

APPENDIX J

Annual variation in San Joaquin River diversions : Banta Carbona Irrigation District 1970-2002

J.1 Objective

This appendix to the Quinn and Tulloch, Final Report (2002) analyses the year to year variation in San Joaquin River flows diverted to the Banta Carbona Irrigation District. This analysis will help modeling of this reach of the river and may allow some simple heuristics to be developed for flow and algal load forecasting purposes.

J.2 Background

In the Final Project Report to CALFED entitled “San Joaquin River diversion data assimilation, drainage estimation and installation of diversion monitoring stations, (Quinn and Tulloch, 2002)” the authors provided data which showed the importance of accurate estimation of river diversions to the development of a mass balance of algal loads from the upper watersheds. In Appendix I flow diversion data from the two largest San Joaquin River riparians was presented for 2002. These water districts have the capacity to divert more than 350 cfs from the San Joaquin River – their patterns of diversion were shown to be quite similar.

The Banta Carbona Irrigation District extends from the City of Tracy to the San Joaquin-Stanislaus County line near the town of Vernalis. The District provides water to 17,900 acres of which 16,500 acres are irrigable. The original intake channel was designed to have a capacity of 200 cfs and pumping plants were designed and installed to be able to provide a minimum of 150 cfs. By 1969, increased salinity levels in the San Joaquin River and the ensuing litigation was resolved by the provision of Central Valley Project water from the US Bureau of Reclamation’s Delta Mendota Canal. A contract of 25,000 acre-feet was signed in 1969. For the period 1973 through 1981, except for critically dry years of 1976 and 1977, the District has withdrawn an average of 9,500 acre-feet of water from the Delta Mendota Canal. During normal water years approximately 50% of the District’s supply is pumped from the San Joaquin River.

Like West Stanislaus Irrigation District and Patterson Irrigation District, Banta Carbona Irrigation District takes gravity flows from the Delta Mendota Canal on the west and pumps from the San Joaquin River through a state-of-the-art fish screen facility on the east – allowing the District to blend water supply. Figures 1-3 shows the Banta Carbona ID intake canal and fish screen facility, ¼ mile above the pumps at the first lift canal. Operational spills to the most part are returned to the Main Canal. Subsurface drainage flows are collected in a network of drains within the New Jerusalem Drainage District, a separate institution contained with Banta Carbona Irrigation District. These flows are combined in the New Jerusalem Drain which discharges to the San Joaquin River approximately ¼ mile downstream from the Banta Carbona Irrigation District intake canal.



Figure J-1. Banta Carbona Irrigation District intake canal.



Figure J-2. Banta Carbona Irrigation District fish screen facility.



Figure J-3. Main intake canal showing first bank of lift pumps approximately 1/4 mile from the fish screen facility.

J.3 Data Development

The data used to perform the analysis of Banta Carbona ID pumping was obtained from hand notes in the daily Water Master handbooks for years 1972 to 2002. A man-day was required to record and analyze each year of record.

J.4 Results

The 1999-2002 diversion data for Banta Carbona Irrigation District is presented in monthly tabular form in Table J-1.

**Banta Carbona Irrigation District
San Joaquin River Diversions
(Ac-Ft.)**

YEAR	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTALS	ERROR EST.
1999	0	0	148	2183	11819	10444	12798	9417	2994	1231	0	0	51035	+/- 5%
2000	1128	0	134	6099	9518	10753	12248	7492	2795	802	0	0	50967	+/- 5%
2001	0	0	1446	6347	11133	9972	7293	7516	2718	1474	311	0	48210	+/- 5%
2002	0	0	667	5082	9335	9205	11182	8736	3306	1233	289	0	49034	+/- 5%
occurrence avg.	282	0	599	4928	10451	10093	10880	8290	2953	1185	150	0	49812	

Table J-1 Comparison of monthly San Joaquin River pumping for years 1999-2002.

