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8 CALIFORNIA DEPARTMENT OF WATER RESOURCES

9   IN THE UNITED STATES DISTRICT COURT

10   FOR THE EASTERN DISTRICT OF CALIFORNIA

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12

NATURAL RESOURCES DEFENSE COUNCIL, et al.,	05 CV 01207 OWW (LJO)
Plaintiffs,	SUPPLEMENTAL DECLARATION OF JOHN LEAHIGH IN RESPONSE TO PLAINTIFFS' REMEDY PROPOSAL, FEDERAL DEFENDANTS' REMEDY PROPOSAL AND IN SUPPORT OF THE CALIFORNIA DEPARTMENT OF WATER RESOURCES' PROPOSED INTERIM REMEDY
v.	
DIRK KEMPTHORNE, in his official capacity as Secretary of the Interior, et al.,	
Defendants,	
SAN LUIS & DELTA-MENDOTA WATER AUTHORITY and WESTLANDS WATER DISTRICT; CALIFORNIA FARM BUREAU FEDERATION; GLENN-COLUSA IRRIGATION DISTRICT, et al.; CALIFORNIA DEPARTMENT OF WATER RESOURCES, and STATE WATER CONTRACTORS,	Hearing: August 21, 2007 Time: 9:00 a.m. Courtroom: 3 Judge: Hon. Oliver W. Wanger
Defendant-Intervenors.	

25 I, John Leahigh, declare as follows:

26 1.   I am employed by the Department of Water Resources (DWR) as Chief of the Project

27 Operations Planning Branch (POPB) within the Division of Operations and Maintenance. I have

28 been in my current position since March 2005. This Declaration is supplemental to my Declaration,

DWR-J

1 submitted on July 9, 2007 in support of the California Department of Water Resources (DWR)

2 Interim Remedy Proposal (July 9 Declaration). This Supplemental Declaration is offered in further

3 support of DWR's Interim Remedy Proposal and in response to the Federal Defendants' Brief on

4 Interim Injunctive Relief, filed on July 9, 2007 (Federal Defendants' Brief) and to Plaintiffs'

5 Remedy Proposal, submitted on July 23, 2007 (Plaintiffs' Remedy Proposal).

6 2.   As set forth in my July 9 Declaration, I am responsible for short-term planning of water

7 operations for the State Water Project (SWP). These planning responsibilities include the estimation

8 of delivery capabilities of the SWP and forecasted water export operations from the Sacramento/San

9 Joaquin Delta (Delta) through the Harvey O. Banks Delta Pumping Plant (Banks), Skinner Fish

10 Protection Facility (Skinner), and Clifton Court Forebay (CCF).

11 3.   My responsibilities also include working with the U.S. Bureau of Reclamation (USBR) to

12 coordinate SWP operations with Central Valley Project (CVP) operations. This coordination

13 includes scheduling SWP exports at CCF and upstream releases from Lake Oroville in coordination

14 with the CVP's scheduling of pumping at Jones Pumping Plant and releases from Lake Shasta and

15 Folsom Lake in accordance with the Coordinated Operations Agreement (COA). The SWP and

16 CVP are sometimes referred to jointly herein as the Projects.

17 4.   I have personal knowledge of the facts stated herein, and, if called to do so, could and would

18 testify competently thereto.

19 5.   I have read and am familiar with Plaintiffs' Remedy Proposal. I have read and am familiar

20 with the Declarations of Christina D. Swanson, Ph.D. (Swanson Declaration) and Spreck Rosekrans

21 (Rosekrans Declaration), filed on July 23, 2007 in support of Plaintiffs' Remedy Proposal.

22 6.   I also have read and am familiar with the Declaration of Steven P. Thompson (Thompson

23 Declaration), filed on July 6, 2007 in support of Federal Defendants' Brief.

24 7.   I also have reviewed and am familiar with the Supplemental Declaration of Jerry Johns,

25 recommending some revisions be considered for incorporation into the Delta Smelt Action Matrix

26 for Water Year 2008, proposed by the United States Fish and Wildlife Service (USFWS Action

27 Matrix).

28 ///

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1   8.   As set forth in my July 9, 2007 Declaration, I worked with POPB staff to develop an

2   estimate of the water costs associated with implementation of the USFWS Action Matrix. As

3   also set forth in my July 9, 2007 Declaration, at paragraph 32, estimates were done using an

4   operational spreadsheet model developed by DWR staff in 1995 to estimate the delivery

5   capabilities of the SWP and CVP for the coming water year. The model is known as the Delta

6   Coordinated Operations Model (DCO Model). In order to estimate future delivery capabilities of

7   the Projects, current conditions, such as storage levels, as well as anticipated future hydrological

8   conditions are taken into consideration.

9   ANALYSIS OF PLAINTIFFS' WATER COST ESTIMATES

10 9.   I have reviewed the declaration of Mr. Rosekrans and the methodology he used to

11 estimate the water costs associated with Plaintiffs' Remedy Proposal. As noted in his

12 declaration, Mr. Rosekrans' methodology differs from the one I used to estimate water costs for

13 the USFWS Action Matrix in that Mr. Rosekrans' methodology applies the proposed remedy to

14 past hydrologic conditions whereas my methodology applies it to projected future conditions.

