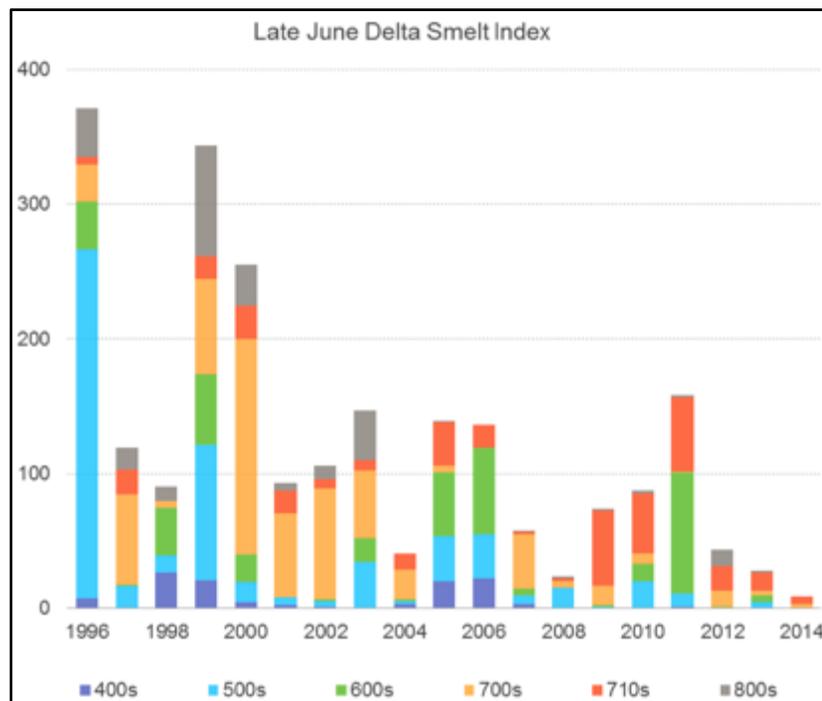


CSPA: Delta Smelt on the Scaffold

Juvenile Delta Smelt are at an All-Time Low Abundance Level

During the summer of 2013, reductions in outflow, coupled with increased water exports, drew the low salinity zone (LSZ) and Delta smelt eastward into the western Delta where smelt encountered lethal water temperatures. That situation was chronicled in a California Sportfishing Protection Alliance (CSPA) report titled *The Summer of 2013, the demise of Delta smelt under D-1641 Delta Water Quality Standards*, which predicted that the smelt population would plunge.¹ As predicted, the following Fall Midwater Trawl's Delta smelt abundance index was the second lowest level on record, statistically indistinguishable from the absolute lowest.

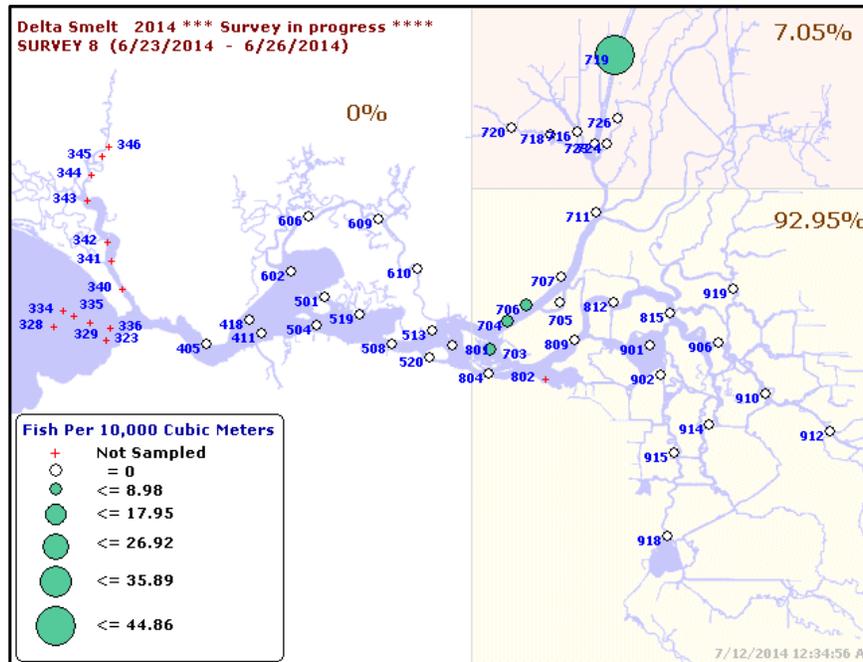
This year, flow and water quality standards have been significantly relaxed. Delta outflow is below levels in recent memory. Exports and water transfers are being approved with little environmental review because agencies claim that Delta smelt are not presently in the Delta. As we show below, this is simply not true. Low outflows have drawn Delta smelt into the Delta where they're at risk from lethal temperatures. Further, outflows are significantly less than being reported by the agencies. Delta smelt populations are headed for new record lows. The point of no return, i.e., the level where the population cannot recover, is unknown. But, that point is likely approaching. A species that existed in this estuary for thousands of years and was the most abundant fish in the Delta is on the scaffold.



CSPA Index by Catch and Sampled Area, 20mm DFW Survey 8, Late June

Note: 400s = West Suisun Bay; 500s = East Suisun Bay; 600s = Montezuma Slough; 700s = Lower Sacramento River; 710s = Cache Slough/Sacramento Ship Channel; 800s = Lower San Joaquin River

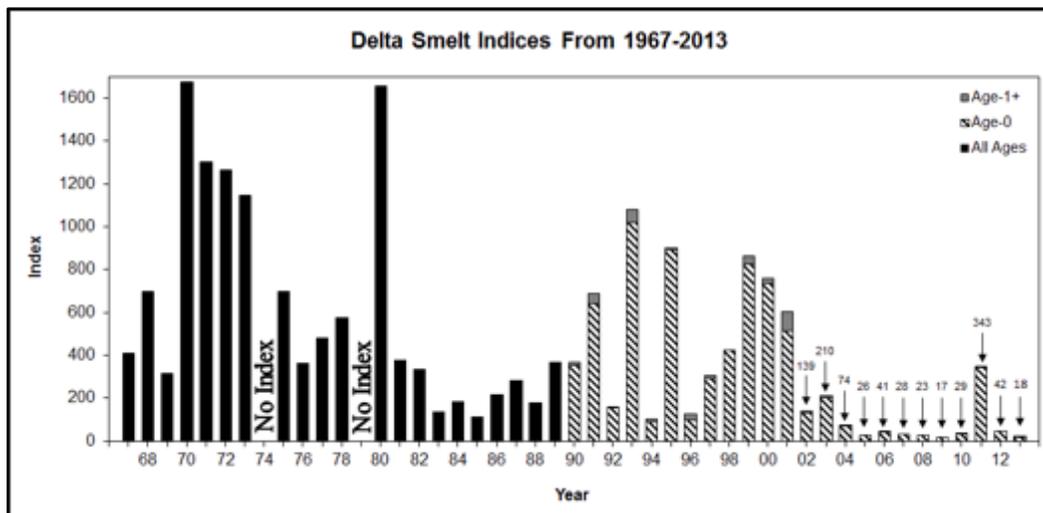
¹ <http://calsport.org/news/wp-content/uploads/CSPA-Cannon-Summer-2013-6.pdf>



California Department of Fish and Wildlife 20mm Delta Smelt Survey 8, 23-26 June 2014
 Chart weighted by volume of area sampled.²

Only 18 Delta smelt were collected in 120 trawls (3 trawls at each of 40 locations).

This pattern is replicated in the annual abundance indices of the Fall Midwater Trawl, which illustrates the continued decline of Delta smelt since the State Water Project began exporting water in 1967.



California Department of Fish and Wildlife: Delta Smelt Fall Midwater Trawl Indices 1967-2013.³

² http://www.dfg.ca.gov/delta/data/20mm/CPUE_Map3.asp

³ <http://www.dfg.ca.gov/delta/projects.asp?ProjectID=FMWT>

The decline of Delta fisheries is not limited to Delta smelt but encompasses the entire range of pelagic species.⁴

Pelagic Fisheries Have Collapsed		
Percent Decline in Delta Fish Population Abundance Indices		
Fall Midwater Trawls		
Species	1967 v. 2013	Five Year Average 67-71 v. 09-13
Striped Bass	-99.6%	-98.8%
Delta Smelt	-95.6%	-89.8%
Longfin Smelt	-99.8%	-99.4%
American Shad	-90.9%	-99.4%
Splittail	-98.5%	-87.7%
Threadfin Shad	-97.8%	-98.1%
Summer Towntnet Survey		
Species	1967 v. 2013	Five Year Average 67-71 v. 09-13
Striped Bass	-98.2%	-98.1%
Delta Smelt	-94.2%	-93.8%
Native lower trophic orders reflect similar magnitude declines.		



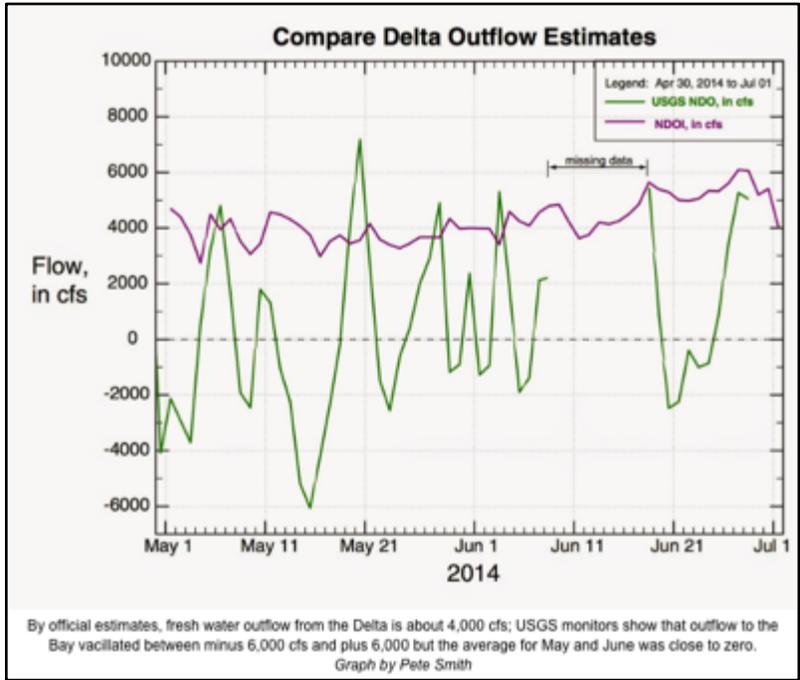
The problem has been exacerbated in recent years by excessive water exports from the Delta coupled with extremely low outflow to the Bay and relaxed or ignored flow and water quality standards. This combination low flow and exports draws the crucial low salinity zone (LSZ) into the Delta where pelagic species are subjected to entrainment in the massive export pumps and lethal summer water temperatures. Last year was bad as a combination of low outflows and high exports hammered Delta smelt.⁵ This year is likely to be much worse and Delta smelt are literally on the brink of extinction.

The Estimates of Delta Outflow by USBR and DWR are Simply Wrong!

U.S. Bureau of Reclamation (USBR) and California Department of Water Resources (DWR) claim that net Delta outflow (NDOI) averaged 3170 cubic feet per second (cfs) between I July and 11 July 2014.⁶ However, the NDOI, which is a complicated computation that guesses at net Delta channel depletion, is simply wrong.

