

### 4.3 MODELING ASSUMPTIONS IN FDM AND DSM2 SIMULATIONS

The two one-dimensional numerical models used in this chapter, FDM and DSM2, allow considerable flexibility in model setup.<sup>1</sup> Key assumptions (including tidal forcing, flow control structure operations, and salinities of the major inflows) could be tailored according to the question that the modeling exercise seeks to address. The different possibilities in FDM and DSM2 and the approaches adopted for this impact study will be reviewed in this section. The key consideration in determining the approach in this analysis is to identify and select the one that would provide a reasonable estimate of the range of potential changes.

The outline of this section is as follows. Section 4.3.1 discusses the two options in tidal forcing and assess the difference in impact estimates between mean-tide and astronomical tide simulations. Section 4.3.2 describes the approach to estimating salinity in the Sacramento and San Joaquin inflows and conversions between different salinity parameters. Operations of flow control structures are discussed in Section 4.3. The approach used to split the total CCWD Delta diversions from CALSIM II output into diversions at Rock Slough and Old River is discussed in Section 4.3.4.

#### 4.3.1 Tidal forcing

The magnitude and pattern of tidal sloshing and freshwater outflow determine the extent of seawater intrusion, the key mechanism leading to high salinity in the Delta. Tidal forcing is imposed at the downstream boundary as a time series of stage (in the hydrodynamics module) and salinity variation (in the water quality module) in numerical models of the Delta.

Tidal stage in the Delta is determined primarily by astronomical forcing (see for example Schwiderski, 1980) and to a lesser extent by Delta outflow during high runoff events. Other factors such as wind (especially during storm events) and barometric pressure could also play significant roles. These same factors also determine salinity at the downstream boundary.

FDM and DSM2 were both developed to use “19-year mean-tide” in simulations for planning studies.<sup>2</sup> This is a repeating tide with a 25-hour cycle and is computed from 19 years of tide data at Eckley.<sup>3</sup> An “adjusted astronomical tide” version of DSM2 was developed recently which accounts for the spring-neap variation of the lunar tide cycle (Department of Water Resources, 2001a). In historical simulations and analyses of real-time project operations, accounting for the salinity variation at this fortnightly time-scale is critical.<sup>4</sup> There are also projects in which the spring-neap variation is important to quantify in their planning level analyses.<sup>5</sup>

Two independent comparisons have recently been made of results from mean-tide and from modified astronomical tide simulations using DSM2. Both comparisons are based on hydrological input from the September 30, 2002 release of the CALSIM II benchmark. Results from “mean-tide” and from “modified

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<sup>1</sup> All other models used in this chapter (such as K-M, G, and ANN) are completely defined.

<sup>2</sup> However, real tides (measured data which would account for all the factors listed previously) have been used in historical simulations and for model calibration in both FDM and DSM2 for some time.

<sup>3</sup> The National Ocean Service adopted the specific 19-year (actually 18.6 years) mean tide as the National Tidal Datum Epoch (presently computed from 1960-1978), from which mean values (e.g., mean lower low water, etc.) are defined for tidal datum. It is the period over which all significant astronomical effects on tides will occur.

<sup>4</sup> Some examples in which the spring-neap variation is critical are the planning of Delta Cross Channel closure, estimating carriage water requirement and low water levels in south Delta.

<sup>5</sup> For example, low water level in south Delta channels is a critical consideration in the South Delta Improvement Program in CALFED. The large difference in stage in a spring-neap tide cycle is an important variation to quantify in planning level analyses for the project.

astronomical tide” simulations are found to be nearly identical in both comparisons except at times of seawater intrusion. At times of low Delta outflow, monthly-averaged salinity from modified astronomical tide simulation is consistently lower. For all months in water years 1977-91 in which the mean chloride concentration in Rock Slough at Old River is above 150 mg/L in the mean tide simulation, predictions from modified astronomical tide simulations could be lower by as much as 19% and averages 6%. The average difference is 2% over the entire 180 months.

As of April 2003, the set up for planning level simulations and impacts analyses with DSM2 using modified astronomical tide has not been made publicly available. The high complexity of this approach would require considerable support by the DWR Delta Modeling Section before stakeholders could take advantage of this new development. Such support would not be available in the near future due to the heavy workload in the Section.

In the impact analyses for the Freeport Project, tidal forcing in both FDM and DSM2 simulations will be based on 19-year mean tide. This allows for a full period simulation that would be possible only by using the mean-tide approach.<sup>6</sup> The difference in salinity impacts using the two formulations of tidal-forcing would be small. The comparison discussed above suggests that simulations using mean-tide would predict a larger potential difference between Project alternatives and thus provides a more conservative (larger) estimate, since mean-tide simulations appear to accentuate the salinity effects of a lower Delta outflow, the key Project impact on Delta salinity.

### ***4.3.2 Salinity of Delta inflows and conversion between salinity parameters***

#### **4.3.2.1 Sacramento River at Freeport**

In the hydrological impact analysis in CALSIM II, 61.5% of the water diverted for Sacramento County Water Agency (SCWA) is assumed to return to the Sacramento River. The salinity impact of this treated wastewater discharge is estimated based on the historical effluent salinity of the Sacramento Regional Wastewater Treatment Plant (SRWWTP).

For the purpose of computing changes in the salinity of the Sacramento River inflow to the Delta, SCWA return flow is assumed to follow a different pattern than in CALSIM II in all Freeport Project alternatives (Alts.1-6). In CALSIM II simulations, 61.5% of the SCWA diversion is assumed to return to the Sacramento River in the same month of the diversion.<sup>7</sup> However, some of the water diverted in wetter years is stored for use in drier years. The return flow, if released in drier months, would have a higher impact on Sacramento River salinity. To account for this effect, the return flow is assumed to follow a seasonal pattern, with a peaking factor of 1.7.<sup>8</sup> The return flow in each month is the same in every year and prorated such that the long-term average is identical to 61.5% of the average SCWA diversion over the 73-year simulation period.

Effluent data show that the chloride concentration in the SRWWTP discharge averaged 78 mg/L between 1997 and 2002, ranged between 45 and 98 mg/L, and has a standard deviation of 11 mg/L. Chloride concentration in the Sacramento River at Freeport is assumed to be 7 mg/L in the absence of the SCWA

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<sup>6</sup> Mean tide simulation could be set up for the entire 1922-1994 CALSIM II simulation period, while astronomical tide simulations are limited to the 1976-1991 period.

<sup>7</sup> For the purpose of quantifying hydrological impacts, this assumption would give a higher impact estimate. By not accounting for the shift in timing of the return flow to drier months, when SCWA may not be diverting as much at Freeport, the CALSIM II results might portray a drier hydrology in some dry years under Alts.2-6 than would be under actual operations.

<sup>8</sup> Return flow in July (month of highest use) is 1.66 times that of annual average while January (month of lowest use) is 55% of average. The standard deviation of this seasonal variation is 0.47 times the average.

return flow. In simulations for the 2001 level-of-development, chloride concentration in the Sacramento River inflow ranges between 7.03 and 8.00 mg/L and averages 7.28 mg/L in Project alternatives (Alts.2-6), compared to a range of between 7.00 and 7.07 mg/L and averages 7.02 mg/L in the No Action alternative (Alt.1). These statistical parameters at 2020 LoD are different by less than 0.01 mg/L. To account for these small salinity differences between Sacramento River inflows, all model input and output are carried to three decimal places and are tabulated in Tables 4.3.2.1-1 for 2001 LoD and in Tables 4.3.2.1-2 for 2020 LoD.

#### **4.3.2.2 Salinity of San Joaquin River at Vernalis**

CALSIM II output includes electrical conductivity for San Joaquin River at Vernalis. These monthly averages are converted to chloride concentration based on a regression relationship developed at DWR, assuming a minimum chloride concentration of 5 mg/L.<sup>9</sup> The chloride concentration in all alternatives are very nearly identical, ranging up to 205 mg/L and averaged 87 mg/L, with the difference between alternatives in any month under 2 mg/L and averages less than 0.1 mg/L. The values are tabulated in Tables 4.3.2.2-1 for 2001 LoD and in Tables 4.3.2.2-2 for 2020 LoD.

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<sup>9</sup> For comparison, the lowest chloride concentration recorded in MWQI grab sample measurements between 1982 and 1998 was 7 mg/L, at an electrical conductivity measurement of 0.12 mmhos/cm. For comparison, the lowest mean monthly-average electrical conductivity recorded in the field since 1993 is 0.10 mmhos/cm.

**Table 4.3.2.1-1a Monthly-average chloride concentration (mg/L) in Sacramento River inflow (below Freeport) in Alternative 1 at 2001 LoD**

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG	
1922	7.032	7.024	7.013	7.014	7.007	7.008	7.025	7.012	7.020	7.038	7.044	7.033	7.023	
1923	7.026	7.018	7.007	7.008	7.018	7.008	7.023	7.017	7.036	7.047	7.035	7.042	7.030	7.026
1924	7.030	7.024	7.019	7.018	7.015	7.013	7.042	7.039	7.039	7.032	7.028	7.030	7.027	
1925	7.015	7.015	7.009	7.010	7.002	7.007	7.019	7.028	7.035	7.044	7.033	7.030	7.021	
1926	7.028	7.021	7.018	7.010	7.005	7.014	7.011	7.032	7.038	7.029	7.038	7.039	7.024	
1927	7.018	7.007	7.008	7.005	7.002	7.006	7.011	7.024	7.040	7.036	7.042	7.035	7.020	
1928	7.028	7.012	7.015	7.010	7.010	7.003	7.018	7.035	7.047	7.032	7.034	7.029	7.023	
1929	7.028	7.018	7.017	7.016	7.015	7.012	7.046	7.046	7.035	7.032	7.028	7.032	7.027	
1930	7.025	7.022	7.008	7.006	7.008	7.005	7.031	7.037	7.040	7.030	7.033	7.033	7.023	
1931	7.026	7.020	7.018	7.013	7.018	7.017	7.041	7.041	7.037	7.024	7.028	7.032	7.026	
1932	7.021	7.018	7.007	7.006	7.008	7.014	7.039	7.029	7.026	7.040	7.039	7.026	7.023	
1933	7.024	7.020	7.016	7.012	7.016	7.009	7.029	7.044	7.036	7.030	7.037	7.032	7.025	
1934	7.018	7.019	7.008	7.006	7.009	7.013	7.032	7.043	7.035	7.037	7.043	7.030	7.025	
1935	7.023	7.013	7.014	7.005	7.011	7.005	7.004	7.021	7.025	7.029	7.032	7.037	7.018	
1936	7.018	7.018	7.016	7.004	7.003	7.006	7.020	7.029	7.035	7.029	7.029	7.028	7.020	
1937	7.023	7.022	7.015	7.014	7.005	7.004	7.018	7.029	7.030	7.029	7.031	7.029	7.021	
1938	7.025	7.008	7.003	7.006	7.003	7.003	7.008	7.011	7.021	7.043	7.045	7.024	7.017	
1939	7.018	7.020	7.016	7.017	7.023	7.013	7.048	7.034	7.047	7.030	7.030	7.026	7.027	
1940	7.022	7.025	7.020	7.005	7.003	7.003	7.009	7.032	7.043	7.032	7.041	7.036	7.023	
1941	7.031	7.020	7.005	7.003	7.004	7.003	7.006	7.014	7.038	7.039	7.046	7.037	7.020	
1942	7.022	7.018	7.004	7.003	7.003	7.010	7.008	7.016	7.027	7.037	7.046	7.035	7.019	
1943	7.026	7.014	7.008	7.003	7.005	7.003	7.017	7.034	7.044	7.040	7.043	7.034	7.023	
1944	7.030	7.026	7.022	7.017	7.010	7.009	7.040	7.041	7.033	7.028	7.030	7.023	7.026	
1945	7.018	7.013	7.011	7.013	7.004	7.009	7.052	7.043	7.040	7.035	7.043	7.034	7.026	
1946	7.025	7.014	7.004	7.005	7.010	7.011	7.052	7.041	7.043	7.035	7.037	7.031	7.026	
1947	7.029	7.019	7.015	7.020	7.014	7.009	7.032	7.045	7.035	7.027	7.029	7.024	7.025	
1948	7.017	7.018	7.016	7.010	7.012	7.011	7.010	7.019	7.034	7.034	7.042	7.041	7.022	
1949	7.029	7.021	7.017	7.021	7.023	7.004	7.043	7.038	7.041	7.036	7.041	7.033	7.029	
1950	7.034	7.024	7.024	7.010	7.007	7.008	7.021	7.028	7.031	7.025	7.032	7.026	7.022	
1951	7.013	7.004	7.002	7.003	7.003	7.010	7.042	7.029	7.044	7.034	7.038	7.034	7.021	
1952	7.026	7.018	7.005	7.003	7.003	7.004	7.009	7.010	7.019	7.037	7.041	7.020	7.016	
1953	7.021	7.019	7.005	7.003	7.011	7.014	7.033	7.024	7.027	7.033	7.039	7.023	7.021	
1954	7.024	7.014	7.016	7.007	7.004	7.005	7.012	7.029	7.053	7.032	7.040	7.030	7.022	
1955	7.027	7.015	7.010	7.012	7.018	7.021	7.031	7.036	7.035	7.033	7.036	7.029	7.025	
1956	7.025	7.015	7.002	7.002	7.003	7.009	7.030	7.014	7.036	7.034	7.041	7.022	7.020	
1957	7.019	7.023	7.020	7.015	7.007	7.005	7.026	7.032	7.042	7.034	7.045	7.038	7.026	
1958	7.014	7.018	7.010	7.006	7.003	7.003	7.004	7.014	7.022	7.039	7.047	7.025	7.017	
1959	7.020	7.023	7.019	7.006	7.005	7.013	7.059	7.050	7.037	7.033	7.035	7.026	7.027	
1960	7.030	7.023	7.023	7.020	7.008	7.006	7.033	7.029	7.035	7.024	7.029	7.029	7.024	
1961	7.024	7.013	7.009	7.013	7.005	7.010	7.037	7.049	7.054	7.032	7.031	7.030	7.025	
1962	7.028	7.017	7.013	7.020	7.005	7.008	7.052	7.050	7.048	7.033	7.037	7.030	7.028	
1963	7.007	7.015	7.009	7.015	7.004	7.007	7.005	7.020	7.045	7.039	7.045	7.041	7.021	
1964	7.017	7.009	7.018	7.010	7.017	7.019	7.041	7.033	7.034	7.026	7.026	7.023	7.023	
1965	7.020	7.013	7.002	7.002	7.006	7.010	7.009	7.028	7.054	7.033	7.040	7.036	7.021	
1966	7.029	7.011	7.015	7.008	7.011	7.010	7.045	7.041	7.038	7.033	7.038	7.034	7.026	
1967	7.027	7.016	7.006	7.006	7.005	7.004	7.009	7.015	7.018	7.043	7.043	7.024	7.018	
1968	7.019	7.018	7.015	7.008	7.004	7.007	7.048	7.055	7.039	7.035	7.038	7.031	7.026	
1969	7.027	7.019	7.010	7.003	7.004	7.005	7.013	7.013	7.033	7.044	7.041	7.021	7.019	
1970	7.018	7.017	7.004	7.003	7.004	7.007	7.044	7.054	7.044	7.029	7.038	7.030	7.024	
1971	7.026	7.014	7.004	7.005	7.009	7.006	7.029	7.021	7.033	7.029	7.038	7.023	7.020	
1972	7.023	7.019	7.012	7.013	7.010	7.008	7.045	7.049	7.034	7.032	7.036	7.033	7.026	
1973	7.021	7.011	7.008	7.003	7.003	7.005	7.035	7.036	7.038	7.033	7.042	7.032	7.022	
1974	7.020	7.004	7.003	7.003	7.007	7.003	7.008	7.029	7.031	7.033	7.042	7.021	7.017	
1975	7.018	7.018	7.014	7.015	7.004	7.003	7.025	7.022	7.029	7.035	7.042	7.023	7.021	
1976	7.013	7.015	7.015	7.017	7.021	7.015	7.040	7.051	7.042	7.031	7.030	7.027	7.027	
1977	7.028	7.022	7.018	7.019	7.022	7.022	7.037	7.043	7.031	7.021	7.026	7.029	7.026	
1978	7.021	7.017	7.008	7.002	7.003	7.004	7.012	7.031	7.043	7.042	7.043	7.030	7.021	
1979	7.032	7.024	7.025	7.010	7.006	7.007	7.033	7.039	7.036	7.036	7.044	7.037	7.027	
1980	7.021	7.018	7.012	7.003	7.003	7.005	7.029	7.038	7.058	7.043	7.041	7.032	7.025	
1981	7.033	7.028	7.016	7.010	7.010	7.007	7.036	7.056	7.051	7.036	7.040	7.034	7.030	
1982	7.020	7.007	7.003	7.003	7.004	7.003	7.004	7.020	7.032	7.044	7.047	7.027	7.018	
1983	7.010	7.007	7.004	7.003	7.003	7.003	7.006	7.011	7.013	7.029	7.033	7.020	7.012	
1984	7.017	7.004	7.003	7.005	7.007	7.009	7.037	7.048	7.046	7.031	7.037	7.031	7.023	
1985	7.023	7.008	7.010	7.017	7.017	7.016	7.050	7.047	7.050	7.036	7.038	7.028	7.028	
1986	7.025	7.022	7.014	7.009	7.003	7.002	7.026	7.046	7.048	7.034	7.034	7.026	7.024	
1987	7.026	7.026	7.019	7.015	7.012	7.006	7.031	7.044	7.035	7.029	7.032	7.027	7.025	
1988	7.021	7.020	7.010	7.006	7.011	7.022	7.035	7.038	7.037	7.040	7.050	7.035	7.027	
1989	7.027	7.016	7.014	7.012	7.018	7.002	7.020	7.032	7.043	7.028	7.031	7.021	7.022	
1990	7.015	7.014	7.014	7.009	7.013	7.010	7.029	7.032	7.043	7.034	7.027	7.021	7.022	
1991	7.020	7.017	7.017	7.016	7.016	7.005	7.028	7.042	7.054	7.034	7.039	7.031	7.027	
AVG:	7.023	7.017	7.012	7.009	7.009	7.009	7.027	7.033	7.038	7.034	7.038	7.030	7.023	
MIN:	7.007	7.004	7.002	7.002	7.002	7.002	7.004	7.010	7.013	7.021	7.026	7.020	7.012	
MAX:	7.034	7.028	7.025	7.021	7.023	7.023	7.059	7.056	7.058	7.044	7.050	7.041	7.030	

**Table 4.3.2.1-1b Monthly-average chloride concentration (mg/L) in Sacramento River inflow (below Freepoint) in Alternatives 2 through 5 at 2001 LoD**

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
1922	7.300	7.244	7.137	7.147	7.067	7.083	7.221	7.128	7.196	7.384	7.431	7.329	7.222
1923	7.287	7.184	7.075	7.083	7.162	7.175	7.220	7.365	7.469	7.367	7.424	7.346	7.263
1924	7.304	7.234	7.200	7.186	7.152	7.245	7.680	7.774	7.754	7.655	7.620	7.647	7.454
1925	7.401	7.305	7.187	7.193	7.037	7.095	7.242	7.421	7.448	7.593	7.422	7.400	7.312
1926	7.334	7.285	7.246	7.139	7.060	7.184	7.261	7.489	7.572	7.448	7.545	7.518	7.340
1927	7.333	7.106	7.130	7.077	7.032	7.057	7.112	7.237	7.389	7.367	7.413	7.341	7.216
1928	7.306	7.123	7.154	7.105	7.092	7.033	7.196	7.384	7.513	7.359	7.398	7.329	7.249
1929	7.287	7.199	7.198	7.183	7.152	7.228	7.714	7.786	7.692	7.566	7.535	7.665	7.434
1930	7.392	7.336	7.133	7.108	7.129	7.078	7.421	7.516	7.533	7.428	7.465	7.477	7.335
1931	7.333	7.279	7.250	7.175	7.220	7.328	7.593	7.838	7.738	7.438	7.545	7.601	7.445
1932	7.393	7.342	7.129	7.115	7.143	7.185	7.536	7.469	7.406	7.634	7.659	7.406	7.368
1933	7.338	7.285	7.245	7.184	7.221	7.186	7.485	7.954	7.701	7.609	7.803	7.643	7.471
1934	7.392	7.335	7.166	7.122	7.162	7.199	7.441	7.782	7.616	7.586	7.737	7.560	7.425
1935	7.393	7.233	7.240	7.083	7.169	7.096	7.108	7.257	7.329	7.396	7.401	7.392	7.258
1936	7.259	7.260	7.216	7.060	7.039	7.082	7.245	7.406	7.462	7.384	7.409	7.386	7.267
1937	7.276	7.259	7.204	7.186	7.066	7.063	7.232	7.381	7.386	7.380	7.431	7.385	7.271
1938	7.312	7.103	7.037	7.076	7.032	7.033	7.084	7.110	7.203	7.427	7.427	7.248	7.174
1939	7.193	7.196	7.162	7.177	7.206	7.184	7.500	7.491	7.593	7.387	7.410	7.371	7.322
1940	7.301	7.281	7.274	7.072	7.042	7.033	7.079	7.327	7.411	7.323	7.416	7.367	7.244
1941	7.320	7.200	7.052	7.032	7.032	7.035	7.084	7.151	7.364	7.393	7.423	7.256	7.195
1942	7.233	7.179	7.037	7.034	7.032	7.108	7.119	7.179	7.259	7.373	7.428	7.254	7.186
1943	7.233	7.142	7.083	7.033	7.046	7.037	7.200	7.333	7.422	7.402	7.419	7.339	7.224
1944	7.269	7.254	7.219	7.169	7.099	7.118	7.484	7.563	7.432	7.371	7.408	7.305	7.308
1945	7.260	7.171	7.146	7.179	7.051	7.111	7.446	7.439	7.392	7.346	7.418	7.337	7.275
1946	7.323	7.140	7.037	7.048	7.095	7.120	7.429	7.430	7.414	7.350	7.399	7.329	7.259
1947	7.276	7.191	7.152	7.208	7.133	7.119	7.368	7.577	7.455	7.360	7.379	7.309	7.294
1948	7.280	7.234	7.211	7.137	7.145	7.166	7.197	7.216	7.330	7.337	7.386	7.301	7.245
1949	7.266	7.217	7.176	7.211	7.208	7.053	7.411	7.443	7.433	7.393	7.474	7.368	7.305
1950	7.331	7.255	7.268	7.114	7.068	7.123	7.271	7.387	7.393	7.339	7.394	7.341	7.274
1951	7.223	7.050	7.032	7.038	7.037	7.089	7.343	7.322	7.427	7.339	7.393	7.343	7.220
1952	7.304	7.179	7.051	7.032	7.033	7.044	7.085	7.099	7.185	7.369	7.421	7.202	7.167
1953	7.186	7.195	7.054	7.032	7.104	7.115	7.322	7.244	7.273	7.329	7.414	7.231	7.208
1954	7.224	7.145	7.166	7.070	7.038	7.050	7.129	7.283	7.506	7.325	7.396	7.296	7.219
1955	7.239	7.149	7.104	7.121	7.167	7.226	7.396	7.495	7.449	7.447	7.508	7.418	7.310
1956	7.328	7.204	7.032	7.031	7.034	7.071	7.275	7.160	7.349	7.343	7.424	7.235	7.207
1957	7.215	7.203	7.202	7.153	7.067	7.054	7.251	7.377	7.399	7.342	7.418	7.342	7.252
1958	7.160	7.165	7.100	7.061	7.031	7.033	7.069	7.136	7.209	7.388	7.433	7.218	7.167
1959	7.180	7.200	7.192	7.065	7.045	7.115	7.510	7.495	7.367	7.333	7.385	7.335	7.268
1960	7.272	7.201	7.236	7.200	7.079	7.114	7.459	7.495	7.559	7.383	7.495	7.470	7.330
1961	7.334	7.210	7.151	7.200	7.067	7.133	7.381	7.538	7.583	7.352	7.353	7.334	7.303
1962	7.292	7.182	7.147	7.226	7.050	7.097	7.444	7.485	7.456	7.325	7.383	7.302	7.282
1963	7.089	7.154	7.088	7.158	7.034	7.075	7.199	7.430	7.394	7.394	7.417	7.310	7.202
1964	7.187	7.088	7.185	7.100	7.163	7.200	7.421	7.455	7.475	7.358	7.374	7.317	7.277
1965	7.315	7.170	7.033	7.032	7.076	7.106	7.125	7.270	7.516	7.334	7.420	7.356	7.229
1966	7.259	7.113	7.154	7.081	7.096	7.088	7.376	7.420	7.388	7.349	7.417	7.359	7.258
1967	7.248	7.164	7.059	7.058	7.044	7.045	7.137	7.138	7.176	7.438	7.403	7.210	7.177
1968	7.171	7.179	7.152	7.083	7.039	7.068	7.422	7.559	7.379	7.349	7.405	7.312	7.260
1969	7.262	7.188	7.101	7.032	7.032	7.053	7.122	7.124	7.321	7.446	7.422	7.212	7.193
1970	7.185	7.173	7.040	7.031	7.033	7.074	7.345	7.538	7.450	7.295	7.406	7.307	7.240
1971	7.282	7.146	7.039	7.050	7.083	7.055	7.236	7.234	7.325	7.296	7.411	7.233	7.199
1972	7.214	7.190	7.127	7.131	7.095	7.070	7.436	7.544	7.370	7.358	7.416	7.410	7.280
1973	7.276	7.125	7.091	7.032	7.032	7.047	7.312	7.350	7.351	7.359	7.427	7.350	7.229
1974	7.247	7.038	7.035	7.032	7.060	7.033	7.078	7.268	7.302	7.357	7.420	7.205	7.173
1975	7.179	7.177	7.146	7.155	7.037	7.035	7.247	7.213	7.283	7.350	7.408	7.224	7.204
1976	7.169	7.147	7.148	7.174	7.191	7.168	7.541	7.796	7.687	7.499	7.525	7.439	7.374
1977	7.391	7.321	7.275	7.292	7.306	7.318	7.321	8.006	7.627	7.436	7.605	7.635	7.482
1978	7.393	7.340	7.160	7.037	7.047	7.040	7.161	7.299	7.416	7.378	7.401	7.299	7.248
1979	7.283	7.239	7.249	7.101	7.057	7.083	7.330	7.382	7.346	7.362	7.417	7.369	7.268
1980	7.270	7.185	7.125	7.032	7.032	7.055	7.286	7.385	7.555	7.440	7.429	7.320	7.259
1981	7.298	7.254	7.165	7.097	7.090	7.077	7.332	7.557	7.486	7.359	7.387	7.349	7.288
1982	7.255	7.069	7.032	7.035	7.032	7.036	7.172	7.303	7.440	7.439	7.211	7.174	
1983	7.136	7.067	7.037	7.033	7.032	7.032	7.083	7.108	7.127	7.296	7.310	7.169	7.119
1984	7.157	7.038	7.032	7.047	7.070	7.069	7.296	7.482	7.481	7.313	7.407	7.319	7.226
1985	7.260	7.077	7.105	7.169	7.156	7.188	7.439	7.460	7.486	7.364	7.396	7.295	7.283
1986	7.253	7.219	7.137	7.095	7.030	7.033	7.281	7.506	7.514	7.378	7.391	7.319	7.263
1987	7.268	7.260	7.217	7.172	7.121	7.103	7.363	7.581	7.460	7.394	7.460	7.362	7.313
1988	7.282	7.274	7.129	7.086	7.144	7.272	7.559	7.696	7.585	7.641	7.813	7.571	7.421
1989	7.392	7.261	7.240	7.189	7.265	7.052	7.236	7.400	7.563	7.382	7.386	7.369	7.311
1990	7.238	7.191	7.186	7.120	7.164	7.189	7.466	7.885	7.805	7.690	7.575	7.412	7.410
1991	7.371	7.336	7.349	7.324	7.294	7.078	7.420	7.696	7.882	7.580	7.644	7.455	7.452
AVG:	7.274	7.198	7.144	7.112	7.096	7.106	7.311	7.424	7.445	7.404	7.451	7.357	7.277
MIN:	7.089	7.038	7.032	7.031	7.030	7.032	7.068	7.099	7.127	7.295	7.310	7.169	7.119
MAX:	7.401	7.342	7.349	7.324	7.306	7.328	7.714	8.006	7.882	7.690	7.813	7.665	7.482

