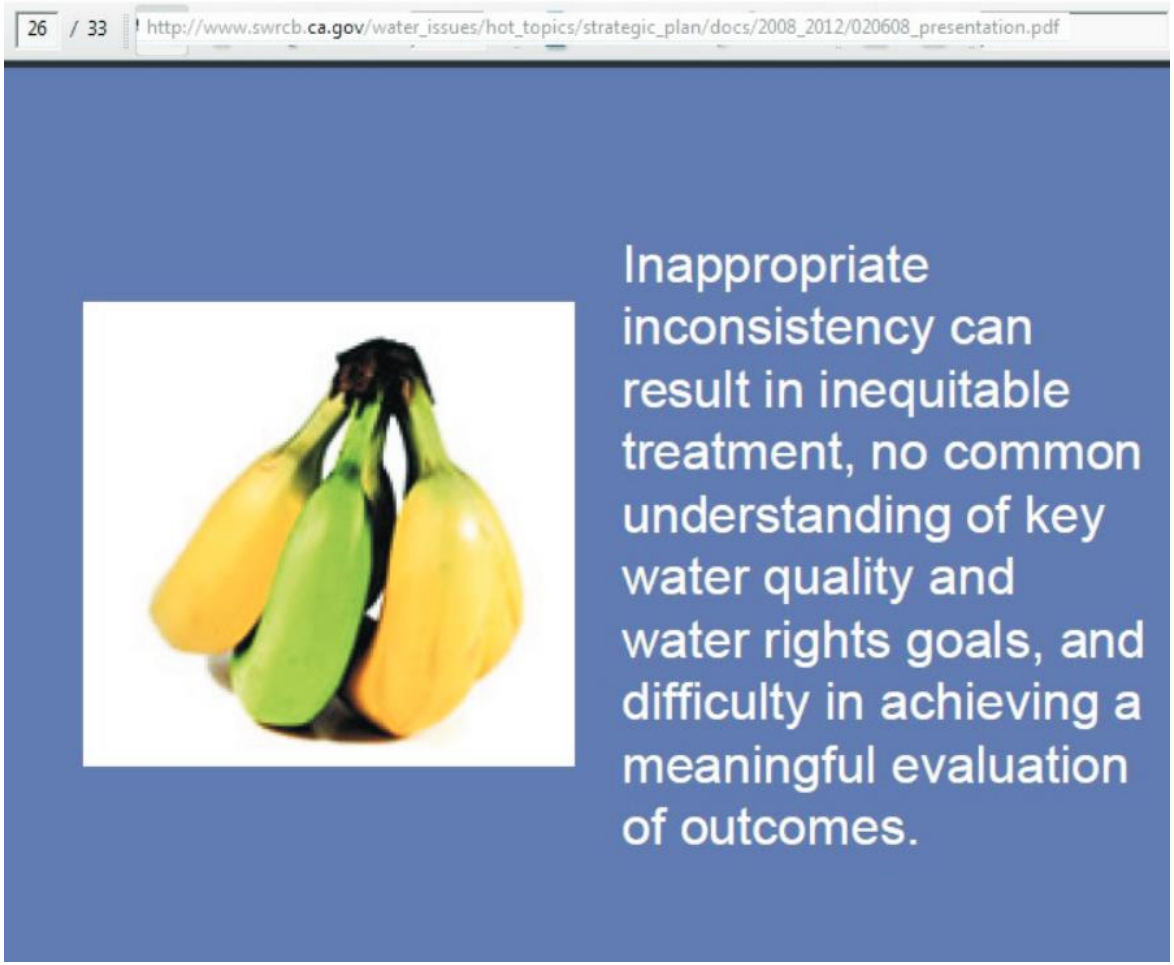
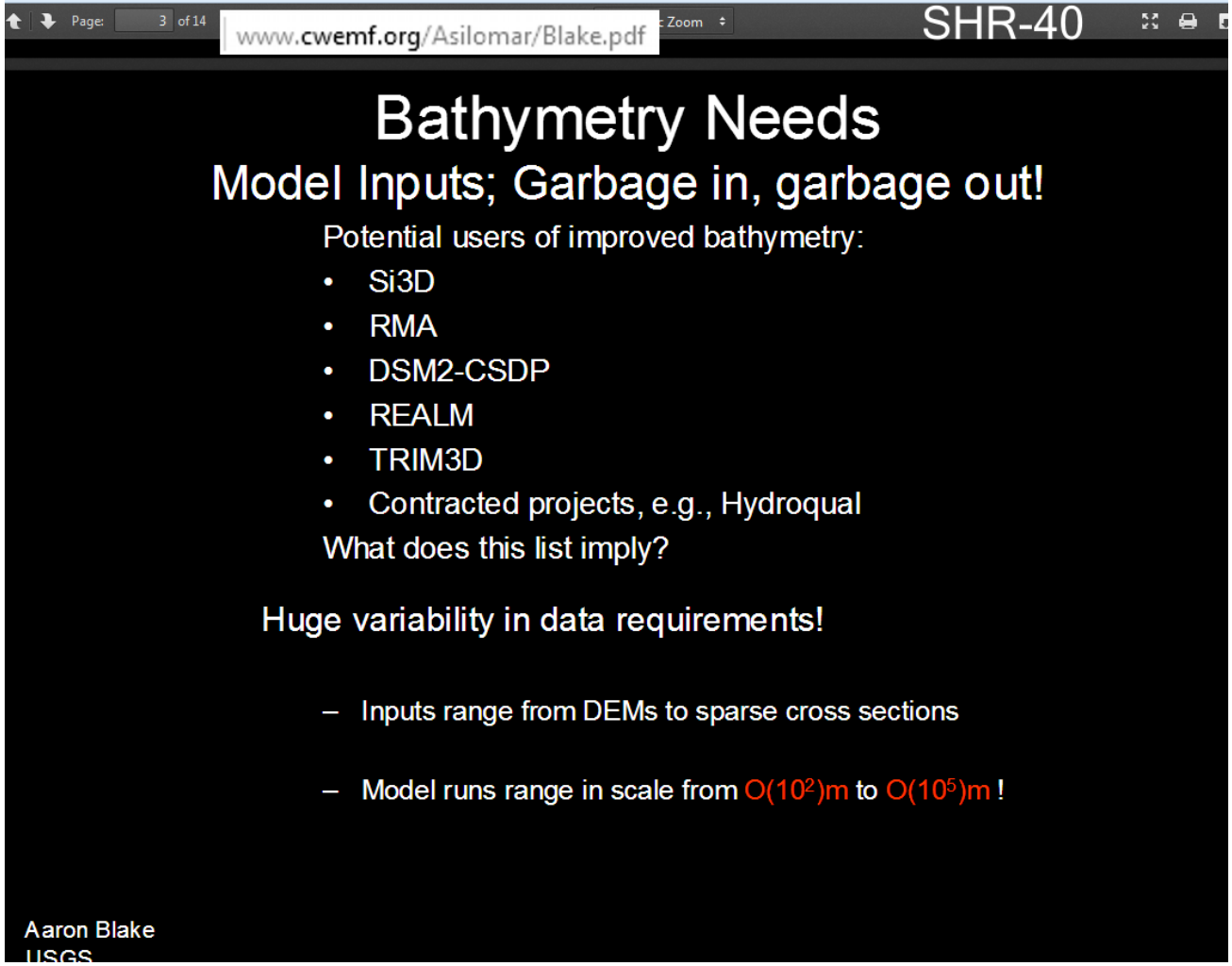
Modeling Questions: DSM2 & CALSIM II SHR-104

We all simply wish to have the ability to conduct meaningful evaluation of outcomes.
So can we agree to the below statement from a 2008 SWRCB presentation? Yes or No



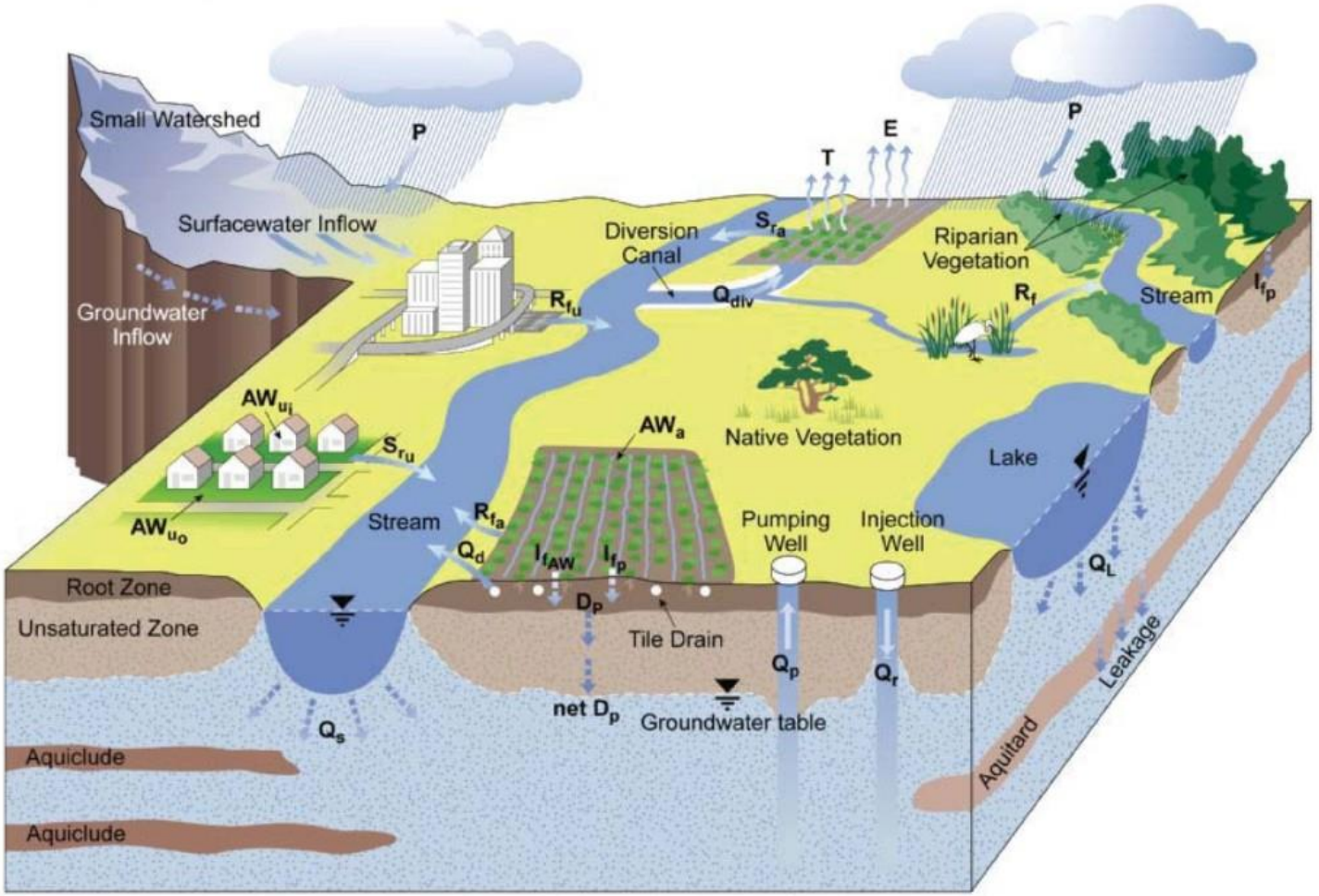


If the baseline data that is input is not correct, what should one expect for the outcome?

Do the computer models used for WaterFix proposal analyze or reflect impact to groundwater recharge of the drinking water aquifer in and around the Delta? Yes or No?

