by CCWD (the Alternative Intake Project), by the City of Stockton (Stockton Delta Water Supply Project), and by the FRWA (Freeport Regional Water Project).

Delta diversions and exports reduce Delta outflow and can impact Delta water quality and water levels in the south Delta. When the CVP and SWP exports are high, water levels in local channels are sometimes drawn down, causing problems for landowners that divert from these channels. Sediment build-up in the channels also presents problems for water diversions. DWR provides portable pumps to resolve diversion issues in areas not helped by the barriers, and contracts dredging at times to improve circulation in these channels.

DELTA BARRIERS

DWR first began installing temporary rock barriers in south Delta channels in 1987. The South Delta Temporary Barriers Project now consists of four rock barriers: a barrier at the Head of Old River to keep migrating fish in the San Joaquin River, and three agricultural barriers that are installed between April and September each year. The three agricultural barriers, located at Old River near Tracy, in Middle River, and in Grant Line Canal, are intended to increase water levels, circulation patterns, and water quality in the south Delta area for local irrigation diversions.

DWR has been studying installation of permanent operational or operable gates since the 1980s. A permanent operable gate at the Head of Old River would be open most of the year and closed to keep young salmon in the San Joaquin River as they outmigrate to the ocean in the spring. The permanent operational gates would also be closed in the fall to keep adult salmon in the San Joaquin River as they migrate upstream. Three permanent agricultural gates would be operated year-round to meet water level, water quality, and water supply needs. The Draft EIS/EIR for the SDIP, which includes operation of the four proposed permanent gates, was released in October 2005, and the Final EIS/EIR was released in December 2006.

DELTA OUTFLOW

Delta outflow is the primary factor controlling water quality in the Delta. Freshwater flows provide a barrier against seawater intrusion, and can be strategically managed through SWP and CVP facility operations. When Delta outflow is low, brackish water can intrude further into the Delta, impacting salinity and bromide concentrations at drinking water intakes. Average winter (December through March) outflow is about 36,000 cfs, while average summer (June through September) outflow is about 7,000 cfs. During above normal water years, average winter outflow is about 46,000 cfs, while average summer outflow is about 7,000 cfs. During below normal water years, average winter outflow is about 25,000 cfs, while average summer outflow is about 6,000 cfs. During dry and critical water years, average winter outflow ranges from about 9,000 to 17,000 cfs, while average summer outflow ranges from about 4,000 to 5,000 cfs. About 20 percent of the Delta inflow is required for salinity control, and an additional 40 percent of inflow flows out to San Francisco Bay in excess of the minimum requirements specified in the 1995 WQCP (CALFED 2000).

5.1.3.2 CVP FACILITIES AND OPERATIONS

The CVP Delta Division facilities include the Delta Cross Channel, the Contra Costa Canal, the Jones Pumping Plant and associated fish collection facility, and the Delta-Mendota Canal.

The Delta Cross Channel is a gated diversion channel off the Sacramento River near Walnut Grove. When the gates are open, water flows from the Sacramento River through the Delta Cross Channel to the lower Mokelumne River and San Joaquin River. The Delta Cross Channel is operated to improve water quality in the interior and southern Delta and to improve the transfer of water from the Sacramento River to the CVP and SWP export facilities in the south Delta.

The Jones Pumping Plant, located in the south Delta about 5 miles from the City of Tracy, is used to lift water from the Delta into the Delta-Mendota Canal. The pumping plant is located at the end of a 2.5-mile intake channel. At the head of the intake channel, louver screens intercept fish, which are collected and transported by tanker to release sites away from the pumps. Jones Pumping Plant consists of six pumps with a maximum rated capacity of about 5,100 cfs, although the permitted capacity is 4,600 cfs. When irrigation demands in the upper reaches of the Delta-Mendota Canal are low, pumping is constrained by the capacity of the Delta-Mendota Canal (Reaches 11 to 13) to 4,200 cfs.

Water exported at the Jones pumps is conveyed via the Delta-Mendota Canal and via the joint reach of the California Aqueduct (San Luis Canal) to M&I and agricultural contractors in the San Joaquin Valley. Water from the Delta-Mendota Canal also is pumped into San Luis Reservoir, where the water commingles with SWP water exported at Banks Pumping Plant. CVP water in San Luis Reservoir is subsequently either diverted to M&I and agricultural water users in Santa Clara and San Benito counties or released back into the Delta-Mendota Canal or the San Luis Canal.

CVP demands typically exceed Jones pumping capacity in the spring and summer months. During this period, the CVP depends on releases from San Luis Reservoir to augment pumping at Jones. In wet and above normal years, and years of high allocations, there is limited or no spare capacity at Jones. When the water supply is available and exports are not limited by standards, the Jones Pumping Plant is operated continuously at the Delta-Mendota Canal capacity limits. However, Jones exports are typically reduced during the spring to meet endangered fish requirements. For example, VAMP[9] operations, typically from April 15 through May 15, require Jones exports to be reduced to 750 cfs. Every year the CVP depends on wheeling capacity at Banks Pumping Plant to deliver federal water.

5.1.3.3 SWP FACILITIES AND OPERATIONS

SWP facilities in the southern Delta include Clifton Court Forebay, John E. Skinner Delta Fish Protective Facility (Skinner Fish Facility), and the Banks Pumping Plant. Clifton Court Forebay is a 31,000 AF reservoir located in the southwestern edge of the Delta, about 10 miles northwest of the City of Tracy. Clifton Court Forebay provides storage for off-peak pumping, moderates the effect of the pumps on the fluctuation of flow and stage in adjacent Delta channels, and collects sediment before it enters the California Aqueduct. Diversions from Old River into Clifton Court Forebay are regulated by five radial gates.

The Skinner Fish Facility is located west of the Forebay, two miles upstream of the Banks Pumping Plant. The Skinner Fish Facility screens fish away from the pumps that lift water into the California Aqueduct. Large fish and debris are directed away from the facility by a 388-foot-long trash boom. Smaller fish are diverted from the intake channel into bypasses by a series of metal louvers, while the main flow of water continues through the louvers and toward the pumps. These fish pass through a secondary system of screens and pipes into seven

[9] VAMP is a 12-year experiment to examine the fishery benefits of increased pulse flows in the lower San Joaquin River combined with CVP/SWP export restrictions. VAMP flow and export requirements are incorporated in D-1641.

holding tanks, where they are later counted and recorded. The salvaged fish are then returned to the Delta in oxygenated tank trucks.

The Banks Pumping Plant is in the south Delta, about 8 miles northwest of Tracy, and marks the beginning of the California Aqueduct. By means of 11 pumps, including two rated at 375 cfs capacity, five at 1,130 cfs capacity, and four at 1,067 cfs capacity, the plant provides the initial lift of water 244 feet into the aqueduct. The Banks Pumping Plant has an installed capacity of 10,300 cfs, and supplies water for the South Bay Aqueduct and the California Aqueduct. Under current operational constraints, inflow to Clifton Court is generally limited to a maximum 3-day average of 6,680 cfs, except between December 15 and March 15, when exports can be increased by 33 percent of the San Joaquin River inflow, if greater than 1,000 cfs. The SWP also pumps water from Barker Slough into the North Bay Aqueduct for use in the North Bay Region. Combined water deliveries from these two facilities have ranged from 1.4 MAF in dry years to nearly 4.0 MAF in wet years.

5.1.3.4 ENVIRONMENTAL WATER ACCOUNT

The EWA Program is a cooperative management program designed to provide protection to the at-risk native fish species of the Bay–Delta estuary through environmentally beneficial changes in the operations of the CVP and SWP, and to provide water supply reliability to CVP and SWP water users. The EWA Program is discussed in Section 3.2.1.6. Unless renewed, the EWA will expire on December 31, 2007. Beneficial changes in CVP and SWP operations include changing the timing of flow releases from storage, and the timing of water exports from the Delta to better protect Delta fisheries. The EWA Program acquires water to replace any regular water supply interrupted by the environmentally beneficial changes to CVP and SWP operations.

The EWA Program obtains its water by acquisition from willing sellers (fixed assets), through operational flexibility of Delta facilities (operational assets formally known as variable assets), and through other water management tools and agreements. Fixed assets are those water supplies that are purchased by Reclamation and DWR for the EWA. Operational assets are water supplies made available through operational changes to CVP and SWP facilities. Examples include the flexing of the export-to-inflow ratio, and the capture of ERPP water resulting from increased upstream releases. Water management tools provide the ability to convey, store, and manage EWA water. Examples include 500 cfs dedicated pumping capacity at Banks Pumping Plant from July to September, borrowing, banking, and entering into exchange agreements with water contractors.

EWA water purchases from 2001 to 2005 are summarized in **Table 5-9**. Annual purchases upstream of the Delta have varied from about 70 TAF to 119 TAF per year. Water sold by YCWA to the EWA is typically transferred across the Delta from July to September. Transferred water replaces water that would have been delivered to export service area contractors but for EWA fishery actions taken in the previous winter and spring months.

5.1.3.5 CROSS-DELTA WATER TRANSFERS

California's water market developed as a result of the last major drought in California (1987 to 1992) and has been facilitated by changes in federal and state legislation pertaining to water rights and entitlements. The California Legislature passed several laws in the 1980s and 1990s making it easier to transfer water beyond the boundaries of historical water service areas. These laws developed an expedited process for the SWRCB to temporarily change the water rights (i.e., point of diversion and place of use) of those conducting a short-term (i.e., one-year) water transfer. Passage of the CVPIA in 1992 changed operating rules of the CVP to allow water transfers among CVP contractors in prescribed situations. In 1994, DWR and 27 of its 29 contractors negotiated a series of principles to resolve issues regarding long-term water supply contracts. In 1995, the Monterey Agreement was signed by those 27 contractors, changing some aspects of water management and formalizing others, such as storage outside a contractor's service area, and facilitating a limited water market between SWP contractors. Water transfers occur both within the CVP and SWP and with external water agencies. In recent years, extensive transfers of water across the Delta have occurred. Water Code provisions grant other parties access to unused SWP conveyance capacity, although SWP contractors have priority access to capacity not used by DWR to meet SWP allocations.

Table 5-9. Summary of Historical EWA Water Purchases, 2001- 2005

	Transfer Volume (AF)					
	2001	**2002**	**2003**	**2004**	**2005**	**Total**
Water Year Type Sacramento Valley 40-30-30 Index	**Dry**	**Dry**	**Above Normal**	**Below Normal**	**Below Normal**	
Upstream from the Delta						
Butte Water District	0	0	0	0	0	0
Merced Irrigation District	25,000	0	0	0	0	25,000
South Feather Water & Power Agency	10,000	0	4,914	0	0	14,914
Placer County Water Agency	20,000	0	0	18,700	0	38,700
Sacramento Groundwater Authority	0	7,143	0	0	0	7,143
Yuba County Water Agency	50,000	135,000	65,000	100,000	6,044 [a]	356,044
Subtotal	*105,000*	*142,143*	*69,914*	*118,700*	*6,044*	*441,801*
Export Service Area (South of the Delta)						
Arvin Edison Water District	10,000	0	0	0	0	10,000
Buena Vista Water Service District, West Kern Water District, Rosedale-Rio Bravo Water District	21,218	0	0	0	0	21,218
Cawelo Water District	10,000	0	0	0	0	10,000
Kern County Water Agency	20,000	97,400	125,000	35,000	89,712	367,112
Rosedale-Rio Bravo Water Storage District	19,036	0	0	0	0	19,036
Santa Clara Valley Water District	30,000	0	20,000	0	8,804	58,804
Semitropic Water Storage District, Tulare Irrigation District	15,000	0	0	0	0	15,000
Westside Mutual Water District	15,000	0	0	0	0	15,000
Dudley Ridge Water District, Westside Mutual Water District, Tejon-Castec Water District	21,000	0	0	0	0	21,000
Subtotal	*161,254*	*97,400*	*145,000*	*35,000*	*98,516*	*537,170*
Total by Year	**266,254**	**239,543**	**214,914**	**153,700**	**104,560**	**978,971**
Source Shift						
Metropolitan Water District of Southern California	50,000	0	0	0	0	50,000
Exchanges						
Metropolitan Water District of Southern California	0	0	0	0	50,000	50,000
Grand Total	**316,254**	**239,543**	**214,914**	**153,700**	**154,560**	**1,078,971**

[a]DWR, on behalf of the EWA, entered into an agreement with YCWA for 62 TAF. Only 6,044 AF were transferred because of Delta excess conditions.

Transfers requiring exports from the Delta are done at times when conveyance and pumping capacity at the CVP or SWP export facilities is available to move water. Parties to the transfer are responsible for providing the incremental change in flows required to protect Delta water quality standards.

Table 5-10 summarizes the major historical cross-Delta water transfers, excluding EWA water acquisitions. The table is based on available information and may not include all historical transfers. Reclamation and DWR have operated water acquisition programs to provide water for environmental programs, and additional supplies to CVP contractors, SWP contractors, and other parties. The DWR programs include the 1991, 1992, and 1994 Drought Water Banks, as well as the 2001, 2002, 2003, and 2004 Dry Year Programs. Almost 800 TAF were purchased in 1991 as part of DWR's Drought Water Bank, and 1991 remains the largest water transfer year of record. Reclamation operated a forbearance program in 2001 by purchasing CVP contractors' water in the Sacramento Valley for CVPIA instream flows, and to augment water supplies for CVP contractors south of the Delta. Reclamation administers the CVPIA Water Acquisition Program for Refuge Level 4 supplies and fishery instream flows.

Table 5-10. Summary of Historical Cross-Delta Water Transfers

		Buyer and Amount Delivered (AF) [a]						
Year	Water Year Type	DWR	DWR (Dry Year)	EWA	MWD	Reclamation WAP	WWD	Total
1987		83,100						83,100
1988		135,000						135,000
1989		200,000						200,000
1990		109,000						109,000
1991	Critical	820,805 [b]						820,805
1992	Critical	121,541 [c]						121,541
1994	Critical	26,033 [d]						26,033
1995						57,809		57,809
1996	Wet							
1997						45,000		45,000
1998	Wet					11,100		11,100
1999	Wet					6,300		
2001	Dry		138,806 [e]	105,000		24,748	90,934	359,488
2002	Dry		22,050 [f]	142,143		12,515		176,708
2003	Above Normal		11,355	69,914	124,447	8,375		214,091
2004	Below Normal		487 [g]	118,700				119,187
2005	Above Normal			6,044			15,000	21,044
Total		**527,100**	**1,141,077**	**441,801**	**124,447**	**175,403**	**105,934**	**2,515,762**

[a] Values do not include water transfers originating in the San Joaquin Valley.
[b] Includes 212,040 AF sold by YCWA to State Water Bank.
[c] Includes 30 TAF sold by YCWA to State Water Bank.
[d] 26,033 AF sold by YCWA to DWR.
[e] 138,806 AF sold by YCWA to DWR.
[f] 22,050 AF sold by YCWA to DWR.
[g] 487 AF sold by YCWA to DWR.

The surplus capacity available for water transfers varies with hydrologic conditions and CVP/SWP allocations. In general, under wetter hydrologic conditions, surplus capacity is lower because the CVP and SWP more fully utilize capacity for their own supplies. The CVP has little surplus capacity except in the driest hydrologic conditions. The SWP has the most surplus capacity in critical and some dry years, less or sometimes none in a broad middle range of hydrologic conditions, and some surplus again in above-normal and wet years when demands may be lower and contractors have alternative local supplies.

Under low outflow conditions, increases in CVP and SWP exports can cause additional seawater intrusion, even if the Delta outflow is not changed (i.e., if additional releases are made from upstream reservoirs to match the increase in export pumping). The additional increment of inflow (and corresponding increase in Delta outflow) that is needed to offset the additional effect of exports on seawater intrusion, and prevent degradation of water quality at Delta drinking water intakes, is referred to as “carriage water”.

5.1.4 EXPORT SERVICE AREA

In general, CVP/SWP facilities south of the Delta are not included in the project study area. However, the differences in CVP/SWP export pumping under the Yuba Accord Alternative and Modified Flow Alternative that may occur in some months due to changes in outflow from the lower Yuba River could affect storage in San Luis Reservoir. Decreases in Yuba River outflow due to operations for the Yuba River Accord will be accounted for according to refill provisions of the proposed Water Purchase Agreement. Therefore, San Luis Reservoir has been included in the study area for surface water supply and management.

5.1.4.1 SAN LUIS RESERVOIR

San Luis Reservoir is a storage facility south of the Delta, operated jointly by the CVP and SWP. Water is stored during the fall and winter months when Delta pumps can export more water than is needed for scheduled water demands. Similarly, water is released from San Luis Reservoir during spring and summer months when water demands are greater than the project’s Delta export capacity. The total storage of San Luis Reservoir is 2,041 TAF, 918 TAF of which is dedicated to the CVP, and 1,123 TAF of which is dedicated to the SWP. San Luis Reservoir receives water from, and releases water to, O’Neil Forebay through the Gianelli Pumping-Generating Plant. The O’Neil Forebay, in turn, receives CVP supplies from the Delta-Mendota Canal via the federal O’Neill Pump-Generating Plant, and SWP supplies from the California Aqueduct.

5.1.4.2 CENTRAL VALLEY PROJECT

WEST SAN JOAQUIN DIVISION

San Luis Dam and Reservoir are part of the CVP West San Joaquin Division. However, these facilities were built by and are jointly operated with DWR. The San Luis Unit also includes the O’Neill Dam and forebay (joint federal-state facilities), O’Neill Pumping-Generating Plant (federal facility), Gianelli Plant (joint federal-state facilities), and the San Luis Canal.

San Luis Reservoir is used to meet demand when water demands and schedules for CVP contractors served from the Delta-Mendota Canal exceed the combined capacity of the Jones Pumping Plant and the capacity of the state facilities (i.e., Banks Pumping Plant) to wheel water for the CVP. Typically, the fill cycle for the CVP’s share of San Luis Reservoir begins in August or September, and the drawdown cycle begins in March or April. As irrigation demands decrease, the Jones Pumping Plant is used to convey water to refill the CVP portion of San Luis Reservoir. The Jones Pumping Plant generally continues to operate at the maximum diversion rate until early spring, unless San Luis Reservoir is filled or the Delta water supply is not available.

The San Felipe Division of the CVP supplies water to customers in Santa Clara and San Benito counties from San Luis Reservoir. The operation of San Luis Reservoir has the potential to affect the water quality and reliability of these supplies if reservoir storage drops below 300 TAF.

CENTRAL VALLEY PROJECT CONTRACTORS

The CVP provides water to settlement contractors in the Sacramento Valley, exchange contractors in the San Joaquin Valley, and agricultural and M&I water service contractors in both the Sacramento and San Joaquin valleys. During the beginning of each year, Reclamation evaluates the hydrologic conditions throughout California and uses this information to forecast CVP operations and to estimate the amount of water to be made available to the federal water service contractors for the year (allocations to settlement and exchange contractors are fixed according to the unimpaired inflow to Lake Shasta).

The majority of the federal water service contractors (excluding contractors in the Friant Division) have service areas located south of the Delta. Most of their supplies must be conveyed through the Delta prior to delivery. Allocations vary considerably from year to year. In general, allocations to CVP water service contractors south of the Delta are lower than allocations to service contractors in the Sacramento Valley. A detailed summary of CVP annual contract amounts for service areas supplied from the Delta is presented in **Table 5-11**.

Table 5-11. Summary of Central Valley Project Contract Amounts for Service Areas South of the Delta

CVP Contractor	Contract Type	Maximum Contract Quantity (AF)
DELTA DIVISION		
Contra Costa Canal		
Contra Costa Water District	M&I	195,000
Subtotal		*195,000*
Delta-Mendota Canal		
Banta-Carbona Irrigation District	Irrigation and M&I	20,000
Byron-Bethany Irrigation District	Irrigation and M&I	20,600
Del Puerto Water District	Irrigation and M&I	140,210
Eagle Field Water District	Irrigation and M&I	4,550
Mercy Springs Water District	Irrigation and M&I	2,842
Oro Loma Water District	Irrigation and M&I	4,600
Pajaro Valley WMA, Santa Clara Valley WD and Westlands WD	Irrigation and M&I	6,260
Patterson Irrigation District	Irrigation and M&I	16,500
Tracy, City of	M&I	10,000
Tracy, City of (from Banta Carbona ID)	M&I	5,000
Tracy, City of (from Westside ID)	M&I	2,500
U.S. Department of Veteran Affairs	M&I	450
West Side Irrigation District	Irrigation and M&I	5,000
West Stanislaus Irrigation District	Irrigation	50,000
Westlands Water District Distribution District 1	Irrigation and M&I	2,990
Westlands Water District Distribution District 1	Irrigation and M&I	2,500
Westlands Water District Distribution District 2	Irrigation and M&I	4,198
Subtotal		*298,200*
Mendota Pool		
Coelho Family Trust	Irrigation and M&I	2,080
Fresno Slough Water District	Irrigation and M&I	4,000
James Irrigation District	Irrigation and M&I	35,300
Laguna Water District	Irrigation and M&I	800
Reclamation District No. 1606	Irrigation and M&I	228
Tranquility Irrigation District	Irrigation and M&I	13,800
Tranquility Public Utility District	Irrigation and M&I	70
Westlands Water District	Irrigation	50,000
Subtotal		*106,278*

CVP Contractor	Contract Type	Maximum Contract Quantity (AF)
San Luis Canal/Tracy		
Broadview Water District (annexed by Westlands WD)	Irrigation and M&I	27,000
Subtotal		*27,000*
MISCELLANEOUS		
Cross Valley Canal		
Fresno, County of	Irrigation and M&I	3,000
Hills Valley Irrigation District	Irrigation and M&I	3,346
Kern-Tulare Water District	Irrigation and M&I	40,000
Lower Tule River Irrigation District	Irrigation and M&I	31,102
Pixley Irrigation District	Irrigation and M&I	31,102
Rag Gulch Water District	Irrigation and M&I	13,300
Tri-Valley Water District	Irrigation and M&I	1,142
Tulare, County of	Irrigation and M&I	5,308
Subtotal		*128,300*
SAN FELIPE DIVISION		
San Felipe Unit		
San Benito County Water District	Irrigation and M&I	43,800
Santa Clara Valley Water District	Irrigation and M&I	152,500
Subtotal		*196,300*
Delta-Mendota Canal		
Pacheco Water District	Irrigation and M&I	9,280
Panoche Water District	Irrigation and M&I	27,000
San Luis Water District	Irrigation and M&I	45,080
Subtotal		*81,360*
WEST SAN JOAQUIN DIVISION		
San Luis Canal/Fresno		
Avenal, City of	M&I	3,500
California Department of Fish & Game	M&I	10
Coalinga, City of	M&I	10,000
Huron, City of	M&I	3,000
Westlands Water District	Irrigation and M&I	200,000
Westlands Water District	Irrigation and M&I	900,000
Subtotal		*1,116,510*
San Luis Canal/Tracy		
Pacheco Water District	Irrigation and M&I	0
Panoche Water District	Irrigation and M&I	67,000
San Luis Water District	Irrigation and M&I	80,000
Subtotal		*147,000*
San Luis Unit		
Dos Palos Joint Area Power Authority & Central California	M&I	2,500
Panoche Water District	Irrigation and M&I	0
Subtotal		*2,500*

–AF- acre-feet
ID - Irrigation District
WMA - Water Management Agency
M&I - Municipal and industrial
WD - Water District
Source: (pers. comm. T. Rust, Reclamation 2007)

5.1.4.3 State Water Project

SWP Contracts

The SWP operates under long-term contracts with public water agencies throughout California. These agencies, in turn, deliver water to wholesalers or retailers, or deliver it directly to agricultural and M&I water users (DWR 1999).