**Table 4.3.2.1-1c Monthly-average chloride concentration (mg/L) in Sacramento River inflow (below Freeport) in Alternative 6 at 2001 LoD**

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
1922	7.300	7.244	7.137	7.147	7.067	7.083	7.221	7.128	7.196	7.382	7.423	7.329	7.221
1923	7.287	7.184	7.076	7.083	7.162	7.175	7.220	7.365	7.478	7.364	7.421	7.348	7.264
1924	7.304	7.234	7.202	7.186	7.152	7.245	7.670	7.770	7.764	7.644	7.607	7.610	7.449
1925	7.401	7.305	7.187	7.193	7.037	7.095	7.242	7.421	7.440	7.587	7.420	7.400	7.311
1926	7.334	7.285	7.246	7.139	7.060	7.182	7.259	7.487	7.572	7.446	7.541	7.509	7.338
1927	7.333	7.105	7.129	7.077	7.032	7.057	7.112	7.237	7.389	7.367	7.406	7.341	7.215
1928	7.306	7.124	7.154	7.105	7.092	7.033	7.196	7.398	7.507	7.356	7.398	7.328	7.250
1929	7.287	7.199	7.198	7.183	7.152	7.225	7.714	7.786	7.682	7.566	7.533	7.554	7.423
1930	7.392	7.336	7.133	7.109	7.128	7.078	7.422	7.510	7.526	7.418	7.447	7.468	7.331
1931	7.333	7.282	7.255	7.177	7.222	7.331	7.592	7.839	7.730	7.442	7.544	7.595	7.445
1932	7.393	7.342	7.126	7.115	7.137	7.185	7.536	7.469	7.405	7.634	7.659	7.406	7.367
1933	7.338	7.285	7.245	7.184	7.221	7.185	7.485	7.954	7.702	7.605	7.795	7.643	7.470
1934	7.392	7.335	7.166	7.122	7.162	7.197	7.441	7.782	7.632	7.660	7.804	7.545	7.437
1935	7.393	7.231	7.240	7.082	7.169	7.096	7.106	7.257	7.330	7.396	7.399	7.386	7.257
1936	7.252	7.253	7.217	7.061	7.039	7.081	7.245	7.402	7.476	7.374	7.402	7.380	7.265
1937	7.273	7.259	7.204	7.186	7.066	7.063	7.232	7.380	7.394	7.369	7.418	7.378	7.269
1938	7.312	7.103	7.037	7.076	7.032	7.033	7.084	7.110	7.203	7.424	7.419	7.247	7.173
1939	7.200	7.196	7.162	7.177	7.206	7.182	7.498	7.494	7.588	7.387	7.411	7.369	7.322
1940	7.303	7.279	7.269	7.072	7.042	7.033	7.079	7.330	7.415	7.319	7.410	7.367	7.243
1941	7.314	7.201	7.052	7.032	7.032	7.035	7.084	7.151	7.364	7.389	7.414	7.256	7.194
1942	7.243	7.179	7.037	7.034	7.032	7.108	7.119	7.179	7.259	7.345	7.420	7.254	7.184
1943	7.233	7.156	7.083	7.033	7.046	7.037	7.200	7.334	7.423	7.409	7.418	7.339	7.226
1944	7.269	7.254	7.219	7.169	7.098	7.117	7.484	7.563	7.432	7.371	7.408	7.305	7.307
1945	7.263	7.171	7.146	7.178	7.051	7.111	7.446	7.439	7.407	7.342	7.407	7.332	7.275
1946	7.324	7.142	7.036	7.048	7.094	7.120	7.430	7.430	7.410	7.347	7.395	7.319	7.258
1947	7.281	7.189	7.151	7.207	7.133	7.120	7.368	7.577	7.464	7.360	7.379	7.313	7.295
1948	7.286	7.235	7.239	7.136	7.145	7.166	7.196	7.215	7.329	7.337	7.386	7.299	7.247
1949	7.267	7.206	7.176	7.211	7.208	7.054	7.411	7.443	7.430	7.393	7.475	7.368	7.304
1950	7.331	7.258	7.268	7.113	7.068	7.123	7.271	7.381	7.404	7.335	7.388	7.344	7.274
1951	7.230	7.050	7.032	7.038	7.037	7.089	7.343	7.322	7.427	7.337	7.391	7.343	7.220
1952	7.304	7.180	7.051	7.032	7.033	7.044	7.084	7.099	7.185	7.366	7.424	7.202	7.167
1953	7.186	7.195	7.054	7.032	7.104	7.115	7.322	7.244	7.273	7.329	7.413	7.231	7.208
1954	7.225	7.145	7.166	7.070	7.038	7.050	7.129	7.283	7.506	7.325	7.396	7.296	7.219
1955	7.239	7.149	7.104	7.121	7.167	7.226	7.398	7.495	7.449	7.448	7.508	7.418	7.310
1956	7.328	7.204	7.032	7.031	7.034	7.071	7.275	7.160	7.349	7.377	7.417	7.235	7.209
1957	7.201	7.202	7.194	7.153	7.067	7.054	7.251	7.377	7.405	7.345	7.423	7.321	7.249
1958	7.161	7.165	7.100	7.061	7.031	7.033	7.069	7.136	7.209	7.384	7.425	7.217	7.166
1959	7.180	7.200	7.192	7.065	7.045	7.115	7.510	7.494	7.368	7.333	7.385	7.339	7.269
1960	7.271	7.196	7.234	7.197	7.078	7.113	7.459	7.487	7.542	7.383	7.494	7.469	7.327
1961	7.334	7.210	7.150	7.200	7.066	7.133	7.381	7.538	7.579	7.352	7.353	7.334	7.303
1962	7.281	7.183	7.147	7.227	7.050	7.097	7.438	7.481	7.456	7.328	7.382	7.300	7.281
1963	7.088	7.152	7.088	7.156	7.034	7.074	7.199	7.199	7.372	7.419	7.372	7.304	7.198
1964	7.187	7.088	7.185	7.106	7.163	7.199	7.416	7.462	7.470	7.358	7.374	7.313	7.277
1965	7.314	7.169	7.033	7.032	7.076	7.106	7.125	7.270	7.524	7.339	7.415	7.356	7.230
1966	7.259	7.111	7.154	7.081	7.096	7.088	7.376	7.420	7.388	7.349	7.417	7.359	7.258
1967	7.248	7.164	7.059	7.058	7.044	7.045	7.137	7.138	7.176	7.438	7.403	7.210	7.177
1968	7.171	7.179	7.152	7.083	7.039	7.068	7.422	7.551	7.381	7.350	7.405	7.312	7.259
1969	7.261	7.188	7.100	7.032	7.032	7.053	7.122	7.124	7.321	7.439	7.415	7.215	7.192
1970	7.185	7.173	7.040	7.031	7.033	7.074	7.345	7.538	7.450	7.295	7.406	7.307	7.240
1971	7.282	7.146	7.039	7.050	7.083	7.055	7.235	7.234	7.325	7.296	7.411	7.233	7.199
1972	7.214	7.190	7.128	7.131	7.095	7.070	7.434	7.544	7.370	7.358	7.413	7.410	7.280
1973	7.276	7.124	7.089	7.032	7.032	7.048	7.312	7.350	7.356	7.355	7.421	7.353	7.229
1974	7.253	7.038	7.035	7.032	7.060	7.033	7.078	7.268	7.304	7.354	7.414	7.210	7.173
1975	7.179	7.177	7.146	7.155	7.037	7.035	7.247	7.213	7.283	7.347	7.408	7.224	7.204
1976	7.170	7.147	7.148	7.174	7.191	7.166	7.537	7.796	7.676	7.493	7.538	7.429	7.372
1977	7.391	7.314	7.281	7.291	7.306	7.319	7.566	8.006	7.627	7.437	7.571	7.635	7.479
1978	7.393	7.340	7.161	7.037	7.047	7.040	7.160	7.299	7.415	7.425	7.401	7.299	7.251
1979	7.283	7.239	7.249	7.099	7.057	7.082	7.328	7.378	7.347	7.362	7.418	7.363	7.267
1980	7.267	7.182	7.123	7.032	7.032	7.055	7.286	7.385	7.555	7.435	7.424	7.320	7.258
1981	7.298	7.254	7.165	7.098	7.090	7.076	7.329	7.549	7.487	7.359	7.387	7.349	7.287
1982	7.252	7.068	7.032	7.035	7.032	7.036	7.172	7.303	7.303	7.436	7.433	7.212	7.173
1983	7.137	7.067	7.037	7.033	7.032	7.032	7.083	7.108	7.127	7.296	7.310	7.169	7.119
1984	7.157	7.038	7.032	7.047	7.070	7.069	7.296	7.482	7.481	7.314	7.406	7.319	7.226
1985	7.260	7.077	7.105	7.169	7.156	7.188	7.439	7.460	7.485	7.364	7.396	7.295	7.283
1986	7.253	7.219	7.137	7.095	7.030	7.033	7.281	7.506	7.515	7.377	7.388	7.319	7.263
1987	7.268	7.260	7.217	7.172	7.121	7.102	7.364	7.579	7.464	7.394	7.469	7.364	7.314
1988	7.276	7.269	7.128	7.086	7.144	7.277	7.549	7.668	7.609	7.613	7.800	7.566	7.415
1989	7.391	7.261	7.233	7.189	7.270	7.052	7.235	7.400	7.556	7.376	7.384	7.364	7.309
1990	7.233	7.188	7.186	7.121	7.164	7.187	7.466	7.861	7.815	7.689	7.572	7.413	7.408
1991	7.375	7.336	7.349	7.321	7.289	7.077	7.413	7.683	7.882	7.544	7.657	7.476	7.450
AVG:	7.274	7.197	7.144	7.112	7.096	7.106	7.311	7.423	7.446	7.403	7.449	7.353	7.276
MIN:	7.088	7.038	7.032	7.031	7.030	7.032	7.068	7.099	7.127	7.295	7.310	7.169	7.119
MAX:	7.401	7.342	7.349	7.321	7.306	7.331	7.714	8.006	7.882	7.689	7.804	7.643	7.479

**Table 4.3.2.1-2a Monthly-average chloride concentration (mg/L) in Sacramento River inflow (below Freeport) in Alternative 1 at 2020 LoD**

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
1922	7.030	7.023	7.013	7.014	7.007	7.008	7.025	7.012	7.021	7.033	7.043	7.034	7.022
1923	7.024	7.017	7.008	7.008	7.017	7.021	7.017	7.038	7.047	7.034	7.040	7.028	7.025
1924	7.025	7.025	7.018	7.017	7.015	7.013	7.044	7.040	7.039	7.034	7.028	7.031	7.027
1925	7.015	7.014	7.009	7.009	7.002	7.007	7.018	7.030	7.034	7.044	7.060	7.030	7.023
1926	7.028	7.021	7.020	7.010	7.005	7.014	7.011	7.032	7.040	7.029	7.041	7.035	7.024
1927	7.018	7.007	7.008	7.005	7.002	7.006	7.011	7.025	7.037	7.035	7.042	7.037	7.019
1928	7.022	7.014	7.015	7.010	7.011	7.003	7.018	7.029	7.041	7.034	7.040	7.032	7.022
1929	7.028	7.017	7.017	7.016	7.014	7.011	7.047	7.046	7.038	7.037	7.041	7.041	7.030
1930	7.025	7.022	7.007	7.006	7.008	7.005	7.029	7.037	7.044	7.031	7.036	7.030	7.023
1931	7.026	7.021	7.019	7.012	7.017	7.016	7.042	7.040	7.037	7.025	7.030	7.028	7.026
1932	7.021	7.018	7.006	7.006	7.008	7.013	7.036	7.032	7.032	7.028	7.032	7.025	7.021
1933	7.024	7.020	7.017	7.011	7.014	7.009	7.030	7.040	7.038	7.031	7.037	7.032	7.025
1934	7.018	7.019	7.008	7.006	7.009	7.013	7.032	7.043	7.036	7.037	7.046	7.030	7.025
1935	7.023	7.012	7.013	7.005	7.011	7.004	7.004	7.021	7.026	7.030	7.032	7.035	7.018
1936	7.019	7.020	7.016	7.004	7.003	7.006	7.020	7.029	7.035	7.029	7.028	7.028	7.020
1937	7.022	7.023	7.015	7.013	7.005	7.004	7.018	7.030	7.038	7.031	7.030	7.028	7.021
1938	7.023	7.008	7.003	7.006	7.003	7.003	7.008	7.011	7.022	7.036	7.045	7.026	7.016
1939	7.019	7.021	7.016	7.017	7.021	7.013	7.053	7.037	7.039	7.028	7.030	7.026	7.027
1940	7.021	7.025	7.019	7.006	7.003	7.003	7.009	7.032	7.041	7.033	7.040	7.036	7.022
1941	7.028	7.019	7.006	7.003	7.004	7.003	7.006	7.014	7.039	7.034	7.046	7.037	7.020
1942	7.023	7.019	7.004	7.003	7.003	7.010	7.007	7.016	7.029	7.038	7.046	7.036	7.020
1943	7.026	7.015	7.008	7.003	7.005	7.003	7.017	7.035	7.044	7.043	7.043	7.037	7.023
1944	7.033	7.025	7.020	7.016	7.010	7.009	7.037	7.042	7.035	7.029	7.032	7.026	7.026
1945	7.019	7.012	7.011	7.012	7.004	7.009	7.048	7.046	7.040	7.035	7.042	7.037	7.026
1946	7.022	7.016	7.004	7.005	7.010	7.013	7.052	7.042	7.043	7.035	7.037	7.030	7.026
1947	7.026	7.019	7.015	7.020	7.014	7.009	7.031	7.044	7.039	7.028	7.030	7.026	7.025
1948	7.018	7.018	7.019	7.011	7.012	7.010	7.010	7.019	7.035	7.034	7.041	7.047	7.023
1949	7.027	7.021	7.017	7.021	7.020	7.004	7.043	7.038	7.040	7.035	7.051	7.032	7.029
1950	7.034	7.024	7.023	7.011	7.007	7.008	7.020	7.027	7.027	7.027	7.033	7.028	7.022
1951	7.015	7.004	7.002	7.003	7.003	7.010	7.043	7.031	7.056	7.031	7.038	7.031	7.022
1952	7.022	7.016	7.006	7.003	7.003	7.004	7.009	7.011	7.019	7.039	7.044	7.021	7.016
1953	7.021	7.018	7.005	7.003	7.011	7.014	7.032	7.024	7.030	7.034	7.039	7.024	7.021
1954	7.024	7.015	7.019	7.007	7.004	7.005	7.012	7.025	7.051	7.032	7.041	7.030	7.022
1955	7.027	7.016	7.010	7.012	7.018	7.019	7.032	7.034	7.035	7.040	7.050	7.029	7.027
1956	7.025	7.015	7.002	7.002	7.003	7.009	7.029	7.015	7.037	7.034	7.041	7.024	7.020
1957	7.019	7.024	7.017	7.018	7.007	7.005	7.026	7.033	7.042	7.035	7.043	7.040	7.026
1958	7.015	7.019	7.010	7.006	7.003	7.003	7.004	7.014	7.025	7.039	7.047	7.027	7.018
1959	7.020	7.023	7.019	7.006	7.005	7.013	7.058	7.049	7.039	7.032	7.035	7.030	7.027
1960	7.028	7.028	7.025	7.018	7.009	7.006	7.034	7.028	7.032	7.024	7.023	7.026	7.023
1961	7.024	7.013	7.009	7.012	7.005	7.009	7.044	7.049	7.052	7.032	7.032	7.032	7.026
1962	7.027	7.021	7.013	7.021	7.005	7.008	7.054	7.048	7.040	7.034	7.039	7.032	7.028
1963	7.007	7.015	7.009	7.015	7.004	7.008	7.005	7.020	7.040	7.034	7.045	7.045	7.021
1964	7.021	7.009	7.018	7.011	7.017	7.020	7.026	7.038	7.038	7.027	7.025	7.024	7.023
1965	7.022	7.013	7.003	7.002	7.006	7.010	7.008	7.028	7.055	7.034	7.040	7.036	7.021
1966	7.036	7.011	7.015	7.008	7.010	7.010	7.045	7.040	7.040	7.034	7.039	7.036	7.027
1967	7.026	7.017	7.007	7.006	7.005	7.004	7.009	7.015	7.020	7.048	7.045	7.024	7.019
1968	7.019	7.018	7.015	7.008	7.004	7.007	7.039	7.054	7.049	7.037	7.038	7.035	7.027
1969	7.025	7.019	7.010	7.003	7.004	7.005	7.013	7.014	7.034	7.044	7.041	7.032	7.020
1970	7.018	7.017	7.004	7.003	7.004	7.007	7.044	7.052	7.045	7.030	7.038	7.032	7.024
1971	7.024	7.014	7.004	7.005	7.009	7.006	7.029	7.021	7.036	7.028	7.038	7.025	7.020
1972	7.022	7.018	7.014	7.014	7.010	7.008	7.046	7.049	7.034	7.033	7.037	7.031	7.026
1973	7.020	7.012	7.008	7.003	7.003	7.005	7.035	7.038	7.036	7.033	7.042	7.033	7.022
1974	7.021	7.004	7.003	7.003	7.006	7.003	7.008	7.030	7.034	7.037	7.042	7.023	7.018
1975	7.021	7.018	7.014	7.015	7.004	7.003	7.024	7.024	7.033	7.035	7.044	7.024	7.022
1976	7.013	7.018	7.014	7.017	7.019	7.015	7.041	7.054	7.046	7.032	7.033	7.028	7.027
1977	7.028	7.022	7.017	7.018	7.023	7.022	7.037	7.043	7.031	7.023	7.023	7.028	7.026
1978	7.021	7.017	7.008	7.002	7.002	7.004	7.011	7.033	7.044	7.042	7.043	7.032	7.022
1979	7.037	7.023	7.015	7.010	7.007	7.007	7.030	7.044	7.036	7.037	7.044	7.037	7.027
1980	7.021	7.018	7.012	7.003	7.003	7.005	7.028	7.038	7.058	7.036	7.038	7.034	7.025
1981	7.033	7.029	7.016	7.011	7.010	7.007	7.033	7.055	7.051	7.036	7.039	7.033	7.029
1982	7.021	7.008	7.003	7.003	7.004	7.003	7.004	7.018	7.034	7.038	7.046	7.034	7.018
1983	7.012	7.007	7.004	7.003	7.003	7.003	7.006	7.011	7.013	7.031	7.034	7.020	7.012
1984	7.017	7.004	7.003	7.005	7.007	7.009	7.037	7.048	7.045	7.031	7.037	7.030	7.023
1985	7.024	7.008	7.011	7.017	7.017	7.014	7.041	7.049	7.051	7.036	7.035	7.028	7.028
1986	7.026	7.021	7.014	7.010	7.003	7.002	7.026	7.045	7.047	7.033	7.035	7.027	7.024
1987	7.027	7.025	7.019	7.015	7.012	7.006	7.033	7.045	7.037	7.032	7.034	7.028	7.026
1988	7.021	7.020	7.009	7.006	7.012	7.023	7.030	7.037	7.040	7.036	7.047	7.035	7.026
1989	7.027	7.015	7.014	7.011	7.018	7.003	7.021	7.032	7.038	7.028	7.031	7.019	7.021
1990	7.015	7.017	7.014	7.009	7.012	7.010	7.030	7.028	7.045	7.037	7.027	7.027	7.022
1991	7.021	7.017	7.017	7.016	7.016	7.005	7.026	7.042	7.059	7.038	7.041	7.031	7.027
AVG:	7.023	7.017	7.012	7.009	7.009	7.008	7.027	7.033	7.038	7.034	7.039	7.031	7.023
MIN:	7.007	7.004	7.002	7.002	7.002	7.002	7.004	7.011	7.013	7.023	7.023	7.019	7.012
MAX:	7.037	7.029	7.025	7.021	7.023	7.023	7.058	7.055	7.059	7.048	7.060	7.047	7.030