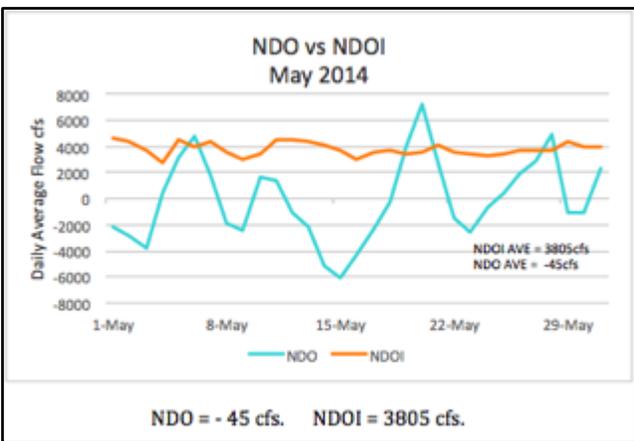
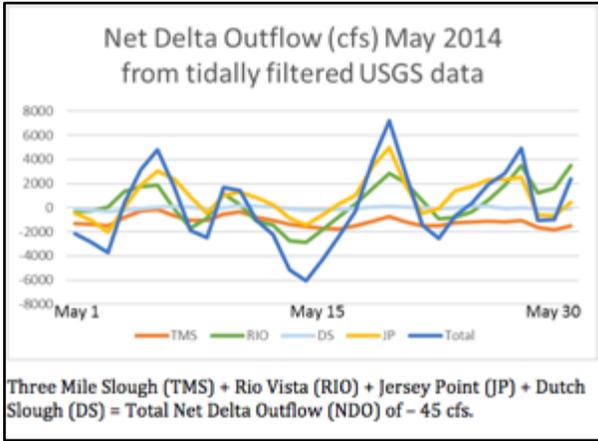
The U.S. Geological Survey (USGS) maintains four state-of-the-art UVM flow gages on the Sacramento and San Joaquin Rivers and Three-mile and Dutch Sloughs that, cumulatively, record total Net Delta Outflow (NDO). Examination of tidally filtered outflow data from these gages reveals that the outflows reported by USBR and DWR are seriously inflated in low water conditions.

⁴ <http://calsport.org/news/wp-content/uploads/St-Bd-Drought-Wkshp1.pdf>
⁵ <http://calsport.org/news/wp-content/uploads/CSPA-Cannon-Summer-2013-6.pdf>
⁶ <http://www.usbr.gov/mp/cvo/vungvari/doutdly.pdf>



Retired USGS Engineer, Pete Smith, prepared the above comparison of NDO versus NDOI that was recently reported in the California Spigot.⁷

CSPA fishery consultant and biostatistician, Thomas Cannon, also prepared an assessment for CSPA that analyzed the NDOI index and discovered that it seriously overestimates actual Delta outflow. Mr. Cannon calculated that the actual Delta outflow in May 2014 was a minus 45 cfs, instead of the positive 3805 cfs claimed by USBR and DWR. He also discovered that DWR had long aware been of the discrepancy.⁸

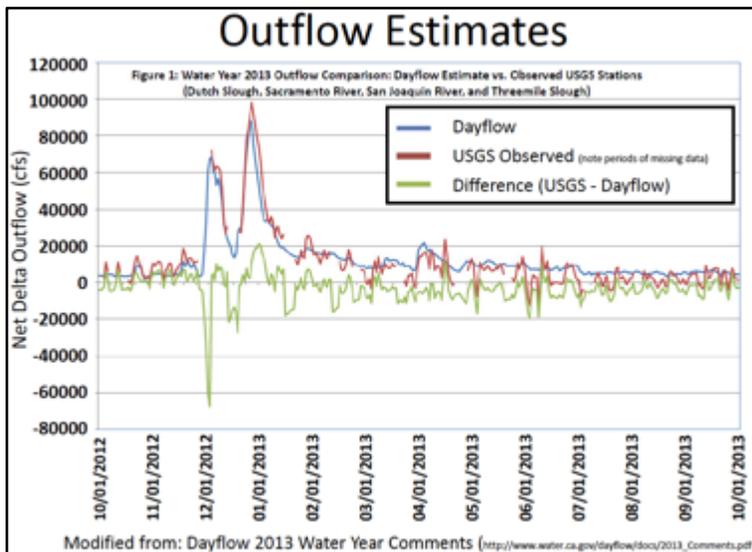


Thomas Cannon: Net Delta Outflow in May 2014 and NDO vs. NDOI.

⁷ <http://www.californiaspigit.blogspot.com>

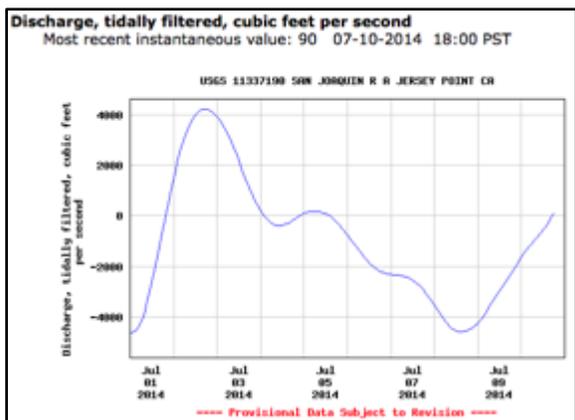
⁸ <http://calsport.org/news/wp-content/uploads/CSPA-NDO-v-NDOI-2.pdf>

Dr. Michael L. MacWilliams, of Delta Modeling Associates, in a presentation to the Delta Science Program’s workshop on Delta outflows and related stressors, observed that NDOI estimates during the fall of 2013 were more than double the USGS measured outflows.

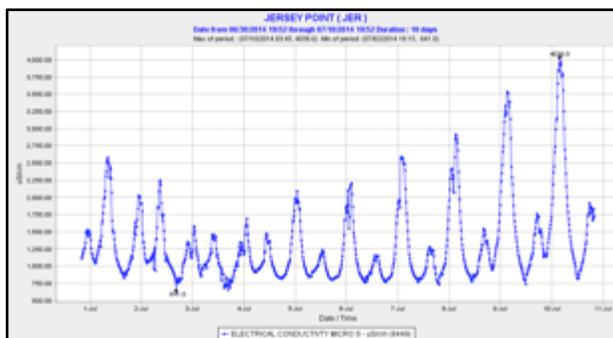


Dr. MacWilliams testified that, based on measured data for salinity intrusion and X2, the NDOI estimates appeared to be clearly incorrect.⁹

During the first ten days of July 2014, the NDOI was reported as a positive outflow averaging 3170 cfs. However, examination of the four USGS tidally filtered stations at Rio Vista, Threemile Slough, Jersey Point and Dutch Slough reveals that outflow had become negative, beginning around 4/5 July. Inflow from the Bay approached 7000 cfs by 8 July. This was reflected in sharply increasing salinity (EC) levels in the Delta, which could not have occurred under a positive NDOI outflow.

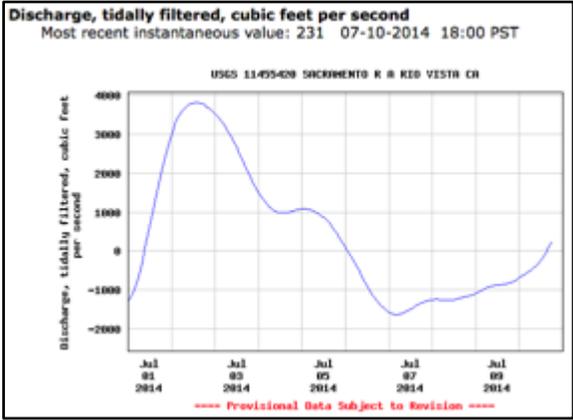


USGS Jersey Point Flow (11337190)

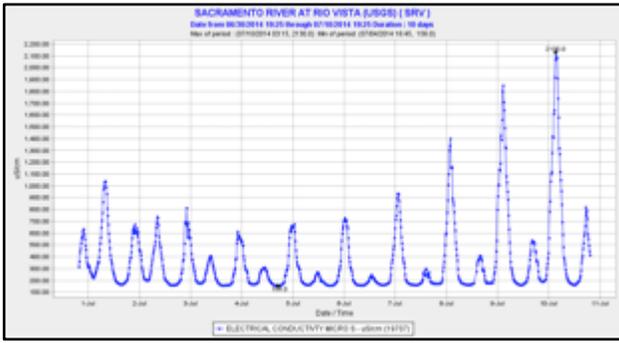


CDEC Jersey Point EC (JER)

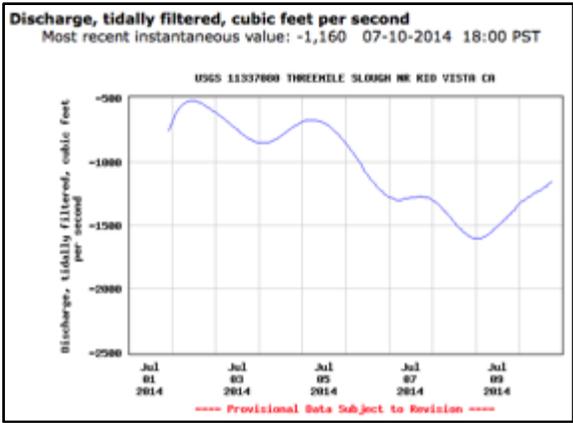
⁹ <http://deltacouncil.ca.gov/sites/default/files/documents/files/10-Outflow-Workshop-MacWilliams-02-10-14-Final.pdf>



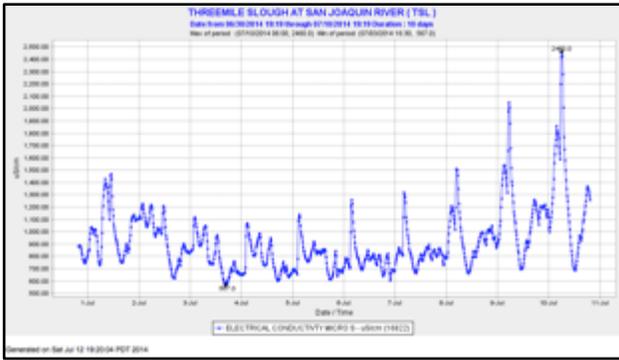
USGS Rio Vista Flow (11455420)



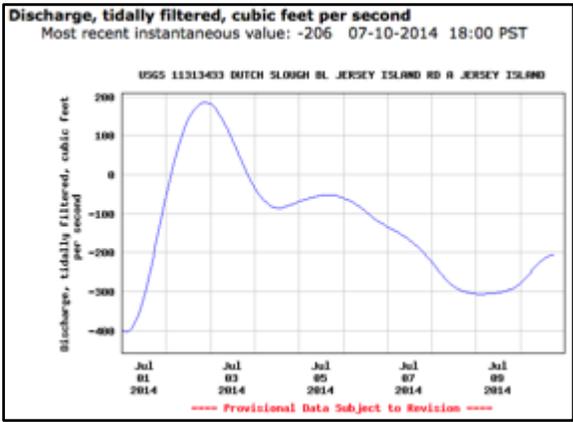
CDEC Rio Vista EC (SRV)



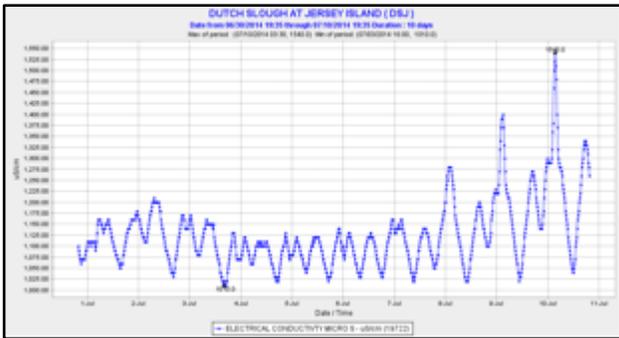
USGS Threemile Slough Flow (11337080)



CDEC Threemile Slough EC (SJJ)



USGS Dutch Slough Flow (11313433)



CDEC Dutch Slough EC (DSJ)

Real time data from the USGS¹⁰ and California Data Exchange Center (CDEC)¹¹ can be accessed online.