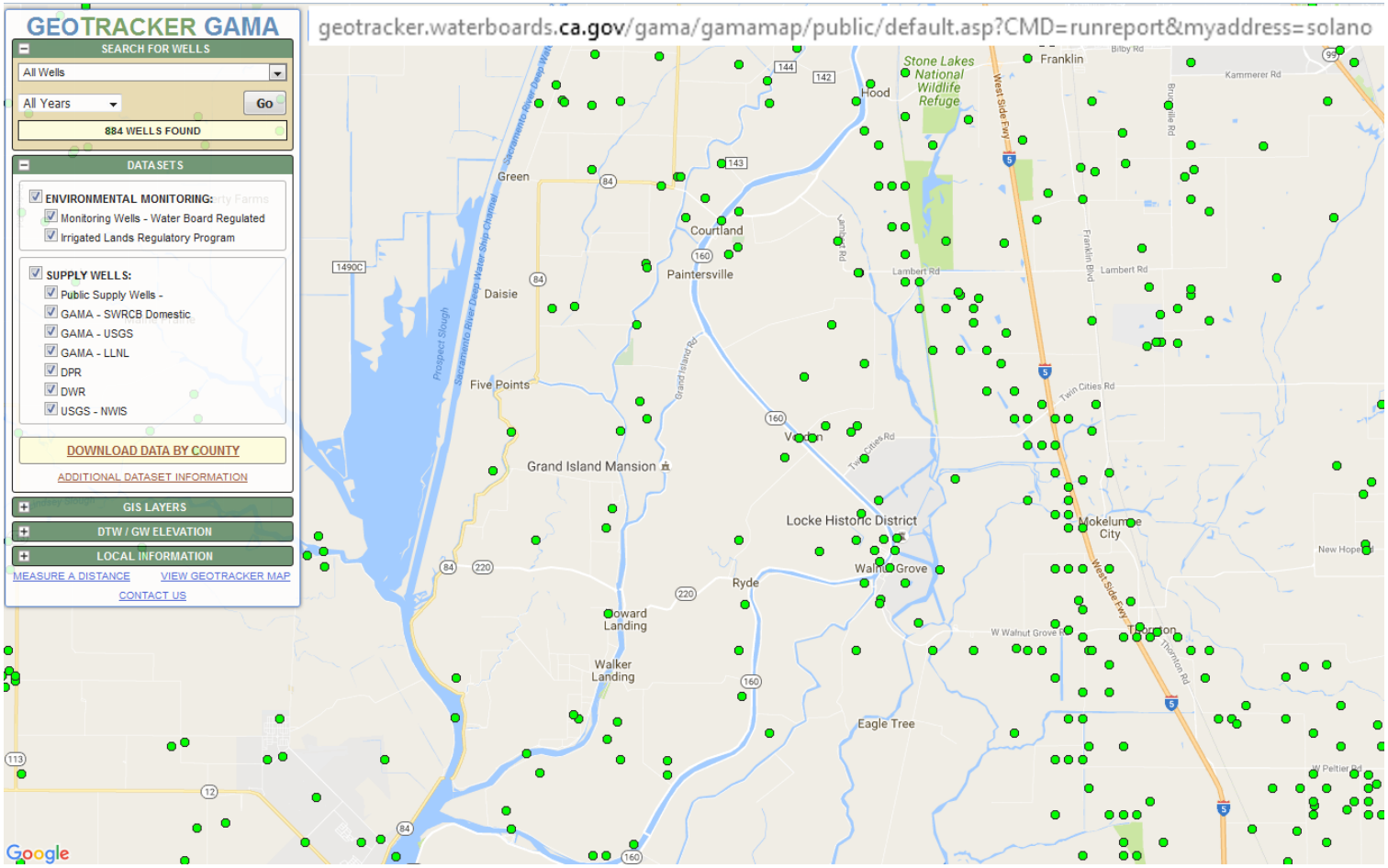
baydeltaoffice.water.ca.gov/modeling/hydrology/C2VSim/download/C2VSim_Model_Report_Final.pdf 42 of 196 SHR-24

Figure 11. Integrated Water Flow Model components.



Fresh drinking water is .5 ppt or less than 1 ppt, correct?

1. Is flow ***currently*** modeled with an assumption that flows are being managed in such a way as to protect drinking water QUALITY and rights In the Delta region? Yes or No?
2. What does DSM2 indicate will be the long term impact on drinking water wells, Besides the 18 ones discussed in the WF description? Please describe, being specific about wells in the Walnut Grove area, Courtland and Clarksburg areas and along Steamboat and Sutter Sloughs. (D1641 apply to only surface water?)



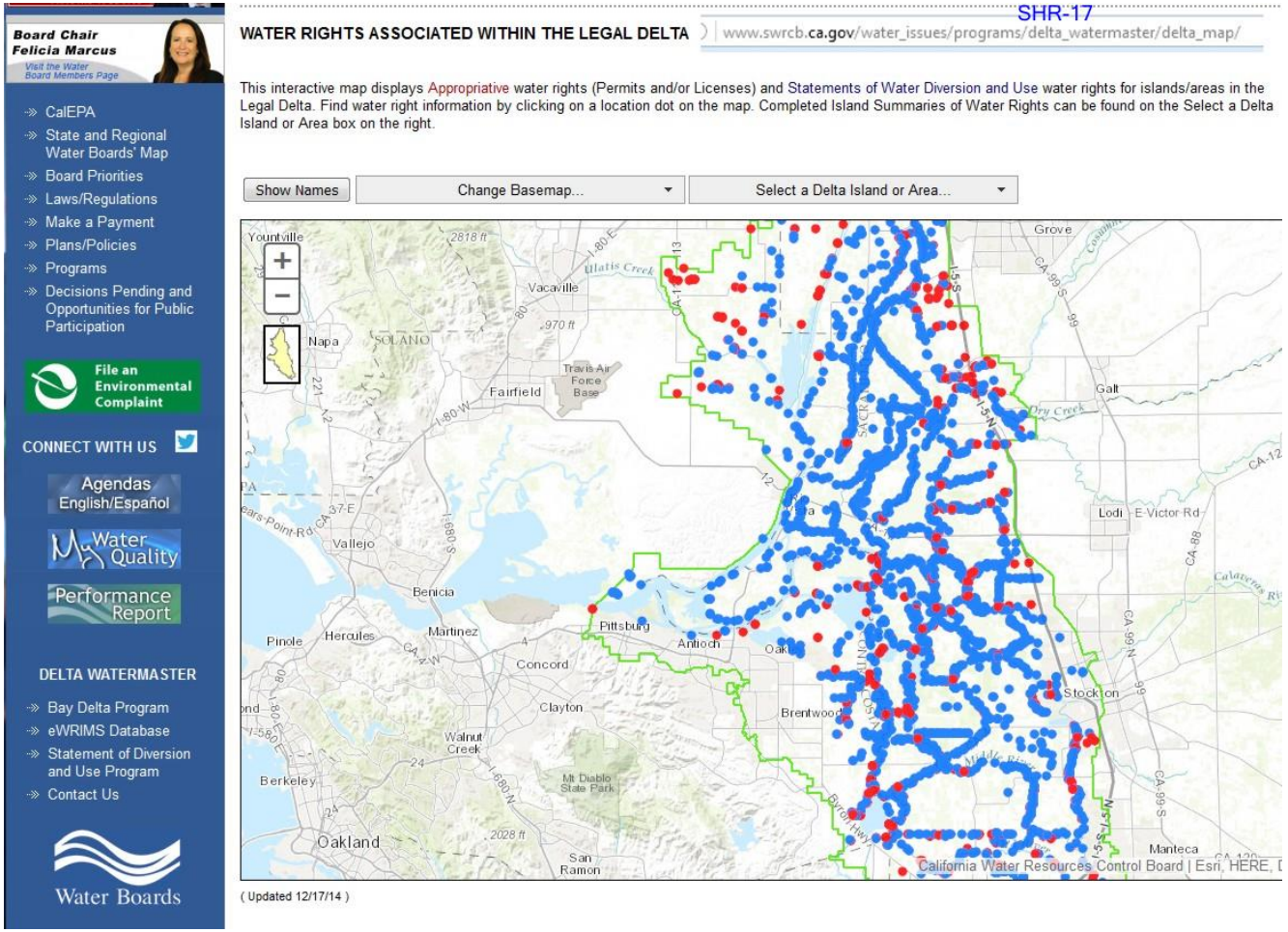
http://geotracker.waterboards.ca.gov/gama/gamamap/public/default.asp?CMD=runreport&myaddress=solano
Accessed 8-11-16 at 9:54 am PT

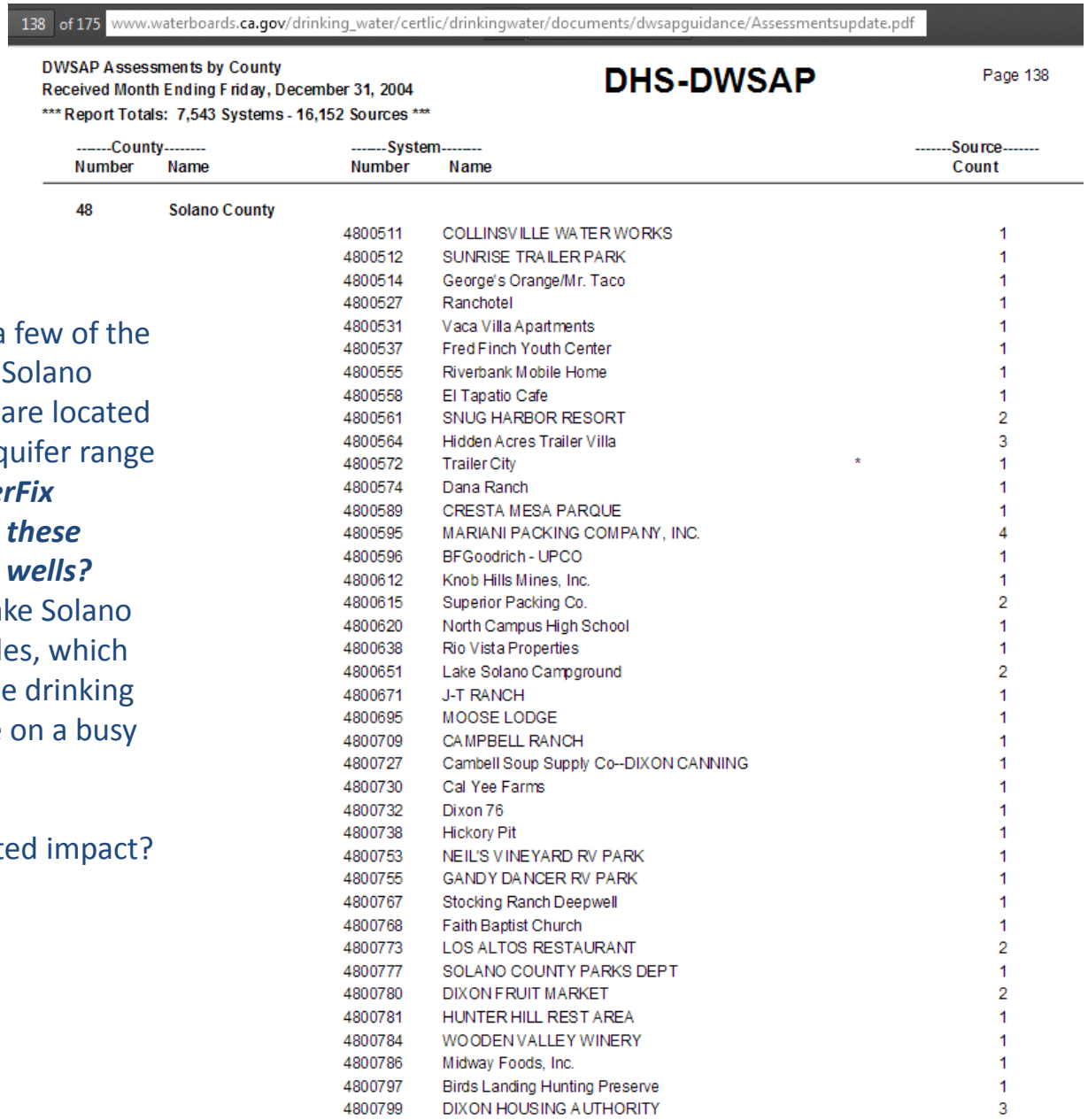
Here is a screen print of a Map showing estimated locations of farmer's pumps along with other water rights or surface diversions in the Delta. Do model outputs confirm there will be fresh drinking water for all current Delta water users? Yes or No?

*Will there be sufficient fresh water for irrigation of crops and animals? Yes or No?

*If the high flows of winter or spring is diverted into CWF tunnels, and thereby does not flush out the sediment buildup from summer low flows, how long will it take before the farmer's intakes are covered by sediment?

*If the Delta area drinking water aquifer is fouled by salinity encroachment and changes in the hydraulic patterns, how do you think that might impact the thousands of people who rely on fresh water wells in and around the Delta region?