The SWP contracts between DWR and individual state water contractors define several classifications of water available for delivery under specific circumstances. All classifications are considered "project water". Table A is an exhibit to the SWP long-term water supply contracts. Table A amounts are used to define each contractor's proportion of the available water supply that DWR will allocate and deliver to that contractor. Each year, each contractor may request an amount not to exceed its Table A amount. The Table A amounts are used as a basis for allocations to contractors, but the actual annual supply to contractors is variable and depends on the amount of water that is available. Water delivery capabilities are frequently lower than Table A amounts (Reclamation and DWR 2005). Table A water is water delivered according to this apportionment methodology and is given first priority for delivery (DWR 2005). The total Table A amount has increased since inception of the SWP, and is projected to reach a maximum amount of about 4.2 MAF per year by 2021. The current Table A amount provided each year is about 4.15 MAF (DWR 2006). Maximum annual Table A amounts allocated to the 29 SWP contractors are presented in **Table 5-12.**

The Monterey Agreement, signed by 27 of the 29 SWP water contractors in 1995, restructured the SWP contracts to allocate water based on contractual Table A amounts instead of the amount of water requested for a given year. In times of shortages, the water supply to SWP agricultural and M&I contractors will be reduced equally.

Many contractors also make frequent use of additional contract water types to increase or decrease the amount of water available to them under Table A. Other contract types of water include Article 21 Water, Turnback Pool Water, and Carry-over Water.

The SWP allocation (proportion of Table A to be delivered) for any specific year is made based on a number of factors, including existing storage, current regulatory constraints, projected hydrologic conditions, and desired carry-over storage. Since 1995, annual delivery of Table A water has varied between 1.374 MAF (in 2001) and 2.965 MAF (in 2003). Article 21 deliveries have varied between approximately 20 TAF (in 1998) to 309 TAF (in 2000) (DWR 2006).

5.1.5 REGULATORY SETTING

5.1.5.1 YUBA REGION

FEDERAL REGULATORY SETTING

YCWA's activities on the lower Yuba River are regulated through a series of agreements, contracts, and laws. The primary focus of these regulations is the flow in the lower Yuba River, but reservoir and powerhouse operations are also subject to control by these various documents. Reclamation and DWR must operate the CVP/SWP system in accordance with similar regulations and laws. These regulations range from agreements with state or federal agencies to laws passed by the state or federal government.

FERC License for Yuba River Development Project

FERC originally issued a license under the Federal Power Act for the Yuba Project on May 16, 1963. On May 6, 1966, FERC issued an order amending this license. The amended license contains release and instream flow requirements similar to the 1965 YCWA/CDFG agreement. YCWA is obligated to operate in such a way as to meet minimum instream flows throughout the year below New Bullards Bar Dam, Englebright Dam, and Daguerre Point Dam, as described below.

Table 5-12 Maximum Annual State Water Project Table A Amounts

Region	SWP Contractor	Maximum Table A (AF)	Maximum Table A Percent of Total
Delivered from the Delta			
North Bay	Napa County FC&WCD	29,025	0.70
	Solano County WA	47,756	1.14
	Subtotal	*76,781*	*1.84*
South Bay	Alameda County FC&WCD, Zone 7	80,619	1.93
	Alameda County WD	42,000	1.01
	Santa Clara Valley WD	100,000	2.40
	Subtotal	*222,619*	*5.34*
San Joaquin Valley	Oak Flat WD	5,700	0.14
	County of Kings	9,305	0.22
	Dudley Ridge WD	57,343	1.37
	Empire West Side ID	3,000	0.07
	Kern County WA	998,730	23.93
	Tulare Lake Basin WSD	95,922	2.30
	Subtotal	*1,170,000*	*28.04*
Central Coast	San Luis Obispo County FC&WCD	25,000	0.60
	Santa Barbara County FC&WCD	45,486	1.09
	Subtotal	*70,486*	*1.69*
Southern California	Antelope Valley-East Kern WA	141,400	3.39
	Castaic Lake WA	95,200	2.28
	Coachella Valley WD	121,100	2.90
	Crestline-Lake Arrowhead WA	5,800	0.14
	Desert WA	50,000	1.20
	Littlerock Creek ID	2,300	0.06
	Mojave WA	75,800	1.82
	MWDSC	1,911,500	45.81
	Palmdale WD	21,300	0.51
	San Bernardino Valley MWD	102,600	2.46
	San Gabriel Valley MWD	28,800	0.69
	San Gorgonio Pass WA	17,300	0.41
	Ventura County FCD	20,000	0.48
	Subtotal	*2,593,100*	*62.14*
	Delta Total	***4,132,986***	***99.05***
Delivered from the Feather River Basin			
	County of Butte	27,500	0.66
	Plumas County FC&WCD	2,700	0.06
	City of Yuba City	9,600	0.23
	Feather River Total	***39,800***	***0.95***
	TOTAL	**4,172,786**	**100.00**

AF-acre-feet

FC&WCD - Flood Control and Water Conservation District
FCD - Flood Control District
ID - Irrigation District
MWDSC - Metropolitan Water District of Southern California
MWD - Municipal Water District
SWP – State Water Project
WA - Water Agency
WD - Water District
WSD - Water Storage District
Source: (DWR 2006)

Minimum Releases Below New Bullards Bar Dam

The minimum release to the North Yuba River from New Bullards Bar Reservoir is 5 cfs year-round. YCWA typically meets these requirements by releases from the bottom outlet of New Bullards Bar Dam.

Minimum Flow Requirements Below Englebright Dam

YCWA's 1966 FERC license specifies that, with the exception of flood control operations and release of uncontrolled inflows from tributary streams, releases from Englebright Dam are to be continuous and uniform. Scheduled releases must be within the limits prescribed below:

- 600 to 1,050 cfs, from October 16 to October 31
- 600 to 700 cfs, from November 1 to November 30
- 600 to 1,400 cfs, from December 1 to December 31
- 1,000 to 1,850 cfs, from January 1 to January 15
- 600 cfs minimum, from January 16 to March 3

Minimum Flow Requirements Below Daguerre Point Dam

Minimum flows as measured over the crest of Daguerre Point Dam and in the fish passage at that dam are as follows:

- 245 cfs, from January 1 to June 30
- 70 cfs, from July 1 to September 30
- 400 cfs, from October 1 to December 31

Water releases for fisheries resources are subject to reductions in critical water years, which are defined as those water years for which the April 1 forecast by DWR predicts that the annual unimpaired flow in the Yuba River at Smartville will be 50 percent or less of normal. Water release curtailments for critical water years are release reductions of 15, 20, and 30 percent when Yuba River unimpaired flow forecasts are, respectively, 50, 45, and 40 percent or less of normal. The critical water year provision is effective from the time of the forecast until April 1 of the following year. However, in no event may these minimum flows be reduced to less than 70 cfs.

Flow Fluctuation and Reductions (Ramping Criteria)

YCWA operates the Yuba Project to meet specific criteria for flow fluctuations as measured at the Smartville Gage. Flow fluctuation criteria are specified in the 1966 FERC License, and in RD-1644. On November 22, 2005, FERC approved an amendment to YCWA's license for the Yuba Project that contains flow fluctuation criteria similar to those specified in RD-1644. The 2005 amended license is the controlling requirement for operation of the Yuba Project. The amended license specifies that with the exception of emergencies, releases for flood control operations, bypasses of uncontrolled inflows into Englebright Reservoir, or uncontrolled spills, the Yuba Project be operated according to the following requirements:

- Project releases or bypasses that increase stream flow downstream of Englebright Dam shall not exceed a rate of change of more than 500 cfs per hour.
- Project releases or bypasses that reduce stream flow downstream of Englebright Dam shall be gradual and, over the course of any 24-hour period, shall not be reduced below 70 percent of the prior day's average flow release or bypass flow.

- Once the daily project release or bypass level is achieved, fluctuations in the stream flow level downstream of Englebright Dam due to changes in project operations shall not vary up or down by more than 15 percent of the average daily flow.
- During the period from September 15 to October 31, the licensee shall not reduce the flow downstream of Englebright Dam to less than 55 percent of the maximum five-day average release or bypass level that has occurred during that September 15 to October 31 period, or the minimum stream flow requirement that would otherwise apply, whichever is greater.
- During the period from November 1 to March 31, the licensee shall not reduce the flow downstream of Englebright Dam to less than the minimum stream flow release or bypass established under the preceding paragraph; 65 percent of the maximum five-day average flow release or bypass that has occurred during that November 1 to March 31 period; or the minimum stream flow requirement that would otherwise apply, whichever is greater.

FERC License for Narrow I Powerhouse

In 1993, FERC issued a new license to PG&E for the continued operation of the Narrows I Powerhouse, located below the left abutment of Englebright Dam. Contained within this license is a new set of instream flow requirements for fisheries resources. The order requires minimum flows measured at Smartville on the lower Yuba River to be those listed in **Table 5-13**, when (1) the total volume of water released to maintain the schedule of daily average flows during the water year, as quantified in the above table, is less than 45 TAF, and (2) the storage in Englebright Reservoir exceeds 60 TAF, or when PG&E is entitled to dispatch releases of water from New Bullards Bar Reservoir under the terms of PG&E's Power Purchase Contract with YCWA (i.e., when storage in New Bullards Bar Reservoir exceeds the Critical Line).

Table 5-13. Narrows I Federal Energy Regulatory Commission License Lower Yuba River Instream Flow Requirements at Smartville

Period	Flow (cfs)
October 1 to March 31	700
April 1 to April 30	1,000
May 1 to May 31	2,000
June 1 to June 30	1,500
July 1 to September 30	450

Flood Control Regulations

New Bullards Bar Reservoir also must be operated from September 16 to May 31 to comply with Part 208 "*Flood Control Regulations, New Bullards Bar Dam and Reservoir, North Yuba River, California,*" pursuant to Section 7 of the Flood Control Act of 1944 (58 Stat. 890). Under the contract between the United States and YCWA, entered into on May 9, 1966, YCWA agreed to reserve 170 TAF of storage space for flood control in accordance with rules and regulations enumerated in Appendix A of the Report on Reservoir Regulation for Flood Control (USACE June 1972). The seasonal flood storage space allocation schedule is presented in **Table 5-14**.

Table 5-14. New Bullards Bar Reservoir Flood Storage Space Allocation

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Storage (TAF)	170	170	170	170	170	170	70	0	0	0	0	56

STATE REGULATORY SETTING

1965 YCWA and CDFG Stream Flow Release Agreement

Instream flow requirements for the Yuba Project were originally specified in the September 2, 1965 agreement between YCWA and CDFG. These requirements were incorporated into the 1966 FERC license.

SWRCB Revised Decision 1644

RD-1644, adopted July 16, 2003, specifies both long-term and interim instream flow requirements for the lower Yuba River. Minimum instream flow requirements are measured by a five-day running average of average daily stream flows. RD-1644 established long-term instream flow requirements that now are scheduled to begin April 1, 2008. The required stream flows, as measured at the USGS gages at Marysville and Smartville, are presented in **Table 5-15**. Water year types are defined by the YRI developed in 2000 for the SWRCB Lower Yuba River Hearings. This index is a measure of the unimpaired flow in the lower Yuba River at the Smartville Gage. The interim flow requirements are applicable until April 1, 2008, after which the long-term flow requirements are scheduled to go into effect (SWRCB Order WR 2007-002-DWR). The required minimum instream flows, as measured at the USGS gages at Marysville and Smartville, are presented in **Table 5-15** (Interim instream flow requirements) and **Table 5-16 (**Long-term instream flow requirements).

LOCAL REGULATORY SETTING

1966 Power Purchase Contract

YCWA executed a Power Purchase Contract with PG&E on May 13, 1966. The Power Purchase Contract, which allowed financing the construction of the Yuba Project, specifies conditions of PG&E's power purchase from YCWA and PG&E's rights to require releases of water from New Bullards Bar Reservoir for power production.

Power Purchase Contract Appendix C, Subsection C-2.A.(b), Water for Power and Irrigation, details the monthly storage criteria and monthly power quotas. The maximum end-of-month storage amount (the "Critical Line") is described in paragraph (1):

> "*When it appears that storage by the end of any month will exceed the critical amount for such month listed in Appendix D, project power plants shall be operated, unless otherwise agreed, to reduce the storage on hand by the end of such month to the amount specified in Appendix D but at rates not to exceed the amount required for full capability operation except when greater releases are needed by reason of flood control requirements …*"

Table 5-15. Revised Decision 1644 Long-term Instream Flow Requirements

Period	Wet, Above Normal, and Below Normal Years[a] (cfs)		Dry Years[a] (cfs)		Critical Years[a] (cfs)		Extreme Critical Years[a] (cfs)	
	Smartville Gage	Marysville Gage	Smartville Gage	Marysville Gage	Smartville Gage	Marysville Gage	Smartville Gage	Marysville Gage
Sep 15 through Oct 14	700	250	500	250	400	250	400	250
Oct 15 through Apr 20	700	500	600	400	600	400	600	400
Apr 21 through Apr 30	--	1,000	--	1,000	--	1,000	--	500
May 1 through May 31	--	1,500	--	1,500	--	1,100	--	500
Jun 1	--	1,050	--	1,050	--	800	--	500
Jun 2	--	800	--	800	--	800	--	500
Jun 3 through Jun 30	--	800	--	800	--	800	--	500
Jul 1	--	560	--	560	--	560	--	500
Jul 2	--	390	--	390	--	390	--	390
Jul 3	--	280	--	280	--	280	--	280
Jul 4 through Sep 14	--	250	--	250	--	250	--	250

[a] Water year classifications are defined by the YRI, which is based on DWR's forecast of unimpaired flow of the Yuba River at Smartville, published in DWR's Bulletin 120. Wet years are defined as years where the YRI > 1,230 TAF, above normal years with YRI > 990 TAF, below normal years with YRI > 790 TAF, dry years with YRI > 630 TAF, critical years with YRI < 630 TAF, extreme critical years < 540 TAF.

"-- "Indicates no flow requirement.

Table 5-16. Revised Decision 1644 Interim Instream Flow Requirements

Period	Wet and Above Normal Years [a] (cfs)		Below Normal Years [a](cfs)		Dry Years [a](cfs)		Critical Years [a](cfs)	
	Smartville Gage	Marysville Gage	Smartville Gage	Marysville Gage	Smartville Gage	Marysville Gage	Smartville Gage	Marysville Gage
Sep 15 through Sep 30							400	150
Sep 15 through Oct 14	700	250	550	250	500	250	400	150
Oct 1 through Oct 14							400	250
Oct 15 through Apr 20	700	500	700	500	600	400	600	400
Apr 21							--	280
Apr 21 through Apr 30	--	1,000	--	900	--	400		
Apr 22 through Apr 30							--	270
May 1 through May 31	--	1,500	--	1,500	--	500	--	270
June 1	--	1,050	--	1,050	--	400		
Jun 1 through Jul 2							--	[b]
Jun 2 through Jun 30	--	800	--	800	--	400		
Jul 1	--	560	--	560	--	280		
Jul 2	--	390	--	390	--	250		
Jul 3	--	280	--	280	--	250		
Jul 3 through Sep 14							--	100
Jul 4 through Sep 14	--	250	--	250	--	250		

[a] Water year classifications are based on DWR forecast of unimpaired flow of the Yuba River at Smartville, published in DWR Bulletin 120.

[b] The Interim instream flow requirements for June 1 through 30 of critical years shall be 245 cfs pursuant to provisions of the agreement between YCWA and CDFG, dated September 2, 1965, except if a lower flow is allowed pursuant to the provisions of the 1965 agreement. The minimum flow on July 1 shall be 70 percent of the flow on June 30, and the minimum flow on July 2 shall be 70 percent of the flow on July 1.

" --" Indicates no flow standard requirement.

No instream flow requirements are associated with shaded cells.

Compliance with this criterion requires releases of up to 3,400 cfs at New Colgate Powerhouse to bring the end-of-month storage at or below the amounts listed in **Table 5-17**, which is the "*critical storage at end of month in Yuba's New Bullards Bar Reservoir*" of Appendix D, Storage Criteria.

Table 5-17. Storage Criteria for New Bullards Bar Reservoir Under 1966 PG&E Power Purchase Contract

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Storage (TAF)	660	645	645	600	600	685	825	930	890	830	755	705

In addition to the storage requirements, a power production quota applies when the operation described above would result in an end-of-month storage at or below the Critical Line. This quota schedule is described in the contract as follows:

> "*When drafts of storage will result in the storage on hand at the end of any month being equal to or less than the critical amount for such month listed in Appendix D, then, unless otherwise requested by Pacific, Yuba shall release during that month only a sufficient amount of water, in accordance with schedules furnished from time to time by Pacific, to generate the following specified amount of energy at the new Colgate Power Plant*."

The minimum required power generation criteria are presented in **Table 5-18**.

Table 5-18. Minimum Required Power Production Under 1966 PG&E Power Purchase Contract

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Power (MWh)	39,300	39,500	37,800	81,700	81,700	81,500	81,700	82,000	82,100	37,700	38,200	38,900
MWh – megawatts per hour												

Additionally, the contract also provides that the Narrows II Powerhouse "… *shall be operated in a manner consistent with the foregoing water release requirements*."

5.1.5.2 CVP/SWP UPSTREAM OF THE DELTA

STATE REGULATIONS

SWRCB Decisions 1275 and 1291

Diversion and storage of water by the SWP in Oroville Reservoir, and diversion and export of water from the Delta, are authorized by the SWRCB. The SWRCB first issued permits to DWR for operation of the SWP in 1967 (D-1275 and D-1291).

1967 DWR and CDFG Agreement

Feather River instream flow requirements were established in accordance with the 1967 agreement between DWR and CDFG, "*Concerning the Operation of the Oroville Division of the State Water Project for Management of Fish & Wildlife*", as amended in 1983. The 1983 agreement specifies that DWR will release a minimum of 600 cfs into the Feather River from the Thermalito Diversion Dam for fishery purposes. This is the total flow from the diversion dam outlet, diversion dam power plant, and Feather River Fish Hatchery pipeline. **Table 5-19** identifies the minimum flow requirements downstream from the Thermalito Afterbay Outlet. These requirements apply if the surface elevation of Oroville Reservoir is greater than 733 feet above msl.

Table 5-19. Feather River Minimum Flow Schedule

Percent of Normal Runoff [a]	October Through February (cfs)	March (cfs)	April Through September (cfs)
>55	1,700	1,700	1,000
<55	1,200	1,000	1,000

[a] Defined as the mean 1911 to 1960 April to July unimpaired runoff, which is equal to 1,942,000 AF.

In addition, if the hourly flow is greater than 2,500 cfs between October 15 and November 30, the flow, less 500 cfs, must be maintained until the following March unless the high flow resulted from flood control operation or mechanical problems. This requirement is to protect any spawning that could occur in overbank areas during the higher flow rate by maintaining flow levels high enough to keep the overbank areas submerged. In practice, flows are maintained below 2,500 cfs from October 15 to November 30 to prevent spawning in overbank areas.

Feather River flows below the confluence with the Yuba River are controlled by an agreement between DWR and the Feather River Service Area agricultural diverters to provide sufficient flow to prevent the agricultural diverters' pumps in the Feather River from being dewatered.

5.1.5.3 DELTA REGION

FEDERAL REGULATORY SETTING

Central Valley Project Improvement Act

The Reclamation Projects Authorization and Adjustment Act of 1992 (Public Law (PL) 102-575), includes Title 34, the CVPIA. Among the changes mandated by the CVPIA was dedication of 800 TAF annually to fish, wildlife, and habitat restoration. The Interior's October 5, 1999, Decision on Implementation of Section 3406 (b)(2) of the CVPIA provides the basis for implementing upstream and Delta actions for fish management purposes. Implementation of Section 3406 (b)(2) includes Jones Pumping Plant export curtailment for fishery management protection, based on USFWS recommendations.

STATE REGULATORY SETTING

Coordinated Operations Agreement

The COA defines how Reclamation and DWR share their joint responsibility to meet Delta water quality standards and the water demands of senior water right holders, and how the two agencies share surplus flows (Reclamation and DWR 1986). The COA defines the Delta as being in either "balanced water conditions" or "excess water conditions." Balanced water conditions are periods when Delta inflows are just sufficient to meet water user demands within the Delta, outflow requirements for water quality and flow standards, and export demands. Under excess water conditions, Delta outflow exceeds the flow required to meet the water quality and flow standards. Typically, the Delta is in balanced water conditions from June to November, and in excess water conditions from December through May. However, depending on the volume and timing of winter runoff, excess or balanced water conditions may extend throughout the year.

SWRCB 1995 Water Quality Control Plan

The 1995 WQCP established water quality control objectives for the protection of beneficial uses in the Delta. The 1995 WQCP identified (1) beneficial uses of the Delta to be protected, (2) water quality objectives for the reasonable protection of beneficial uses, and (3) a program of implementation for achieving the water quality objectives. Because these new beneficial objectives and water quality standards were more protective than those of the previous D-1485, the new objectives were adopted in 1995 through a water rights order for the operation of the CVP and SWP. Key features of the 1995 WQCP include estuarine habitat objectives for Suisun Bay and the western Delta (consisting of a salinity measurement [i.e., X2] at several locations), E/I ratios intended to reduce entrainment of fish at the export pumps, Delta Cross Channel gate closures, and San Joaquin River electrical conductivity (EC) and flow standards. The SWRCB adopted a new Bay/Delta WQCP on December 13, 2006. However, this new WQCP made only minor changes to the 1995 WQCP.

SWRCB Water Right Decision 1641

D-1641 and Order WR 2001-05 contain the current water right requirements to implement the 1995 WQCP. D-1641 incorporates water right settlement agreements between Reclamation and DWR and certain water users in the Delta and upstream watersheds regarding contributions of flows to meet water quality objectives. The SWRCB imposed terms and conditions on the water rights held by Reclamation and DWR that require them, in some circumstances, to meet many of the water quality objectives established in the 1995 WQCP. D-1641 also authorizes the CVP and SWP to use joint points of diversion in the south Delta, and recognizes the CALFED Operations Coordination Group process for operational flexibility in applying or relaxing certain protective standards.

