

February 9, 2009

Ms. Dorothy R. Rice
Executive Director
State Water Resources Control Board
1001 I Street
Sacramento CA 95814

Dear Ms. Rice:

I would like to give you some additional information for your consideration of the February 5, 2009, request from Reclamation and DWR to provide some relaxation of the D-1641 X2 (salinity) objectives. I am suggesting, as a concerned California citizen, that the X2 objectives for February, March, and April be relaxed to an outflow requirement of 4,500 cfs. This is a stronger relaxation of the Delta outflow objectives than DWR and Reclamation are requesting.

I appreciate your consideration of these suggested D-1641 adjustments for the balanced beneficial uses of our limited Central Valley water resources during 2009. I am an employee of ICF Jones & Stokes and have worked on environmental impact evaluations for several Delta water projects. However, I have prepared this letter as an individual to ask your consideration of these matters. These suggestions are not endorsed or recommended by ICF Jones and Stokes, nor are they the positions of any of the clients whom we serve. These are my own suggestions based on my knowledge of the CVP, SWP, and Delta operations to protect our fish, our water quality, and our water supply. I understand that this is always a difficult endeavor.

The basis for my request is that the general intent of the X2 (salinity gradient location) estuary objectives is to provide a water management framework, with adaptive adjustments to be considered when necessary. As the 1995 WQCP states under Chapter III C. Water Quality Objectives for Fish and Wildlife:

Unlike water quality objectives for parameters such as dissolved oxygen, temperature, and toxic materials, which have thresholds beyond which adverse impacts to the beneficial uses occur, there are no defined threshold conditions that can be used to set objectives for flows and project operations. Instead the available information indicates that a continuum of protection exists. Higher flows and lower exports provide greater protection for the bulk of estuarine resources up to the limit of unimpaired conditions. Therefore these objectives must be set based on subjective determination of the reasonable needs of all the consumptive and non-consumptive demands on the waters of the Estuary” (pg 14–15 of Draft Water Quality Control Plan, May 1995).

The X2 objectives are established for the months of February–June of all water-year types, and are described in footnote [14] and Table A. These objectives are very adaptive and are adjusted

each month of each year based on the location of X2 at the end of the previous month and the previous month's unimpaired runoff conditions (PMI). The general WQCP framework for establishing a balance between Delta outflow and allowable exports is generally sound. The Export/Inflow ratio (E/I) is another WQCP objective that helps establish this flexible balance in beneficial uses.

My request for X2 relaxation in February, March, and April of this year originates from my evaluation of the D-1641 rules for estimating the X2 objectives during low runoff years such as 2009. As stated in the letter from DWR and Reclamation, the December Eight River Index (unimpaired runoff estimate) was 590 taf. The January Eight River Index was 973 taf. These are relatively low unimpaired runoff estimates. As Table 1 (attached to this letter) indicates, the December unimpaired runoff was less than 590 taf in only about 15% of the years from 1967 through 2008. January unimpaired runoff was less than 973 taf in only about 25% of these years.

These unimpaired runoff values are used to establish the E/I and X2 objectives for the following month. These adjustments based on the previous runoff conditions follow an adaptive management principle, but may not result in a balanced management of our beneficial uses. In a dry year, much of this runoff will be stored in upstream reservoirs, and not be available to DWR and Reclamation for releases to the Delta. Reservoir releases are themselves controlled by minimum fish requirements.

Let me review the adjustments to the monthly E/I and X2 objectives that result from these previous month index (PMI) values for 2009. The December Eight River Index was less than 800 taf, so footnote [13] indicates that the Delta outflow objective for January remains at 4,500 cfs. Because the January Eight River Index was less than 1,000 taf, footnote [25] indicates that the maximum E/I objective for February should be increased from 0.35 to 0.45. This would allow higher exports in February of low runoff years, although the X2 outflow requirements must also be satisfied.