**Table 4.3.2.1-2b Monthly-average chloride concentration (mg/L) in Sacramento River inflow (below Freepoint) in Alternatives 2 through 5 at 2020 LoD**

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
1922	7.285	7.235	7.134	7.145	7.066	7.083	7.222	7.129	7.197	7.329	7.424	7.344	7.216
1923	7.268	7.171	7.084	7.082	7.157	7.162	7.219	7.390	7.472	7.356	7.410	7.313	7.257
1924	7.255	7.238	7.189	7.179	7.145	7.242	7.705	7.778	7.746	7.708	7.621	7.651	7.455
1925	7.401	7.286	7.176	7.182	7.037	7.092	7.237	7.440	7.436	7.596	7.777	7.392	7.338
1926	7.334	7.285	7.266	7.136	7.058	7.181	7.248	7.487	7.595	7.455	7.587	7.459	7.341
1927	7.332	7.102	7.124	7.076	7.032	7.057	7.112	7.242	7.373	7.358	7.413	7.367	7.216
1928	7.237	7.138	7.152	7.105	7.100	7.033	7.196	7.316	7.453	7.390	7.476	7.368	7.247
1929	7.290	7.195	7.189	7.182	7.146	7.206	7.741	7.789	7.753	7.649	7.762	7.745	7.471
1930	7.392	7.335	7.128	7.108	7.127	7.077	7.410	7.508	7.573	7.420	7.487	7.431	7.333
1931	7.332	7.285	7.260	7.172	7.206	7.300	7.606	7.822	7.752	7.469	7.587	7.592	7.449
1932	7.393	7.342	7.121	7.111	7.141	7.182	7.491	7.526	7.487	7.440	7.545	7.395	7.348
1933	7.331	7.285	7.267	7.172	7.200	7.188	7.492	7.894	7.726	7.626	7.791	7.653	7.469
1934	7.392	7.335	7.160	7.126	7.158	7.191	7.444	7.779	7.651	7.665	7.909	7.650	7.455
1935	7.392	7.215	7.227	7.080	7.173	7.091	7.107	7.263	7.335	7.397	7.394	7.372	7.254
1936	7.263	7.262	7.218	7.059	7.039	7.083	7.243	7.412	7.465	7.390	7.403	7.374	7.268
1937	7.281	7.262	7.203	7.172	7.066	7.062	7.232	7.397	7.490	7.415	7.412	7.373	7.280
1938	7.290	7.101	7.039	7.076	7.032	7.033	7.084	7.111	7.207	7.363	7.426	7.267	7.169
1939	7.205	7.197	7.160	7.176	7.188	7.178	7.562	7.557	7.484	7.373	7.413	7.360	7.321
1940	7.284	7.285	7.260	7.073	7.042	7.033	7.079	7.328	7.391	7.328	7.409	7.309	7.235
1941	7.264	7.198	7.056	7.033	7.032	7.035	7.083	7.157	7.370	7.340	7.425	7.256	7.187
1942	7.237	7.186	7.039	7.034	7.032	7.106	7.117	7.180	7.275	7.381	7.428	7.263	7.190
1943	7.232	7.152	7.082	7.033	7.046	7.037	7.197	7.337	7.425	7.429	7.424	7.370	7.230
1944	7.297	7.245	7.203	7.164	7.096	7.114	7.450	7.574	7.456	7.387	7.432	7.347	7.314
1945	7.272	7.165	7.142	7.167	7.052	7.109	7.415	7.470	7.397	7.350	7.407	7.366	7.276
1946	7.289	7.158	7.036	7.048	7.090	7.135	7.440	7.415	7.351	7.399	7.307	7.258	
1947	7.243	7.193	7.149	7.207	7.130	7.120	7.364	7.569	7.514	7.368	7.387	7.334	7.298
1948	7.302	7.234	7.251	7.147	7.145	7.147	7.194	7.223	7.340	7.340	7.385	7.340	7.254
1949	7.250	7.210	7.173	7.208	7.188	7.051	7.411	7.440	7.426	7.390	7.602	7.362	7.309
1950	7.331	7.258	7.257	7.118	7.068	7.119	7.257	7.349	7.342	7.360	7.403	7.365	7.269
1951	7.255	7.054	7.032	7.038	7.037	7.088	7.346	7.337	7.535	7.313	7.392	7.313	7.228
1952	7.255	7.156	7.060	7.032	7.033	7.044	7.084	7.103	7.189	7.397	7.455	7.215	7.169
1953	7.186	7.183	7.054	7.032	7.104	7.114	7.310	7.244	7.305	7.338	7.413	7.240	7.210
1954	7.223	7.151	7.192	7.069	7.038	7.050	7.128	7.247	7.487	7.324	7.403	7.297	7.217
1955	7.240	7.164	7.101	7.125	7.164	7.214	7.401	7.460	7.451	7.542	7.705	7.424	7.333
1956	7.325	7.200	7.032	7.031	7.034	7.071	7.264	7.163	7.360	7.345	7.424	7.264	7.209
1957	7.210	7.207	7.167	7.181	7.068	7.053	7.254	7.388	7.405	7.354	7.404	7.355	7.254
1958	7.173	7.171	7.102	7.062	7.031	7.033	7.069	7.140	7.236	7.397	7.433	7.237	7.174
1959	7.179	7.205	7.193	7.063	7.044	7.113	7.509	7.481	7.381	7.332	7.383	7.408	7.274
1960	7.238	7.256	7.253	7.181	7.082	7.120	7.472	7.468	7.489	7.372	7.374	7.437	7.312
1961	7.332	7.199	7.148	7.192	7.079	7.125	7.456	7.541	7.557	7.349	7.368	7.359	7.309
1962	7.263	7.229	7.142	7.230	7.050	7.098	7.458	7.467	7.387	7.346	7.392	7.319	7.282
1963	7.096	7.151	7.087	7.156	7.034	7.081	7.072	7.203	7.387	7.343	7.416	7.350	7.198
1964	7.236	7.093	7.182	7.109	7.162	7.214	7.262	7.544	7.521	7.371	7.365	7.328	7.282
1965	7.333	7.168	7.034	7.032	7.076	7.108	7.120	7.274	7.524	7.346	7.421	7.361	7.233
1966	7.326	7.116	7.154	7.080	7.094	7.088	7.377	7.409	7.409	7.359	7.428	7.370	7.268
1967	7.239	7.167	7.066	7.058	7.044	7.045	7.135	7.141	7.192	7.481	7.420	7.216	7.184
1968	7.171	7.178	7.149	7.082	7.039	7.068	7.340	7.547	7.474	7.373	7.404	7.350	7.264
1969	7.250	7.193	7.101	7.032	7.032	7.052	7.122	7.134	7.327	7.445	7.421	7.324	7.203
1970	7.180	7.175	7.040	7.031	7.033	7.074	7.345	7.517	7.458	7.302	7.404	7.331	7.241
1971	7.252	7.137	7.040	7.050	7.083	7.058	7.233	7.237	7.358	7.284	7.410	7.254	7.200
1972	7.211	7.182	7.137	7.147	7.095	7.070	7.438	7.541	7.366	7.364	7.425	7.391	7.281
1973	7.268	7.129	7.092	7.032	7.032	7.047	7.309	7.367	7.349	7.334	7.423	7.346	7.227
1974	7.250	7.042	7.035	7.032	7.059	7.033	7.077	7.277	7.323	7.394	7.419	7.222	7.180
1975	7.212	7.178	7.143	7.154	7.036	7.035	7.234	7.226	7.317	7.350	7.433	7.235	7.213
1976	7.170	7.170	7.146	7.172	7.179	7.161	7.552	7.861	7.708	7.509	7.569	7.452	7.387
1977	7.390	7.325	7.271	7.278	7.310	7.321	7.576	8.013	7.630	7.491	7.520	7.640	7.480
1978	7.393	7.340	7.152	7.037	7.046	7.040	7.143	7.318	7.426	7.424	7.396	7.327	7.254
1979	7.326	7.227	7.156	7.105	7.065	7.081	7.302	7.430	7.348	7.370	7.413	7.359	7.265
1980	7.252	7.183	7.126	7.032	7.032	7.055	7.281	7.388	7.556	7.371	7.390	7.348	7.251
1981	7.298	7.258	7.163	7.111	7.089	7.077	7.304	7.547	7.490	7.362	7.378	7.349	7.286
1982	7.255	7.076	7.032	7.034	7.032	7.034	7.068	7.156	7.324	7.378	7.428	7.260	7.173
1983	7.151	7.066	7.037	7.033	7.032	7.032	7.082	7.109	7.129	7.307	7.320	7.171	7.122
1984	7.156	7.037	7.031	7.047	7.070	7.069	7.297	7.480	7.471	7.314	7.406	7.316	7.225
1985	7.267	7.079	7.108	7.169	7.152	7.170	7.364	7.472	7.499	7.365	7.371	7.295	7.276
1986	7.264	7.210	7.138	7.100	7.030	7.033	7.282	7.490	7.502	7.374	7.396	7.340	7.263
1987	7.273	7.258	7.218	7.165	7.118	7.099	7.379	7.590	7.487	7.435	7.488	7.381	7.324
1988	7.282	7.278	7.125	7.083	7.150	7.277	7.528	7.612	7.650	7.582	7.788	7.568	7.410
1989	7.392	7.244	7.227	7.179	7.261	7.054	7.244	7.394	7.488	7.376	7.385	7.336	7.298
1990	7.227	7.227	7.195	7.121	7.151	7.183	7.474	7.756	7.850	7.741	7.571	7.508	7.417
1991	7.394	7.336	7.337	7.334	7.284	7.077	7.390	7.684	7.928	7.628	7.690	7.510	7.466
AVG:	7.272	7.199	7.142	7.111	7.094	7.104	7.306	7.424	7.455	7.409	7.465	7.369	7.279
MIN:	7.096	7.037	7.031	7.031	7.030	7.032	7.068	7.103	7.129	7.284	7.320	7.171	7.122
MAX:	7.401	7.342	7.337	7.334	7.310	7.321	7.741	8.013	7.928	7.741	7.909	7.745	7.480

**Table 4.3.2.1-2c Monthly-average chloride concentration (mg/L) in Sacramento River inflow (below Freeport) in Alternative 6 at 2020 LoD**

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
1922	7.285	7.235	7.134	7.145	7.066	7.083	7.222	7.129	7.197	7.325	7.416	7.350	7.216
1923	7.268	7.171	7.085	7.082	7.157	7.162	7.219	7.390	7.481	7.354	7.407	7.312	7.258
1924	7.249	7.236	7.185	7.179	7.145	7.242	7.694	7.776	7.754	7.698	7.611	7.627	7.450
1925	7.398	7.286	7.176	7.182	7.037	7.093	7.236	7.439	7.441	7.595	7.775	7.392	7.337
1926	7.334	7.285	7.266	7.136	7.058	7.180	7.249	7.482	7.596	7.453	7.585	7.459	7.340
1927	7.332	7.102	7.121	7.076	7.032	7.057	7.112	7.242	7.370	7.339	7.406	7.367	7.213
1928	7.238	7.141	7.155	7.105	7.100	7.033	7.196	7.324	7.444	7.385	7.474	7.368	7.247
1929	7.286	7.194	7.189	7.182	7.146	7.204	7.739	7.787	7.758	7.652	7.766	7.726	7.469
1930	7.393	7.335	7.128	7.108	7.127	7.077	7.404	7.503	7.577	7.420	7.489	7.421	7.332
1931	7.332	7.285	7.260	7.172	7.206	7.300	7.606	7.821	7.746	7.470	7.587	7.533	7.443
1932	7.393	7.342	7.120	7.110	7.137	7.182	7.491	7.526	7.487	7.439	7.545	7.400	7.348
1933	7.331	7.285	7.267	7.172	7.200	7.186	7.492	7.877	7.726	7.624	7.788	7.652	7.467
1934	7.392	7.335	7.160	7.126	7.158	7.190	7.444	7.779	7.651	7.665	7.899	7.542	7.445
1935	7.392	7.212	7.227	7.079	7.169	7.091	7.107	7.263	7.335	7.396	7.393	7.363	7.252
1936	7.263	7.262	7.216	7.059	7.039	7.084	7.242	7.411	7.476	7.389	7.397	7.366	7.267
1937	7.281	7.263	7.203	7.172	7.067	7.062	7.232	7.395	7.498	7.414	7.407	7.367	7.280
1938	7.291	7.101	7.038	7.076	7.032	7.033	7.084	7.111	7.207	7.358	7.418	7.273	7.168
1939	7.210	7.198	7.161	7.176	7.188	7.176	7.547	7.551	7.490	7.373	7.413	7.360	7.320
1940	7.288	7.284	7.255	7.073	7.042	7.033	7.079	7.332	7.398	7.326	7.403	7.304	7.235
1941	7.264	7.198	7.056	7.033	7.032	7.035	7.083	7.157	7.376	7.335	7.416	7.257	7.187
1942	7.237	7.186	7.039	7.034	7.032	7.106	7.117	7.180	7.275	7.351	7.420	7.263	7.187
1943	7.232	7.156	7.082	7.033	7.046	7.036	7.197	7.337	7.426	7.442	7.418	7.370	7.231
1944	7.297	7.246	7.202	7.164	7.096	7.113	7.450	7.574	7.456	7.385	7.430	7.346	7.313
1945	7.274	7.169	7.141	7.166	7.052	7.109	7.415	7.470	7.411	7.346	7.401	7.366	7.277
1946	7.279	7.163	7.036	7.048	7.088	7.138	7.430	7.440	7.411	7.348	7.395	7.304	7.257
1947	7.243	7.196	7.150	7.209	7.130	7.119	7.364	7.569	7.528	7.371	7.388	7.335	7.300
1948	7.306	7.237	7.252	7.147	7.146	7.147	7.194	7.223	7.340	7.340	7.385	7.340	7.255
1949	7.236	7.211	7.173	7.208	7.188	7.051	7.411	7.441	7.426	7.393	7.591	7.362	7.308
1950	7.331	7.260	7.257	7.119	7.068	7.121	7.258	7.349	7.348	7.359	7.399	7.368	7.270
1951	7.255	7.054	7.032	7.038	7.037	7.088	7.346	7.337	7.526	7.303	7.390	7.313	7.227
1952	7.255	7.155	7.062	7.032	7.033	7.044	7.084	7.103	7.189	7.394	7.453	7.217	7.168
1953	7.186	7.183	7.054	7.032	7.104	7.114	7.310	7.244	7.305	7.337	7.412	7.240	7.210
1954	7.223	7.151	7.192	7.069	7.038	7.050	7.128	7.247	7.487	7.325	7.403	7.297	7.218
1955	7.240	7.165	7.101	7.125	7.164	7.214	7.403	7.460	7.451	7.540	7.703	7.424	7.333
1956	7.326	7.200	7.032	7.031	7.034	7.071	7.264	7.163	7.360	7.340	7.416	7.268	7.209
1957	7.210	7.207	7.170	7.181	7.068	7.053	7.254	7.389	7.405	7.354	7.404	7.356	7.254
1958	7.175	7.171	7.102	7.062	7.031	7.033	7.069	7.140	7.236	7.393	7.425	7.241	7.173
1959	7.179	7.205	7.193	7.063	7.044	7.113	7.501	7.483	7.384	7.330	7.383	7.373	7.271
1960	7.258	7.240	7.249	7.179	7.082	7.119	7.471	7.461	7.489	7.372	7.374	7.442	7.311
1961	7.332	7.199	7.148	7.192	7.077	7.125	7.456	7.541	7.553	7.349	7.369	7.359	7.308
1962	7.263	7.228	7.142	7.230	7.050	7.098	7.452	7.464	7.383	7.344	7.403	7.317	7.281
1963	7.095	7.150	7.087	7.154	7.034	7.080	7.072	7.203	7.383	7.317	7.409	7.350	7.194
1964	7.236	7.093	7.182	7.109	7.162	7.215	7.260	7.537	7.526	7.375	7.365	7.333	7.283
1965	7.333	7.168	7.034	7.032	7.076	7.109	7.120	7.274	7.535	7.351	7.416	7.360	7.234
1966	7.326	7.114	7.155	7.080	7.094	7.088	7.377	7.409	7.409	7.359	7.428	7.370	7.267
1967	7.240	7.167	7.066	7.058	7.044	7.045	7.135	7.141	7.192	7.481	7.420	7.216	7.184
1968	7.171	7.178	7.149	7.082	7.039	7.068	7.340	7.539	7.476	7.369	7.404	7.350	7.264
1969	7.249	7.191	7.100	7.032	7.032	7.052	7.122	7.134	7.327	7.438	7.414	7.329	7.202
1970	7.184	7.175	7.040	7.031	7.033	7.074	7.345	7.517	7.457	7.302	7.403	7.331	7.241
1971	7.252	7.137	7.041	7.050	7.083	7.053	7.233	7.237	7.358	7.283	7.410	7.254	7.200
1972	7.211	7.182	7.137	7.147	7.095	7.070	7.438	7.541	7.366	7.364	7.425	7.391	7.281
1973	7.268	7.129	7.092	7.032	7.032	7.047	7.309	7.367	7.354	7.331	7.419	7.350	7.228
1974	7.249	7.042	7.035	7.032	7.059	7.033	7.077	7.277	7.324	7.390	7.414	7.222	7.180
1975	7.216	7.178	7.142	7.154	7.036	7.035	7.234	7.226	7.317	7.348	7.428	7.237	7.213
1976	7.170	7.171	7.147	7.172	7.179	7.159	7.548	7.841	7.715	7.511	7.573	7.447	7.386
1977	7.390	7.325	7.269	7.278	7.311	7.320	7.582	8.014	7.628	7.496	7.519	7.636	7.481
1978	7.393	7.340	7.152	7.037	7.045	7.039	7.142	7.318	7.426	7.425	7.396	7.327	7.253
1979	7.325	7.229	7.156	7.105	7.065	7.081	7.300	7.425	7.349	7.370	7.415	7.359	7.265
1980	7.259	7.182	7.126	7.032	7.032	7.055	7.281	7.388	7.556	7.367	7.385	7.357	7.252
1981	7.298	7.258	7.163	7.111	7.090	7.077	7.302	7.540	7.492	7.362	7.378	7.344	7.284
1982	7.257	7.076	7.032	7.034	7.032	7.034	7.156	7.324	7.374	7.425	7.260	7.173	
1983	7.152	7.066	7.037	7.033	7.032	7.032	7.082	7.109	7.129	7.307	7.320	7.171	7.122
1984	7.156	7.037	7.031	7.047	7.070	7.069	7.297	7.480	7.471	7.315	7.405	7.317	7.225
1985	7.265	7.079	7.108	7.169	7.152	7.170	7.364	7.472	7.499	7.365	7.371	7.295	7.276
1986	7.264	7.210	7.138	7.100	7.030	7.033	7.282	7.490	7.512	7.372	7.394	7.340	7.264
1987	7.273	7.258	7.218	7.165	7.118	7.098	7.380	7.590	7.485	7.437	7.489	7.382	7.324
1988	7.279	7.274	7.124	7.082	7.151	7.277	7.472	7.631	7.661	7.587	7.587	7.587	7.410
1989	7.392	7.243	7.227	7.179	7.261	7.053	7.245	7.395	7.489	7.375	7.384	7.342	7.299
1990	7.225	7.226	7.194	7.120	7.151	7.181	7.475	7.742	7.853	7.751	7.565	7.512	7.416
1991	7.394	7.336	7.337	7.333	7.284	7.076	7.384	7.672	7.928	7.614	7.682	7.501	7.462
AVG:	7.273	7.199	7.142	7.111	7.094	7.104	7.305	7.423	7.456	7.407	7.463	7.366	7.278
MIN:	7.095	7.037	7.031	7.031	7.030	7.032	7.068	7.103	7.129	7.283	7.320	7.171	7.122
MAX:	7.398	7.342	7.337	7.333	7.311	7.320	7.739	8.014	7.928	7.751	7.899	7.726	7.481

**Table 4.3.2.2-1a Monthly-average chloride concentration (mg/L) in San Joaquin River inflow at Vernalis in Alternative 1 at 2001 LoD**

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
1922	117	119	71	68	36	36	35	30	19	107	107	150	75
1923	59	119	35	17	35	91	41	47	92	107	107	154	75
1924	99	111	91	95	115	130	94	97	102	96	119	180	111
1925	115	110	96	105	68	95	51	55	90	103	106	149	95
1926	118	120	98	112	110	128	63	71	107	97	142	188	113
1927	123	91	70	78	42	66	39	47	87	104	106	154	84
1928	120	89	68	68	85	41	39	54	99	105	104	156	86
1929	115	115	96	100	116	129	86	84	103	97	145	195	115
1930	121	123	106	100	114	119	82	84	100	103	150	196	116
1931	122	122	106	109	134	152	95	94	94	104	138	179	121
1932	126	110	39	32	17	49	37	48	75	79	83	116	68
1933	89	96	82	72	85	101	72	68	96	101	103	159	94
1934	105	110	88	88	89	121	90	96	99	104	126	179	108
1935	129	104	86	33	50	67	32	36	65	86	94	132	76
1936	110	115	91	79	16	44	29	40	85	97	102	139	79
1937	92	112	85	59	5	22	22	21	79	93	99	135	69
1938	72	118	24	18	5	5	9	5	8	67	95	104	44
1939	23	113	85	80	82	72	56	63	105	99	100	176	88
1940	124	133	116	45	39	29	35	44	88	107	106	148	85
1941	104	119	69	31	8	25	25	26	42	105	107	153	68
1942	54	117	35	17	22	51	36	38	50	89	101	140	63
1943	44	104	51	6	16	14	31	33	79	95	103	139	59
1944	81	122	104	105	83	90	59	56	107	105	105	163	98
1945	127	119	105	112	38	39	38	49	100	107	106	159	92
1946	74	107	29	36	46	64	44	51	94	107	106	155	76
1947	103	97	76	86	86	127	87	84	104	100	161	202	110
1948	129	127	116	129	153	126	57	58	91	106	106	152	112
1949	120	123	108	120	133	94	63	65	106	105	105	156	108
1950	118	120	106	76	80	99	61	63	102	105	104	152	99
1951	132	47	10	5	13	45	40	41	76	102	105	140	63
1952	99	105	59	28	31	23	22	13	15	70	94	112	56
1953	24	102	62	20	44	81	48	50	87	106	105	158	74
1954	109	119	101	101	106	97	48	51	107	105	105	160	101
1955	108	120	99	89	118	135	86	83	106	104	143	197	116
1956	151	132	9	5	7	41	38	45	43	92	101	120	65
1957	43	109	87	90	87	59	48	48	85	106	105	154	85
1958	105	114	95	87	71	30	14	15	22	83	91	116	70
1959	32	111	92	78	44	78	61	64	104	100	99	163	86
1960	121	128	113	112	102	124	87	87	104	102	173	200	121
1961	127	119	96	108	135	161	100	101	102	136	169	200	129
1962	148	127	108	117	37	54	44	58	102	104	104	153	96
1963	111	113	99	77	60	83	37	40	68	88	96	135	84
1964	105	95	79	86	120	126	83	80	103	96	136	187	108
1965	128	103	34	5	22	51	30	38	72	99	105	143	69
1966	99	59	24	29	44	74	66	72	106	104	103	162	79
1967	118	120	62	54	77	41	19	14	11	26	99	94	61
1968	37	113	83	78	52	77	56	66	105	100	100	163	86
1969	124	129	95	5	5	12	9	5	5	62	102	108	55
1970	21	111	50	5	18	36	41	45	85	106	106	148	64
1971	103	106	73	75	92	78	53	54	96	106	105	162	92
1972	108	113	87	92	114	134	80	75	102	102	101	166	106
1973	125	128	109	70	27	33	33	41	98	107	107	147	85
1974	100	118	82	25	45	43	29	33	64	97	102	135	73
1975	66	111	89	89	39	32	32	38	50	95	103	137	73
1976	51	107	88	94	114	129	85	81	103	100	99	184	103
1977	69	80	85	109	143	162	104	93	98	139	180	197	122
1978	117	122	96	38	20	29	16	17	18	87	107	110	65
1979	45	115	90	27	15	29	33	38	95	107	106	144	70
1980	93	104	84	5	5	17	26	32	39	57	93	98	54
1981	40	109	89	77	89	70	55	60	105	101	102	163	88
1982	125	126	110	20	10	17	5	11	26	70	106	79	59
1983	13	23	5	5	5	5	8	7	5	10	105	49	20
1984	14	7	5	5	18	46	48	50	89	107	106	155	54
1985	102	99	84	94	109	113	76	57	106	98	100	163	100
1986	123	127	108	88	5	7	18	29	39	98	105	140	74
1987	61	108	92	95	111	120	85	83	103	98	114	205	106
1988	123	119	106	108	143	162	97	99	101	104	179	201	128
1989	122	121	94	102	127	129	90	93	102	99	134	186	116
1990	123	118	106	106	135	148	90	91	102	98	122	184	119
1991	119	114	98	110	141	87	64	71	103	103	97	164	106
AVG:	96	109	80	67	66	75	52	54	80	96	112	153	87
MIN:	13	7	5	5	5	5	5	5	5	10	83	49	20
MAX:	151	133	116	129	153	162	104	101	107	139	180	205	129