¹⁰ http://waterdata.usgs.gov/ca/nwis/current/?type=flow&group_key=basin_cd

¹¹ <http://cdec.water.ca.gov/staMeta.html>

The final report of the expert panel observed that, “Although a precise estimate of the accuracy of the measured outflow is not known, the measured values should be more accurate than the NDOI as long as the four monitoring stations used in the calculations are operating properly.” The panel asked, “why the measured outflows (rather than NDOI) aren’t used for the specific outflow standards during the July-to-January period, and also why they aren’t used as the alternative flow compliance option in the springtime X2 standard.”¹²

The California Spigot quoted State Water Resources Control Board engineer, Rick Satkowski, as saying, in light of these findings, the State Board will be looking at, “possible changes in determining outflow.

USBR and DWR have long known of the difference between measured net delta outflow and the calculated net delta outflow index. They have long known that they do not have reliable data on in Delta channel depletions. They have long known that not all inflow into the Delta from tributary streams is accurately gaged. But they are also aware that if NDO, instead of the NDOI, is used as the standard of net delta outflow, more water will have to be directed to outflow and less to exports, especially in dry years.

USBR and DWR are committed to maximizing water deliveries to contractors, even if it sends the Delta smelt, once the most abundant fish in the Delta, toward extinction. That is unacceptable!

Contrary to USBR and DWR Claims, Delta Smelt are in the Delta in June, July and August

The USFWS Biological Opinion for Delta smelt provides no protection in July and August because the service claims that there are no Delta smelt in the Delta during those months. On that basis, USBR and DWR, with USFWS concurrence, provided no protection for smelt during water transfers. Earlier this year, the State Water Board, again with USFWS concurrence, lowered the Delta outflow criteria, contained in D-1641, from 4000 cfs to 3000 cfs during the months of May and July. However, they are simply wrong!

Last year, as chronicled in CSPA’s report titled *The Summer of 2013, the demise of Delta smelt under D-1641 Delta Water Quality Standards*,¹³ reductions in outflow, coupled with increased water exports, drew Delta smelt into the western Delta where they encountered lethal water temperatures. Abundance levels plunged.

Delta smelt are in the Delta. They shouldn’t be. During late June and July, Delta smelt should be in the LSZ in Suisun Bay, protected from the lethal 76-77 degrees water temperatures

¹² <http://deltacouncil.ca.gov/sites/default/files/documents/files/Delta-Outflows-Report-Final-2014-05-05.pdf>

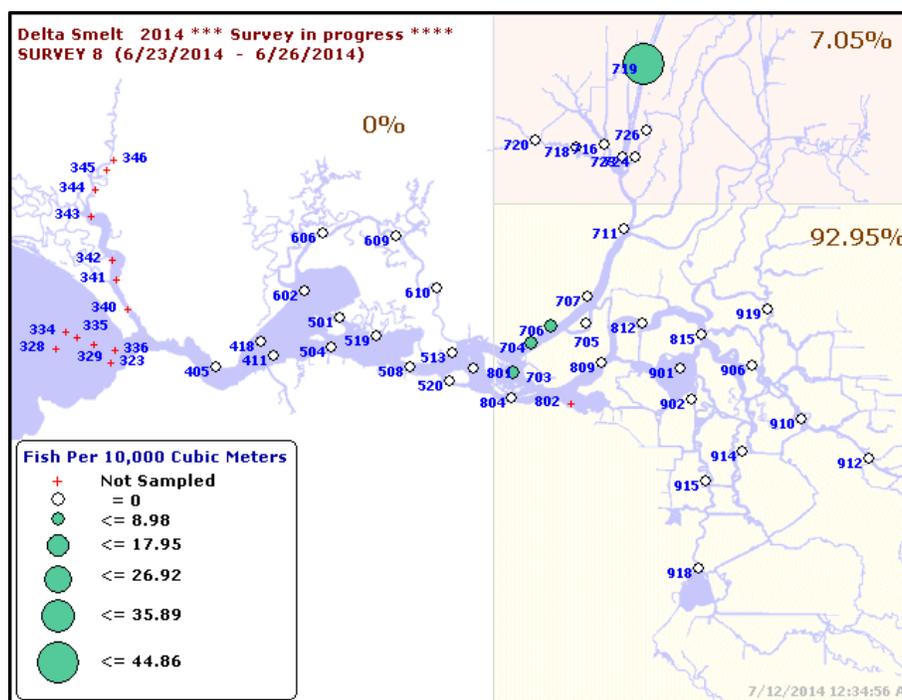
¹³ <http://calsport.org/news/wp-content/uploads/CSPA-Cannon-Summer-2013-6.pdf>

frequently found in the Delta during summer. However, a combination of low outflow and excessive exports draws the LSZ and Delta smelt into the Delta during drier years.

There is also a small population of smelt that spawn in the Cache Slough-Sacramento Ship Channel area. However, they become trapped and unable to migrate back to the LSZ and seek to survive in the stratified waters of the deep water in the ship channel. Extended heat waves pose a severe threat to that population, as the coldwater pool will ultimately dissipate. In 2009, the California Department of Fish and Wildlife (CDFW) conducted supplemental monitoring at six sites in the ship channel and found that smelt populations decreased through July and virtually disappeared by August. The USFWS's 2008 Biological Opinion does not suggest that the Cache Slough-Sacramento Ship Channel area provides a viable temperature refuge for Delta smelt when their only recognized habitat – the LSZ in the Delta – has been rendered unsuitable for survival.

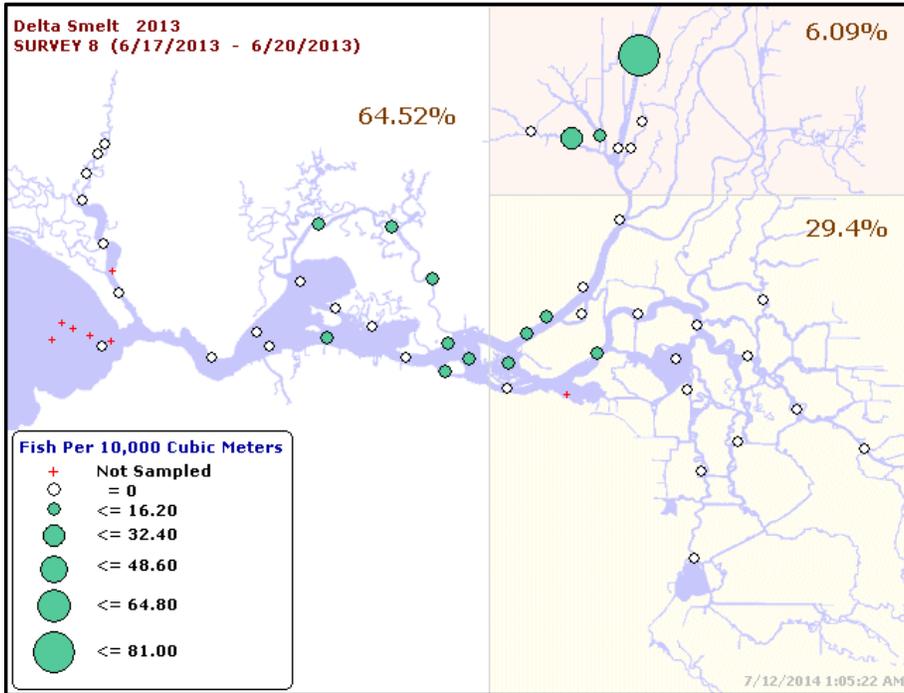
Below are the CDFW's late June and early July 20mm Delta smelt surveys from 1996 to 2014. The 20mm surveys are comprised of three separate trawls conducted at 40 sites in the Delta. They demonstrate that in all but the wettest years, Delta smelt are in the Delta during late June and early July. In drier years, a significant percentage of Delta smelt, perhaps the majority of juveniles, are in the Delta.

CDFW: 20mm Delta Smelt Surveys, Late June 1996-2014 (with percentages)¹⁴

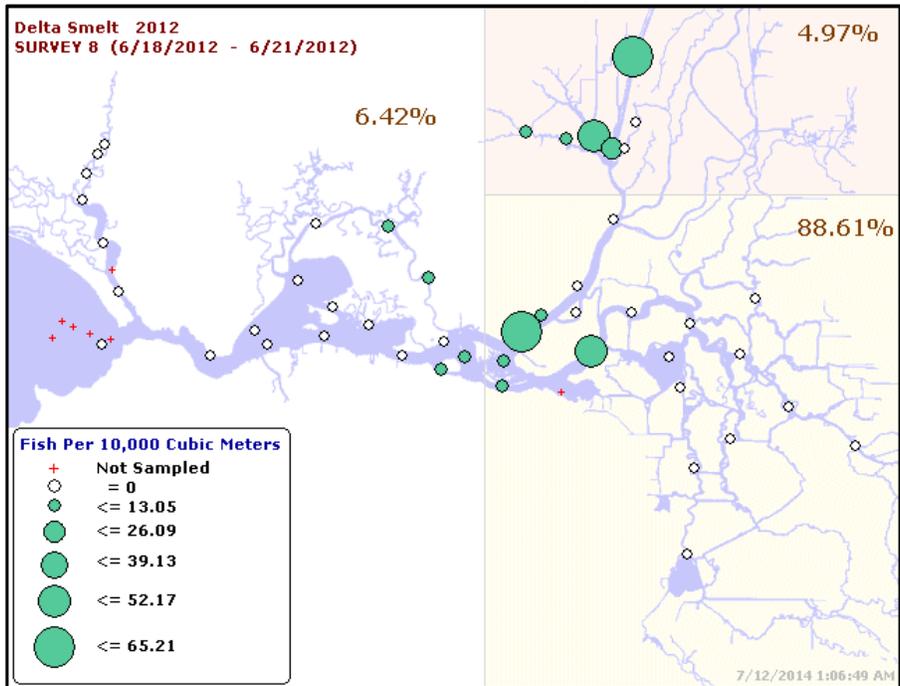


2014 Water Year: Sacramento = Critical; SJR = Critical

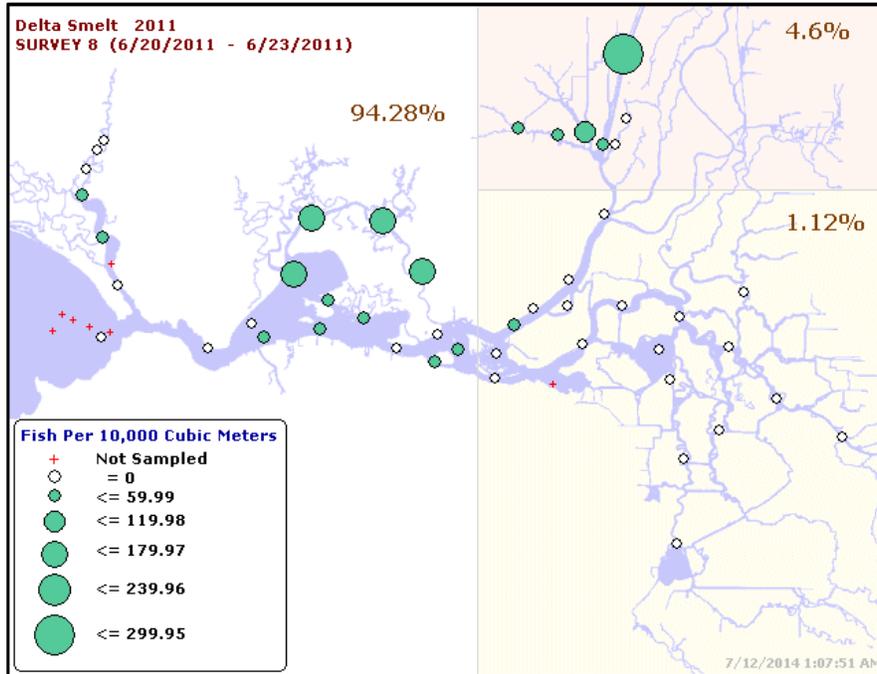
¹⁴ http://www.dfg.ca.gov/delta/data/20mm/CPUE_map.asp



