GREGORY K. WILKINSON, Bar No. 054809
STEVEN M. ANDERSON, Bar No. 186700
JASON M. ACKERMAN, Bar No. 219940
BEST BEST & KRIEGER LLP
3750 University Avenue, Suite 400
Riverside, California 92501
Telephone: (951) 686-1450
Fax: (951) 686-3083
Gregory.Wilkinson@BBKlaw.com

Attorneys for Defendant in Intervention
State Water Contractors

UNITED STATES DISTRICT COURT

EASTERN DISTRICT OF CALIFORNIA, FRESNO DIVISION

NATURAL RESOURCES DEFENSE COUNCIL, CALIFORNIA TROUT, BAYKEEPER AND ITS DELTAKEEPER CHAPTER, FRIENDS OF THE RIVER, and THE BAY INSTITUTE, all non-profit organizations,

Plaintiffs,

v.

DIRK KEMPTHORNE in his official capacity as Secretary of the Interior; and STEVEN A. WILLIAMS, in his official capacity as Director, U.S. Fish and Wildlife Service,

Defendants.

STATE WATER CONTRACTORS,

Defendant in Intervention.

Case No. 1:05-CV-01207 OWW LJO

DECLARATION OF CHARLES H. HANSON, PH.D. IN RESPONSE TO THE INTERIM REMEDY PROPOSALS OF DWR AND THE FEDERAL DEFENDANTS

Date: August 21, 2007
Time: 9:00 a.m.
Courtroom: 3

Judge: Honorable Oliver W. Wanger

I, Charles H. Hanson, declare as follows:

1. I am a principal in the firm of Hanson Environmental, Inc., located at 132 Cottage Lane, Walnut Creek, California. I have Bachelor of Science and Master of Science degrees in Fisheries Biology from the University of Washington, and a Ph.D. in Ecology and Fisheries Biology from the University of California at Davis. A copy of my professional qualifications has been submitted previously as Exhibit 1 to the Declaration of Charles H. Hanson, Ph.D. in Support of Intervenors' Joint Motion to Stay (Doc. 293).

2. I am familiar with the interim remedy proposals of the California Department of Water Resources (DWR) and the Federal Defendants in this proceeding, including the Delta Smelt Action Matrix for Water Year 2008 (Matrix) described in the Declaration of Jerry Johns in Support of the California Department of Water Resources' Interim Remedy Proposal, dated July 9, 2007, and the Declaration of Cay Collette Goude, dated July 3, 2007. I am also familiar with the fishery monitoring programs being conducted within the Delta to monitor the status and distribution of various fish species, including delta smelt, each year.

3. In the following sections I briefly describe (1) the methods, data, assumptions and uncertainties, and results of estimates of the delta smelt population abundance during the early summer 2007, (2) potential refinements to the Matrix that are intended to maintain the high level of delta smelt protection in the Matrix while adding flexibility to State Water Project (SWP) and Central Valley Project (CVP) operations to potentially reduce water supply impacts, and (3) my assessment of the likelihood that implementation of the Matrix actions and the possible refinements to the Matrix would avoid extinction and jeopardy to the delta smelt as a result of SWP and CVP operations in the interim period before a new Biological Opinion for the delta smelt is issued.

I. Delta Smelt Population Estimates

4. A number of researchers have explored opportunities to develop quantitative estimates of the population abundance of delta smelt inhabiting the Bay-Delta estuary. The approaches used by Bennett *et al* (2004), Miller (2005), Sitts (2007), and Hanson (2007), are all

similar in that they utilize the results of the California Department of Fish and Game's (CDFG) fishery sampling at various locations within the estuary (Exhibit 1) to develop estimates of the regional density (number of delta smelt per thousand m^3 of water) at each sampling site. A simple population estimate can then be derived based on multiplying the density of delta smelt times the volume of water within a region to estimate a regional abundance figure. These regional abundance figures can then be summed to derive an overall population abundance figure for the Delta.

5. Several investigators have refined the population estimates to take into consideration factors such as size-specific efficiency of the nets used by CDFG for collecting delta smelt (e.g., smaller delta smelt are frequently extruded through the mesh of the sampling net and therefore are underrepresented in the resulting estimate of fish density). The approach for estimating population abundance outlined above produces a rough estimate of the magnitude of delta smelt abundance during each of the various time periods encompassed by one or more of the CDFG fishery sampling events. The estimation process has a number of assumptions that influence the overall confidence that can be placed in the resulting population abundance estimates. These assumptions include, but are not limited to, (1) that delta smelt densities within a region are uniformly distributed throughout the region as well as vertically within the water column (e.g., the density of delta smelt reported from the CDFG fishery sampling is representative of the actual density within a specified region of the estuary); (2) that CDFG fishery sampling effectively collects a representative sample of delta smelt during each survey, including such factors as size-specific collection efficiency and that sampling in the upper portion of the water column is representative of delta smelt densities throughout the water volume; and (3) that CDFG fishery sampling is effective in accurately depicting the density of delta smelt, even in those regions of the estuary where delta smelt densities may be low and difficult to detect using conventional fishery sampling techniques.

6. In order to address these various assumptions, several of the investigators have refined population abundance estimates by (1) identifying specific regions or cells within the estuary encompassing CDFG fishery sampling stations to address issues associated with fishery

sampling being representative of the actual density of fish within a specific region of the estuary; (2) some investigators have made corrections to population abundance estimates to account for a vertical distribution of delta smelt within the water column; (3) some investigators have made corrections to the population estimates to reflect size-specific collection efficiency of the various sampling nets used by CDFG; and (4) some investigators have used correction factors, such as the density of delta smelt observed in the SWP and CVP fish salvage operations, to augment density estimates within the southern portion of the Delta where delta smelt densities may be low and difficult to detect using conventional CDFG fishery sampling techniques. Although each of these refinements to the population abundance estimate approach has merit, in many cases actual data are limited in their support of one or more of these assumptions. These various approaches for developing population abundance estimates for delta smelt were all evaluated and taken into consideration in developing the analytical approach and resulting delta smelt population abundance estimates presented below.

7. CDFG conducts fishery sampling within the estuary year-round that provides information on the status and geographic distribution of delta smelt, and other fish species, at a wide range of sampling sites (Exhibit 1) within the Delta. Rather than combine information from multiple fishery surveys using various sampling techniques, the estimates of delta smelt population abundance presented below have been derived solely using the CDFG 20 mm delta smelt survey data collected during the spring and early summer, 2007.

8. The latest CDFG 20 mm delta smelt survey was conducted between July 2 and July 7, 2007 and provides the most recent information on the status and population abundance of delta smelt available. Data from the 2007 20 mm delta smelt surveys were then used to calculate an estimated average delta smelt density within each of a number of regional areas (Exhibit 2) for each of the separate fishery surveys. The corresponding volume of water estimated to be present within each of the regional survey areas (Exhibit 3) was estimated using information from bathymetric surveys conducted within the Delta by the California Department of Water Resources (DWR) and US Geological Survey (USGS) as calculated using GIS-based mapping techniques. The resulting volumes of water estimated to be present within each of the designated regions of

the Delta are presented in Exhibit 3. For purposes of these calculations of delta smelt population abundance it was assumed that the average density of delta smelt within each region was uniformly distributed and was representative of the delta smelt density throughout the region. No additional corrections were made to account for either the vertical distribution of delta smelt within the water column or size-specific collection efficiency of the CDFG 20 mm sampling nets.