15 Rosekrans Declaration at ¶ 12 (Doc. 420). In addition, Mr. Rosekrans' methodology does not

16 take into consideration current reservoir storage levels. Finally, Mr. Rosekrans considered only

17 export reductions and did not estimate delivery reductions. Thus, while Mr. Rosekrans'

18 methodology may be adequate to assess export reductions associated with the Plaintiffs' Remedy

19 Proposal had it been applied over the past 27 years, his methodology is not necessarily adequate

20 to estimate all water costs, including delivery reductions, based on current conditions and

21 projected conditions for the interim period before a new biological opinion is issued.

22 10.   One critical difference in Mr. Rosekrans' methodology is that it does not take into

23 consideration the specific reservoir storages going into the fall of 2007. Water supply

24 forecasting requires a projection of initial reservoir storages and forecasted runoff as a

25 foundation to estimate deliveries. In implementing any of the proposed remedy actions, higher

26 water costs would occur when storage levels are lower than average, because more time and

27 water are needed to fill both upstream and south-of-Delta reservoirs.

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1 11.   Upstream storage, which includes Lake Shasta, Lake Oroville and Folsom Lake, is

2 operated to reserve flood control space in the event that a major storm drops heavy amounts of

3 precipitation, resulting in a surge of inflow that cannot be immediately passed downstream. If

4 initial reservoir storage is normal or high at the beginning of the rainy season and rain events

5 cause reservoir storage to near the level of this flood control space, the reservoir operators

6 increase releases to minimize encroachment into the flood control space. These increased

7 releases to the Delta either would be pumped at the Project exports or result in increased Delta

8 outflow. When initial reservoir storage is low, these releases may not be available to meet Delta

9 outflow objectives, such as would be required under Action 10 of Plaintiffs' Remedy Proposal.

10 12.   In the south-of-Delta reservoir storage, the Projects typically pump at as high a rate as

11 possible, beginning in the fall, to meet immediate demand and to fill San Luis Reservoir. Once

12 San Luis Reservoir is filled, the Projects reduce pumping to meet immediate demands only and

13 to maintain a full reservoir. San Luis Reservoir usually is filled in the middle of the winter when

14 water is plentiful. If San Luis Reservoir cannot be filled during this time, less water will be

15 available to make up for delivery reductions caused by implementing fish protection actions and

16 meeting water quality standards. This reduced water supply will result in overall higher water

17 delivery impacts throughout the year.

18 13.   Currently conditions in the Sacramento Valley are classified as "Dry" and conditions in

19 the San Joaquin Valley are classified as "Critical" as defined in the Sacramento Valley Index and

20 the San Joaquin Valley Index, respectively. See Exhibits A and B, attached to this Supplemental

21 Declaration. Statewide precipitation is 65% of average to date and runoff is 55% of average to

22 date. This year's snowpack was the smallest since 1988. San Luis Reservoir currently is at 20%

23 of capacity.

24 14.   Mr. Rosekrans' analysis also is based on an average of conditions instead of on actual

25 current conditions, resulting in an estimated lower export reduction from Plaintiffs' Remedy

26 Proposal than is likely to occur. For example, Mr. Rosekrans estimated that, between 2000 and

27 2006, "the average effect of the Plaintiffs' Remedy Proposal would be a reduction of 1,549

28 TAF." Rosekrans Declaration at ¶ 18 (Doc 420). However, average storage levels during that

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1   period were greater than the current storage levels going into the fall of 2007. Therefore, even if

2   the coming year is an average year, the impacts will be greater.

3   15.   Finally, Mr. Rosekrans considered only export reductions and did not consider the

4   resulting impacts to deliveries. As stated in my July 9 declaration, export reductions may result

5   in delivery reductions greater than one-to-one, especially if export reductions occur at critical

6   periods during the year. For example, during the high demand summer period, Delta exports

7   alone often are not enough to meet demand, but must be supplemented by releases from San Luis

8   Reservoir. Under Plaintiffs' Remedy Proposal, not only would Delta exports be limited during

9   this critical time, but only limited storage would be available in San Luis Reservoir because of

10 the cumulative effect of the previous export curtailments earlier in the year. This would magnify

11 the delivery shortage during the most critical demand period when most water contractors may

12 not have adequate alternative supplies to make up the difference.

13 16.   Attached to this Supplemental Declaration as Exhibit C is a table I prepared that

14 summarizes the differences in water costs between the Plaintiffs' Remedy Proposal and the

15 USFWS Action Matrix.

16   ESTIMATED EXPORT REDUCTIONS ASSOCIATED WITH

17   PLAINTIFFS' REMEDY PROPOSAL

18 17.   Using the DCO model that I used to analyze the water costs associated with the USFWS

19 Action Matrix, I estimated the export reductions that would result if the Plaintiffs' Remedy

20 Proposal were implemented.

21 18.   Plaintiffs' Actions 1 through 3, which are survey and monitoring proposals, are not

22 expected to result in reduced exports.

23 19.   Plaintiffs' Action 4 is a two-part action. The first part requires a restriction in export

24 increases to avoid negative flows on Old and Middle rivers (OMR) for a minimum of 10 days,

25 starting December 25. The second part requires the Projects to maintain OMR flows at >-3,500

26 cfs flows on a 5-day average, through February.

27 20.   For my analysis, I have assumed that the first part of Action 4 will begin December 25

28 and continue through January 3. During that period, this action is estimated to reduce exports by

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1   140 taf in a dry year and 200 taf in an average year.

2   21.   I have further assumed that the second part of Action 4 will begin on January 4 and

3   continue until February 20. During that period, this action is estimated to reduce exports by 260

4   taf in a dry year and 600 taf in an average year.