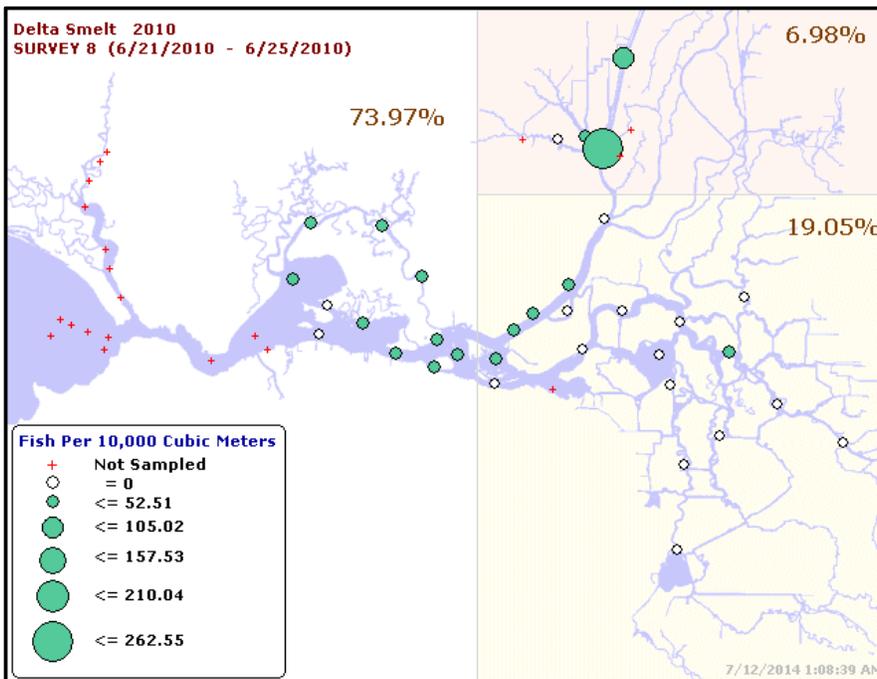
2013 Water Year: Sacramento = Dry; SJR = Critical



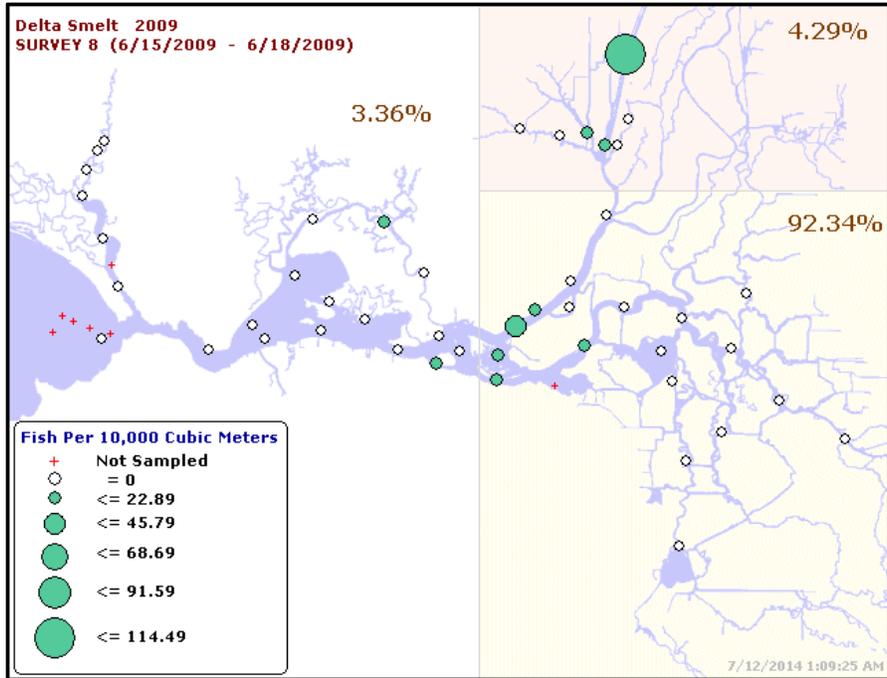
2012 Water Year: Sacramento = Below Normal; SJR = Dry



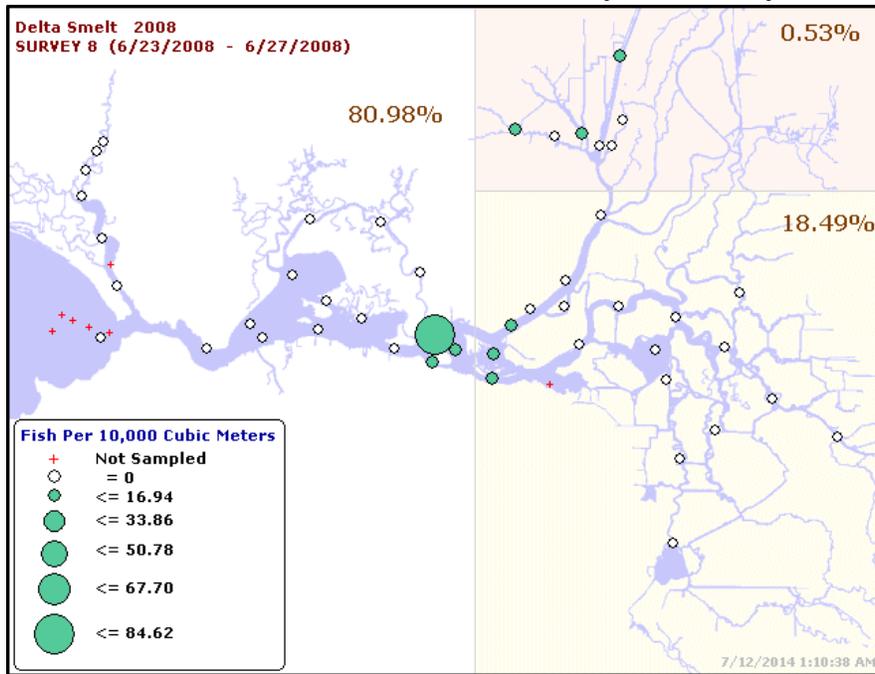
2011 Water Year: Sacramento = Wet; SJR = Wet



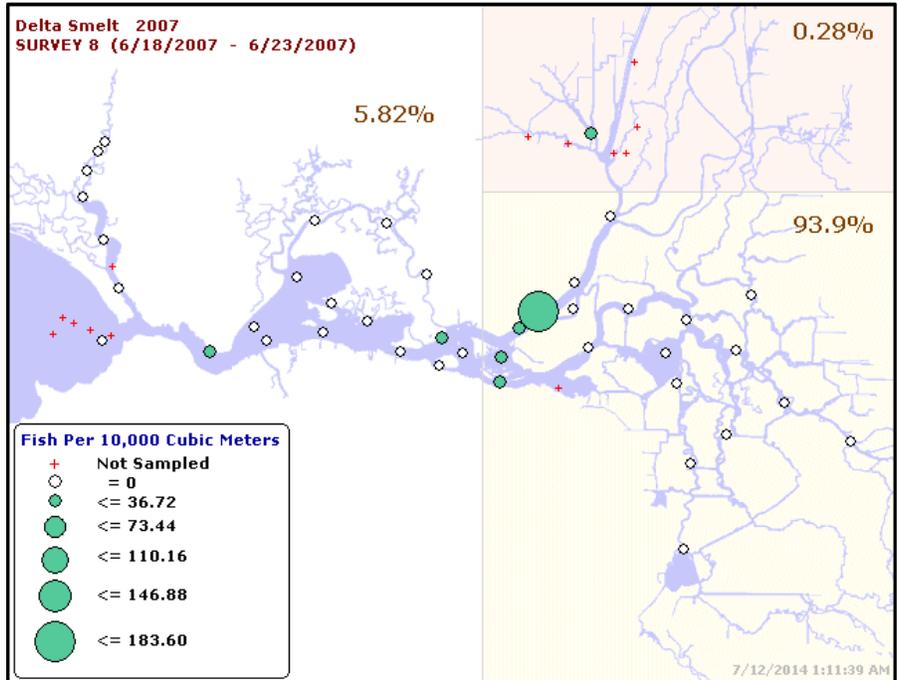
2010 Water Year: Sacramento = Below Normal; SJR = Above Normal



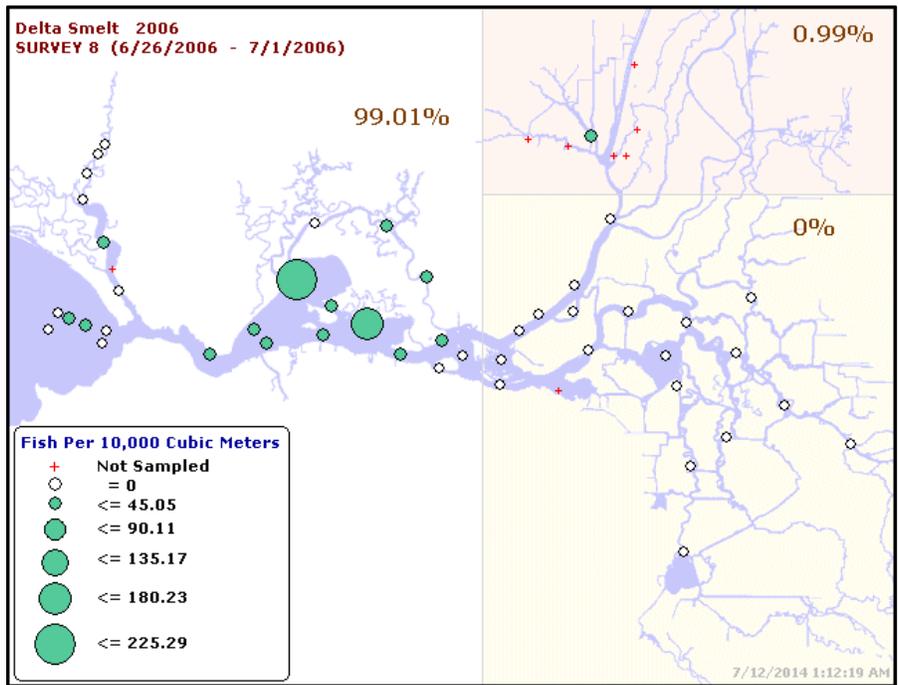
2009 Water Year: Sacramento = Dry; SJR = Dry