Footnote [14] describes the general X2 objective and the monthly relaxation criteria. Because the January Eight River Index is greater than 900 taf, the X2 (daily average EC value of less than 2,640 $\mu\text{S}/\text{cm}$) must be measured at Collinsville (at 81 km) for at least 1 day within the February 1–14 period. A steady-state outflow of about 7,100 cfs is required to maintain X2 at Collinsville. However, because the January outflow was about 4,500 cfs and the corresponding X2 location was upstream near Antioch (about km 85) on the San Joaquin River channel and somewhat downstream of Emmaton (km 92) on the Sacramento River, a higher outflow will take several days to move the 2 ppt salinity position (X2) downstream to Collinsville.

Table 2 (attached) shows the daily Delta operations for January and early February 2009. This table shows that DWR and Reclamation reduced exports on January 30 and 31 (from a combined export of about 4,500 cfs to a combined pumping of just 2,000 cfs) to increase Delta outflow and move X2 downstream toward Collinsville. However, DWR and Reclamation are concerned about the details of Table A, which specifies how many days in February the X2 position must be downstream of Chipps Island (at km 75). Table A is very adaptive, and allows the PMI to determine the number of days that X2 must be located downstream of Chipps Island (and Port Chicago for higher runoff condition). Table A indicates that X2 must be located downstream of

Chippis Island for all 28 days in February if the January Eight River Index is greater than 1,000 taf. The Chippis Island requirement is 0 days if the January Eight River Index is less than 800 taf, and footnote (c) indicates that the number of days at Chippis Island is linearly interpolated for PMI values between 800 and 1,000 taf. Because the January Eight River Index was 973, this footnote rule indicates that X2 must be downstream of Chippis Island for 24 days in February (every day from last Thursday February 5 to February 28).

DWR and Reclamation are asking in their letter that this Chippis Island X2 requirement be relaxed this February because there is insufficient Delta inflow to meet this objective, which requires an effective outflow of about 11,400 cfs, and would require an additional pulse of outflow to move the X2 position (still upstream of Collinsville on February 5) to Chippis Island.

I am asking that you consider relaxing the X2 objective at Collinsville for February and March and April, and extend the January outflow requirement of 4,500 cfs until May 1. I am also asking that you consider relaxing the E/I criteria during these months to allow the reduced outflow requirement to be pumped for beneficial water supply uses. Delta inflow during January 2009 was only about 10,000 cfs. Pumping of the additional 2,500 cfs flow that would be possible if my suggested relaxation of the X2 objective is allowed for the next 3 months (total pumping of about 4,500 cfs) would be possible only if the E/I also were relaxed from 35% to 45% of the inflow for the next 3 months.

The possible relaxation of the X2 objectives during low runoff conditions was introduced in the 1995 WQCP documents. Footnote [14] states that the X2 requirement in February may be reconsidered by the CALFED policy group whenever the January Eight River Index is less than 900 taf (lowest 20% of years), and eliminated if it is less than 650 taf (lowest 10% of years). Footnote [14] also states that whenever the February Eight River Index is less than 500 taf, the March X2 may be relaxed. No relaxation criteria were identified for April, but the May and June X2 objectives are relaxed to an outflow requirement of 4,000 cfs if the best estimate for the Sacramento River Index (SRI) is less than about 8 maf. A low SRI estimate is likely for water year 2009.

I am suggesting that if the Eight River Index values for February, March, and April 2009 remain in the lowest 25% of historical monthly values, the monthly X2 objectives should be relaxed to a minimum monthly Delta outflow of 4,500 cfs. This would allow the salinity gradient downstream of Collinsville to be maintained at current locations and provide low-salinity habitat zone areas that are similar to the low-salinity habitat zone areas established with the X2 objectives. Fish with spring life-stage salinity preferences of greater than 2 ppt will have slightly greater salinity-habitat areas, because the salinity gradient will be stretched out slightly with an upstream X2. Estuarine fish with spawning salinity preferences of less than 2 ppt (e.g., delta smelt and longfin smelt) would have slightly less freshwater habitat available in the confluence region of the Delta, but spawning habitat upstream of Emmaton and Antioch would not be affected by this recommended relaxation of the X2 objectives for 2009. Table 1d indicates that the historical Delta outflow in water year 1977 (prior to D-1485 objectives) was less than 4,500 cfs in most months. The pelagic fish abundance did not decline substantially in 1977 in comparison with previous year abundance index values. CDFG data indicates that Fall Mid-Water Trawl (FMWT) abundance increased from 1976 to 1978 for delta smelt,

American shad, and striped bass juveniles. Threadfin shad abundance was very high in 1977 compared with 1976 and 1978.