138 of 175 www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/dwsapguidance/Assessmentsupdate.pdf

DWSAP Assessments by County
Received Month Ending Friday, December 31, 2004
*** Report Totals: 7,543 Systems - 16,152 Sources ***

DHS-DWSAP

Page 138

County Number	County Name	System Number	System Name		Source Count
48	Solano County				
		4800511	COLLINSVILLE WATER WORKS		1
		4800512	SUNRISE TRAILER PARK		1
		4800514	George's Orange/Mr. Taco		1
		4800527	Ranchotel		1
		4800531	Vaca Villa Apartments		1
		4800537	Fred Finch Youth Center		1
		4800555	Riverbank Mobile Home		1
		4800558	El Tapatio Cafe		1
		4800561	SNUG HARBOR RESORT		2
		4800564	Hidden Acres Trailer Villa		3
		4800572	Trailer City	*	1
		4800574	Dana Ranch		1
		4800589	CRESTA MESA PARQUE		1
		4800595	MARIANI PACKING COMPANY, INC.		4
		4800596	BFGoodrich - UPCO		1
		4800612	Knob Hills Mines, Inc.		1
		4800615	Superior Packing Co.		2
		4800620	North Campus High School		1
		4800638	Rio Vista Properties		1
		4800651	Lake Solano Campground		2
		4800671	J-T RANCH		1
		4800695	MOOSE LODGE		1
		4800709	CAMPBELL RANCH		1
		4800727	Cambell Soup Supply Co--DIXON CANNING		1
		4800730	Cal Yee Farms		1
		4800732	Dixon 76		1
		4800738	Hickory Pit		1
		4800753	NEIL'S VINEYARD RV PARK		1
		4800755	GANDY DANCER RV PARK		1
		4800767	Stocking Ranch Deepwell		1
		4800768	Faith Baptist Church		1
		4800773	LOS ALTOS RESTAURANT		2
		4800777	SOLANO COUNTY PARKS DEPT		1
		4800780	DIXON FRUIT MARKET		2
		4800781	HUNTER HILL REST AREA		1
		4800784	WOODEN VALLEY WINERY		1
		4800786	Midway Foods, Inc.		1
		4800797	Birds Landing Hunting Preserve		1
		4800799	DIXON HOUSING AUTHORITY		3

Here is a listing of just a few of the drinking water wells of Solano County, some of which are located in the drinking water aquifer range of the Delta. ***Has WaterFix modeled the impact to these specific drinking water wells?*** (Note SHR, Rio Vista, Lake Solano Campground as examples, which combined might provide drinking water to 15,000 people on a busy day) Yes or No?

If so, what is the expected impact?

If not, why not?

- McCormack Williamson tract is going be restored and there is a very high probability that Cache Slough will be restored.
- The DSM2 dispersion coefficients were not changed when the tidal marshes were added.

V. **Modeling Results – Flow Reversals**

- A decrease in the frequency of reverse flow event occurs north of Sutter and Steamboat slough with the addition of the proposed project and tidal restoration sites. This is caused due to the addition of the tidal-marsh restoration in the Cache Slough and Suisun Marsh area.

- When the no action alternative is compared to the proposed project, with no tidal marsh restoration, then there is a slight increase in the number of reverse flow event at Freeport.
- These modeling results haven't been finalized and are not currently available to the public.

"**Similar water quality**" per testimony for Sutter Slough and Steamboat Slough: 9:40 am on 8/24/2016 Please explain ***how*** tidal restoration sites will decrease the frequency of reverse flow events on the Sacramento River caused by operation of CWF. How has the model reflected changes in hydrology due to the development of the Liberty Island "reservoir" per DSM2? **Please explain how you determined what the minimum level of flow on the Sacramento River below the intakes should be to maintain drinking water quality, water levels, and water temperature, especially late summer months.**

Please also confirm the baseline data has been updated to include the many bench tests and "restoration" actions for the last 10 years that have already negatively impacted flows on Steamboat Slough.

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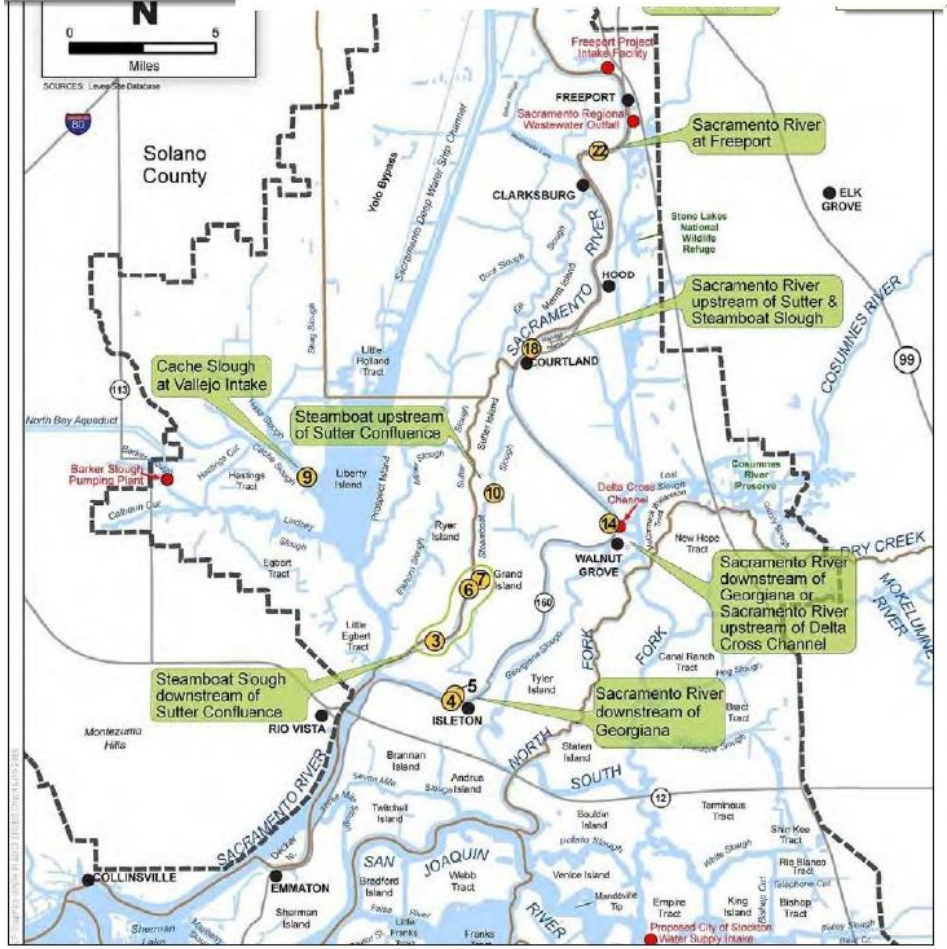
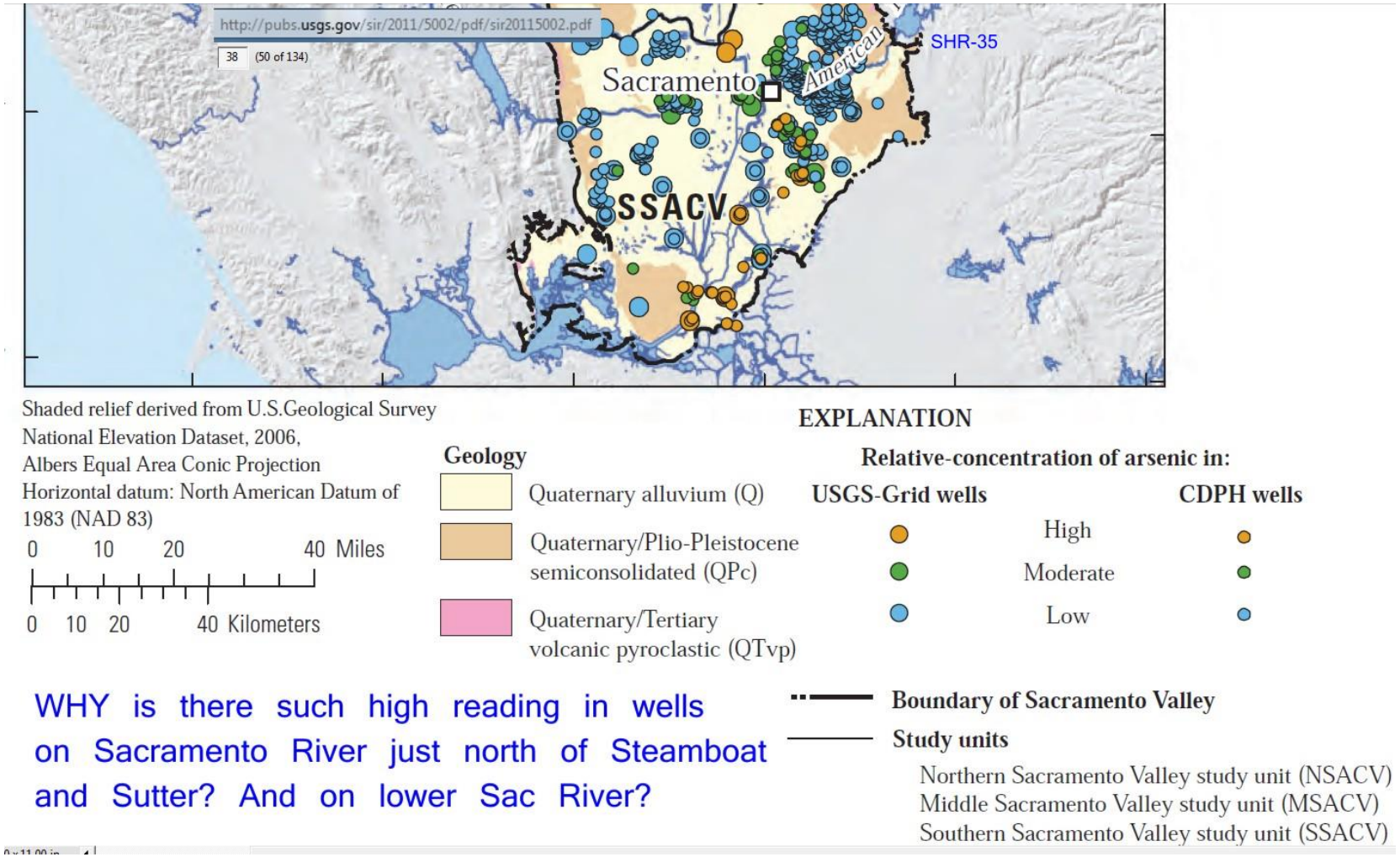


Figure 5C.4-27. Bench Habitat Analysis Sites

10-sediment insertion and bench test resulted in raising bed of waterway
6,7 Large trees placed in waterway near banks to capture sediment & reduce waterway navigation and use in this area
3 bench built up and planted with tules but was infested with egeria densa which is not suitable for salmonids. Also causes flood control issues as bench reduces water outflow in high flow times.

How does the CWF plan help to correct the negative impacts to the Delta drinking water that can be shown to have occurred in the last 8-10 years during the CALFED-BDCP "restoration" actions?

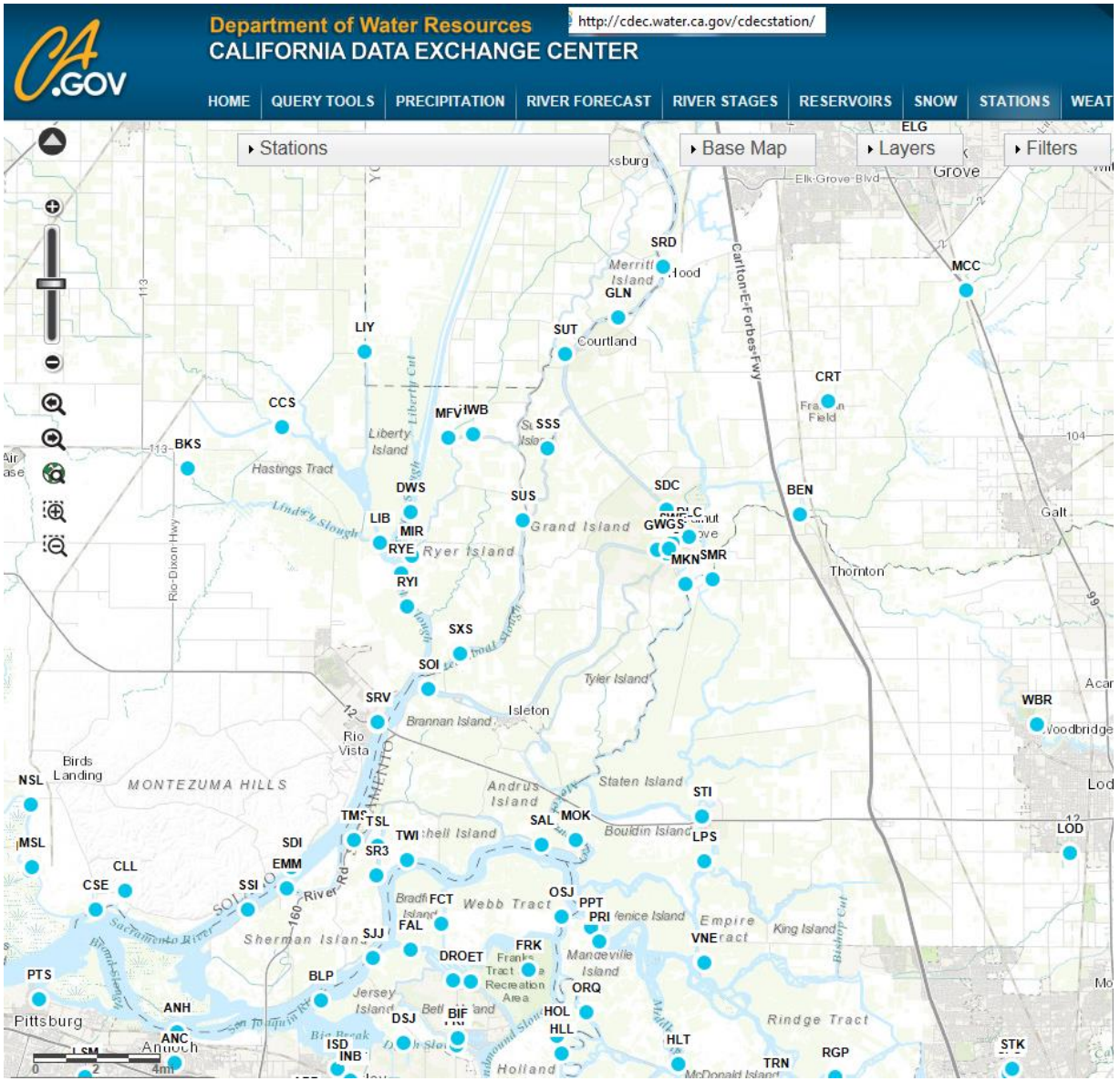


Model baseline Data questions:

Is CalSim II based on actual flow numbers from CDEC?