Delta Outflow Requirement

Delta outflow, inflow that is not exported or diverted, is the primary factor controlling water quality in the Delta. When Delta outflow is low, seawater is able to intrude further into the Delta, impacting water quality at drinking water intakes. D-1641 specifies minimum monthly Delta outflow objectives to maintain a reasonable range of salinity in the estuarine aquatic habitat based on the Net Delta Outflow Index (NDOI). The NDOI is a measure of the freshwater outflow and is determined from a water balance that considers river inflows, precipitation, agricultural consumptive demand, and project exports. The NDOI does not take into account the semidiurnal and spring-neap tidal cycles.

The monthly minimum values of the NDOI specified in D-1641 depend on the water year type. Minimum flows are specified for the months of January and July to December. The outflow objectives from February to June are determined based on the X2 objective.

Delta Salinity Objectives

Salinity standards for the Delta are stated in terms of EC (for protection of agricultural and fish and wildlife beneficial uses), and chloride (for protection of M&I uses). Compliance values vary with water year and month. The salinity objectives at Emmaton on the Sacramento River, and at Jersey Point on the San Joaquin River, often control Delta outflow requirements during the irrigation season from April through August, requiring additional releases from upstream CVP and SWP reservoirs.

X2 Objective

The location of X2, the 2 parts per thousand (ppt) salinity unit isohaline at one meter above the bottom of the Sacramento River Channel, is used as a surrogate measure of ecosystem health in the Delta. The X2 objective requires specific daily surface EC criteria, to be met for a certain numbers of days each month from February through June. Compliance can also be achieved by meeting a 14-day running average salinity or 3-day average outflow equivalent. These requirements were designed to provide improved shallow water habitat for fish species in the spring. Because of the relationship between seawater intrusion and interior Delta water quality, the X2 criteria also improved water quality at Delta drinking water intakes.

Maximum Export/Inflow Ratio

D-1641 includes a maximum E/I standard to limit the fraction of Delta inflows that are exported. This requirement was developed to protect fish species and to reduce entrainment losses. Delta exports are defined as the combined pumping of water at Banks and Jones pumping plants. Delta inflows are the gaged or estimated river inflows. The maximum authorized E/I ratio is 0.35 for February through June and 0.65 for the remainder of the year. If the January eight-river runoff index is less than 1.0 MAF, the February E/I ratio is increased to 0.45. The CVP and SWP have agreed to share the allowable exports equally if the E/I ratio is limiting exports.

Joint Point of Diversion

The JPOD refers to the CVP and SWP use of each other's pumping facilities in the south Delta to export water from the Delta. The CVP and SWP have historically coordinated use of Delta export pumping facilities to assist with deliveries and to aid each other during times of facility failures. In 1978, by agreement with DWR and with authorization from SWRCB, the CVP began using the SWP Banks Pumping Plant for replacement pumping (195 TAF per year) for pumping capacity lost at Jones Pumping Plant because of striped bass pumping restrictions in D-1485. In 1986, Reclamation and DWR formally agreed that "*either party may make use of its facilities available to the other party for pumping and conveyance of water by written agreement*" and that the SWP would pump CVP water to make up for striped bass protection measures (Reclamation and DWR 1986).

Reclamation filed a number of temporary petitions with SWRCB to use Banks Pumping Plant for purposes other than replacement pumping and CVP deliveries that contractually relied on SWP conveyance. Such uses included deliveries to Cross Valley Contractors, The Musco Olive Company, and the San Joaquin National Cemetery. In D-1641, the SWRCB conditionally approved the use of the JPOD in three separate stages:

- Stage 1 is the use of the JPOD to serve Cross Valley Canal contractors, the Musco Olive Company and the San Joaquin National Cemetery; to support a recirculation study; and to recover export reductions made to benefit fish. Authorization for Stage 1 JPOD pumping to recover export reductions prohibits the CVP and SWP from annually exporting more water than each would have exported without the use of each other's pumping facilities. Stage 1 pumping is subject to SWRCB approval of a water level response plan, and a water quality response plan.

- Stage 2 is the use of JPOD for any purpose authorized in the water rights permits up to the limitations contained in the Corps permit. In addition to the Stage 1 requirements, Stage 2 pumping is subject to SWRCB approval of an operations plan to protect aquatic resources and other legal users of water.
- Stage 3 is the use of JPOD for any purpose authorized under the water rights permits up to the physical capacity of the export pumps. Stage 3 is subject to the operation of barriers or other means to protect water levels in the southern Delta, on SWRCB-approved operations plan that adequately protects aquatic resources and other legal users of water, and certification of a project-level EIR by DWR for the SDIP.

It has been the policy of the SWRCB that all water transfers must meet similar criteria and conditions as set forth for the JPOD, and the SWRCB has mandated a "response plan" evaluation process for real-time incremental export operations to determine the effects of water transfer and JPOD operations. SWRCB approval of the 2006 and 2007 Accord Pilot Programs included the provision that rediversion of transfer water at Banks and Jones pumping plants must be in compliance with the various plans under D-1641 that are prerequisites for the use of the JPOD by DWR and Reclamation.

Reclamation and DWR have produced the following response plans:

- Water Level Response Plan to address incremental effects of additional export, at the time of the export, to water levels in the South Delta environment.
- Water Quality Response Plan (WQRP) to address incremental effect of additional export, at the time of the export, to water quality in the Delta and South Delta specifically.
- Operations Plan to protect fish and wildlife, and other legal uses of water.

5.2 ENVIRONMENTAL IMPACTS/ENVIRONMENTAL CONSEQUENCES

Reservoirs and streams that potentially would be affected by the Proposed Project/Action and alternatives include New Bullards Bar Reservoir and the lower Yuba River, Oroville Reservoir and the lower Feather River, the lower Sacramento River below its confluence with the Feather River, the Delta, and San Luis Reservoir. The Proposed Project/Action and alternatives also could affect the operation of pumping and power generation facilities of the Yuba Project and of the CVP/SWP. This section describes the impact assessment methodology, and presents the impact indicators and significance criteria used to evaluate potential water supply and management impacts.

5.2.1 IMPACT ASSESSMENT METHODOLOGY

Computer simulation models and post-processing tools were used to assess potential changes in reservoir storage, river flows, and diversions that could occur under the Proposed Project/Action and alternatives, relative to the basis of comparison. Model assumptions and results are generally more reliable for comparative purposes than for absolute predictions of conditions. All assumptions are the same for both the with-project and without-project model runs, except assumptions associated with the action itself, and the focus of the analysis is on differences in the results. Results from a single simulation may not necessarily correspond to actual system operations for a specific month or year, but are representative of general conditions. Model results are best interpreted using various statistical measures such as long-term and year-type averages, and probabilities of exceedance.

5.2.1.1 METHODOLOGY FOR EVALUATING POTENTIAL IMPACTS TO YCWA DELIVERIES

Reservoir simulation models have been used routinely to analyze flow and storage conditions in the Yuba River Basin. The first model of the Yuba River Basin was developed by DWR in the mid-1980s. Subsequently, that model was refined and enhanced by Bookman-Edmonston Engineering, Inc. (B-E). In 2002, MWH developed a spreadsheet model of the Yuba Project that simulates operations of New Bullards Bar and Englebright reservoirs, flows in the lower Yuba River, and diversions at Daguerre Point Dam. The spreadsheet model uses outputs from the B-E model to estimate inflows from the Upper Yuba Basin. The MWH spreadsheet model was used to conduct the analysis presented in the Water Code Environmental Analysis for the 2006 and 2007 Pilot Programs (YCWA 2005; YCWA 2006). In this Draft EIR/EIS, the spreadsheet-based model is referred to as the Yuba Project Model (YPM), and is described in detail in Attachment A of Appendix D. The YPM network schematic and a list of associated model outputs are shown on **Figure 5-3.**

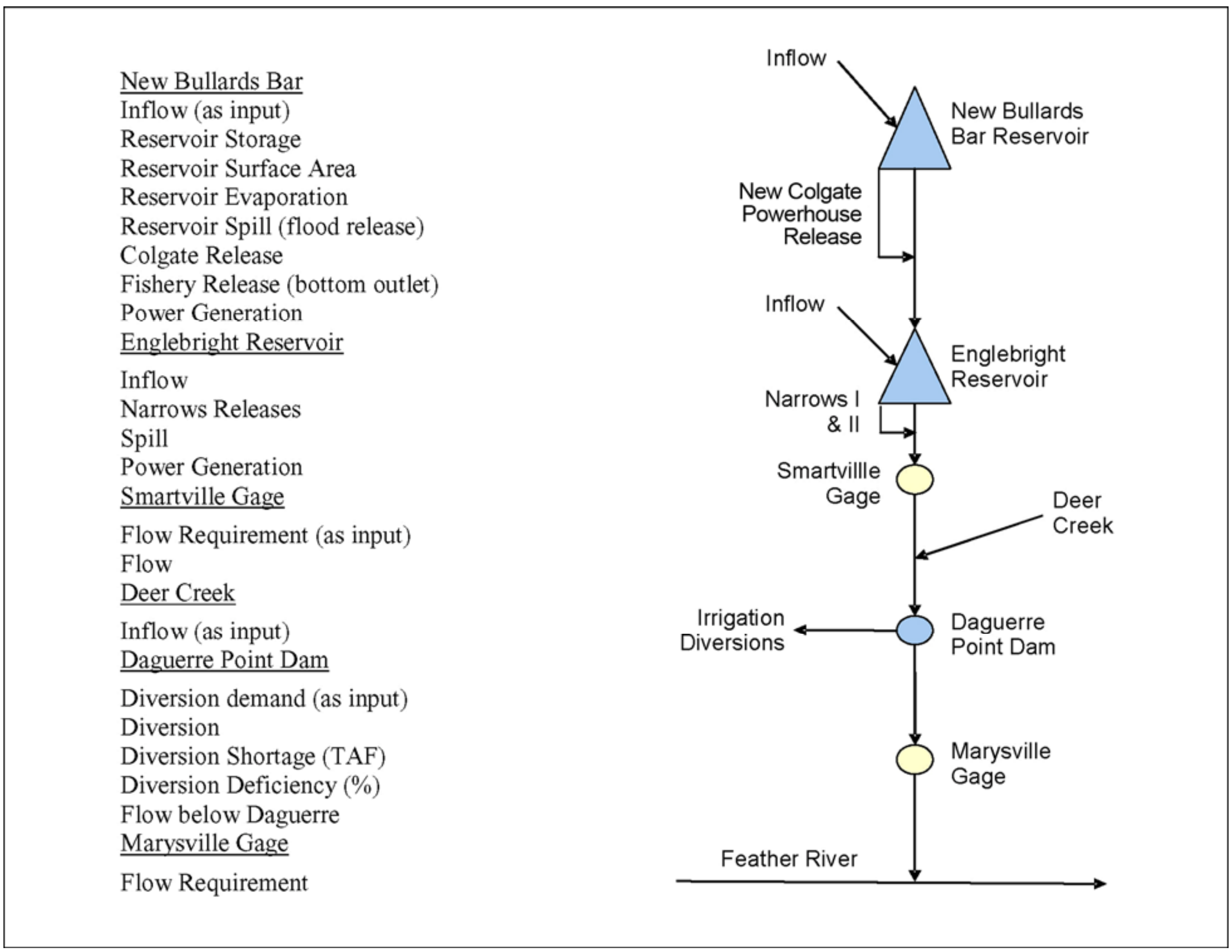

Figure 5-3 Yuba Project Model Network Schematic and Output

5.2.1.2 METHODOLOGY FOR EVALUATING POTENTIAL IMPACTS TO CVP AND SWP AND DELTA OPERATIONS

Potential impacts to CVP/SWP operations and water supply conditions upstream of and including the Delta, but external to the Yuba Region, were assessed using the CALSIM II operations model and using post-processing spreadsheet tools. The Delta Simulation Model, version 2 (DSM2), that simulates Delta hydrodynamics and water quality was used to assess changes in South Delta tidal levels. Detailed information about all of the modeling tools and modeling assumptions is presented in Appendix D.

CALSIM II

CALSIM II is the application of the CALSIM[10] software to the CVP/SWP. This application was jointly developed by Reclamation and DWR for planning studies relating to CVP/SWP operations. The primary purpose of CALSIM II is to evaluate the water supply reliability of the CVP and SWP at current or future levels of development (e.g., 2005, 2020), with and without various assumed future facilities, and with different modes of facility operations. Geographically, the model covers the drainage basin of the Delta, and CVP/SWP exports to the San Francisco Bay Area, San Joaquin Valley, Central Coast, and Southern California.

CALSIM II typically simulates system operations for a 72-year period using a monthly time step. The model assumes that facilities, land use, water supply contracts, and regulatory requirements are constant over this period, representing a fixed level of development (e.g., 2001 or 2020). The historical flow record of October 1921 to September 1994, adjusted for the influences of land use changes and upstream flow regulation, is used to represent the possible range of water supply conditions. Major Central Valley rivers, reservoirs, and CVP/SWP facilities are represented by a network of arcs and nodes. CALSIM II uses a mass balance approach to route water through this network. Simulated flows are mean flows for the month, reservoir storage volumes correspond to end-of month storage.

CALSIM II models a complex and extensive set of regulatory standards and operations criteria. Descriptions of both are contained in Chapter 8 of the OCAP BA (Reclamation 2004), and in the Benchmark Studies Assumptions Document (Reclamation and DWR 2002). (As discussed in Section 4.1.4, any conveyance of water provided by the Yuba Accord Alternative through the CVP/SWP system, the Delta and the Export Service Area would be consistent with all of the procedures and operating principles that are established in the new OCAP that Reclamation will adopt after completion of the new OCAP ESA consultations. Because this new OCAP has not been prepared yet, it was not possible to include its provisions in the hydrological modeling for this EIR/EIS.)

CALSIM II modeling undertaken for Reclamation's OCAP BA is used to provide the foundation for CVP/SWP system-wide baseline conditions (stream flow, storage, and diversions) for the CEQA Existing Condition (CEQA basis of comparison) and the future No Action Alternative (NEPA basis of comparison). OCAP model simulations were rerun (OCAP Study 3 and OCAP Study 5) with updated inputs for lower Yuba River outflow to the Feather River, lower Yuba River diversions at Daguerre Point Dam, and Trinity River instream flow requirements downstream of Lewiston Dam.

For this EIR/EIS, CALSIM II was used to establish baseline flow conditions in the lower Sacramento River, Feather River, and Delta, storage in Oroville Reservoir and San Luis Reservoir, and the availability of pumping capacity at Banks and Jones pumping plants. Analysis of the Proposed Project/Action and alternatives was implemented using a post-processing analysis based on changes in simulated flow in the lower Yuba River at the

[10] The CALSIM software has been renamed WRIMS to eliminate confusion between the generic engine or software and its application to the CVP/SWP system (DWR Website 2007).

Marysville Gage. Modeling accuracy for the alternatives is dependent on the accuracy of the CALSIM II baseline. While simulated operations may depart from actual operations, it is believed that the CALSIM II baseline establishes a reasonable range of likely Delta conditions.

The hydrologic analysis presented for this EIR/EIS utilized the 2004 OCAP CALSIM II models, which are the best available hydrological modeling tools, to approximate the changes in storage, flow, salinity, and reservoir system re-operation associated with the Proposed Project/Action and alternatives. Although CALSIM II is the best available tool for simulating system-wide operations, the model also contains simplifying assumptions in its representation of the real system.

A general external review of the methodology, software, and applications of CALSIM II was conducted in 2003 (Close *et al.* 2003). Recently, an external review of the San Joaquin River Valley CALSIM II model was also conducted (Ford *et al.* 2006). Several limitations of the CALSIM II models were identified in these external reviews. The main limitations of the CALSIM II models are as follows:

- Use of a monthly time step
- The accuracy of the inflow hydrology is uncertain
- The model lacks a fully explicit groundwater representation

Reclamation, DWR, and the external reviews have identified the need for a comprehensive error and uncertainty analysis for various aspects of the CALSIM II model. DWR has issued the CALSIM II Model Sensitivity Analysis Study (DWR 2005) and Reclamation is currently embarking on a similar sensitivity and uncertainty analysis for the San Joaquin River Basin. This information will improve understanding of the model results.

Despite these limitations, the monthly CALSIM II model results remain useful for comparative purposes. It is important to differentiate between "absolute or "predictive" modeling applications and "comparative" applications. In "absolute" applications, the model is run once to predict a future outcome, and errors or assumptions in formulation, system representation, data, operational criteria, etc., all contribute to total error or uncertainty in model results. In "comparative" applications, the model is run twice,: once to represent a base condition (no project) and a second time with a specific change (project) to assess the change in the outcome due to the input change. In this mode (the mode used for this EIR/EIS), the difference between the two simulations is of principal importance. Potential errors or uncertainties that exist in the "no project" simulation are also present in the "project" simulation such that their effects are reduced when assessing the change in outcomes.

POST-PROCESSING SPREADSHEET TOOLS

River flow and reservoir storage conditions under the Proposed Project/Action and alternatives were calculated using a post-processing application that routes changes in the Yuba River outflow, simulated using the YPM, through the Feather River, lower Sacramento River, and Delta. The post-processing analysis includes reoperation of Oroville Reservoir for temporary storage of transferred water from the Yuba Basin, changes in Delta operations, including Delta inflow, Delta outflow, Delta exports and X2 location, and changes in San Luis Reservoir storage due to refill impacts.

MODELING THE ENVIRONMENTAL WATER ACCOUNT

Analysis for this EIR/EIS assumes that EWA operations or a similar environmental program, as generally described in the CALFED ROD, will continue to be implemented. EWA operations are included in the CALSIM II modeling of the Proposed Project/Action and alternatives, including the future No Action Alternative. Simulated EWA operations closely follow the EWA modeling conducted by Reclamation for the 2004 OCAP BA. CALSIM II modeling generally follows EWA export actions and changes in export pumping, as anticipated by the CALFED ROD. However, EWA operations have differed from the ROD description as state and federal agencies have adapted operations to implement a successful EWA Program. This adaptive management cannot be represented in CALSIM II.

Simulated EWA actions include (1) reduction in total exports by up to 50 TAF per month from December through February, (2) VAMP SWP export restrictions from April 15 through May 15,(3) post-VAMP SWP export restrictions from May 16 through May 31 (and potentially CVP export restrictions if B2 post-VAMP action is not taken), (4) pre-VAMP SWP export restrictions from April 1 through April 14, and (5) export ramping from June 1 to June 7.

Simulated EWA purchases upstream of the Delta and in the export service area are 250 TAF per year in wet, above normal, and below normal water years, 230 TAF in dry water years, and 210 TAF in critical water years (Sacramento Valley 40-30-30 Index). Other simulated EWA assets include use of 50 percent JPOD export capacity, acquisitions of 50 percent of any CVPIA 3406(b)(2) releases pumped by the SWP, and dedicated 500 cfs pumping capacity at Banks Pumping Plant from July through September.

The Proposed Project/Action and alternatives would provide varying amounts of water to the EWA Program. CALSIM II modeling conducted for the OCAP BA does not identify the sources of water for EWA purchases upstream of the Delta. Modeling for this EIR/EIS specifically identifies volumes of water sold to the EWA by YCWA. It is assumed that this volume is part of, or all of, the EWA purchases simulated in the OCAP BA. Where simulated YCWA sales to the EWA under the Proposed Project/Action and alternatives exceed the volumes of North of Delta purchases identified in the CALSIM II modeling conducted for the OCAP BA, it is assumed that this volume offsets EWA purchases in the export service areas south of the Delta.

MODELING THE PROPOSED PROJECT/ACTION

Methodology for Evaluating Component 1 through Component 4 Water Transfers (2008 through 2015)

To evaluate potential service area impacts associated with the provision of water under the Tier 2 and Tier 3 Agreements proposed in the Yuba Accord Alternative, this EIR/EIS includes an analysis of the quantities of Component 2, 3, and 4 water likely to be provided to CVP and SWP contractors, by water year type.

As previously described for the Yuba Accord Alternative, Component 1 water is designed for EWA use and purposes currently approved by the certified EIS/EIR (Reclamation *et al.* 2004) for the EWA Program, which is anticipated to expire on December 31, 2007. It is anticipated that Component 1 water would continue to be used for similar purposes after the end of the EWA Program.

For CEQA purposes related to DWR and the SWP, a technical review of the EWA EIS/EIR was first conducted to determine the evaluated parameters (e.g., volumes of water, timing and duration), assessment methodology, impact indicators and significance criteria used to support the conclusions in the EWA EIS/EIR. The EWA water supply analysis was separated into analysis of the potential effects on agencies and their users from transferring water to the EWA, water users receiving water from the EWA, and water users not selling water to the EWA (Reclamation *et al.* 2003). To provide maximum flexibility, the EWA analysis included many potential transfers even though the EWA Project agencies would likely not need all transfers in a given year. The EWA analysis also compared the timing of transfer to the timing, of the demand. To compare potential water supply changes associated with the Proposed Project/Action and alternatives to those identified for the EWA Program, a separate analysis designed to mimic the approach used in the EWA EIS/EIR was conducted for this EIR/EIS. Because conditions associated with the EWA Program represent the basis of comparison (i.e., Existing Condition), the modeling used to characterize the CEQA Existing Condition includes operational assumptions for the EWA Program, as modeled in Reclamation's OCAP Study 3. Using OCAP Study 3 as the modeling baseline, transfer water provided to the EWA Program under the Proposed Project/Action and alternatives was post-processed to determine the amount of change expected to occur in evaluated Delta parameters (e.g., export pumping), relative to the EWA Program. The modeling results for the Proposed Project/Action and alternatives were compared to the modeled EWA EIS/EIR results to determine whether potential changes in water supply deliveries associated with transfers to the EWA Program (or functionally equivalent state program) under the Proposed Project/Action and alternatives would produce hydrologic changes similar to those occurring under the CEQA Existing Condition and thus be within the range of effects identified by the EWA Program. Following independent review and comparison of these two analyses, separate findings were made for this project and are presented in this EIR/EIS.

As part of the Tier 2 Agreement between Reclamation and DWR, the agencies normally would implement a 50-50 split in Components 2 through 4 water for delivery to CVP and SWP water contractors. Under the Tier 3 Agreements, Reclamation would allocate Components 2 through 4 water to CVP water service contractors and DWR would normally allocate Component 2 water to SWP Contractors in proportion to their Table A amounts. While DWR would normally allocate Component 3 water to SWP Contractors in proportion to their Table A amounts, individual contractor participation would be optional. The impact analysis assumes that all Yuba Accord water for the CVP would be exported to CVP service areas south of the Delta.

