

State Water Resources Control Board

Workshop Regarding Pelagic Organism Decline in the San Francisco Bay / Sacramento-San Joaquin Delta Estuary

Presented By
State Water Contractors

January 22, 2008

- Since the State Board's June 19, 2007 workshop on POD issues, a number of events have occurred:
 - Continued development of BDCP
 - Release of Delta Vision Report
 - Trial and issuance of Remedial Order in NRDC v. Kempthorne, Case No. 1:05-CV-01207 OWW
- While each of these matters is significant, the ruling in NRDC v. Kempthorne, in our view, has the most relevance to this workshop.

THE TRIAL

- Difficult to summarize two weeks of trial testimony in a few sentences.
 - Smelt abundance is way down.
 - While the CVP / SWP may contribute to declining abundance, other factors do too.
 - Toxics
 - In-Delta diversions
 - Exotic species
 - Food shortages
 - Predation

THE COURT'S DECISION

- First, the Court remanded the 2005 smelt BiOp, but did so “without vacature” – thus keeping in place the ITS necessary for project operations – and required FWS to produce a new BiOp by a date certain – 9/15/08.
- Second, the Court found that “the decline of Delta smelt is the result of multiple factors.” According to the Court, these include:
 - a) The presence of toxic materials, such as pesticides, in the Delta;
 - b) An overall reduction in zooplankton that are the food of the smelt;

- c) Introduction and propagation of invasive species (Asian clam);
 - d) Unscreened agricultural diversions on the Delta;
 - e) Power plant diversions;
 - f) Modification to the hydrology of the Delta and Estuary;
 - g) Operations of the CVP and SWP (as well as other water diversions within the Delta).
- Third, the Court granted a preliminary injunction that will substantially alter only one of the foregoing factors; viz., project operations. To this end, the Court required:

More Monitoring

- More intensive monitoring to determine the presence of smelt.
- Reclamation to increase the frequency of monitoring at the Jones P.P.
- Reclamation and DWR to monitor for the presence of larval / juvenile smelt at the SWP / CVP P.P. whenever diversions are occurring; whenever smelt begin spawning; when water temperatures reach 12°C; or when larval smelt detected in the 20 mm survey.

Flow Limitations

- Winter Pulse Flows. After 12/25, when turbidity increases at Prisoners Pt., Holland Tract or Victoria Canal, Reclamation / DWR to modify project operations to achieve average upstream flows not greater than 2,000 cfs for a 10-day period.
- Pre-Spawning Adult Limitations. Immediately following conclusion of the winter pulse flow action (or 1/15 – whichever is earlier), the SWP / CVP to achieve OMR flows not greater than 5,000 cfs (on 7-day running average) until the on-set of smelt spawning.

Flow Limitations (continued)

- Larval and Juvenile Smelt Limitations. Once spawning begins, SWP / CVP to achieve daily average net upstream OMR flows not greater than 750 to 5,000 cfs (on a 7-day running average). The specific flow within this range to be set by USFWS in consultation with Reclamation / DWR based upon status and distribution of smelt. Action to continue until entrainment risk abated or 6/30 (whichever occurs first).
- VAMP. Reclamation / DWR to implement VAMP (no change from current SWP / CVP operations).

Barrier Operations

- Head of Old River Barrier. Installation prohibited until the end of VAMP.
- Delta Ag. Barriers. All flap gates to be tied open (to minimize tidal effects of the barriers) until the end of VAMP.

Termination of Order. Interim injunctive relief to terminate automatically upon completion of remand and issuance of a new or revised BiOp by USFWS.

IMPACTS

ESTIMATED TOTAL SWP AND CVP DELIVERY REDUCTIONS ASSOCIATED WITH INTERIM REMEDIAL ORDER – BEYOND LIMITATIONS IMPOSED BY WATER RIGHT DECISION 1641

Proposals	Average Year		Dry Year	
	Total Impacts to CVP and SWP	% Loss of Projects Yield	Total Impacts to CVP and SWP	% Loss of Projects Yield
-750 cfs OMR flow	-1,741,000 acre ft.	-29%	-627,000 acre ft.	-19%
-5,000 cfs OMR flow	-512,000 acre ft.	-9%	-80,000 acre ft.	-3%

Source: Declaration of John Leahigh, DWR, 8/3/07, Exhibits C and F.

- The result of the Court's Order is that the SWP and CVP are now subject to operational limitations well beyond those in D-1641.
- But, while SWP and CVP water supplies are suffering a large reduction, none of the other causes identified by the federal court as contributors to the decline of the smelt are under any limitation related to pelagic species.
- We believe this results in a gross regulatory imbalance that ill serves pelagic species.
- It is an imbalance this Board can now begin to correct.

- To that end we have several specific recommendations for the State Board to consider.
- We will discuss them in the course of responding to the issues raised in the Notice of Workshop.

Workshop Issue 2 – Information Regarding Toxicological Studies Related to the POD

- The State Water Contractors believe toxics are a very substantial problem in the Delta.
- We've provided references to a number of recent studies in our written comments (pp. 5-12).

