

Job No.



WATER & WASTEWATER
MUNICIPAL INFRASTRUCTURE
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MEMORANDUM

To: Steve Ottemoeller, Friant Water Authority
From: Richard Moss
Daniel Steiner
Subject: SJR Restoration Water Supply Impact Accounting Tool
Date: May 7, 2009

You have requested our assistance in the development of an illustrative tool to assist the Authority membership in analyzing how the San Joaquin River Settlement and the resultant accounting of the water supply impacts and impact offset tools may work. We have developed a spreadsheet model consistent with our memorandum of April 2, 2009. This brief memo will further describe the model and the assumptions used in its development.

Model Purpose

The purpose of this modeling effort is to analyze the annual and cumulative impacts by district of Settlement Restoration flows, including the impact offsets generated by water made available under: (1) the Restoration Water Account (RWA), (2) water which is released from Friant Dam for Settlement purposes and then recaptured by diversion downstream of Friant including the state or federal pumps and recirculated, and (3) high flow Friant Division water which is captured and stored as a result of increased recharge potential associated with the \$50 million federal investment called for in Title III of the Settlement legislation (also assuming the proposed restoration of the Friant-Kern and Madera canals to their original capacity). The accounting and allocation process are consistent with what we understand to be the results of the current mediation efforts among the Friant water agencies lead by Attorney Jim Waldo.

Model Assumptions

The following is a list of tasks, approach, assumptions and limitations associated with the development of the draft accounting tool. Additional notes and comments about data sources and model limitations can be found in the comment boxes posted in the model:

Task	Approach	Assumptions/Limitations
Distribute Class 1 and Class 2 water supply impacts by year and by district.	We have used the most current version of Dan Steiner's Restoration Flow impact modeling (V3.1) to estimate the Class 1 and Class 2 impacts by year and by district which includes the 10 percent buffer flows.	Basic assumption that historical water availability and demand as modeled are representative of future availability and demand patterns.
Distribute "Other Water" impacts to Friant contractors.	We have looked at a history of who has taken "Other Water" from representative FWA data which was limited to just non-long-term contractors over a period of years including the 1990's and early 2000's. We didn't find, given the data set we had, a consistent relationship between San Joaquin River flows and Non-long-term contractor use of "Other Water." We did conclude that long-term contractors were the only users of "Other Water" in all but the Wet and Normal Wet year types.	We assumed that "Other Water" use in Wet and Normal Wet year types was split 50/50 between long-term and non-long-term contractors. We also used the Class 2 contract quantities as a surrogate for who would otherwise typically have taken "Other Water" as among the Friant long-term contractors. These assumptions are based on very limited data and can be easily changed in the model to bracket the range of "Other Water" impacts to long-term contractors if desired.
Estimate each district's modeled overall long term impact from Settlement flows	Impact = Class 1 Impact + Class 2 Impact + Other Water Impact (by district by year, and long-term average). Display each district's impacts as a relative percentage of total Friant impacts	

Distribute \$10 water delivery and provide distribution of wet year \$10 Water based on RWA balances.

"Other Water" to Friant long-term contractors remaining post Restoration Flows was deemed to be available to the Friant long-term contractors as \$10 water.

Account annually for water that is returned via recirculation as a reduction in long-term contractor water supply impacts for that year.

Estimate by year type how much "recapture" occurs. Discount this volume by that amount necessary to keep other CVP contractors whole (Mendota Pool impacts). RWA balance is reduced by Recirculated Water made available.

All water recirculated is assumed to be made available back to the Friant service area prior to September of the year it is released.

Distribute increased recharge capability associated with new demand created by the Title III \$50 million federal investment in groundwater recharge programs.

Estimate the additional annual recharge volume generated by the \$50 million federal investment coupled with \$50 million local matching monies and allocate the water conserved and stored to each contractor based upon the then current RWA balance. Restoration of FKC and MC capacity is assumed to allow an increase in diversion amounts over historic diversions.

Assume the water yet remaining available to Friant long-term contractors post Restoration Flows is available for this new demand. This volume is equal to post Restoration Flows "spills" to the river and "Other Water" assumed to go to non-long-term contractors during Wet and Normal Wet years. The yield analysis used the same principles from previous efforts to estimate average recharge volumes consistent with a \$100 million Title III Program and with practical canal capacity limits. Water returned via the Title III local recharge program is separate from water sold as RWA \$10 water.