**Table 4.3.2.2-1b Monthly-average chloride concentration (mg/L) in San Joaquin River inflow at Vernalis in Alternatives 2 through 5 at 2001 LoD**

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
1922	117	119	71	68	36	36	35	30	19	107	107	150	75
1923	59	119	35	17	35	91	41	47	92	107	107	154	75
1924	99	111	91	95	115	130	94	97	102	96	119	180	111
1925	115	110	96	105	68	95	51	55	90	103	106	149	95
1926	118	120	98	112	110	128	63	71	107	97	142	188	113
1927	123	91	70	78	42	66	39	47	87	104	106	154	84
1928	120	89	68	68	85	41	39	54	99	105	104	156	86
1929	115	115	96	100	116	129	86	84	103	97	145	195	115
1930	121	123	106	100	114	119	82	84	100	103	149	196	116
1931	122	122	106	109	134	152	95	94	94	104	138	179	121
1932	126	110	39	32	17	49	37	48	75	79	83	116	68
1933	89	96	82	72	85	101	72	68	96	101	103	159	94
1934	105	110	88	88	89	121	90	96	99	104	126	179	108
1935	129	104	86	33	50	67	32	36	65	86	94	132	76
1936	110	114	91	79	16	44	30	40	85	97	102	140	79
1937	92	112	85	59	5	23	22	21	79	93	99	135	69
1938	72	118	24	18	5	5	9	5	8	67	95	104	44
1939	23	113	85	80	82	72	56	63	105	99	100	176	88
1940	124	133	116	45	39	29	35	44	88	107	106	148	85
1941	104	119	69	31	8	25	25	26	42	105	107	153	68
1942	54	117	35	17	22	51	36	38	50	89	101	140	63
1943	44	104	51	6	16	14	31	33	79	95	103	139	59
1944	81	122	104	105	83	90	59	56	107	105	105	163	98
1945	127	119	105	112	38	39	38	49	100	107	106	159	92
1946	74	107	29	36	46	64	44	51	94	107	106	155	76
1947	103	97	76	86	86	127	87	84	104	100	161	202	110
1948	129	127	116	129	153	126	57	58	91	106	106	152	112
1949	120	123	108	120	133	94	63	65	106	105	105	156	108
1950	118	120	106	76	80	99	61	63	102	105	104	152	99
1951	132	47	10	5	12	45	40	41	76	102	105	140	63
1952	99	105	59	28	31	23	22	13	15	70	94	112	56
1953	24	102	62	20	44	81	48	50	87	106	105	158	74
1954	109	119	101	101	106	97	48	51	107	105	105	160	101
1955	108	120	99	89	118	135	86	83	106	104	143	197	116
1956	151	131	9	5	7	41	38	45	43	92	101	120	65
1957	43	109	87	90	87	59	48	48	85	106	105	154	85
1958	105	114	95	87	71	30	14	15	22	83	91	116	70
1959	32	111	92	78	44	78	61	64	104	100	99	163	86
1960	121	128	113	112	102	124	87	86	104	102	172	200	121
1961	126	119	96	108	135	161	100	101	102	135	169	200	129
1962	147	127	108	117	36	54	44	58	102	104	104	153	96
1963	111	113	99	77	60	83	37	40	68	88	96	135	84
1964	105	95	79	86	120	126	83	80	103	96	136	187	108
1965	127	103	34	5	22	51	30	38	72	99	105	143	69
1966	98	59	24	29	44	74	66	72	106	104	103	162	78
1967	118	120	62	54	77	41	19	14	11	26	99	94	61
1968	37	113	83	78	52	77	56	66	105	100	100	163	86
1969	124	129	95	5	5	12	9	5	5	62	102	108	55
1970	21	111	50	5	18	36	41	45	85	106	106	148	64
1971	103	106	73	75	92	78	53	54	96	106	105	162	92
1972	108	113	87	92	114	134	80	75	102	102	101	166	106
1973	125	128	109	70	27	33	33	41	98	107	107	147	85
1974	100	118	82	25	45	43	29	33	64	97	102	135	73
1975	66	111	89	89	39	32	32	38	50	95	103	137	73
1976	51	107	88	94	114	129	85	81	103	100	99	184	103
1977	69	80	85	109	143	162	104	93	98	139	179	197	122
1978	117	122	96	38	20	29	16	17	18	87	107	110	65
1979	45	115	90	27	15	29	33	38	95	107	106	144	70
1980	93	104	84	5	5	17	26	32	39	57	93	98	54
1981	40	109	89	77	89	70	55	60	105	101	102	163	88
1982	125	126	110	20	10	17	5	11	26	70	106	79	59
1983	13	23	5	5	5	5	8	7	5	10	105	49	20
1984	14	7	5	5	18	46	48	50	89	107	106	155	54
1985	102	99	84	94	109	113	76	57	106	98	100	163	100
1986	123	127	108	88	5	7	18	29	39	98	105	140	74
1987	61	108	92	95	111	120	85	83	103	98	114	205	106
1988	123	119	106	108	143	162	97	99	101	104	178	201	128
1989	122	120	94	102	127	129	90	93	102	99	133	186	116
1990	123	118	106	106	135	148	90	91	102	98	122	184	119
1991	119	114	98	110	141	87	64	71	103	103	97	164	106
AVG:	96	109	80	67	66	75	52	54	80	96	112	153	87
MIN:	13	7	5	5	5	5	5	5	5	10	83	49	20
MAX:	151	133	116	129	153	162	104	101	107	139	179	205	129

**Table 4.3.2.2-1c Monthly-average chloride concentration (mg/L) in San Joaquin River inflow at Vernalis in Alternative 6 at 2001 LoD**

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
1922	117	119	71	68	36	36	35	30	19	107	107	150	75
1923	59	119	35	17	35	91	41	47	92	107	107	154	75
1924	99	111	91	95	115	130	94	97	102	96	119	180	111
1925	115	110	96	105	68	95	51	55	90	103	106	149	95
1926	118	120	98	112	110	128	63	71	107	97	142	188	113
1927	123	91	70	78	42	66	39	47	87	104	106	154	84
1928	120	89	68	68	85	41	39	54	99	105	104	156	86
1929	115	115	96	100	116	129	86	84	103	97	145	195	115
1930	121	123	106	100	114	119	82	84	100	103	150	196	116
1931	122	122	106	109	134	152	95	94	94	104	138	179	121
1932	126	110	39	32	17	49	37	48	75	79	83	116	68
1933	89	96	82	72	85	101	72	68	96	101	103	159	94
1934	105	110	88	88	89	121	90	96	99	104	126	179	108
1935	129	104	86	33	50	67	32	36	65	86	94	132	76
1936	110	115	91	79	16	44	30	40	85	98	102	140	79
1937	92	112	85	59	5	23	22	21	79	93	100	135	69
1938	73	118	24	18	5	5	9	5	8	67	95	104	44
1939	23	113	85	80	82	72	56	63	105	99	100	176	88
1940	124	133	116	45	39	29	35	44	88	107	106	148	85
1941	104	119	69	31	8	25	25	26	42	105	107	153	68
1942	54	117	35	17	22	51	36	38	50	89	101	140	63
1943	44	104	51	6	16	14	31	33	79	95	103	139	59
1944	81	122	104	105	83	90	59	56	107	105	105	163	98
1945	127	119	105	112	38	39	38	49	100	107	106	159	92
1946	74	107	29	36	46	64	44	51	94	107	106	155	76
1947	103	97	76	86	86	127	87	84	104	100	161	202	110
1948	129	127	116	129	153	126	57	58	91	106	106	152	112
1949	120	123	108	120	132	94	63	65	106	105	105	156	108
1950	118	121	106	76	80	100	61	63	102	105	104	152	99
1951	132	47	10	5	13	45	40	41	76	102	105	140	63
1952	99	105	59	28	31	23	22	13	15	70	94	112	56
1953	24	102	62	20	44	81	48	50	87	106	105	158	74
1954	109	119	101	101	106	97	48	51	107	105	105	160	101
1955	108	120	99	89	118	135	86	83	106	104	143	197	116
1956	151	131	9	5	7	41	38	45	43	92	101	120	65
1957	43	109	87	90	87	59	48	48	85	106	105	154	85
1958	105	114	95	87	71	30	14	15	22	83	91	116	70
1959	32	111	92	78	44	78	61	64	104	100	99	163	86
1960	121	128	113	112	102	124	87	87	104	102	173	200	121
1961	127	119	96	108	135	161	100	101	102	136	169	200	129
1962	147	127	108	117	37	54	44	58	102	104	104	153	96
1963	111	113	99	77	60	83	37	40	68	88	96	135	84
1964	105	95	79	85	120	126	83	80	104	96	136	187	108
1965	127	103	34	5	22	51	30	38	72	99	105	143	69
1966	98	59	24	29	44	74	66	72	106	104	103	162	78
1967	118	120	62	54	77	41	19	14	11	26	99	94	61
1968	37	113	83	78	52	77	56	66	105	100	100	163	86
1969	124	129	95	5	5	12	9	5	5	62	102	108	55
1970	21	111	50	5	18	36	41	45	85	106	106	148	64
1971	103	106	73	75	92	78	53	54	96	106	105	162	92
1972	108	113	87	92	114	134	80	75	102	102	101	166	106
1973	125	128	109	70	27	33	33	41	98	107	107	147	85
1974	100	118	82	25	45	43	29	33	64	97	102	135	73
1975	66	111	89	89	39	32	32	38	50	95	103	137	73
1976	51	107	88	94	114	129	85	81	103	100	99	185	103
1977	69	80	85	110	144	162	104	93	98	139	179	197	122
1978	117	122	96	38	20	29	16	17	18	87	107	110	65
1979	45	115	90	27	15	29	33	38	95	107	106	144	70
1980	93	104	84	5	5	17	26	32	39	57	93	98	54
1981	40	109	89	77	89	70	55	60	105	101	102	163	88
1982	125	126	110	20	10	17	5	11	26	70	106	79	59
1983	13	23	5	5	5	5	8	7	5	10	105	49	20
1984	14	7	5	5	18	46	48	50	89	107	106	155	54
1985	102	99	84	94	109	113	76	57	106	98	100	163	100
1986	123	127	108	88	5	7	18	29	39	98	105	140	74
1987	61	108	92	95	111	120	85	83	103	98	114	205	106
1988	123	119	106	108	143	162	97	99	101	104	179	201	129
1989	122	121	94	102	128	129	90	93	102	99	134	186	116
1990	123	118	106	106	135	148	90	91	102	98	122	184	119
1991	119	114	98	110	141	87	64	71	103	103	97	164	106
AVG:	96	109	80	67	66	75	52	54	80	96	112	153	87
MIN:	13	7	5	5	5	5	5	5	5	10	83	49	20
MAX:	151	133	116	129	153	162	104	101	107	139	179	205	129

**Table 4.3.2.2-2a Monthly-average chloride concentration (mg/L) in San Joaquin River inflow at Vernalis in Alternative 1 at 2020 LoD**

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
1922	114	119	71	68	38	53	39	40	49	107	107	149	79
1923	78	119	52	42	55	97	46	47	92	107	107	152	83
1924	98	111	90	94	113	131	95	99	101	96	115	179	110
1925	112	110	96	104	68	96	51	56	91	103	106	148	95
1926	115	120	98	112	110	129	64	73	106	97	142	186	113
1927	119	91	69	78	41	66	39	47	88	103	106	154	83
1928	120	89	68	68	85	77	50	54	99	105	104	154	89
1929	114	115	95	99	115	130	85	84	103	97	145	194	115
1930	118	123	105	99	113	119	83	83	100	103	150	195	116
1931	120	122	105	108	133	152	96	94	94	96	139	179	120
1932	127	110	39	33	17	49	38	50	77	81	84	117	68
1933	88	97	83	74	88	102	74	71	96	101	106	158	95
1934	102	111	88	88	90	121	91	95	98	103	130	175	108
1935	130	104	86	33	50	67	33	36	65	85	93	131	76
1936	107	114	91	79	16	44	30	38	85	97	100	138	78
1937	106	112	84	62	11	34	25	18	77	92	98	133	71
1938	101	118	32	30	5	5	9	5	7	68	94	115	49
1939	25	112	85	81	83	86	60	63	105	99	101	170	89
1940	121	133	116	45	43	29	36	45	89	107	107	148	85
1941	102	119	69	35	10	26	26	23	41	105	107	153	68
1942	69	117	42	17	23	52	36	34	47	89	101	140	64
1943	54	105	57	6	17	14	30	31	79	94	102	139	61
1944	107	122	104	105	85	92	60	56	106	105	105	163	101
1945	124	118	104	110	42	44	38	46	97	107	107	156	91
1946	81	108	45	35	47	66	45	48	94	107	106	155	78
1947	101	97	76	86	94	128	87	83	104	99	150	200	109
1948	125	126	115	127	151	127	58	58	90	106	106	150	112
1949	116	122	108	119	131	94	64	66	106	105	105	155	108
1950	115	120	106	75	80	100	61	64	101	105	105	149	98
1951	120	46	15	17	16	46	40	42	78	104	105	140	64
1952	98	106	60	28	39	23	21	13	15	71	93	114	57
1953	28	102	63	20	45	82	49	51	86	106	105	157	74
1954	106	118	101	100	104	98	52	52	107	106	105	160	101
1955	107	120	99	89	118	136	87	83	106	104	143	190	115
1956	147	131	9	5	6	42	39	40	42	92	100	125	65
1957	55	109	87	90	94	61	48	48	85	106	105	154	87
1958	103	114	95	87	71	38	14	14	23	82	90	122	71
1959	39	110	92	78	45	79	67	65	104	100	98	163	87
1960	119	128	113	112	102	125	87	86	104	101	168	199	120
1961	124	118	95	106	134	161	100	102	101	135	165	198	128
1962	144	126	108	117	36	54	44	59	100	104	104	150	95
1963	107	112	97	75	57	84	38	40	69	88	95	135	83
1964	103	94	79	85	120	127	85	83	102	96	134	185	108
1965	119	103	44	21	22	52	32	37	72	99	105	143	71
1966	91	72	26	30	45	75	68	74	106	104	104	161	80
1967	115	119	61	53	76	53	18	13	11	26	97	110	63
1968	40	112	82	77	51	78	60	67	105	101	101	163	86
1969	124	129	95	7	5	12	8	5	5	63	101	120	56
1970	26	99	47	5	19	37	41	46	85	106	106	147	64
1971	101	105	72	75	106	109	55	55	96	106	105	161	95
1972	105	113	87	92	114	139	81	76	101	102	99	164	106
1973	121	128	109	70	45	37	34	41	98	107	107	146	87
1974	99	118	82	23	46	43	30	29	65	96	101	134	72
1975	89	111	89	91	42	34	33	37	47	94	102	136	75
1976	72	106	88	94	115	130	86	81	102	100	97	184	105
1977	68	80	85	109	143	162	104	92	98	139	179	197	121
1978	117	122	96	38	20	29	16	16	18	89	106	127	66
1979	51	115	90	39	16	29	34	33	95	107	106	143	72
1980	93	104	84	5	5	17	27	28	43	58	93	106	55
1981	48	110	89	77	90	73	58	61	105	102	103	163	90
1982	123	126	109	27	10	17	5	11	25	69	104	91	60
1983	14	21	5	5	5	5	8	6	5	10	105	54	20
1984	15	6	5	5	18	47	49	51	89	107	106	155	54
1985	100	99	84	94	109	114	77	58	105	98	99	163	100
1986	118	126	108	88	10	8	18	27	40	97	104	139	74
1987	82	108	92	95	111	121	85	82	102	97	105	201	107
1988	119	118	104	106	140	162	98	99	100	110	180	202	128
1989	120	121	94	103	129	129	90	93	101	99	133	186	117
1990	121	118	106	106	135	149	91	91	101	98	120	184	118
1991	117	114	98	105	141	88	65	72	101	103	97	163	105
AVG:	97	109	80	68	67	78	53	54	80	96	111	154	87
MIN:	14	6	5	5	5	5	5	5	5	10	84	54	20
MAX:	147	133	116	127	151	162	104	102	107	139	180	202	128

**Table 4.3.2.2-2b Monthly-average chloride concentration (mg/L) in San Joaquin River inflow at Vernalis in Alternatives 2 through 5 at 2020 LoD**

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
1922	114	119	71	68	38	53	39	40	49	107	107	149	79
1923	78	119	52	42	55	97	46	47	92	107	107	152	83
1924	98	111	90	94	113	131	95	99	101	96	115	179	110
1925	112	110	96	104	67	96	51	56	91	103	105	148	95
1926	115	120	98	112	110	129	64	73	106	97	142	186	113
1927	119	91	69	78	41	66	39	47	88	103	106	154	83
1928	120	89	68	68	85	77	50	54	99	105	104	154	89
1929	114	115	95	99	115	130	85	84	103	97	145	194	115
1930	118	123	105	99	113	119	83	83	100	103	149	195	116
1931	120	122	105	108	133	152	95	94	94	96	139	179	120
1932	127	110	39	32	17	49	38	50	77	81	84	117	68
1933	88	96	83	74	87	102	74	71	96	101	106	158	95
1934	102	111	88	88	90	121	91	95	98	103	128	175	108
1935	129	104	86	33	50	67	32	36	65	85	93	131	76
1936	107	114	91	79	16	44	30	38	85	96	100	137	78
1937	106	112	84	62	11	34	25	18	77	92	98	133	71
1938	101	118	32	30	5	5	9	5	7	68	94	115	49
1939	25	112	85	81	83	86	60	63	105	99	101	170	89
1940	121	133	116	45	43	29	36	45	89	107	107	148	85
1941	102	119	69	35	10	26	26	23	41	105	107	153	68
1942	69	117	42	17	23	52	36	34	47	89	101	140	64
1943	54	105	57	6	17	14	30	31	79	94	102	139	61
1944	107	122	104	105	85	92	60	56	106	105	105	163	101
1945	124	118	104	110	42	44	38	46	97	107	107	156	91
1946	81	108	45	35	47	66	45	48	94	107	106	155	78
1947	101	97	76	86	94	128	87	83	104	99	150	200	109
1948	125	126	115	127	151	127	58	58	90	106	106	150	112
1949	116	122	108	119	131	94	64	66	106	105	105	155	108
1950	115	120	106	75	80	100	61	64	101	105	105	149	98
1951	120	46	15	17	16	46	40	42	78	104	105	140	64
1952	98	106	60	28	39	23	21	13	15	71	93	114	57
1953	28	102	63	20	45	82	49	51	86	106	105	157	74
1954	106	118	101	100	104	98	52	52	107	106	105	160	101
1955	107	120	99	89	118	136	87	83	106	104	143	190	115
1956	147	131	9	5	6	42	39	40	42	92	100	125	65
1957	55	109	87	90	94	61	48	48	85	106	105	154	87
1958	103	114	95	87	71	38	14	14	23	82	90	122	71
1959	38	110	92	78	45	79	67	65	104	100	98	163	86
1960	119	128	113	112	102	125	87	86	104	101	167	199	120
1961	124	118	95	106	133	161	100	102	101	134	165	198	128
1962	144	126	108	116	36	54	44	59	100	104	104	150	95
1963	107	112	97	75	57	84	38	40	69	88	95	135	83
1964	103	94	79	85	120	127	85	83	102	96	134	185	108
1965	119	103	44	21	22	52	32	37	72	99	105	143	71
1966	92	72	26	30	45	75	68	74	106	104	104	161	80
1967	115	119	61	53	76	53	18	13	11	26	97	110	63
1968	40	112	82	77	51	78	60	67	105	101	101	163	86
1969	124	129	95	7	5	12	8	5	5	63	101	120	56
1970	26	99	47	5	19	37	41	46	85	106	106	147	64
1971	101	105	72	75	106	109	55	55	96	106	105	161	95
1972	105	113	87	92	114	139	81	76	101	102	99	164	106
1973	121	128	109	70	45	37	34	41	98	107	107	146	87
1974	99	118	82	23	46	43	30	29	65	96	101	134	72
1975	89	111	89	91	42	34	33	37	47	94	102	136	75
1976	72	106	88	94	115	130	86	81	102	100	97	184	105
1977	68	80	85	109	143	162	104	92	98	139	179	197	121
1978	117	122	96	38	20	29	16	16	18	89	106	127	66
1979	51	115	90	39	16	29	34	33	95	107	106	143	72
1980	93	104	84	5	5	17	27	28	43	58	93	106	55
1981	48	110	89	77	90	73	58	61	105	102	103	163	90
1982	123	126	109	27	10	17	5	10	25	69	104	91	60
1983	14	21	5	5	5	5	8	6	5	10	105	54	20
1984	15	6	5	5	18	47	49	51	89	107	106	155	54
1985	100	99	84	94	109	114	77	58	105	98	99	163	100
1986	118	126	108	88	10	8	18	27	40	97	104	139	74
1987	82	108	92	95	111	121	85	82	102	97	105	201	107
1988	119	118	104	106	140	162	98	99	100	109	180	202	128
1989	120	121	94	103	128	129	90	93	101	99	133	185	117
1990	121	118	106	106	135	149	91	91	101	98	120	184	118
1991	117	114	98	105	139	88	65	72	101	103	97	163	105
AVG:	97	109	80	68	67	78	53	54	80	96	111	154	87
MIN:	14	6	5	5	5	5	5	5	5	10	84	54	20
MAX:	147	133	116	127	151	162	104	102	107	139	180	202	128

**Table 4.3.2.2-2c Monthly-average chloride concentration (mg/L) in San Joaquin River inflow at Vernalis in Alternative 6 at 2020 LoD**