5   22.   Plaintiffs' Action 5, which requires that OMR flows be maintained at >-1,500 cfs on a

6   five-day average, is designed to extend from February through April 15. For my analysis, I have

7   assumed that Action 5 will begin on February 21 and continue through April 15. During that

8   period, this action is estimated to reduce exports by 280 taf in a dry year and 830 taf in an

9   average year.

10   23.   Plaintiffs' Action 6 calls for the implementation of the Vernalis Adaptive Mangement

11   Plan (VAMP). Because the Projects are required already to implement VAMP, no additional

12   export reductions are associated with this Action.

13   24.   Plaintiffs' Action 7 requires that OMR flows again be maintained at >-1,500 cfs on a

14   five-day average, beginning on May 15 (or end of VAMP) and continuing until June 15 "or a

15   minimum of 5 days after the last detection of larval or juvenile smelt at either the SWP or CVP

16   fish protective facilities by either the salvage or larval monitoring program, whichever comes

17   last." Mr. Rosekrans' analysis assumes Action 7 will end on June 15. Rosekrans Declaration at

18   16 (Doc. 420). However, the median date of the last detection of delta smelt at the Project

19   facilities since 1993, when smelt were first listed as threatened under the Endangered Species

20   Act, has been July 10. See Exhibit D to this Supplemental Declaration. Therefore, in my

21   analysis of Action 7, I have assumed that Action 7 will begin on May 15 and continue through

22   July 15. During that period, this action is estimated to reduce exports by 80 taf in a dry year and

23   700 taf in an average year.

24   25.   Plaintiffs' Actions 8 and 9, requiring that installation or operation of agricultural barriers

25   and the Head of Old River barrier be prohibited from December through June, is not anticipated

26   to result in any additional export reductions.

27   26.   Plaintiffs' Action 10 requires that X-2 be maintained upstream of 80 km (based on a 14-

28   day running average), beginning on September 1 and going through approximately December

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1   15. Implementation of Action 10 would require either substantial export reductions, substantial

2   upstream storage releases (resulting in reduced upstream storage), or a combination of both. In

3   my professional judgment, the most prudent way of modeling the potential impacts to the

4   Projects in the event DWR and USBR were required to implement Action 10 would be a

5   combination of export reductions and upstream storage releases. Using this combination of

6   measures, implementation of Action 10 is estimated to reduce exports by 350 taf in a dry year

7   and 490 taf in an average year. In addition, upstream storage would be reduced by 310 taf in a

8   dry year and 20 taf in an average year. Significant upstream storage releases to implement

9   Action 10 could impact the amount of cold water available for other fish species, including listed

10 steelhead, winter-run and spring-run Chinook salmon.

11   COMBINED SWP/CVP ESTIMATED DELIVERY REDUCTIONS

12   ASSOCIATED WITH PLAINTIFFS' REMEDY PROPOSAL

13 27.   As discussed above, and in my July 9 Declaration at ¶ 31, export reductions do not result

14 in a one-for-one impact on deliveries because of a multitude of complicating factors including

15 system constraints, runoff patterns, annual delivery patterns, and operational flexibility.

16 28.   My analysis shows that the Plaintiffs' Remedy Proposal will reduce the combined 2008

17 deliveries of the SWP and CVP in a dry year 1.423 million acre-feet (maf), or approximately

18 44%, from a baseline delivery of 3.2 maf.

19 29.   My analysis indicates that Plaintiffs' Remedy Proposal will reduce the combined 2008

20 deliveries of the SWP and CVP in an average year by 3.190 maf, or approximately 54%, from a

21 baseline delivery of 5.9 maf.

22   JUSTIFICATION FOR 14-DAY RUNNING AVERAGE FOR ACTIONS 2, 3 AND 4

23 30.   The 14-day running average proposed for Actions 2 and 3 of the USFWS remedy

24 proposal, in which DWR joins, represents the full lunar tidal cycle. The lunar tidal cycle is 14

25 days and fluctuates between approximately seven days of Delta "filling," during the spring tide,

26 followed by seven days of Delta "draining," during the neap tide. The 7-day average

27 incorporated into Actions 2 and 3 is intended to act as a damper to prevent extreme swings in

28 flows on a daily basis. A 14-day average also is consistent with the average used for

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1 determining whether water quality standards, such as D-1641, to which the CVP and SWP

2 operate, are being met. Looking at the entire lunar tidal cycle is more representative of what

3 actual net flows are occurring, in the case of flow requirements, and of actual salinity levels, in

4 the case of water quality standards.

5 31.   In addition, a 14-day average allows DWR and USBR to adapt to unpredictable

6 meteorological events. The effect of the moon on the tides can be predicted and compensated

7 for, to a certain extent. However, other meteorological effects, such as barometric pressure

8 changes, increased winds, and storm surge, are not very well understood or predictable and can

9 dramatically influence river flows, even to the point of overwhelming the lunar tidal cycle (i.e.,

10 these types of effects can force a negative OMR flow during neap tides).

11 32.   By contrast, Actions 4, 5 and 7 of the Plaintiffs' Remedy Proposal require that flows in

12 OMR be maintained at a certain level based on a five-day average. However, Plaintiffs' Remedy

13 Proposal does not take into account an entire tidal cycle or the meteorological effects. As

14 mentioned above, these meteorological effects can have a dramatic impact on river flows.