Contaminant Effects

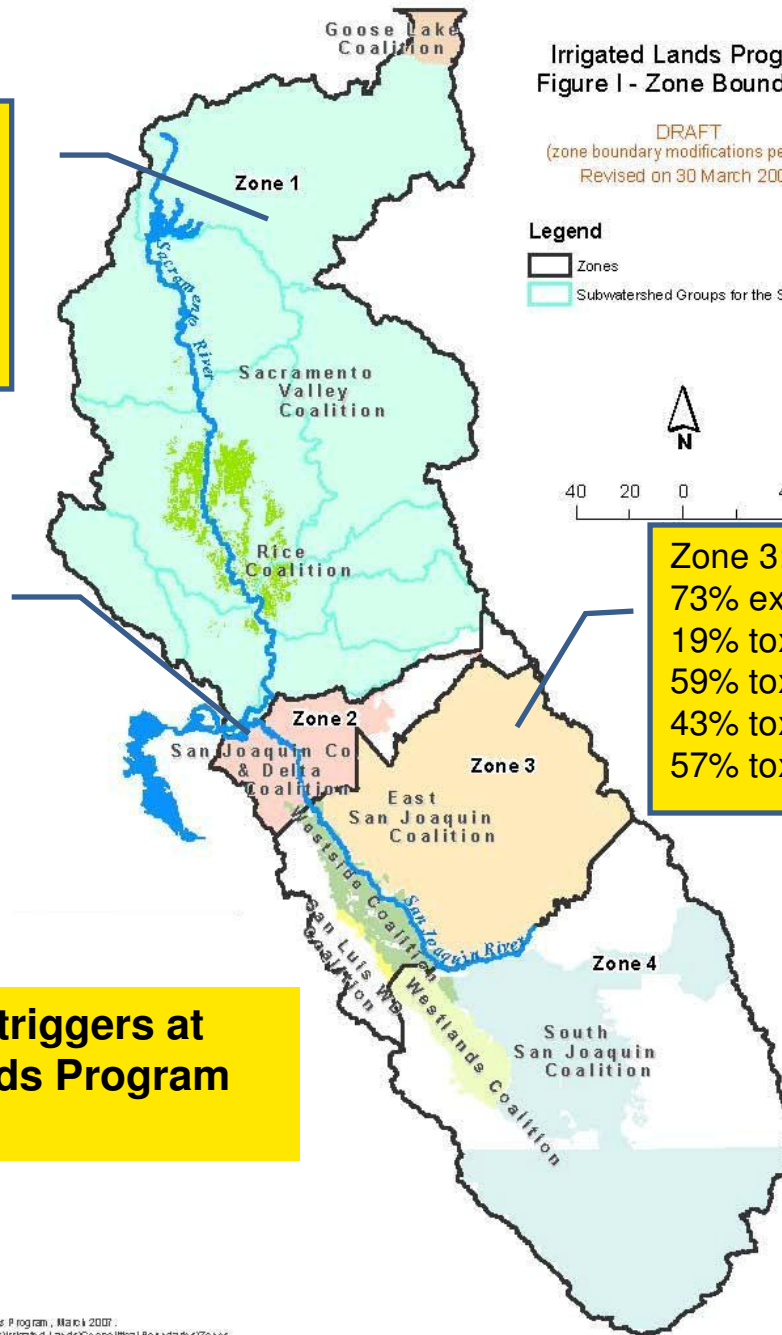
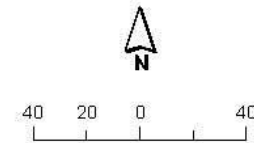
- Numerous contaminants detected
- Water column toxicity observed
- Sediment toxicity observed
- Olfactory disruption observed
- Endocrine disruption observed
- Short duration, low dose exposure effects observed
- Synergistic and additive effects of chemical mixtures observed

Irrigated Lands Program
Figure 1 - Zone Boundaries

DRAFT
(zone boundary modifications pending)
Revised on 30 March 2007

Legend

-  Zones
-  Subwatershed Groups for the SWWGC

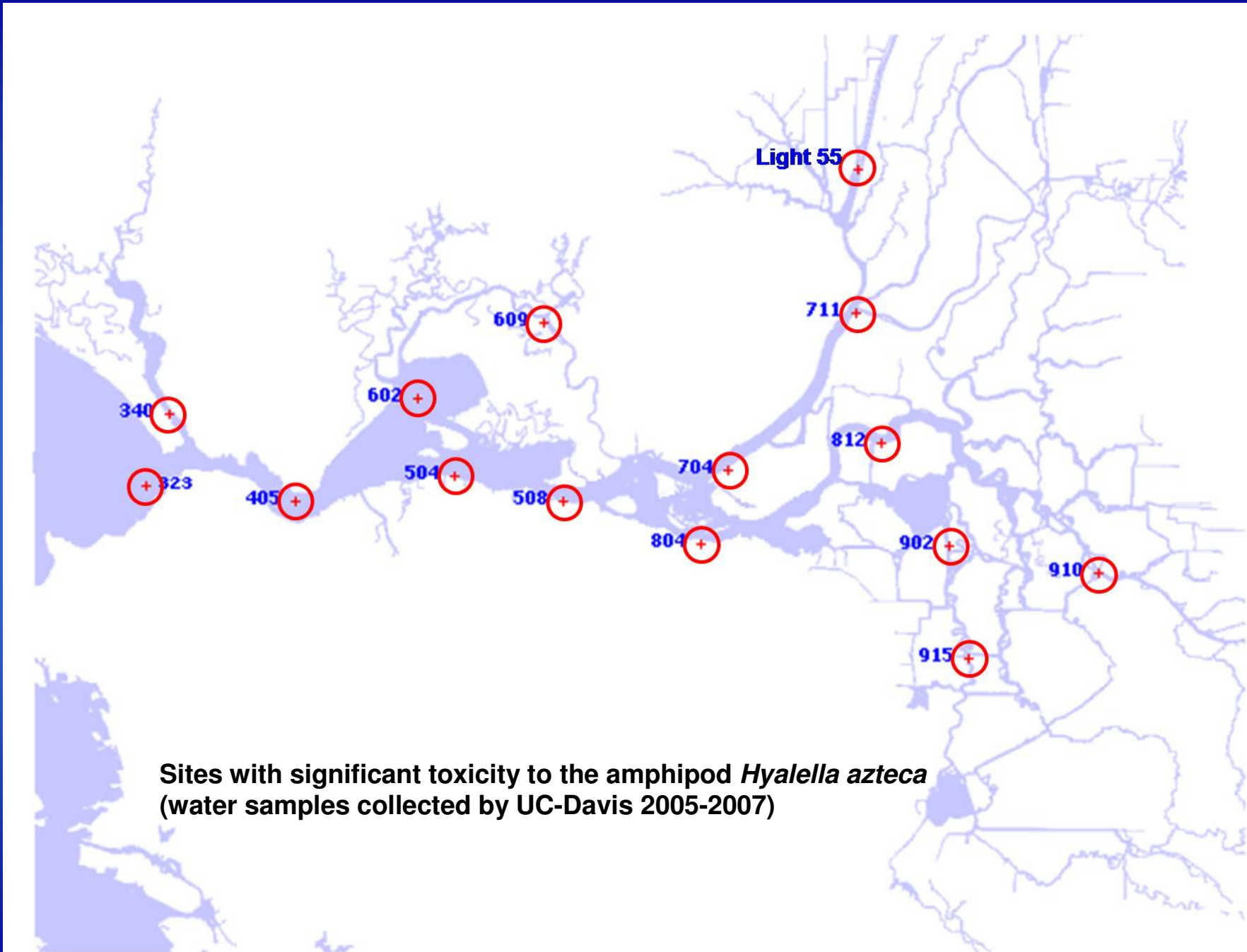


Zone 1
40% exceed pesticide trigger
8% toxic to fathead minnow
27% toxic to water flea
41% toxic to green algae
25% toxic to amphipod (sediment)