9. Based on results of the 2007 CDFG 20 mm delta smelt survey data, estimates of the abundance of larval and early juvenile delta smelt inhabiting the Delta during the spring and early summer of 2007 are shown in Exhibit 4 and Exhibit 5. Population assessments derived from these surveys show a marked increase in population abundance with the 20 mm survey conducted in mid-June, with a further increase in delta smelt abundance reflected in the CDFG survey results from early July. Based upon the most recent CDFG survey conducted between July 2 and 7, the estimated population of larval and early juvenile delta smelt (typically ranging in length from approximately 20 to 55 mm; Exhibit 6) is approximately 1.8 million individuals. Although confidence intervals have not been calculated for this delta smelt population estimate, it is recognized that there is a relatively high degree of uncertainty with respect to the absolute abundance of delta smelt inhabiting the Delta during 2007. However, the population abundance estimates presented above provide an indicator of the relative abundance of delta smelt inhabiting the estuary.

10. The above population estimate of 1.8 million individuals which is derived from the early July CDFG survey data compares with the corresponding estimate for the same survey period by Sitts (2007) of approximately one million delta smelt. The estimates derived using the methods presented above show a generally similar pattern to the estimates derived by Sitts (2007). Both estimates show a substantial increase in delta smelt abundance occurring during the survey period from mid-June through early July with both sets of population estimates exceeding one million individuals based on the early July surveys.

11. The receipt of the most recent mid-June through early July 20 mm survey data has substantially increased the estimate of the current population of delta smelt. A population estimate based on pre-June/July data would have been extremely low (Exhibit 4) and would have

increased the vulnerability of the smelt to significant impacts associated with various sources of mortality. With the increase in delta smelt abundance observed during late June and early July, it appears that the 2007 delta smelt population has higher abundance than earlier expected. This suggests that with higher population abundance, the 2007 delta smelt cohort will be more resistant and resilient to various factors affecting population dynamics, and that through implementation of various protective measures to reduce and avoid significant mortality during the remainder of the summer, fall, and winter, an increased abundance of adult delta smelt would be expected in the spawning populations during the winter and early spring of 2008.

12. The geographic distribution of delta smelt from the two most recent CDFG 20 mm surveys (Survey 8-Exhibit 7 and Survey 9-Exhibit 8) show that delta smelt currently inhabit the lower Sacramento River and Suisun Bay. No delta smelt were collected from the central or southern Delta, which contributes directly to a reduced vulnerability to the effects of SWP and CVP export operations. Delta smelt are expected to remain in the lower Sacramento River and Suisun Bay throughout the summer and begin movement upstream into the Delta and lower reaches of the rivers during the late fall and winter. The timing of interim actions designed to protect delta smelt is most important during the winter and spring when the fish inhabit areas of the estuary where they would potentially be vulnerable to export effects.

13. To provide a context for assessing the risk of significant impacts of SWP and CVP export operations on the delta smelt population, data was compiled from the USBR Mid-Pacific web page on the reported numbers of delta smelt in SWP and CVP salvage operations. The data have been summarized for the period from April 2006 through June 2007. The expanded number of delta smelt reported in the CVP salvage over this period has been 336 fish (greater than 20 mm) with a corresponding number of delta smelt in the SWP salvage of 1,673 fish. The combined expanded salvage loss for both the SWP and CVP export facilities between April 2006 and June 2007 is 2,009 delta smelt.

14. CDFG conducts a summer townet survey within the Delta that typically begins in July each year. Results of the first 2007 townet survey produced a delta smelt index that was comparable to the index in 2006 and slightly higher than the 2005 index for the same survey

period. These results are consistent with estimates of population abundance from the latest 20 mm survey in showing delta smelt abundance comparable to recent years and substantially higher than expected based on the low abundance estimates from the early 2007 surveys (Exhibit 4). Although a variety of factors influence the survival of delta smelt over the summer and fall (e.g., competition for limited food supplies, predation by native and non-native species, potential exposure to toxicants, etc.) the higher abundance of delta smelt observed in the latest 20 mm survey and the first summer townet survey are encouraging and would be expected to contribute to higher abundance of delta smelt in the fall midwater trawl survey and contribute to the adult spawning population next spring.

II. Potential Refinements to Matrix Implementation

15. In their interim remedy submittals, DWR and the Federal Defendants have outlined in the Matrix various proposed actions that would be implemented during the fall, winter, and spring to protect and reduce the potential effects of SWP and CVP export operations on delta smelt. I have reviewed the proposed Matrix actions, and although I agree with many of the underlying principles reflected in the Matrix, I have identified additional refinements to the implementation of the Matrix that could be considered. These refinements are intended to (1) increase the potential for reducing water supply impacts to the SWP and CVP, while; (2) maintaining or enhancing the level of protection offered to delta smelt during the interim period of SWP and CVP export operations before the federal delta smelt Biological Opinion is completed and approved. These refinements to the Matrix are briefly outlined below.

16. The framework for the possible modifications and refinements to implementation of Matrix actions is based on a three-tiers of nondiscretionary actions. Implementation of each of the tiers would be triggered by the results of fishery sampling within the Delta as well as results of salvage monitoring at the SWP and CVP export facilities to assess the performance and potential risk to delta smelt from adverse effects associated with project operations. Moving from Tier 1 to Tier 2, and subsequently to Tier 3, would result in progressively greater levels of direct protection through SWP and CVP export operations, but would also result in greater impacts to

water supply. In general, the Tier 1 management actions are intended to reduce and avoid the presence of various lifestages of delta smelt within central and southern Delta where they would be at risk of adverse effects associated with water project operations (e.g., preventative actions). The second tier of actions is designed to reduce the movement of delta smelt from the central Delta, (if they were to locate in that region despite the preventative actions undertaken in Tier 1), downstream through Old or Middle River towards the export facilities. In the event that delta smelt salvage is found to increase substantially despite the actions taken in Tiers 1 or 2, Tier 3 actions would involve an immediate short-duration reduction in either SWP and/or CVP export operations.

17. Implementation of the three tiers would occur by taking immediate nondiscretionary action in response to a triggering event associated with either a change in the geographic distribution of delta smelt that increases their vulnerability to direct export effects and/or an increase in salvage of delta smelt at either the SWP or CVP fish salvage facilities. Each of the tiered actions would be implemented for a specified period of time, providing an immediate increase in the level of protection of delta smelt, while additional data collection, modeling, analysis, and consultation proceeds among state and federal resources agencies and interested stakeholders. These efforts would be undertaken to determine, based on the current understanding of Delta hydrodynamics and the geographic distribution and occurrence of delta smelt, whether or not a given protective measure should be increased, decreased, or discontinued. The basic structure of the three-tiered approach for interim delta smelt protection is described below.