15 Therefore, in order to maintain the average flow requirements of Actions 4, 5 and 7 over a 5-day

16 period, DWR and USBR would have to target a flow objective significantly more positive than is

17 believed necessary to be protective of smelt, thus increasing the water supply impacts to the

18 Projects without a corresponding benefit to the smelt.

19 33.   In the April 2, 2007 notes of the DSWG that the DSWG recommended a 5-day average to

20 maintain flows between -5,000 cfs and -3,500 cfs, significantly higher than plaintiffs' proposed

21 maximum negative flows of -3,500 cfs for Action 4 and -1,500 cfs for Actions 5 and 7. Swanson

22 Declaration, Exhibit U (Doc. 421-6). In addition, the DSWG recommendation recognizes that

23 "OR/MR flows do vary over time because of natural causes" and "[t]he Group is not concerned

24 with small variations in the 5-day average." *Id.* Plaintiffs' Remedy Proposal does not allow any

25 variations.

26 34.   Finally, Dr. Swanson states that a >-1,500 cfs over a 5-day running average is supported

27 by Dr. William Bennett's analysis of the effects of the Vernalis Adaptive Management Plan

28 (VAMP) period and based on average OMR flows measured during VAMP between 1999-2005

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1   and 2007. Swanson Declaration, Appendix 2 (Doc. 421-2).

2   35.   The VAMP period is 31 days long. During the VAMP export, both Project exports and

3   flows on the San Joaquin River are held to a constant rate for a 31-day period between

4   approximately April 15 through May 15. The VAMP does not include flow objectives on OMR,

5   which can vary considerably during this time. As justification for the use of -1500 cfs for the

6   OMR flow objective, Dr. Swanson appears to have calculated the average OMR flows for eight

7   31-day periods (each VAMP period from 1999 - 2005 and 2007), not a five-day running average

8   over one VAMP period. Therefore, Dr. Swanson's reliance on averaged VAMP flows during

9   this period does not support an OMR flow objective of >-1500 cfs over a 5-day running average.

<div align="center">

CURRENT AND PAST PRACTICE FOR ALLOCATING

EXPORT REDUCTIONS BETWEEN CVP AND SWP

</div>

12   36.   In the Declaration of Steven P. Thompson, FWS proposes returning operations of the

13   CVP and SWP "to patterns that occurred in the late 1990's" (Thompson Dec. (Doc. 396-2) at ¶ 6)

14   and that "a return to such operational patterns would reduce total exports, on average, by

15   approximately 500,000 acre-feet in wetter years, with the majority of that reduction borne by the

16   SWP." Id.

17   37.   DWR proposes that, whatever interim remedy is ordered by the court, water costs

18   resulting from the interim remedy be allocated between the CVP and the SWP as has been the

19   recent practice for mandated changes in combined export operations, or as otherwise agreed

20   upon by DWR and USBR.

21   38.   Since the adoption of the 1995 Water Quality Control Plan (WQCP), the two Projects

22   have agreed that exports should be split equally under export restricted conditions. For example,

23   this sharing arrangement has been implemented with regard to the VAMP export period in

24   April/May and to the so-called "E/I ratio" standard introduced in the Water Quality Control Plan

25   (Decision 1641), which restricts the Projects to exporting a specific fraction of the Delta inflow.

26   39.   The operation of the Projects consistently has been described as equally sharing exports

27   under export restricted conditions in recent project descriptions. The Project operation modeling

28   for both the 2004 Biological Opinion and the work now underway for the updated Biological

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1   Assessment for the new Biological Opinion is based on the assumption that the Projects will

2   share restricted export pumping capacity equally.

3   40.   Restricting exports equally is supported by the fact that the CVP and the SWP influence

4   the OMR flows to an equal extent. As illustrated in Exhibit E to this Supplemental Declaration,

5   the entrances to the SWP and CVP intake channels are located approximately one mile apart.

6   Both the SWP and CVP divert from Old River and both are upstream of the Old River gaging

7   station. Thus, reducing exports from the SWP by, for example, 2,000 cfs, without reducing CVP

8   exports, will not improve the negative flow conditions in the OMR any more than if the SWP

9   and CVP each reduced exports by 1,000 cfs.

10   ESTIMATED WATER COSTS ASSOCIATED WITH

11   PROPOSED MODIFICATIONS TO USFWS ACTION MATRIX

12   41.·   Using the DCO model, I have analyzed the water costs associated with possible

13   modifications to the USFWS Action Matrix, as described in the Supplemental Declaration of

14   Jerry Johns, filed concurrently herewith. Exhibit F to this Supplement Declaration is a table that

15   summarizes the differences in export reductions and delivery reductions between the USFWS

16   Action Matrix and the USFWS Action Matrix if modified as proposed.

17   42.   For purposes of analyzing the water costs associated with the proposed modifications to

18   the USFWS Action Matrix, I made the same assumptions as set forth in my July 9 Declaration

19   for my analysis of the USFWS Action Matrix, modified where necessary to reflect the

20   modifications to the USFWS Action Matrix.

21   43.   Action 1 is not modified by the proposed modifications to the USFWS Action Matrix.

22   Therefore, I used the same assumption in analyzing export reductions. I assumed in the analysis

23   that Action 1 would be triggered and implemented as of December 25, 2007 and continue

24   through January 3, 2008. December 25 is described as the first possible day to trigger this

25   10-day Action in the USFWS Action Matrix.