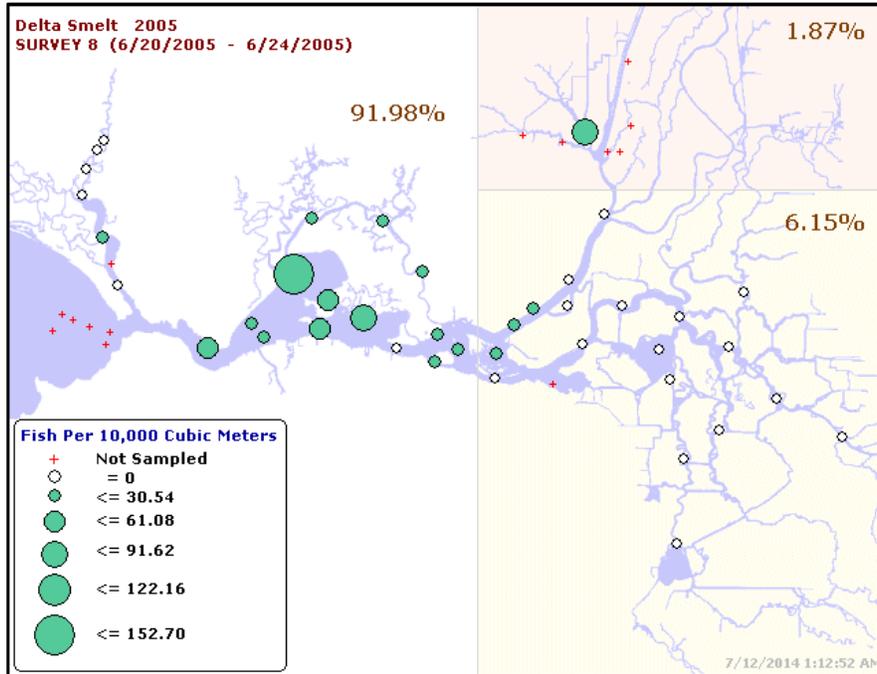
2008 Water Year: Sacramento = Critical; SJR = Critical



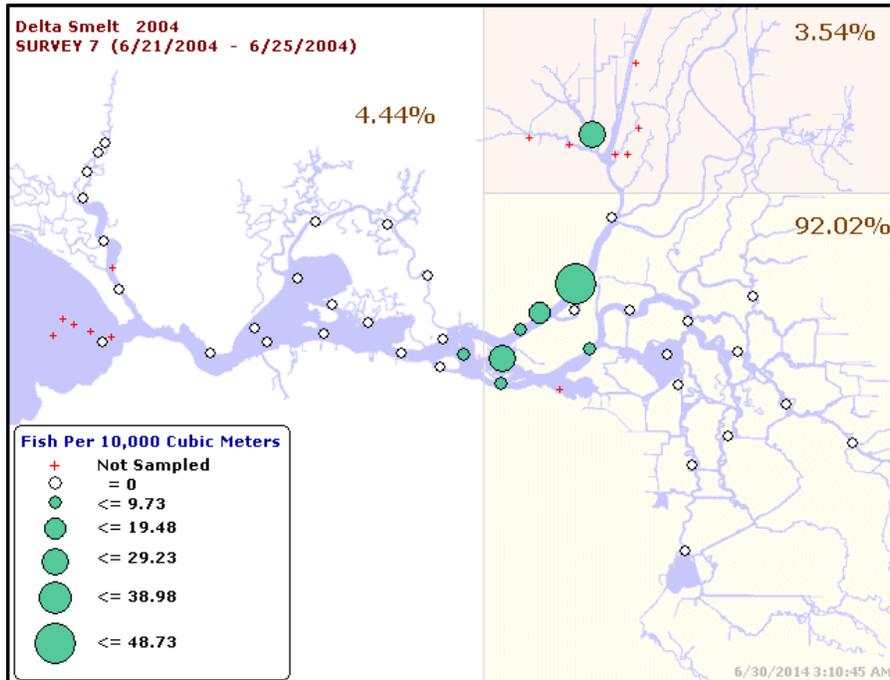
2007 Water Year: Sacramento = Dry; SJR = Critical



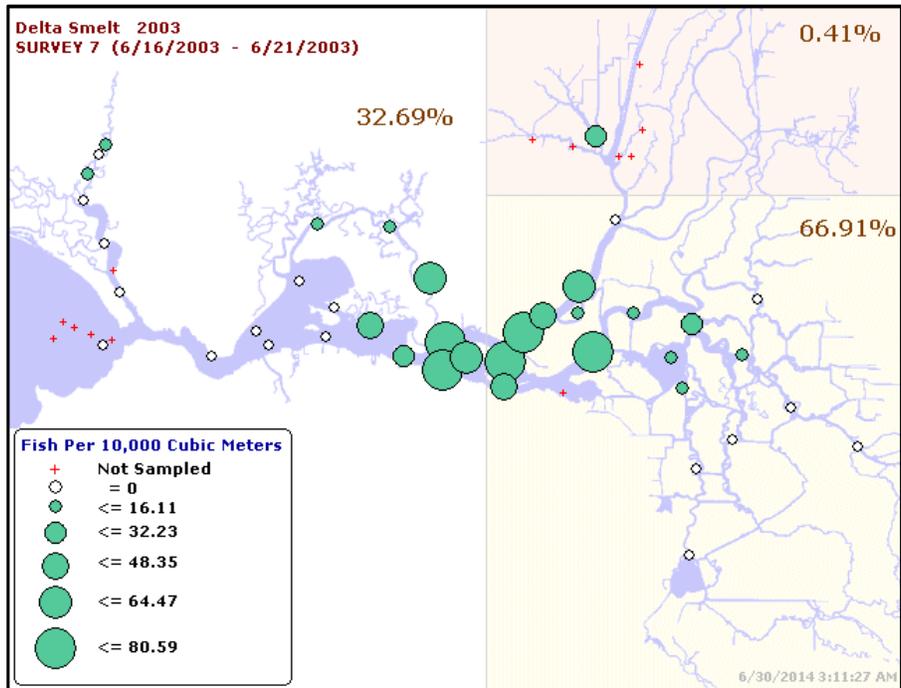
2006 Water Year: Sacramento = Wet; SJR = Wet



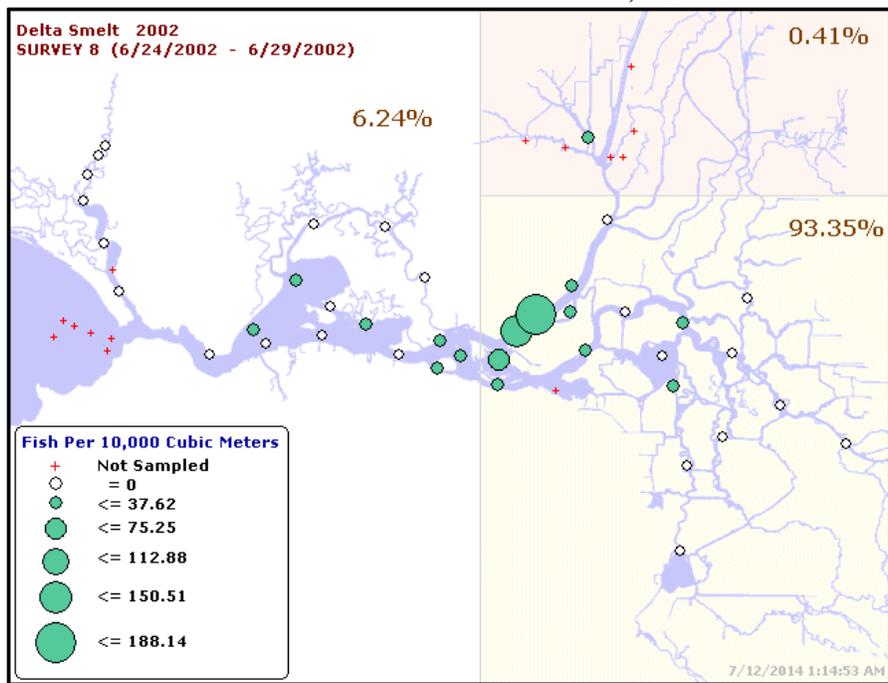
2005 Water Year: Sacramento = Above Normal; SJR = Wet



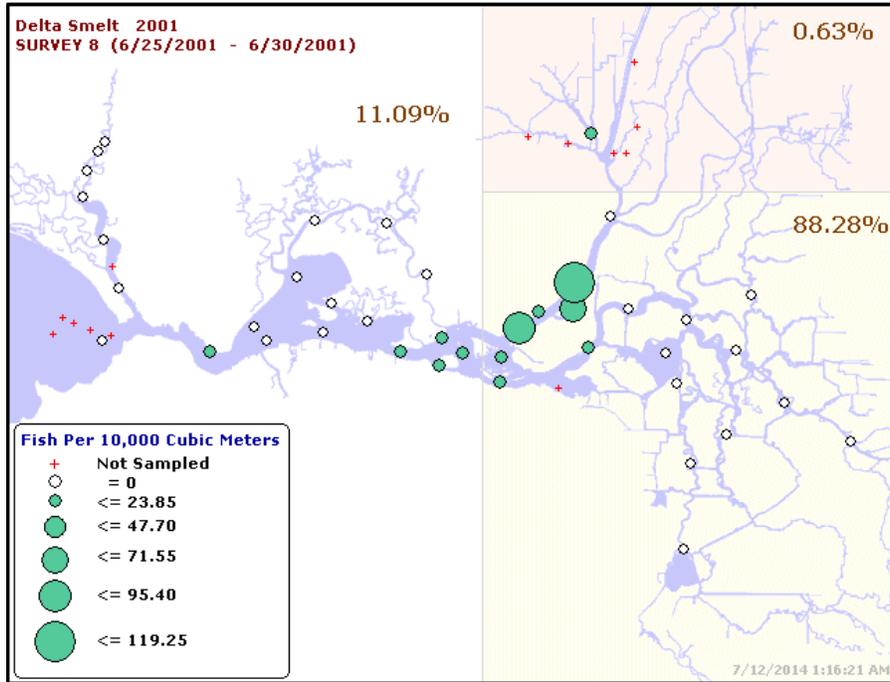
2004 Water Year: Sacramento = Below Normal; SJR = Dry



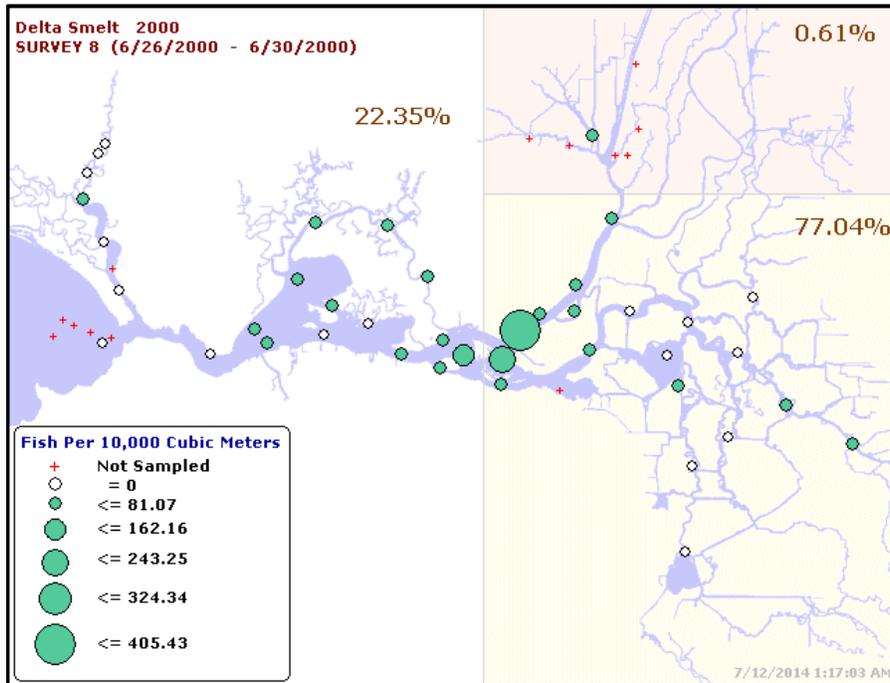
2003 Water Year: Sacramento = Above Normal; SJR = Below Normal