18. **Tier 1.** The Tier 1 management actions are intended to modify Delta hydrodynamics in such a way as to reduce or prevent the movement of various life-history stages of delta smelt into the central Delta. In response to delta inflows and export operations, net flows in the lower San Joaquin River and Three-mile Slough may be reversed (moving easterly) into the central region of the Delta (Exhibit 9 shows a conceptual illustration of reverse flows). It has been hypothesized that the geographic distribution of delta smelt would primarily occur in the lower Sacramento River and Suisun Bay, away from the area of increased vulnerability to export

operations, if net westerly flows were maintained in the low San Joaquin River during the winter and spring. Results of particle tracking modeling have been used to identify the potential change in delta smelt distribution and vulnerability to SWP and CVP export operations over a range of hydrologic conditions. The particle tracking model simulates the water transport of neutrally-buoyant particles through the Delta. The technical details of the model are beyond my expertise but are described in the accompanying Declaration of Armin Munevar. The particle tracking model is considered by biologists and other experts in the field to be a reliable method for predicting and analyzing the movement and fate of delta smelt larvae in the Delta under different hydrologic conditions. Results of these particle tracking modeling exercises indicate that, by maintaining a positive net westerly flow of water within the lower San Joaquin River through regulation of a combination of flow through the Delta Cross-channel, San Joaquin River flow, and SWP and CVP exports during the period extending from approximately December 1 through June 30, the vulnerability of sub-adult, adult, larval, and early juvenile lifestages of delta smelt to Project export effects can be substantially reduced or eliminated. Although management of a positive net westerly flow throughout the winter and spring appears, based on particle tracking model results, to be an effective tool in reducing the vulnerability of delta smelt to export-related losses while reducing overall water supply impacts, this management technique has not been tested under field conditions. In recognition of the uncertainty associated with the performance of Tier 1 hydrodynamic management actions, and to provide for delta smelt protection during the interim period, the proposed management framework specifies implementation of the Tier 1 actions beginning on December 1, and continuing throughout the remainder of the winter and spring, unless results of fishery monitoring and/or salvage monitoring show that the Tier 1 action has not been effective and delta smelt are distributed within the central or southern Delta. In that event, Tier 2 actions would be immediately implemented.

19. **Tier 2.** Tier 2 management actions would be implemented immediately in the event that fishery surveys or salvage monitoring demonstrate increased vulnerability of delta smelt to export-related effects. Tier 2 management actions are based, with some modification, on the Matrix of actions proposed by DWR and the Federal Defendants. The possible modifications

to the Matrix include (1) replacement of the short-duration action 1 with the Tier 1 hydrodynamic management described in paragraph 17 above; and (2) quantification of the flows within Old and Middle river identified under action 2 from a range of 0 to 4,000 cfs to a range of -1,000 to -6,000 cfs. Potential modifications to the Matrix are shown in redline format in Exhibit 10. The basis for the potential modifications to the Old and Middle river reverse flows from 0 to -1,000 cfs is the fact that other water diversions within Old and Middle river that are not related to SWP or CVP export operations also affect the magnitude and direction of flow within Old and Middle river. The modification of Old and Middle river flows from -4,000 to -6,000 cfs is based upon results of analyses prepared by DWR as presented in the declaration of Jerry Johns (Exhibits B and C) that show a threshold response between delta smelt salvage and the magnitude of Old and Middle river reverse flows with very little increase in salvage as reverse flows increase from 0 to approximately -6,000 cfs, followed by a sharp increase in delta smelt salvage as reverse flows began to exceed -6,000 cfs. Although there is only a small incremental biological benefit of modifying Old and Middle river reverse flows within the range up to approximately -6,000 cfs, there is a substantial water supply benefit associated with increasing allowable reverse flows to -6,000 cfs. As noted above, the potential interim operations, if Tier 2 management actions are triggered, would be nondiscretionary and would be implemented immediately with management targeted at the least restrictive end of the allowable range, to provide increased protection for delta smelt while also reducing water supply impacts, with subsequent analysis and discussion focused on whether or not the geographic distribution of delta smelt and the risk of adverse effects associated with SWP and CVP export operations warrants more restrictive operating conditions.

20. Decisions regarding the level of restriction for Tier 2 management actions would be in accordance with a water supply increment of 500,000 acre-feet, as proposed in the Declaration of Steven P. Thompson, of the U.S. Fish and Wildlife Service. In the event that management actions implemented under Tier 2 exhaust the 500,000 acre-foot increment, additional water supplies would be made available, if needed, to provide continued or enhanced protection of delta smelt. The allocation of additional water resources above the 500,000 acre-

foot initial increment would be predicated on a finding by the US Fish and Wildlife Service that delta smelt are near the level of jeopardy and that without further protection on an interim basis would experience a high risk of possible extinction. Information used to assess the level of risk to the delta smelt population would include, but not be limited to, current projected hydrologic conditions within the Delta, the magnitude of previous and ongoing delta smelt salvage at the SWP and CVP export facilities, and the estimated population abundance of delta smelt, as determined through analysis of fishery survey results produced by CDFG and analyzed in a manner similar to that described above for estimating delta smelt population abundance.

21. **Tier 3.** Despite the protective actions identified in Tier 1 and Tier 2, there is some risk that delta smelt may potentially occur within the central and southern Delta and be vulnerable to substantially increased levels of incidental take as a direct result of SWP and/or CVP export operations. In the event that results of routine salvage monitoring at the SWP or CVP export facilities shows a dramatic increase in the number of delta smelt salvaged (e.g., increased by a factor of 10 over the average of the three preceding days of salvage) exports at one or both of the facilities could be immediately curtailed to a minimum level necessary to meet health and safety requirements. Export curtailments could continue for a period of four days during which time additional analyses and assessment of the available information would be undertaken and a decision made as to whether or not exports at one or both of the facilities should be increased or should remain at restricted levels. The temporary reduction in exports would be nondiscretionary and would occur immediately in response to results of salvage monitoring.

22. To reduce the possibility that Tier 3 actions would need to be implemented, a temporary physical inter-tie between the SWP and CVP export facilities has been identified as a potential management tool that would allow preferential export operations by either of the diversion facilities in an effort to minimize water supply impacts while also providing the specified level of protection for delta smelt. For example, during much of the spring 2007 the occurrence of delta smelt in salvage operations was higher at the SWP salvage facility when compared to the CVP salvage facility. In the event that a similar difference in delta smelt vulnerability to salvage operations is detected during the interim period of operations, it would be

desirable to preferentially operate the diversion with the lowest vulnerability of delta smelt while continuing to supply water to meet demands within both the SWP and CVP service areas. The feasibility of designing and constructing a temporary inter-tie between the SWP and CVP facilities during the interim operation period is uncertain due to time requirements for engineering design, environmental review and permitting, and construction. The inter-tie is a non-essential component of the proposed implementation plan for Tier 3 activities. However, if the inter-tie could be constructed, it would offer increased flexibility in diversion operations, an improved opportunity to preferentially continue water exports while reducing the vulnerability of delta smelt to salvage, and reduce the overall water supply impacts associated with interim operations.