How do you convert cfs of flow into acre feet exported or delivered?

To be accurate would you convert cfs to gallons per day, then to acre feet per day or what?



http://cdec.water.ca.gov/cdecstation/

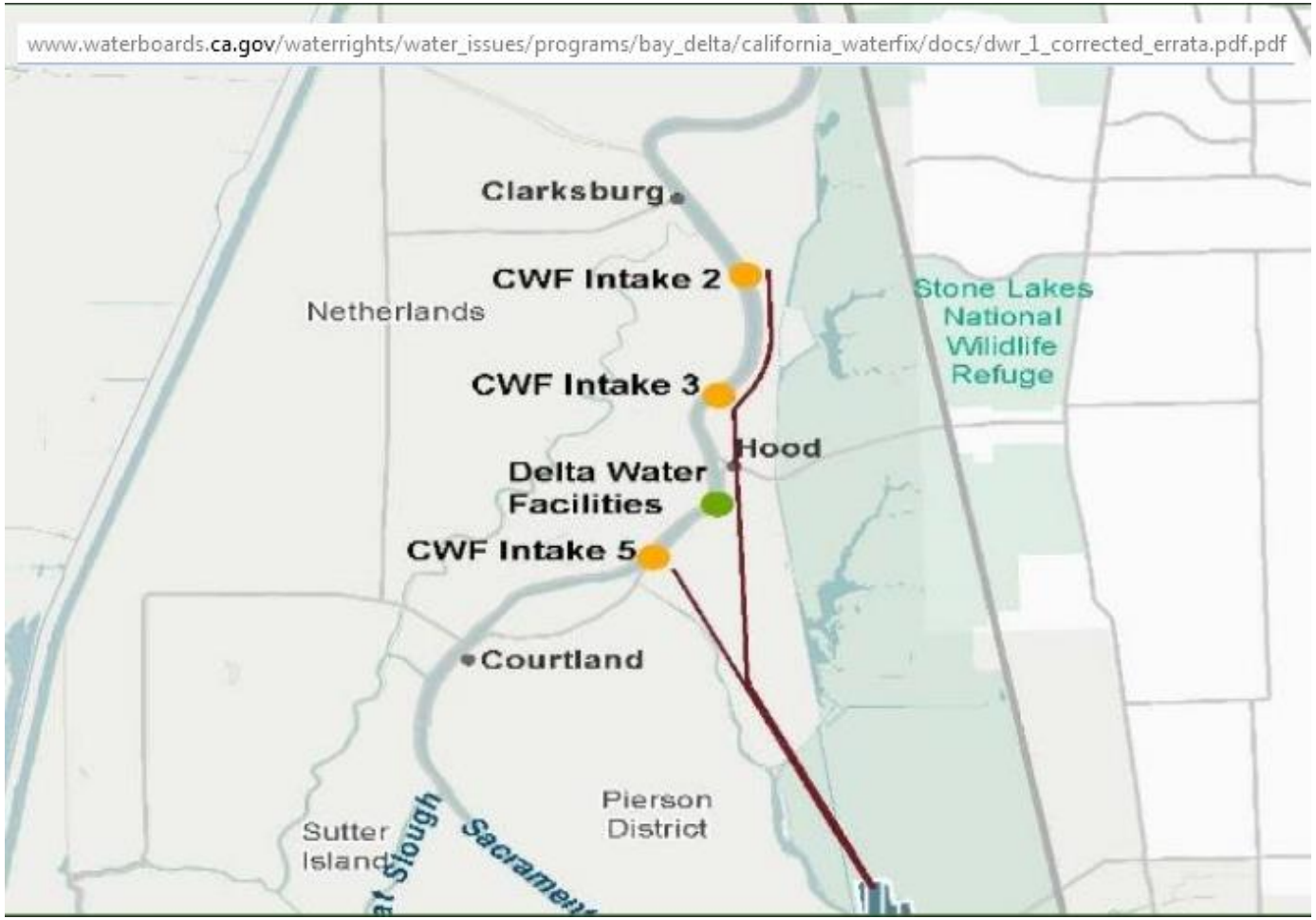
*Who provided the Dayflow numbers to the modelers for the recalibration of CALSIM II, and when?

*Who provided the flow data for DSM2 to the modelers and when?

*Who provided the bathymetry for DSM2 and when? Who determined what Cross sections to use and when?

*Has USBR or DWR already built a siphon or subsurface intake at the estimated Location of the green dot? (next page)

WaterFix models and documents talk about three 3000 cfs intakes but what about the 4th intake?
How many cfs is that? Is it already permitted, and if so, when was it permitted? When was it built?
How do the CALSIM II and DSM2 models account for this fourth intake or diversion?
If "bypass flows" after CWF intakes 2 and 3 are only 5,000 cfs left in the river, will the "Delta Water Facilities" shown on the map below be allowed to operate to remove more flow off the Sacramento River?



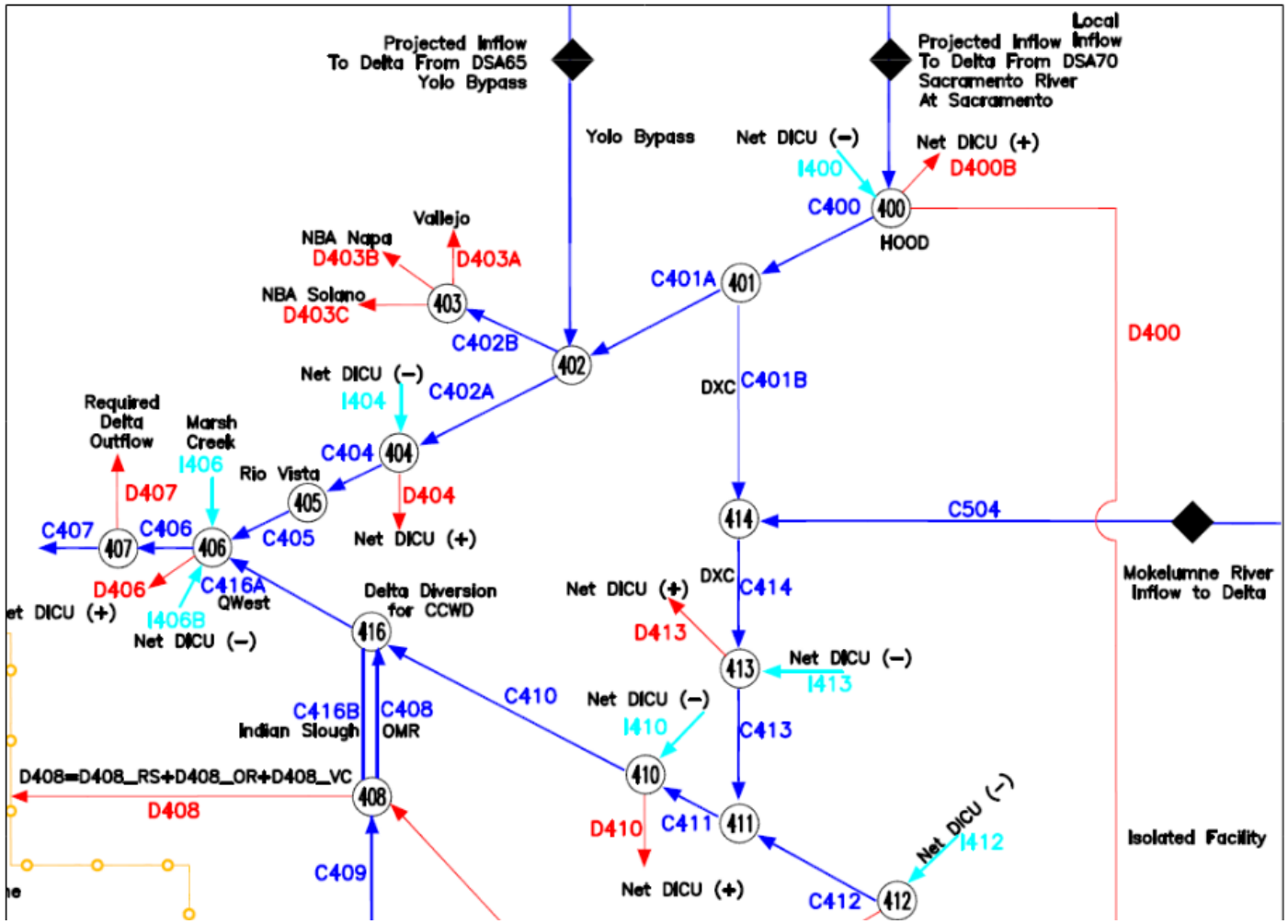
Expected remaining flows in the North Delta

SHR-23

*flow into Steamboat Slough before the confluence with Sutter Slough; **flow left on the Sacramento River below Georgiana Slough

	No Action Alternative	Boundary 1	Boundary 2	H3	H4
flows in cfs: September					
Inflow at Freeport	15,000	15,000	15,000	15,000	15,000
flow immediately below intakes	15,000	5,000	5,000	5,000	5,000
diversion at ? Above Sutter Slough	( )	( )	( )	( )	( )
flow into Sutter Slough	( )	( )	( )	( )	( )
flow into Miner's Slough	( )	( )	( )	( )	( )
Flow into Steamboat*	( )	( )	( )	( )	( )
Flow into DCC	( )	( )	( )	( )	( )
Flow into Georgiana Slough	( )	( )	( )	( )	( )
Flow into Lower Sacramento River**	( )	( )	( )	( )	( )
less use by ND consumptive use	( )	( )	( )	( )	( )
Flow from Yolo Bypass/Cache Slough					
Minimum outflow at Rio Vista					

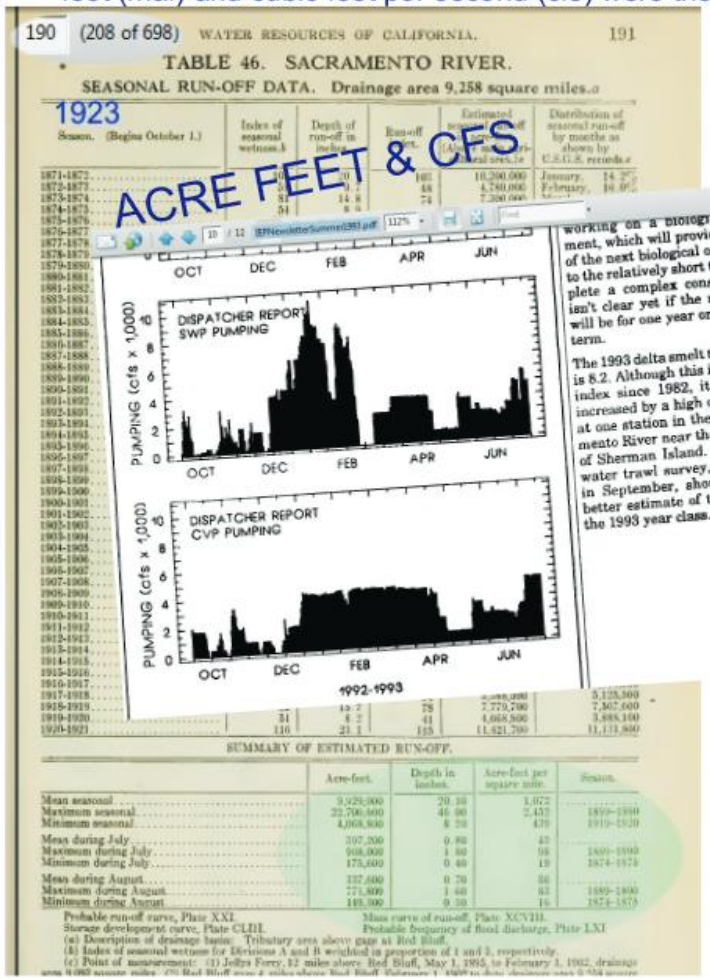
	No Action Alternativ	Boundary 1	Boundary 2	H3	H4
flows in cfs: September					
Inflow at Freeport	10,000	15,000	15,000	15,000	15,000
flow immediately below intakes	10,000				
diversion at ? Above Sutter Slough	( )	( )	( )	( )	( )
flow into Sutter Slough	( )	( )	( )	( )	( )
flow into Miner's Slough	( )	( )	( )	( )	( )
Flow into Steamboat*	( )	( )	( )	( )	( )
Flow into DCC	( )	( )	( )	( )	( )
Flow into Georgiana Slough	( )	( )	( )	( )	( )
Flow into Lower Sacramento River**	( )	( )	( )	( )	( )
less use by ND consumptive use	( )	( )	( )	( )	( )
Flow from Yolo Bypass/Cache Slough					
Minimum outflow at Rio Vista					