Zone 2:
61% exceed pesticide trigger
18% toxic to fathead minnow
29% toxic to water flea
29% toxic to green algae
33% toxic to amphipod (sediment)

Zone 3:
73% exceed pesticide trigger
19% toxic to fathead minnow
59% toxic to water flea
43% toxic to green algae
57% toxic to amphipod (sediment)

**Percent of sites exceeding triggers at least once for Irrigated Lands Program
May 2004 – October 2006**

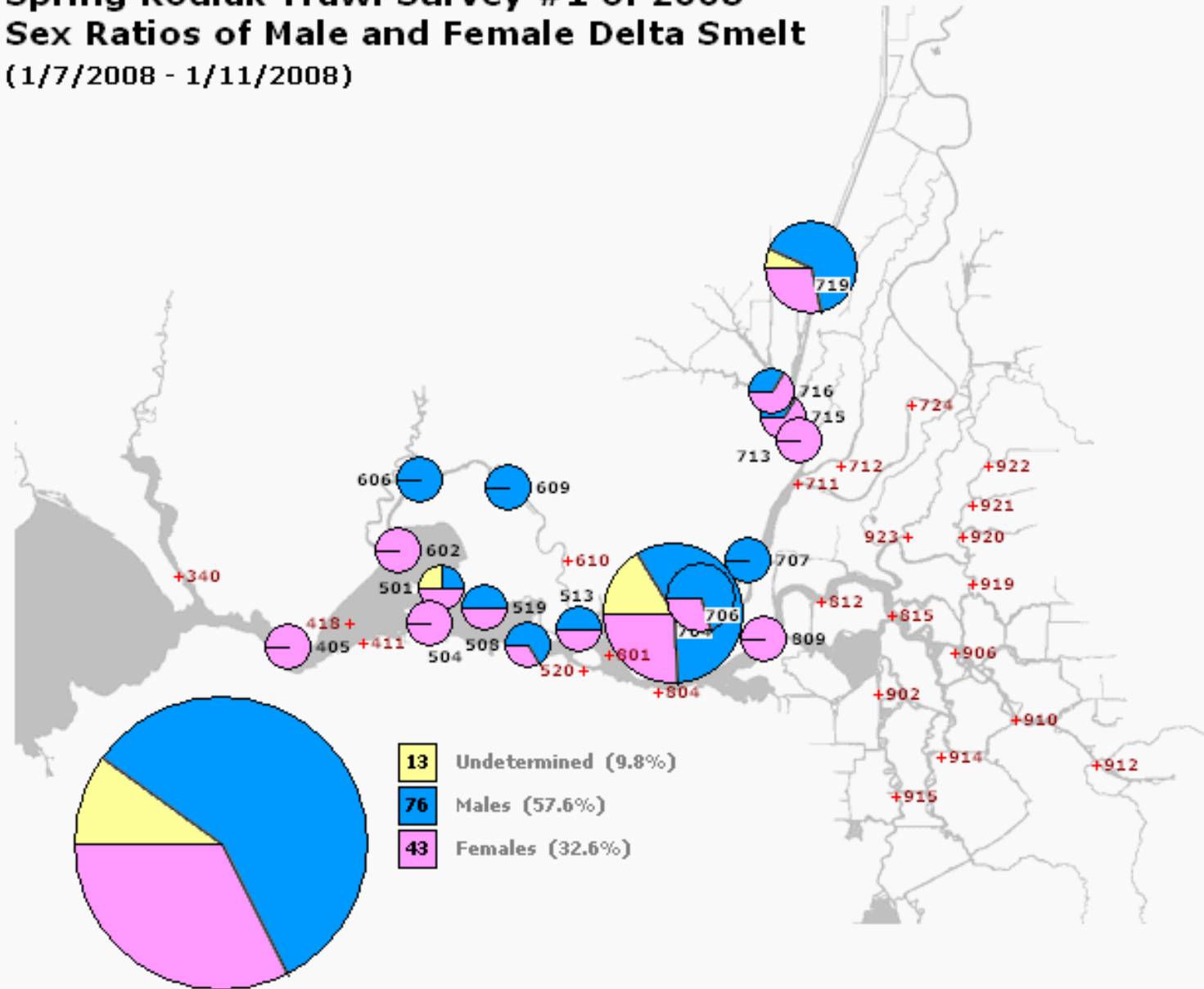


Sites with significant toxicity to the amphipod *Hyalella azteca*
(water samples collected by UC-Davis 2005-2007)

Spring Kodiak Trawl Survey #1 of 2008

Sex Ratios of Male and Female Delta Smelt

(1/7/2008 - 1/11/2008)



Key Recommendations

1. Synthesis of existing data to inform a comprehensive monitoring program designed to determine sources of contamination and to facilitate implementation and enforcement of source control measures

Key Recommendations

2. An investigation of (1) the link between sediment contamination and possible effects on pelagic organisms either through food web transfers or through re-suspension of sediments during storm or wind events, (2) the effects of metals and other contaminants on the olfactory response of Delta pelagic species, and (3) the concentrations of endocrine disrupting chemicals in the Delta as well as of the impacts of these chemicals on pelagic species

Key Recommendations

3. An investigation of the relative sensitivity of the POD species and the organisms they feed on, to the chemicals and chemical mixtures that have already been found in the Delta.

Workshop Issue 3 – The Significance of Scientific Information Derived From Critically Low Population Levels of Pelagic Species

- There is no question that the population abundance of pelagic species is seriously reduced.
- As found by the federal court, for example, the status of the Delta smelt is “serious” and some scientists believe it faces an imminent risk of extinction.
- But, it is also true that our existing survey techniques do a very poor job of providing accurate population abundance numbers.

- The result is that the ability to infer abundance trends and the relative impact of different sources of mortality declines as fewer and fewer individuals are detected.
- The principal tool used to determine the abundance of Delta smelt, for example, is the Fall Midwater Trawl.
- But the FMWT appears to be extremely inefficient at capturing pre-adult smelt.
- The following figures present the results of an IEP study that ran different types of nets side-by-side and compared the results.