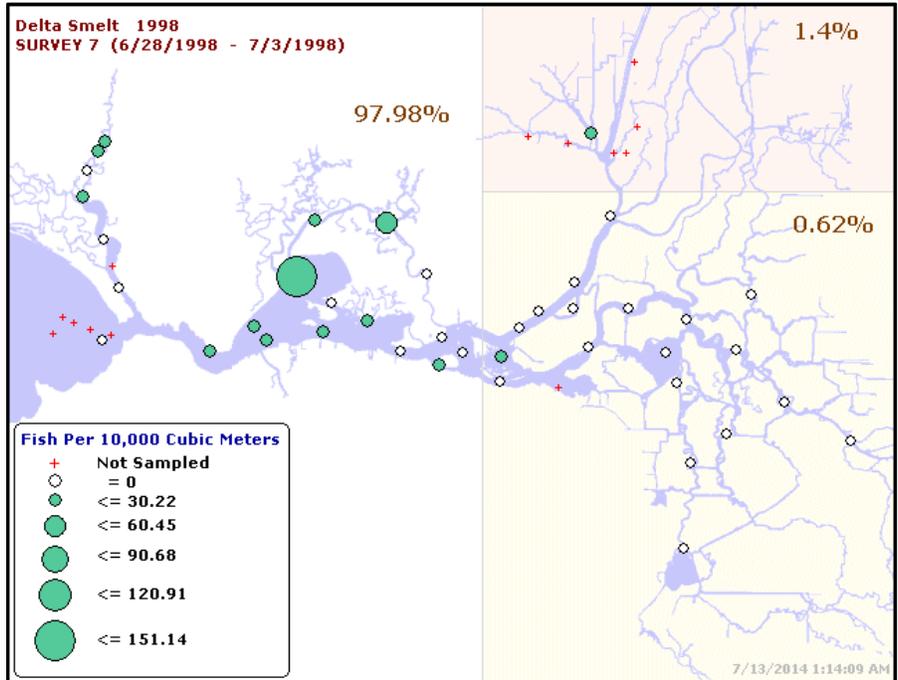
2002 Water Year: Sacramento = Dry; SJR = Dry



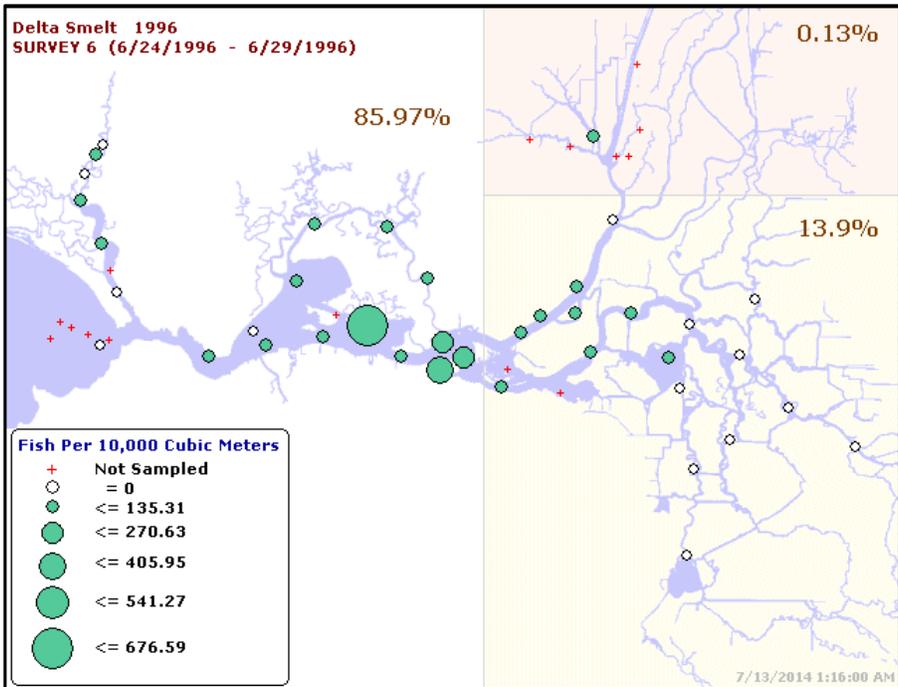
2001 Water Year: Sacramento = Dry; SJR = Dry



2000 Water Year: Sacramento = Above Normal; SJR = Above Normal

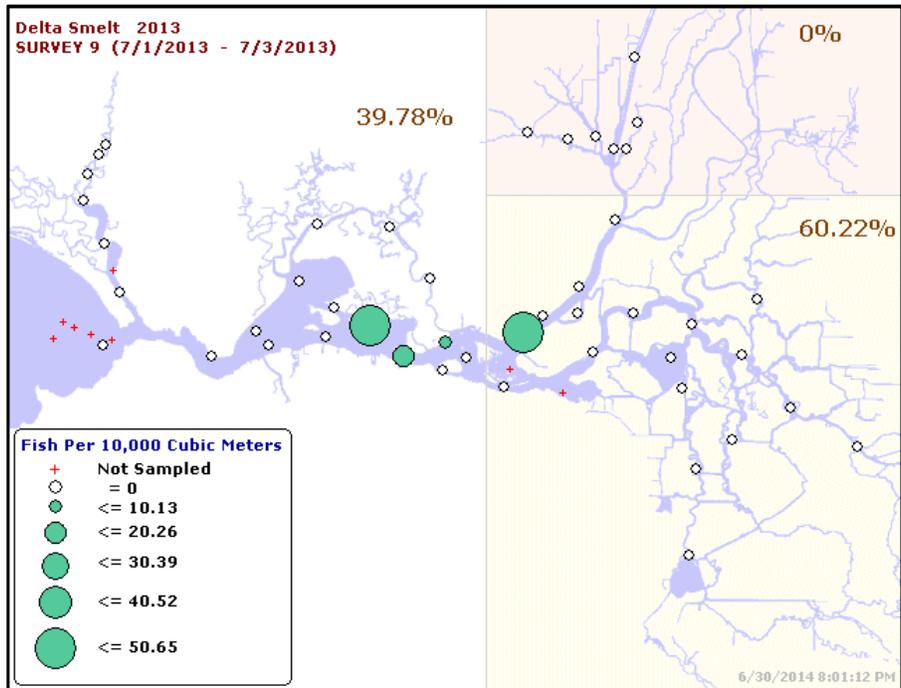


1998 Water Year: Sacramento = Wet; SJR = Wet

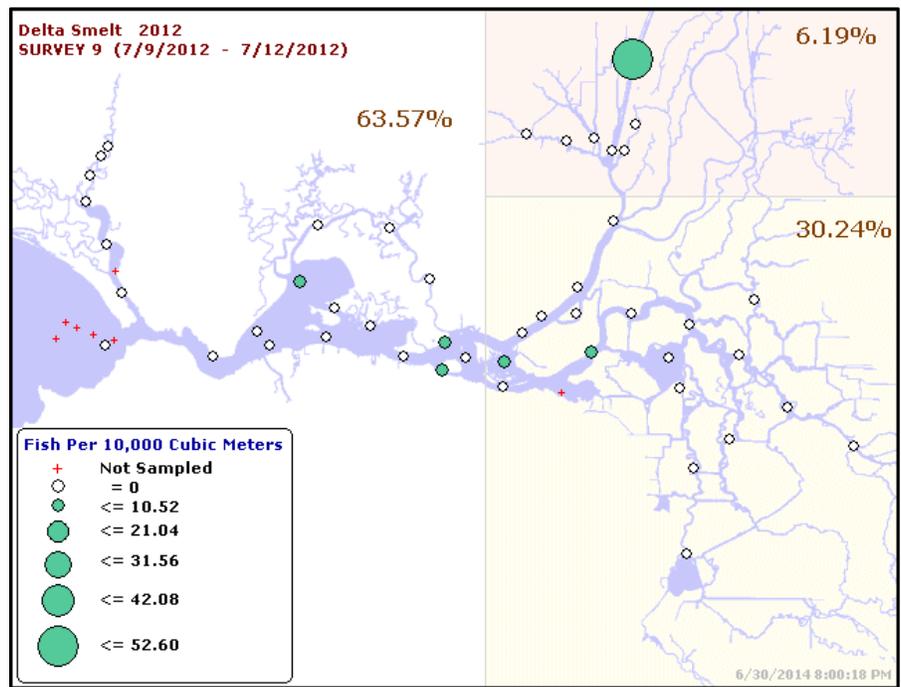


1996 Water Year: Sacramento = Wet; SJR = Wet

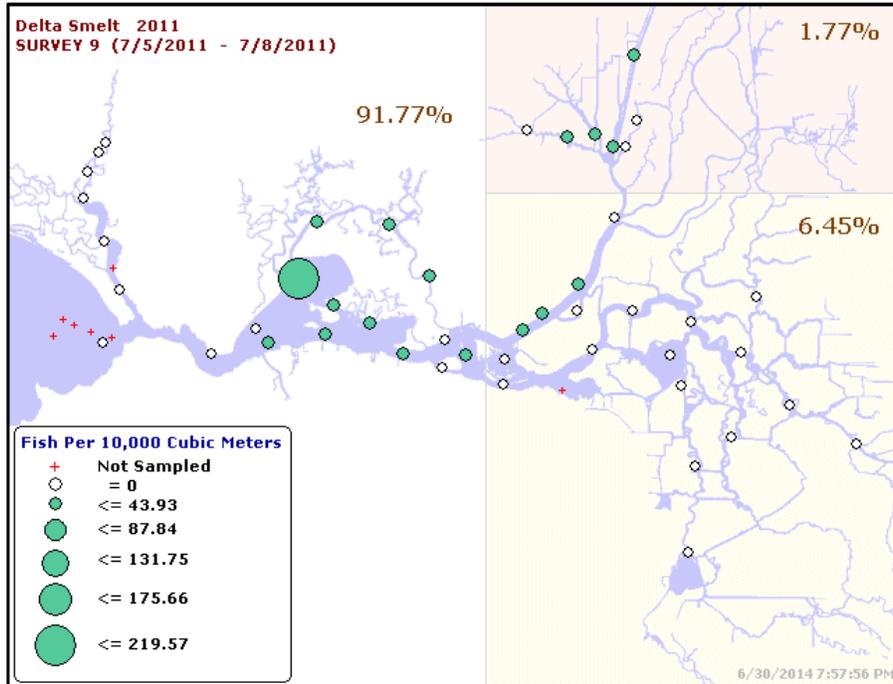
**CDFW: 20mm Delta Smelt Surveys, Early July 1996-2013
(with percentages)**