If you approve this relaxation of X2 objectives for February, March, and April of 2009 to a minimum Delta outflow of 4,500 cfs, there will be opportunity to pump for beneficial water supply uses an additional 2,500 cfs compared to meeting the minimum X2 requirement at Collinsville of 7,100 cfs outflow. This is equivalent to about 5,000 af of water each day. This would be enough water pumped each day to supply 10,000 families of 3 people for a year (assuming per capita use of 150 gpd). This daily additional pumping would be enough water to irrigate about 2.5 square miles (1,600 acres) of California crops (assuming 3 feet of applied water). Because of our very dry runoff conditions, and very low reservoir storage, this water for these important beneficial uses for people cannot be replaced with any feasible alternative sources this year. Assuming a moderate municipal water cost (wholesale price) of \$500/af, this additional pumping of 2,500 cfs would have a water supply value of about \$2.5 million per day. If this X2 objective relaxation allowed pumping of 2,500 cfs during February, March, and April of 2009, the additional water supply would be about 400,000 af of water (80 days of increased pumping), representing about 6.5% of our average annual Delta pumping of about 6 maf.

Thank you for your consideration of these temporary adjustments in the D-1641 objectives for the balanced beneficial uses of our limited Central Valley water resources during 2009. Please contact me if you or your staff have any questions about my suggestions in this matter.

Sincerely,

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Table 1. Historical Eight River Unimpaired Runoff Data for 1967-2008

Table 1a. Monthly Eight River Index (Unimpaired Runoff) for Water Years 1967-2008 (taf)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ANNUAL
1967	366	1,304	2,981	3,345	2,517	4,091	3,819	6,256	5,444	2,589	818	512	34,043
1968	517	550	851	1,494	3,710	2,554	2,168	2,153	1,092	553	522	411	16,576
1969	515	887	1,765	7,913	4,731	3,359	5,438	7,340	4,278	1,765	742	537	39,271
1970	637	658	3,298	10,681	3,021	3,119	1,823	2,766	1,911	810	512	431	29,669
1971	481	1,927	3,259	3,045	1,834	3,725	3,403	4,177	3,333	1,213	580	503	27,480
1972	557	693	1,191	1,395	1,731	3,298	2,520	2,610	1,537	573	408	484	16,998
1973	624	1,211	1,835	4,076	3,657	3,271	3,080	4,757	2,258	768	514	463	26,515
1974	668	4,556	3,685	6,933	2,097	6,176	5,070	4,688	3,187	1,364	675	519	39,619
1975	535	622	859	1,013	2,924	4,650	2,891	5,403	4,076	1,238	636	566	25,412
1976	916	858	763	648	877	1,342	1,351	1,436	607	425	512	450	10,185
1977	416	418	379	475	476	545	689	906	755	378	335	402	6,174
1978	356	473	1,898	5,907	3,478	5,357	4,398	4,701	3,782	1,740	685	793	33,568
1979	430	522	535	1,445	2,102	2,897	2,674	4,504	1,747	708	438	390	18,392
1980	668	886	1,242	6,885	5,927	3,618	3,108	3,673	2,906	1,724	602	555	31,793
1981	488	453	917	1,571	1,760	2,476	2,323	2,113	1,007	474	377	353	14,313
1982	616	4,326	5,582	3,505	5,568	4,740	8,048	5,682	3,334	1,883	797	866	44,947
1983	1,303	1,888	3,694	4,248	6,459	10,569	4,869	6,964	7,101	3,454	1,349	761	52,657
1984	782	3,773	6,717	2,851	2,287	3,081	2,504	3,600	1,989	903	516	482	29,486
1985	648	1,858	1,196	842	1,210	1,593	2,786	2,135	1,013	474	389	498	14,644
1986	544	749	1,254	2,615	11,549	7,092	3,191	3,559	2,573	973	508	605	35,213
1987	571	444	528	778	1,505	2,544	1,727	1,472	640	419	333	326	11,287
1988	362	472	1,700	1,835	1,007	1,258	1,475	1,584	927	452	318	278	11,667
1989	329	1,048	719	852	985	6,138	3,585	2,213	1,193	528	349	428	18,367
1990	769	566	445	1,272	885	1,832	1,801	1,773	1,240	506	315	292	11,693