26   44.   Action 2 is modified by the proposed modifications to provide for an OMR flow

27   objective of >-5500 cfs, compared with >-4500 cfs set forth in the USFWS Action Matrix.

28   However, the trigger dates remain unchanged. Therefore, my assumptions in analyzing export

1 reductions associated with Action 2 remain unchanged. I assumed in the analysis that delta

2 smelt spawning will occur on February 20, 2008. February 20 is the average date on which

3 DWR biologists have estimated that spawning has begun historically. This assumption

4 establishes the durations of Actions 2 and 3, which could vary significantly. The end of Action 2

5 and the trigger for the start of Action 3 is the onset spawning as described in the USFWS Action

6 Matrix.

7 45.   Actions 3 and 4 assume a range of flow objectives, both under the USFWS Action

8 Matrix and under the proposed modification. The proposed modification provides range of

9 OMR flows between -1500 and -4000 cubic feet per second (cfs) for Action 3, whereas the

10 USFWS Action Matrix assumed a range of flows between 0 and -4000 cfs.

11 46.   Modified Action 4 does not have targeted flow but allows a range similar to Modified

12 Action 3 (from -1500 to approximately -4000 cfs).

13 47.   Because Modified Actions 3 and 4 flow objectives are described as a range, I assumed a

14 range for water costs as well. The high end of this range assumes that the OMR flow objective is

15 -1500 cfs for both Modified Actions 3 and 4. For determining the lower costs in the range, I

16 assumed that Modified Action 3 is implemented at the -1500 cfs flow objective and Modified

17 Action 4 is not triggered, resulting in no water costs.

18 48.   This range of cost was necessary as part of the analysis because of the uncertainty

19 related to the real-time distribution of delta smelt and the susceptibility of this distribution to the

20 exports as noted in footnotes of the USFWS Action Matrix.

21   ESTIMATED EXPORT REDUCTIONS ASSOCIATED WITH

22   PROPOSED MODIFICATION TO THE USFWS'S REMEDY PROPOSAL

23 49.   Implementation of flow objectives pursuant to the proposed modification to the USFWS

24 Action Matrix will require reductions in export operations by the SWP and CVP.

25 50.   Action 1 - Winter Pulse Flow to Benefit Adult Spawning: CVP and SWP target OMR

26 flow not to exceed -2,000 cfs for a 10-day period during late December or early January. This

27 action is estimated to reduce combined project exports by 100 thousand acre-feet (taf) in a dry

28 year and 160 taf in an average year. This is unchanged from export reductions estimated under

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1 | the USFWS Action Matrix.

2 | 51.   Modified Action 2 - Adult Salvage Minimized: CVP and SWP target OMR flow not to

3 | exceed -5,500 cfs from early January to late February. This action is estimated to reduce

4 | combined project exports by 70 taf in a dry year and 400 taf in an average year.

5 | 52.   Modified Action 3 – Larval and Juvenile Protection: CVP and SWP target OMR flow

6 | between -4,000 cfs to -1500 cfs from late February through the end of May. This action is

7 | estimated to reduce combined project exports by 60 taf to 280 taf in a dry year and 630 taf to

8 | 1.02 million acre-feet (maf) in an average year.

9 | 53.   Modified Action 4 – Juvenile Protection: If triggered, the CVP and SWP may target

10 | OMR flow between -4000 to -1500 cfs in June. This action is estimated to reduce combined

11 | project exports up to 30 taf in a dry year and up to 260 taf in an average year.

12 | 54.   Action 5 - Barrier Operations: This Action remains unmodified from the USFWS Action

13 | Matrix. There were no additional export reductions associated with this action.

14 | COMBINED SWP/CVP ESTIMATED DELIVERY REDUCTIONS

15 | ASSOCIATED WITH MODIFICATIONS TO THE USFWS ACTION MATRIX

16 | 55.   I assumed in my analysis that both the SWP and CVP are equally responsible for meeting

17 | the objectives in the USFWS Action Matrix, if modified as proposed. The estimated delivery

18 | reductions provided below represent combined CVP/SWP delivery reductions.

19 | 56.   As noted above, export reductions do not result in a one-for-one impact on deliveries

20 | because of a multitude of complicating factors including system constraints, runoff patterns,

21 | annual delivery patterns, and operational flexibility.

22 | 57.   The resulting delivery reductions are expressed as a range for each hydrologic

23 | assumption for the same reason that the export reductions were expressed as a range. Modified

24 | Actions 3 and 4 have an adaptive management process that will vary the flow objective.

25 | 58.   The conclusion of the analysis is that the sum of all these export reductions in a dry year

26 | is expected to decrease combined 2008 deliveries of the SWP and CVP by 3% (84 taf) to 13%

27 | (415 taf) from a baseline delivery of 3.2 maf.

28 | ///

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1   59.   In an average year, the delivery reductions are expected to be between 8% (476 taf) to

2   24% (1.413 maf) from a baseline delivery of 5.9 maf.

3

4   I declare under penalty of perjury under the laws of the State of California that the

5   foregoing is true and correct.