23. **Monitoring.** As discussed above, CDFG routinely conducts fishery monitoring within the Delta that provides important information that can be used in triggering and managing interim actions designed to protect delta smelt. During the spring, CDFG conducts 20 mm delta smelt surveys at a frequency of approximately twice per month. During the remainder of the year, the majority of fishery surveys are conducted monthly. During critical seasonal periods, monthly information on the geographic distribution and relative abundance of delta smelt may not be adequate to inform management actions and decisions with respect to either the protection of delta smelt or SWP and CVP export operations. As part of a potential interim operations plan, the current CDFG fishery monitoring activities could be modified to provide the necessary information for use in assessing the geographic distribution and potential vulnerability of various life-history stages of delta smelt to export-related effects. The key fishery surveys used to inform management decisions as part of the interim operations include the 20 mm delta smelt surveys conducted during the late spring and early summer, the fall midwater trawl surveys conducted during the fall and early winter, and the winter-spring Kodiak trawl surveys designed to assess the geographic distribution of adult pre-spawning delta smelt. During these key time periods, fishery monitoring should be flexible to accommodate more frequent monitoring, if needed, for use as a basis in making management decisions (e.g., sampling approximately 2-week intervals over all or a part of the Delta depending on the geographic distribution of delta smelt).

///

24. **Continued Refinement of Interim Operations and Adaptive Management**

In recent years, there has been a substantial increase in the level of fishery sampling, data analysis, hypothesis testing, and the evaluation of various alternative hydrologic conditions on the geographic distribution and potential vulnerability of delta smelt to the effects of SWP and CVP export operations. Results of recent analyses, such as those derived for delta smelt salvage as a function of reverse flow in Old and Middle river, as discussed under Tier 1 actions, are continuing to be developed and refined. The possible interim operations plan outlined above provides a framework for a series of non-discretionary actions to be implemented to protect various life-history stages of delta smelt based upon the best available scientific information. As new information and analyses become available over the next several months, the collaborative discussions among resource agencies, water supply agencies, and interested stakeholders including the State Water Contractors should continue. These discussions may further refine the appropriate triggers for determining management actions within the framework described above, identify appropriate levels of fishery monitoring necessary to accurately assess the geographic distribution and abundance of delta smelt, lead to improvements in the ability to estimate delta smelt abundance and to integrate available real-time hydrologic monitoring information, turbidity monitoring, and other information within the framework of interim actions, and help identify other improvements and modifications that can made to the Matrix. These collaborative discussions aid in evaluating the relationship between incidental take as a result of SWP and CVP export operations on the overall population dynamics and abundance of delta smelt as part of an ongoing effort to assess the relative risk of SWP and CVP export operations on the delta smelt population. The State Water Contractors are committed to continuing to participate with the California Department of Fish and Game, US Fish and Wildlife Service, National Marine Fisheries Service, California Department of Water Resources, and US Bureau of Reclamation, as well as other interested parties, in further refining the proposed interim operations plan for delta smelt protection during 2008.

///

///

III. **Risks of Extinction and Jeopardy**

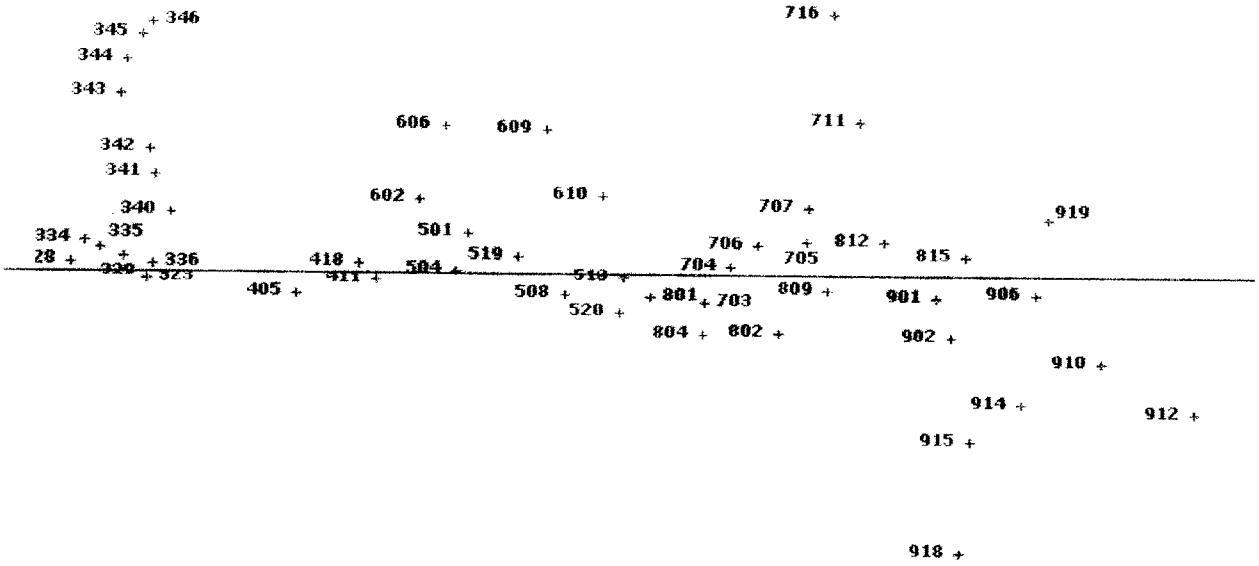
25. The Action Matrix proposed for implementation during the interim period by DWR and the Federal Defendants does not appear to be based on the most recent 20 mm delta smelt survey data or the data available from the summer townet survey. Nevertheless, the proposed Action Matrix is expected, in my opinion, to be protective of delta smelt and avoid jeopardy of the species to extinction in 2008 as a result of SWP and CVP operations. The Action Matrix, however, does not take advantage of protective measures such as managing for a net westerly flow during the winter and spring that are also expected to protect delta smelt while reducing potential water supply impacts. The Matrix is also overly prescriptive and does not take advantage of current information on hydrological conditions within the Delta or results of fishery surveys that provide information on the actual geographic distribution, population abundance, or risk of adverse effects directly associated with SWP and CVP operations. The interim approach proposed by DWR and the Federal Defendants can be modified to be more responsive to actual current conditions (adaptive) affecting the vulnerability of delta smelt to export effects while maintaining the high level of protection with a potentially reduced impact on water supplies.