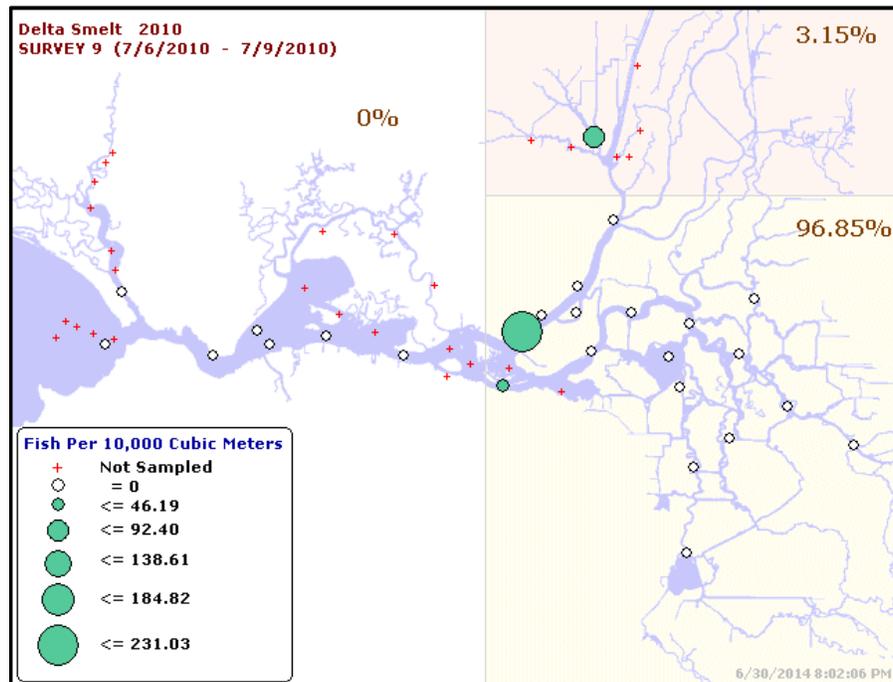
2013 Water Year: Sacramento = Dry; SJR = Critical



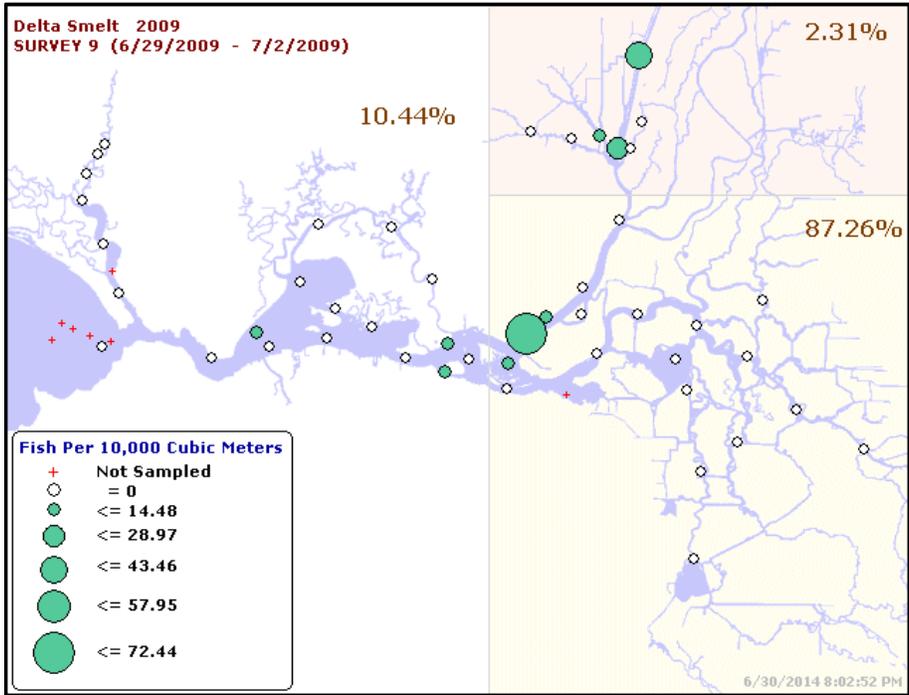
2012 Water Year: Sacramento = Below Normal; SJR = Dry



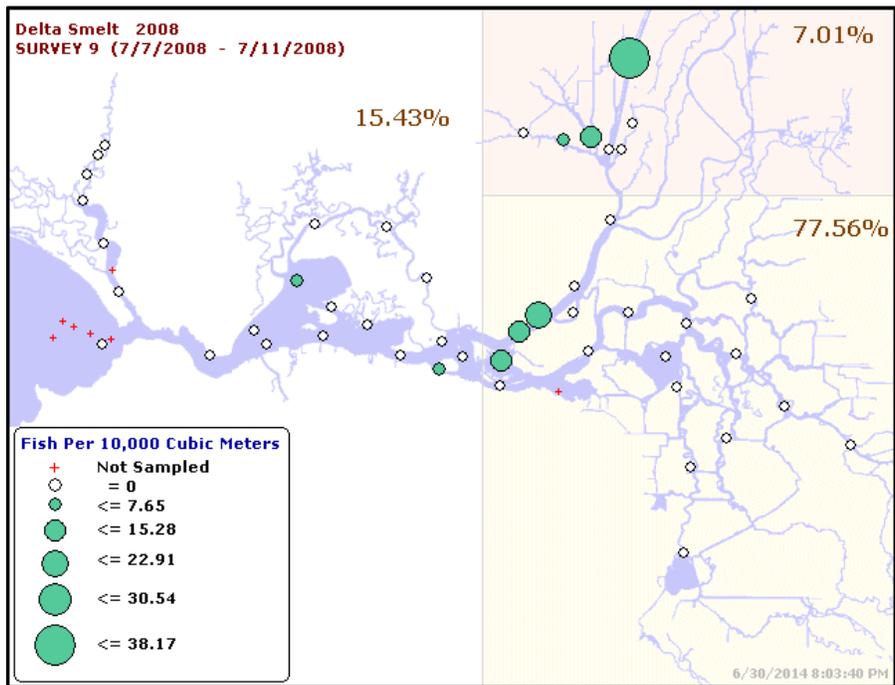
2011 Water Year: Sacramento = Wet; SJR = Wet



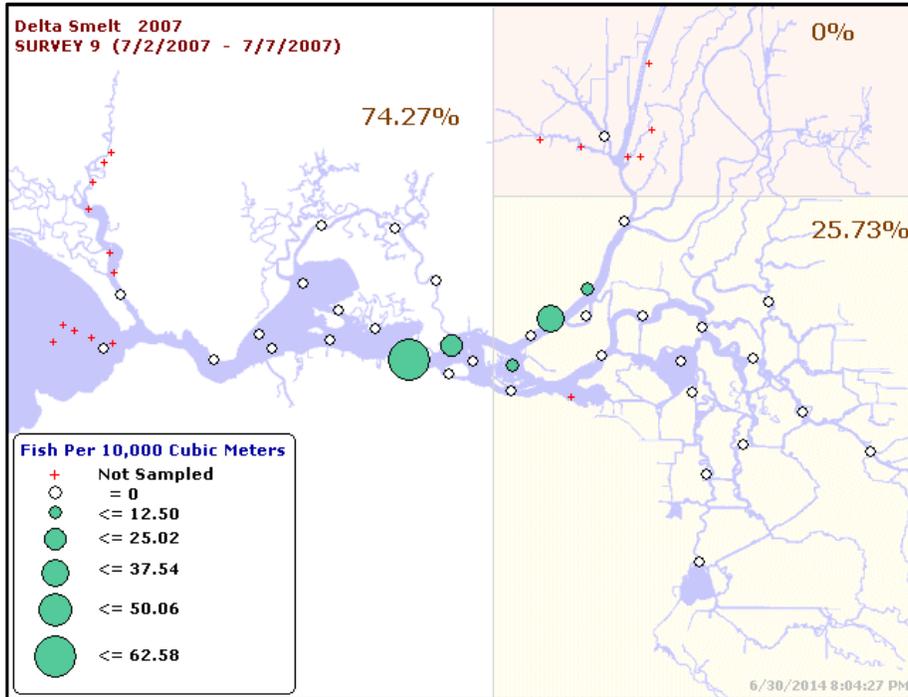
2010 Water Year: Sacramento = Below Normal; SJR = Above Normal



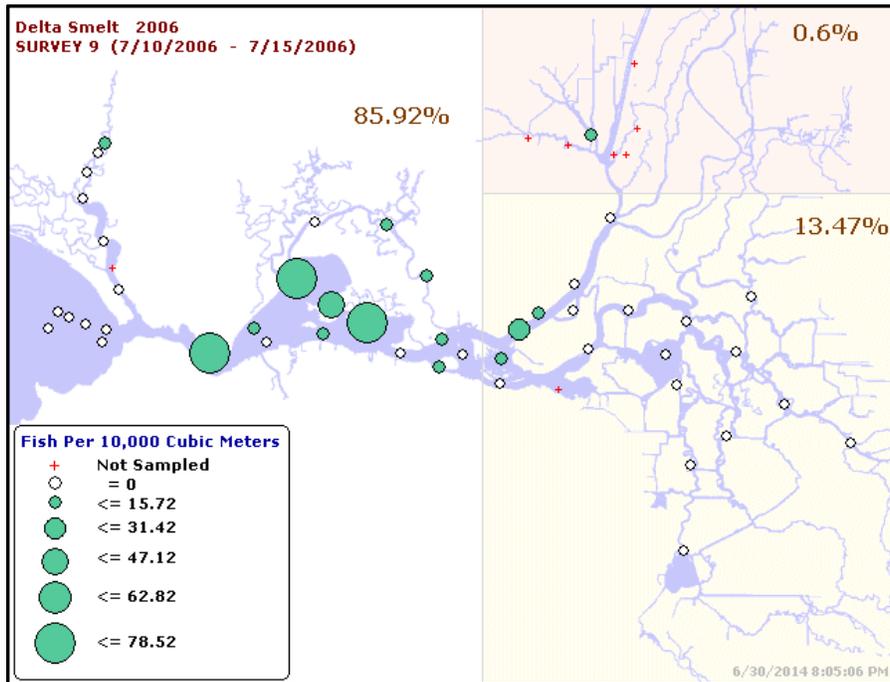
2009 Water Year: Sacramento = Dry; SJR = Dry



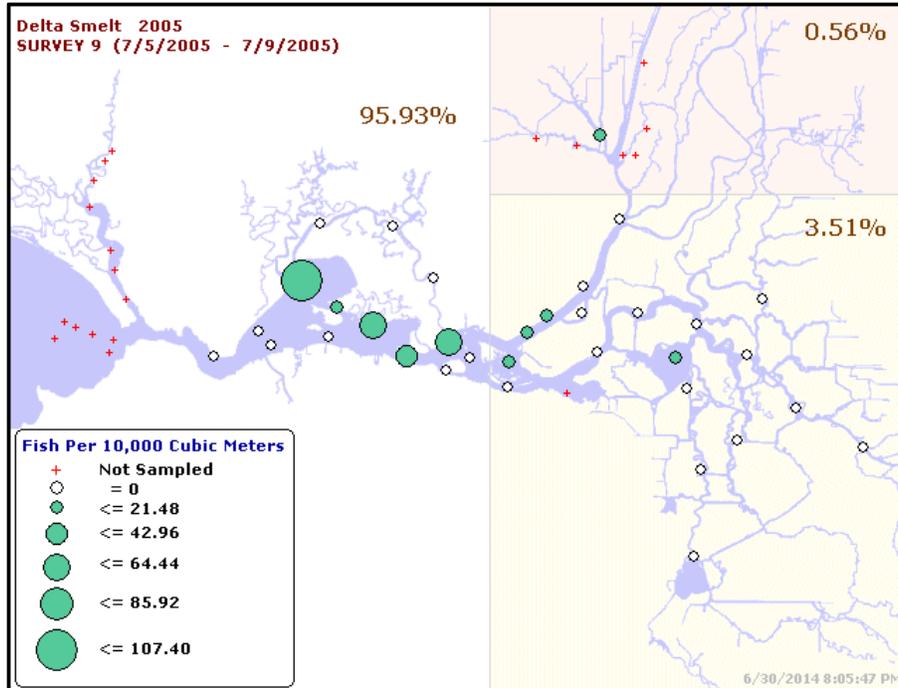
2008 Water Year: Sacramento = Critical; SJR = Critical