6   Executed this 2nd day of August, 2007 at ___Sacramento___, California

7

8   JOHN LEAHIGH, Declarant.

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EXHIBIT A

To

LEAHIGH
DECLARATION

FIGURE 2

Sacramento Valley Water Year Hydrologic Classification
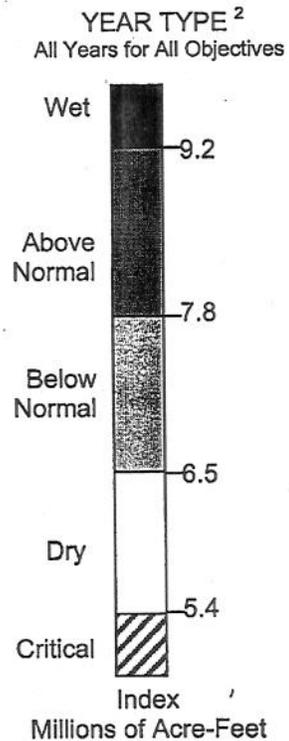
Year classification shall be determined by computation of the following equation:

$$INDEX = 0.4 * X + 0.3 * Y + 0.3 * Z$$

Where:

X = Current year's April – July Sacramento Valley unimpaired runoff

Y = Current October – March Sacramento Valley unimpaired runoff

Z = Previous year's index[1]

YEAR TYPE [2]
All Years for All Objectives

The Sacramento Valley unimpaired runoff for the current water year (October 1 of the preceding calendar year through September 30 of the current calendar year), as published in California Department of Water Resources Bulletin 120, is a forecast of the sum of the following locations: Sacramento River above Bend Bridge, near Red Bluff; Feather River, total inflow to Oroville Reservoir; Yuba River at Smartville; American River, total inflow to Folsom Reservoir. Preliminary determinations of year classification shall be made in February, March, and April with final determination in May. These preliminary determinations shall be based on hydrologic conditions to date plus forecasts of future runoff assuming normal precipitation for the remainder of the water year.

Wet

9.2

Above
Normal

7.8

Below
Normal

6.5

Dry

5.4

Critical

Index
Millions of Acre-Feet

Classification	Index Millions of Acre-Feet (MAF)
Wet.................	Equal to or greater than 9.2
Above Normal.....	Greater than 7.8 and less than 9.2
Below Normal.....	Equal to or less than 7.8 and greater than 6.5
Dry..................	Equal to or less than 6.5 and greater than 5.4
Critical..............	Equal to or less than 5.4

1 A cap of 10.0 MAF is put on the previous year's index (Z) to account for required flood control reservoir releases during wet years.
2 The year type for the preceding water year will remain in effect until the initial forecast of unimpaired runoff for the current water year is available.

EXHIBIT B

To

LEAHIGH DECLARATION

Exhibit B, taken from the 2006 Water Quality Control Plan
for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary

FIGURE 3

San Joaquin Valley Water Year Hydrologic Classification

Year classification shall be determined by computation of the following equation:

$$INDEX = 0.6 * X + 0.2 * Y + 0.2 * Z$$

Where: X = Current year's April – July
San Joaquin Valley unimpaired runoff

Y = Current October – March
San Joaquin Valley unimpaired runoff

Z = Previous year's index[1]

The San Joaquin Valley unimpaired runoff for the current water year (October 1 of the preceding calendar year through September 30 of the current calendar year), as published in California Department of Water Resources Bulletin 120, is a forecast of the sum of the following locations: Stanislaus River, total flow to New Melones Reservoir; Tuolumne River, total inflow to Don Pedro Reservoir; Merced River, total flow to Exchequer Reservoir; San Joaquin River, total inflow to Millerton Lake. Preliminary determinations of year classification shall be made in February, March, and April with final determination in May. These preliminary determinations shall be based on hydrologic conditions to date plus forecasts of future runoff assuming normal precipitation for the remainder of the water year.
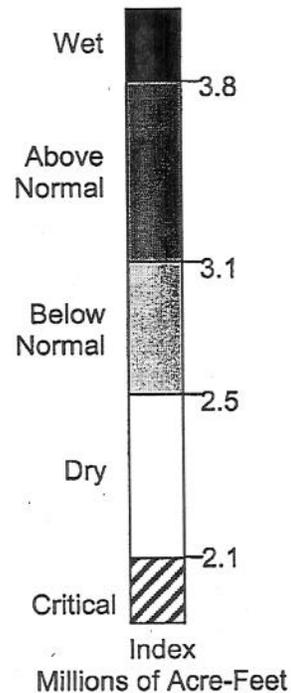
Classification	Index Millions of Acre-Feet (MAF)
Wet.................	Equal to or greater than 3.8
Above Normal.....	Greater than 3.1 and less than 3.8
Below Normal.....	Equal to or less than 3.1 and greater than 2.5
Dry...................	Equal to or less than 2.5 and greater than 2.1
Critical..............	Equal to or less than 2.1

YEAR TYPE [2]
All Years for All Objectives

Wet

— 3.8

Above Normal

— 3.1

Below Normal

— 2.5

Dry

— 2.1

Critical

Index
Millions of Acre-Feet

1 A cap of 4.5 MAF is put on the previous year's index (Z) to account for required flood control reservoir releases during wet years.

2 The year type for the preceding water year will remain in effect until the initial forecast of unimpaired runoff for the current water year is available.