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
1922	114	119	71	68	38	53	39	40	49	107	107	149	79
1923	78	119	52	42	55	97	46	47	92	107	107	152	83
1924	98	111	90	94	113	131	95	99	101	96	115	179	110
1925	112	110	96	104	68	96	51	56	91	103	105	148	95
1926	115	120	98	112	110	129	64	73	106	97	142	186	113
1927	119	91	69	78	41	66	39	47	88	103	106	154	83
1928	120	89	68	68	85	77	50	54	99	105	104	154	89
1929	114	115	95	99	115	130	85	84	103	97	145	194	115
1930	118	123	105	99	113	119	83	83	100	103	150	195	116
1931	120	122	105	108	133	152	95	94	94	96	139	179	120
1932	127	110	39	32	17	49	38	50	77	81	84	117	68
1933	88	97	83	74	88	102	74	71	96	101	106	158	95
1934	102	111	88	88	90	121	91	95	98	103	130	175	108
1935	130	104	86	33	50	67	33	36	65	85	93	131	76
1936	107	114	91	79	16	44	30	38	85	97	100	138	78
1937	106	112	84	62	11	34	25	18	77	92	98	133	71
1938	101	118	32	30	5	5	9	5	7	68	94	115	49
1939	25	112	85	81	83	86	60	63	105	99	101	170	89
1940	121	133	116	45	43	29	36	45	89	107	107	148	85
1941	102	119	69	35	10	26	26	23	41	105	107	153	68
1942	69	117	42	17	23	52	36	34	47	89	101	140	64
1943	54	105	57	6	17	14	30	31	79	94	102	139	61
1944	107	122	104	105	85	92	60	56	106	105	105	163	101
1945	124	118	104	110	42	44	38	46	97	107	107	156	91
1946	81	108	45	35	47	66	45	48	94	107	106	155	78
1947	101	97	76	86	94	128	87	83	104	99	150	199	109
1948	125	126	114	127	151	127	58	58	90	106	106	150	111
1949	116	122	108	119	131	94	64	66	106	105	105	155	108
1950	115	120	106	75	80	100	61	64	101	105	105	149	98
1951	120	46	15	17	16	46	40	42	78	104	105	140	64
1952	98	106	60	28	39	23	21	13	15	71	93	114	57
1953	28	102	63	20	45	82	49	51	86	106	105	157	74
1954	106	118	101	100	104	98	52	52	107	106	105	160	101
1955	107	120	99	89	118	136	87	83	106	104	143	190	115
1956	147	131	9	5	6	42	39	40	42	92	100	125	65
1957	55	109	87	90	94	61	48	48	85	106	105	154	87
1958	103	114	95	87	71	38	14	14	23	82	90	122	71
1959	42	100	83	73	45	79	67	65	104	100	98	163	85
1960	119	128	113	112	102	125	87	86	104	101	168	199	120
1961	124	118	95	106	134	161	100	102	101	135	165	198	128
1962	144	126	108	117	36	54	44	59	100	104	104	150	95
1963	107	112	97	75	57	84	38	40	69	88	95	135	83
1964	103	94	79	85	120	127	85	83	102	96	134	185	108
1965	119	103	44	21	22	52	32	37	72	99	104	143	71
1966	90	72	26	30	45	74	68	74	106	104	104	161	79
1967	115	119	61	53	76	53	18	13	11	26	97	110	63
1968	40	112	82	77	51	78	60	67	105	101	101	163	86
1969	124	129	95	7	5	12	8	5	5	63	101	120	56
1970	26	99	47	5	19	37	41	46	85	106	106	147	64
1971	101	105	72	75	106	109	55	55	96	106	105	161	95
1972	105	113	87	92	114	139	81	76	101	102	99	164	106
1973	121	128	109	70	45	37	34	41	98	107	107	146	87
1974	99	118	82	23	46	43	30	29	65	96	101	134	72
1975	89	111	89	91	42	34	33	37	47	94	102	136	75
1976	72	106	88	94	115	130	86	81	102	100	97	184	105
1977	68	80	85	109	143	162	104	92	98	139	179	197	121
1978	117	122	96	38	20	29	16	16	18	89	106	127	66
1979	51	115	90	39	16	29	34	33	95	107	106	143	72
1980	93	104	84	5	5	17	27	28	43	58	93	106	55
1981	48	110	89	77	90	73	58	61	105	102	103	163	90
1982	123	126	109	27	10	17	5	10	25	69	104	91	60
1983	14	21	5	5	5	5	8	6	5	10	105	54	20
1984	15	6	5	5	18	47	49	51	89	107	106	155	54
1985	100	99	84	94	109	114	77	58	105	98	99	163	100
1986	118	126	108	88	10	8	18	27	40	97	104	139	74
1987	82	108	92	95	111	121	85	82	102	97	105	201	107
1988	119	118	104	106	140	162	98	99	100	110	180	202	128
1989	120	121	94	103	129	129	90	93	101	99	133	185	117
1990	121	118	106	106	135	149	91	91	101	98	120	184	118
1991	117	114	98	105	141	88	65	72	101	103	97	163	105
AVG:	97	109	80	68	67	78	53	54	80	96	111	154	87
MIN:	14	6	5	5	5	5	5	5	5	10	84	54	20
MAX:	147	133	116	127	151	162	104	102	107	139	180	202	128

### 4.3.2.3 Empirical relationships between different salinity parameters

Laboratory analyses for different salinity parameters in the same water sample have been performed in the Municipal Water Quality Investigation Program (MWQI) of the California Department of Water Resources. These data, collected since 1983, provide the most direct and reliable correlation between electrical conductivity (EC), total dissolved solids concentration (TDS), chloride concentration (Cl), and bromide concentration (Br). For the water quality analysis of the Freeport Project, Br is converted from modeling results for EC and Cl at Rock Slough for potential Project effects on disinfection byproducts formation, TDS is converted from model results for EC and Cl in Clifton Court Forebay for potential Project changes on salt load in State Water Project exports, and Cl is converted from model results on EC in Rock Slough and the Old River at the Los Vaqueros intake for potential Project changes on delivered water salinity of the Contra Costa Water District. These regression relationships are summarized in Table 4.3.2.3-1.

**Table 4.3.2.3-1. Regression relationships used in the conversion of salinity parameters.**

#### Rock Slough near entrance to Old River

<i>from</i>	<i>to</i>	<i>slope</i>	<i>intercept</i>	<i>range</i>
Cl (mg/L)	Br (µg/L)	3.40	38	all values
EC (mS/cm)	Br (µg/L)	913	- 96	all values
EC (mS/cm)	Cl (mg/L)	150	- 12	EC < 0.281 mS/cm
		285	- 50	EC > 0.281 mS/cm

#### Banks Pumping Plant at Clifton Court Forebay

<i>from</i>	<i>to</i>	<i>slope</i>	<i>intercept</i>	<i>range</i>
Cl (mg/L)	TDS (mg/L)	1.818	126	all values
EC (mS/cm)	TDS (mg/L)	513	23	all values

#### Old River near CCWD's Los Vaqueros intake

<i>from</i>	<i>to</i>	<i>slope</i>	<i>intercept</i>	<i>range</i>
EC (mS/cm)	Cl (mg/L)	150	- 12	EC < 0.341 mS/cm
		285	- 50	EC > 0.341 mS/cm

#### San Joaquin River at Vernalis

<i>from</i>	<i>to</i>	<i>slope</i>	<i>intercept</i>	<i>range</i>
EC (mS/cm)	Cl (mg/L)	0	5	EC < 0.152 mS/cm
		185	-23	EC > 0.152 mS/cm

Figure 4.3.2.3-1 shows the linear regression relationships used in the conversion to Br from model results for Rock Slough. Both regression relationships (from Cl and from EC) appear to overestimate bromide concentration at low salinity. This over-estimation would tend to over-predict bromate formation and give a higher estimate of project effects, and no attempts were made to adjust the bromide regression at low salinity. On the other hand, a bilinear regression based on two linear regressions developed at Contra Costa Water District is used for conversion from EC to Cl. The two linear regressions intersect at an EC value of 0.281 mS/cm (at a Cl value of 30 mg/L). This equation is also used for the conversion of chloride concentration from FDM to EC values for comparison with results of the G-model and DSM2 at Martinez and Chipps Island.

Figure 4.3.2.3-2 shows the linear regression relationships used in the conversion to TDS from model results for Clifton Court Forebay. As in the conversion to Br of the Rock Slough data, both linear

regressions tend to overestimate TDS, the Cl regression more so than the EC regression. No attempt is made to adjust the low salinity conversion.

Figure 4.3.2.3-3 shows the bilinear regression relationships used in the conversion from EC to Cl from model results for Old River near the Los Vaqueros intake of the Contra Costa Water District. The regression is based on two linear regressions developed at Contra Costa Water District for Rock Slough, with the one for higher salinity slightly adjusted. The two linear regressions intersect at an EC value of 0.341 mS/cm (at a Cl value of 39 mg/L).

The scatter in the correlations between different parameters found in Figures 4.3.2.3-1 through 4.3.2.3-3 is caused in part by the different composition of the water at the intakes from different sources at different times and uncertainties in the laboratory analyses. Uncertainties in laboratory measurements of salinity vary with the parameters and methods, but a possible discrepancy of 10% is within the accuracy of EPA approved methods in most cases (see *EPA Methods and Guidance for Analysis of Water*). These uncertainties in the conversion between salinity parameters add to the variability in comparing results from different models simulating different salinity parameters.

### **4.3.3 Operations of flow control structures**

A number of flow control structures are currently operated seasonally in the Delta. Of these, only a few would have significant effects on flows in the main channels in the Delta. By altering the circulation pattern over a large portion of the Delta, these structures could have considerable impacts on salinity over parts of the Delta under certain hydrological conditions.

Freeport Project alternatives would not change the operation of any of the flow control structures in the Delta.<sup>10</sup> Whereas specifics of gate operations could lead to substantial differences in salinity predictions, impact estimates would not depend on details of these specifics as long as they are consistent.<sup>11</sup> Nevertheless, assumptions for the operations of key flow control structures are briefly reviewed in this section for completeness. Only the control structures at Delta Cross Channel and Sand Mound Slough are simulated in FDM.

#### **4.3.3.1 Delta Cross Channel**

The Delta Cross Channel could substantially increase the amount of Sacramento River inflow reaching central Delta through North Fork Mokelumne, by 20% to 30% of the Sacramento River flow above the Channel when the channel gates are open. In comparison, Georgiana Slough alone would divert only between 15% and 20% of the Sacramento River inflow to Central Delta.<sup>12</sup> At times of seawater intrusion (when the salinity at Collinsville is high), a closed Delta Cross Channel could increase the entrainment of

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<sup>10</sup> There is one exception. In one month out of the 876-month simulation, CALSIM II output in Alt.1 is for closed Delta Cross Channel gates but the output in Alts.2-6 is for open gates for 11 days. This happens in January 1986, when Delta outflow is high in December 1985 and the following months. The effect of this difference in gate operations on Delta salinity is much more significant in DSM2 results than in FDM results, with ANN results showing the smallest response. Recall that G-model does not simulate the effects of Delta Cross Channel gate operations.

<sup>11</sup> That is, the same gates operations are used in all alternatives.

<sup>12</sup> Based on the empirical relationships developed by DWR between the flow in Sacramento River at Freeport and the flow into Delta Cross Channel and Georgiana Slough:

$DXC+GS = 0.133 \times Sac + 829$  when gates are closed

$DXC+GS = 0.293 \times Sac + 2090$  when gates are open

These relationships compare very closely with flow measurements made by the U.S. Geological Survey.

higher salinity water in Sherman Lake and San Joaquin River towards Central and South Delta to meet export pumping.<sup>13</sup>

CALSIM II output includes the number of days the Delta Cross Channel gates are open in each month. To simulate requirements in the Water Quality Control Plan, the gates are closed for 10 days in November, 15 days in December, and 20 days in January. They are also closed from February 1 to May 20, and for 14 days between May 21 and June 15. In addition, the gates are closed whenever Sacramento River flow at Delta Cross Channel is over 25,000 cfs to avoid scouring. As discussed above, the magnitude of salinity impact of a Delta Cross Channel closure depend on the location of the salinity gradient downstream. It is possible that closing the gates early in a month could have a different effect than closing the gates later in the month (for the same number of days) when the extent of seawater intrusion may be different. In all FDM and DSM2 simulations in this analysis, all partial month closings of the Delta Cross Channel are assumed to occur at the end of the month, consistent with planning simulations performed by DWR Delta Modeling Section using DSM2.

#### **4.3.3.2 South Delta flow barriers**

One-way flow control structures have been installed in south Delta channels since 1988 to raise water level in the region. Over the years, these temporary barriers have been undergoing continuous changes in design and in operations schedule. Details of these barriers could be found on the web at <http://sdelta.water.ca.gov/>. Installations of permanent barriers (to be operated seasonally) are being studied as part of the CALFED South Delta Improvement Program. However, much of the details of the program have yet to be determined as of this writing.

The water quality impacts of these barriers at urban water intakes could vary considerably with design details such as the number of barriers and their operations schedule. The one-way barriers act to redirect the higher salinity San Joaquin River inflow to Delta drinking water intakes through Central Delta. Under typical summer and early fall conditions, barrier operations could increase salinity at Delta's drinking water intakes by close to 10 mg/L in chloride concentration at CCWD's Rock Slough intake, and half that amount at CCFB.<sup>14</sup> The magnitude of these impacts generally increases with the rate of Delta exports pumping, salinity and volume of San Joaquin inflow. The Freeport Project will likely decrease export pumping and hence decrease the impacts of the barriers operation on Delta water users. For a conservative estimate of Project impacts, and because of the uncertainty in barrier operations in the future, these barriers are not simulated.

#### **4.3.3.3 Suisun Marsh Salinity Control Gate**

When Delta outflow is low to moderate and the SMSCG are not operating, net movement of water in Montezuma Slough is from west to east and leads to high salinity. To meet salinity standards in western Delta, the Suisun Marsh Salinity Control Gates (SMSCG), consisting of a boat lock, a series of three radial gates, and flashboards, were installed and began operations in October 1988. The facility controls

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<sup>13</sup> As an example of the significance of the Delta Cross Channel, consider a combined export pumping of 10,000 cfs. In late summer and fall of below normal years, Sacramento River flow is not much higher than 1.5 times that of export pumping. Assuming a Sacramento flow of 16,000 cfs, the amount of flow into Central Delta would be around 3,000 cfs when the Delta Channel gates are closed and 6,800 cfs when they are open. When the Delta channel gates are closed, more of the water for export pumping in south Delta is routed through further downstream (7,000 cfs compared to 3,200 cfs in this example). This leads to a higher salinity in Central and south Delta. Note that an export pumping of 10,000 cfs corresponds to 600 TAF per month, or roughly one-third of the total volume of water in the Delta between Martinez, Sacramento, and Vernalis. For comparison, the volume of water passing through Martinez in a typical tide cycle is roughly 100 TAF.

<sup>14</sup> The water quality impacts of these barriers are considerably less if the Grant Line Canal barrier is not operating.

salinity by restricting the flow of higher salinity water from Grizzly Bay into Montezuma Slough during incoming tides and retaining lower salinity Sacramento River water from the previous ebb tide. Operation of the SMSCG in this fashion lowers salinity in Suisun Marsh channels and results in a net movement of water from east to west. The SMSCG usually begin operating in early October and, depending on salinity conditions, may continue operating through the end of the control season in May. When the channel water salinity decreases sufficiently below the salinity standards, or at the end of the control season, the flashboards are removed and the gates are raised to allow unrestricted movement through Montezuma Slough. Details of annual SMSCG operations can be found in *Summary of Salinity Conditions in Suisun Marsh During Water Years 1984–1992* (DWR 1994b), or the *Suisun Marsh Monitoring Program Data Summary* produced annually by DWR’s Environmental Services Office, and on the web at <http://www.iep.ca.gov/suisun/facts/physicalFacilities.html>.

The fact that SMSCG operation depends on salinity in the Suisun Marsh precludes its determination a priori in FDM simulations. The relatively small flow through Montezuma Slough, whether SMSCG is operating or not, has little effects on salinity in central and south Delta. SMSCG is therefore not simulated in FDM. On the other hand, an empirical approach has been set up in DSM2 to model its operations.<sup>15</sup> This rather complex algorithm is an integral part of DSM2 and is used in all DSM2 simulations in this impact analysis.

#### **4.3.4 Assigning CCWD diversions to Old River and Rock Slough intakes**

Contra Costa Water District (CCWD) has established a delivered water quality goal of 65 mg/L in chloride concentration. To meet this goal, a new Delta intake (at Old River on Byron Tract) and an 100,000 acre-feet Los Vaqueros Reservoir were recently built to store low salinity water from the Delta for blending during times of high Delta salinity. In planning studies, only water with a chloride concentration of 50 mg/L or less will be diverted for storage in the Reservoir. Water quality at the new intake is usually better, but the Rock Slough intake is used to the extent possible because of a lower electrical consumption required for pumping at that intake. Rock Slough diversion could be used only to the extent of meeting customer demand at the time and cannot be delivered to the Los Vaqueros Reservoir for storage.

In this analysis, CCWD’s operation is approximated according to its water quality goal, customer demand at the time, and its pumping capacities at the Old River and Rock Slough intakes. Monthly values of total CCWD Delta diversions from CALSIM II output are divided between the two intakes as follows.<sup>16</sup> A monthly pattern of CCWD’s customer demand is assumed based on the annual average for the 1922-1994 simulation period and a peaking factor of 1.4 (see Table 4.3.4-1). Salinity at Rock Slough is estimated from Delta outflow using the “G-model”. Whenever salinity at Rock Slough is lower than 64.5 mg/L in chloride concentration, the Rock Slough diversion is assigned the CCWD diversion in CALSIM II output or the CCWD customer demand, whichever is lower. If the CCWD diversion in CALSIM II is higher than the estimated Rock Slough diversion, the balance is diverted at the Old River intake. When water quality at Rock Slough is over 65 mg/L in chloride concentration, the amount that could be diverted at Rock Slough is determined such that this diversion, when blended with Los Vaqueros release, assumed at 50 mg/L, would be no higher than 65 mg/L in chloride concentration. This approach is applied to all

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<sup>15</sup> See Appendix D, SMSCG Operations Criteria for 73-Year DSM (Suisun Marsh Version) Model Runs, in Suisun Marsh 73-year modeling studies in support of SWRCB EIR for implementation of the Water Quality Control Plan of the San Francisco/Sacramento-San Joaquin Delta Estuary, Suisun Marsh Branch, Environmental Services Office, Department of Water Resources, November 1997.

<sup>16</sup> Diversions at a third intake of the Contra Costa Water District, at Mallard Slough, are not simulated. The Mallard Slough intake, with a capacity of less than 40 cfs, is used only when the chloride concentration is under 100 mg/L, typically when Delta outflow has been well over 10,000 cfs for a prolonged period.

alternatives. Differences in diversions at CCWD’s two intakes give an estimate on potential effects on CCWD operations.<sup>17</sup> The values are tabulated in Tables 4.3.4-2 and 4.3.4-3 for 2001 LoD and in Tables 4.3.4-4 and 4.3.4-5 for 2020 LoD.

**Table 4.3.4-1 Monthly demand (in cfs) assumed for division of CCWD diversions**

	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>Jul</b>	<b>Aug</b>	<b>Sep</b>
<b>2001 LoD</b>	180	159	152	148	148	159	174	210	256	284	284	218
<b>2020 LoD</b>	190	168	160	156	156	168	184	222	270	300	300	230

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<sup>17</sup> Note that CALSIM II output for CCWD’s total diversions are identical in all alternatives.

**Table 4.3.4-2a Monthly-average diversion of Contra Costa Water District at its Rock Slough intake in Alternative 1 at 2001 LoD**

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
1922	3	9	25	148	148	159	174	73	256	284	284	41	134
1923	7	46	79	106	113	159	108	128	256	284	284	14	132
1924	4	10	23	33	101	57	174	152	62	85	74	23	67
1925	15	14	19	58	148	159	174	84	256	284	192	12	118
1926	3	8	19	55	148	159	174	126	256	284	54	5	108
1927	15	36	152	148	148	159	174	109	256	284	284	84	154
1928	9	60	123	136	109	103	163	126	256	284	284	28	140
1929	6	4	29	51	141	147	174	152	256	129	60	5	96
1930	2	13	29	95	148	153	174	126	256	284	44	5	111
1931	17	18	25	38	148	159	174	136	223	83	72	10	92
1932	16	15	39	148	148	159	174	84	256	284	281	15	135
1933	3	3	4	41	148	159	174	192	256	131	66	13	99
1934	17	15	24	148	122	159	174	138	256	193	61	5	109
1935	15	16	20	65	148	159	174	210	256	284	284	14	137
1936	8	22	24	68	148	159	174	84	256	284	284	12	127
1937	3	10	24	23	148	125	174	126	256	284	284	22	123
1938	4	28	152	148	148	81	163	109	256	284	284	218	156
1939	180	153	133	136	146	135	174	84	256	284	31	4	143
1940	2	3	4	44	148	159	174	210	256	284	284	28	133
1941	5	21	68	148	148	153	174	73	256	284	284	218	153
1942	119	61	95	50	105	97	107	73	256	284	284	218	146
1943	172	150	95	68	113	77	110	109	256	284	284	80	150
1944	5	4	2	20	148	159	174	84	256	284	69	4	101
1945	2	4	9	148	148	159	174	84	256	284	284	14	131
1946	4	26	152	148	148	159	174	84	256	284	284	14	144
1947	4	10	41	138	148	159	174	126	256	284	40	5	115
1948	3	3	3	39	148	159	174	210	256	284	284	17	132
1949	10	25	32	72	148	143	174	126	256	284	170	12	121
1950	3	3	4	50	148	159	174	184	256	284	284	17	131
1951	7	60	152	148	148	130	174	84	256	284	284	31	147
1952	5	5	109	148	148	129	109	109	256	284	284	218	150
1953	180	150	95	103	113	124	132	73	256	284	284	218	168
1954	153	77	55	108	142	107	110	109	256	284	284	29	143
1955	5	8	147	148	148	159	174	84	256	284	115	8	128
1956	3	3	28	148	148	159	174	73	256	284	284	218	148
1957	180	159	17	17	148	159	174	84	256	284	284	26	149
1958	15	139	152	68	87	55	93	73	256	284	284	218	144
1959	180	159	39	45	148	159	174	126	256	284	234	14	152
1960	6	23	33	40	126	159	174	128	256	284	32	4	106
1961	2	3	35	96	148	159	174	126	256	284	124	12	118
1962	4	18	43	118	101	159	174	210	256	284	284	12	139
1963	34	159	152	148	94	90	106	73	256	284	284	84	147
1964	41	150	133	136	141	159	174	152	256	284	51	6	140
1965	3	3	19	148	148	159	174	109	256	284	284	98	141
1966	10	49	152	103	113	129	174	126	256	284	278	12	140
1967	4	16	152	148	148	99	106	109	256	284	284	218	152
1968	180	159	134	91	109	121	174	126	256	284	256	11	158
1969	4	20	84	148	148	159	174	109	256	284	284	218	157
1970	180	152	95	68	113	108	174	126	256	284	284	120	163
1971	6	8	152	148	115	132	163	73	256	284	284	218	153
1972	170	49	21	148	142	135	174	126	256	284	227	10	145
1973	4	34	152	148	148	89	165	126	256	284	284	31	143
1974	8	100	152	103	113	106	109	109	256	284	284	218	153
1975	180	159	133	129	94	94	163	109	256	284	284	218	175
1976	180	154	135	106	85	159	174	152	207	47	15	2	118
1977	1	3	3	18	43	70	123	105	75	81	71	27	52
1978	15	15	23	77	148	159	174	210	256	284	284	38	140
1979	8	21	20	52	148	159	174	126	256	284	284	13	129
1980	4	17	58	148	148	159	174	126	256	284	284	36	141
1981	8	5	20	85	148	153	174	126	256	284	30	4	108
1982	2	10	152	148	148	135	174	109	256	284	284	218	160
1983	157	122	95	41	57	52	103	109	256	275	284	209	147
1984	159	122	95	103	109	121	174	126	256	284	284	100	161
1985	8	90	123	136	147	136	174	126	256	284	33	5	127
1986	3	3	7	129	148	159	174	210	256	284	284	131	149
1987	12	6	4	12	148	153	174	126	256	284	37	4	101
1988	4	5	18	148	148	159	128	92	256	186	64	5	101
1989	3	15	18	33	94	159	174	126	256	284	53	6	102
1990	25	27	37	84	148	86	174	190	223	82	55	10	95
1991	17	15	17	27	39	159	174	126	256	97	50	5	82
AVG:	40	47	67	97	131	137	162	122	249	260	205	63	132
MIN:	1	3	2	12	39	52	93	73	62	47	15	2	52
MAX:	180	159	152	148	148	159	174	210	256	284	284	218	175