1991	333	354	336	369	449	2,637	1,949	2,402	1,624	590	314	294	11,651
1992	458	437	468	579	2,414	1,990	2,166	1,332	562	509	297	291	11,501
1993	397	394	1,247	4,058	3,125	5,703	4,325	5,231	3,683	1,372	595	430	30,559
1994	509	425	778	775	1,229	1,485	1,565	1,787	807	355	270	323	10,308
1995	369	614	1,055	8,024	3,061	9,946	5,579	7,091	5,443	3,312	1,107	634	46,234
1996	495	447	1,715	2,465	6,253	4,247	3,970	5,500	2,401	984	541	451	29,470
1997	512	1,291	6,835	12,155	2,756	2,443	2,696	2,968	1,633	680	503	463	34,935
1998	572	992	1,187	5,210	7,445	5,109	4,532	5,535	6,416	3,182	971	747	41,895
1999	693	1,379	1,905	2,605	4,584	3,653	3,253	4,271	2,618	926	557	525	26,971
2000	563	727	650	2,528	5,474	4,047	3,549	3,634	1,844	732	503	519	24,770
2001	578	550	667	866	1,503	2,390	2,035	2,486	715	457	375	376	12,997
2002	392	944	2,499	2,704	1,744	2,308	2,819	2,603	1,372	521	395	363	18,664
2003	348	777	3,242	3,400	1,663	2,524	3,268	4,817	2,436	715	556	434	24,179
2004	419	549	2,137	1,900	3,980	3,474	2,636	2,293	1,136	584	390	354	19,852
2005	692	636	1,558	2,489	2,006	3,746	3,182	7,228	3,613	1,538	608	464	27,760
2006	475	667	5,820	5,210	3,440	5,300	8,522	6,799	3,601	1,393	619	490	42,336
2007	510	673	1,320	873	2,140	2,065	1,737	1,667	657	436	363	351	12,791
2008	492	396	694	1,698	1,809	1,787	1,891	2,676	1,196	474	334	264	13,709
2009	360	696	591	973									

Table 1b. Cumulative Percentiles of Monthly Eight River Index values (Unimpaired Runoff) for Water Years 1967-2008

Monthly Runoff (taf)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
250	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
500	0.42	0.26	0.09	0.03	0.03	0.00	0.00	0.00	0.00	0.24	0.41	0.67
750	0.92	0.59	0.24	0.09	0.04	0.01	0.00	0.00	0.12	0.52	0.88	0.93
800	0.95	0.62	0.28	0.13	0.04	0.01	0.00	0.00	0.14	0.56	0.91	0.98
900	0.97	0.69	0.33	0.22	0.08	0.01	0.01	0.00	0.17	0.58	0.94	1.00
1000	0.98	0.74	0.36	0.24	0.11	0.02	0.01	0.01	0.19	0.66	0.96	1.00
1250	1.00	0.79	0.50	0.27	0.17	0.02	0.02	0.02	0.34	0.71	0.99	1.00
1500	1.00	0.86	0.56	0.34	0.19	0.08	0.06	0.08	0.38	0.80	1.00	1.00
1750	1.00	0.87	0.63	0.40	0.30	0.12	0.13	0.14	0.46	0.86	1.00	1.00
2000	1.00	0.93	0.72	0.44	0.39	0.17	0.23	0.19	0.54	0.91	1.00	1.00
2250	1.00	0.93	0.74	0.45	0.48	0.21	0.31	0.28	0.56	0.92	1.00	1.00
2500	1.00	0.93	0.76	0.49	0.53	0.30	0.34	0.34	0.62	0.92	1.00	1.00
2750	1.00	0.94	0.77	0.59	0.56	0.40	0.45	0.43	0.67	0.93	1.00	1.00
3000	1.00	0.94	0.78	0.63	0.60	0.43	0.53	0.46	0.69	0.94	1.00	1.00
3250	1.00	0.94	0.82	0.65	0.67	0.48	0.63	0.48	0.72	0.96	1.00	1.00
3500	1.00	0.95	0.87	0.71	0.71	0.57	0.70	0.49	0.77	1.00	1.00	1.00
3750	1.00	0.95	0.90	0.72	0.76	0.66	0.75	0.56	0.85	1.00	1.00	1.00
4000	1.00	0.96	0.91	0.73	0.78	0.68	0.78	0.58	0.87	1.00	1.00	1.00
4250	1.00	0.97	0.91	0.78	0.79	0.73	0.80	0.60	0.90	1.00	1.00	1.00
4500	1.00	0.99	0.91	0.79	0.80	0.75	0.85	0.63	0.91	1.00	1.00	1.00
4750	1.00	1.00	0.92	0.79	0.83	0.78	0.87	0.70	0.91	1.00	1.00	1.00
5000	1.00	1.00	0.92	0.80	0.84	0.80	0.89	0.74	0.92	1.00	1.00	1.00