EXHIBIT C

To

LEAHIGH
DECLARATION

Exhibit C

Water Cost Analysis

Plaintiffs' Remedy Proposal

Action #	Timing	Flow Objective	Export Reductions Average	Export Reductions Dry
1	All Year	Monitoring	No Cost	No Cost
2	Dec to Jul	Monitoring	No Cost	No Cost
3	Jan to May	Monitoring	No Cost	No Cost
4	Dec 25 to Jan 3	OMR > 0 cfs	200 taf	140 taf
	Jan 4 to Feb 20	OMR > -3500 cfs	600 taf	260 taf
5	Feb 21 to Apr 14	OMR > -1500 cfs	830 taf	280 taf
6	Apr 15 to May 15	VAMP	No Cost	No Cost
7	May 16 to Jul 15	OMR > -1500 cfs	700 taf	80 taf
8	Dec to Jun	No Ag Barrier Ops	No Cost	No Cost
9	Dec to Jun	No Head Barrier	No Cost	No Cost
* 10	Sep 1 to Dec 15	NDOI > 7500 cfs	490 taf	350 taf

Total SWP and CVP Delivery Reductions	Average	Dry
Annual Delivery Reduction	3190 taf	1423 taf
Percent Delivery Reduction	54%	44%

* Additional water releases from upstream storage required to meet Action 10
Total requirement is 20 taf for an average year and 310 taf for a dry year.

USFWS Action Matrix

Action #	Timing	Flow Objective	Export Reductions Average	Export Reductions Dry
-	No Equivalent Action			
-	No Equivalent Action			
-	No Equivalent Action			
1	Dec 25 to Jan 03	OMR > -2000 cfs	160 taf	100 taf
2	Jan 4 to Feb 20	OMR > -4500 cfs	500 taf	150 taf
	Feb 21 to Apr 14	OMR > 0 cfs	1010 taf	440 taf
3		OMR > -4000 cfs	540 taf	60 taf
	Apr 15 to May 15	VAMP with OMR > 0 cfs	50 taf	30 taf
		VAMP with OMR > -4000 cfs	0 taf	0 taf
	May 16 to May 31	OMR > 0 cfs	240 taf	30 taf
		OMR > -4000 cfs	100 taf	0 taf
4	Jun 1 to Jun 30	OMR > 0 cfs	350 taf	130 taf
		OMR > -4000 cfs		
5	Dec to Jun	No Ag Barrier Ops	No Cost	No Cost
	Dec to Jun	No Head Barrier	No Cost	No Cost
-	No Equivalent Action			

Total SWP and CVP Delivery Reductions	Average	Dry
Annual Delivery Reduction (-4000 cfs)	820 taf	183 taf
Percent Delivery Reduction (-4000 cfs)	14%	6%
Annual Delivery Reduction (0 cfs)	2170 taf	814 taf
Percent Delivery Reduction (0 cfs)	37%	25%

EXHIBIT D

To

LEAHIGH DECLARATION

Exhibit D

Analysis of Last Date of Delta Smelt Salvage by Banks PP and Jones PP

Year	Year Type	Last Salvage Date - All Year Types		
		Banks PP	Jones PP	Banks PP & Jones PP
1993	AN	27-Jul	5-Jul	27-Jul
1994	C	23-Jul	7-Jul	23-Jul
1995	W	8-Mar	12-Apr	12-Apr
1996	W	18-Jul	10-Jul	18-Jul
1997	W	23-Jul	3-Jul	23-Jul
1998	W	10-Jul	6-Jul	10-Jul
1999	W	26-Jul	12-Jul	26-Jul
2000	AN	26-Jul	16-Jul	26-Jul
2001	D	6-Jul	20-Jun	6-Jul
2002	D	23-Jun	5-Jul	5-Jul
2003	AN	23-Jun	1-Jul	1-Jul
2004	BN	1-Jul	29-Jun	1-Jul
2005	AN	17-Jun	20-Jun	20-Jun
2006	W	22-Apr	21-Mar	22-Apr
2007	D	18-Jul	1-Jul	18-Jul
	Median	10-Jul	3-Jul	10-Jul

Note. Year type is based on Sacramento Valley 40-30-30 Index.