The analysis evaluates how annual CVP and SWP contract deliveries would change as a result of the Proposed Project/Action and alternatives, relative to the basis of comparison. Reclamation and DWR would elect to proportionally distribute the additional water supplied by the Yuba Accord Alternative to CVP and SWP contractors according to authorized federal CVP contracts and state SWP Table A amounts, respectively. The increases in annual delivery of Components 2, 3, and 4 water, by contractor and water year type, are compared to deliveries under the basis of comparison to determine the percent changes that would be expected to occur as a result of the Proposed Project/Action. Additionally, the percent increases in CVP and SWP dry and critical year deliveries provided by the Components 2, 3, and 4 water were calculated for comparative purposes. Because the Proposed Project/Action, relative to the basis of comparison, could change the distribution of CVP and SWP annual deliveries, annual deliveries are presented by water year type and over the 72-year simulation period.

Methodology for Evaluating Component 1 through Component 4 Water Transfers (2016 through 2025)

Water available for transfer under the Proposed Project/Action and alternatives may be more restricted after 2016 because of changes in Yuba Project operations (e.g., FERC relicensing constraints, see Chapter 3) and changes in CVP/SWP system-wide operations (e.g., more restrictive operational constraints associated with protecting listed species). Therefore, the analysis of the Yuba Accord Alternative during 2016 through 2025 considers a range of potential deliveries, which include a minimum of 20 TAF. The minimum delivery amount of 20 TAF is characterized as Component 1 water. Consistent with the modeling assumptions for Component 1 water deliveries before 2016, it is assumed that the 20 TAF would be pumped through the Delta primarily during the July through September period using some or all of the 500 cfs dedicated capacity available to the EWA, or capacity freed up if the EWA Program is no longer in place (post-2016).

Because of the many uncertainties associated with future changes in Yuba Project operations, the analysis of potential water supply changes expected to occur as a result of post-2016 water transfers associated with the Proposed Project/Action and alternatives, relative to the basis of comparison, is performed qualitatively.

5.2.2 WATER SUPPLY ANALYSIS

This section discusses modeling results for Delta export operations and deliveries to the CVP, SWP, and EWA under the Existing Condition, and for each of the CEQA and NEPA alternatives. The focus of this section is the water supply aspects of each alternative. Environmental impacts are discussed in Sections 5.2.4. through 5.2.10

As discussed in Chapter 4, CEQA and NEPA have different requirements and different bases of comparison. Although only one Proposed Project (the Yuba Accord Alternative) and one action alternative (the Modified Flow Alternative) are evaluated in this EIR/EIS, it is necessary to use separate modeling scenarios to correctly characterize these two alternatives under CEQA and NEPA. As a result, the scenarios compared in the impact assessment have either a "CEQA" or a "NEPA" prefix before the name of the alternative being evaluated.

5.2.2.1 WATER SUPPLY SCENARIOS

Table 5-20 summarizes the key assumptions for each alternative. A detailed discussion of the different assumptions used for the CEQA and NEPA alternatives is included in Appendix D. Two additional scenarios, Scenarios A and B, are included in Table 5-20. These scenarios represent a transitional state between the CEQA Existing Condition and the CEQA No Project Alternative. The purpose of these scenarios is to identify the separate effects of the Wheatland Project and implementation of the RD-1644 Long-term lower Yuba River instream flow requirements on CVP and SWP water supplies.

CEQA EXISTING CONDITION

The CEQA Existing Condition represents the environmental condition as it existed in 2005, when the NOP/NOI was published. It includes RD-1644 Interim instream flow requirements on the lower Yuba River, and a present level of demand for agricultural diversions at Daguerre Point Dam.

Table 5-20. Water Supply Scenarios and Alternatives

Scenario	CEQA Existing Condition	Scenario A RD-1644 Interim with Wheatland Project	Scenario B RD-1644 Long-term No Wheatland Project	CEQA No Project	CEQA Yuba Accord Alternative	CEQA Modified Flow Alternative	NEPA No Action	NEPA Yuba Accord Alternative	NEPA Modified Flow Alternative
Time Period	**2005**	**2008**	**2008**	**2008-2016**	**2008-2025**	**2008-2025**	**2016-2025**	**2008-2025**	**2008-2025**
Local Study Area Assumptions									
Lower Yuba River Instream Flow Requirements	RD-1644 Interim	RD-1644 Interim	RD-1644 Long-term	RD-1644 Long-term	Accord Flow Schedules	RD-1644 Interim + Conference Year	RD-1644 Long-term	Accord Flow Schedules	RD-1644 Interim + Conference Year
Demand at Daguerre Point Dam TAF/yr	298 - 304	338 – 344 [a]	298 - 304	338 – 344 [a]	338 – 344 [a]	338 – 344 [a]	338 – 344 [a]	338 – 344 [a]	338 – 344 [a]
CALSIM II Level of Development	Present Level Land Use	Present Level Land Use	Present Level Land Use	Present Level Land Use	Present Level Land Use	Present Level Land Use	2020 Level Land Use	2020 Level Land Use	2020 Level Land Use
YCWA Water Transfers	SW and GW Transfers	None	None	GW Transfers Only	SW and GW Transfers	SW and GW Transfers	GW Transfers Only	SW and GW Transfers	SW and GW Transfers
Other Projects and Programs Assumptions									
CVP/SWP Intertie	Not Included	Not Included	Not Included	Not Included	Not Included	Not Included	Included	Included	Included
Freeport Regional Water Project	Not Included	Not Included	Not Included	Not Included	Not Included	Not Included	Included	Included	Included
South Delta Improvements Program(Stages 1 and 2)	Not Included	Not Included	Not Included	Not Included	Not Included	Not Included	Included	Included	Included
CVP/SWP Integration	Not Included	Not Included	Not Included	Not Included	Not Included	Not Included	Included	Included	Included

[a] Increased demand at Daguerre Point Dam associated with implementation of the Wheatland Project.
SW - Surface water
GW - Groundwater

For a water supply assessment, in contrast to environmental impact determination, CVP, SWP and EWA deliveries under the Yuba Accord and Modified Flow alternatives are compared to the CEQA No Project Alternative rather than the CEQA Existing Condition. Maintaining the CEQA Existing Condition is not an alternative because in the absence of the Proposed Project or an action alternative, the Long-term instream flow requirements are scheduled to go into effect on April 1, 2008.

CEQA No Project Alternative

The CEQA No Project Alternative represents current environmental conditions plus future operational and environmental conditions anticipated to occur in the foreseeable future in the absence of the Proposed Project or other action alternative. The CEQA No Project Alternative includes implementation of the RD-1644 Long-term instream flow requirements on the lower Yuba River. The CEQA No Project Alternative also includes increased irrigation demand at Daguerre Point Dam due to implementation of the Wheatland Project. Additional modeling analysis was conducted to estimate the separate water supply effects of the RD-1644 Long-term instream flow requirements and the Wheatland Project on CVP and SWP deliveries to the Export Service Area. The modeling scenarios, described below, are for this single purpose, and are *not* project alternatives to be considered under CEQA or NEPA.

Scenario A: RD-1644 Long-term Without Wheatland Project

RD-1644 Interim and RD-1644 Long-term specify similar flow requirements at the Marysville gage in wet, above normal, and below normal years as defined by the YRI. However, in dry and critical years, the RD-1644 Long-term instream flow requirements would be significantly higher for the period April 21 to September 14. Therefore, RD-1644 Long-term would result in greater Yuba River outflow during Delta balanced conditions, and increased water supplies to the CVP and SWP in these year types.

Section 5.2.2.2 presents modeling results summarizing the changes in Yuba River outflow and changes in CVP and SWP exports resulting from RD-1644 Long-term instream flow requirements as compared to RD-1644 Interim instream flow requirements.

Scenario B: RD-1644 Interim With Wheatland Project

After 2007, YCWA will deliver surface water from the lower Yuba River to the Wheatland Water District to meet a projected agricultural water demand of approximately 40 TAF per year. While the Wheatland Project would increase surface water deliveries, the effect on Delta exports would be significantly less in magnitude than the amounts of these deliveries.

Flows at the Marysville gage in excess of the instream flow requirements may occur when releases from New Bullards Bar Reservoir are made to meet the reservoir target operating line, or when releases from New Bullards Bar Dam are controlled by instream flow requirements at the Smartville gage. The Smartville flow requirements can control New Bullards Bar Reservoir releases from October to March. Balanced water conditions in the Delta vary from year to year, but typically run from June to November. Operating for increased demands at Daguerre Point Dam would typically result in decreased New Bullards Bar Reservoir storage, greater diversion of water released to meet the Smartville flow requirements, and potentially accompanying decreases in lower Yuba River outflows.

Section 5.2.2.2 presents modeling results summarizing the changes in lower Yuba River outflow and changes in CVP and SWP exports resulting from the increased demand at Daguerre Point Dam associated with the Wheatland Project.

NEPA NO ACTION ALTERNATIVE

The local Yuba elements of the NEPA No Action Alternative are similar to those for the CEQA No Project alternative. The primary differences between the CEQA No Project and NEPA No Action alternatives are assumptions relating to land use development in the Sacramento Valley, SWP export demands, and the implementation of reasonably foreseeable programs and actions. The NEPA No Action Alternative includes the following additional projects or actions that are not included in the CEQA No Project Alternative:

- CVP/SWP Intertie
- Freeport Regional Water Project
- South Delta Improvements Program
- CVP/SWP Integration

YUBA ACCORD ALTERNATIVE

Elements of the Yuba Accord Alternative include operating to meet the Accord flow schedules for the lower Yuba River and a lower carry-over storage target for New Bullards Bar Reservoir. Both the CEQA and NEPA Yuba Accord alternatives include full-level development demands at Daguerre Point Dam reflecting completion of the Wheatland Project.

MODIFIED FLOW ALTERNATIVE

The Modified Flow Alternative includes implementation of flows characterized by RD-1644 Interim instream flow requirements, and the conference year provisions proposed for the Yuba Accord Alternative.

5.2.2.2 BASE DELTA EXPORTS TO EXPORT SERVICE AREA

Base Delta exports, measured as exports through the Banks and Jones pumping plants, are used as an index of the water available to the SWP long-term contractors, CVP water service contractors, and wildlife refuges located in the Export Service Area. Base Delta exports include export of EWA purchases north of the Delta, but do not include water made available through other single-year water transfer or long-term water purchase agreements (e.g., the Accord Water Purchase Agreement).

CEQA EXISTING CONDITION AND NO PROJECT ALTERNATIVE

Table 5-21 compares base Delta exports for present level demands at Daguerre Point Dam under RD-1644 Interim (the CEQA Existing Condition), and RD-1644 Long-term instream flow requirements (Scenario A). The effect of implementing RD-1644 Long-term instream flow requirements on the lower Yuba River would be to increase average annual Delta exports by 9 TAF per year, compared to RD-1644 Interim. In dry and critical years, the increase in exports would be greater, averaging 11 TAF per year in dry years, and 34 TAF per year in critical years.

Table 5-21. Base Delta Exports (TAF per year) for Present Level Demands at Daguerre Point Dam

Water Year Type (SVI)	Existing Condition RD-1644 Interim No Wheatland Project	Scenario A RD-1644 Long-term No Wheatland Project	Difference
Average All Years	5,477	5,485	9
Wet	6,592	6,593	1
Above Normal	6,227	6,227	0
Below Normal	5,880	5,882	2
Dry	4,928	4,938	11
Critical	3,162	3,195	34
Note: Values in the table do not include transfers. SVI - Sacramento Valley Index			

Table 5-22 compares base Delta exports under RD-1644 Long-term instream flow requirements for present level demand (Scenario A) and full level demand (the No Project Alternative) at Daguerre Point Dam (i.e., without and with the Wheatland Project).

With the RD-1644 Long-term instream flow requirements, and with changing from present level demands to full level of development demands, the average annual Delta export would decrease by 13 TAF. In dry and critical years, the effect of the Wheatland Project would be less: exports would average 8 TAF per year less in dry years, and 3 TAF per year less in critical years.

Table 5-22. Base Delta Exports (TAF per year) for RD-1644 Long-term

Water Year Type (SVI)	Scenario A RD-1644 Long-term No Wheatland Project	CEQA No Project Alternative RD-1644 Long-term With Wheatland Project	Difference
Average All Years	5,485	5,473	-13
Wet	6,593	6,578	-15
Above Normal	6,227	6,206	-21
Below Normal	5,882	5,865	-17
Dry	4,938	4,931	-8
Critical	3,195	3,192	-3
Note: Values in the table do not include transfers. SVI - Sacramento Valley Index			

The CEQA Existing Condition includes RD-1644 Interim instream flow requirements and a present level of demand. The CEQA No Project Alternative includes RD-1644 Long-term instream flow requirements and a full development level of demand. **Table 5-23** presents the combined effect of the change in flow requirements and the change in demand on base Delta exports (equivalent to the combined effects shown in Table 5-21 and Table 5-22). The beneficial effect of the Long-term instream flow requirement on CVP and SWP exports is offset by the increase in demand at Daguerre Point Dam for the Wheatland Project. The average annual base Delta export would decrease by 4 TAF. However, the base Delta exports would average 3 TAF per year more in dry years, and 30 TAF per year more in critical years.

Table 5-23. Base Delta Exports (TAF per year) for CEQA Existing Condition and CEQA No Project Alternative

Water Year Type (SVI)	CEQA Existing Condition	CEQA No Project Alternative	Difference
Average All Years	5,477	5,473	-4
Wet	6,592	6,578	-15
Above Normal	6,227	6,206	-21
Below Normal	5,880	5,865	-14
Dry	4,928	4,931	3
Critical	3,162	3,192	30
Note: Values in the table do not include transfers. SVI - Sacramento Valley Index			

YUBA ACCORD ALTERNATIVE

Base Delta exports under the Yuba Accord Alternative correspond to exports under the accounting baseline, as defined in Exhibit 1 to the proposed Water Purchase Agreement (see Appendix B). Baseline conditions for the accounting of released transfer water include RD-1644 Interim instream flow requirements,[11] and FERC License 2246 instream flow requirements of 400 cfs at the Marysville gage for the period of October 1 to October 14. Flows above operations for RD-1644 Interim would be transferable, but are not considered part of base Delta exports (i.e., base Delta exports do not include water that would be provided under the Water Purchase Agreement). For modeling purposes, base Delta exports under the Yuba Accord Alternative are identical to Scenario B. The calculated division between base Delta exports and transfer water is approximate due to difficulties in accurately modeling the Accord accounting rules and modeling reservoir refill impacts in analytical tools that use a monthly time step. **Table 5-24** compares base Delta exports for the Yuba Accord accounting baseline to the CEQA No Project and NEPA No Action alternatives.

Table 5-24. Base Delta Exports (TAF per year) for the No Project, No Action and Yuba Accord Alternatives

Year-Type (SVI)	CEQA No Project Alternative	CEQA Yuba Accord Accounting Baseline	Difference	NEPA No Action Alternative	NEPA Yuba Accord Accounting Baseline	Difference
Average All Years	5,473	5,460	-12	5,939	5,927	-13
Wet	6,578	6,577	-1	7,258	7,257	-1
Above Normal	6,206	6,206	0	6,808	6,808	0
Below Normal	5,865	5,862	-4	6,277	6,273	-4
Dry	4,931	4,911	-20	5,225	5,204	-21
Critical	3,192	3,150	-42	3,465	3,423	-42
Note: Values in the table do not include transfers. SVI - Sacramento Valley Index						

MODIFIED FLOW ALTERNATIVE

Table 5-25 compares base Delta exports for the Modified Flow Alternative to the CEQA No Project and NEPA No Action alternatives.

Base Delta exports under the Modified Flow Alternative would be similar to base Delta exports under the Yuba Accord Alternative, except under extremely dry conditions (e.g., water year 1977), when base Delta exports would be less due to the proposed conference year provision.

Table 5-25. Base Delta Exports (TAF per year) for the No Project, No Action and Modified Flow Alternatives

Water Year Type (SVI)	CEQA No Project Alternative	CEQA Modified Flow Alternative	Difference	NEPA No Action Alternative	NEPA Modified Flow Alternative	Difference
Average All Years	5,473	5,460	-12	5,939	5,927	-12
Wet	6,578	6,577	-1	7,258	7,257	-1
Above Normal	6,206	6,206	0	6,808	6,808	0
Below Normal	5,865	5,862	-4	6,277	6,273	-4
Dry	4,931	4,911	-20	5,225	5,204	-21
Critical	3,192	3,150	-42	3,465	3,426	-39
Note: Values in the table do not include transfers.						

[11] For modeling purposes, this accounting baseline varies from the CEQA Existing Condition because of projected increased demands at Daguerre Point Dam associated with implementation of the Wheatland Project.

5.2.2.3 YCWA STORED WATER TRANSFERS

The ability of YCWA to conduct stored water transfers is considered under each of the alternatives. Modeling results for the volume of stored water transfers, including the carriage water required to implement the transfers, are shown in **Table 5-26**.

Table 5-26. YCWA Stored Water Transfer Volumes (TAF per year)

Water Year Type (SVI)	CEQA No Project Alternative	CEQA Yuba Accord Alternative	CEQA Modified Flow Alternative	NEPA No Action Alternative	NEPA Yuba Accord Alternative	NEPA Modified Flow Alternative
Average All Years	0	64	42	0	66	52
Wet	0	56	52	0	68	69
Above Normal	0	73	65	0	74	67
Below Normal	0	66	52	0	66	52
Dry	0	62	31	0	60	45
Critical	0	70	12	0	65	16
Note: Exports may be less because of Delta carriage water losses. SVI - Sacramento Valley Index						

NO PROJECT AND NO ACTION ALTERNATIVES

YCWA would not be able to undertake stored water transfers under RD-1644 Long-term instream flow requirements. Drawing down storage levels in New Bullards Bar Reservoir to affect a stored water transfer could jeopardize following year's deliveries to YCWA member units because of the higher flow requirements of RD-1644 Long-term in dry and critical years compared to the RD-1644 Interim instream flow requirements. For a more detailed discussion of these constraints on stored water transfers, see Attachment C of Appendix D.

YUBA ACCORD ALTERNATIVE

Stored water transfers would be an integral part of the Yuba Accord, and would be implemented through the Accord flow schedules. The accounting principles for transfers under the Yuba Accord Alternative are specified in the proposed Water Purchase Agreement. Transferable flow is based on the difference between flows at the Marysville gage under the Yuba Accord compared to the accounting baseline. Additional stored water transfers, over and above those afforded through the Proposed Yuba Accord flow schedules and New Bullards Bar Reservoir target operating line, would not be possible.

MODIFIED FLOW ALTERNATIVE

YCWA would be able to conduct single-year stored water transfers under the Modified Flow Alternative, depending on available water in New Bullards Bar Reservoir, Delta conditions, and available Delta export capacity.

5.2.2.4 YCWA GROUNDWATER SUBSTITUTION TRANSFERS

Groundwater substitution transfers involve the shifting of agricultural irrigation from surface water to groundwater, and allowing the surface water that would have otherwise been used for irrigation to be released at a time when it is exportable from the Delta. Limits to groundwater substitution transfer pumping, adopted for modeling purposes, are described in Chapter 6. Groundwater substitution transfers are included under each alternative. For the impact analysis, it is assumed that single-year groundwater substitution pumping would occur in only dry and critical years, and below normal years with SWP allocations less than 60 percent.

Modeling results for groundwater substitution transfers, including the carriage water required to implement the transfers, are shown in **Table 5-27**. Lower values are projected for the NEPA alternatives because of YCWA's projected SVWMP groundwater obligation.

Table 5-27. YCWA Groundwater Substitution Transfer Volumes (AF per year)

Water Year Type (SVI)	CEQA No Project Alternative	CEQA Yuba Accord Alternative	CEQA Modified Flow Alternative	NEPA No Action Alternative	NEPA Yuba Accord Alternative	NEPA Modified Flow Alternative
Average All Years	19	25	21	18	23	18
Wet	0	0	0	0	0	0
Above Normal	0	0	0	0	0	0
Below Normal	0	0	0	0	0	0
Dry	50	71	58	47	68	51
Critical	50	59	49	40	50	43

NO PROJECT AND NO ACTION ALTERNATIVES

It is assumed that single-year groundwater substitution transfers would occur under the No Project and No Action alternatives. However, the volume of transfers would be significantly less than those under the Yuba Accord Alternative because of the need to undergo the permitting process, including preparation of a Biological Evaluation, and the need for YCWA to negotiate Conjunctive Use Agreements with its Member Units each year.

YUBA ACCORD ALTERNATIVE

One of the primary components of the Proposed Yuba Accord is the proposed Conjunctive Use Agreements between YCWA and its Member Units, which would formalize the integration of surface water and groundwater supplies in Yuba County. Groundwater substitution pumping would help meet the Component 2 and Component 3 commitments in the Water Purchase Agreement. Groundwater substitution pumping would also provide Component 4 water in dry and critical years. In Schedule 6 years, groundwater substitution would include 30 TAF of pumping to increase surface water storage releases for instream flows.

MODIFIED FLOW ALTERNATIVE

Single-year groundwater substitution transfers would occur under the Modified Flow Alternative, in similar amounts to what would occur under the No Project and No Action alternatives.

5.2.2.5 TOTAL YCWA TRANSFERS

The combined stored water and groundwater substitution transfers for each alternative are presented in **Table 5-28**. Water provided under the Yuba Accord would be greater than the single-year transfer volumes expected under the No Project Alternative, the No Action Alternative, and the Modified Flow Alternative. The Yuba Accord also provides contractual assurances to buyers, and therefore would provide a more secure water supply than single-year water transfers.

Table 5-28. YCWA Combined Stored Water and Groundwater Substitution Transfer Volumes (TAF per year)

Water Year Type (SVI)	CEQA No Project Alternative	CEQA Yuba Accord Alternative	CEQA Modified Flow Alternative	NEPA No Action Alternative	NEPA Yuba Accord Alternative	NEPA Modified Flow Alternative
Average All Years	19	89	63	18	89	70
Wet	0	56	52	0	68	69
Above Normal	0	73	65	0	74	67
Below Normal	0	66	52	0	66	52
Dry	50	133	89	47	128	96
Critical	50	129	61	40	115	59

The volume of water transfers received by south-of-Delta contractors would be subject to reductions for carriage water. For the environmental impact analysis, a constant 20 percent carriage water loss[12] was assumed. **Table 5-29** presents the YCWA water transfer volumes exported through Banks and Tracy pumping plants after accounting for this assumed carriage water loss.