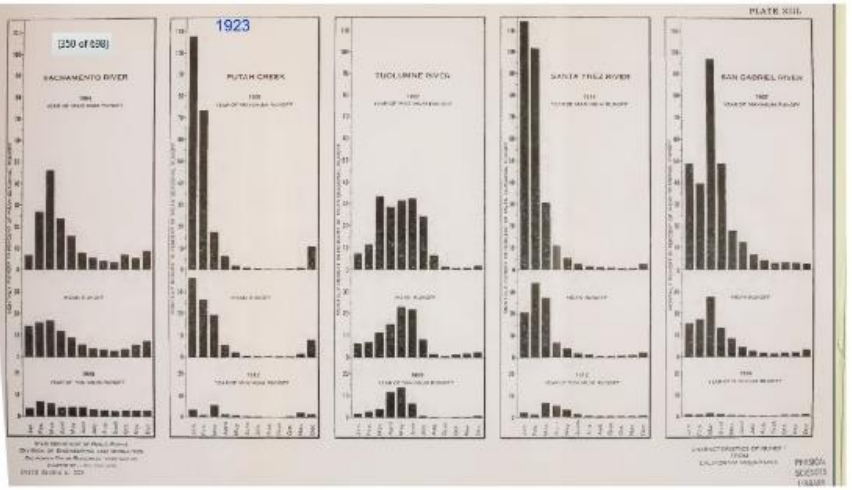


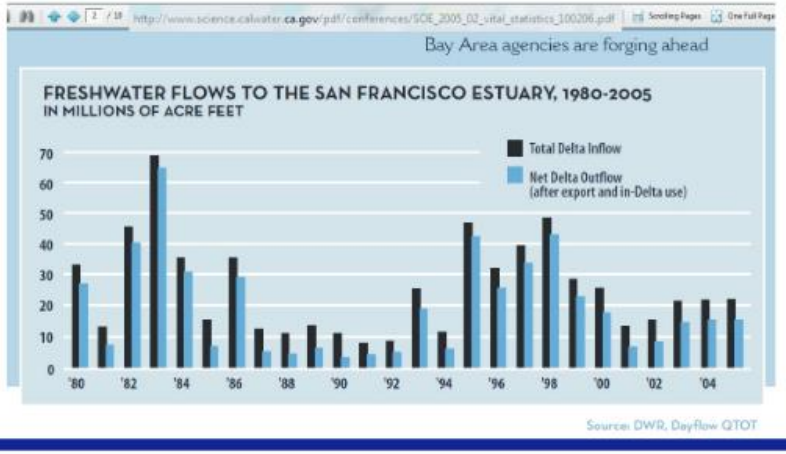
From 2003 to 2016, what has changed? Look at Yolo Bypass area, DXC, D400.
Does CALSIM II even cover flows within the Delta other than the numerical DICU? Or
Is that the function of DSM2 for calculating in-Delta impacts?
** Is the “green dot” on this schematic?

www.deltarevision.com/Issues/water-issues/waterflow/video/NorthDelta_vs_NorthDelta/waterflow-graphics-2of3.pdf

From the time the state first started measuring and reporting Sacramento River water flow, acre feet (af) or million acre feet (maf) and cubic feet per second (cfs) were the measures used...until the last few years of planning...







Q: Does 1 cubic foot/second equal 646,320 OR 646,272 gallons a day?

Why does DWR use different conversion numbers from USGS? Compare converting CFS to gallons per day

http://www.water.ca.gov/swp/operationscontrol/docs/annual/annual01.pdf

Conversion Factors

Quantity	Multiply	By	To obtain
Area	acre	43,560	square feet
Volume	cubic foot	7.481	gallons
	cubic foot	62.4	pounds of water
	gallon	0.13368	cubic feet
	acre-foot	325,900	gallons
	acre-foot	43,560	cubic feet
	million gallons	3.07	acre-feet
Flow	cubic foot/second (cfs)	450	gallons/minute (gpm)
	gallons/minute	0.002228	cubic feet/second (cfs)
	million gallons/day	1.5472	cubic feet/second (cfs)
	cubic foot/second (cfs)	646,320	gallons a day
	cubic foot/second (cfs)	1.98	acre-feet a day
	million gallons/day (mgd)	1,120	acre-feet a year
Pressure	feet head of water	.433	pounds/square inch (psi)
Power	kilowatts (kW)	1.3405	horsepower (hp)

http://md.water.usgs.gov/cfscalc/

USGS CFS Conversion Calculator

Convert to: gallons per day

CFS Value (ft³/s): 1

Convert from cfs

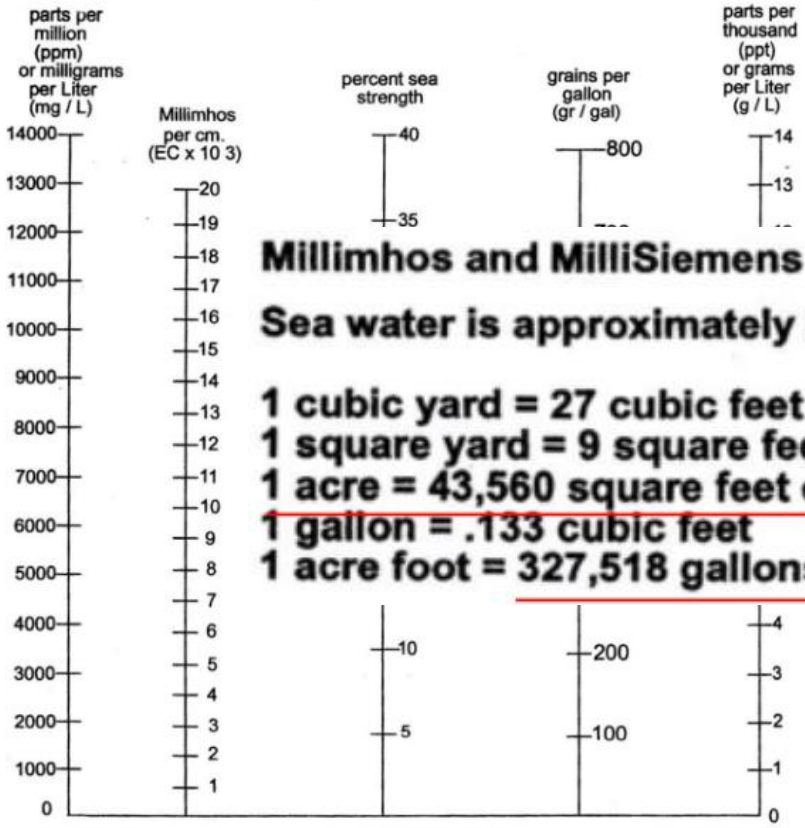
Result: 646272

Conversion factors for cfs calculations: 1 cfs =

7	.48	gallons per second
448	.8	gallons per minute
26,928	.0	gallons per hour
646,272	.0	gallons per day
28	.32	liters of water per second
1,699	.2	liters of water per minute
101,952	.0	liters of water per hour
2,446,848	.0	liters of water per day
2.446848	.0	million liters of water per day
0	.646272	million gallons per day
62	.5	pounds of water per second
3,750	.0	pounds of water per minute
225,000	.0	pounds of water per hour
5,400,000	.0	pounds of water per day

close this window

Salinity Conversion Table



Millimhos and MilliSiemens are equivalent terms.

Sea water is approximately 35 parts per thousand, or 52 millimhos per cm.

1 cubic yard = 27 cubic feet
1 square yard = 9 square feet
1 acre = 43,560 square feet or 4,840 square yards
1 gallon = .133 cubic feet
1 acre foot = 327,518 gallons

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Sea water is approximately 35 parts per thousand, or 52 millimhos per cm.

1 cubic yard = 27 cubic feet
1 square yard = 9 square feet
1 acre = 43,560 square feet or 4,840 square yards
1 gallon = .133 cubic feet
1 acre foot = 327,518 gallons

Does 1 acre foot equal 327,518 gallons
Or does it equal 325,900 gallons?

Did the baseline flow and outcome data for CALSIM and CALSIM II use the DWR Conversion chart from the previous page Or the one shown in DWR_316, page 11?

http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/california_waterfix/exhibits/docs/petitioners_exhibit/dwr/dwr_316.pdf Page 11

Is there a “plus” or “minus” percentage of accuracy modeled into CALSIM II flow data? If not, how is Incomplete flow data accounted for in the models?

Example: Data gap on 3/26/14 for Freeport and Steamboat Slough

From 10:45 to 12 noon Sacramento River flow drops over 6000 cfs, from 8210 to 2180. Flows continue to drop to -1760 in just a 3 hour time. This indicates all flow on the Sacramento River at Freeport had been cut off

Impact to Steamboat Slough from flow cut-off is hidden due to gap in data reporting. What does show is that Steamboat Slough was already not receiving freshwater inflow, and the cutoff of flow created a more drastic low tide at this time. Impact to Sutter Slough shows less drastic low water impact.

2014FLOW-updated.xlsx — Section of review of flow data from CDEC which exposed missing data and experimental flow timing:

	A	B	C	FREEPORT	F	SUTTER	I	STEAMBOAT	L	GEORGIANA	O
1100		3/26/2014 9:45		3/26/2014 9:45 11300		3/26/2014 9:45 2190		3/26/2014 9:45 1200		3/26/2014 9:45 3370	
1101		3/26/2014 10:00		3/26/2014 10:00 10500		3/26/2014 10:00 1910		3/26/2014 10:00 510		3/26/2014 10:00 3180	
1102		3/26/2014 10:15		3/26/2014 10:15 10100		3/26/2014 10:15 1610		3/26/2014 10:15 -129		3/26/2014 10:15 2990	
1103		3/26/2014 10:30		3/26/2014 10:30 9260		3/26/2014 10:30 1420		3/26/2014 10:30 -842		3/26/2014 10:30 2830	
1104		3/26/2014 10:45		3/26/2014 10:45 8210		3/26/2014 10:45 1200		3/26/2014 10:45 -1770		3/26/2014 10:45 3050	
1105	11:00 AM	3/26/2014 11:00		MISSING DATA		3/26/2014 11:00 1190		3/26/2014 11:00 -2030		3/26/2014 11:00 2960	
1106		3/26/2014 11:15		MISSING DATA		3/26/2014 11:15 966		MISSING DATA		3/26/2014 11:15 3100	
1107		3/26/2014 11:30		MISSING DATA		3/26/2014 11:30 714		MISSING DATA		3/26/2014 11:30 3010	
1108		3/26/2014 11:45		MISSING DATA		3/26/2014 11:45 240		MISSING DATA		3/26/2014 11:45 2840	
1109	NOON	3/26/2014 12:00		3/26/2014 12:00 2180		3/26/2014 12:00 -7		MISSING DATA		3/26/2014 12:00 2750	
1110		3/26/2014 12:15		3/26/2014 12:15 1140		3/26/2014 12:15 -242		3/26/2014 12:15 -3000		3/26/2014 12:15 2620	
1111		3/26/2014 12:30		3/26/2014 12:30 613		3/26/2014 12:30 -408		3/26/2014 12:30 -3130		3/26/2014 12:30 2480	
1112		3/26/2014 12:45		3/26/2014 12:45 -188		3/26/2014 12:45 -658		3/26/2014 12:45 -3040		3/26/2014 12:45 2410	
1113	1:00 PM	3/26/2014 13:00		MISSING DATA		3/26/2014 13:00 -931		3/26/2014 13:00 -3050		3/26/2014 13:00 2320	
1114		3/26/2014 13:15		MISSING DATA		3/26/2014 13:15 -1040		MISSING DATA		3/26/2014 13:15 2220	
1115		3/26/2014 13:30		MISSING DATA		3/26/2014 13:30 -1230		MISSING DATA		3/26/2014 13:30 2110	
1116		3/26/2014 13:45		MISSING DATA		3/26/2014 13:45 -1260		MISSING DATA		3/26/2014 13:45 1890	
1117	2:00 PM	3/26/2014 14:00		3/26/2014 14:00 -1760		3/26/2014 14:00 -1310		MISSING DATA		3/26/2014 14:00 1830	
1118		3/26/2014 14:15		3/26/2014 14:15 -1950		3/26/2014 14:15 -1260		3/26/2014 14:15 -2070		3/26/2014 14:15 1620	
1119		3/26/2014 14:30		3/26/2014 14:30 -2240		3/26/2014 14:30 -1120		3/26/2014 14:30 -1390		3/26/2014 14:30 1390	
1120		3/26/2014 14:45		3/26/2014 14:45 -1880		3/26/2014 14:45 -959		3/26/2014 14:45 -588		3/26/2014 14:45 1130	
1121	3:00 PM	3/26/2014 15:00		3/26/2014 15:00 -1320		3/26/2014 15:00 -635		3/26/2014 15:00 302		3/26/2014 15:00 732	
1122		3/26/2014 15:15		3/26/2014 15:15 -855		3/26/2014 15:15 -194		3/26/2014 15:15 1260		3/26/2014 15:15 731	