DAILY CVP DIVERSIONS AND SJR PUMPING

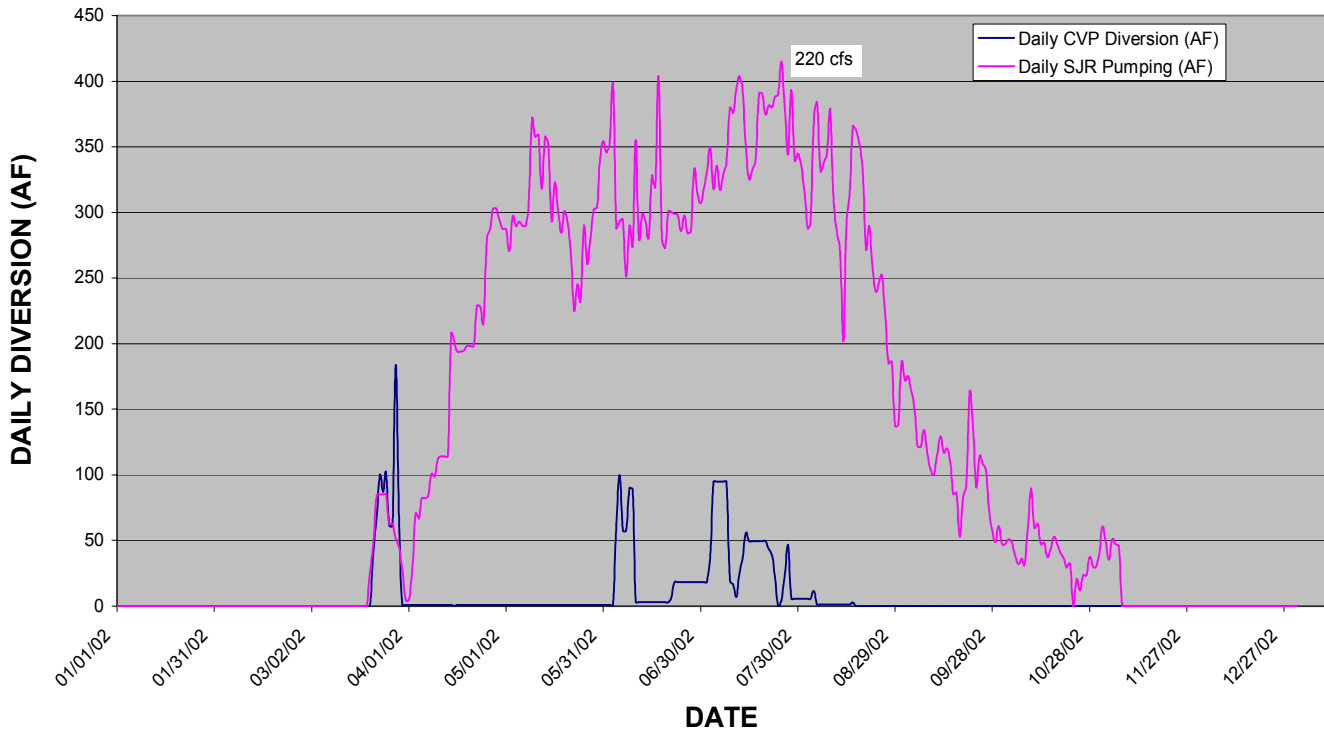


Figure J-4. Daily pumping from the San Joaquin River and estimated CVP diversions from totalizing meters on the Delta Mendota Canal for 2002.