Table 5-29. Delta Export of YCWA Transfer Water (TAF per year)

Water Year Type (SVI)	CEQA No Project Alternative	CEQA Yuba Accord Alternative	CEQA Modified Flow Alternative	NEPA No Action Alternative	NEPA Yuba Accord Alternative	NEPA Modified Flow Alternative
Average All Years	15	71	51	14	72	56
Wet	0	45	41	0	55	56
Above Normal	0	59	52	0	59	53
Below Normal	0	53	42	0	53	42
Dry	40	106	71	37	103	77
Critical	40	103	49	32	92	47

5.2.2.6 WATER SUPPLY BENEFITS OF THE YUBA ACCORD ALTERNATIVE

The water supply benefits of the Yuba Accord Alternative are presented in **Table 5-30,** which compares Delta exports, including export of released transfer water, under the Yuba Accord Alternative to base Delta exports under the CEQA No Project Alternative and the NEPA No Action Alternative.

Table 5-30. Combined Base Delta Exports and YCWA Water Transfers: Yuba Accord Alternative (TAF per year)

Water Year Type (SVI)	CEQA No Project Alternative Base Export	CEQA Yuba Accord Alternative Base Export + YCWA Transfer	Difference	NEPA No Action Alternative Base Export	NEPA Yuba Accord Alternative Base Export + YCWA Transfer	Difference
Average All Years	5,473	5,532	59	5,939	5,998	59
Wet	6,578	6,622	44	7,258	7,312	54
Above Normal	6,206	6,265	59	6,808	6,867	59
Below Normal	5,865	5,914	49	6,277	6,325	48
Dry	4,931	5,017	87	5,225	5,307	82
Critical	3,192	3,253	61	3,465	3,515	50

[12] Expressed as a percentage of the transfer volume inflow to the Delta.

For purposes of the environmental impact analyses for this EIR/EIS, specific assumptions regarding the distribution of water transfers between different purposes have been made.

Single-year water transfers have been a component of Yuba Project operations since 1987. For environmental impact assessment, YCWA water transfers are included as part of the Existing Condition, the No Project Alternative, and the No Action Alternative. It is assumed that all transfers would be sold to Reclamation and DWR and the water would be used by CVP and SWP water service contractors, EWA, or wildlife refuges located in the Export Service Area south of the Delta.

For modeling purposes, the following allocation of transfer water was assumed:

- If the SWP end-of-May agricultural allocation, as determined in CALSIM II, is greater than 60 percent, all YCWA transfers are attributed to the EWA;
- If the SWP end-of-May agricultural allocation from CALSIM II is between 40 percent and 60 percent, YCWA transfers are split evenly between the EWA and the DWR Dry Year Program and
- If the SWP end-of-May agricultural allocation from CALSIM II is less than 40 percent, all YCWA transfers are attributed to Reclamation and DWR in equal amounts

The same allocation of transfer water was assumed for the Modified Flow Alternative to provide consistency in the comparative analysis.

Historically, YCWA has sold more water to DWR than to Reclamation. For institutional and financial reasons, CVP contractors in the Export Service Area have preferred to negotiate with CVP contractors in the Sacramento Valley for water transfers. In 2001, some CVP interests expressed a willingness to participate in the DWR Dry Year Program, but ultimately used the Forbearance Program and kept the transfers strictly between CVP contractors. The history of YCWA transfers echoes that preference, with the exception of CCWD (which is a CVP contractor but is not served by the Jones Pumping Plant). However, for the impact analysis, it is assumed that YCWA water would be used equally by the CVP and SWP.

Under the Yuba Accord Alternative, Component 1 water would be used for the EWA Program. Components 2 and 3 water would be made available to the CVP and SWP. For the environmental impact analysis, it is assumed that Component 4 water would be used by the EWA Program, or the CVP and SWP contractors in the same proportions as described above for single-year water transfers. **Table 5-31** presents the resulting breakdown of deliveries to the CVP, SWP, and the EWA for the Yuba Accord Alternative compared to base deliveries under the CEQA No Project Alternative and the NEPA No Action Alternative.

As previously mentioned, the split between CVP, SWP, and the EWA for the Yuba Accord Alternative would be determined by the water purchase agreement described in the proposed lower Yuba River Accord. **Table 5-32** shows the approximate split of transfer volumes made available by the Yuba Accord Alternative into various components, by year, according to the accounting described in the water purchase agreement. The volumes are approximate due to the inability to capture real-time operations in monthly modeling.

Table 5-31. CVP, SWP, and EWA Deliveries: Yuba Accord Alternative Compared to CEQA No Project and NEPA No Action Alternatives (TAF per year)

Water Year Type (SVI)	CEQA No Project Alternative Base Delivery	CEQA Yuba Accord Alternative Base Delivery + YCWA Transfer	Difference	NEPA No Action Alternative Base Delivery	NEPA Yuba Accord Alternative Base Delivery + YCWA Transfer	Difference
CVP South-of-Delta Water Service Contractors and Wildlife Refuges						
Average All Years	1,497	1,498	1	1,569	1,569	0
Wet	1,939	1,940	1	2,051	2,050	-1
Above Normal	1,743	1,743	0	1,864	1,864	0
Below Normal	1,574	1,573	-1	1,633	1,631	-1
Dry	1,267	1,271	4	1,322	1,327	5
Critical	732	736	4	732	733	1
SWP South of Delta Table A						
Average All Years	2,854	2,856	3	3,088	3,090	2
Wet	3,226	3,227	1	3,590	3,589	-1
Above Normal	3,236	3,236	0	3,660	3,660	0
Below Normal	3,270	3,269	-1	3,462	3,461	-1
Dry	2,676	2,682	6	2,729	2,736	7
Critical	1,635	1,644	9	1,773	1,779	6
EWA – Export of YCWA Purchases						
Average All Years	0	54	54	0	55	55
Wet	0	42	42	0	54	54
Above Normal	0	58	58	0	59	59
Below Normal	0	51	51	0	51	51
Dry	0	78	78	0	69	69
Critical	0	47	47	0	43	43

Table 5-32. Breakdown of Annual Water Transfer Components for the Yuba Accord Alternatives

				CEQA Yuba Accord Alternative						NEPA Yuba Accord Alternative					
Year	SVI Year Type	SWP Alloc.	CVP Alloc.	C1 TAF	C2 TAF	C3A TAF	C3B TAF	C4 TAF	Total TAF	C1 TAF	C2 TAF	C3A TAF	C3B TAF	C4 TAF	Total TAF
1922	AN	102%	71%	60	0	0	0	9	69	60	0	0	0	9	69
1923	BN	100%	46%	60	0	0	0	8	68	40	0	0	0	0	40
1924	C	15%	75%	60	30	40	0	21	151	60	30	40	0	22	152
1925	D	43%	80%	60	15	0	35	0	110	60	15	0	40	10	125
1926	D	75%	100%	36	15	15	0	0	66	60	15	15	0	0	90
1927	W	103%	73%	83	0	0	0	0	83	62	0	0	0	0	62
1928	AN	78%	32%	61	0	0	0	16	77	77	0	0	0	0	77
1929	C	25%	62%	60	30	40	0	20	150	60	30	40	0	26	156
1930	D	70%	67%	43	15	40	0	5	103	32	15	40	0	5	92
1931	C	24%	77%	47	13	0	0	0	60	47	13	0	0	0	60
1932	D	32%	48%	58	15	39	0	0	112	58	15	39	0	0	112
1933	C	31%	86%	60	30	40	0	25	155	60	30	40	25	0	155
1934	C	35%	68%	60	30	40	0	18	148	60	30	40	0	18	148
1935	BN	111%	100%	48	0	0	0	0	48	60	0	0	5	0	65
1936	BN	101%	80%	69	0	0	0	0	69	76	0	0	0	0	76
1937	BN	95%	100%	60	0	0	11	0	71	60	0	0	16	0	76
1938	W	100%	72%	62	0	0	0	0	62	62	0	0	0	0	62
1939	D	87%	72%	59	15	0	0	75	149	60	15	0	0	76	151
1940	AN	106%	68%	81	0	0	0	0	81	86	0	0	0	0	86
1941	W	100%	79%	48	0	0	0	0	48	61	0	0	0	3	64
1942	W	100%	81%	71	0	0	0	0	71	55	0	0	0	0	55
1943	W	94%	79%	24	0	0	0	0	24	57	0	0	0	0	57
1944	D	104%	15%	60	15	0	0	87	162	49	15	0	0	75	139
1945	BN	105%	3%	75	0	0	0	0	75	61	0	0	0	0	61
1946	BN	100%	100%	59	0	0	0	0	59	36	0	0	0	0	36
1947	D	72%	80%	60	15	0	40	88	203	60	15	0	40	85	200
1948	BN	84%	88%	77	0	0	0	0	77	103	0	0	0	8	111
1949	D	57%	75%	60	15	0	40	57	172	59	15	0	40	26	140
1950	BN	84%	100%	60	0	17	0	0	77	60	0	16	0	0	76
1951	AN	100%	100%	56	0	0	0	0	56	56	0	0	0	0	56
1952	W	100%	79%	40	0	0	0	0	40	56	0	0	0	0	56
1953	W	100%	59%	55	0	0	0	0	55	55	0	0	0	0	55
1954	AN	102%	73%	107	0	0	0	17	124	73	0	0	0	67	140
1955	D	37%	43%	60	15	40	0	37	152	48	15	0	40	35	138
1956	W	100%	10%	60	0	0	0	14	74	72	0	0	0	2	74
1957	AN	80%	42%	60	0	0	0	10	70	60	0	0	0	10	70
1958	W	101%	0%	22	0	0	0	0	22	59	0	0	0	0	59
1959	BN	83%	12%	77	0	0	0	0	77	61	0	0	0	18	79
1960	D	62%	34%	-19	15	40	0	35	71	60	15	40	40	16	171
1961	D	64%	70%	60	15	0	0	253	328	60	15	0	0	153	228

Year	SVI Year Type	SWP Alloc.	CVP Alloc.	CEQA Yuba Accord Alternative						NEPA Yuba Accord Alternative					
				C1 TAF	C2 TAF	C3A TAF	C3B TAF	C4 TAF	Total TAF	C1 TAF	C2 TAF	C3A TAF	C3B TAF	C4 TAF	Total TAF
1962	BN	89%	84%	88	0	0	0	0	88	60	0	0	0	28	88
1963	W	101%	71%	55	0	0	0	0	55	55	0	0	0	0	55
1964	D	78%	46%	-11	15	0	0	75	79	43	15	0	0	75	133
1965	W	81%	75%	104	0	0	0	0	104	82	0	0	0	63	145
1966	BN	100%	80%	42	0	0	0	0	42	30	0	0	0	0	30
1967	W	101%	100%	30	0	0	0	0	30	83	0	0	0	0	83
1968	BN	85%	73%	30	0	0	0	0	30	45	0	0	0	0	45
1969	W	101%	32%	81	0	0	0	0	81	69	0	0	0	0	69
1970	W	100%	62%	109	0	0	0	0	109	73	0	0	0	37	111
1971	W	101%	67%	77	0	0	0	0	77	60	0	0	0	17	77
1972	BN	71%	77%	72	0	0	0	0	72	60	0	0	0	25	85
1973	AN	101%	48%	83	0	0	0	0	83	60	0	0	0	9	69
1974	W	100%	86%	24	0	0	0	0	24	55	0	0	0	0	55
1975	W	100%	68%	25	0	0	0	0	25	55	0	0	0	0	55
1976	C	74%	100%	60	30	40	0	24	154	0	0	0	0	0	0
1977	C	3%	80%	13	0	0	0	0	13	60	30	29	0	0	119
1978	AN	103%	100%	57	0	0	0	0	57	56	0	0	0	0	56
1979	BN	101%	72%	55	0	0	0	0	55	55	0	0	0	0	55
1980	AN	101%	72%	56	0	0	0	0	56	56	0	0	0	0	56
1981	D	84%	68%	42	15	0	0	75	132	13	15	0	0	75	103
1982	W	100%	79%	79	0	0	0	0	79	67	0	0	0	0	67
1983	W	100%	81%	0	0	0	0	0	0	0	0	0	0	0	0
1984	W	100%	79%	16	0	0	0	0	16	27	0	0	0	0	27
1985	D	97%	15%	30	15	0	0	53	98	-29	0	0	0	0	-29
1986	W	101%	3%	99	0	0	0	0	99	125	0	0	0	0	125
1987	D	69%	100%	60	15	0	40	35	150	60	15	40	0	35	150
1988	C	12%	80%	51	30	30	0	0	111	51	30	30	0	0	111
1989	D	91%	88%	-1	15	0	15	0	29	39	15	0	0	15	69
1990	C	25%	75%	60	30	40	0	105	235	60	30	40	0	66	196
1991	C	23%	100%	60	30	40	0	7	137	60	30	40	0	8	138
1992	C	38%	100%	36	30	0	0	0	66	31	30	0	0	0	61
1993	AN	102%	79%	57	0	0	0	0	57	58	0	0	0	0	58
1994	C	79%	59%	60	30	0	0	64	154	32	30	0	0	60	122

Note: Allocations as defined by CEQA modeling
Transfer volumes as simulated using environmental impact modeling tools.

5.2.3 IMPACT INDICATORS AND SIGNIFICANCE CRITERIA

Impact indicators and significance criteria developed for the evaluation of water supply impacts are presented in **Table 5-33.** Simulated stream flow and reservoir storage data, generated as part of the surface water supply and management impact assessment, also are used in the evaluation of groundwater, hydropower, flood control, water quality, fisheries, terrestrial, recreation and cultural resources.

As also discussed in Chapter 4, while the CEQA and NEPA analyses in this EIR/EIS refer to "potentially significant," "less than significant," "no", and "beneficial" impacts, the first two comparisons (CEQA Yuba Accord Alternative compared to the CEQA No Project Alternative and CEQA Modified Flow Alternative compared to the CEQA No Project Alternative) presented below instead refer to whether or not the proposed change would "unreasonably affect" the evaluated parameter. This is because these first two comparisons are made to determine whether the action alternative would satisfy the requirement of Water Code Section 1736 that the proposed change associated with the action alternative "would not unreasonably affect fish, wildlife, or other instream beneficial uses."

5.2.3.1 YCWA ALLOCATIONS TO MEMBER UNITS

Reoperation of the Yuba Project under the Proposed Project/Action or alternatives may result in reduced surface water deliveries by YCWA to its Member Units in some years. It is assumed that, except for extremely dry conditions as experienced in 1977, surface water delivery deficiencies would be offset by increased groundwater pumping (i.e., that the reductions in surface water supplies would be less than the available capacity to pump groundwater). In reporting simulated model results, a distinction is made between YCWA allocations to Member Units and YCWA surface water deliveries. The YCWA allocations reflect water supply conditions and are used as the metric for assessing water supply impacts. YCWA surface water deliveries to Member Units are the allocations less any voluntary groundwater substitution transfers. For analytical purposes, groundwater pumping is assumed equal to the irrigation demand less the surface water delivery.

Table 5-33. Impact Indicators and Significance Criteria for Surface Water Supply and Management

Impact Indicator	Significance Criteria
Surface water allocations to YCWA Member Units	Reduction in YCWA allocations to Member Units due to decreases in annual water supply or increases in flow requirements in the lower Yuba River.
Deliveries to south-of-Delta CVP water service contractors and refuges	Reduction in combined deliveries to south-of-Delta CVP water service contractors and refuges of 5 percent or greater [a] due to decreases in the annual supply of available water to the CVP.
Deliveries to south-of-Delta SWP contractors (Table A)	Reduction in deliveries to south-of-Delta SWP contractors of 5 percent or greater [a] due to decreases in the annual supply of available water to the SWP.
X2 location	Increase in X2 that adversely affects CCWD's ability to fill Los Vaqueros Reservoir • Movement of X2 location to west of Chipps Island from February through May • Movement of X2 location to west of Collinsville during December, January, and June
Delta excess water conditions	Reduction in the duration of Delta excess conditions during the November to June period that adversely affects CCWD's ability to fill Los Vaqueros Reservoir.
Water levels in the South Delta [b]	A reduction in water surface elevation, relative to the basis of comparison, of sufficient frequency and magnitude that it adversely affects south Delta water users' abilities to divert water. • Water levels at Old River near Tracy Road Bridge and Grant Line Canal near Tracy Road Bridge less than 0.0 feet above msl. • Water levels at Middle River near the Undine Road Bridge less than 0.3 feet above msl.
San Luis Reservoir storage	Reduction in reservoir levels may adversely affect the water quality of deliveries to the San Felipe Division when water levels are below about 300 TAF. Reduction in reservoir storage may also impact allocations to SWP and CVP contractors.

[a] There appears to be no accepted standard for a significance threshold with regard to model determinations of project impacts. CALFED estimates modeling uncertainty at 10 percent and identifies all impacts below 10 percent as less than significant (CALFED 2000, Section 5.3.5). A significance criterion of 5 percent or greater is used because it is believed that this value approximates the level of quantitative error able to be detected in the CALSIM II model for a comparative analysis.

[b] Changes in south Delta water levels are estimated using the DSM2 Model. The DSM2 Model is described in Chapter 9.

5.2.3.2 CVP AND SWP DELIVERIES

Improvements in statewide water supply management, including supplemental water for the CVP and the SWP, are a project purpose. Under the Proposed Project, Reclamation and DWR would each enter into separate agreements with state and federal water contractors, respectively, regarding allocation of purchased water supply (Tier 3 Agreements).

Under the Existing Condition, and No Project, No Action, and Modified Flow alternatives, it is anticipated that CVP and SWP water supplies would be supplemented by YCWA single-year water transfers. The total water supply to CVP and SWP contractors is the combination of CVP and SWP allocations and YCWA water purchases and transfers. Historically, YCWA has sold more water to DWR than to Reclamation; for institutional and financial reasons, CVP contractors in the Export Service Area have preferred to negotiate with CVP contractors in the Sacramento Valley for water transfers.

Individual CVP and SWP contractors may opt out of all or some of the water made available under the Yuba Accord Alternative. Similarly, not all CVP and SWP contractors may benefit from single-year water transfer agreements that could take place under the project alternatives. For these reasons, the impact indicator for water supply deliveries is the base CVP and SWP allocations prior to any supplemental deliveries that would result from the Yuba Accord or single-year water transfer agreements.

5.2.3.3 X2 LOCATION

CCWD is almost entirely dependent on the Delta for water supply. CCWD's raw water system consists of three Delta pumping plants (Mallard Slough, Rock Slough and Old River), and a 100 TAF reservoir (Los Vaqueros). The pumping plants on Rock Slough and on the Old River are the primary source. The third intake at Mallard Slough is used only when water quality conditions in the western Delta permit, usually following a prolonged period of surplus Delta outflow. Water diverted at the Old River Pumping Plant is either used directly or stored in Los Vaqueros Reservoir for later use. CCWD's current operational priority is to fill Los Vaqueros Reservoir with high quality water whenever possible.

CCWD has established a water quality delivery target of 65 mg/l chloride. An increase in salinity in the Western Delta could affect the ability of CCWD to divert water for direct delivery to its customers, or to fill Los Vaqueros Reservoir for later use in blending operations. The potential effects of increased salinity on CCWD operations are discussed in Chapter 9.

CCWD diversions to fill Los Vaqueros Reservoir are constrained by the Delta Smelt BO (NMFS 2004; USFWS 2005) as subsequently modified by agreements between CCWD, USFWS, CDFG, and SWRCB. From February through May, the BO precondition for filling the reservoir is that the X2 location is west of Chipps Island. In December, January, and June, the X2 location must be west of Collinsville. Filling of Los Vaqueros Reservoir is unconstrained in December if no delta smelt are present at the diversion location. Through agreement with CDFG and USFWS, the X2 restrictions on filling Los Vaqueros Reservoir have subsequently been modified for a temporary trial period through 2010 to conform with the X2 requirements specified in D-1641.

For the impact analysis, it is assumed that from February to June, the X2 requirement for filling Los Vaqueros Reservoir will be met by Reclamation and DWR as part of their responsibilities under D-1641[13]. Changes in simulated Delta conditions are considered to be potentially significant only for the months of December and January, and only when all of the following conditions are met:

- ❑ The Delta is in excess conditions
- ❑ Under the basis of comparison, X2 is west of Collinsville
- ❑ Under the Proposed Project/Action or alternative X2 is east of Collinsville
- ❑ CCWD is diverting under its Los Vaqueros water right, (based on simulation of Los Vaqueros Reservoir operations modeling performed for the Alternative Intake Project EIR/EIS (CCWD and Reclamation 2006).

[13] When the Eight River Index is less than 8.1 MAF, the D-1641 X2 requirements for May and June are relaxed, potentially impacting filling of Los Vaqueros Reservoir. Model simulations show that this would occur eight times during the historical record for water years 1922 to 1994, but in these circumstances the Delta would be in balanced water conditions.

It is noted that Reclamation and DWR are not authorized to use the JPOD when the Delta is in excess conditions, and such diversions would cause the location of X2 to shift upstream so as to prevent CCWD from filling Los Vaqueros Reservoir under its water right permits.

5.2.3.4 DELTA EXCESS WATER CONDITIONS

Changes from Delta excess water conditions to balanced conditions could adversely affect CCWD's ability to fill Los Vaqueros Reservoir. Under SWRCB Water Right Decision 1629 (D-1629), filling Los Vaqueros Reservoir is restricted to the parts of the period from November 1 to June 30 when the Delta is in excess water conditions. Changes in simulated Delta conditions are considered to be potentially significant if during this period all of the following conditions are met:

- Under the basis of comparison, the Delta is in excess conditions
- Under the Proposed Project/Action or alternative, the Delta is in balanced conditions
- CCWD is diverting under its Los Vaqueros water right, (based on simulation of Los Vaqueros Reservoir operations modeling performed for the Alternative Intake Project EIR/EIS (CCWD and Reclamation 2006)

5.2.3.5 SOUTH DELTA WATER LEVELS

Water levels in the south Delta are influenced to varying degrees by natural tidal fluctuations, San Joaquin River flows, barrier operations, CVP and SWP pumping, local agricultural diversions and drainage return flows, channel capacities, siltation, and dredging. When the CVP and SWP are exporting water, water levels in local channels can be drawn down, particularly during low water years. The South Delta Water Agency (SDWA) and local farmers in the south and central Delta have interests in maintaining the water levels so that their siphons and pumps, which are installed at fixed locations in the Delta, can continue to be used for irrigation diversions. The Proposed Project/Action and alternatives could adversely affect the ability of the SDWA to divert water if changes in Delta operations cause reductions in Delta channel water levels during the irrigation season from April to October.