Sheet1 Sheet2 Sheet3

How does CALSIM II account for gaps in flows?

snugharbor.net/images-2014/comments/wheresthewater/cdecdatagaps.pdf

Example: Comparison of splits of flow between the different tributaries of the Sacramento River at Freeport and below: Why don't the flow numbers add up correctly and why are there gaps in the data flow reporting online? Consistent gaps in data results in under reporting of flow and diversion into Georgiana Slough, more likely than not. Consistent timing and pattern of data gaps indicate DWR or other agencies were conducting flow experiments on these waterways at the time the gaps occured but were obscured in the online reporting. (Red boxes added to show the gap areas-compare to screen prints showing what the same timing looks like online)

	FREEPORT			SUTTER			STEAMBOAT			GEORGIANA			BELOW GEORGIANA	
C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
	3/20/2014 8:45	-9		3/20/2014 8:45	-482		3/20/2014 8:45	-349		3/20/2014 8:45	1780		3/20/2014 8:45	-1690
	3/20/2014 9:00	635		3/20/2014 9:00	-124		3/20/2014 9:00	570		3/20/2014 9:00	1450		3/20/2014 9:00	-71
	3/20/2014 9:15	1470		3/20/2014 9:15	368		3/20/2014 9:15	1740		3/20/2014 9:15	1060		3/20/2014 9:15	1280
	3/20/2014 9:30	2660		3/20/2014 9:30	901		3/20/2014 9:30	2270		3/20/2014 9:30	916		3/20/2014 9:30	3050
	3/20/2014 9:45	4120		3/20/2014 9:45	1310		3/20/2014 9:45	2780		3/20/2014 9:45	1100		3/20/2014 9:45	4270
	3/20/2014 10:00	5920		3/20/2014 10:00	1660		3/20/2014 10:00	3030		3/20/2014 10:00	1220		3/20/2014 10:00	5190
	3/20/2014 10:15	7960		3/20/2014 10:15	2010		3/20/2014 10:15	3320		3/20/2014 10:15	1490		3/20/2014 10:15	6180
	3/20/2014 10:30	9530		3/20/2014 10:30	2360		3/20/2014 10:30	3540		3/20/2014 10:30	1670		3/20/2014 10:30	7050
	3/20/2014 10:45	10200		3/20/2014 10:45	2600		3/20/2014 10:45	3710		3/20/2014 10:45	1720		3/20/2014 10:45	7790
	MISSING	DATA		3/20/2014 11:00	2850		3/20/2014 11:00	3870		3/20/2014 11:00	1720		3/20/2014 11:00	8150
	MISSING	DATA		3/20/2014 11:15	3000		MISSING	DATA		3/20/2014 11:15	1760		3/20/2014 11:15	8400
	MISSING	DATA		3/20/2014 11:30	3140		MISSING	DATA		3/20/2014 11:30	1810		3/20/2014 11:30	8600
	MISSING	DATA		3/20/2014 11:45	3210		MISSING	DATA		3/20/2014 11:45	1910		3/20/2014 11:45	8720
	3/20/2014 12:00	12900		3/20/2014 12:00	3330		MISSING	DATA		3/20/2014 12:00	2100		3/20/2014 12:00	8720
	3/20/2014 12:15	13000		3/20/2014 12:15	3350		3/20/2014 12:15	4150		3/20/2014 12:15	2170		3/20/2014 12:15	8810
	3/20/2014 12:30	13000		3/20/2014 12:30	3440		3/20/2014 12:30	4170		3/20/2014 12:30	2200		3/20/2014 12:30	8880
	3/20/2014 12:45	12900		3/20/2014 12:45	3480		3/20/2014 12:45	4120		3/20/2014 12:45	2270		3/20/2014 12:45	8900
	3/20/2014 13:00	13200		3/20/2014 13:00	3460		3/20/2014 13:00	4110		3/20/2014 13:00	2410		3/20/2014 13:00	8930
	3/20/2014 13:15	13100		3/20/2014 13:15	3510		3/20/2014 13:15	4070		3/20/2014 13:15	2340		3/20/2014 13:15	9030
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	3/20/2014 14:15	13600		3/20/2014 14:15	3550		3/20/2014 14:15	4040		3/20/2014 14:15	2570		3/20/2014 14:15	9240

Notes on flow numbers used for flow modeling for DSM2 indicate missing data is “fair”. What data was used?

cms.**capitoltechsolutions.com**/ClientData/CaliforniaWaterFix/uploads/App_5.B_DSM2_Att1_RevisedDraftBA.pdf

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TABLE 3-2
Selection of Calibration Period Based on Hydrology, Exports, and Observed Data Availability

Water Year	Sacramento Valley[a]	Annual Exports (cfs)[b]	Data Availability[c]		
			Flow	Stage	EC
2001	D	7,067	Sparse	Sparse	Good
2002	D	7,698	Good	Good	Good
2003	AN	8,734	Good	Good	Good
2004	BN	8,464	Fair	Fair	Good
2005	AN	8,936	Fair	Fair	Good
2006 *	W	8,722	Fair	Fair	Good
2007	D	8,020	Good	Good	Good
2008	C	5,146	Good	Good	Good

[a] Based on CDEC data (http://cdec.water.ca.gov/cgi-progs/iodir/WSIHIST)
[b] Based on DAYFLOW data from IEP website (http://www.iep.water.ca.gov/dayflow/output/index.html)
[c] Based on data availability from IEP, CDEC and USGS at several locations in the Delta

*Dayflow data for DCC and Georgiana was never provided for 2006, and never updated despite the 2007 notation, so how can the flow data available be considered "fair"? water.ca.gov/dayflow/output/2006comments.cfm

SACRAMENTO RIVER INFLOW , DELTA EXPORTS AND DELTA OUTFLOW (taf)

YEAR	SAC RIVER	YOLO	EASTSIDE	SJ	EXPORTS	LOGIC-IN DELTA	DELTA OUTFLOW reported	UNACCOUNTED FOR FLOW	in-Delta use
2010	12777	659	2461	1829	-4774	12952	2461	10,491	877
2009	9867	317	1231	865	-3673	8607	6713	1894	1029
2008	9557	417	0	1234	-3735	7473	1529	5944	1093
2007	11010	248	1979	1596	-5806	9027	6216	2811	1214
2006	28039	13034	9679	7341	-6314	51779	43805	7974	632
2005	16747	707	1173	3777	-6471	15933	15403	530	602
2004	17129	3121	445	1373	-6145	15923	14922	1001	940
2003	18304	1122	534	1365	-6323	15002	14050	952	952
2002	13104	708	462	1396	-5573	10097	9163	934	933

Chart above was created by taking the exact flow numbers from the DWR 2013 table below, calculating basic Delta inflow and outflow as reported below, and then noting where there is unaccounted for flow. Note also how low the Delta outflow has been 2008-2010!

http://www.waterplan.water.ca.gov/docs/cwpu2013/ae/water_portfolio-inflow_outflow_delta.pdf

1-16-2014 screen print

Delta Water Balance Estimates[1] (TAF)	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Sacramento River Inflow	29015	21770	18360	10517	13104	18304	17129	16747	28039	11010	9557	9867	12777
Yolo Bypass Inflow	8996	1635	2961	366	708	1122	3121	707	13034	248	417	317	659
Eastside Tributaries Inflow	2096	1399	1078	372	462	534	445	1173	9679	1979	n	1231	2461
San Joaquin River Inflow	8456	3568	2846	1732	1396	1365	1373	3777	7341	1596	1234	865	1829
North Bay Aqueduct Exports	39	37	47	45	47	42	52	48	43	61	55	46	43
Contra Costa Water District Diversions at Rock Slough and Old River	160	133	126	104	121	138	120	119	116	112	135	107	94
State Water Project Exports at Banks Pumping Plant or Clifton Court Intake	2134	2439	3692	2635	2900	3458	3251	3625	3527	2954	1527	1636	2496
Central Valley Project Exports at Tracy	2474	2262	2487	2332	2505	2685	2722	2679	2628	2679	2018	1884	2141
Delta Consumptive Use[2]	1691	1691	1693	1691	1691	1691	1693	1691	1691	1691	1693	1691	1666
Delta Precipitation[2]	1423	734	956	764	758	739	753	1089	1059	477	600	662	789
Delta Outflow	43487	22542	18155	6944	9163	14050	14922	15403	43805	6216	1529	6713	2461

1 Data from DAYFLOW Program; NOTE: includes DAYFLOW corrections through 01-07-2004 (http://iep.water.ca.gov/dayflow)
2 Content Required by Water Code Section 10004.6

www.water.ca.gov/waterplan/docs/cwpu2013/ae/water_portfolio-inflow_outflow_delta.pdf 8-10-16 screen print

Delta Water Balance Estimates[1] (TAF) Note: Draft Information. The final Water Plan assumptions and estimates will be included in Volume 5, the Technical Guide.

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Sacramento River Inflow	29,015	21,770	18,360	10,517	13,104	18,304	17,128	16,747	27,592	10,970	9,557	9,867	12,777
Yolo Bypass Inflow	8,416	1,629	2,961	366	708	1,122	3,128	707	10,939	248	417	317	659
Eastside Tributaries Inflow	2,090	1,399	1,078	372	462	534	445	1,173	2,338	383	295	366	633
San Joaquin River Inflow	8,491	3,568	2,846	1,732	1,396	1,365	1,373	3,777	7,341	1,596	1,234	865	1,829
North Bay Aqueduct Exports	39	38	47	45	47	42	52	48	43	61	55	46	43
Contra Costa Water District Diversions at Rock Slough and Old River	160	133	126	104	121	138	120	119	116	112	135	107	94
State Water Project Exports at Banks Pumping Plant or Clifton Court Intake	2,134	2,439	3,692	2,635	2,900	3,458	3,251	3,625	3,527	2,954	1,527	1,636	2,496
Central Valley Project Exports at Tracy	2,474	2,263	2,487	2,332	2,505	2,685	2,722	2,679	2,628	2,679	2,018	1,884	2,141
Delta Consumptive Use (2	1,751	2,039	2,017	1,863	1,837	1,791	1,991	2,096	1,881	1,700	1,793	1,784	1,865
Delta Precipitation (2 (3	2,033	1,088	1,271	936	903	839	976	1,233	1,249	525	700	755	988
Delta Outflow	43,487	22,542	18,147	6,944	9,163	14,050	14,914	15,070	41,264	6,216	6,675	6,713	10,247

1) Data from DAYFLOW Program; 7-1-2012 (http://www.water.ca.gov/dayflow)
2) Content Required by Water Code Section 10004.6
3) Delta only without Suisun Marsh

http://www.water.ca.gov/waterplan/cwpu2013/ae/index.cfm goes to
http://www.water.ca.gov/waterplan/docs/cwpu2013/ae/water_portfolio-inflow_outflow_delta.pdf as of 8-10-2016

As of 8/24/2016 the link not longer provides data online. I request that a final, correct table of Delta Water Balance Estimates Be provided to me for use in my case in chief, and that the table reflect flows and outflows through 2015 water year, if possible.

http://www.water.ca.gov/waterplan/docs/cwpu2013/Final/Vol2_DeltaRR.pdf

How much flow is modeled to be currently diverted directly off Georgiana Slough by USBR and/or DWR? Is there currently a siphon and pumps drawing flows into Georgiana Slough, and was this included in the modeling for impacts?