Determine yearly and cumulative RWA balance (mitigated impact total). Show also as a percentage of cumulative mitigated impacts to Division-wide impacts.

RWA annual impact accounting (by district) = the Sum of year's Class 1 Impacts + Class 2 Impacts + "Other Water" impacts - \$10 water received - Recirculated Water received - Title III water received. Accumulate with a running balance.

Per the last task noted above, the following are summary tables that show the cumulative mitigated impact to each long-term contractor both in acre-feet and as a percentage of the total cumulative mitigated impacts to the Friant Division long-term contractors. It's important to note that this analysis does not speak to any individual contractor's ability to actually take advantage of any or all of the mitigation tools; the model just assumes each contractor can take full advantage of a particular tool if and when it is made available.

District Mitigated Effects – Restoration Hydrograph +10% (thousands of acre-feet)

	Water Delivery Impacts - Average TAF				Recapture - Ave TAF			RWA bfr 16(b)	16(b)		RWA aft 16(b)	82-Year RWA
	Class 1	Class 2	215	Total	Class 1	Class 2	Total		\$10 Water	T3 Water		
Arvin-Edison WSD	-2.4	-27.9	-9.5	-39.9	0.8	7.9	8.7	-31.2	6.5	13.5	-11.2	-915.9
Delano-Earlimart ID	-6.6	-6.7	-2.3	-15.5	2.3	1.9	4.1	-11.4	2.4	4.9	-4.1	-336.4
Exeter ID	-0.7	-1.7	-0.6	-3.0	0.2	0.5	0.7	-2.3	0.5	1.0	-0.8	-66.6
Fresno ID	0.0	-6.7	-2.3	-9.0	0.0	1.9	1.9	-7.1	1.5	3.1	-2.5	-209.0
Garfield WD	-0.2	0.0	0.0	-0.2	0.1	0.0	0.1	-0.1	0.0	0.1	-0.1	-4.1
International WD	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.4
Ivanhoe ID	-0.5	-0.7	-0.2	-1.4	0.2	0.2	0.4	-1.1	0.2	0.5	-0.4	-31.1
Lewis Creek WD	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	-1.7
Lindmore ID	-2.0	-2.0	-0.7	-4.6	0.7	0.6	1.2	-3.4	0.7	1.5	-1.2	-100.5
Lindsay-Strathmore ID	-1.7	0.0	0.0	-1.7	0.6	0.0	0.6	-1.1	0.2	0.5	-0.4	-32.7
Lower Tule River ID	-3.7	-21.3	-7.3	-32.3	1.3	6.0	7.3	-25.0	5.2	10.8	-9.0	-735.3
Orange Cove ID	-2.4	0.0	0.0	-2.4	0.8	0.0	0.8	-1.6	0.3	0.7	-0.6	-46.6
Porterville ID	-1.0	-2.7	-0.9	-4.6	0.3	0.8	1.1	-3.5	0.7	1.5	-1.3	-102.5
Saucelito ID	-1.3	-2.9	-1.0	-5.2	0.4	0.8	1.3	-4.0	0.8	1.7	-1.4	-116.5
Shafter-Wasco ID	-3.0	-3.5	-1.2	-7.8	1.0	1.0	2.0	-5.7	1.2	2.5	-2.1	-169.5
Southern San Joaquin MUD	-5.9	-4.5	-1.5	-11.9	2.0	1.3	3.3	-8.6	1.8	3.7	-3.1	-254.1
Stone Corral ID	-0.6	0.0	0.0	-0.6	0.2	0.0	0.2	-0.4	0.1	0.2	-0.1	-11.8
Tea Pot Dome WD	-0.5	0.0	0.0	-0.5	0.2	0.0	0.2	-0.3	0.1	0.1	-0.1	-8.9
Terra Bella ID	-1.8	0.0	0.0	-1.8	0.6	0.0	0.6	-1.2	0.2	0.5	-0.4	-34.3
Tulare ID	-1.8	-12.6	-4.3	-18.8	0.6	3.6	4.2	-14.6	3.1	6.3	-5.2	-428.4
Chowchilla WD	-3.3	-14.3	-4.9	-22.6	1.1	4.0	5.2	-17.4	3.6	7.5	-6.2	-511.0
Madera ID	-5.1	-16.7	-5.7	-27.5	1.8	4.7	6.5	-21.0	4.4	9.1	-7.5	-618.9
Gravelly Ford WD	0.0	-1.3	-0.4	-1.7	0.0	0.4	0.4	-1.3	0.3	0.6	-0.5	-39.0
City of Fresno	-3.6	0.0	0.0	-3.6	1.2	0.0	1.2	-2.4	0.5	1.0	-0.9	-71.0
City of Orange Cove	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	-1.7
City of Lindsay	-0.2	0.0	0.0	-0.2	0.1	0.0	0.1	-0.1	0.0	0.0	0.0	-3.0
Fresno County WWD No. 18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2
Madera County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2
System	-48.4	-125.6	-42.9	-216.8	16.6	35.4	52.0		34.4	71.2		-4852.3