The South Delta Temporary Barriers Program was initiated in 1991 to improve water conditions in the South Delta and to provide design data for permanent gates. Since 1991, DWR has seasonally installed four barriers. Three barriers, located on the Middle River, Grant Line Canal, and the Old River, ensure adequate water levels and water quality for agricultural diversions. The barriers are constructed from rock fill and incorporate overflow weirs and gated culverts. These barriers are installed in the spring and removed in the fall. A fourth barrier is seasonally installed at the Head of the Old River for fish control. The Head of the Old River barrier is typically in place from April 15 to May 15 to protect out-migration of young salmon, and from September 15 to November 30 to improve dissolved oxygen concentrations in the San Joaquin River for adult return migration. The existing seasonal barriers (and proposed permanent tidal gates) significantly impact water levels in the South Delta. In October 2005, Reclamation and DWR released a Draft EIR/EIS for the SDIP. This Draft EIR/EIS discusses the proposed operation and evaluates the impacts of four proposed permanent tidal and fish control gates in the South Delta. The Final EIR/EIS for the SDIP was released in December 2006.

The methodology for determining water level impacts in the south Delta follows the methodology established by Reclamation and DWR in the "*Response Plan for Water Level*

Concerns in the South Delta Under Water Rights Decision 1641" (DWR 2004), and subsequently approved by the SWRCB on July 19, 2004. Channel tidal levels at four south Delta locations have been selected to describe the possible effects of the Proposed Project/Action and alternatives on south Delta tidal hydraulics. The four locations are as follows:

- The Old River at Tracy Boulevard Bridge (Road Bridge). This station is a tidal level and EC monitoring location and is upstream of the temporary barrier and proposed permanent barrier just east (upstream) of the Delta-Mendota Canal intake and fish facility.
- Doughty Cut above Grant Line Canal Barrier. This station is upstream of the temporary barrier on Grant Line Canal and upstream of the proposed permanent tidal gate. Doughty Cut connects the Old River and Grant Line Canal.
- Middle River near the Howard Road Bridge. This station is located just upstream of the temporary barrier near Victoria Canal and the proposed permanent tidal gate.
- East of Coney Island (DSM2 Channel 218).

For the impact assessment, DSM2 simulated tidal levels indicative of the first three of these four locations are reported[14] as the monthly means of the daily average water levels and the monthly means of the daily minimum levels. It is important to consider the minimum daily water levels because the potential for effects would be greatest at these levels.

According to the Water Level Response Plan, south Delta water levels are considered adequate if they are projected to be 0.0 feet at msl or greater at Old River near Tracy Road Bridge, and Doughty Cut above Grant Line Canal Barrier, and 0.3 feet above msl or greater at Middle River near the Howard Road Bridge.

The Water Level Response Plan recognizes that the Coney Island/Channel 218 location is downstream of the temporary barriers and may at times have water levels below that which is necessary for local diversions. A long-term solution for water levels of concern downstream of the barriers is to be developed within the SDIP. Until such a plan is implemented, Reclamation and DWR are committed to providing mitigation for effects to water levels caused by transfer operations. Such mitigation may include diversion modifications, the use of temporary pumps, or other measures (Reclamation and DWR 2005). No quantitative threshold of significance has been developed for Coney Island/Channel 218.

5.2.3.6 San Luis Reservoir Storage

San Luis Reservoir typically provides little carry-over storage, and undergoes an annual drawdown and refill cycle. The CVP and SWP try to fill San Luis Reservoir by the end of March of each year. In April and May, export pumping from the Delta is limited by D-1641 San Joaquin River pulse period standards as well as B2 and EWA fishery management actions. As a result, demand in the export service area exceeds Delta exports, and San Luis Reservoir begins its drawdown cycle. In July and August, irrigation demands meet their peak, and San Luis

[14] Water levels for the Middle River at the Undine Road Bridge are reported rather than water levels for the Middle River at Howard Road Bridge. The Undine Road Bridge is located approximately 3.5 miles upstream of the Howard Road Bridge. Water levels for the Grant Line Canal near the Tracy Road Bridge are reported rather than water levels for Doughty Cut. Doughty Cut is located approximately 1.5 miles upstream of the Grant Line Canal at the Tracy Road Bridge.

Reservoir continues to be drawn down. Historically, San Luis Reservoir has typically reached its low-point in August or September.

The San Luis Reservoir low point may affect the reliability and quality of CVP water delivered to Santa Clara County and San Benito County water districts. During the summer, as the San Luis Reservoir is drawn down, a thick layer of algae can grow on the water surface. When the volume of water in the reservoir drops to below 300 TAF, this algae begins to enter the San Felipe Division intake, degrading water quality and making the water harder to treat for M&I purposes.

The Proposed Project/Action and alternatives could reduce water levels in San Luis Reservoir and thus impact the water quality and reliability of water deliveries to the San Felipe Division, if San Luis Reservoir storage drops below 300 TAF (Reclamation 2004). Reductions in San Luis Reservoir carry-over storage could also affect SWP and/or CVP allocations in the following contract year.

5.2.4 ENVIRONMENTAL IMPACTS/ENVIRONMENTAL CONSEQUENCES OF THE CEQA YUBA ACCORD ALTERNATIVE COMPARED TO THE CEQA NO PROJECT ALTERNATIVE

Impact 5.2.4-1: Surface water allocations and deliveries to YCWA Member Units

Table F1-1 presents simulated surface water allocations to YCWA Member Units. Allocations would be approximately 0.7 percent per year, or approximately 3 TAF per year, higher with the implementation of the CEQA Yuba Accord Alternative. However, surface water deliveries under the Yuba Accord Alternative would be lower, largely due to greater volumes of groundwater substitution transfers. Table F1-2 shows surface water deliveries to Member Units would be an average of approximately 4 TAF per year lower.

It is assumed that lower surface water deliveries would be offset by greater volumes of groundwater pumping, resulting in no difference in Member Unit water supply. The effects of greater groundwater pumping are discussed in Chapter 6.

Therefore, potential reductions in annual water supply or increases in lower Yuba River flows under the CEQA Yuba Accord Alternative, relative to the CEQA No Project Alternative, would not unreasonably affect surface water deliveries to YCWA Member Units.

Impact 5.2.4-2: Deliveries to south-of-Delta CVP contractors

Model results presented in Table F1-3 show that average annual deliveries to CVP south-of-Delta water service contractors and refuges, excluding additional water made available through water transfers, would be approximately 7 TAF per year, or less than 1 percent, lower under the CEQA Yuba Accord Alternative, relative to the CEQA No Project Alternative. In dry and critical years, the average annual deliveries would be approximately 11 TAF and 23 TAF per year lower, respectively. However, reductions in dry and critical years would be offset by the purchase of Component 2 and Component 3 water under the Water Purchase Agreement.

Therefore, changes under the CEQA Yuba Accord Alternative, relative to the CEQA No Project Alternative, would not unreasonably affect surface water deliveries to CVP contractors.

Impact 5.2.4-3: Deliveries to south-of-Delta SWP contractors

Simulated SWP Table A deliveries are presented in Table F1-4. Model results show that under the CEQA Yuba Accord Alternative, the average annual south-of-Delta Table A deliveries, excluding additional water made available through water transfers, would be approximately 5 TAF per year lower than under the CEQA No Project Alternative. In dry and critical years, the average annual deliveries would be approximately 9 TAF and 19 TAF per year lower, respectively. However, reductions in dry and critical years would be offset by the purchase of Component 2 and Component 3 water under the Water Purchase Agreement.

Therefore, changes under the CEQA Yuba Accord Alternative, relative to the CEQA No Project Alternative, would not unreasonably affect surface water deliveries to SWP contractors.

Impact 5.2.4-4: X2 location

The simulated monthly locations and differences in location of X2 are presented in Table F1-5 for the 72-year period of simulation. Under the CEQA No Project Alternative, the location of X2 restricts filling of Los Vaqueros Reservoir 34 times in December and 19 times in January. However, the X2 criterion for filling Los Vaqueros Reservoir in December is applicable only when delta smelt are present in the vicinity of CCWD's Old River intake. Constraints on filling Los Vaqueros Reservoir are similar under implementation of the CEQA Yuba Accord Alternative, except that the number of times filling of Los Vaqueros Reservoir would be constrained increases from 34 to 36 times in December, and from 19 to 21 times in January.

Los Vaqueros Reservoir operations modeling performed for the Alternative Intake Project EIR/EIS (CCWD and Reclamation 2006) was examined to assess the potential impacts of changes in X2 location under the CEQA Yuba Accord Alternative. Examination of simulated results for particular months and years when changes in X2 might constrain filling of Los Vaqueros Reservoir showed that in only one case would filling of the reservoir be affected. Therefore, differences in X2 location under the CEQA Yuba Accord Alternative compared to the CEQA No Project Alternative would not be expected to unreasonably affect Los Vaqueros Reservoir operations.

Impact 5.2.4-5: Delta excess water conditions

Model results show that the CEQA Yuba Accord Alternative would change the timing and amount of surplus Delta outflow compared to the CEQA No Project Alternative. Table F1-6 shows that for 4 months of the period of simulation, the reduction in Delta outflow under the CEQA Yuba Accord Alternative would be sufficient to change the Delta from excess to balanced water conditions and potentially affect filling of Los Vaqueros Reservoir under CCWD's water right.

Los Vaqueros Reservoir operations modeling performed for the Alternative Intake Project EIR/EIS (CCWD and Reclamation 2006) was examined to assess the potential impacts of changes in Delta conditions under the CEQA Yuba Accord Alternative. Examination of simulated results for particular months and years when changes in Delta conditions might affect filling of Los Vaqueros Reservoir shows that in only one case, in the month of December, would filling of the reservoir be affected. In this case, loss of filling of the reservoir in December could be offset by increased filling in subsequent months. Therefore, reductions in the period of Delta excess water conditions under the CEQA Yuba Accord Alternative, relative to the CEQA No Project Alternative, would not be expected to unreasonably affect Los Vaqueros Reservoir operations.

Impact 5.2.4-6: South Delta water levels

Tables F1-7 and F1-8 present simulated water levels in the south Delta at Old River near Tracy Road Bridge, at Grant Line Canal near Tracy Road Bridge, at Middle River near the Undine Road Bridge, and at Old River at Coney Island for the CEQA Yuba Accord Alternative as compared to the CEQA No Project Alternative. Based on model results, differences in the monthly mean of minimum daily water levels would be less than 0.01 feet in all months. Therefore, reductions in south Delta water levels under the CEQA Yuba Accord Alternative, relative to the CEQA No Project Alternative, would not unreasonably affect south Delta water users.

Impact 5.2.4-7: San Luis reservoir storage

Model results show that SWP San Luis end-of-September storage would be expected to be lower by an average of 2 TAF per year with implementation of the CEQA Yuba Accord Alternative as compared to the CEQA No Project Alternative (Appendix F4, 3 vs. 2, pg. 1376). CVP San Luis end-of-September storage would be similar under the two alternatives (Appendix F4, 3 vs. 2, pg. 1339). Therefore, reductions in San Luis Reservoir storage under the CEQA Yuba Accord Alternative, relative to the CEQA No Project Alternative, would not unreasonably affect water quality or reliability of water deliveries to CVP or SWP contractors.

5.2.5 ENVIRONMENTAL IMPACTS/ENVIRONMENTAL CONSEQUENCES OF THE CEQA MODIFIED FLOW ALTERNATIVE COMPARED TO THE CEQA NO PROJECT ALTERNATIVE

Impact 5.2.5-1: Surface water allocations and deliveries to YCWA Member Units

Table F1-9 presents simulated surface water allocations to YCWA Member Units. Allocations would be approximately 1.3 percent per year, or approximately 5 TAF per year higher with the implementation of the CEQA Modified Flow Alternative compared to the CEQA No Project Alternative. However, the higher surface water deliveries under the Modified Flow Alternative would be partially offset by greater volumes of groundwater substitution transfers. Table F1-10 shows that surface water deliveries to Member Units would be approximately 2.5 TAF per year higher.

It is assumed that higher surface water deliveries would be offset by lower levels of groundwater pumping, resulting in no changes in Member Unit water supplies. The effects of the decreased groundwater pumping are discussed in Chapter 6.

Therefore, potential reductions in annual water supply or increases in lower Yuba River flows under the CEQA Modified Flow Alternative, relative to the CEQA No Project Alternative, would not unreasonably affect surface water allocations and deliveries to YCWA Member Units.

Impact 5.2.5-2: Deliveries to south-of-Delta CVP contractors

Model results presented in Table F1-11 show average annual CVP south-of-Delta water service contractor and refuge deliveries, excluding additional water made available through water transfers, would be approximately 7 TAF per year, or less than 1 percent, lower under the CEQA Modified Flow Alternative compared to the CEQA No Project Alternative. In dry and critical years, the average annual deliveries would be approximately 11 TAF and 23 TAF per year lower respectively. Therefore, the CEQA Modified Flow Alternative, relative to the CEQA No Project Alternative, would not unreasonably affect water deliveries to south-of-Delta CVP water service contractors and refuges.

Impact 5.2.5-3: Deliveries to south-of-Delta SWP contractors

Simulated south-of-Delta SWP Table A deliveries, excluding additional water made available through water transfers, are presented in Table F1-12. Model results show that under the

CEQA Modified Flow Alternative, average annual south-of-Delta Table A deliveries would be approximately 5 TAF per year lower. In dry and critical years, the average annual deliveries would be approximately 9 TAF and 19 TAF per year lower, respectively. Therefore, the CEQA Modified Flow Alternative, relative to the CEQA No Project Alternative, would not unreasonably affect water deliveries to SWP contractors.

Impact 5.2.5-4: X2 location

The simulated monthly location and location difference of X2 are presented in Table F1-13. Under the CEQA No Project Alternative, the location of X2 would restrict filling of Los Vaqueros Reservoir 34 times in December and 19 times in January. However, the X2 criterion for filling Los Vaqueros Reservoir in December would be applicable only when delta smelt are present in the vicinity of CCWD's Old River intake. Constraints on filling Los Vaqueros Reservoir would be similar under implementation of the CEQA Modified Flow Alternative, except that the number of times filling of Los Vaqueros Reservoir would be constrained increases from 34 to 35 times in December, and from 19 to 22 times in January.

Los Vaqueros Reservoir operations modeling performed for the Alternative Intake Project EIR/EIS (CCWD and Reclamation 2006) was examined to assess the potential impacts of changes in X2 location under the CEQA Modified Flow Alternative. Examination of simulated results for particular months and years when changes in X2 might constrain filling of Los Vaqueros Reservoir showed that in no case would filling of the reservoir be affected. Therefore, differences in X2 location under the CEQA Modified Flow Alternative compared to the CEQA No Project Alternative would not be expected to unreasonably affect CCWD's Los Vaqueros Reservoir operations.

Impact 5.2.5-5: Delta excess water conditions

Model results show that the CEQA Modified Flow Alternative would change the timing and amount of surplus Delta outflow compared to the CEQA No Project Alternative. Table F1-14 shows that for 15 months of the period of simulation, the reduction in Delta outflow under the Modified Flow Alternative would be sufficient to change the Delta from excess to balanced water conditions and potentially affect filling of Los Vaqueros Reservoir under CCWD's water right.

Los Vaqueros Reservoir operations modeling performed for the Alternative Intake Project EIR/EIS (CCWD and Reclamation 2006) was examined to assess the potential impacts of changes in Delta conditions under the CEQA Yuba Accord Alternative. Examination of simulated results for particular months and years when changes in Delta conditions might affect filling of Los Vaqueros Reservoir showed that in only one case, in the month of December, would filling of the reservoir be affected. In this case, loss of filling of the reservoir in December could be offset by increased filling in subsequent months.

Therefore, reductions in the period of Delta excess water conditions under the CEQA Modified Flow Alternative, relative to the CEQA No Project Alternative, would not be expected to unreasonably affect CCWD's Los Vaqueros Reservoir operations.

Impact 5.2.5-6: South Delta water levels

Tables F1-15 and F1-16 present simulated water levels in the south Delta at Old River near Tracy Road Bridge, at Grant Line Canal near Tracy Road Bridge, at Middle River near the Undine Road Bridge, and at Old River at Coney Island for the CEQA Modified Flow Alternative as compared to the CEQA No Project Alternative. Based on model results, differences in the monthly mean of minimum daily water levels would be less than 0.01 feet in all months.

Therefore, reductions in south Delta water levels under the CEQA Modified Flow Alternative, relative to the CEQA No Project Alternative, would not unreasonably affect south Delta water users.

Impact 5.2.5-7: San Luis Reservoir storage

Model results show that SWP San Luis end-of-September storage would be expected to be the same with implementation of the CEQA Modified Flow Alternative as compared to the CEQA No Project Alternative (Appendix F4, 4 vs. 2, pg. 1376). Also, model results show CVP San Luis end-of-September storage would be similar under the two alternatives (Appendix F4, 4 vs. 2, pg. 1339). Therefore, reductions in San Luis Reservoir storage under the CEQA Modified Flow Alternative, relative to the CEQA No Project Alternative, would not unreasonably affect water quality or reliability of water deliveries to the CVP or SWP contractors.

5.2.6 Environmental Impacts/Environmental Consequences of the CEQA Yuba Accord Alternative Compared to the CEQA Existing Condition

Impact 5.2.6-1: Surface water allocations and deliveries to YCWA Member Units

There would be a difference in irrigation demand between the CEQA Existing Condition and the CEQA Yuba Accord Alternative due to the expected completion of the Wheatland Project, as described in Section 5.1.1.5, in 2007; surface water demands would be approximately 41 TAF per year higher. Table F1-17 presents the simulated surface water allocations to YCWA Member Units. Allocations under the CEQA Yuba Accord Alternative would be approximately 1.0 percent per year lower compared to the CEQA Existing Condition. However, given the greater level of demand, these allocations would be approximately 37 TAF per year higher. Table F1-18 shows surface water deliveries to Member Units would be approximately 30 TAF per year higher.

It is assumed that differences in demand and surface water deliveries would be offset by differences in groundwater pumping, resulting in no changes in Member Unit water supplies. Effects of the greater volume of groundwater pumping are discussed in Chapter 6.

Reductions in surface water allocations to YCWA Member Units under the CEQA Yuba Accord Alternative compared to the CEQA Existing Condition would result in less than significant impacts to Member Units.

Impact 5.2.6-2: Deliveries to south-of-Delta CVP contractors

Model results presented in Table F1-19 show that average annual CVP south-of-Delta water service contractor and refuge deliveries, excluding additional water made available through water transfers, would be approximately 9 TAF, or 1 percent, per year lower under the CEQA Yuba Accord Alternative compared to the CEQA Existing Condition. In dry and critical years, the average annual deliveries would be approximately 9 TAF and 7 TAF per year lower, respectively. However, reductions in dry and critical years would be offset by the purchase of Component 2 and Component 3 water under the Water Purchase Agreement.

Reductions in water deliveries to south-of-Delta CVP water service contractors and refuges under the CEQA Yuba Accord Alternative compared to the CEQA Existing Condition would result in less than significant impacts to south-of-Delta CVP water service contractors and refuges because decreases in base deliveries would be more than offset by water made available to the CVP under the proposed Water Purchase Agreement.

Impact 5.2.6-3: Deliveries to south-of-Delta SWP contractors

Simulated south-of-Delta SWP Table A deliveries, excluding additional water made available through water transfers, are presented in Table F1-20. Model results show that, under the Yuba Accord Alternative, average annual south-of-Delta Table A deliveries would be expected to be approximately 7 TAF, or less than 1 percent, per year lower. In dry and critical years, the average annual deliveries would be approximately 5 TAF and 8 TAF per year lower respectively. However, reductions in dry and critical years would be offset by the purchase of Component 2 and Component 3 water under the Water Purchase Agreement.

Reductions in water deliveries to south-of-Delta SWP contractors under the CEQA Yuba Accord Alternative compared to the CEQA Existing Condition would result in less than significant impacts to SWP contractors because decreases in base deliveries would be more than offset by water made available to the SWP under the Water Purchase Agreement.

Impact 5.2.6-4: X2 location

The simulated monthly location and change in location of X2 are presented in Table F1-21 for the 72-year period. Under the CEQA Existing Condition, the location of X2 would restrict filling of Los Vaqueros Reservoir 35 times in December and 22 times in January. However, the X2 criterion for filling Los Vaqueros Reservoir in December is applicable only when delta smelt are present in the vicinity of CCWD's Old River intake. Constraints on filling Los Vaqueros Reservoir would be similar under implementation of the CEQA Yuba Accord Alternative, except that the number of times filling of Los Vaqueros Reservoir would be constrained would go up from 35 to 36 times in December, but go down from 22 to 21 times in January.

Los Vaqueros Reservoir operations modeling performed for the Alternative Intake Project EIR/EIS (CCWD and Reclamation 2006) was examined to assess the potential impacts of changes in X2 location under the CEQA Yuba Accord Alternative. Additional constraints on filling the reservoir in December and January would be offset by increased filling in February and March. Examination of simulated results for particular months and years when changes in X2 might constrain filling of Los Vaqueros Reservoir showed that in no case would filling of the reservoir be affected. Therefore, changes in Los Vaqueros Reservoir operations due to changes in the X2 location under the CEQA Yuba Accord Alternative compared to the CEQA Existing Condition would result in less than significant impacts to CCWD's Los Vaqueros Reservoir operations.

Impact 5.2.6-5: Delta excess water conditions

Model results show that the CEQA Yuba Accord Alternative would change the timing and amount of surplus Delta outflow compared to the CEQA Existing Condition. Table F1-22 shows that the difference in Delta outflow would never be sufficient to move the Delta from excess into balanced water conditions and potentially prevent filling of Los Vaqueros Reservoir.

Changes in Los Vaqueros Reservoir operations due to changes in Delta conditions under the CEQA Yuba Accord Alternative compared to the CEQA Existing Condition would result in no impacts to CCWD's Los Vaqueros Reservoir operations.

Impact 5.2.6-6: South Delta water levels

Tables F1-23 and F1-24 present simulated water levels in the south Delta at Old River near Tracy Road Bridge, at Grant Line Canal near Tracy Road Bridge, at Middle River near the Undine Road Bridge, and at Old River at Coney Island for the CEQA Yuba Accord Alternative as compared to the CEQA Existing Condition. Based on model results, differences in the monthly mean of minimum daily water levels would be less than 0.01 feet in all months.

Reductions in south Delta water elevations under the CEQA Yuba Accord Alternative as compared to the CEQA Existing Condition would result in no impacts to south Delta water users.

Impact 5.2.6-8: San Luis reservoir storage

Model results show that SWP San Luis end-of-September storage would be expected to be lower by an average of 3 TAF per year with implementation of the CEQA Yuba Accord Alternative as compared to the CEQA Existing Condition (Appendix F4, 1 vs. 3, pg. 1376). Model results show CVP San Luis end-of-September storage would be similar under the two alternatives (Appendix F4, 1 vs. 3, pg. 1339).

Reductions in San Luis Reservoir storage under the CEQA Yuba Accord Alternative compared to the CEQA Existing Condition would result in less than significant impacts to reservoir water quality or the CVP or SWP's water supplies.