ANNUAL CVP DIVERSIONS AND SJR PUMPAGE 1972-2002

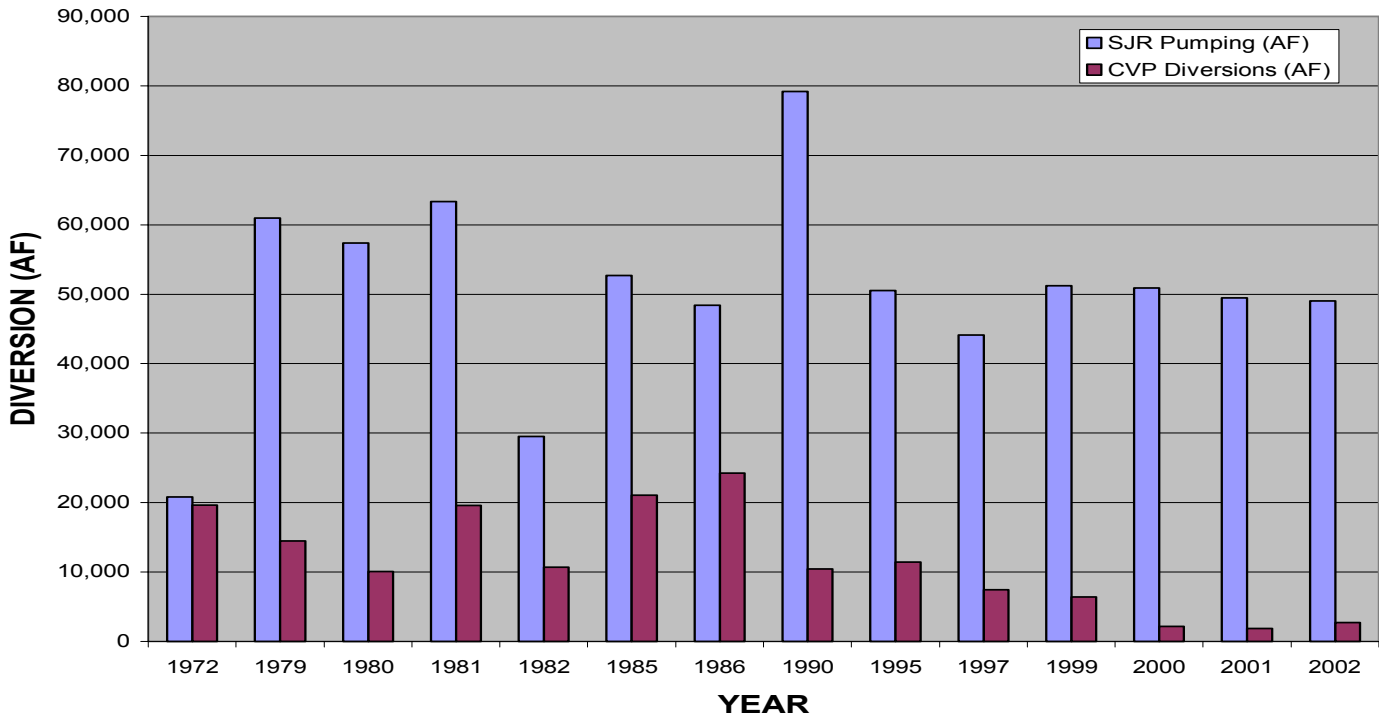


Figure J-4. Comparison of annual CVP diversions and SJR pumping for years 1972 - 2002.