26. The potential framework for interim operations during 2008 to protect delta smelt is based on a tiered operation strategy that balances the level of uncertainty in the performance of various management actions designed to protect delta smelt with flexible operations designed, to the extent feasible, to reduce water supply impacts. The interim operational framework embraces the scientific concepts embodied in the US Fish and Wildlife Service and Department of Water Resource Action matrix, with modifications, while adding additional non-discretionary actions designed to avoid and minimize the occurrence of delta smelt within the central and southern Delta (Tier 1) and to respond through dramatic short-duration reductions in export operations in the event that delta smelt salvage begins to rapidly increase (Tier 3). The potential interim operational framework also provides an opportunity to continue collaborative discussions and analyses with state and federal resource agencies to further refine specific aspects of the proposal, including specific definitions of each of the triggering events and the associated biological and

physical monitoring that would be necessary to fully implement and evaluate the performance of the interim actions, during 2008. Based upon the tiered approach to interim operations, and the expected level of biological protection that would be afforded delta smelt during the interim period, in combination with the recent evidence of increased larval and early juvenile delta smelt population abundance during July 2007 it is my opinion that the modifications to the Action Matrix, described above, are adequately protective to avoid jeopardy to delta smelt during 2008 and the risk of population extinction as a result of SWP and CVP export operations. It should be acknowledged, however, that a wide variety of other factors may influence the population dynamics and viability of delta smelt within the estuary that are independent of SWP and CVP export operations. These factors include, but are not limited to, the effects of chronic and acute exposure to toxics and contaminants, vulnerability to entrainment at a large number of water diversions located throughout the Bay-Delta estuary, predation and competition with non-native species for available food supplies, changes in the species composition, abundance, and distribution of phytoplankton and zooplankton within the estuary that form the foundation of the trophic food web, and other factors. Any or all of these factors may influence the population dynamics and viability of delta smelt during the interim operational period, but not under the control or authority of either the SWP or CVP. The potential modifications to the Action Matrix described above have been specifically designed to substantially reduce the incremental contribution of export effects during 2008 to the cumulative effects of other factors affecting the delta smelt population.

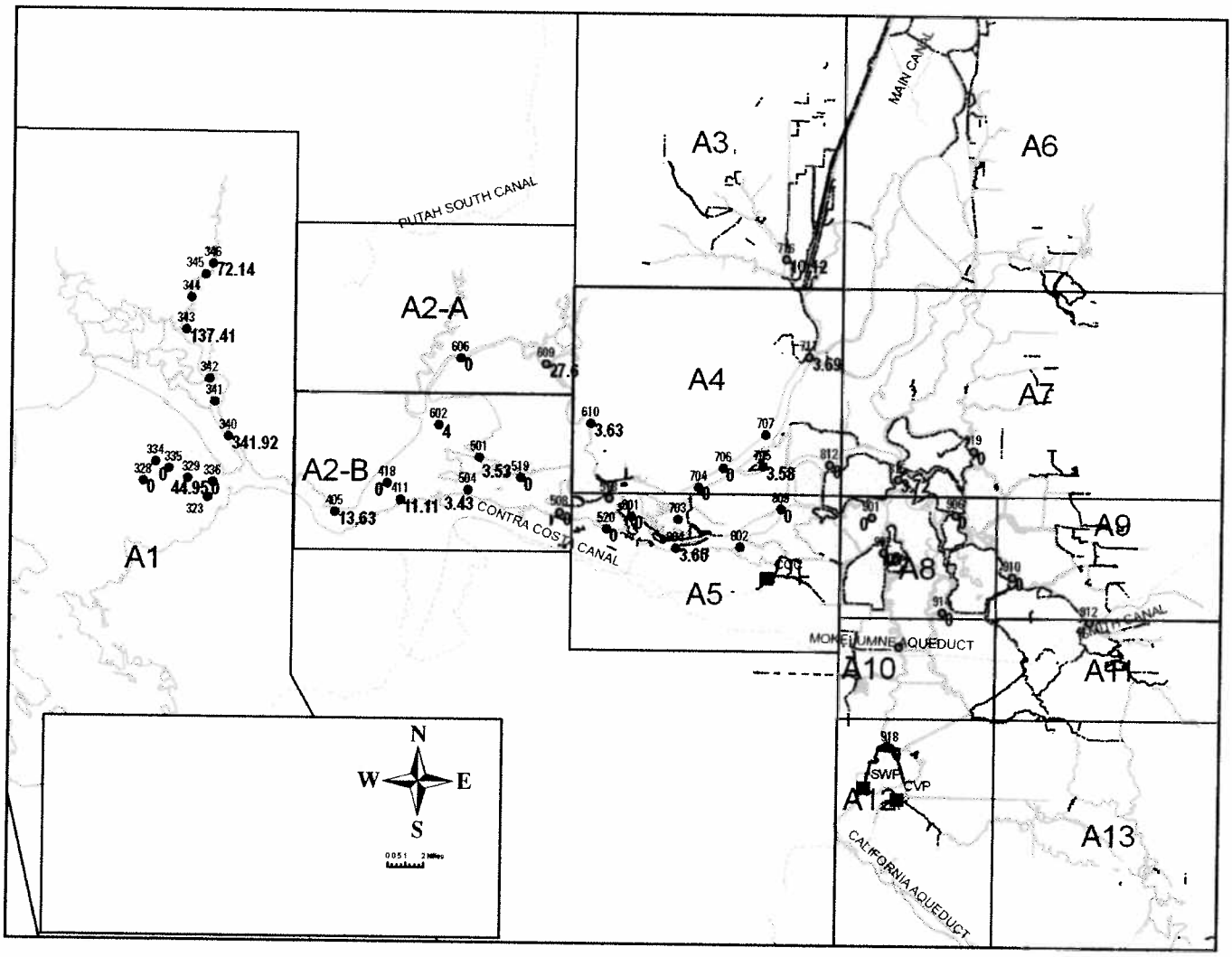
I declare under penalty of perjury that the foregoing is true and correct. Executed at Sacramento California, on July 23, 2007.

CHARLES H. HANSON, Ph.D.



CDFG 20 mm sampling sites.