EXHIBIT E

To

LEAHIGH
DECLARATION

Exhibit E

Sacramento River

San Francisco Bay

Old River at Bacon Island flow station

Middle River at Middle River flow station

Middle River

Middle River

Old River

N

Clifton Court Forebay

Clifton Court Intake SWP diversion

Jones Pumping Plant CVP diversion

Old River

Old River

Tracy

Stockton

San Joaquin River

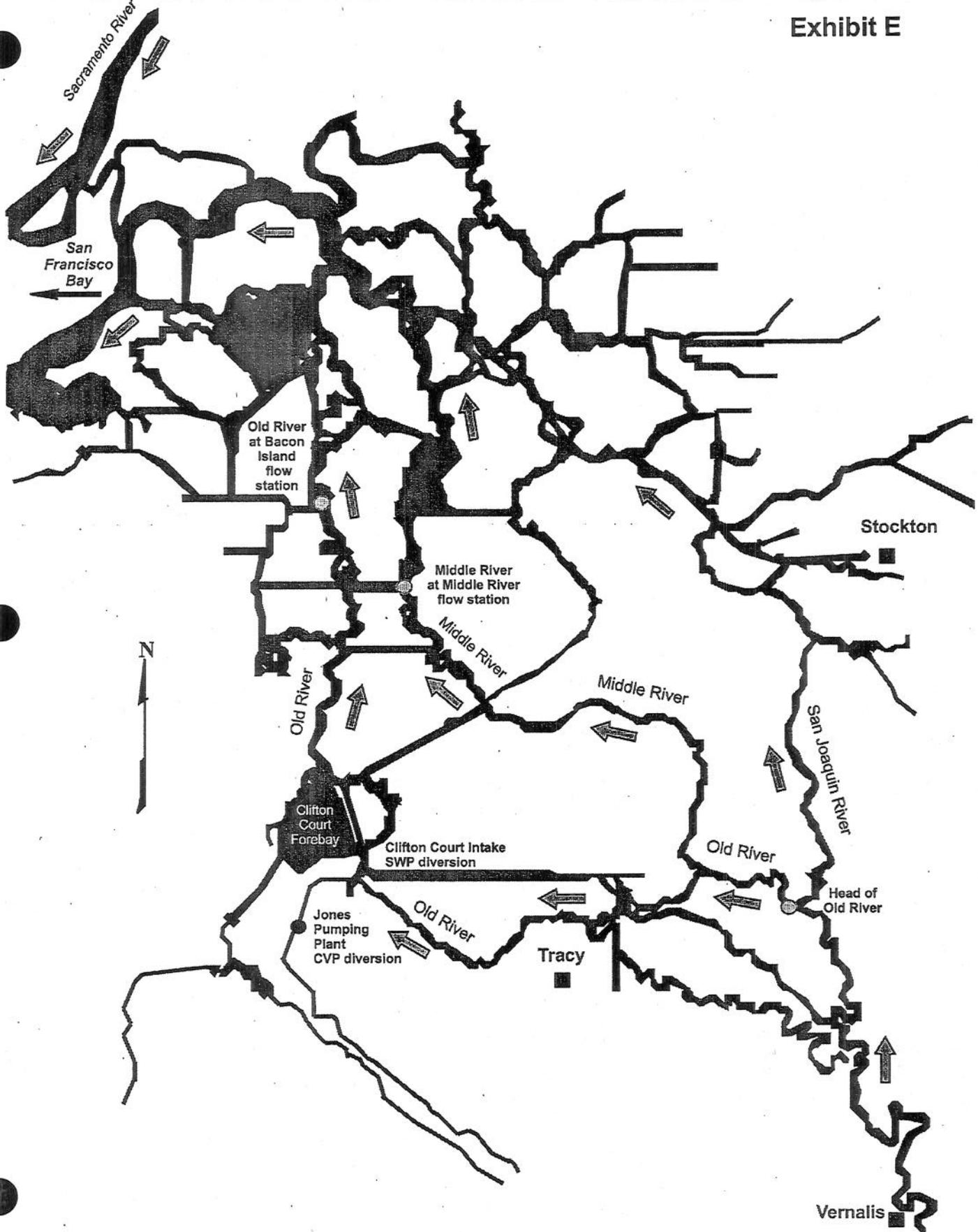Head of Old River

Vernalis

EXHIBIT F

To

LEAHIGH DECLARATION

Exhibit F

Water Cost Analysis

USFWS Action Matrix

Action #	Timing	Flow Objective	Export Reductions Average	Export Reductions Dry
1	Dec 25 to Jan 03	OMR > -2000 cfs	160 taf	100 taf
2	Jan 4 to Feb 20	OMR > -4500 cfs	500 taf	150 taf
3	Feb 21 to Apr 14	OMR > 0 cfs	1010 taf	440 taf
		OMR > -4000 cfs	540 taf	60 taf
	Apr 15 to May 15	VAMP with OMR > 0 cfs	50 taf	30 taf
		VAMP with OMR > -4000 cfs	0 taf	0 taf
	May 16 to May 31	OMR > 0 cfs	240 taf	30 taf
		OMR > -4000 cfs	100 taf	0 taf
4	Jun 1 to Jun 30	OMR > 0 cfs	350 taf	130 taf
		OMR > -4000 cfs		
5	Dec to Jun	No Ag Barrier Ops	No Cost	No Cost
	Dec to Jun	No Head Barrier	No Cost	No Cost

Total SWP and CVP Delivery Reductions

	Average	Dry
Annual Delivery Reduction (-4000 cfs)	820 taf	183 taf
Percent Delivery Reduction (-4000 cfs)	14%	6%
Annual Delivery Reduction (0 cfs)	2170 taf	814 taf
Percent Delivery Reduction (0 cfs)	37%	25%

Modified USFWS Action Matrix

Action #	Timing	Flow Objective	Export Reductions Average	Export Reductions Dry
1	Dec 25 to Jan 03	OMR > -2000 cfs	160 taf	100 taf
2	Jan 4 to Feb 20	OMR > -5500 cfs	400 taf	70 taf
3	Feb 21 to Apr 14	OMR > -1500 cfs	830 taf	280 taf
		OMR > -4000 cfs	530 taf	60 taf
	Apr 15 to May 15	VAMP with OMR > -1500 cfs	0 taf	0 taf
		VAMP with OMR > -4000 cfs	0 taf	0 taf
	May 16 to May 31	OMR > -1500 cfs	190 taf	0 taf
		OMR > -4000 cfs	100 taf	0 taf
4	Jun 1 to Jun 30	OMR > -1500 cfs	260 taf	30 taf
		OMR > -4000 cfs		
5	Dec to Jun	No Ag Barrier Ops	No Cost	No Cost
	Dec to Jun	No Head Barrier	No Cost	No Cost

Total SWP and CVP Delivery Reductions

	Average	Dry
Annual Delivery Reduction (-4000 cfs)	476 taf	84 taf
Percent Delivery Reduction (-4000 cfs)	8%	3%
Annual Delivery Reduction (-1500 cfs)	1413 taf	415 taf
Percent Delivery Reduction (-1500 cfs)	24%	13%