Table 1c. Cumulative Distribution of Monthly Eight River Index values (Unimpaired Runoff) for Water Years 1967-2008

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ANNUAL
Minimum	329	354	336	369	449	545	689	906	562	355	270	264	6,174
10%	362	426	529	775	988	1,613	1,728	1,592	719	438	320	297	11,516
20%	401	457	699	867	1,504	2,114	1,903	2,117	1,009	474	352	353	12,832
30%	463	549	853	1,410	1,749	2,491	2,215	2,325	1,194	523	389	394	15,223
40%	493	617	1,188	1,753	2,042	2,741	2,651	2,637	1,572	586	464	430	18,501
50%	514	670	1,250	2,508	2,350	3,285	2,855	3,579	1,878	724	512	457	25,091
60%	552	766	1,709	2,792	2,983	3,639	3,188	4,233	2,422	917	533	483	27,648
70%	576	927	1,903	3,473	3,467	4,078	3,505	4,740	3,102	1,230	591	509	30,292
80%	646	1,275	3,190	5,017	4,464	5,035	4,254	5,481	3,611	1,509	633	535	34,756
90%	693	1,885	3,693	6,929	5,891	6,094	5,050	6,744	4,258	1,871	791	631	41,668
Maximum	1,303	4,556	6,835	12,155	11,549	10,569	8,522	7,340	7,101	3,454	1,349	866	52,657
Average	545	1,033	1,938	3,179	3,033	3,671	3,200	3,733	2,373	1,064	536	469	24,775

Table 1d. Historical Delta outflow (cfs) in Water Year 1977

OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
3,611	3,643	4,213	4,363	4,878	3,007	2,977	3,909	2,383	3,049	2,383	2,717

Table 2. Daily Delta Flows and Exports for January 6 to February 8, 2009.