**Table 4.3.4-2b Differences between Alternatives 2 through 5 and Alternative 1 in monthly-average diversion of Contra Costa Water District at its Rock Slough intake at 2001 LoD**

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
1922			-0.1	0.3	0.3	0.4	0.4		0.6	0.6	0.6	-0.3	0.2
1923	-0.1		-0.2			0.4			0.6	0.6	0.6	-0.1	0.2
1924	0.0	0.0	0.2	0.5	1.8		0.4		-0.7	-0.5	-3.0	-0.6	-0.2
1925	0.0	0.2	0.4	2.2	0.3	0.4	0.4		0.6	0.6	6.9	0.3	1.0
1926	0.0	0.0	0.1	0.3	0.3	0.4	0.4		0.6	0.6	0.5	0.1	0.3
1927	0.1	-0.4	0.3	0.3	0.3	0.4	0.4		0.6	0.6	0.6	-0.9	0.2
1928	-0.1								0.6	0.6	0.6	-0.1	0.1
1929	0.0	0.0	-0.1	0.1	-4.5		0.4		0.6	0.3	-0.7	-0.1	-0.3
1930	0.0	0.0	-0.3		0.3		0.4		0.6	0.6	-3.0	-0.5	-0.2
1931	-0.6	-0.2	-0.5	0.7	0.3	0.4	0.4	6.1		1.1	1.3	0.1	0.8
1932	0.1	0.1	0.0	0.3	0.3	0.4	0.4		0.6	0.6	-2.6	-0.1	0.0
1933	0.0	0.0	0.0	-1.9	0.3	0.4	0.4		0.6	0.2	-0.1	-0.1	0.0
1934	0.1	0.1	0.0	0.3		0.4	0.4		0.6	0.4	0.1	0.0	0.2
1935	0.1	0.3	0.4	1.6	0.3	0.4	0.4	0.5	0.6	0.6	0.6	-0.1	0.5
1936	-0.2	-0.3	0.5	4.9	0.3	0.4	0.4		0.6	0.6	0.6	-0.1	0.7
1937	0.0	0.1	0.4	0.1	0.3		0.4		0.6	0.6	0.6	0.0	0.3
1938	0.0	-0.1	0.3	0.3	0.3				0.6	0.6	0.6	0.5	0.3
1939	0.4						0.4		0.6	0.6	0.0	0.0	0.2
1940	0.0	0.0	0.0	-0.5	0.3	0.4	0.4	0.5	0.6	0.6	0.6	-0.1	0.2
1941	0.0	0.0	1.4	0.3	0.3		0.4		0.6	0.6	0.6	0.5	0.4
1942	-11.5	-5.8							0.6	0.6	0.6	0.5	-1.2
1943	-14.3								0.6	0.6	0.6	-0.5	-1.1
1944	0.0	0.0	0.0	0.0	0.3	0.4	0.4		0.6	0.6	-0.6	0.0	0.1
1945	0.0	0.0	-0.3	0.3	0.3	0.4	0.4		0.6	0.6	0.6	-0.1	0.2
1946	0.0	-0.3	0.3	0.3		0.4	0.4		0.6	0.6	0.6	-0.2	0.2
1947	0.0	-0.1	-0.8	-4.9	0.3	0.4	0.4		0.6	0.6	0.1	0.0	-0.3
1948	0.0	0.0	0.0	-0.5	0.3	0.4	0.4	0.5	0.6	0.6	0.6	-0.3	0.2
1949	-0.1	-0.2	-0.6	-1.3	0.3		0.4		0.6	0.6	-1.2	-0.1	-0.1
1950	0.0	0.0	0.0	-1.7	0.3	0.4	0.4		0.6	0.6	0.6	-0.1	0.1
1951	0.1	3.2	0.3	0.3	0.3		0.4		0.6	0.6	0.6	-0.3	0.5
1952	0.0	0.0	1.1	0.3	0.3				0.6	0.6	0.6	0.5	0.3
1953	0.4								0.6	0.6	0.6	0.5	0.2
1954	-9.5	-8.3	-7.3						0.6	0.6	0.6	0.0	-1.9
1955	0.0	0.0	-3.5	0.3	0.3	0.4	0.4		0.6	0.6	-0.4	0.0	-0.1
1956	0.0	0.0	-0.3	0.3	0.3	0.4	0.4		0.6	0.6	0.6	0.5	0.3
1957	0.4	0.4	-0.4	-0.3	0.3	0.4	0.4		0.6	0.6	0.6	0.0	0.3
1958	-0.5	-19.9	0.3						0.6	0.6	0.6	0.5	-1.5
1959	0.4	0.4	-1.2		0.3	0.4	0.4		0.6	0.6		0.3	0.2
1960	0.1	0.0	-1.0	-1.4		0.4	0.4		0.6	0.6	0.2	0.0	0.0
1961	0.0	0.0	-0.3		0.3	0.4	0.4		0.6	0.6	0.4	0.0	0.2
1962	-0.1	-0.3	0.4	-0.6		0.4	0.4	0.5	0.6	0.6	0.6	0.1	0.2
1963	0.0	0.4	0.3	0.3					0.6	0.6	0.6	2.8	0.5
1964	1.1					0.4	0.4		0.6	0.6	-0.4	0.0	0.2
1965	0.0	0.0	0.0	0.3	0.3	0.4	0.4		0.6	0.6	0.6	-1.3	0.2
1966	-0.1	-1.8	0.3				0.4		0.6	0.6		0.0	0.0
1967	0.0	-0.1	2.6	0.3	0.3				0.6	0.6	0.6	0.5	0.5
1968	0.4	0.4					0.4		0.6	0.6		0.0	0.2
1969	0.0	0.1	0.1	0.3	0.3	0.4	0.4		0.6	0.6	0.6	0.5	0.3
1970	0.4						0.4		0.6	0.6	0.6	-0.3	0.2
1971	0.0	-0.1	0.3	0.3					0.6	0.6	0.6	0.5	0.2
1972	-10.1	-1.0	-1.3	0.3			0.4		0.6	0.6		0.0	-0.9
1973	0.0	-0.3	0.3	0.3	0.3				0.6	0.6	0.6	-1.7	0.1
1974	-0.8		0.3						0.6	0.6	0.6	0.5	0.2
1975	0.4	0.4	-2.0	-6.9					0.6	0.6	0.6	0.5	-0.5
1976	0.4		-0.8		1.5	0.4	0.4			0.0	0.2	0.0	0.2
1977	0.0	0.0	0.1	0.6	1.5	1.5	1.4	0.3	0.2	0.1	-0.1	0.0	0.5
1978	0.0	0.0	-0.1		0.3	0.4	0.4	0.5	0.6	0.6	0.6	-0.9	0.2
1979	-0.2	0.2	0.3	-0.9	0.3	0.4	0.4		0.6	0.6	0.6	-0.2	0.2
1980	0.0	-0.2	-3.0	0.3	0.3	0.4	0.4		0.6	0.6	0.6	-0.7	-0.1
1981	-0.2	0.0	-0.1		0.3		0.4		0.6	0.6	-0.1	0.0	0.1
1982	0.0	-0.1	0.3	0.3	0.3		0.4		0.6	0.6	0.6	0.5	0.3
1983									0.6		0.6		0.1
1984							0.4		0.6	0.6	0.6	-0.1	0.2
1985	0.0						0.4		0.6	0.6	0.0	0.0	0.1
1986	0.0	0.0	-0.1		0.3	0.4	0.4	0.5	0.6	0.6	0.6	-5.5	-0.2
1987	-0.3	0.0	0.0	0.0	0.3		0.4		0.6	0.6	-0.6	0.0	0.1
1988	0.0	0.0	-0.3	0.3	0.3	0.4			0.6	0.3	-1.3	-0.1	0.0
1989	0.0	0.0	-0.3	-1.4	-5.5	0.4	0.4		0.6	0.6	-0.6	-0.1	-0.5
1990	-0.5	-1.0	-2.1	-4.4	0.3		0.4			-0.3	0.3	0.0	-0.6
1991	0.0	0.2	0.3	0.1	-0.5	0.4	0.4		0.6	-1.4	-1.6	-0.3	-0.1
AVG:	-0.6	-0.5	-0.2	-0.1	0.1	0.2	0.3	0.1	0.5	0.6	0.3	-0.1	0.0
MIN:	-14.3	-19.9	-7.3	-6.9	-5.5				-0.7	-1.4	-3.0	-5.5	-1.9
MAX:	1.1	3.2	2.6	4.9	1.8	1.5	1.4	6.1	0.6	1.1	6.9	2.8	1.0

**Table 4.3.4-2c Differences between Alternative 6 and Alternative 1 in monthly-average diversion of Contra Costa Water District at its Rock Slough intake at 2001 LoD**

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
1922			-0.1									-1.4	-0.1
1923	-0.2		-0.5									-0.3	-0.1
1924	-0.1	-0.1	0.1	0.2	1.6				0.0	-0.1	-0.4	-0.1	0.1
1925	0.1	0.2	0.4	2.5							-0.3	-0.1	0.2
1926	0.0	0.0	0.0	-0.1							2.0	0.2	0.2
1927	0.3	0.1										-6.4	-0.5
1928	-0.4											0.0	0.0
1929	0.0	0.0	-0.5	0.2	-2.3					0.0	-0.6	-0.1	-0.3
1930	0.0	-0.1	-0.4								-0.1	0.0	-0.1
1931	0.0	-0.1	-0.3	-0.4				0.5		0.1	-0.2	0.0	0.0
1932	0.0	0.0	0.1								-2.9	-0.1	-0.2
1933	0.0	0.0	0.0	-1.9						0.0	-0.1	0.0	-0.2
1934	0.0	0.0	0.0							0.0	-0.4	0.0	0.0
1935	-0.1	0.0	0.0	-0.1								-0.2	0.0
1936	-0.2	-0.2	0.8	6.4								-0.1	0.6
1937	0.0	0.2	0.6	0.2								0.0	0.1
1938	0.0	0.7											0.1
1939											0.0	0.0	0.0
1940	0.0	0.0	0.0	0.0								-0.8	-0.1
1941	-0.1	0.0	3.7										0.3
1942	-34.1	-17.7											-4.3
1943	-37.9	-0.5										-6.2	-3.7
1944	-0.2	-0.1	0.0	-0.1							-0.6	0.0	-0.1
1945	0.0	-0.1	-0.3									-0.1	0.0
1946	0.0	-0.8										0.1	-0.1
1947	0.0	-0.1	-0.6	-1.6							0.4	0.0	-0.2
1948	0.0	0.0	0.0	-1.3								-0.1	-0.1
1949	0.0	0.5	1.0	3.2							-11.2	-0.8	-0.6
1950	-0.1	0.0	-0.1	-5.3								-0.5	-0.5
1951	-0.1	0.7										-0.7	0.0
1952	-0.1	0.0	1.5										0.1
1953													
1954	-11.3	-9.6	-8.4									0.0	-2.4
1955	0.0	0.1	1.1								-0.6	0.0	0.1
1956	0.0	0.0	-0.1										0.0
1957			2.8	0.9								1.4	0.4
1958	0.6	-14.8											-1.2
1959			-1.7									0.1	-0.1
1960	0.0	0.1	0.2	0.3							0.0	0.0	0.0
1961	0.0	0.0	-0.2	2.8							0.1	-0.1	0.2
1962	0.0	0.2	1.5	4.0								0.0	0.5
1963	0.0											2.6	0.2
1964	1.1										-0.2	0.0	0.1
1965	0.0	0.0	0.0									-7.3	-0.6
1966	-0.4	-2.4										0.0	-0.2
1967	0.0	0.0	5.1										0.4
1968												0.0	0.0
1969	0.0	0.1	0.4										0.0
1970												-0.8	-0.1
1971	0.0	-0.1											0.0
1972	-11.9	-1.2	-1.4									0.0	-1.2
1973	0.0	1.1										-2.4	-0.1
1974	-1.1												-0.1
1975			-10.3	-10.1									-1.7
1976				-2.6	4.8					-0.1	-0.1	0.0	0.2
1977	0.0	0.1	0.0	0.0	0.0	0.2	0.1	0.1	0.1	-0.2	-0.4	-0.1	0.0
1978	0.0	0.0	0.0									-0.9	-0.1
1979	-0.2	-0.3	-0.1	-0.8								0.0	-0.1
1980	0.0	0.0	0.0									-1.4	-0.1
1981	-0.3	-0.1	-0.1								0.0	0.0	0.0
1982	0.0	0.0											0.0
1983													
1984												-1.7	-0.1
1985	-0.1										0.1	0.0	0.0
1986	0.0	0.0	-0.1									-15.3	-1.3
1987	-0.8	-0.1	0.0	-0.1							-1.5	-0.1	-0.2
1988	0.0	0.0	0.1							0.0	-0.5	-0.1	0.0
1989	0.0	0.1	0.1	0.2	0.2						0.0	0.0	0.1
1990	0.1	-0.3	-1.0	-2.4						0.0	0.4	0.1	-0.3
1991	0.0	0.0	0.0	-0.1	-0.3					0.8	0.3	0.0	0.1
AVG:	-1.4	-0.6	-0.1	-0.1	0.1	0.0	0.0	0.0	0.0	0.0	-0.2	-0.6	-0.2
MIN:	-37.9	-17.7	-10.3	-10.1	-2.3					-0.2	-11.2	-15.3	-4.3
MAX:	1.1	1.1	5.1	6.4	4.8	0.2	0.1	0.5	0.1	0.8	2.0	2.6	0.6

**Table 4.3.4-3a Monthly-average diversion of Contra Costa Water District at its Los Vaqueros intake at Old River in Alternative 1 at 2001 LoD**

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
1922	31	86	104	188	42	4	84		146	17	28	44	65
1923	33	250	228			9			167	37	16	41	65
1924	23	64	114	119	52		18		124	211	215	161	92
1925	189	150	118	95	40	9	31		198	208	97	55	99
1926	22	60	118	92	49	31	54		198	208	96	26	79
1927	126	122	182	188	42	4	31		209	220	78	176	115
1928	53	250							172	37	12	69	49
1929	34	23	94	102	17		18		217	167	229	34	78
1930	22	123	108		90		118		198	208	70	25	80
1931	136	146	113	64	10	4	24	55	250	212	216	73	109
1932	189	149	88	165	47	21	118		198	208	7	58	104
1933	27	22	20	29	10	3	24		217	165	222	72	68
1934	187	149	114	0		103	118		217	103	228	37	105
1935	189	149	117	32	98	199	46	19	209	220	16	42	111
1936	51	142	113	28	21	4	84		209	220	16	45	78
1937	26	66	109	73	40		44		209	220	16	74	73
1938	29	93	143	155	21				126	17	28	38	54
1939	6						23		137	25	69	21	23
1940	17	18	23	48	19	126	109	18	209	220	12	67	74
1941	29	132	41	120	29		31		91	17	28	39	46
1942	67	90							85	17	28	39	27
1943	14								154	37	28	181	35
1944	31	24	12	71	43	4	54		198	208	88	22	63
1945	16	19	16	131	69	157	118		209	220	16	42	84
1946	26	127	172	155		5	23		128	37	16	44	61
1947	25	55	91	187	97	7	118		217	98	56	22	81
1948	20	18	13	74	5	104	156	24	209	220	16	38	75
1949	49	139	103	76	10		118		198	208	119	50	89
1950	22	18	17	8	98	225	118		209	220	16	50	83
1951	40	97	143	155	50		22		128	37	12	70	63
1952	31	27	158	113	57				126	17	28	19	48
1953	8								115	17	28	39	17
1954	54	74	78						153	37	12	53	39
1955	25	34	106	143	98	21	15		116	25	157	41	65
1956	24	21	29	117	57	4	31		209	97	28	37	54
1957	5	6	35	40	50	4	8		123	39	12	57	32
1958	32	221	119						47	16	29	40	42
1959	9	5	10		46	4	27		176	39		37	29
1960	33	111	104	113		21	118		198	208	61	22	82
1961	19	18	99		82	28	118		198	208	165	43	81
1962	24	102	94	35		165	243	68	209	220	16	34	101
1963	15	191	172	30					107	16	26	174	61
1964	162					5	18		163	25	61	23	38
1965	19	20	8	155	65	97	31		209	220	77	162	88
1966	52	216	11				24		172	35		41	46
1967	24	75	182	112	21				109	17	28	38	50
1968	8	2					24		174	38		35	23
1969	21	105	46	107	46	4	84		147	17	28	37	54
1970	6						23		172	38	28	137	34
1971	28	28	143	37					111	18	29	39	36
1972	37	114	32	64			23		170	37		35	43
1973	24	104	172	113	9				174	17	12	61	57
1974	42	250	70						156	17	30	40	50
1975	8	3		8					158	15	27	38	21
1976	3			45	47	21	18		250	249	113	20	64
1977	17	31	19	69	115	90	82	83	198	237	227	212	115
1978	189	149	115		26	111	101	20	209	200	12	44	98
1979	34	129	117	37	37	4	84		209	220	16	41	77
1980	25	103	72	120	39	4	84		181	17	12	60	60
1981	37	30	95		65		118		198	132	60	19	63
1982	16	15	143	120	65		31		181	155	28	16	64
1983									89		9		8
1984							23		178	19	30	150	33
1985	38	250					24		168	27	61	20	49
1986	16	17	14		38	154	84	17	209	200	150	128	85
1987	45	35	19	44	74		118		217	208	81	28	72
1988	26	24	17	115	90	21			217	110	225	35	73
1989	35	149	120	120	64	53	84		198	194	78	25	93
1990	167	137	101	64	61		25		250	214	234	75	111
1991	188	149	120	126	119	66	118		217	198	239	38	132
AVG:	47	82	73	63	34	27	50	4	176	115	65	56	66
MIN:									47				8
MAX:	189	250	228	188	119	225	243	83	250	249	239	212	132

**Table 4.3.4-3b Differences between Alternatives 2 through 5 and Alternative 1 in monthly-average diversion of Contra Costa Water District at its Los Vaqueros intake at Old River at 2001 LoD**

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
1922			0.1	-0.3	-0.3	-0.4	-0.4		-0.6	-0.6	-0.6	0.3	-0.2
1923	0.1		0.2			-0.4			-0.6	-0.6	-0.6	0.1	-0.2
1924	0.0	0.0	-0.2	-0.5	-1.8		-0.4		0.7	0.5	3.0	0.6	0.2
1925	0.0	-0.2	-0.4	-2.2	-0.3	-0.4	-0.4		-0.6	-0.6	-6.9	-0.3	-1.0
1926	0.0	0.0	-0.1	-0.3	-0.3	-0.4	-0.4		-0.6	-0.6	-0.5	-0.1	-0.3
1927	-0.1	0.4	-0.3	-0.3	-0.3	-0.4	-0.4		-0.6	-0.6	-0.6	0.9	-0.2
1928	0.1								-0.6	-0.6	-0.6	0.1	-0.1
1929	0.0	0.0	0.1	-0.1	4.5		-0.4		-0.6	-0.3	0.7	0.1	0.3
1930	0.0	0.0	0.3		-0.3		-0.4		-0.6	-0.6	3.0	0.5	0.2
1931	0.6	0.2	0.5	-0.7	-0.3	-0.4	-0.4	-6.1		-1.1	-1.3	-0.1	-0.8
1932	-0.1	-0.1	0.0	-0.3	-0.3	-0.4	-0.4		-0.6	-0.6	2.6	0.1	0.0
1933	0.0	0.0	0.0	1.9	-0.3	-0.4	-0.4		-0.6	-0.2	0.1	0.1	0.0
1934	-0.1	-0.1	0.0	-0.3		-0.4	-0.4		-0.6	-0.4	-0.1	0.0	-0.2
1935	-0.1	-0.3	-0.4	-1.6	-0.3	-0.4	-0.4	-0.5	-0.6	-0.6	-0.6	0.1	-0.5
1936	0.2	0.3	-0.5	-4.9	-0.3	-0.4	-0.4		-0.6	-0.6	-0.6	0.1	-0.7
1937	0.0	-0.1	-0.4	-0.1	-0.3		-0.4		-0.6	-0.6	-0.6	0.0	-0.3
1938	0.0	0.1	-0.3	-0.3	-0.3				-0.6	-0.6	-0.6	-0.5	-0.3
1939	-0.4						-0.4		-0.6	-0.6	0.0	0.0	-0.2
1940	0.0	0.0	0.0	0.5	-0.3	-0.4	-0.4	-0.5	-0.6	-0.6	-0.6	0.1	-0.2
1941	0.0	0.0	-1.4	-0.3	-0.3		-0.4		-0.6	-0.6	-0.6	-0.5	-0.4
1942	11.5	5.8							-0.6	-0.6	-0.6	-0.5	1.2
1943	14.3								-0.6	-0.6	-0.6	0.5	1.1
1944	0.0	0.0	0.0	0.0	-0.3	-0.4	-0.4		-0.6	-0.6	0.6	0.0	-0.1
1945	0.0	0.0	0.3	-0.3	-0.3	-0.4	-0.4		-0.6	-0.6	-0.6	0.1	-0.2
1946	0.0	0.3	-0.3	-0.3		-0.4	-0.4		-0.6	-0.6	-0.6	0.2	-0.2
1947	0.0	0.1	0.8	4.9	-0.3	-0.4	-0.4		-0.6	-0.6	-0.1	0.0	0.3
1948	0.0	0.0	0.0	0.5	-0.3	-0.4	-0.4	-0.5	-0.6	-0.6	-0.6	0.3	-0.2
1949	0.1	0.2	0.6	1.3	-0.3	-0.4	-0.4		-0.6	-0.6	1.2	0.1	0.1
1950	0.0	0.0	0.0	1.7	-0.3	-0.4	-0.4		-0.6	-0.6	-0.6	0.1	-0.1
1951	-0.1	-3.2	-0.3	-0.3	-0.3		-0.4		-0.6	-0.6	-0.6	0.3	-0.5
1952	0.0	0.0	-1.1	-0.3	-0.3				-0.6	-0.6	-0.6	-0.5	-0.3
1953	-0.4								-0.6	-0.6	-0.6	-0.5	-0.2
1954	9.5	8.3	7.3						-0.6	-0.6	-0.6	0.0	1.9
1955	0.0	0.0	3.5	-0.3	-0.3	-0.4	-0.4		-0.6	-0.6	0.4	0.0	0.1
1956	0.0	0.0	0.3	-0.3	-0.3	-0.4	-0.4		-0.6	-0.6	-0.6	-0.5	-0.3
1957	-0.4	-0.4	0.4	0.3	-0.3	-0.4	-0.4		-0.6	-0.6	-0.6	0.0	-0.3
1958	0.5	19.9	-0.3						-0.6	-0.6	-0.6	-0.5	1.5
1959	-0.4	-0.4	1.2		-0.3	-0.4	-0.4		-0.6	-0.6		-0.3	-0.2
1960	-0.1	0.0	1.0	1.4		-0.4	-0.4		-0.6	-0.6	-0.2	0.0	0.0
1961	0.0	0.0	0.3		-0.3	-0.4	-0.4		-0.6	-0.6	-0.4	0.0	-0.2
1962	0.1	0.3	-0.4	0.6		-0.4	-0.4	-0.5	-0.6	-0.6	-0.6	-0.1	-0.2
1963	0.0	-0.4	-0.3	-0.3					-0.6	-0.6	-0.6	-2.8	-0.5
1964	-1.1					-0.4	-0.4		-0.6	-0.6	0.4	0.0	-0.2
1965	0.0	0.0	0.0	-0.3	-0.3	-0.4	-0.4		-0.6	-0.6	-0.6	1.3	-0.2
1966	0.1	1.8	-0.3				-0.4		-0.6	-0.6		0.0	0.0
1967	0.0	0.1	-2.6	-0.3	-0.3				-0.6	-0.6	-0.6	-0.5	-0.5
1968	-0.4	-0.4					-0.4		-0.6	-0.6		0.0	-0.2
1969	0.0	-0.1	-0.1	-0.3	-0.3	-0.4	-0.4		-0.6	-0.6	-0.6	-0.5	-0.3
1970	-0.4						-0.4		-0.6	-0.6	-0.6	0.3	-0.2
1971	0.0	0.1	-0.3	-0.3					-0.6	-0.6	-0.6	-0.5	-0.2
1972	10.1	1.0	1.3	-0.3			-0.4		-0.6	-0.6		0.0	0.9
1973	0.0	0.3	-0.3	-0.3	-0.3				-0.6	-0.6	-0.6	1.7	-0.1
1974	0.8		-0.3						-0.6	-0.6	-0.6	-0.5	-0.2
1975	-0.4	-0.4	2.0	6.9					-0.6	-0.6	-0.6	-0.5	0.5
1976	-0.4			0.8	-1.5	-0.4	-0.4			0.0	-0.2	0.0	-0.2
1977	0.0	0.0	-0.1	-0.6		-1.5	-1.4	-0.3	-0.2	-0.1	0.1	0.0	-0.5
1978	0.0	0.0	0.1		-0.3	-0.4	-0.4	-0.5	-0.6	-0.6	-0.6	0.9	-0.2
1979	0.2	-0.2	-0.3	0.9	-0.3	-0.4	-0.4		-0.6	-0.6	-0.6	0.2	-0.2
1980	0.0	0.2	3.0	-0.3	-0.3	-0.4	-0.4		-0.6	-0.6	-0.6	0.7	0.1
1981	0.2	0.0	0.1		-0.3		-0.4		-0.6	-0.6	0.1	0.0	-0.1
1982	0.0	0.1	-0.3	-0.3	-0.3		-0.4		-0.6	-0.6	-0.6	-0.5	-0.3
1983									-0.6		-0.6		-0.1
1984							-0.4		-0.6	-0.6	-0.6	0.1	-0.2
1985	0.0						-0.4		-0.6	-0.6	0.0	0.0	-0.1
1986	0.0	0.0	0.1		-0.3	-0.4	-0.4	-0.5	-0.6	-0.6	-0.6	5.5	0.2
1987	0.3	0.0	0.0	0.0	-0.3		-0.4		-0.6	-0.6	0.6	0.0	-0.1
1988	0.0	0.0	0.3	-0.3	-0.3	-0.4			-0.6	-0.3	1.3	0.1	0.0
1989	0.0	0.0	0.3	1.4	5.5	-0.4	-0.4		-0.6	-0.6	0.6	0.1	0.5
1990	0.5	1.0	2.1	4.4	-0.3		-0.4			0.3	-0.3	0.0	0.6
1991	0.0	-0.2	-0.3	-0.1	0.5	-0.4	-0.4		-0.6	1.4	1.6	0.3	0.1
AVG:	0.6	0.5	0.2	0.1	-0.1	-0.2	-0.3	-0.1	-0.5	-0.6	-0.3	0.1	0.0
MIN:	-1.1	-3.2	-2.6	-4.9	-1.8	-1.5	-1.4	-6.1	-0.6	-1.1	-6.9	-2.8	-1.0
MAX:	14.3	19.9	7.3	6.9	5.5				0.7	1.4	3.0	5.5	1.9