**IEP Net Comparison Study
Sacramento River near Decker Island
9/22/1994**

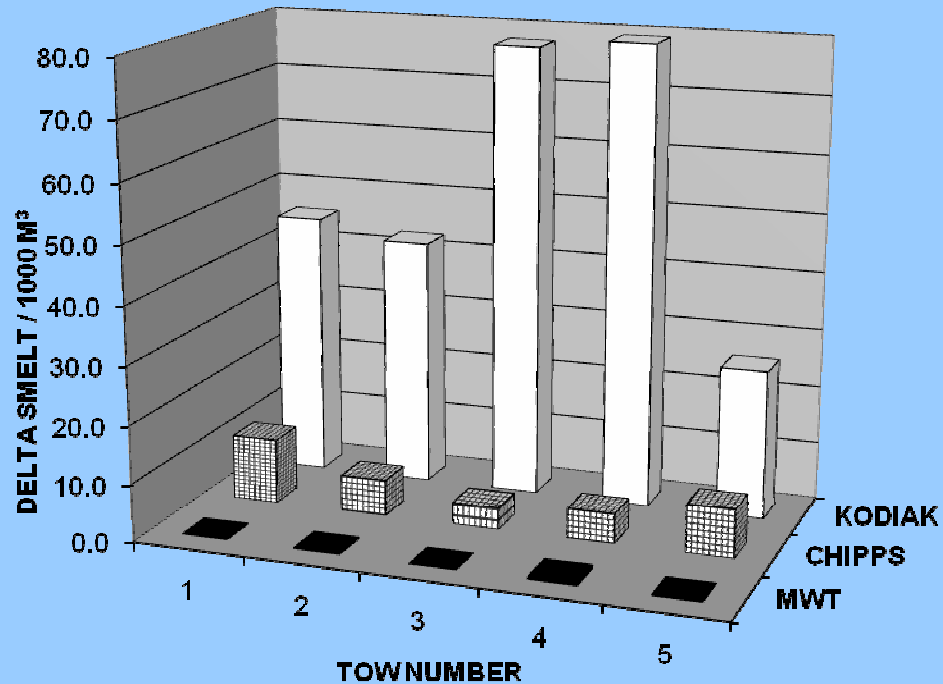


Figure 3.1. IEP Delta smelt catches/1,000 cubic meters sampled by the Fall Midwater Trawl (MWT), Chipps Island trawl (CHIPPS) and the Kodiak trawl (KODIAK) near Decker Island.

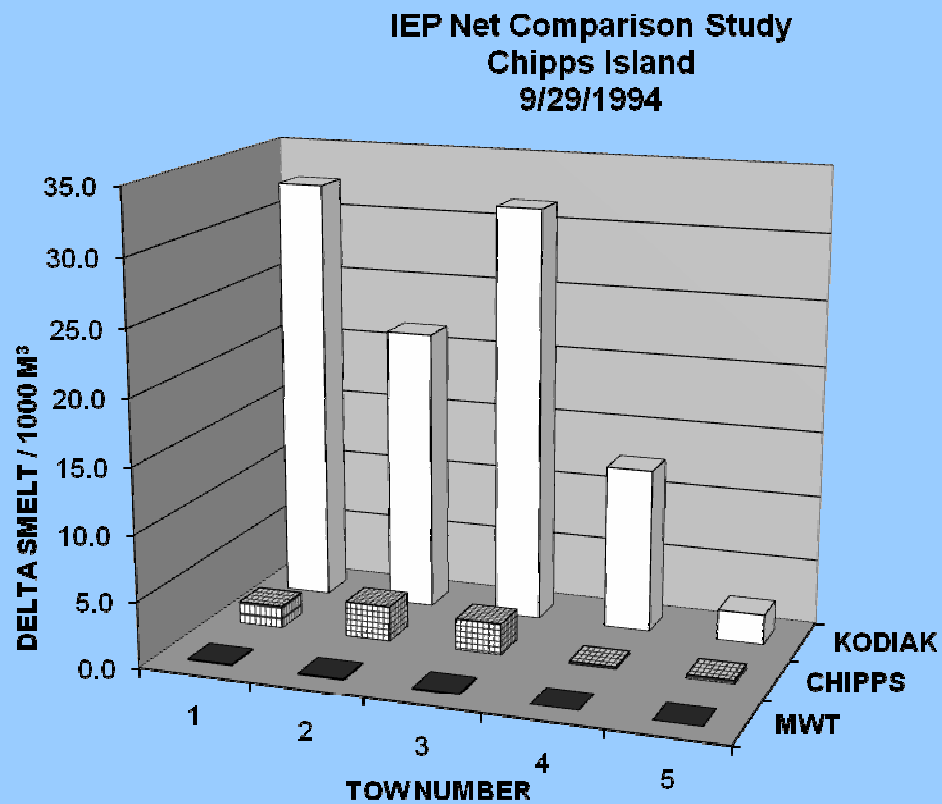


Figure 3.2. IEP Delta smelt catches/1,000 cubic meters sampled near Chipps Island by the Fall Midwater Trawl (MWT), Chipps Island Trawl (Chipps) and the Kodiak trawl. (Kodiak).