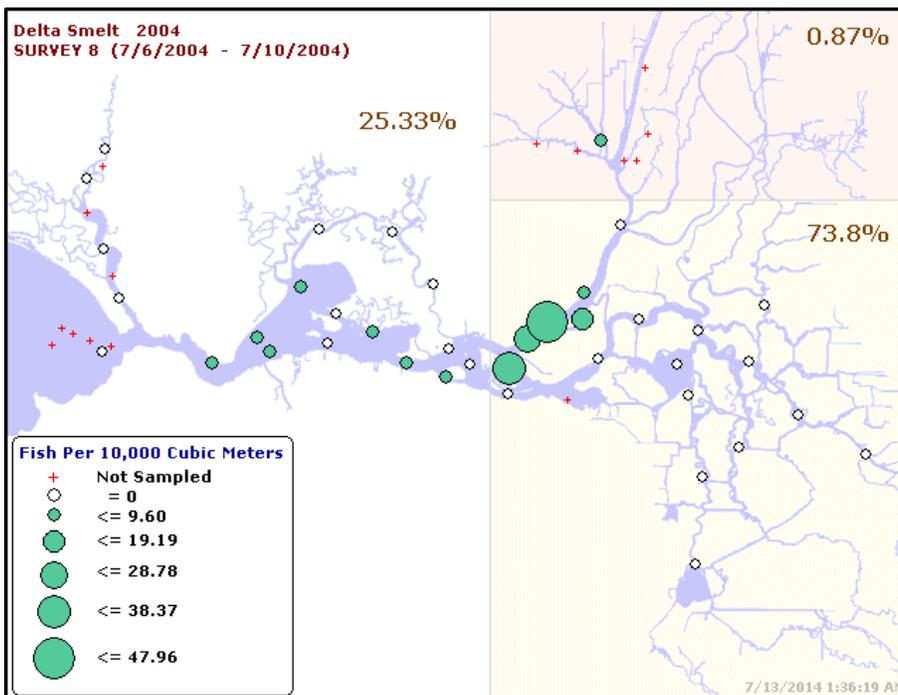
2007 Water Year: Sacramento = Dry; SJR = Critical



2006 Water Year: Sacramento = Wet; SJR = Wet

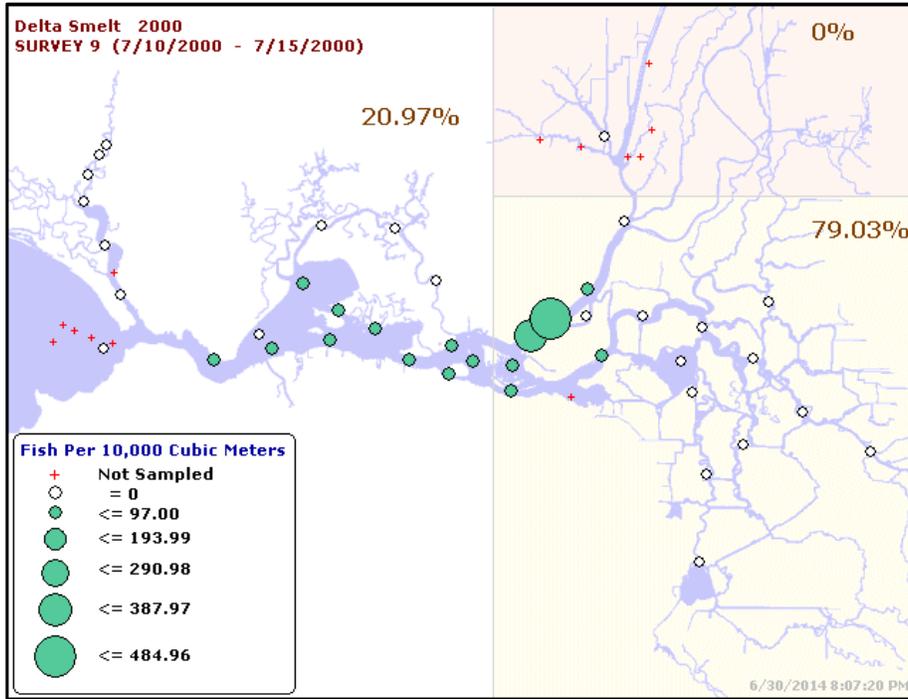


2005 Water Year: Sacramento = Above Normal; SJR = Wet

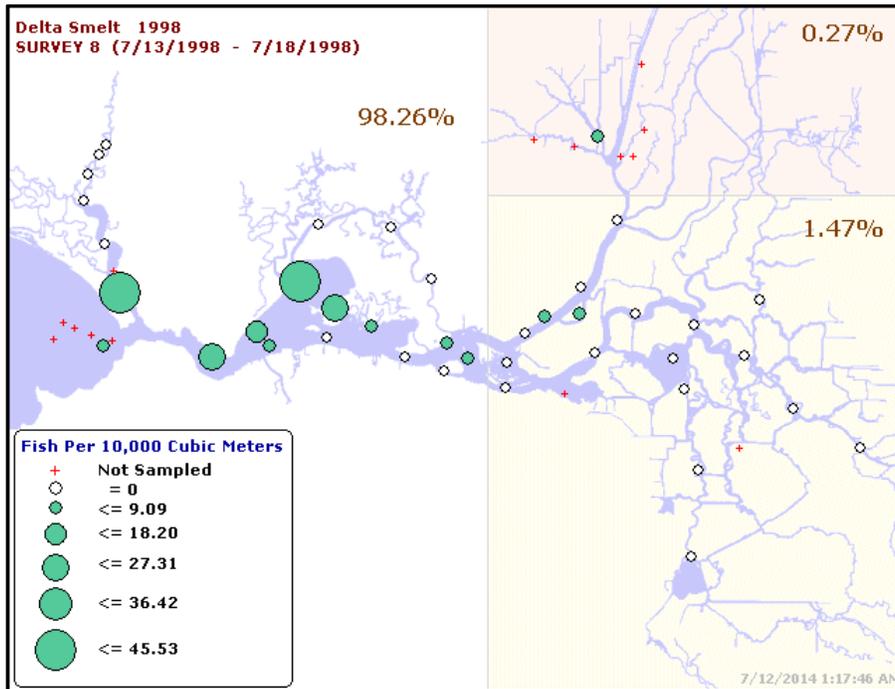


2004 Water Year: Sacramento = Below Normal; SJR = Dry

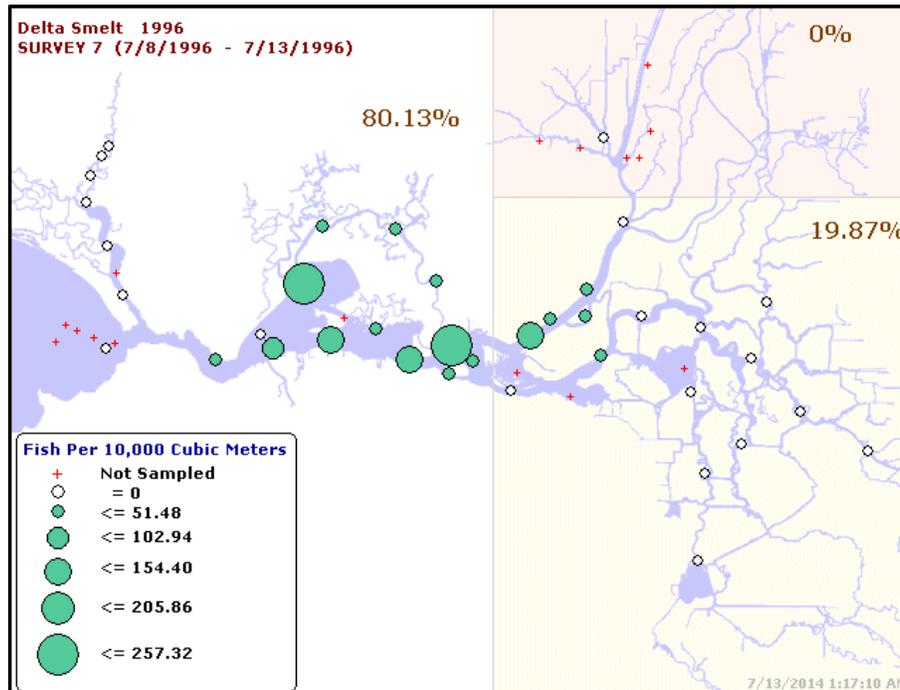
There Were No Early July Surveys in 2001, 2002 and 2003



2000 Water Year: Sacramento = Above Normal; SJR = Above Normal



1998 Water Year: Sacramento = Wet; SJR = Wet



1996 Water Year: Sacramento = Wet; SJR = Wet

Delta Smelt on the Scaffold

To summarize: during the summer of 2013, reductions in outflow, coupled with increased water exports, drew the LSZ and Delta smelt eastward into the Delta where smelt encountered lethal water temperatures. That situation was chronicled in a CSPA report titled *The Summer of 2013, the demise of Delta smelt under D-1641 Delta Water Quality Standards*, which predicted that the smelt population would plunge.¹⁵ As predicted, the following Fall Midwater Trawl's Delta smelt abundance index was the second lowest level on record, statistically indistinguishable from the absolute lowest.

The previous low in 2009 was followed by a slightly better water year (below normal on the Sacramento and above normal on the San Joaquin) and smelt populations experienced a small rebound. This year, Delta smelt are being subjected to another year of critically dry conditions on both rivers. And this year, the State Water Board seriously weakened Delta flow and water quality standards. Delta outflow is below levels in recent memory and Delta smelt populations are at historic lows. Yet exports continue and water transfers are being approved with little environmental review.

The next Fall Midwater Trawl will almost surely find Delta smelt populations at new record lows. Population abundance levels over the last few years make the numbers of Delta smelt during the Pelagic Organism Decline (POD) in the early 2000s look robust. The POD years generated an enormous outcry. Myriad meetings were conducted, numerous studies funded

¹⁵ <http://calsport.org/news/wp-content/uploads/CSPA-Cannon-Summer-2013-6.pdf>

and an array of programs launched. Today, the agencies that were so concerned about the POD are silent and have embraced measures they know will be disastrous for the species.

The point of no return, i.e., the level where the population cannot recover, is unknown. But, that point is likely approaching. A species that existed in this estuary for thousands of years and was the most abundant fish in the Delta is on the scaffold. Perhaps, the greatest tragedy is that our trustee agencies charged with the protection of Delta smelt; the USFWS, CDFW and the State Water Board have escorted it there.