**Table 4.3.4-3c Differences between Alternative 6 and Alternative 1 in monthly-average diversion of Contra Costa Water District at its Los Vaqueros intake at Old River at 2001 LoD**

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
1922			0.1									1.4	0.1
1923	0.2		0.5									0.3	0.1
1924	0.1	0.1	-0.1	-0.2	-1.6				0.0	0.1	0.4	0.1	-0.1
1925	-0.1	-0.2	-0.4	-2.5							0.3	0.1	-0.2
1926	0.0	0.0	0.0	0.1							-2.0	-0.2	-0.2
1927	-0.3	-0.1										6.4	0.5
1928	0.4											0.0	0.0
1929	0.0	0.0	0.5	-0.2	2.3					0.0	0.6	0.1	0.3
1930	0.0	0.1	0.4								0.1	0.0	0.1
1931	0.0	0.1	0.3	0.4				-0.5		-0.1	0.2	0.0	0.0
1932	0.0	0.0	-0.1								2.9	0.1	0.2
1933	0.0	0.0	0.0	1.9						0.0	0.1	0.0	0.2
1934	0.0	0.0	0.0							0.0	0.4	0.0	0.0
1935	0.1	0.0	0.0	0.1								0.2	0.0
1936	0.2	0.2	-0.8	-6.4								0.1	-0.6
1937	0.0	-0.2	-0.6	-0.2								0.0	-0.1
1938	0.0	-0.7											-0.1
1939											0.0	0.0	0.0
1940	0.0	0.0	0.0	0.0								0.8	0.1
1941	0.1	0.0	-3.7										-0.3
1942	34.1	17.7											4.3
1943	37.9	0.5										6.2	3.7
1944	0.2	0.1	0.0	0.1							0.6	0.0	0.1
1945	0.0	0.1	0.3									0.1	0.0
1946	0.0	0.8										-0.1	0.1
1947	0.0	0.1	0.6	1.6							-0.4	0.0	0.2
1948	0.0	0.0	0.0	1.3								0.1	0.1
1949	0.0	-0.5	-1.0	-3.2							11.2	0.8	0.6
1950	0.1	0.0	0.1	5.3								0.5	0.5
1951	0.1	-0.7										0.7	0.0
1952	0.1	0.0	-1.5										-0.1
1953													
1954	11.3	9.6	8.4									0.0	2.4
1955	0.0	-0.1	-1.1								0.6	0.0	-0.1
1956	0.0	0.0	0.1										0.0
1957			-2.8	-0.9								-1.4	-0.4
1958	-0.6	14.8											1.2
1959			1.7									-0.1	0.1
1960	0.0	-0.1	-0.2	-0.3							0.0	0.0	0.0
1961	0.0	0.0	0.2	-2.8							-0.1	0.1	-0.2
1962	0.0	-0.2	-1.5	-4.0								0.0	-0.5
1963	0.0											-2.6	-0.2
1964	-1.1										0.2	0.0	-0.1
1965	0.0	0.0	0.0									7.3	0.6
1966	0.4	2.4										0.0	0.2
1967	0.0	0.0	-5.1										-0.4
1968												0.0	0.0
1969	0.0	-0.1	-0.4										0.0
1970												0.8	0.1
1971	0.0	0.1											0.0
1972	11.9	1.2	1.4									0.0	1.2
1973	0.0	-1.1										2.4	0.1
1974	1.1												0.1
1975			10.3	10.1									1.7
1976				2.6	-4.8					0.1	0.1	0.0	-0.2
1977	0.0	-0.1	0.0	0.0	0.0	-0.2	-0.1	-0.1	-0.1	0.2	0.4	0.1	0.0
1978	0.0	0.0	0.0									0.9	0.1
1979	0.2	0.3	0.1	0.8								0.0	0.1
1980	0.0	0.0	0.0									1.4	0.1
1981	0.3	0.1	0.1								0.0	0.0	0.0
1982	0.0	0.0											0.0
1983													
1984												1.7	0.1
1985	0.1										-0.1	0.0	0.0
1986	0.0	0.0	0.1									15.3	1.3
1987	0.8	0.1	0.0	0.1							1.5	0.1	0.2
1988	0.0	0.0	-0.1							0.0	0.5	0.1	0.0
1989	0.0	-0.1	-0.1	-0.2	-0.2						0.0	0.0	-0.1
1990	-0.1	0.3	1.0	2.4						0.0	-0.4	-0.1	0.3
1991	0.0	0.0	0.0	0.1	0.3						-0.8	-0.3	-0.1
AVG:	1.4	0.6	0.1	0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.6	0.2
MIN:	-1.1	-1.1	-5.1	-6.4	-4.8	-0.2	-0.1	-0.5	-0.1	-0.8	-2.0	-2.6	-0.6
MAX:	37.9	17.7	10.3	10.1	2.3					0.2	11.2	15.3	4.3

**Table 4.3.4-4a Monthly-average diversion of Contra Costa Water District at its Rock Slough intake in Alternative 1 at 2020 LoD**

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
1922	18	13	29	120	74	99	86	220	269	299	299	98	135
1923	29	26	106	120	104	99		220	269	299	299	61	136
1924	29	25	27	29	96	168		221	83	52	46	12	66
1925	3	15	24	68	156	99	111	220	269	299	300	55	135
1926	24	19	19	42	103	99		220	269	299	95	34	102
1927	20	42	160	120	103	168		220	269	299	299	78	148
1928	28	33	91	120	99	101		220	269	299	299	60	135
1929	25	24	27	33	86	168		221	249	103	47	30	84
1930	9	4	14	143	156	99	111	220	269	299	99	180	134
1931	20	17	20	30	103	168		156	79	42	58	29	60
1932	17	16	46	143	156	168	180	221	269	299	273	63	154
1933	25	20	27	71	156	168	45	221	249	139	63	34	101
1934	18	15	28	143	156	168	180	221	249	203	59	29	122
1935	16	17	25	120	156	99	111	220	269	299	299	214	154
1936	25	23	17	73	99	99		220	269	299	299	49	123
1937	23	22	18	25	103	81		220	269	299	299	52	118
1938	22	39	145	120	45	125		220	269	299	299	229	151
1939	189	168	146	120	103	99		220	269	299	90	34	145
1940	22	23	21	43	70	168		220	269	299	299	68	125
1941	25	26	142	120	81	99		220	269	299	299	229	151
1942	84	42	116	120	103	99		220	269	299	299	229	157
1943	103	112	145	120	103	99		220	269	299	299	72	153
1944	25	20	18	29	99	99		220	269	299	118	32	102
1945	22	29	69	148	103	99		220	269	299	299	51	134
1946	22	24	148	120	104	99		220	269	299	299	58	139
1947	29	25	46	146	103	99		220	269	299	125	39	117
1948	24	23	21	33	99	99		220	269	299	299	60	120
1949	28	27	33	44	61	99		220	269	299	157	39	106
1950	23	21	19	71	103	99		220	269	299	299	56	123
1951	25	60	145	120	103	99		220	269	299	299	89	144
1952	30	29	146	120	99	99		220	269	299	299	229	153
1953	189	168	145	120	104	99		111	269	299	299	229	169
1954	106	57	41	120	103	99		220	269	299	299	72	140
1955	31	30	117	120	103	99		220	269	299	119	33	120
1956	21	21	66	94	99	137		220	269	299	299	229	146
1957	140	86	40	33	103	99		220	269	299	299	72	138
1958	44	58	146	120	40	37		220	269	299	299	229	147
1959	189	168	89	120	103	99		220	269	299	299	57	159
1960	27	26	32	46	99	99		220	240	299	114	39	104
1961	23	23	42	120	103	99		220	269	299	126	43	114
1962	25	22	38	100	103	99		220	269	299	299	54	127
1963	104	168	146	120	103	99		220	269	299	299	105	161
1964	30	61	145	120	99	99		220	269	299	125	45	126
1965	25	24	107	120	104	99		220	269	299	299	98	139
1966	29	47	145	120	103	99		220	269	299	299	47	140
1967	27	31	160	120	103	99		220	269	299	299	229	155
1968	189	168	146	120	99	99		220	269	299	291	48	162
1969	25	26	93	120	103	85		220	269	299	299	121	138
1970	142	168	145	37	77	168		220	269	299	299	110	161
1971	30	37	145	120	103	102		220	269	299	299	229	154
1972	84	39	40	101	99	99		220	269	299	299	52	133
1973	25	42	145	120	40	99		220	269	299	299	72	136
1974	27	60	145	120	104	101		220	269	299	299	229	156
1975	189	91	53	62	104	99		220	269	299	299	229	160
1976	189	168	126	53	80	168		145	106	28	20	29	93
1977	15	6	6	25	49	77	130	124	74	82	62	29	57
1978	16	15	27	143	156	99	111	220	269	299	299	214	156
1979	163	21	29	120	103	168		220	269	299	299	53	145
1980	25	24	64	120	61	99		220	269	299	299	129	134
1981	37	24	27	120	103	99		220	269	299	106	41	112
1982	25	64	145	120	103	34		220	269	299	299	229	151
1983	189	168	145	120	103	99		220	269	299	299	229	178
1984	189	143	160	122	101	99		220	269	299	299	105	167
1985	32	72	145	120	103	99		220	269	299	110	48	126
1986	29	23	46	120	56	150		220	269	299	299	117	136
1987	36	24	23	27	103	99		220	269	299	88	29	101
1988	11	11	47	120	99	99		220	269	101	51	12	87
1989	17	16	20	30	85	99	111	220	269	299	288	46	125
1990	28	28	31	61	103	168		221	249	75	42	21	85
1991	16	15	20	21	31	168	180	221	249	105	47	29	92
AVG:	53	49	78	96	99	111	19	215	257	270	228	95	131
MIN:	3	4	6	21	31	34		111	74	28	20	12	57
MAX:	189	168	160	148	156	168	180	221	269	299	300	229	178

**Table 4.3.4-4b Differences between Alternatives 2 through 5 and Alternative 1 in monthly-average diversion of Contra Costa Water District at its Rock Slough intake at 2020 LoD**

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
1922	0.0		-0.1						0.6	0.7	0.7	-0.7	0.1
1923	-0.2	-0.1	-0.5						0.6	0.7	0.7	0.3	0.1
1924	0.1	0.1	0.1	0.2	1.5	0.4		0.5	-0.6	-0.2	-0.8	0.0	0.1
1925	0.0	0.1	0.8	5.0	0.3				0.6	0.7	4.0	0.8	1.0
1926	0.2	0.1	0.1	0.3					0.6	0.7	0.5	0.2	0.2
1927	0.2	0.3	0.4			0.4			0.6	0.7	0.7	-1.7	0.1
1928	0.1	0.7	4.7						0.6	0.7	0.7	0.1	0.6
1929	0.0	0.0	0.0	0.0	-0.6	0.4		0.5		0.1	0.2	0.2	0.0
1930	0.0	0.0	0.1		0.3				0.6	0.7	-0.4		0.1
1931	-0.1	0.1	0.2	0.1		0.4		1.6	-0.4	0.2	0.6		0.2
1932	0.0	0.0	0.3		0.3	0.4		0.5	0.6	0.7		-0.2	0.2
1933	0.0	0.1	0.4	2.2	0.3	0.4		0.5		-0.7	-0.1	0.1	0.3
1934	0.1	0.1	0.2		0.3	0.4		0.5		0.4	3.6		0.5
1935	0.5	0.3	1.3	13.2	0.3				0.6	0.7	0.7		1.5
1936	0.0	0.0	0.0	-0.8					0.6	0.7	0.7	0.1	0.1
1937	0.0	0.0	0.0	0.0					0.6	0.7	0.7	0.1	0.2
1938	0.1	-0.1							0.6	0.7	0.7	0.5	0.2
1939	0.4	0.4							0.6	0.7	0.0	-0.1	0.2
1940	0.1	0.3	0.0	-0.7		0.4			0.6	0.7	0.7	12.0	1.2
1941	5.8	3.6	-0.2						0.6	0.7	0.7	1.1	1.0
1942	1.7	-0.1	-1.1						0.6	0.7	0.7	7.7	0.8
1943	-5.4	-11.4							0.6	0.7	0.7	0.0	-1.2
1944	0.0	0.0	0.0	-0.1					0.6	0.7	0.1	0.0	0.1
1945	0.0	-0.3	-3.1						0.6	0.7	0.7	0.0	-0.1
1946	0.0	-0.1							0.6	0.7	0.7	0.1	0.2
1947	0.0	0.0	0.2						0.6	0.7	-0.5	-0.2	0.1
1948	0.0	0.1	0.0	0.2					0.6	0.7	0.7	-0.1	0.2
1949	-0.3	-0.2	-0.2	-0.5	-2.2				0.6	0.7	-1.0	-0.3	-0.3
1950	-0.1	0.1	0.0	-0.2					0.6	0.7	0.7	0.0	0.1
1951	0.0	-0.1							0.6	0.7	0.7	0.2	0.2
1952	0.0	0.0							0.6	0.7	0.7	0.5	0.2
1953	0.4	0.4							0.6	0.7	0.7	0.5	0.3
1954	-6.6	-2.8	-0.8						0.6	0.7	0.7	0.1	-0.7
1955	0.0	0.0	-1.6						0.6	0.7	0.0	0.0	0.0
1956	0.0	0.0	0.0						0.6	0.7	0.7	-3.7	-0.1
1957	-11.9	-5.8	-0.1	0.6					0.6	0.7	0.7	-0.4	-1.3
1958	-0.8	-2.0							0.6	0.7	0.7	0.5	0.0
1959	0.4	0.4	-2.2						0.6	0.7	0.7	-3.1	-0.2
1960	-0.3	0.4	-1.0	-3.2						0.7	2.1	1.1	0.0
1961	0.0	-0.1	0.5						0.6	0.7	2.0	0.4	0.3
1962	0.1	0.0	0.5	4.4					0.6	0.7	0.7	-0.3	0.6
1963	-1.1	0.4							0.6	0.7	0.7	0.0	0.1
1964	-0.1	-0.7							0.6	0.7	0.7	-0.4	0.1
1965	-0.1	0.1	0.7						0.6	0.7	0.7	-0.4	0.2
1966	-0.1	-1.1							0.6	0.7	0.7	0.1	0.1
1967	0.1	-0.3	0.4						0.6	0.7	0.7	0.5	0.2
1968	0.4	0.4							0.6	0.7	-9.2	-0.4	-0.6
1969	0.0	-0.1	-2.5						0.6	0.7	0.7	-4.4	-0.4
1970	-10.1	0.4				0.4			0.6	0.7	0.7	-0.8	-0.7
1971	-0.2	-0.5							0.6	0.7	0.7	0.5	0.1
1972	-2.6	-0.6	-0.6	-8.6					0.6	0.7	0.7	0.1	-0.9
1973	0.0	-0.3							0.6	0.7	0.7	-0.4	0.1
1974	-0.2	-0.8							0.6	0.7	0.7	0.5	0.1
1975	0.4	-9.4	-3.7	-3.4					0.6	0.7	0.7	0.5	-1.1
1976	0.4	0.4	-7.6	-0.6	0.3	0.4			-7.0	-0.4	0.0		-1.2
1977	0.1	0.1	0.1	0.1	0.2	0.5	0.2	0.2	0.0	0.0	-0.3		0.1
1978	0.0	0.0	0.0		0.3				0.6	0.7	0.7		0.2
1979		0.1	0.2			0.4			0.6	0.7	0.7	0.1	0.2
1980	0.3	0.3	-0.5						0.6	0.7	0.7	-2.0	0.0
1981	-0.5	-0.1	-0.1						0.6	0.7		-0.6	0.0
1982	0.0	1.3							0.6	0.7	0.7	0.5	0.3
1983	0.4	0.4							0.6	0.7	0.7	0.5	0.3
1984	0.4		0.4						0.6	0.7	0.7	-0.3	0.2
1985	0.0	0.0							0.6	0.7	0.2	0.1	0.1
1986	0.0	-0.1	-0.2						0.6	0.7	0.7	-0.8	0.1
1987	-0.1	0.0	0.0	0.0					0.6	0.7		0.1	0.1
1988	0.0	-0.1	-1.0						0.6	-1.2	-0.1	0.0	-0.2
1989	0.0	0.1	0.0	0.0	-0.1				0.6	0.7		0.3	0.1
1990	0.4	0.0	-0.9	-2.8		0.4		0.5		-0.7	0.6	0.0	-0.2
1991	0.2	0.3	0.5	1.1	1.5	0.4		0.5		-1.7	-0.4		0.2
AVG:	-0.4	-0.4	-0.2	0.1	0.0	0.1	0.0	0.1	0.4	0.5	0.4	0.1	0.1
MIN:	-11.9	-11.4	-7.6	-8.6	-2.2				-7.0	-1.7	-9.2	-4.4	-1.3
MAX:	5.8	3.6	4.7	13.2	1.5	0.5	0.2	1.6	0.6	0.7	4.0	12.0	1.5

**Table 4.3.4-4c Differences between Alternative 6 and Alternative 1 in monthly-average diversion of Contra Costa Water District at its Rock Slough intake at 2020 LoD**