**BANTA CARBONA SAN JOAQUIN RIVER PUMPING
1972 - 2002**

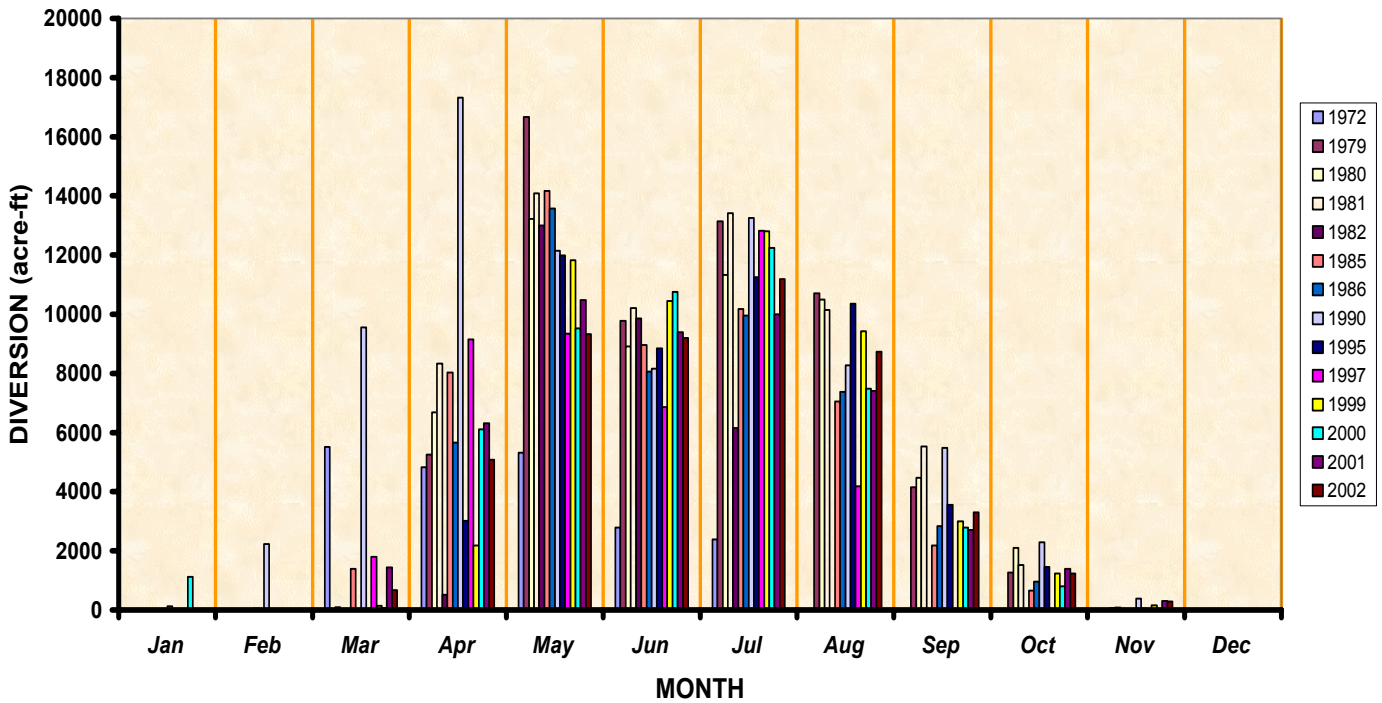


Figure J-5. Monthly pumping from the San Joaquin River for selected water years 1972-2002.

The data in Table J-1 shows very consistent river diversions between 2001 and 2002. In 2001 pumping was estimated at 48,210 acre-ft. In 2002 the total river pumping was 49,035 acre-feet. River pumping appears to end a little earlier in Banta Carbona Irrigation District than in Patterson or West Stanislaus Irrigation Districts as shown in Figure J-4. CVP water appears to be used in the District mainly as a supplemental supply. Very little CVP water was used in 2000, 2001 or 2002. The incentive to pump close to a full allocation of San Joaquin River water may relate to the cost of CVP water and the ability to sell surplus water outside the District. CVP diversions from the Delta Mendota Canal appear to have steadily decreased as a proportion of the District supply since 1986.

In Figure J-5 the monthly pumping from the San Joaquin River for selected years from 1972 to 2002 is shown. The Figure shows quite consistent river pumping in wet and dry years alike. The pumping rate drops off in mid-August and is close to zero most years in the month of November.

J5. Summary

The results of the analysis performed on Banta Carbona Irrigation District San Joaquin River pumping are significant for future forecasting of algal load removal rates in the reach from Vernalis to Mossdale Bridge and the Deep Water Ship Channel. Consistent removal rates make forecasting easier and reduce error. Real-time access to flows measured at the fish facility would help to quantify San Joaquin River diversions leading to improved estimation of remaining algal loads being passed into the Deep Water Ship Channel.

J.6 References

Banta Carbona Irrigation District : 1972-2002. Water Master field notebooks.

Quinn N.W.T. and A. Tulloch, 2002 San Joaquin River diversion data assimilation, drainage estimation and installation of diversion monitoring stations CALFED Bay-Delta Program, Sacramento, CA 95814. September 15, 2002.