Date	Sacramento Freeport (cfs)	Yolo Bypass (cfs)	Eastside Rivers (cfs)	SJR Flow (cfs)	Stockton Rain (in)	CCF Intake (cfs)	Banks Pumping (cfs)	Jones Pumping (cfs)	CCWD Intakes (cfs)	Barker NBA (cfs)	Channel Depletion (cfs)	Delta Outflow (cfs)	Rio Vista (cfs)	QWEST (cfs)	E/I 14-day running
1/6/2009	9,338	22	276	1,120	0	2,493	3,090	2,808	54	56	1,450	4,502	6,986	-2,375	42%
1/7/2009	8,935	23	268	1,120	0	2,493	2,471	2,830	54	56	1,400	4,608	7,089	-2,375	43%
1/8/2009	8,558	23	264	1,108	0	2,496	2,474	2,843	54	54	1,400	3,727	6,613	-2,750	43%
1/9/2009	8,805	21	261	1,090	0	2,492	2,384	2,171	67	58	1,350	4,044	6,300	-2,120	42%
1/10/2009	8,834	21	259	1,088	0	1,989	2,044	1,903	65	55	1,300	5,092	6,526	-1,303	39%
1/11/2009	8,513	20	256	1,076	0	1,986	1,943	1,902	61	54	1,300	4,899	6,487	-1,443	36%
1/12/2009	8,749	21	253	1,069	0	1,989	1,989	1,893	70	58	1,250	4,605	6,222	-1,471	35%
1/13/2009	9,001	21	250	1,066	0	2,246	2,299	1,898	67	59	1,250	4,572	6,427	-1,709	36%
1/14/2009	8,701	20	253	1,063	0	2,245	2,288	1,892	78	61	1,200	4,862	6,660	-1,653	38%
1/15/2009	8,618	15	261	1,065	0	2,454	2,454	1,895	86	64	1,200	4,338	6,399	-1,913	40%
1/16/2009	8,865	16	262	1,054	0	2,491	2,480	1,884	74	82	1,150	4,279	6,336	-1,894	41%
1/17/2009	8,518	17	255	1,053	0	2,493	2,482	1,888	81	70	1,150	4,515	6,551	-1,885	42%
1/18/2009	8,391	18	255	1,060	0	2,494	2,483	1,883	68	72	1,100	4,226	6,265	-1,890	43%
1/19/2009	8,034	18	260	1,053	0	2,499	2,434	1,888	82	73	1,100	4,083	6,156	-1,923	43%
1/20/2009	7,543	17	263	1,040	0	2,494	2,472	1,908	86	74	1,100	3,703	5,846	-1,992	44%
1/21/2009	6,642	17	270	1,034	0.2	1,995	1,984	1,272	78	71	1,050	4,398	5,434	-892	41%
1/22/2009	8,579	20	325	1,070	0.84	2,493	2,536	1,002	76	45	1,050	4,438	4,972	-495	38%
1/23/2009	8,578	23	488	1,130	0.36	2,493	2,601	1,004	69	22	1,000	11,340	8,010	3,006	35%
1/24/2009	8,669	23	990	1,196	0.04	2,490	2,414	1,643	70	10	1,000	12,995	8,588	3,928	38%
1/25/2009	9,248	18	979	1,236	0	2,490	2,446	1,930	77	37	1,000	13,561	8,730	4,362	41%
1/26/2009	10,446	18	679	1,322	0	2,498	2,465	1,912	76	29	1,000	14,181	9,227	4,478	44%
1/27/2009	13,224	17	515	1,403	0	2,490	2,512	1,912	86	31	950	14,071	9,961	3,712	44%
1/28/2009	13,393	13	436	1,433	0	2,494	2,505	2,455	73	37	950	11,433	11,026	350	44%
1/29/2009	12,386	8	397	1,390	0	2,489	2,521	2,674	80	38	950	9,273	10,594	-1,232	45%
1/30/2009	11,004	18	371	1,319	0	1,492	1,861	1,892	90	53	950	9,704	9,652	172	41%
1/31/2009	10,261	18	355	1,275	0	993	1,253	994	63	53	900	9,550	8,477	1,189	31%

2/1/2009	10,021	19	345	1,230	0	996	1,017	995	60	44	900	8,752	7,833	1,026	22%
2/2/2009	9,522	20	346	1,195	0	998	1,009	991	63	57	900	8,606	7,626	1,100	17%
2/3/2009	8,905	20	328	1,185	0	996	1,007	995	70	22	900	8,100	7,195	991	17%
2/4/2009	8,931	20	328	1,193	0	989	1,011	1,001	76	53	900	7,418	6,660	875	17%
2/5/2009	9,136	22	311	1,203	0.16	999	1,010	1,003	73	32	900	7,465	6,682	878	17%
2/6/2009	9,224	26	325	1,229	0.32	990	1,044	1,001	69	57	900	8,417	7,118	1,355	17%
2/7/2009	9,073	31	333	1,258	0	994	919	1,003	64	44	900	10,371	7,709	2,577	17%
2/8/2009	8,480	29	332	1,254	0.08	991	1,023	1,001	65	40	900	10,267	7,583	2,595	17%

Source: DWR Operations www.wco.water.ca.gov/cmplmon/DeltaHydrology.pdf