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
1922	0.0		-0.1						0.6	0.7	0.7	-4.8	-0.2
1923	-1.5	-0.6	1.7						0.6	0.7	0.7	0.0	0.1
1924	0.0	0.3	0.8	0.9	3.5	0.4		0.5	0.0	0.0	0.9	0.4	0.6
1925	0.0	0.1	0.6	3.8	0.3				0.6	0.7	-3.4	-0.5	0.2
1926	-0.1	0.0	-0.1	-0.4					0.6	0.7	0.2	0.1	0.1
1927	0.1	0.0	0.4			0.4			0.6	0.7	0.7	-2.8	0.0
1928	0.1	0.3	-10.1						0.6	0.7	0.7	0.1	-0.6
1929	0.1	0.0	-0.2	0.0	-1.7	0.4		0.5		0.0	0.3	0.3	0.0
1930	0.0	0.0	0.1		0.3				0.6	0.7	-2.1		0.0
1931	-0.1	0.1	-0.1	-0.4		0.4		1.7	-0.4	0.1	0.3		0.1
1932	0.0	0.0	0.1		0.3	0.4		0.5	0.6	0.7		-0.2	0.2
1933	0.0	0.0	0.0	-0.4	0.3	0.4		0.5		-0.4	-0.1	0.1	0.0
1934	0.0	0.0	0.1		0.3	0.4		0.5		0.5	1.0		0.2
1935	0.2	0.3	0.9	9.6	0.3				0.6	0.7	0.7		1.1
1936	-0.1	0.0	0.0	-0.2					0.6	0.7	0.7	0.1	0.1
1937	0.0	-0.1	-0.1	0.0					0.6	0.7	0.7	0.2	0.2
1938	0.1	-0.1							0.6	0.7	0.7	0.5	0.2
1939	0.4	0.4							0.6	0.7	-0.6	0.0	0.1
1940	0.0	0.0	-0.1	-0.4		0.4			0.6	0.7	0.7	10.9	1.1
1941	5.7	3.5	-2.1						0.6	0.7	0.7	3.2	1.0
1942	-6.5	-2.3	-7.5						0.6	0.7	0.7	-15.5	-2.5
1943	-16.2	-27.9							0.6	0.7	0.7	-5.2	-3.9
1944	-1.0	-0.4	-0.1	-0.2					0.6	0.7	0.1	0.1	0.0
1945	0.1	-1.1	-8.6						0.6	0.7	0.7	-0.8	-0.7
1946	-0.2	-0.1							0.6	0.7	0.7	0.3	0.2
1947	0.5	0.1	-1.8	-11.0					0.6	0.7	-1.0	-0.1	-1.0
1948	-0.1	-0.1	-0.2	-0.2					0.6	0.7	0.7	-0.1	0.1
1949	0.4	0.5	-0.1	-0.7	-1.2				0.6	0.7	8.7	1.9	0.9
1950	0.3	-0.2	-0.1	-0.1					0.6	0.7	0.7	-1.0	0.1
1951	-0.4	-0.8							0.6	0.7	0.7	0.4	0.1
1952	-0.1	0.3							0.6	0.7	0.7	0.5	0.2
1953	0.4	0.4							0.6	0.7	0.7	0.5	0.3
1954	-7.3	-3.0	-0.9						0.6	0.7	0.7	0.1	-0.8
1955	0.3	0.4	0.1						0.6	0.7	0.2	0.1	0.2
1956	0.1	0.2	0.6						0.6	0.7	0.7	-41.9	-3.3
1957	-39.1	-15.4	-1.2	0.0					0.6	0.7	0.7	-0.7	-4.5
1958	-1.8	-5.0							0.6	0.7	0.7	0.5	-0.4
1959	0.4	0.4	-12.1						0.6	0.7	0.7	1.3	-0.7
1960	0.3	0.1	0.3	0.7						0.7	2.4	1.1	0.5
1961	0.0	-0.1	0.6						0.6	0.7	1.2	0.2	0.3
1962	0.1	0.4	1.6	4.7					0.6	0.7	0.7	0.2	0.7
1963	0.7	0.4							0.6	0.7	0.7	-2.4	0.1
1964	-0.9	-2.6							0.6	0.7	-0.5	-0.9	-0.3
1965	-0.4	0.0	1.8						0.6	0.7	0.7	-5.7	-0.2
1966	-0.9	-1.2							0.6	0.7	0.7	0.1	0.0
1967	0.0	-0.2	0.4						0.6	0.7	0.7	0.5	0.2
1968	0.4	0.4							0.6	0.7	-1.3	0.0	0.1
1969	0.1	0.1	0.1						0.6	0.7	0.7	-9.1	-0.6
1970	-23.8	0.4				0.4			0.6	0.7	0.7	-1.3	-1.9
1971	-0.2	-0.6							0.6	0.7	0.7	0.5	0.1
1972	-3.2	-0.7	-0.7	-8.7					0.6	0.7	0.7	0.1	-0.9
1973	0.3	0.8							0.6	0.7	0.7	-2.2	0.1
1974	-1.0	-3.1							0.6	0.7	0.7	0.5	-0.1
1975	0.4	-20.8	-7.1	-4.4					0.6	0.7	0.7	0.5	-2.5
1976	0.4	0.4	-17.2	-2.1	2.1	0.4			-1.9	-0.1	0.0		-1.5
1977	0.2	0.1	0.1	0.5	1.2	1.2	0.8	0.1	0.2	-0.2	-1.1		0.3
1978	0.0	0.0	0.0		0.3				0.6	0.7	0.7		0.2
1979		0.0	0.1			0.4			0.6	0.7	0.7	0.1	0.2
1980	0.0	0.0	-0.7						0.6	0.7	0.7	-8.4	-0.6
1981	-2.2	-0.5	-0.1						0.6	0.7		-0.1	-0.1
1982	0.1	1.1							0.6	0.7	0.7	0.5	0.3
1983	0.4	0.4							0.6	0.7	0.7	0.5	0.3
1984	0.4		0.4						0.6	0.7	0.7	-2.3	0.0
1985	-0.3	-0.5							0.6	0.7	0.2	0.1	0.1
1986	0.0	0.0	0.4						0.6	0.7	0.7	-9.6	-0.6
1987	-1.8	-0.4	-0.1	-0.1					0.6	0.7		0.0	-0.1
1988	0.0	0.0	-0.2						0.6	0.0	0.1	0.0	0.0
1989	0.0	0.0	0.0	0.0	0.5				0.6	0.7		-0.2	0.1
1990	0.1	0.1	-0.6	-1.8		0.4		0.5		-0.4	0.1	0.1	-0.1
1991	0.2	0.1	0.0	0.7	1.4	0.4		0.5		-1.0	-0.2		0.2
AVG:	-1.4	-1.1	-0.9	-0.1	0.1	0.1	0.0	0.1	0.5	0.5	0.5	-1.3	-0.2
MIN:	-39.1	-27.9	-17.2	-11.0	-1.7				-1.9	-1.0	-3.4	-41.9	-4.5
MAX:	5.7	3.5	1.8	9.6	3.5	1.2	0.8	1.7	0.6	0.7	8.7	10.9	1.1

**Table 4.3.4-5a Monthly-average diversion of Contra Costa Water District at its Los Vaqueros intake at Old River in Alternative 1 at 2020 LoD**

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
1922	195	123	116						211	212	190	166	101
1923	206	161	39						156	28	55	202	71
1924	206	158	118	91	4	29		19	166	122	128	83	94
1925	33	158	151	73	7				211	212	38	209	91
1926	189	164	126	79					211	212	243	230	121
1927	193	142	185			33			206	28	55	186	86
1928	206	151	55						153	28	55	204	71
1929	211	159	102	87	17	29		19		124	169	196	93
1930	89	44	44		7				211	212	239	250	91
1931	193	134	104	60		29		85	170	103	176	250	109
1932	224	178	131		1	29		19	179	25		216	84
1933	215	174	150	72	7	29		19		185	210	245	109
1934	223	178	149		7	29		19		121	214	250	99
1935	224	177	152	23	7				211	212	239	250	125
1936	222	160	87	47					211	212	83	237	105
1937	198	162	90	78					190	28	39	237	85
1938	206	147							153	28	55	35	52
1939	46	19							11	12	182	222	41
1940	191	160	123	47		33			211	176	55	196	99
1941	210	158	3						132	28	55	35	52
1942	152	145	29						149	28	55	35	49
1943	133	74							151	28	55	192	53
1944	211	163	98	92					181	28	236	232	103
1945	191	146	75						154	28	55	212	72
1946	212	159							158	28	55	206	68
1947	207	131	99						156	28	230	225	90
1948	189	161	115	87					185	28	55	204	85
1949	207	156	97	77	42				171	28	181	225	99
1950	190	162	98	37					211	44	57	229	86
1951	196	125							156	28	55	175	61
1952	206	154							151	28	55	35	52
1953	46	19							58	212	67	56	38
1954	117	131	105						153	28	55	192	65
1955	204	153	31						156	28	219	230	85
1956	192	162	79						156	12	64	56	60
1957	81	102	108	87					149	29	57	191	67
1958	188	128							166	12	62	51	51
1959	40	22	59						168	29	57	207	48
1960	207	157	104	74						212	247	224	102
1961	221	150	102						163	28	212	221	91
1962	188	132	106	21					205	12	62	230	80
1963	114	17							139	12	64	177	44
1964	189	124							166	12	236	219	79
1965	189	159	67						151	12	64	186	69
1966	192	136							161	12	62	239	67
1967	196	132	3						132	12	62	56	49
1968	33	21							158	29	47	240	44
1969	204	157	52						164	12	64	165	68
1970	80	19							161	12	64	176	44
1971	193	146							151	12	64	58	52
1972	139	149	107	19					163	12	64	234	74
1973	193	141							188	12	64	214	68
1974	194	125							151	29	57	35	49
1975	50	97	94	59					154	12	64	55	49
1976	30	19	22	68					143	136	147	250	72
1977	225	60	43	90	113	120	50	116	175	242	212	250	141
1978	225	178	151		7				11	212	239	250	106
1979	250	162	144			33			205	29	57	211	91
1980	211	159	82						149	28	55	135	68
1981	199	164	120						161	33	250	223	96
1982	211	121							210	28	55	35	55
1983	43	17							141	29	57	50	28
1984	33		21						166	29	57	175	40
1985	193	112							164	31	246	216	80
1986	208	127	99						151	28	55	147	68
1987	198	159	122	93					168	29	250	235	105
1988	85	60	52						11	51	180	91	44
1989	196	167	125	90	18				211	212	250	218	124
1990	186	155	114	59		29		19		176	190	146	90
1991	168	179	158	122	131	29		19		219	227	250	125
AVG:	170	127	69	25	5	7	1	5	147	70	117	178	77
MIN:	30									12		35	28
MAX:	250	179	185	122	131	120	50	116	211	242	250	250	141

**Table 4.3.4-5b Differences between Alternatives 2 through 5 and Alternative 1 in monthly-average diversion of Contra Costa Water District at its Los Vaqueros intake at Old River at 2020 LoD**

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
1922	0.0		0.1						-0.6	-0.7	-0.7	0.7	-0.1
1923	0.2	0.1	0.5						-0.6	-0.7	-0.7	-0.3	-0.1
1924	-0.1	-0.1	-0.1	-0.2	-1.5	-0.4		-0.5	0.6	0.2	0.8	0.0	-0.1
1925	0.0	-0.1	-0.8	-5.0	-0.3				-0.6	-0.7	-4.0	-0.8	-1.0
1926	-0.2	-0.1	-0.1	-0.3					-0.6	-0.7	-0.5	-0.2	-0.2
1927	-0.2	-0.3	-0.4			-0.4			-0.6	-0.7	-0.7	1.7	-0.1
1928	-0.1	-0.7	-4.7						-0.6	-0.7	-0.7	-0.1	-0.6
1929	0.0	0.0	0.0	0.0	0.6	-0.4		-0.5		-0.1	-0.2	-0.2	0.0
1930	0.0	0.0	-0.1		-0.3				-0.6	-0.7	0.4		-0.1
1931	0.1	-0.1	-0.2	-0.1		-0.4		-1.6	0.4	-0.2	-0.6		-0.2
1932	0.0	0.0	-0.3		-0.3	-0.4		-0.5	-0.6	-0.7		0.2	-0.2
1933	0.0	-0.1	-0.4	-2.2	-0.3	-0.4		-0.5		0.7	0.1	-0.1	-0.3
1934	-0.1	-0.1	-0.2		-0.3	-0.4		-0.5		-0.4	-3.6		-0.5
1935	-0.5	-0.3	-1.3	-13.2	-0.3				-0.6	-0.7	-0.7		-1.5
1936	0.0	0.0	0.0	0.8					-0.6	-0.7	-0.7	-0.1	-0.1
1937	0.0	0.0	0.0	0.0					-0.6	-0.7	-0.7	-0.1	-0.2
1938	-0.1	0.1							-0.6	-0.7	-0.7	-0.5	-0.2
1939	-0.4	-0.4							-0.6	-0.7	0.0	0.1	-0.2
1940	-0.1	-0.3	0.0	0.7		-0.4			-0.6	-0.7	-0.7	-12.0	-1.2
1941	-5.8	-3.6	0.2						-0.6	-0.7	-0.7	-1.1	-1.0
1942	-1.7	0.1	1.1						-0.6	-0.7	-0.7	-7.7	-0.8
1943	5.4	11.4							-0.6	-0.7	-0.7	0.0	1.2
1944	0.0	0.0	0.0	0.1					-0.6	-0.7	-0.1	0.0	-0.1
1945	0.0	0.3	3.1						-0.6	-0.7	-0.7	0.0	0.1
1946	0.0	0.1							-0.6	-0.7	-0.7	-0.1	-0.2
1947	0.0	0.0	-0.2						-0.6	-0.7	0.5	0.2	-0.1
1948	0.0	-0.1	0.0	-0.2					-0.6	-0.7	-0.7	0.1	-0.2
1949	0.3	0.2	0.2	0.5	2.2				-0.6	-0.7	1.0	0.3	0.3
1950	0.1	-0.1	0.0	0.2					-0.6	-0.7	-0.7	0.0	-0.1
1951	0.0	0.1							-0.6	-0.7	-0.7	-0.2	-0.2
1952	0.0	0.0							-0.6	-0.7	-0.7	-0.5	-0.2
1953	-0.4	-0.4							-0.6	-0.7	-0.7	-0.5	-0.3
1954	6.6	2.8	0.8						-0.6	-0.7	-0.7	-0.1	0.7
1955	0.0	0.0	1.6						-0.6	-0.7	0.0	0.0	0.0
1956	0.0	0.0	0.0						-0.6	-0.7	-0.7	3.7	0.1
1957	11.9	5.8	0.1	-0.6					-0.6	-0.7	-0.7	0.4	1.3
1958	0.8	2.0							-0.6	-0.7	-0.7	-0.5	0.0
1959	-0.4	-0.4	2.2						-0.6	-0.7	-0.7	3.1	0.2
1960	0.3	-0.4	1.0	3.2					-0.6	-0.7	-2.1	-1.1	0.0
1961	0.0	0.1	-0.5						-0.6	-0.7	-2.0	-0.4	-0.3
1962	-0.1	0.0	-0.5	-4.4					-0.6	-0.7	-0.7	0.3	-0.6
1963	1.1	-0.4							-0.6	-0.7	-0.7	0.0	-0.1
1964	0.1	0.7							-0.6	-0.7	-0.7	0.4	-0.1
1965	0.1	-0.1	-0.7						-0.6	-0.7	-0.7	0.4	-0.2
1966	0.1	1.1							-0.6	-0.7	-0.7	-0.1	-0.1
1967	-0.1	0.3	-0.4						-0.6	-0.7	-0.7	-0.5	-0.2
1968	-0.4	-0.4							-0.6	-0.7	9.2	0.4	0.6
1969	0.0	0.1	2.5						-0.6	-0.7	-0.7	4.4	0.4
1970	10.1	-0.4				-0.4			-0.6	-0.7	-0.7	0.8	0.7
1971	0.2	0.5							-0.6	-0.7	-0.7	-0.5	-0.1
1972	2.6	0.6	0.6	8.6					-0.6	-0.7	-0.7	-0.1	0.9
1973	0.0	0.3							-0.6	-0.7	-0.7	0.4	-0.1
1974	0.2	0.8							-0.6	-0.7	-0.7	-0.5	-0.1
1975	-0.4	9.4	3.7	3.4					-0.6	-0.7	-0.7	-0.5	1.1
1976	-0.4	-0.4	7.6	0.6	-0.3	-0.4			7.0	0.4	0.0		1.2
1977	-0.1	-0.1	-0.1	-0.1	-0.2	-0.5	-0.2	-0.2	0.0	0.0	0.3		-0.1
1978	0.0	0.0	0.0		-0.3				-0.6	-0.7	-0.7		-0.2
1979		-0.1	-0.2			-0.4			-0.6	-0.7	-0.7	-0.1	-0.2
1980	-0.3	-0.3	0.5						-0.6	-0.7	-0.7	2.0	0.0
1981	0.5	0.1	0.1						-0.6	-0.7		0.6	0.0
1982	0.0	-1.3							-0.6	-0.7	-0.7	-0.5	-0.3
1983	-0.4	-0.4							-0.6	-0.7	-0.7	-0.5	-0.3
1984	-0.4		-0.4						-0.6	-0.7	-0.7	0.3	-0.2
1985	0.0	0.0							-0.6	-0.7	-0.2	-0.1	-0.1
1986	0.0	0.1	0.2						-0.6	-0.7	-0.7	0.8	-0.1
1987	0.1	0.0	0.0	0.0					-0.6	-0.7		-0.1	-0.1
1988	0.0	0.1	1.0						-0.6	1.2	0.1	0.0	0.2
1989	0.0	-0.1	0.0	0.0	0.1				-0.6	-0.7		-0.3	-0.1
1990	-0.4	0.0	0.9	2.8		-0.4		-0.5		0.7	-0.6	0.0	0.2
1991	-0.2	-0.3	-0.5	-1.1	-1.5	-0.4		-0.5		1.7	0.4		-0.2
AVG:	0.4	0.4	0.2	-0.1	0.0	-0.1	0.0	-0.1	-0.4	-0.5	-0.4	-0.1	-0.1
MIN:	-5.8	-3.6	-4.7	-13.2	-1.5	-0.5	-0.2	-1.6	-0.6	-0.7	-4.0	-12.0	-1.5
MAX:	11.9	11.4	7.6	8.6	2.2				7.0	1.7	9.2	4.4	1.3

**Table 4.3.4-5c Differences between Alternative 6 and Alternative 1 in monthly-average diversion of Contra Costa Water District at its Los Vaqueros intake at Old River at 2020 LoD**

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
1922	0.0		0.1						-0.6	-0.7	-0.7	4.8	0.2
1923	1.5	0.6	-1.7						-0.6	-0.7	-0.7	0.0	-0.1
1924	0.0	-0.3	-0.8	-0.9	-3.5	-0.4		-0.5	0.0	0.0	-0.9	-0.4	-0.6
1925	0.0	-0.1	-0.6	-3.8	-0.3				-0.6	-0.7	3.4	0.5	-0.2
1926	0.1	0.0	0.1	0.4					-0.6	-0.7	-0.2	-0.1	-0.1
1927	-0.1	0.0	-0.4			-0.4			-0.6	-0.7	-0.7	2.8	0.0
1928	-0.1	-0.3	10.1						-0.6	-0.7	-0.7	-0.1	0.6
1929	-0.1	0.0	0.2	0.0	1.7	-0.4		-0.5		0.0	-0.3	-0.3	0.0
1930	0.0	0.0	-0.1		-0.3				-0.6	-0.7	2.1		0.0
1931	0.1	-0.1	0.1	0.4		-0.4		-1.7	0.4	-0.1	-0.3		-0.1
1932	0.0	0.0	-0.1		-0.3	-0.4		-0.5	-0.6	-0.7		0.2	-0.2
1933	0.0	0.0	0.0	0.4	-0.3	-0.4		-0.5		0.4	0.1	-0.1	0.0
1934	0.0	0.0	-0.1		-0.3	-0.4		-0.5		-0.5	-1.0		-0.2
1935	-0.2	-0.3	-0.9	-9.6	-0.3				-0.6	-0.7	-0.7		-1.1
1936	0.1	0.0	0.0	0.2					-0.6	-0.7	-0.7	-0.1	-0.1
1937	0.0	0.1	0.1	0.0					-0.6	-0.7	-0.7	-0.2	-0.2
1938	-0.1	0.1							-0.6	-0.7	-0.7	-0.5	-0.2
1939	-0.4	-0.4							-0.6	-0.7	0.6	0.0	-0.1
1940	0.0	0.0	0.1	0.4		-0.4			-0.6	-0.7	-0.7	-10.9	-1.1
1941	-5.7	-3.5	2.1						-0.6	-0.7	-0.7	-3.2	-1.0
1942	6.5	2.3	7.5						-0.6	-0.7	-0.7	15.5	2.5
1943	16.2	27.9							-0.6	-0.7	-0.7	5.2	3.9
1944	1.0	0.4	0.1	0.2					-0.6	-0.7	-0.1	-0.1	0.0
1945	-0.1	1.1	8.6						-0.6	-0.7	-0.7	0.8	0.7
1946	0.2	0.1							-0.6	-0.7	-0.7	-0.3	-0.2
1947	-0.5	-0.1	1.8	11.0					-0.6	-0.7	1.0	0.1	1.0
1948	0.1	0.1	0.2	0.2					-0.6	-0.7	-0.7	0.1	-0.1
1949	-0.4	-0.5	0.1	0.7	1.2				-0.6	-0.7	-8.7	-1.9	-0.9
1950	-0.3	0.2	0.1	0.1					-0.6	-0.7	-0.7	1.0	-0.1
1951	0.4	0.8							-0.6	-0.7	-0.7	-0.4	-0.1
1952	0.1	-0.3							-0.6	-0.7	-0.7	-0.5	-0.2
1953	-0.4	-0.4							-0.6	-0.7	-0.7	-0.5	-0.3
1954	7.3	3.0	0.9						-0.6	-0.7	-0.7	-0.1	0.8
1955	-0.3	-0.4	-0.1						-0.6	-0.7	-0.2	-0.1	-0.2
1956	-0.1	-0.2	-0.6						-0.6	-0.7	-0.7	41.9	3.3
1957	39.1	15.4	1.2	0.0					-0.6	-0.7	-0.7	0.7	4.5
1958	1.8	5.0							-0.6	-0.7	-0.7	-0.5	0.4
1959	-0.4	-0.4	12.1						-0.6	-0.7	-0.7	-1.3	0.7
1960	-0.3	-0.1	-0.3	-0.7					-0.6	-0.7	-2.4	-1.1	-0.5
1961	0.0	0.1	-0.6						-0.6	-0.7	-1.2	-0.2	-0.3
1962	-0.1	-0.4	-1.6	-4.7					-0.6	-0.7	-0.7	-0.2	-0.7
1963	-0.7	-0.4							-0.6	-0.7	-0.7	2.4	-0.1
1964	0.9	2.6							-0.6	-0.7	0.5	0.9	0.3
1965	0.4	0.0	-1.8						-0.6	-0.7	-0.7	5.7	0.2
1966	0.9	1.2							-0.6	-0.7	-0.7	-0.1	0.0
1967	0.0	0.2	-0.4						-0.6	-0.7	-0.7	-0.5	-0.2
1968	-0.4	-0.4							-0.6	-0.7	1.3	0.0	-0.1
1969	-0.1	-0.1	-0.1						-0.6	-0.7	-0.7	9.1	0.6
1970	23.8	-0.4				-0.4			-0.6	-0.7	-0.7	1.3	1.9
1971	0.2	0.6							-0.6	-0.7	-0.7	-0.5	-0.1
1972	3.2	0.7	0.7	8.7					-0.6	-0.7	-0.7	-0.1	0.9
1973	-0.3	-0.8							-0.6	-0.7	-0.7	2.2	-0.1
1974	1.0	3.1							-0.6	-0.7	-0.7	-0.5	0.1
1975	-0.4	20.8	7.1	4.4					-0.6	-0.7	-0.7	-0.5	2.5
1976	-0.4	-0.4	17.2	2.1	-2.1	-0.4			1.9	0.1	0.0		1.5
1977	-0.2	-0.1	-0.1	-0.5	-1.2	-1.2	-0.8	-0.1	-0.2	0.2	1.1		-0.3
1978	0.0	0.0	0.0		-0.3				-0.6	-0.7	-0.7		-0.2
1979		0.0	-0.1			-0.4			-0.6	-0.7	-0.7	-0.1	-0.2
1980	0.0	0.0	0.7						-0.6	-0.7	-0.7	8.4	0.6
1981	2.2	0.5	0.1						-0.6	-0.7		0.1	0.1
1982	-0.1	-1.1							-0.6	-0.7	-0.7	-0.5	-0.3
1983	-0.4	-0.4							-0.6	-0.7	-0.7	-0.5	-0.3
1984	-0.4		-0.4						-0.6	-0.7	-0.7	2.3	0.0
1985	0.3	0.5							-0.6	-0.7	-0.2	-0.1	-0.1
1986	0.0	0.0	-0.4						-0.6	-0.7	-0.7	9.6	0.6
1987	1.8	0.4	0.1	0.1					-0.6	-0.7		0.0	0.1
1988	0.0	0.0	0.2						-0.6	0.0	-0.1	0.0	0.0
1989	0.0	0.0	0.0	0.0	-0.5				-0.6	-0.7		0.2	-0.1
1990	-0.1	-0.1	0.6	1.8		-0.4		-0.5		0.4	-0.1	-0.1	0.1
1991	-0.2	-0.1	0.0	-0.7	-1.4	-0.4		-0.5		1.0	0.2		-0.2
AVG:	1.4	1.1	0.9	0.1	-0.1	-0.1	0.0	-0.1	-0.5	-0.5	-0.5	1.3	0.2
MIN:	-5.7	-3.5	-1.8	-9.6	-3.5	-1.2	-0.8	-1.7	-0.6	-0.7	-8.7	-10.9	-1.1
MAX:	39.1	27.9	17.2	11.0	1.7				1.9	1.0	3.4	41.9	4.5