IEP NET COMPARISON 10/20/1994
SAN JOAQUIN RIVER NEAR WEST ISLAND

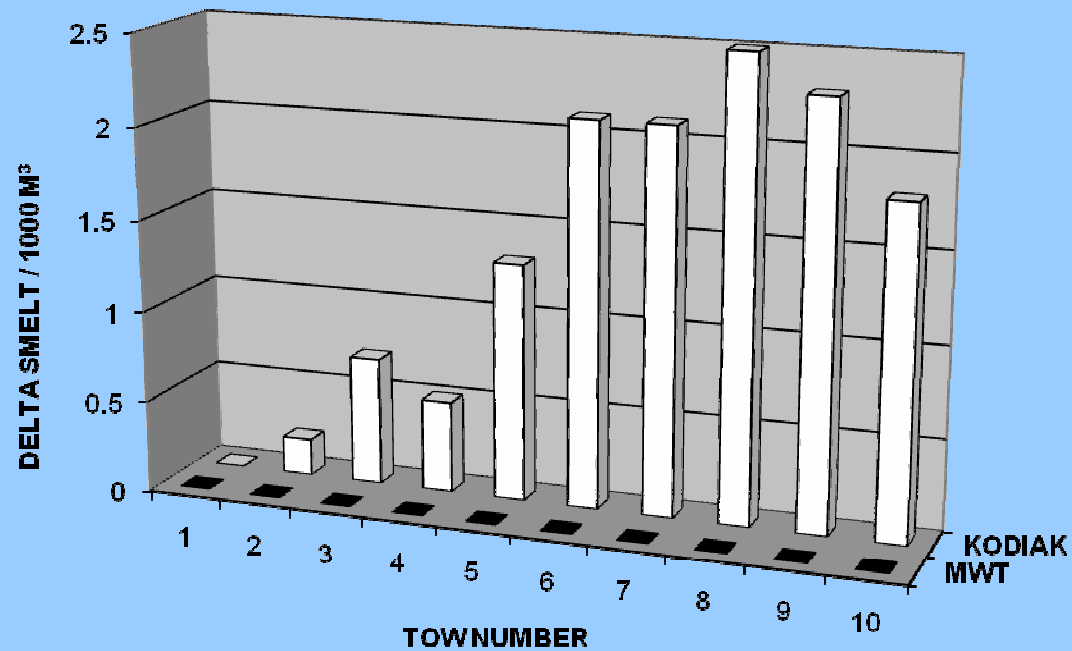


Figure 3.3. IEP Delta smelt catches/1,000 cubic meters sampled by the Fall Midwater Trawl (MWT) and the Kodiak trawl (Kodiak) near West Island.

- One other comparison is worth noting.
 - The attached graphic compares juvenile smelt abundance from the FMWT with pre-spawning adult abundance based on Kodiak Trawl Sampling.
 - From the results of the two surveys, one would be led to believe that adults out-number juveniles, when the reverse is true.

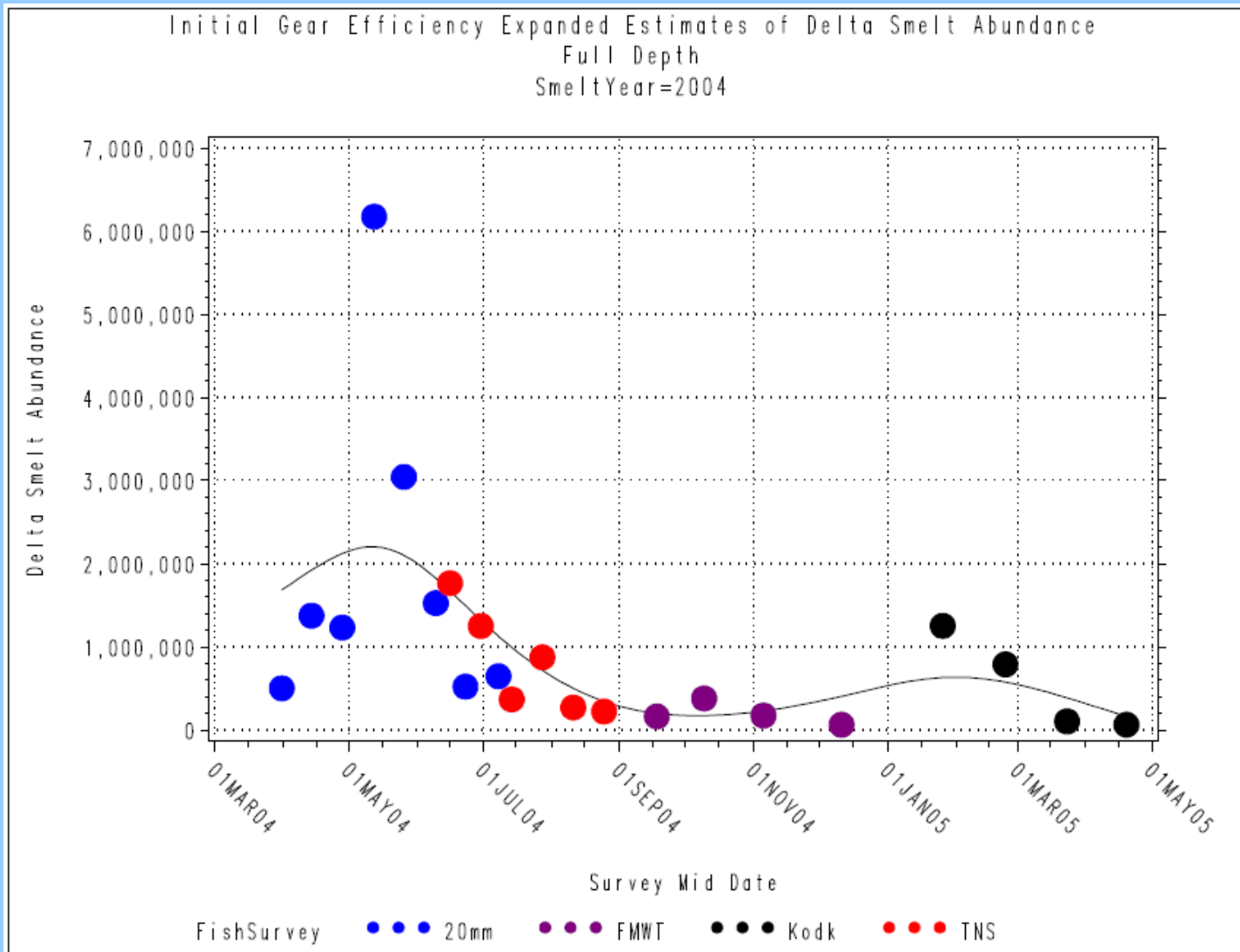


Figure 3.7. Delta smelt abundance estimates for 2004 and 2005. Fall estimates of pre-adult abundance based on the Fall Midwater Trawl (FMWT) are exceeded by abundance estimates for adults based on Kodiak trawl (Kodiak) sampling.