Exhibit 1



Grid sections delineating the Delta used to estimate delta smelt populations

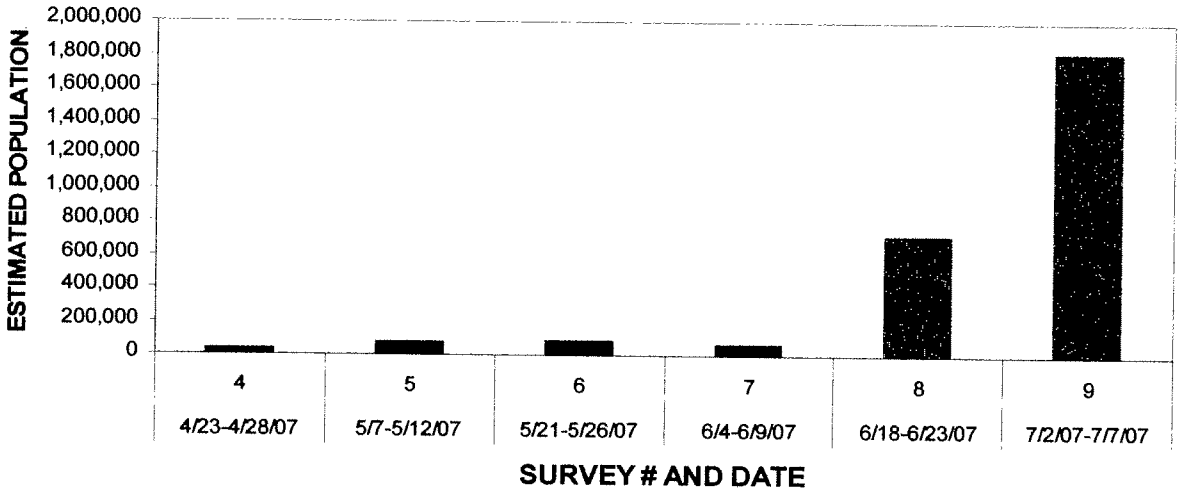
Exhibit 2

NAME	AREA Square Feet of Division	AREA Square Feet of Division Occupied by Bathymetry	Volume, Acre, Feett
A2-B	3902268716	1273130000	518,442.1
A2-A	4191923895	132762000	43,445.8
A1	42872769412	10840800000	5,216,540.8
A4	4981024099	365539000	205,405.8
A7	7204367506	282268000	112,946.3
A6	18817548200	207162000	76,999.1
A8	1703693112	376055000	129,529.3
A9	2521865063	76472300	24,853.2
A10	1393921511	79857400	24,331.4
A12	3233010579	148808000	32,579.0
A11	2114471519	38463300	12,613.4
A13	4811036332	43400500	7,193.4
A5	3761689630	582285000	245,533.4
A3	12949676323	108575000	43,140.0

Formula used to estimate delta smelt population:

$\sum$ (water volume[AF] per grid section * average CPUE [AF] per grid section) = estimated population in the Delta

Exhibit 3



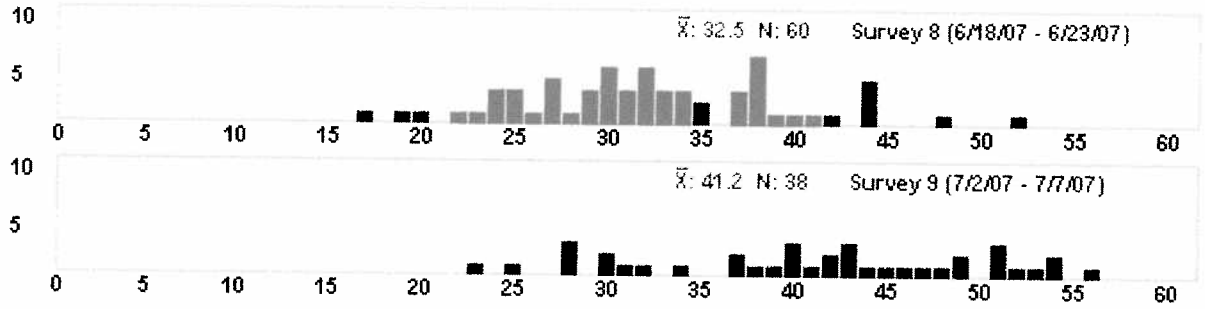
Estimated delta smelt population based on surveys 4-9 from the 20mm survey, 2007.

Exhibit 4

Estimated delta smelt population based on surveys 4-9 from the 20mm survey, 2007.

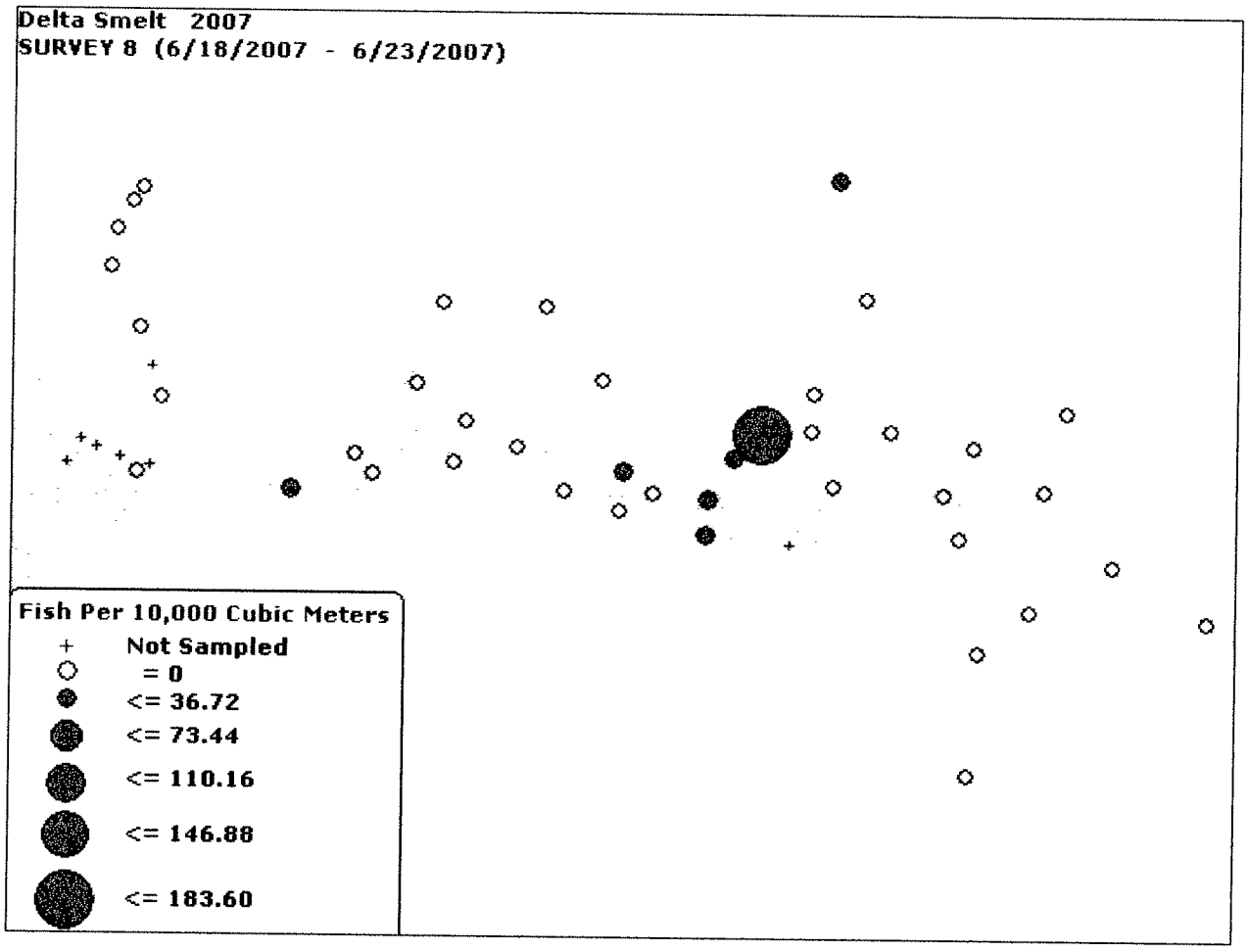
DATES	SURVEY	(no efficiency correction factor) ESTIMATED POPULATION
4/23 - 4/28/07	4	41,824
5/7 - 5/12/07	5	85,035
5/21 - 5/26/07	6	93,393
6/4 - 6/9/07	7	69,986
6/18 - 6/23/07	8	723,304
7/2/07 - 7/7/07	9	1,826,609

