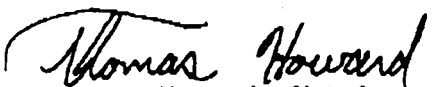


Memorandum

413

To : George Barnes, Chief
Modeling Support Branch
Department of Water Resources
1416 Ninth Street
Sacramento, CA 95814

Date: AUGUST 18 1994


Thomas Howard, Chief
Bay-Delta Unit
From : STATE WATER RESOURCES CONTROL BOARD
901 P Street Sacramento, CA 95814
Mail Code G-8

Subject: REQUEST FOR DWRSIM OPERATION STUDIES

The purpose of this memorandum is to request the Department of Water Resources' (DWR) assistance in estimating the water supply impacts of alternative standards for the Bay-Delta Estuary.

The State Water Resources Control Board (SWRCB) is undertaking a triennial review of its 1991 Water Quality Control Plan for the Bay-Delta Estuary, and the SWRCB intends to evaluate a range of alternative standards. Initially, we would like to evaluate the alternatives listed below, which are based on input by various parties. After the water supply and fishery impacts of these alternatives have been evaluated, additional studies may be required. Also, the SWRCB is holding a workshop on September 1, 1994 to solicit comments on alternative standards, and additional alternatives may be developed through that process.

Please be advised that the standards the SWRCB is considering may not be formulated precisely as characterized below.

Alternative 1

This alternative should include:

1. The water quality standards in the 1991 Water Quality Control Plan for Salinity (1991 Bay-Delta Plan);
2. The flow and export standards for the protection of fish and wildlife in D-1485;
3. The X2 isohaline standard contained in study 2' (1968 level of development with Roe Island triggered), as described in the June 10, 1994 letter from Bruce Herbold to George Barnes..
4. The salmon smolt survival standard as described in the August 17, 1994 letter from Susan Hatfield to George Barnes.

Alternative 2

This alternative should include:

1. The standards for the protection of agricultural and municipal uses in the 1991 Bay-Delta Plan;
2. The standards for the protection of Suisun Marsh contained in the water right permits of the DWR and the USBR;
3. Flows on the San Joaquin River at Vernalis for four weeks from April 17 through May 14 of 8,000, 7,000, 6,000, 5,000, and 4,000 cfs in wet, above normal, below normal, dry and critical years, respectively;
4. Maximum exports of 1,500 cfs for four weeks from April 17 through May 14;
5. Total exports for the rest of April through June not above 4,000 cfs in critical years, 5,000 cfs in dry years, and 6,000 cfs in below normal, above normal and wet years;
6. Total exports less than 9,200 cfs in July;
7. Fixed export constraints in April through July are eliminated when the Delta Outflow Index exceeds 50,000 cfs;
8. Close the Delta Cross Channel gates from November 1 through June 30;
9. Delta Outflow Indices as follows:

Year Type	Delta Outflow Index	
	12,000 cfs	7,000 cfs
Wet	2/1-6/30	...
Above Normal	2/1-6/30	...
Below Normal	3/15-6/15	3/1-3/14 and 6/16-6/30
Dry	4/1-6/10	3/1-3/31 and 6/11-6/30
Critical	4/15-5/15	3/15-4/14 and 5/16-6/15

10. Maximum CVP and SWP exports less than 30 percent of Delta inflow from February 1 through June 30 and 60 percent of Delta inflow from July 1 through January 30;
11. Flow on the San Joaquin River of 2,000 cfs from October 18 through October 31.

Alternative 3

This alternative is the same as Alternative 2 with one exception. The Delta outflow standard in Alternative 2 (# 9) should be replaced with the X2 isohaline standard recommended by the California Urban Water Agencies in the August 10, 1994 letter from Lyle Hoag to Harry Seraydarian.

Alternative 4

This alternative should include:

1. The standards for the protection of agricultural and municipal uses in the 1991 Bay-Delta Plan;
2. The standards for the protection of Suisun Marsh contained in the water right permits of the DWR and the USBR;
3. Close the Delta Cross Channel gates from February 1 through June 30;
4. Flow on the Sacramento River at Rio Vista of 4,000 cfs from April 1 through June 30;
5. Minimum daily flow on the Sacramento River at Freeport of 13,000 cfs from April 15 through May 31;
6. QWEST of zero cfs from February 1 through March 30;
7. QWEST of at least 1,000 cfs from April 1 through June 30 in all year types and from April 15 to May 31 QWEST of 1,500, 2,000, 2,500, 3,000 cfs in dry, below normal, above normal and wet years, respectively;
8. Flows on the San Joaquin River at Vernalis and maximum exports from April 15 through May 15 as follows:

<u>Year Type</u>	<u>Export Limit (cfs)</u>	<u>Flow (cfs)</u>
Wet	6,000	10,000
Above Normal	5,000	8,000
Below Normal	4,000	6,000
Dry	3,000	4,000
Critical	2,000	2,000

9. Mean Daily Delta Outflow Indices below which exports in excess of 1,500 cfs and diversions to storage would be prohibited:

Month	Delta Outflow Index (cfs)			
	Wet	Above Normal	Below Normal	Dry
February	50,000	50,000	22,200	19,200
March	45,000	50,000	15,400	15,000
April	18,000	13,600	9,500	9,500

May	24,400	15,000	9,500	9,500
June	17,500	12,000	8,600	7,900
July	12,500	9,900	8,300	7,600
October	14,200	--	--	--
November	16,300	12,900	9,500	--
December	28,000	27,000	26,000	20,000

10. Delta Outflow Indices of 8,700, 7,800, 7,000, 6,200, 5,600, and 5,000 cfs in February, March, April, May, June and July of critical years;

11. Average Delta Outflow Indices (cfs) as follows:

Year Type	Aug	Sept	Oct	Nov	Dec
Wet	5,800	7,300	7,300	7,300	7,300
Above Normal	5,600	4,200	4,500	4,500	5,400
Below Normal	5,300	4,200	4,500	4,500	4,900
Dry	5,000	4,000	4,500	4,500	4,700
Critical	3,300	3,000	3,600	3,600	4,700

12. Average monthly exports (cfs) less than:

Year Type	Apr-Jul	Aug-Mar
Wet	6,400	7,900
Above Normal	5,400	7,100
Below Normal	4,400	6,500
Dry	3,400	6,000
Critical	1,600	5,000

(For standards # 9, 11, and 12, October through December should be classified based on the previous year's hydrologic index. Two of the standards in this alternative are expressed as daily standards (# 5 and 9). DWRSIM cannot directly model daily standards because it operates on a monthly time step. Please develop assumptions to model these daily standards and discuss these assumptions with me prior to beginning the study.)

Alternative 5

This alternative should include:

1. The standards for the protection of agricultural and municipal uses in the 1991 Bay-Delta Plan;
2. The standards for the protection of Suisun Marsh contained in the water right permits of the DWR and the USBR.
3. Delta Outflow Index from February 1 through June 30 of 12,000 cfs in wet, above normal, and below normal years and 7,000 cfs in dry and critical years;

4. Delta Outflow Index of 25,000 cfs for seven days in April, May, and June in wet and above normal years;
5. Delta Outflow Index of 25,000 cfs for seven days in May in below normal years;
6. Delta Outflow Index of 12,000 cfs for seven days in April, May, and June of dry or critical years unless the previous water year was dry or critically dry in which case only the May flow is required;
7. Total CVP and SWP exports during the flows described in # 4, 5, and 6 above of 3,000 cfs;
8. Flows on the Sacramento River at Freeport from September 1 through October 14 of 12,000 cfs in wet, above normal and below normal years and 8,000 cfs in dry and critical years;
9. Flows on the Sacramento River at Rio Vista from March 15 through June 15 of 7,000 cfs in wet, above normal and below normal years and 5,000 cfs in dry and critical years;
10. Flows on the San Joaquin River at Vernalis as follows:

Year Type	Dates	Flow (cfs)
Wet, above normal, and below normal	3/1-3/31	1,000
	4/1-5/15	6,000
	5/16-6/15	1,000
	9/1-10/31	2,000
Dry and critical	3/1-3/31	1,000
	4/1-5/15	3,000
	5/16-6/15	1,000
	9/1-10/31	1,000

11. CVP and SWP exports limited to 35 percent of Delta inflow from March 1 through June 30, 55 percent from July 1 through September 30, and 65 percent from October 1 through February 28;
12. Close the Delta Cross Channel gates from February 1 through May 20.