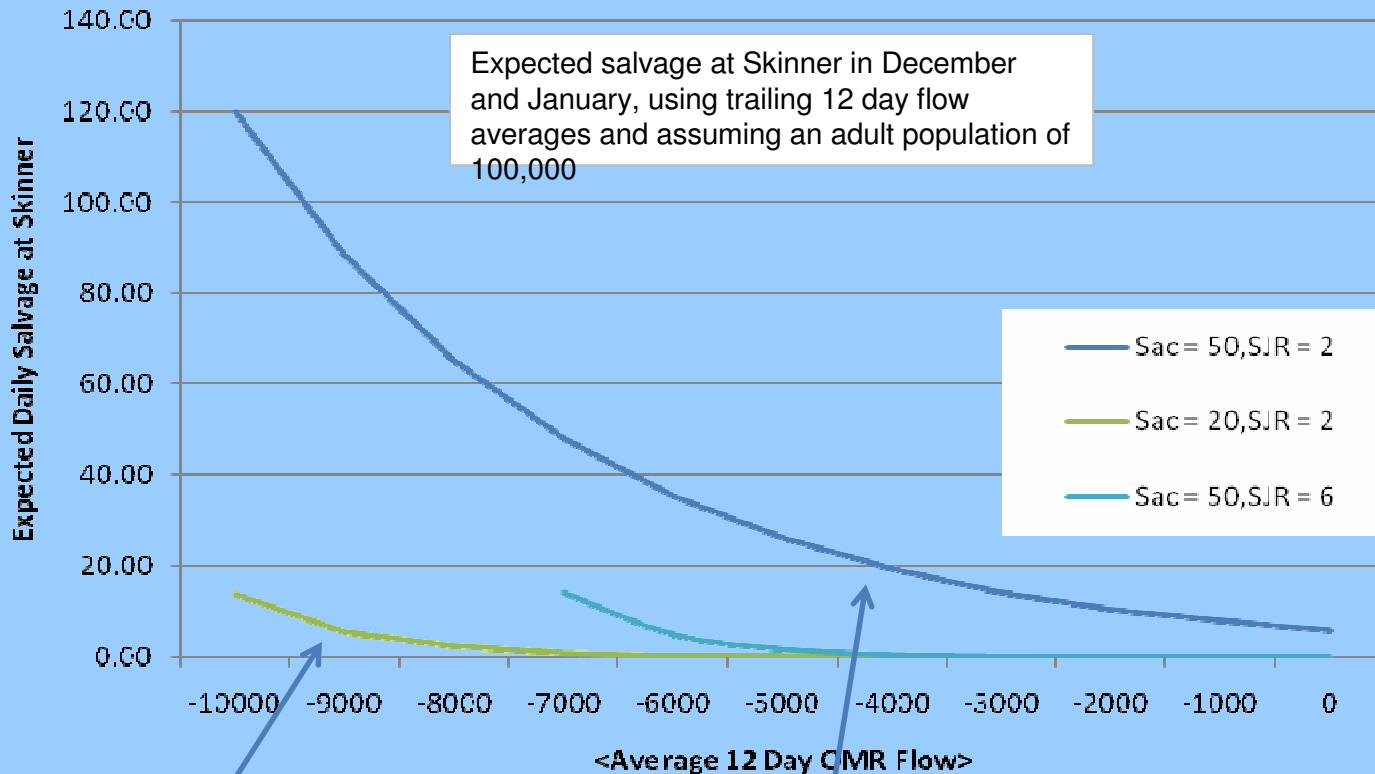
- We believe there are several implications to be drawn from the IEP study:
 - We are capable of gathering data on Delta smelt distributions and abundance far more robust than the data currently gathered;
 - Smelt abundance is probably higher than previously believed based on FMWT results;
 - More effective management of smelt (and other pelagic species) requires that the relative importance of the different sources of mortality be properly evaluated and compared.

- Accordingly, the State Contractors recommend the State Board initiate and pursue discussions with CDFG to integrate or add to their normal monitoring activities, fishery survey protocols that are relevant to pelagic species, are statistically valid, and more accurately reflect the distribution and abundance of such species.

Workshop Issue 4 – New Findings Related to the Effects of Water Exports

- New work by Dr. Bryan Manly demonstrates that adult salvage events have a well-defined signature in December and January.
- Similar correlations are under development for February and March.
- Additional correlations show the fraction of smelt juveniles in the south Delta in the spring.
- In all cases, salvage can be reduced significantly and efficiently through changed operations.

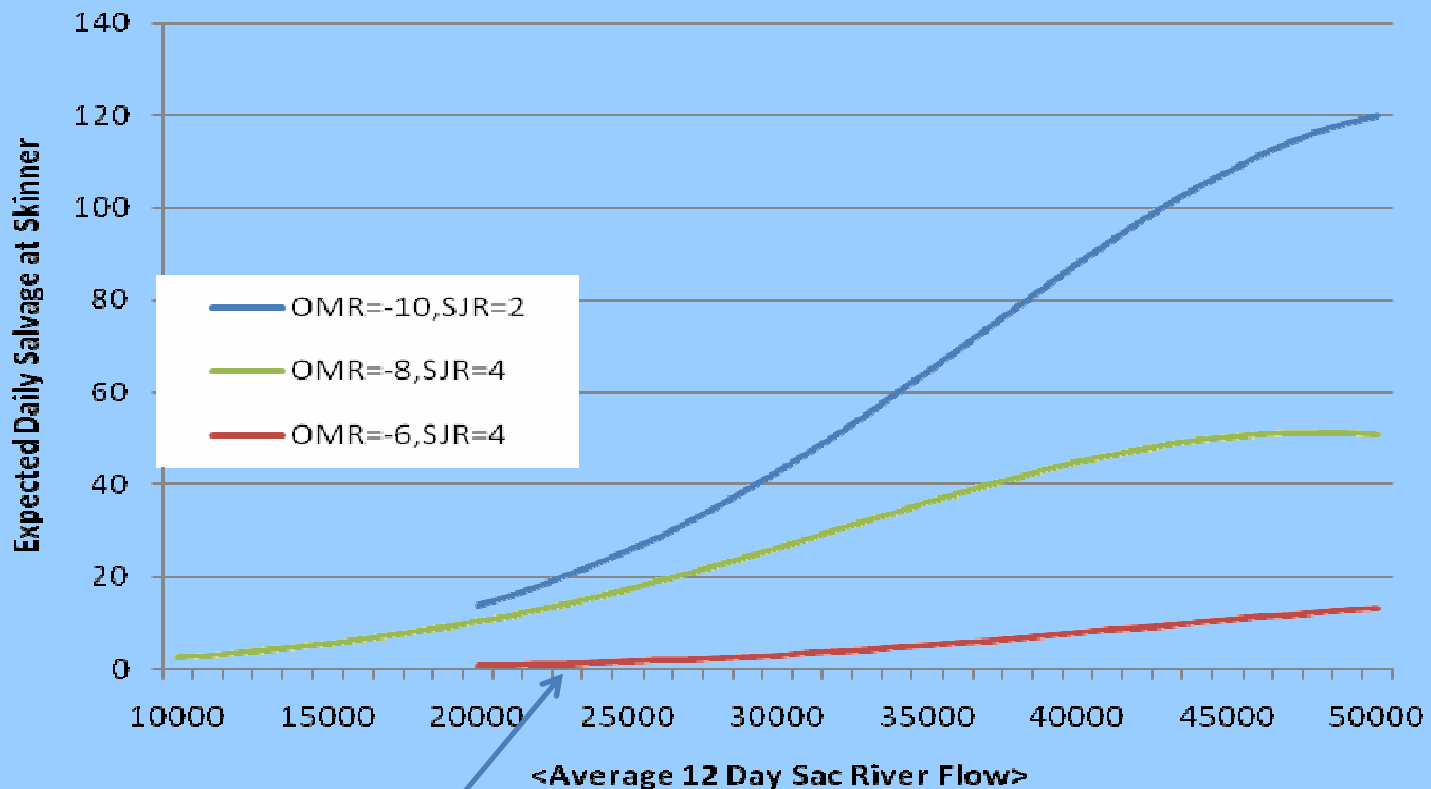
Salvage can be controlled by Managing Old and Middle River flows.