4/10/2014 8:30	2460		4/10/2014 8:30	11500
4/10/2014 8:45	2440		4/10/2014 8:45	10900
4/10/2014 9:00	2460		4/10/2014 9:00	10200
4/10/2014 9:15	2730		4/10/2014 9:15	9560
4/10/2014 9:30	2760		4/10/2014 9:30	7970
4/10/2014 9:45	2870		4/10/2014 9:45	6380
4/10/2014 10:00	3050		4/10/2014 10:00	4710
4/10/2014 10:15	3190		4/10/2014 10:15	2080
4/10/2014 10:30	3350		4/10/2014 10:30	-378
4/10/2014 10:45	3390		4/10/2014 10:45	-2860
4/10/2014 11:00	3380		4/10/2014 11:00	-4880
4/10/2014 11:15	3270		4/10/2014 11:15	-6630
4/10/2014 11:30	3310		4/10/2014 11:30	-7910
4/10/2014 11:45	3200		4/10/2014 11:45	-8430
4/10/2014 12:00	3260		4/10/2014 12:00	-9140
4/10/2014 12:15	3380		4/10/2014 12:15	-9770
4/10/2014 12:30	3450		4/10/2014 12:30	-9720
4/10/2014 12:45	3180		4/10/2014 12:45	-9070
4/10/2014 13:00	3120		4/10/2014 13:00	-8820
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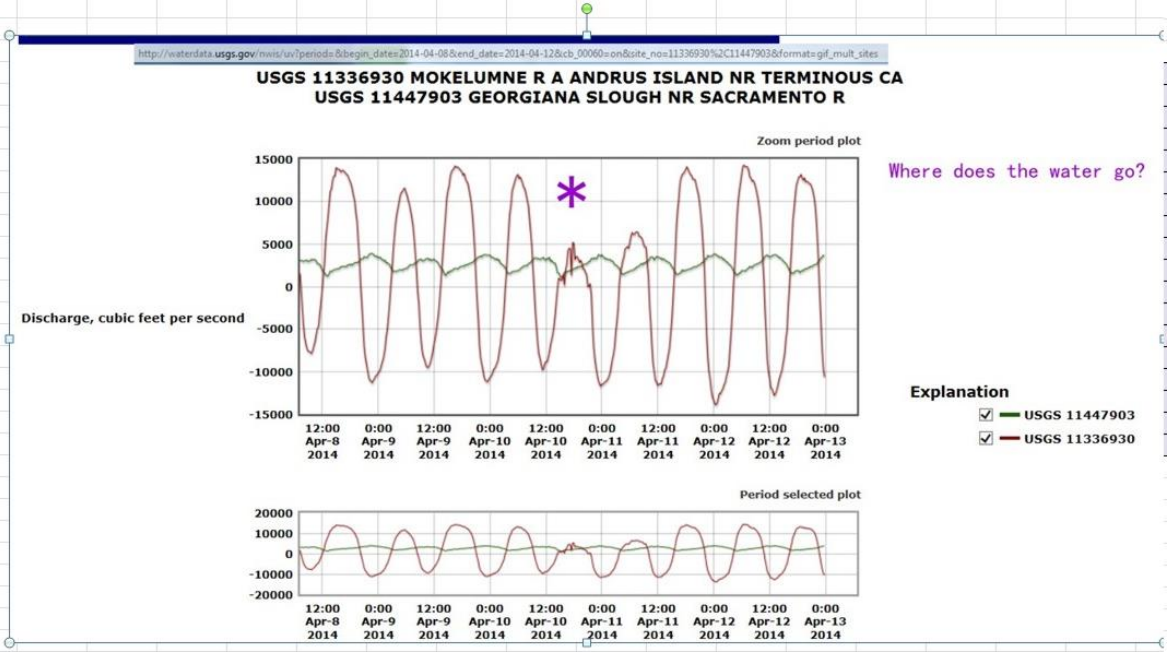
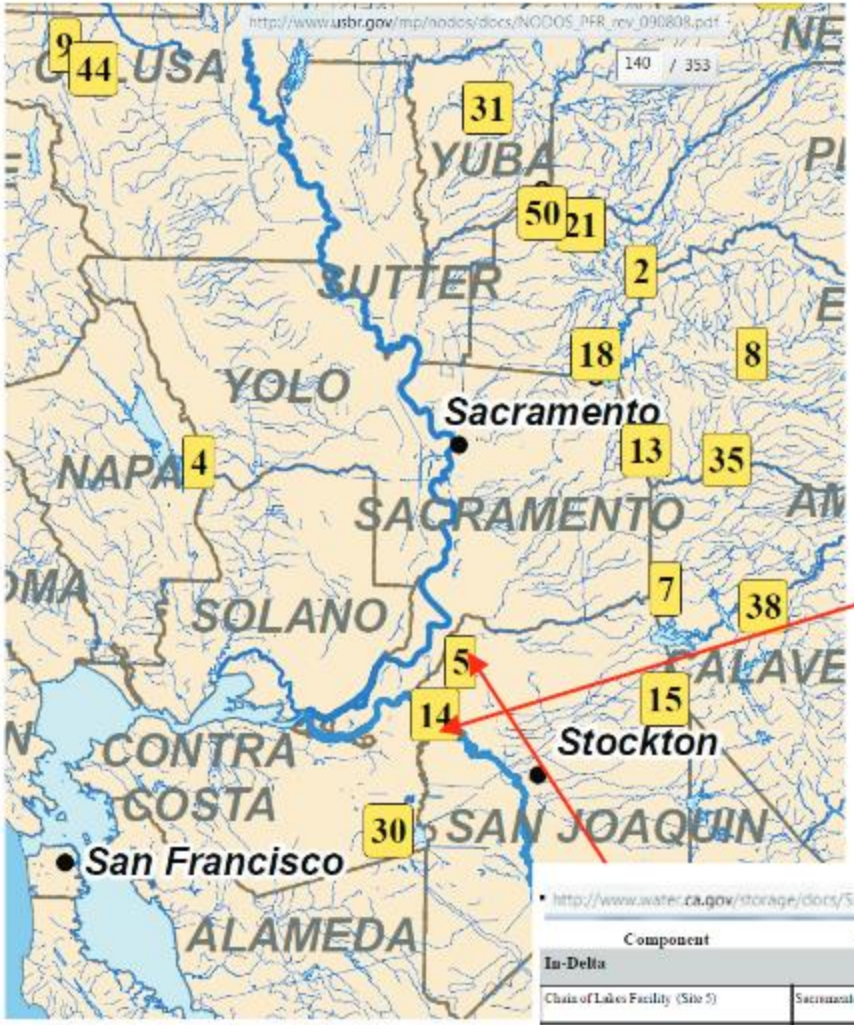
4/10/2014 13:30	3220		4/10/2014 13:30	-8390
4/10/2014 13:45	3470		4/10/2014 13:45	-7710
4/10/2014 14:00	2960		4/10/2014 14:00	-6830
4/10/2014 14:15	3110		4/10/2014 14:15	-6240
4/10/2014 14:30	2880		4/10/2014 14:30	-5540
4/10/2014 14:45	2790		4/10/2014 14:45	-4640
4/10/2014 15:00	2770		4/10/2014 15:00	-3330
4/10/2014 15:15	2300		4/10/2014 15:15	-1710
4/10/2014 15:30	1680		4/10/2014 15:30	-199
4/10/2014 15:45	1610		4/10/2014 15:45	1000
4/10/2014 16:00	1380		4/10/2014 16:00	899
4/10/2014 16:15	1090		4/10/2014 16:15	696
4/10/2014 16:30	1130		4/10/2014 16:30	889
4/10/2014 16:45	1220		4/10/2014 16:45	1470
4/10/2014 17:00	1710		4/10/2014 17:00	197
4/10/2014 17:15	1710		4/10/2014 17:15	2040

It appears that somewhere below the flow gage on Georgiana Slough at the Sacramento River there were several days in April 2014 when substantial amounts of fresh water was diverted from Georgiana Slough, which caused the saltier water of the San Joaquin River to travel up into Georgiana Slough creating the "reverse flows" as indicated from the flow data. Who was diverting that much water and ***WHERE DID THE WATER GO?***

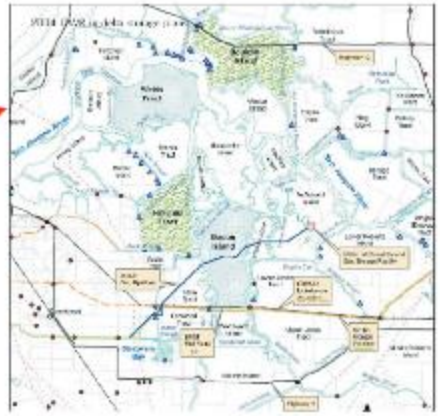


Do the models account for limited inflow into the Sacramento River once the other Perimeter Projects are fully built, such as the diversion of flows from Folsom Dam? Map below locates ongoing or Already built projects affecting availability of flows into the Delta in the future. (see example next slide)



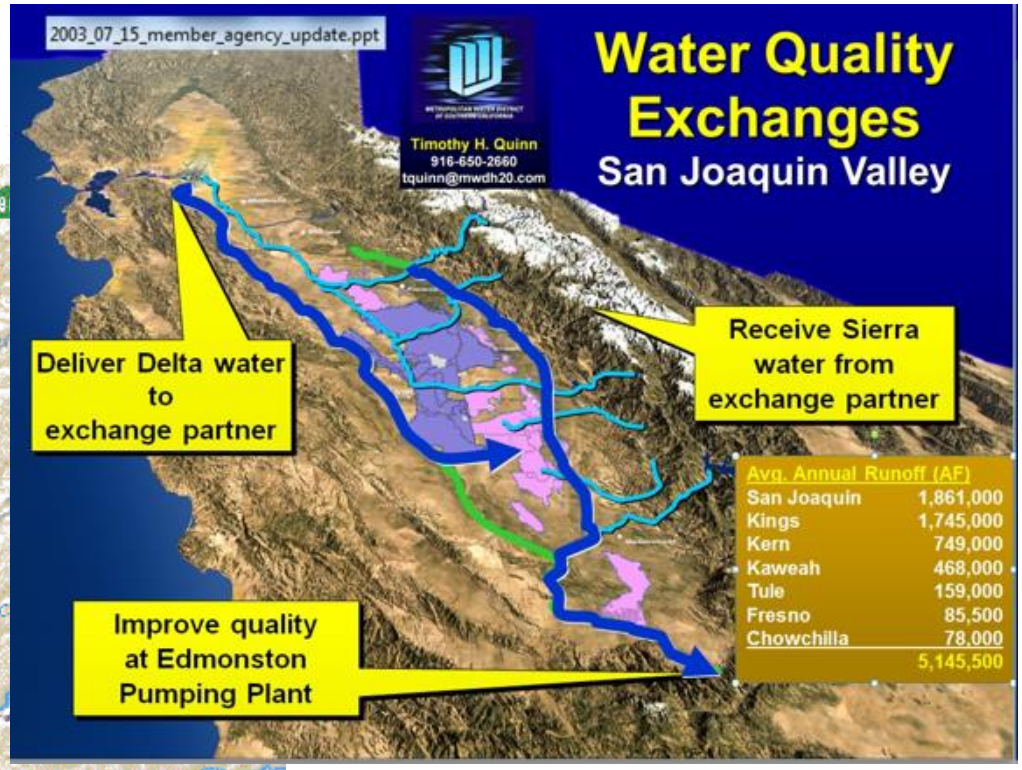
Currently there are MANY different proposals for additional surface storage facilities which would "capture" Sacramento River water before it ever gets to the Delta...which would further reduce the net outflow to Suisun Marsh area.