Exhibit 5



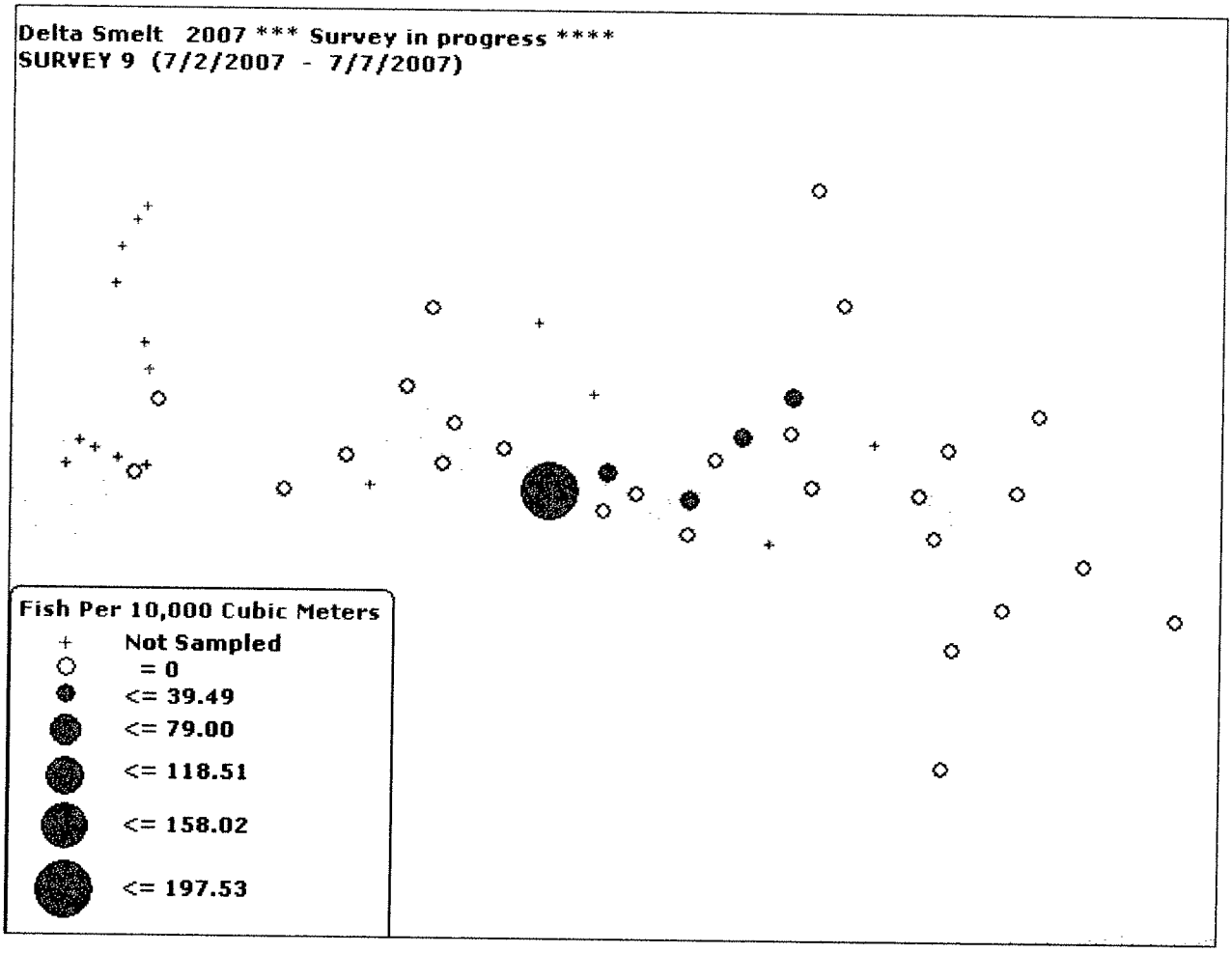
Length frequency graphs showing sizes of delta smelt in surveys 8 and 9.

Exhibit 6



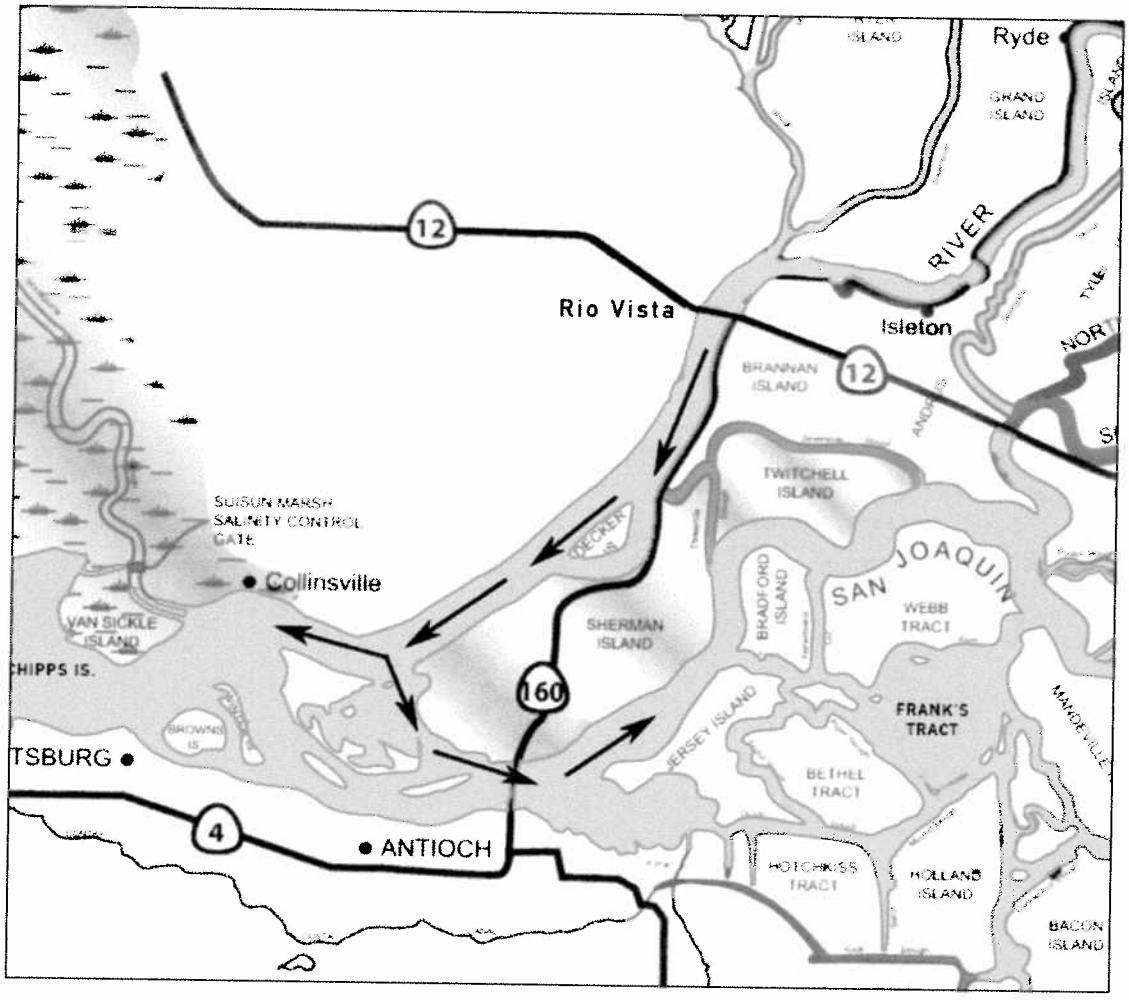
Distribution and density of delta smelt in CDFG 20mm Survey 8, conducted June 18-June 23, 2007.