Salvage is limited at low Sacramento flows

Salvage is limited at reverse flows of -5000 cfs

There is little risk of salvage at low Sacramento flows



There is little salvage when average Sacramento River flow is less than 25,000 cfs.

A Delta Smelt Lifecycle Model

- MWD has developed a Delta smelt life-cycle model.
- The model tracks mortality over the course of each year.
- Mortality caused by export pumping or other sources can be analyzed for population-level impacts.
- Can look at historical patterns.
- Can look at changed impacts with different operational scenarios.
- Initial runs of the model indicate that a limited amount of Delta smelt take does not necessarily mean large population impacts, even at low abundances.

Workshop Issue 6 – Recommendations for Short- / Long-Term Actions by the State Board to Improve Pelagic Species Habitat

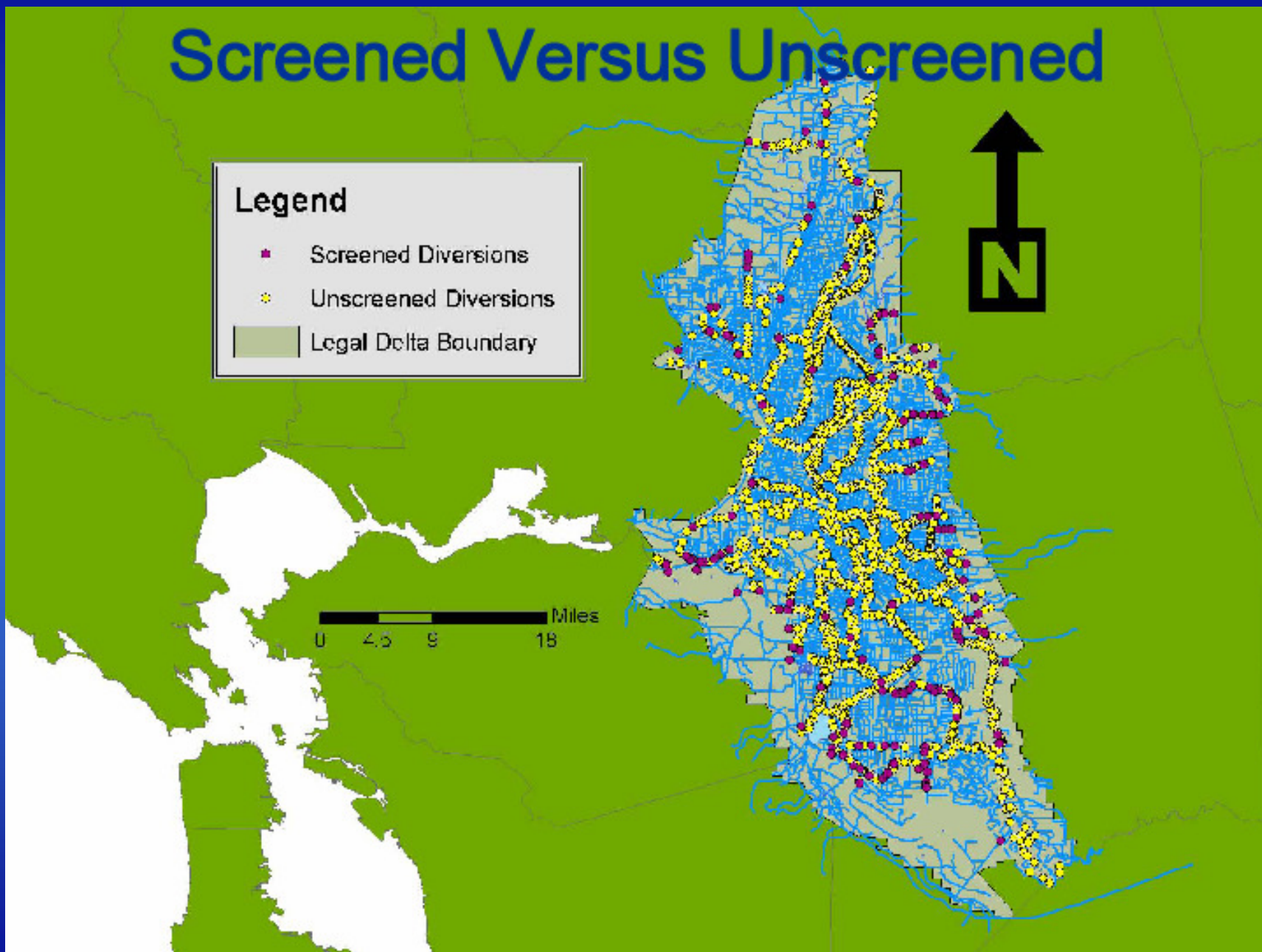
- The SWP / CVP pumps are regulated by D-1641 and by the federal court.
- That is not true of the 2000+ other diversions of water that are found in the Delta.
- Collectively, these diversions have a capacity of about 4,000 cfs – roughly the same as the CVP's Jones Pumping Plant.