5.2.7 Environmental Impacts/Environmental Consequences of the CEQA Modified Flow Alternative Compared to the CEQA Existing Condition

Impact 5.2.7-1: Surface water allocations and deliveries to YCWA Member Units

There would be a difference in irrigation demand between the CEQA Existing Condition and the CEQA Modified Flow Alternative due to the expected completion of the Wheatland Project, as described in Section 5.1.1.5, in 2007. Surface water demands would be approximately 40 TAF per year higher. Table F1-25 presents simulated surface water allocations to YCWA Member Units. Allocations under the CEQA Modified Flow Alternative would be approximately 0.4 percent per year lower. However, given the difference in demand, these allocations would be approximately 39 TAF per year higher. Groundwater substitution transfers would increase. Table F1-26 shows surface water deliveries to Member Units would be approximately 36 TAF per year higher.

It is assumed that differences in demand and surface water deliveries would be offset by groundwater pumping, resulting in no changes in Member Unit water supplies. The effects of the groundwater pumping are discussed in Chapter 6.

Reductions in surface water allocations to YCWA Member Units under the CEQA Modified Flow Alternative compared to the CEQA Existing Condition would result in less than significant impacts to Member Units.

Impact 5.2.7-2: Deliveries to south-of-Delta CVP contractors

Model results presented in Table F1-27 show that average annual CVP south-of-Delta water service contractor and refuge deliveries, excluding additional water made available through water transfers, would be approximately 9 TAF, or 1 percent, per year lower under the CEQA Modified Flow Alternative compared to the CEQA Existing Condition. In dry and critical years, the average annual deliveries would be approximately 7 TAF and 9 TAF per year lower respectively.

Reductions in water deliveries to south-of-Delta CVP water service contractors and refuges under the CEQA Modified Flow Alternative compared to the CEQA Existing Condition would result in less than significant impacts to south-of-Delta CVP water service contractors and refuges.

Impact 5.2.7-3: Deliveries to south-of-Delta SWP contractors

Simulated south-of-Delta SWP Table A deliveries, excluding additional water made available through water transfers, are presented in Table F1-28. Model results show that under the CEQA Modified Flow Alternative, average annual south-of-Delta Table A deliveries would be approximately 7 TAF per year lower. This would be less than 1 percent of the total south-of-Delta Table A delivery. In dry and critical years, the average annual deliveries would be approximately 5 TAF and 8 TAF per year lower, respectively.

Reductions in Table A water deliveries to south-of-Delta SWP contractors under the CEQA Modified Flow Alternative compared to the CEQA Existing Condition would result in less than significant impacts to SWP contractors.

Impact 5.2.7-4: X2 location

The simulated monthly location and change in location of X2 is presented in Table F1-29 for the 72-year period. Under the CEQA Existing Condition, the location of X2 would restrict filling of Los Vaqueros Reservoir 35 times in December and 22 times in January. However, the X2 criterion for filling Los Vaqueros Reservoir in December is applicable only when delta smelt are present in the vicinity of CCWD's Old River intake. Constraints on filling Los Vaqueros Reservoir would be similar under implementation of the CEQA Modified Flow Alternative.

Changes in Los Vaqueros Reservoir operations due to changes in the X2 location under the CEQA Modified Flow Alternative compared to the CEQA Existing Condition would result in less than significant impacts to CCWD's Los Vaqueros Reservoir operations.

Impact 5.2.7-5: Delta excess water conditions

Model results show that the CEQA Modified Flow Alternative would change the timing and amount of surplus Delta outflow compared to the CEQA Existing Condition. Table F1-30 shows that for 1 month of the period of simulation, the reduction in Delta outflow under the Modified Flow Alternative would be sufficient to change the Delta from excess to balanced water conditions and potentially affect filling of Los Vaqueros Reservoir under CCWD's water right.

Los Vaqueros Reservoir operations modeling performed for the Alternative Intake Project EIR/EIS (CCWD and Reclamation 2006) was examined to assess the potential impacts of changes in Delta conditions under the CEQA Yuba Accord Alternative. Examination of simulated results for particular months and years when changes in Delta conditions might constrain filling of Los Vaqueros Reservoir showed that in only one case, in the month of December, would filling of the reservoir be affected. In this case, loss of filling of the reservoir in December could be offset by increased filling in subsequent months.

Changes in Los Vaqueros Reservoir operations due to changes in Delta conditions under the CEQA Modified Flow Alternative compared to the CEQA Existing Condition would result in less than significant impacts to CCWD's Los Vaqueros Reservoir operations.

Impact 5.2.7-6: South Delta water levels

Tables F1-31 and F1-32 present simulated water levels in the south Delta at Old River near Tracy Road Bridge, at Grant Line Canal near Tracy Road Bridge, at Middle River near the Undine Road Bridge, and at Old River at Coney Island for the CEQA Modified Flow Alternative as compared to the CEQA Existing Condition. Based on model results, differences in the monthly mean of minimum daily water levels would be less than 0.01 feet in all months.

Reductions in south Delta water elevations under the CEQA Modified Flow Alternative as compared to the CEQA Existing Condition would result in no impacts to south Delta water users.

Impact 5.2.7-8: San Luis Reservoir storage

Model results show that SWP San Luis end-of-September storage would be expected to be lower by an average of 1 TAF per year with implementation of the CEQA Modified Flow Alternative as compared to the CEQA Existing Condition (Appendix F4, 1 vs. 4, pg. 1376). Model results show CVP San Luis end-of-September storage would be similar under the two alternatives (Appendix F4, 1 vs. 4, pg. 1339).

Reductions in San Luis Reservoir storage under the CEQA Modified Flow Alternative compared to the CEQA Existing Condition would result in less than significant impacts to reservoir water quality or projects' water supply.

5.2.8 Environmental Impacts/Environmental Consequences of the CEQA No Project/NEPA No Action Alternative Compared to the CEQA Existing Condition /NEPA Affected Environment

As discussed in Chapter 3, the key elements and activities (e.g., implementation of the RD-1644 Long-term instream flow requirements) for the CEQA No Project Alternative would be the same for the NEPA No Action Alternative. The primary differences between the CEQA No Project and NEPA No Action alternatives are various hydrologic and other modeling assumptions (see Section 4.5 and Appendix D). Because of these differences between the No Project and No Action alternatives, these alternatives are distinguished as separate alternatives for CEQA and NEPA evaluation purposes.

Based on current plans and consistent with available infrastructure and community services, the CEQA No Project Alternative in this EIR/EIS is based on current environmental conditions (e.g., project operations, water demands, and level of land development) plus potential future operational conditions (e.g., implementation of the RD-1644 Long-term instream flow requirements in the lower Yuba River) that probably would occur in the foreseeable future in the absence of the Proposed Project/Action or another action alternative. The NEPA No Action Alternative also is based on conditions without the proposed project, but uses a longer-term future time frame that is not restricted by existing infrastructure or physical and regulatory environmental conditions. The differences between these modeling characterizations and assumptions for the CEQA No Project and the NEPA No Action alternatives, including the rationale for developing these two different scenarios for this EIR/EIS, are explained in Chapter 4.[15]

Although implementation of the RD-1644 Long-term instream flow requirements would occur under both the CEQA No Project and the NEPA No Action alternatives, the resultant model

[15] For modeling purposes related to CEQA analytical requirements, OCAP Study 3 (2001 level of development) is used as the foundational study upon which the modeling scenarios for the CEQA No Project Alternative and the CEQA Existing Condition were developed. For modeling purposes related to NEPA analytical requirements, OCAP Study 5 (2020 level of development) is used as the foundational study upon which the modeling scenario for the NEPA No Action Alternative was developed.

outputs for both scenarios are different because of variations in the way near-term and long-term future operations are characterized for other parameters in the CEQA and NEPA assumptions. As discussed in Chapter 4, the principal difference between the CEQA No Project Alternative and the NEPA No Action Alternative is that the NEPA No Action Alternative includes several potential future water projects in the Sacramento and San Joaquin valleys (e.g., CVP/SWP Intertie, FRWP, and SDIP, and a long-term EQA program equivalent to the EWA), while the CEQA No Project Alternative does not. Because many of the other assumed conditions for these two scenarios are similar, the longer-term analysis of the NEPA No Action Alternative compared to the NEPA Affected Environment builds upon the nearer-term analysis of the CEQA No Project Alternative compared to the CEQA Existing Condition.

Because the same foundational modeling base (OCAP Study 3) was used to characterize near-term conditions (2001 level of development) for both the CEQA No Project Alternative and the CEQA Existing Condition, it was possible to conduct a comparative analysis to quantitatively evaluate the hydrologic changes in the Yuba Region and the CVP/SWP system that would be expected to occur due to specific changes within the Yuba Region. However, because the NEPA No Action Alternative uses a foundational modeling base that has a 2020 level of development (OCAP Study 5), and includes additional water projects, it was not possible to make an entirely quantitative comparison to the NEPA Affected Environment (which uses OCAP Study 3), identifying the relative impacts due to the different elements.

The analysis of the NEPA No Action Alternative compared to the NEPA Affected Environment therefore consists of two components: (1) an analysis of near-term future without project conditions quantified through the CEQA No Project Alternative, relative to the CEQA Existing Condition; and (2) a qualitative analysis of longer-term future without project conditions (the NEPA No Action alternative).

5.2.8.1 CEQA No Project Alternative Compared to the CEQA Existing Condition

Impact 5.2.8.1-1: Surface water allocations and deliveries to YCWA Member Units

There would be a difference in irrigation demand between the CEQA Existing Condition and the CEQA No Project Alternative due to the expected completion of the Wheatland Project, as described in Section 5.1.1.5, in 2007. Surface water demands would be approximately 41 TAF per year higher. Table F1-33 presents the surface water allocations to YCWA Member Units. Allocations under the CEQA No Project Alternative would be approximately 1.7 percent per year lower. However, given the difference in demand, this would be equivalent to 35 TAF per year higher surface water deliveries. Groundwater substitution transfers would increase. Table F1-34 shows surface water deliveries to Member Units would be approximately 34 TAF per year higher.

It is assumed that differences in demand and surface water deliveries would be offset by groundwater pumping, resulting in no changes in Member Unit water supplies. The effects of the groundwater pumping are discussed in Chapter 6.

Reductions in surface water allocations to YCWA Member Units under the No Project Alternative compared to the CEQA Existing Condition would result in less than significant impacts to Member Units.

Impact 5.2.8.1-2: Deliveries to south-of-Delta CVP contractors

Model results presented in Table F1-35 show that average annual CVP south-of-Delta water service contractor and refuge deliveries, excluding additional water made available through water transfers, would be approximately 2 TAF per year lower under the CEQA No Project Alternative as compared to the CEQA Existing Condition. Compared to average annual south-of-Delta CVP deliveries of over 2,450 TAF, this would be a less than significant change in south-of-Delta CVP deliveries to water service contractors and refuges. Deliveries in dry and critical years would be expected to be 2 TAF and 17 TAF higher, respectively.

Reductions in water deliveries to south-of-Delta CVP water service contractors and refuges under the CEQA No Project Alternative compared to the CEQA Existing Condition would result in less than significant impacts to CVP water service contractors and refuges.

Impact 5.2.8.1-3: Deliveries to south-of-Delta SWP contractors

Simulated south-of-Delta SWP Table A deliveries, excluding additional water made available through water transfers, are presented in Table F1-36. Model results show that under the CEQA No Project Alternative, average annual Table A deliveries would be approximately 2 TAF per year lower. This would be less than 1 percent of the south-of-Delta Table A delivery. Deliveries in dry and critical years would be expected to be 1 TAF and 14 TAF higher, respectively.

Reductions in water deliveries to south-of-Delta SWP contractors under the CEQA No Project Alternative compared to the CEQA Existing Condition would result in less than significant impacts to SWP contractors.

Impact 5.2.8.1-4: X2 location

The simulated monthly location and change in location of X2 is presented in Table F1-37 for the 72-year period. Under the CEQA Existing Condition, the location of X2 would restrict filling of Los Vaqueros Reservoir 35 times in December and 22 times in January. However, the X2 criterion for filling Los Vaqueros Reservoir in December is applicable only when delta smelt are present in the vicinity of CCWD's Old River intake. Constraints on filling Los Vaqueros Reservoir would be similar under the CEQA No Project Alternative, except that the number of times filling of Los Vaqueros Reservoir would be constrained goes down from 35 to 34 times in December and from 22 to 19 times in January.

Changes in Los Vaqueros Reservoir operations due to changes in the X2 location under the CEQA No Project Alternative compared to the CEQA Existing Condition may be beneficial to CCWD's Los Vaqueros Reservoir operations.

Impact 5.2.8.1-5: Delta excess water conditions

Model results show that the CEQA No Project Alternative would change the timing and amount of surplus Delta outflow compared to the CEQA Existing Condition. Table F1-38 shows that for 1 month of the period of simulation, the reduction in Delta outflow under the No Project Alternative would be sufficient to change the Delta from excess to balanced water conditions during the November 1 to June 30 period, and potentially prevent filling of Los Vaqueros Reservoir under CCWD's water right.

Los Vaqueros Reservoir operations modeling performed for the Alternative Intake Project EIR/EIS (CCWD and Reclamation 2006) was examined to assess the potential impacts of changes in Delta conditions under the CEQA No Project Alternative. Simulation results show that changes in Delta conditions under the CEQA No Project Alternative compared to the

CEQA Existing Condition would result in no impacts to CCWD's Los Vaqueros Reservoir operations.

Impact 5.2.8.1-6: South Delta water levels

Tables F1-39 and F1-40 present simulated water levels in the south Delta at Old River near Tracy Road Bridge, at Grant Line Canal near Tracy Road Bridge, at Middle River near the Undine Road Bridge, and Old River at Coney Island for the CEQA No Project Alternative as compared to the CEQA Existing Condition. Based on model results, differences in the monthly mean of minimum daily water levels would be less than 0.01 feet in all months.

Reductions in south Delta water elevations under the CEQA No Project Alternative as compared to the CEQA Existing Condition would result in no impacts to south Delta water users.

Impact 5.2.8.1-8: San Luis Reservoir storage

Model results show that SWP San Luis end-of-September storage would be expected to be 1 TAF lower with implementation of the CEQA No Project Alternative as compared to the CEQA Existing Condition (Appendix F4, 1 vs. 2, pg. 1376). Model results show CVP San Luis end-of-September storage would be similar under the two alternatives (Appendix F4, 1 vs. 2, pg. 1339).

Reductions in San Luis Reservoir storage under the CEQA No Project Alternative compared to the CEQA Existing Condition would result in less than significant impacts to reservoir water quality or projects' water supply.

5.2.8.2 NEPA No Action Alternative Compared to the NEPA Affected Environment

In the Yuba Region, the primary differences between the NEPA No Action Alternative and the NEPA Affected Environment are changes in lower Yuba River flows associated with the implementation of the RD-1644 Long-term instream flow requirements, which would replace the RD-1644 Interim instream flow requirements, implementation of the Wheatland Project, which will increase surface water diversions at Daguerre Point Dam, and groundwater substitution pumping associated with the SVWMP.

In the Yuba Region, the primary differences between the CEQA No Project and the Existing Condition are implementation of RD-1644 Long-term instream flow requirements, and implementation of the Wheatland Project. Therefore, in the Yuba Region, assumptions regarding the volume of groundwater substitution pumping that may occur in the future are the only difference between the NEPA No Action and the CEQA No Project alternatives. Although groundwater substitution transfers may take place under different programs (single-year transfers versus SVWMP under the different alternatives), the total volume of groundwater substitution would be similar. Reservoir, dam and hydropower facilities operations, river flows, and water temperature model outputs for the lower Yuba River are therefore similar for the NEPA No Action Alternative compared to the NEPA Affected Environment, and for the CEQA No Project Alternative compared to the CEQA Existing Condition. Quantitative analysis for the latter is presented in Section 5.2.8.1 above. Trends in evaluation parameters previously presented for the CEQA No Project Alternative relative to the CEQA Existing Condition (Appendix F4, 2 vs. 1) are similar to the comparison of the NEPA No Action Alternative relative to the NEPA Affected Environment, and are not repeated here.

The NEPA No Action Alternative includes additional projects in the project study area that are not included in the CEQA No Project Alternative. These proposed projects would not affect water supply and management in the Yuba Region and, thus, are only discussed in the context of CVP and SWP operations upstream of the Delta, in the Delta, and in the Export Service Area.

Projects included in the NEPA No Action Alternative include conveyance projects (SDIP and CVP/SWP Intertie), water supply projects to meet increasing demand (Freeport Regional Water Project, American River diversions in accordance with the Water Forum), water transfer and acquisition programs (long-term EWA Program or a program equivalent to the EWA), and projects related to CVP/SWP system operations (CVP/SWP Integration). The NEPA No Action Alternative also considers 2020 level of development in the Sacramento Valley and increased SWP Table A demands.

The proposed projects included under the NEPA No Action Alternative would result in changes to reservoir operations, river and channel flows, river and channel diversions, and pumping and power generation facilities in the Project Study Area, but outside the Yuba Region. In general, the types of changes that may occur and that could affect water supply and management include the following:

- Change in the timing of releases from CVP/SWP reservoirs
- Increased surface water diversions from the Sacramento, Feather, and American rivers
- Decreased Delta inflow
- Reduced Delta outflow
- Increased pumping at the Jones Pumping Plant
- Increased pumping at the Banks Pumping Plant (including wheeling of CVP water)
- Increased E/I ratios in the fall and winter
- Reduced X2 in the fall and winter

5.2.9 ENVIRONMENTAL IMPACTS/ENVIRONMENTAL CONSEQUENCES OF THE NEPA YUBA ACCORD ALTERNATIVE COMPARED TO THE NEPA NO ACTION ALTERNATIVE

Impact 5.2.9-1: Surface water allocations and deliveries to YCWA Member Units

Table F1-41 presents simulated surface water allocations to YCWA Member Units. Allocations are expected to be approximately 0.7 percent, or approximately 3 TAF, per year higher with the implementation of the NEPA Yuba Accord Alternative compared to the NEPA No Action Alternative, with average annual allocations changing from 97.6 percent to 98.3 percent, and average annual shortages changing from 8.3 TAF per year to 5.8 TAF. Table F1-42 shows surface water deliveries to Member Units would be 316.5 TAF per year under the NEPA No Action Alternative, and 312.7 TAF per year under the NEPA Yuba Accord Alternative, with a reduction of approximately 4 TAF per year lower.

It is assumed that the reduction in surface water deliveries would be offset by higher groundwater pumping, resulting in no changes in Member Unit water supplies. The effects of the higher volume of groundwater pumping are discussed in Chapter 6.

Reductions in surface water allocations to YCWA Member Units under the NEPA Yuba Accord Alternative compared to the NEPA No Action Alternative would result in less than significant impacts to Member Units.

Impact 5.2.9-2: Deliveries to south-of-Delta CVP contractors

Model results presented in Table F1-43 show that average annual CVP south-of-Delta water service contractor and refuge deliveries, excluding additional water made available through water transfers, would change from 1,569 TAF per year under the NEPA No Action Alternative to 1,562 TAF per year under the NEPA Yuba Accord Alternative, with average annual deliveries approximately 7 TAF per year lower under the NEPA Yuba Accord Alternative as compared to the NEPA No Action Alternative. In dry and critical years, the average annual deliveries would be approximately 12 TAF and 23 TAF per year lower, respectively. However, reductions in dry and critical years would be offset by the purchase of Component 2 and Component 3 water under the Water Purchase Agreement.

Reductions in water deliveries to south-of-Delta CVP water service contractors and refuges under the NEPA Yuba Accord Alternative compared to the NEPA No Action Alternative would result in less than significant impacts to south-of-Delta CVP water service contractors and refuges because decreases in base deliveries would be more than offset by water made available to the CVP under the Water Purchase Agreement.

Impact 5.2.9-3: Deliveries to south-of-Delta SWP contractors

Simulated south-of-Delta SWP Table A deliveries, excluding additional water made available through water transfers, are presented in Table F1-44**.** Model results show that, under the NEPA Yuba Accord Alternative, average annual south-of-Delta Table A deliveries would change from 3,088 TAF per year under the NEPA No Action Alternative to 3,082 TAF per year under the NEPA Yuba Accord Alternative, with average annual deliveries approximately 6 TAF per year lower, which corresponds to a change of less than 1 percent. In dry and critical years, the average annual deliveries would be approximately 9 TAF and 19 TAF per year lower respectively. However, reductions in dry and critical years would be offset by the purchase of Component 2 and Component 3 water under the Water Purchase Agreement.

Reductions in water deliveries to south-of-Delta SWP contractors under the NEPA Yuba Accord Alternative compared to the NEPA No Action Alternative would result in less than significant impacts to SWP contractors because decreases in base deliveries would be more than offset by water made available to the SWP under the Water Purchase Agreement.

Impact 5.2.9-4: X2 location

The simulated monthly location and change in location of X2 is presented in Table F1-45 for the 72-year period. Under the NEPA No Action Alternative, the location of X2 would restrict filling of Los Vaqueros Reservoir 42 times in December and 20 times in January. However, the X2 criterion for filling Los Vaqueros Reservoir in December is applicable only when delta smelt are present in the vicinity of CCWD's Old River intake. Under the NEPA Yuba Accord Alternative, constraints on filling Los Vaqueros Reservoir in December would remain the same, but constraints on filling Los Vaqueros Reservoir in January would increase from 20 to 25 times.

Los Vaqueros Reservoir operations modeling performed for the Alternative Intake Project EIR/EIS (CCWD and Reclamation 2006) was examined to assess the potential impacts of changes in X2 location under the NEPA Yuba Accord Alternative. Additional constraints on filling the reservoir in December and January would be offset by increased filling in February and March. Examination of simulated results for particular months and years when changes in

X2 might constrain filling of Los Vaqueros Reservoir showed that in only one case would filling of the reservoir be affected. Therefore, changes in Los Vaqueros Reservoir operations due to differences in the X2 location under the NEPA Yuba Accord Alternative compared to the NEPA No Action Alternative would result in less than significant impacts to CCWD's Los Vaqueros Reservoir operations.

Impact 5.2.9-5: Delta excess water conditions

Model results show that the NEPA Yuba Accord Alternative would change the timing and amount of surplus Delta outflow compared to the NEPA No Action Alternative. Table F1-46 shows that under the NEPA No Action Alternative, there are 322 months of excess conditions, and there are 330 months of excess conditions under the NEPA Yuba Accord Alternative between November 1 and June 30. For 8 fewer months of the period of simulation, the reduction in Delta outflow under the Yuba Accord Alternative would be sufficient to change the Delta from excess to balanced water conditions during the November 1 to June 30 period and potentially prevent filling of Los Vaqueros Reservoir under CCWD's water right.