District Mitigated Effects – Restoration Hydrograph +10% (percentage of overall impact)

	Water Delivery Impacts - Percent of Total				Recapture - Percent			RWA bfr 16(b)	16(b)		RWA aft 16(b)	82-Year RWA
	Class 1	Class 2	215	Total	Class 1	Class 2	Total		\$10 Water	T3 Water		
Arvin-Edison WSD	5.0	22.2	22.2	18.4	5.0	22.2	16.7		19.0	18.9		18.9
Delano-Earlimart ID	13.6	5.3	5.3	7.2	13.6	5.3	8.0		6.9	6.9		6.9
Exeter ID	1.4	1.4	1.4	1.4	1.4	1.4	1.4		1.4	1.4		1.4
Fresno ID	0.0	5.4	5.4	4.2	0.0	5.4	3.6		4.3	4.3		4.3
Garfield WD	0.4	0.0	0.0	0.1	0.4	0.0	0.1		0.1	0.1		0.1
International WD	0.2	0.0	0.0	0.0	0.2	0.0	0.0		0.0	0.0		0.0
Ivanhoe ID	1.0	0.6	0.6	0.7	1.0	0.6	0.7		0.6	0.6		0.6
Lewis Creek WD	0.2	0.0	0.0	0.0	0.2	0.0	0.1		0.0	0.0		0.0
Lindmore ID	4.1	1.6	1.6	2.1	4.1	1.6	2.4		2.1	2.1		2.1
Lindsay-Strathmore ID	3.4	0.0	0.0	0.8	3.4	0.0	1.1		0.7	0.7		0.7
Lower Tule River ID	7.7	17.0	17.0	14.9	7.7	17.0	14.0		15.2	15.2		15.2
Orange Cove ID	4.9	0.0	0.0	1.1	4.9	0.0	1.6		0.9	0.9		1.0
Porterville ID	2.0	2.1	2.1	2.1	2.0	2.1	2.1		2.1	2.1		2.1
Saucelito ID	2.7	2.3	2.3	2.4	2.7	2.3	2.4		2.4	2.4		2.4
Shafter-Wasco ID	6.3	2.8	2.8	3.6	6.3	2.8	3.9		3.5	3.5		3.5
Southern San Joaquin MUD	12.1	3.6	3.6	5.5	12.1	3.6	6.3		5.2	5.2		5.2
Stone Corral ID	1.3	0.0	0.0	0.3	1.3	0.0	0.4		0.2	0.2		0.2
Tea Pot Dome WD	0.9	0.0	0.0	0.2	0.9	0.0	0.3		0.2	0.2		0.2
Terra Bella ID	3.6	0.0	0.0	0.8	3.6	0.0	1.2		0.7	0.7		0.7
Tulare ID	3.8	10.1	10.1	8.7	3.8	10.1	8.0		8.9	8.8		8.8
Chowchilla WD	6.9	11.4	11.4	10.4	6.9	11.4	10.0		10.6	10.5		10.5
Madera ID	10.6	13.3	13.3	12.7	10.6	13.3	12.4		12.8	12.8		12.8
Gravelly Ford WD	0.0	1.0	1.0	0.8	0.0	1.0	0.7		0.8	0.8		0.8
City of Fresno	7.5	0.0	0.0	1.7	7.5	0.0	2.4		1.4	1.4		1.5
City of Orange Cove	0.2	0.0	0.0	0.0	0.2	0.0	0.1		0.0	0.0		0.0
City of Lindsay	0.3	0.0	0.0	0.1	0.3	0.0	0.1		0.1	0.1		0.1
Fresno County WWD No. 18	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Madera County	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Sum	100.0	100.0	100.0	100.0	100.0	100.0	100.0		100.0	100.0		100.0