Screened Versus Unscreened

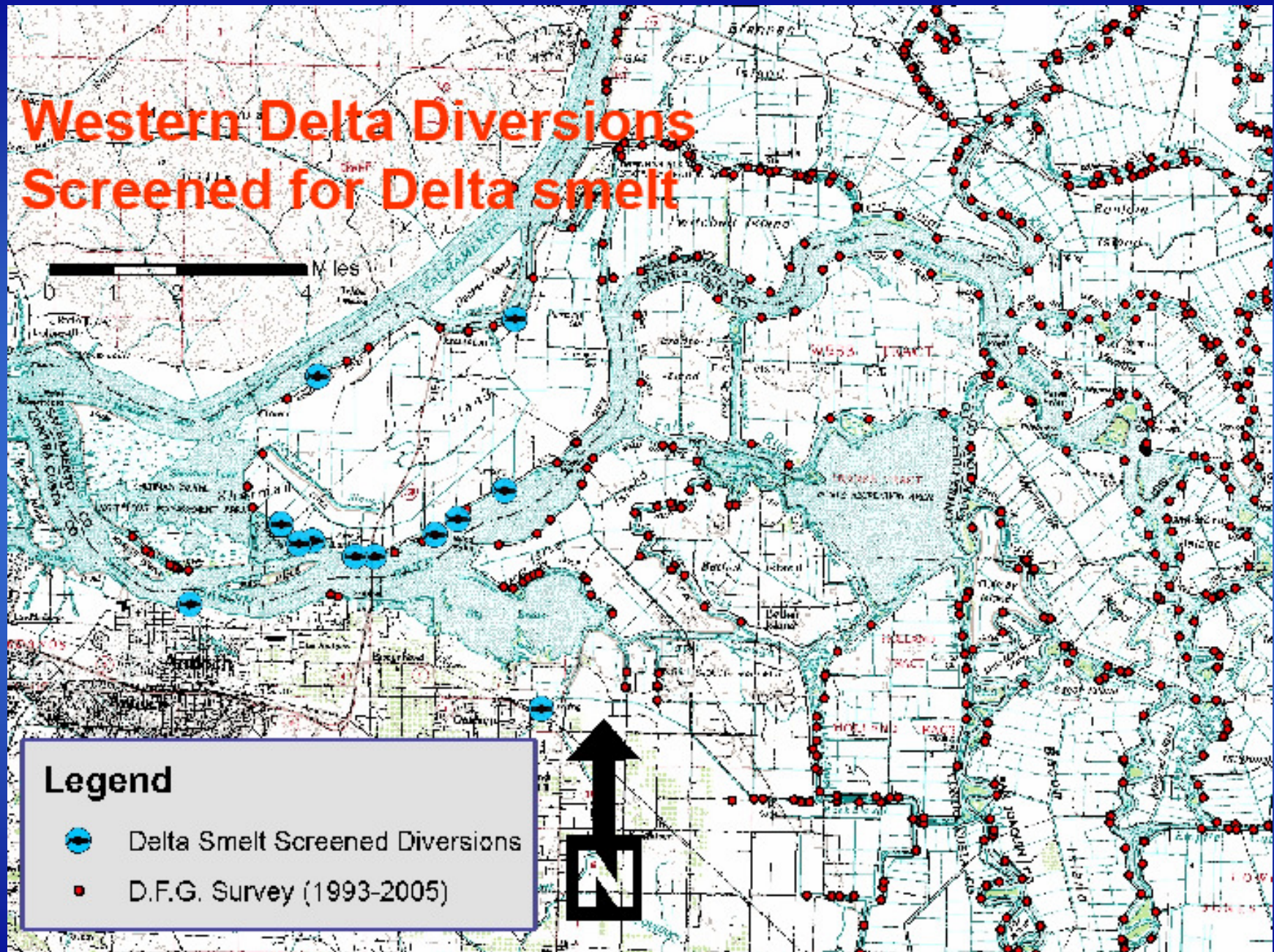
Legend

- Screened Diversions
- Unscreened Diversions
- ▭ Legal Delta Boundary

0 4.5 9 18 Miles



Western Delta Diversions Screened for Delta smelt



- These “other” Delta diversions were identified by the federal court as a cause of the decline of the Delta smelt.
- But, unlike the SWP/ CVP:
 - These other diversions are not monitored
 - These other diversions are not subject to pumping limitations intended to protect pelagic species
 - These other diversions, to our knowledge, have never been evaluated in terms of their impact upon pelagic species

- The State Contractors thus recommend that an evaluation be done of the other in-Delta municipal, industrial and agricultural diversions that are not subject to D-1641 to determine their impact upon pelagic species and to develop measures to minimize that impact.

- The State Contractors also believe an evaluation of the impact of the operation of the Suisun Marsh Salinity Control Gates (SMSCG) is long overdue.
- The SMSCG was developed in response to concerns expressed by the State Board that a brackish Suisun Marsh would not produce enough food for migrating waterfowl.

- As operated, the SMSCG cuts off more than 50,000 acres of brackish marsh habitat that once served as a nursery area for juvenile Delta smelt and other pelagic species.
- Moreover, this loss of habitat serves no real purpose – the DFG studies regarding waterfowl food sources have long been discredited.
 - The plant species used by waterfowl found “in abundance” in “other” areas of the marsh.

- The SMSCG may be adversely affecting pelagic species:
 - They reduce flows in the main channels of the Sacramento River downstream of Collinsville;
 - They result in higher salinity (as much as 2,000 umhos / c.m. electro-conductivity) in the main channel of the Sacramento downstream of the confluence with the San Joaquin River;
 - They divert smelt and other pelagic species into Montezuma Slough, where they can be prevented from later upstream migration for spawning;
 - They cut off the tidal exchange of nutrients and organisms between Suisun Bay and the marsh.

- The State Contractors thus recommend the scheduling of a workshop within the next three months to receive updated information on the impacts of the SMSCG on the POD.
- Contractors also recommend an update of the Suisun Marsh Habitat Management and Restoration Program to receive information on the need for existing water quality objectives.

- Finally, we do not recommend that the Board attempt to deal with POD issues by requiring Delta outflow increases that attempt to position X-2 during the fall months.
- Such a proposal was made the subject of considerable testimony during the trial in NRDC v. Kempthorne and was firmly rejected by the federal court.

- There were several reasons for this outcome:
 - The testimony established the DSWG had already considered and rejected a similar measure to control fall salinity to place X-2 at KM. 8D. DSWG concluded it would not charge physical habitat quality or quantity or control the overbite claim.
 - Testimony also showed there is much disagreement among scientists about the benefits to pelagic species.

- None of the scientific articles or correlations demonstrated a causal relationship between fall salinity and smelt abundance.
- USFWS testified that using outflow to position X-2 would not necessarily provide benefits because the underlying biology is uncertain.
- Further, because of existing Delta outflow requirements in D-1641 (for the protection of Delta M&I and ag. uses) fall salinity at the location sought for X-2 would not be more than 3-4 ppt – well within the tolerance of the smelt.
- Finally, because of the volume of water involved (500,000 a.f.) there was concern about the impact upon upstream cold water pools at Shasta / Oroville needed for temperature control for salmon.