Alternative 6

This alternative eliminates all existing standards and includes the following new standards:

1. Delta Outflow Indices (cfs) as follows:

Month	Wet	AN	BN	Dry	Critical
October	4,500	4,500	4,500	3,500	3,500
November	4,500	4,500	4,500	3,500	3,500
December	4,500	4,500	4,500	3,500	3,500
January	4,500	4,500	4,500	3,500	3,500
February	12,000	12,000	12,000	12,000	12,000
March	12,000	12,000	12,000	12,000	12,000
April	12,000	12,000	12,000	12,000	12,000
May	12,000	12,000	12,000	12,000	12,000
June	12,000	12,000	12,000	12,000	12,000
July	7,000	7,000	4,500	3,500	3,500
August	7,000	7,000	4,500	3,500	3,500
Sept	3,500	3,500	3,500	3,500	3,500

2. QWEST greater than zero cfs from February 1 through July 31, with the exception of the month of June where QWEST is greater than 4,000 cfs. and QWEST greater than -2,000 cfs from August 1 through January 31;
3. Flow on the San Joaquin River at Vernalis of 5,000 cfs from April 20 through May 10;
4. Exports limited to 2,000 cfs from April 20 through May 10;
5. Flow on the San Joaquin River at Vernalis of 2,000 cfs from October 18 through October 31;
6. Flow on the Sacramento River at Freeport of 13,000 cfs from April 15 to May 15;
7. Release 14,000 cfs from Keswick from May 1 through May 7;
8. Close the Delta Cross Channel gates from February 1 to June 30;

Assumptions

The assumptions listed below should be incorporated into the operation studies. Please consult with me if there are additional, significant assumptions that need to be made to complete the requested studies.

1. The variable export demand option should be used. Under this option CVP and SWP demands south of the Delta are adjusted to account for hydrologic conditions in Central and Southern California.
2. The sharing formula between the CVP and SWP in the Coordinated Operation Agreement should be used except when QWEST restrictions are controlling. Export pumping rate reductions necessary to meet the QWEST standard should be shared on an equal percentage basis from a base of 6,680 cfs for the SWP and 4,600 cfs for the CVP, except when the reductions occur at the same time that fixed export limits apply in which case the export reductions are shared equally.
3. The studies should be done from two different base cases. The first base case is D-1485, and all of the alternatives should be evaluated relative to this base case. The second base case is existing conditions, which consists of D-1485, the winter-run Chinook salmon biological opinion and the Delta smelt biological opinion, including take limits. Only alternative 1 should be evaluated relative to this second base case at this time. Eventually, DWR will be asked to evaluate all of the final alternatives relative to this second base case, but this request will be deferred until the final alternatives for consideration are selected.

The issue of take limits is complicated and not amenable to modeling; however, in DWR's written comments to the SWRCB at its May 1994 Bay-Delta workshop, DWR stated that assumptions for take limits based on operational experience during the past two years can be incorporated into the studies.!!! 15

4. The water necessary to meet the pulse flow requirements on the San Joaquin River should be released from New Melones. If there is insufficient water to meet all of the requirements from this reservoir, the additional water should be provided from the San Joaquin River upstream of the confluence with the Stanislaus River. The quantity of additional water required should be identified.
5. The D-1485 base case should be modeled using D-1485 year types. The isohaline standard in Alternative 1 should be modeled using the method described in the June 10, 1994 letter from Bruce Herbold to George Barnes. The isohaline standard in Alternative 3 should be modeled in consultation with representatives from the California Urban Water Agencies. The San Joaquin River flow requirements should be modeled using the 60-20-20 San Joaquin Valley water year hydrologic classification system. All other standards should be modeled using the 40-30-30 Sacramento Valley water year hydrologic classification system.

Thank you for your consideration of this request. Please contact me at (916) 657-1873 if you have any questions.

TABLE 1

**SUMMARY OF COMPARATIVE WATER SUPPLY IMPACTS RELATIVE TO D-1485
(1000'S AF/Year)**

**PRELIMINARY
8/31/94**

STATE WATER RESOURCES CONTROL BOARD STUDY	Critical Dry Period Average (May 1928 - October 1934)	71-Year Average (1922 - 1992)	Average Annual Carryover Storage Sacramento Basin	Average Annual Carryover Storage New Melones
ALTERNATIVE 1	1,3 -1093	2,3 -490	-174	-727
ALTERNATIVE 2	1,3 -1555	2,3 -645	-195	-672
ALTERNATIVE 3	1,3 -1386	2,3 -569	-253	-672
ALTERNATIVE 4	1,3 -2604	-	-	-
ALTERNATIVE 5	1,3 -798	2,3 -213	-330	-626
ALTERNATIVE 6	1,3 -1807	2,3 -994	+484	-414

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1. Includes adjustments due to upstream net Storage used and additional flows from Tuolumne and Merced River system to meet Vernalls pulse flows.
2. Includes adjustments due to additional flows from Tuolumne and Merced River system to meet Vernalls pulse flows.
3. Does not include potential water supply impact for "Take Limits."