Los Vaqueros Reservoir operations modeling performed for the Alternative Intake Project EIR/EIS (CCWD and Reclamation 2006) was examined to assess the potential impacts of changes in Delta conditions under the NEPA Yuba Accord Alternative. Examination of simulated results for particular months and years when changes in Delta conditions might constrain filling of Los Vaqueros Reservoir showed that in only one case, in the month of December, would filling of the reservoir be affected. In this case, loss of filling of the reservoir in December could be offset by increased filling in subsequent months.

Changes in Los Vaqueros Reservoir operations due to differences in Delta conditions under the NEPA Yuba Accord Alternative compared to the NEPA No Action Alternative would result in less than significant impacts to CCWD's Los Vaqueros Reservoir operations.

Impact 5.2.9-6: South Delta water levels

Tables F1-47 and F1-48 present simulated water levels in the south Delta at Old River near Tracy Road Bridge, at Grant Line Canal near Tracy Road Bridge, at Middle River near the Undine Road Bridge, and at Old River at Coney Island for the NEPA Yuba Accord Alternative as compared to the NEPA No Action Alternative. The average annual mean daily water levels are 1.55 feet, 1.52 feet, and 2.13 feet at Old River near Tracy Road Bridge, Grant Line Canal near Tracy Road Bridge, and Middle River near the Undine Road Bridge, respectively, under both the NEPA No Action Alternative and NEPA Yuba Accord Alternative, and the average minimum daily water level at all three locations are 0.00 feet under both alternatives.

Reductions in south Delta water elevations under the NEPA Yuba Accord Alternative, as compared to the NEPA No Action Alternative, would result in no impacts to south Delta water users.

Impact 5.2.9-8: San Luis Reservoir storage

Model results show that average annual SWP San Luis end-of-September storage would be expected to be 216 TAF under the NEPA No Action Alternative, and 215 TAF under the NEPA Yuba Accord Alternative, or an average of 1 TAF per year lower with implementation of the NEPA Yuba Accord Alternative as compared to the NEPA No Action Alternative (Appendix F4, 5 vs. 6, pg. 1376). Model results show the average annual CVP San Luis end-of-September storage would be the same, 213 TAF, under the two alternatives (Appendix F4, 5 vs. 6, pg. 1339).

Reductions in San Luis Reservoir storage under the NEPA Yuba Accord Alternative compared to the NEPA No Action Alternative would result in less than significant impacts to reservoir water quality or projects' water supply.

5.2.10 ENVIRONMENTAL IMPACTS/ENVIRONMENTAL CONSEQUENCES OF THE NEPA MODIFIED FLOW ALTERNATIVE COMPARED TO THE NEPA NO ACTION ALTERNATIVE

Impact 5.2.10-1: Surface water allocations and deliveries to YCWA Member Units

Table F1-49 presents simulated surface water allocations to YCWA Member Units. Allocations are expected to be approximately 1.0 percent per year higher, changing from 97.6 percent to 98.6 percent, with the implementation of the NEPA Modified Flow Alternative compared to the NEPA No Action Alternative. Table F1-50 shows surface water deliveries to Member Units would change from 316.5 TAF per year to 318.2 TAF per year with the implementation of the NEPA Modified Flow Alternative as compared to the NEPA No Project Alternative, an increase of approximately 1.7 TAF per year.

It is assumed that the greater volume of surface water deliveries would be offset by less groundwater pumping, resulting in no changes in Member Unit water supplies. The effects of the lower level groundwater pumping are discussed in Chapter 6.

Reductions in surface water allocations to YCWA Member Units under the NEPA Modified Flow Alternative compared to the NEPA No Action Alternative would result in less than significant impacts to Member Units.

Impact 5.2.10-2: Deliveries to south-of-Delta CVP contractors

Model results presented in Table F1-51 show average annual CVP south-of-Delta water service contractor and refuge deliveries, excluding additional water made available through water transfers, would change from an average of 1,569 TAF per year under the NEPA No Action Alternative to 1,562 TAF per year under the NEPA Yuba Accord Alternative, a difference of approximately 7 TAF per year. In dry and critical years, the average annual deliveries would be approximately 12 TAF and 22 TAF per year lower respectively.

Reductions in water deliveries to south-of-Delta CVP water service contractors and refuges under the NEPA Modified Flow Alternative compared to the NEPA No Action Alternative would result in less than significant impacts to south-of-Delta CVP water service contractors and refuges.

Impact 5.2.10-3: Deliveries to south-of-Delta SWP contractors

Simulated south-of-Delta SWP Table A deliveries, excluding additional water made available through water transfers, are presented in Table F1-52. Model results show that, under the NEPA Modified Flow Alternative, average annual Table A deliveries would be approximately 5 TAF per year lower, changing from 3,088 TAF per year under the NEPA No Project Alternative to 3,082 TAF per year under the NEPA Modified Flow Alternative. In dry and critical years, the average annual deliveries would be approximately 9 TAF and 18 TAF per year lower respectively.

Reductions in water deliveries to south-of-Delta SWP contractors under the NEPA Modified Flow Alternative compared to the NEPA No Action Alternative would result in less than significant impacts to SWP contractors.

Impact 5.2.10-4: X2 location

The simulated monthly location and change in location of X2 is presented in Table F1-53 for the 72-year period. Under the NEPA No Action Alternative, the location of X2 would restrict filling of Los Vaqueros Reservoir 42 times in December and 20 times in January. However, the X2 criterion for filling Los Vaqueros Reservoir in December would be applicable only when Delta Smelt are present in the vicinity of CCWD's Old River intake. Constraints on filling Los Vaqueros Reservoir would be similar under implementation of the NEPA Modified Flow Alternative, except that the number of times filling of Los Vaqueros Reservoir would be constrained rises from 42 to 43 times in December, and 20 to 23 times in January.

Los Vaqueros Reservoir operations modeling performed for the Alternative Intake Project EIR/EIS (CCWD and Reclamation 2006) was examined to assess the potential impacts of changes in X2 location under the NEPA Yuba Accord Alternative. Examination of simulated results for particular months and years when changes in X2 might constrain filling of Los Vaqueros Reservoir showed that in only one month out of the period of records would filling of the reservoir be affected. Therefore, changes in Los Vaqueros Reservoir operations due to changes in the X2 location under the NEPA Modified Flow Alternative compared to the NEPA No Action Alternative would result in less than significant impacts to CCWD's Los Vaqueros Reservoir operations.

Impact 5.2.10-5: Delta excess water conditions

Model results show that the NEPA Modified Flow Alternative would change the timing and amount of surplus Delta outflow compared to the NEPA No Action Alternative. Table F1-54 shows that the Delta would be in excess conditions between November 1 and June 30 for 322 months under the NEPA No Action Alternative and for 308 months under the NEPA Modified Flow Alternative, indicating that there would be 15 months of the period of simulation that the reduction in Delta outflow under the NEPA Yuba Accord Alternative would be sufficient to change the Delta from excess to balanced water conditions during the November 1 to June 30 period, and potentially prevent filling of Los Vaqueros Reservoir under CCWD's water right.

Los Vaqueros Reservoir operations modeling performed for the Alternative Intake Project EIR/EIS (CCWD and Reclamation 2006) was examined to assess the potential impacts of changes in Delta conditions under the NEPA Yuba Accord Alternative. Examination of simulated results for particular months and years when changes in Delta conditions might constrain filling of Los Vaqueros Reservoir showed that in only one month out of the period of record, would filling of the reservoir be affected. In this case, loss of filling of the reservoir in December could be offset by increased filling in subsequent months.

Changes in Los Vaqueros Reservoir operations due to changes in Delta conditions under the NEPA Modified Flow Alternative compared to the NEPA No Action Alternative would result in less than significant impacts to Los Vaqueros Reservoir operations.

Impact 5.2.10-6: South Delta water levels

Tables F1-69 and F1-70 present simulated water levels in the south Delta at Old River near Tracy Road Bridge, at Grant Line Canal near Tracy Road Bridge, at Middle River near the Undine Road Bridge, and at Old River at Coney Island for the NEPA Modified Flow Alternative as compared to the NEPA No Action Alternative. Based on model results, differences in the monthly mean of minimum daily water levels would be less than 0.01 feet in all months. The average annual mean daily water levels are 1.55 feet, 1.52 feet, and 2.13 feet at Old River near Tracy Road Bridge, Grant Line Canal near Tracy Road Bridge, and Middle River near the

Undine Road Bridge, respectively, under both the NEPA No Action Alternative and NEPA Modified Flow Alternative. The average minimum daily water level at all three locations is 0.00 feet at msl under both alternatives.

Reductions in south Delta water elevations under the NEPA Modified Flow Alternative as compared to the NEPA No Action Alternative would result in no impacts to south Delta water users.

Impact 5.2.10-8: San Luis Reservoir storage

Model results show that average annual SWP San Luis end-of-September storage would be 216 TAF under the NEPA No Action Alternative, and 215 TAF under the NEPA Modified Flow Alternative, reflecting an average annual change of 1 TAF. The average annual CVP San Luis end-of-September storage would be 239 TAF under both alternatives (Appendix F4, 5 vs. 7, pg. 1376 and pg. 1339).

Differences in San Luis Reservoir storage under the NEPA Modified Flow Alternative compared to the NEPA No Action Alternative would result in less than significant impacts to reservoir water quality or projects' water supply.

5.3 CUMULATIVE IMPACTS

This section considers the cumulative effects of the Proposed Project (Yuba Accord Alternative) with other proposed projects and actions that may occur in the future. Proposed projects that have been adequately defined (e.g., in recent project-level environmental documents or CALSIM II modeling) and that have the potential to contribute to cumulative impacts are included in the quantitative assessment of the Yuba Accord's impacts. Projects that cannot be accurately characterized for hydrologic modeling purposes at this time, either due to the nature of the particular project or because specific operations details are only in the preliminary phases of development, are evaluated qualitatively.

For analytical purposes of this EIR/EIS, the projects that are considered well defined and "reasonably foreseeable" are described in Chapter 21. Additionally, the assumptions used to categorize future hydrologic conditions that are quantitatively simulated using the Yuba Project model, CALSIM II, and post-processing tools are presented in Appendix D. To the extent feasible, potential cumulative impacts on resources dependent on hydrology or water supply are analyzed quantitatively.

Only projects that could affect surface water supply and management are considered in subsequent sections of this chapter. Although most of the proposed projects described in Chapter 21 could have project-specific impacts that will be addressed in future project-specific environmental documentation, future implementation of these projects is not expected to result in cumulative impacts to regional water supply operations, or water-related and water-dependent resources that also could be affected by the Proposed Project/Action or an action alternative (see Chapter 21). For this reason, only the limited number of projects that have the potential to cumulatively impact surface water supply and management in the project study area are specifically considered qualitatively in the cumulative impacts analysis for surface water supply and management. These projects are as follows:

- Water Supply and Conveyance Projects
  - Shasta Lake Water Resources Investigation (Shasta Reservoir Enlargement)
  - Upstream of Delta Off-Stream Storage (Sites Reservoir)
  - Upper San Joaquin River Storage Project
  - In-Delta Storage Program (Delta Wetlands Project)
  - Los Vaqueros Reservoir Expansion Project
  - Folsom Dam Raise Project
- Projects Related to CVP/SWP Operations
  - Delta Cross Channel Reoperation and Through-Delta Facility
  - Delta-Mendota Canal/California Aqueduct Intertie
  - Long-Term CVP and SWP Operations Criteria and Plan
  - Central Valley Project Long-term Contract Renewals
  - CVP/SWP Integration Proposition
  - Isolated Delta Facility
  - Delta-Mendota Canal Recirculation Feasibility Study
  - Monterey Plus EIR
  - Sacramento River Water Reliability Study
  - City of Stockton Delta Water Supply Project
  - Oroville Facilities FERC Relicensing
- Water Transfers and Acquisition Programs
  - Dry Year Water Purchase Program
  - Delta Improvements Package
  - San Joaquin Valley/Southern California Exchange
  - Sacramento Valley Water Management Program
- Ecosystem Restoration and Water Quality Improvement Projects
  - North Bay Aqueduct Improvements
  - San Joaquin River Restoration Settlement Act (Friant Settlement Legislation)
- Local Projects in the Yuba Region
  - Yuba River Development Project FERC Relicensing
  - Wheatland Project

These projects and actions could affect water supply and management either through changing CVP/SWP operations, changing the available water supply for export, or changing the allocation of exported water among CVP and SWP contractors. These projects are described in Chapter 21 and qualitatively addressed below.

The FERC license for the Yuba Project will expire in 2016. Prior to the expiration of the license, YCWA will follow a relicensing process that will allow FERC, state and federal resource agencies, conservation groups, and the general public to review and discuss appropriate operations for the project. Because the renewal has a different time frame than the Accord, the FERC relicensing is not considered in the quantitative cumulative analysis. While any required changes to Yuba Project operations as part of the FERC relicensing, could impact surface water supply and management, such changes are not known at this time.

5.3.1 ENVIRONMENTAL IMPACTS/ENVIRONMENTAL CONSEQUENCES OF THE YUBA ACCORD ALTERNATIVE CUMULATIVE CONDITION COMPARED TO THE EXISTING CONDITION

For CEQA, the purpose of the cumulative analysis is to determine whether the incremental effects of the Proposed Project (Yuba Accord Alternative) would be expected to be "cumulatively considerable" when viewed in connection with the effects of past projects, other current projects, and probable future projects (PRC Section 21083, subdivision (b)(2)).[16]

For NEPA, the scope of an EIS must include "Cumulative actions, which when viewed with other proposed actions have cumulatively significant impacts and should therefore be discussed in the same impact statement" (40 CFR, §1508.25(a)(2)).

Because the CEQ regulations for implementing NEPA and the CEQA guidelines contain very similar requirements for analyzing, and definitions of, cumulative impacts, the discussions of cumulative impacts of the Yuba Accord Alternative Cumulative Condition relative to the Existing Condition will be the basis for evaluation of cumulative impacts for both CEQA and NEPA. In addition, an analysis of the Modified Flow Alternative Cumulative Condition relative to the Existing Condition is provided to fulfill NEPA requirements.

5.3.1.1 OTHER IMPACT CONSIDERATIONS RELATIVE TO CUMULATIVE SURFACE WATER SUPPLY AND MANAGEMENT

The quantitative operations-related impact considerations for the Yuba Accord Alternative, relative to the Existing Condition, are discussed in Section 5.2.5. Potential impacts identified in Section 5.2.5 provide an indication of the potential incremental contributions of the Yuba Accord Alternative to cumulative impacts. These potential impacts are summarized here:

- ❑ Impact 5.2.5-1: Reduction in surface water allocations and deliveries to YCWA Member Units – Less than Significant
- ❑ Impact 5.2.5-2: Reduction in deliveries to CVP contractors – Less than Significant
- ❑ Impact 5.2.5-3: Reduction in deliveries to SWP contractors - Less than Significant
- ❑ Impact 5.2.5-4: Westward movement of X2 – Less than Significant
- ❑ Impact 5.2.5-5: Reduction in the period of Delta excess water conditions – No Impact
- ❑ Impact 5.2.5-6: Reduction in south Delta water levels – No Impact
- ❑ Impact 5.2.5-7: Reduction in San Luis Reservoir storage – Less than Significant

Although these impacts would be less than significant, the potential exists for cumulative impacts nevertheless. Cumulative impact determinations are presented below, and are based upon consideration of the quantified Yuba Accord Alternative impacts relative to the Existing Condition, in combination with the potential impacts of other reasonably foreseeable projects. These cumulative impact determinations are made by type of project.

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[16] The "*Guide to the California Environmental Quality Act*" (Remy *et al*. 1999) states that "*…although a project may cause an "individually limited" or "individually minor" incremental impact that, by itself, is not significant, the increment may be "cumulatively considerable", and thus significant, when viewed against the backdrop of past, present, and probably future projects.*" (CEQA Guidelines, Section 15064, subd. (i)(l), 15065, subd. (c), 15355, subd. (b)).

5.3.1.2 POTENTIAL FOR CUMULATIVE SURFACE WATER SUPPLY AND MANAGEMENT IMPACTS WITHIN THE PROJECT STUDY AREA

Results from the quantitative analysis generally indicate that direct project-related impacts to surface water supply and management would be less than significant. Nevertheless, there is the potential for the Yuba Accord Alternative to incrementally contribute to cumulative surface water supply and management impacts within the project study area. The frequency and magnitude of the quantitative hydrologic changes associated with the Yuba Accord Alternative, and the other qualitative analytical considerations discussed above, were both considered during the development of the overall cumulative impact conclusions discussed below for the Yuba Accord Alternative Cumulative Condition, relative to the Existing Condition.

WATER STORAGE AND CONVEYANCE PROJECTS

The water storage and conveyance projects that have the potential to contribute to cumulative impacts would generally not be expected to have cumulative impacts as measured by the impact indicators for surface water. None of the identified projects would be expected to have impacts on water supply in the Yuba region (deliveries to Member Units). Additionally, none of the identified projects would be expected to have negative impacts on most of the other impact indicators; these projects are designed to enhance water supply to the service area, and in the Delta. No potential cumulative significant impacts are anticipated for the Yuba Accord Alternative Cumulative Condition relative to the Existing Condition.

PROJECTS RELATED TO CVP/SWP SYSTEM OPERATIONS

The water storage and conveyance projects that have the potential to contribute to cumulative impacts are generally intended to improve water supply, reliability, and flexibility for the CVP/SWP systems, and would not generally be anticipated to have any impacts on surface water allocations to the YCWA Member Units.

It is unknown how the various systems operations projects may affect other impact indicators; it therefore is assumed that projects related to CVP/SWP operations may have some minor impacts on X2, south Delta water levels, or the duration of Delta excess water conditions. Thus, the Yuba Accord Alternative Cumulative Condition has the potential for significant impacts relative to the Existing Condition with regards to projects related to future CVP/SWP system operations projects.

WATER TRANSFER AND ACQUISITION PROGRAMS

The water transfer and acquisition programs that have the potential to contribute to cumulative impacts would generally not be anticipated to affect Yuba Region deliveries, and would generally be anticipated to improve deliveries to CVP/SWP contractors. However, those water transfer and acquisition programs would likely entail additional pumping, cross-Delta transfer, or changing of timing of Delta outflow. As a result, the Yuba Accord Alternative Cumulative Condition has the potential for significant impacts relative to the Existing Condition with regards to projects related to future water transfer and acquisition programs.

ECOSYSTEM RESTORATION AND WATER QUALITY IMPROVEMENT PROJECTS

The ecosystem restoration and water quality improvement programs that have the potential to contribute to cumulative impacts would generally not be anticipated to affect Yuba Region deliveries; however, their cumulative impact on CVP/SWP deliveries is unknown. The ecosystem restoration and water quality improvement projects would generally be anticipated to improve system conditions, as measured by the other impact indicators such as X2 or the duration of Delta excess conditions. Overall, it is anticipated that the Yuba Accord Alternative Cumulative Condition will not have significant impacts relative to the Existing Condition with regards to potential future ecosystem restoration and water quality improvement projects.

LOCAL PROJECTS IN THE YUBA REGION

The local projects in the Yuba Region have the potential for impacts to local water deliveries, when considered cumulatively with the Yuba Accord Alternative. Further, changes to local water deliveries would likely affect downstream flows, and thus could potentially impact CVP/SWP deliveries, and various Delta impact indicators. As a result, the Yuba Accord Alternative Cumulative Condition has the potential for significant impacts relative to the Existing Condition with regards to future local projects in the Yuba Region.

5.3.1.3 SUMMARY OF CUMULATIVE SURFACE WATER SUPPLY AND MANAGEMENT IMPACTS WITHIN THE PROJECT STUDY AREA

The following potentially significant cumulative impacts to surface water supply and management have been identified for the project area:

Impact 5.3.1.3-1 Potential for significant cumulative surface water supply and management impacts within the Yuba Region

Potentially significant and unavoidable impacts may result from the Yuba Accord Alternative Cumulative Condition in conjunction with potential future local projects in the Yuba Region.

Impact 5.3.1.3-2 Potential for significant cumulative surface water supply and management impacts within the Delta Region

Potentially significant and unavoidable impacts may result from the Yuba Accord Alternative Cumulative Condition in conjunction with potential future CVP/SWP operations projects and water transfer and acquisition programs in the Delta Region.

Impact 5.3.1.3-3 Potential for significant cumulative surface water supply and management impacts within the Export Service Area (San Luis Reservoir)

Potentially significant and unavoidable impacts may result from the Yuba Accord Alternative Cumulative Condition in conjunction with potential future CVP/SWP operations projects and water transfer and acquisition programs in the Export Service Area.

5.3.2 ENVIRONMENTAL IMPACTS/ENVIRONMENTAL CONSEQUENCES OF THE MODIFIED FLOW ALTERNATIVE CUMULATIVE CONDITION COMPARED TO THE EXISTING CONDITION

It is anticipated that the Modified Flow Alternative Cumulative Condition would have the same potential for cumulative impacts as the Yuba Accord Alternative Cumulative Condition. Therefore, the description of the potential impacts in Section 5.3.1 also serves as the description of cumulative impacts associated with the Modified Flow Alternative. Thus, the Modified Flow Alternative Cumulative Condition would result in the following potential cumulative impacts:

- Yuba Region - Potential cumulative impacts on surface water supply and management in the Yuba Region could be potentially significant and unavoidable.
- Delta Region - Potential cumulative impacts on surface water supply and management in the Delta Region could be potentially significant and unavoidable.
- Export Service Area - Potential cumulative impacts on surface water supply and management in the Export Service Area (San Luis Reservoir) could be potentially significant and unavoidable.

5.4 POTENTIAL CONDITIONS TO SUPPORT APPROVAL OF YCWA'S WATER RIGHTS PETITION

No unreasonable adverse effects to surface water supply and management would occur under the Proposed Project/Action or an action alternative. Therefore, no impact avoidance measures or other protective conditions are identified for SWRCB consideration in determining whether or not to approve YCWA's petitions to implement the Yuba Accord.

5.5 MITIGATION MEASURES/ENVIRONMENTAL COMMITMENTS

No adverse effects would occur to surface water supply and management under the Proposed Project/Action or an action alternative and, thus, no mitigation measures are required.

5.6 POTENTIALLY SIGNIFICANT UNAVOIDABLE IMPACTS

There are no potentially significant unavoidable project-related impacts to surface water supply and management associated with the implementation of the Proposed Project/Action, or an action alternative, individually. However, the Yuba Accord Alternative, in combination with the impacts of other reasonably foreseeable future projects, could result in potentially significant unavoidable cumulative impacts on surface water supply and management in the Yuba Region, the Delta Region, and the Export Service Area (San Luis Reservoir only). Similarly, the Modified Flow Alternative, in combination with the impacts of other reasonably foreseeable future projects, could result in potentially significant unavoidable cumulative impacts on surface water supply and management in the Yuba Region, the Delta Region, and the Export Service Area (San Luis Reservoir only).