Exhibit 7



Distribution and density of delta smelt in CDFG 20mm Survey 9, conducted July 2-July 7, 2007.

Exhibit 8



Conceptual representation of reverse flows in the lower San Joaquin River.

Exhibit 9

~~Exhibit A~~

Proposed refinements to the USFWS Delta Smelt Action Matrix for Water Year 2008 ~~(7/3/07)~~

Action #	Timing	Lifestage	Action	Triggers	End of Action	Benefits to delta smelt
1	Winter	Adults	~~Within 3 days of the trigger, achieve an average net daily upstream Old and Middle River (OMR) flow not to exceed 2,000 cfs for a 10-day period (one-time action)~~[1] Replaced by Tier 1 action	~~On or after December 25 contingent on when turbidity threshold is greater than 12 Nephelometric Turbidity Unit at Prisoners Point, Holland Tract, or Victoria Island unless the three-day average Sacramento River flow at Freeport is greater than~~	~~After 10 days of if the three-day Sacramento River flow at Freeport increases to greater than 80,000 cfs during the 10 days, or the onset of spawning~~[2] ~~or when water temperatures reach 12 C.~~[3]	~~Pulse flow for pre-spawning adult smelt to minimize movement into the south Delta where they would be entrained~~[4] ~~and their offspring would also be entrained.~~[4] ~~The goal is to maximize the number of smelt that spawn north of the confluence where their~~

[1] ~~Action #1 may be the first action or it may follow or be concurrent with Action #2.~~

[2] ~~The onset of spawning is indicated by the presence of spent females collected in Spring Kodiak Trawl OR at the salvage facilities.~~

[3] ~~Delta water temperature will be determined based on a three-station average of the water temperatures at the Mossdale, Antioch and Rio Vista monitoring stations.~~

[4] ~~A pulse flow based on the "first flush" conceptual model, developed by the DSWG in meeting notes from 10/10/06, but based on salvage triggers (an analysis prepared by Dr. Mike Chotkowski, USBR, unpublished data available from the author or from the Service) and Particle Tracking Modeling (PTM).~~

				~~80,000 cfs during the period.~~		~~offspring are less susceptible to entrainment at the facilities.~~
2	**Winter**	**Adults**	**Daily net upstream OMR not to exceed ~~4,500~~6,000 cfs.[5] The flow will be a 14-day running average. Simultaneously, the 7-day running average will not exceed ~~5,000~~ 6,500cfs.**	**~~Immediately following action #1 or beginning January 15 unless the three-day average Sacramento River flow at Freeport is greater than 80,000 cfs.~~ Implement based on occurrence of pre-spawning adult delta smelt in Central Delta and/or salvage.**	**The onset of spawning[2] ~~or~~ when Delta water temperatures reach 12 C.[3]**	**To minimize the number of pre-spawning adult smelt entrained at the facilities and to avoid spawning in the south Delta where their offspring could be entrained.**

[5] ~~Net upstream OMR flow is based on Peter Smith's (PE, USGS) relationship (unpublished data available from the author or from the Service).~~
[6] ~~Typically, the range of 0 to 4,000~~ ~~1,000 to 6,000cfs would be the net upstream OMR flow.~~

3	**Winter/Spring**	**Larval/Juvenile**	**Target daily net upstream OMR flow of ~~0-4,000~~ -1,000 to 6,000 cfs.[6] As described in Attachment A to this Exhibit, actual flow to be determined based on the real-time data estimating spawning distribution and the susceptibility of a substantial portion of the population to the effects of project operations based on particle tracking model results or other real-time data.**	**Initiate the action at the onset of spawning[2] or when water temperatures reach 12 C.[3] ~~This action may be modified or unnecessary if the distribution for spawning delta smelt,~~ if larvae and juveniles ~~is not~~ occur~~ring~~ south or east of Frank's Tract ~~and flows in the Yolo Bypass have reached the lower end of the bypass~~.**	**Until entrainment risk is abated ~~(see Attachment B to this Exhibit)~~ or June ~~1~~30, whichever occurs first.[7]**	**To minimize the number of larval smelt entrained at the facilities.**

[7] ~~VAMP conditions as described in Water Rights Decision 1641 are assumed to occur during this period.~~

			The flow will be a 14-day running average. Simultaneously, the 7-day running average shall be within 500 cfs of the applicable 14-day running average.			
4	**Spring/Summer**	**Juvenile**	**Evaluation of real-time delta smelt data to recommend an action to protect juvenile smelt.**	**Based on real-time information, starting June 1. Evaluation of conditions to start Action 4 will begin May 15.**	**Until entrainment risk abated ~~(See Attachment B to this Exhibit)~~ or June 30.**	**Potentially provide additional protections to delta smelt. Effects of listed salmon, steelhead, and green sturgeon will be incorporated into the decision-making process.**

5	**Spring**	**Larval/Juvenile**	**No installation of Spring Head of Old River Barrier and flap gates tied open on south Delta agricultural barriers.**	**31 day period of increased San Joaquin River inflow and reduced export pumping outlined in Water Rights Decision 1641.**	**End of VAMP[7]**	**To allow a greater proportion of the San Joaquin River to contribute to a more positive OMR flow to allow smelt to move to the confluence.[8]**

Exhibit 10

[8] ~~Based on PTM produced for the DSWG by DWR modeling staff – see DSWG notes 3/26/07 at http://www.fws.gov/sacramento/es/delta_smelt.htm.~~