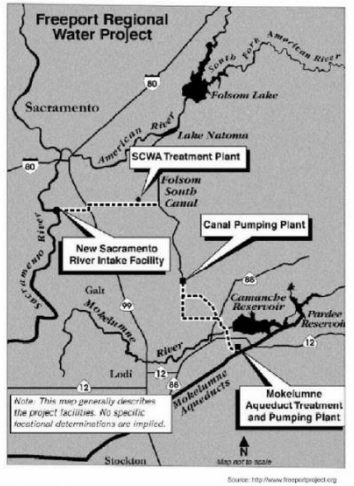
Two Delta area surface storage proposals/planning in process now are called
Chain of Lakes
In-Delta Storage (the Bacon Island-Jones Tract studies)



Component	Location	Type	Description	Gross Storage Capacity
In-Delta				
Chain of Lakes Facility (Site 5)	Sacramento/San Joaquin Delta	Island Storage in Delta	A chain of contiguous island storage facilities from the north Delta to the export Facilities.	300 to 600 TAF
In-Delta Storage (Site 14)	Sacramento/San Joaquin Delta	Island Storage in Central or Southern Delta	Island storage in the Delta for Delta flows	250 TAF

Folsom Lake
Auburn Folsom South Canal
American R.
River
Mokelumne Aqueduct
Pardee Reservoir
New Hogan Reservoir
New Melones Lake
Tulloch Lake
Stanislaus River
Don Pedro Reservoir
Modesto Reservoir
Hetch Hetchy Aqueduct
California Aqueduct
Delta Mendota Canal
San Joaquin River
Merced River
Lake McClure
Bear Reservoir
Owens Reservoir
Eastman Lake
Hensley Lake
Madera Canal
Chowchilla River
O'Neill Forebay
San Luis Reservoir
Los Banos Reservoir
Millerton Lake


2003_07_15_member_agency_update.ppt
Timothy H. Quinn
916-650-2660
tquinn@mwdh20.com
Water Quality Exchanges
San Joaquin Valley
Deliver Delta water to exchange partner
Receive Sierra water from exchange partner
Improve quality at Edmonston Pumping Plant
Avg. Annual Runoff (AF)
San Joaquin 1,861,000
Kings 1,745,000
Kern 749,000
Kaweah 468,000
Tule 159,000
Fresno 85,500
Chowchilla 78,000
5,145,500


Freeport Regional Water Project
Sacramento
Folsom Lake
Lake Natoma
American River
SCWA Treatment Plant
Folsom South Canal
Canal Pumping Plant
New Sacramento River Intake Facility
Sacramento River
Galt
Mokelumne River
Camanche Reservoir
Pardee Reservoir
Lodi
Mokelumne Aqueducts
Mokelumne Aqueduct Treatment and Pumping Plant
Stockton
Note: This map generally describes the project facilities. No specific locational determinations are implied.

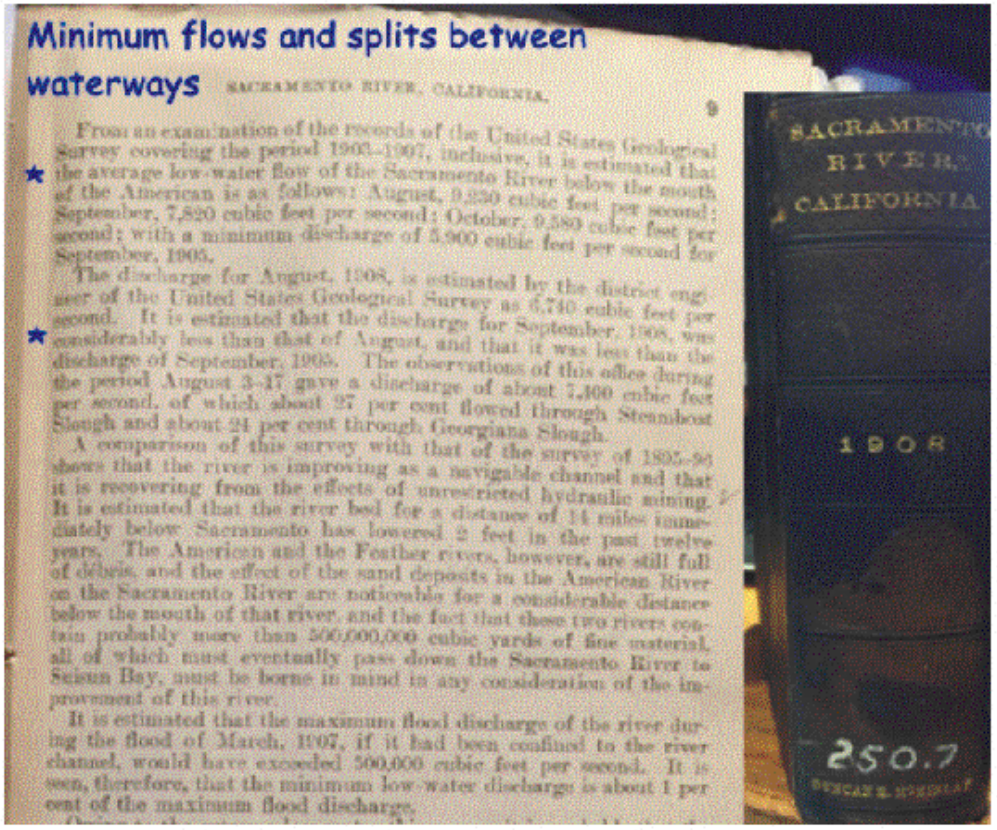
Historic records indicate that "it is estimated that the average low water flow of the Sacramento River below the mouth of the American is as follows: August 9,250 cfs, September 7,820 cfs, October 9,580 cfs; with a minimum discharge of 5,900 cfs for September 1905" I.E. no "reverse flows" even in dry summer months.

Will the CWF project, if built, leave at least 7,400 cfs of constant outflow on the Sacramento River in the Delta? Is it a fair assumption that the CWF project would in effect suspend the Delta into a permanent drought or dry year status almost year round?

8/24 Testimony is **"less than 10,000 cfs of flow on the Sacramento River would be dry or critical year flow"** But the bypass flows are only 5,000 cfs so doesn't that mean the CWF project is designed to Result in historic low flows on the Sacramento River below Intakes?

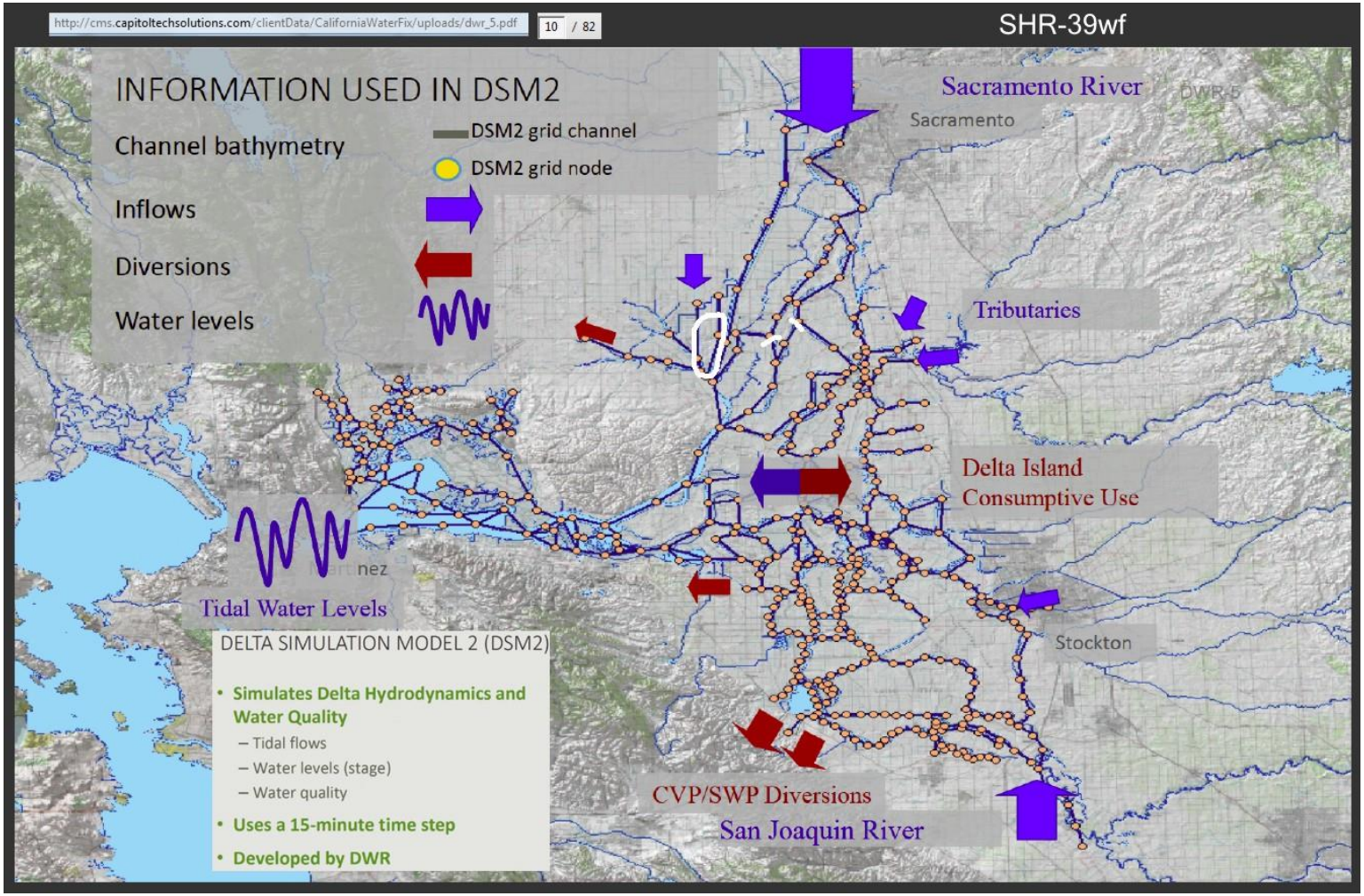
SHR-6

1908 Sacramento River, California official survey for US Congress and report of findings compiled by USGS from 1903-1907: At the driest time of year of a dry year, the minimum Sacramento River constant "average low water" outflow is more than 7,400 cfs, with 27% flow into Steamboat Slough (1,998) and 24% through Georgiana Slough.
Alternate flow observation: 7,377 cfs at Courtland, with 1,802 cfs split between Steamboat and Sutter Sloughs.
(Note that fresh water < 1 ppt for the entire reach of the Sacramento River)



Book of maps is available for view upon request by contacting N. Suard, Esq.
All maps and descriptions were also professionally scanned and uploaded to the following locations for easy access to viewers:
Https://archive.org/details/MapsCADelta (Sacramento River and Steamboat Slough)
Https://archive.org/search.php?query=1908%20san%20joaquin%20river%20survey

DSM2 Questions: (screen print from dwr_5 page 10)
Review of Bathymetry of BDCP and WaterFix…what's changed and what hasn't?
BDCP conveyance compared to WaterFix conveyance…its about the QUANTITY OF WATER diverted, not the method of diversion, for purposes of this line of questions:



DSM2 2002, recalibrated in 2009, for use in 2013, 2015, 2016

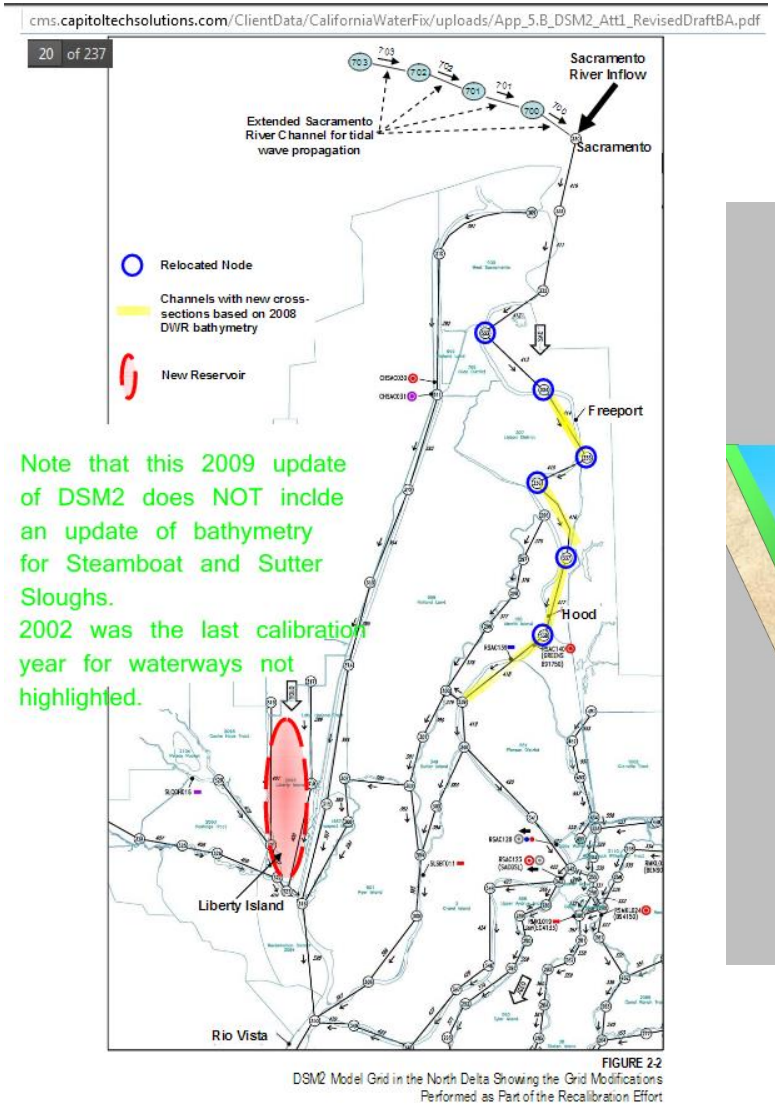
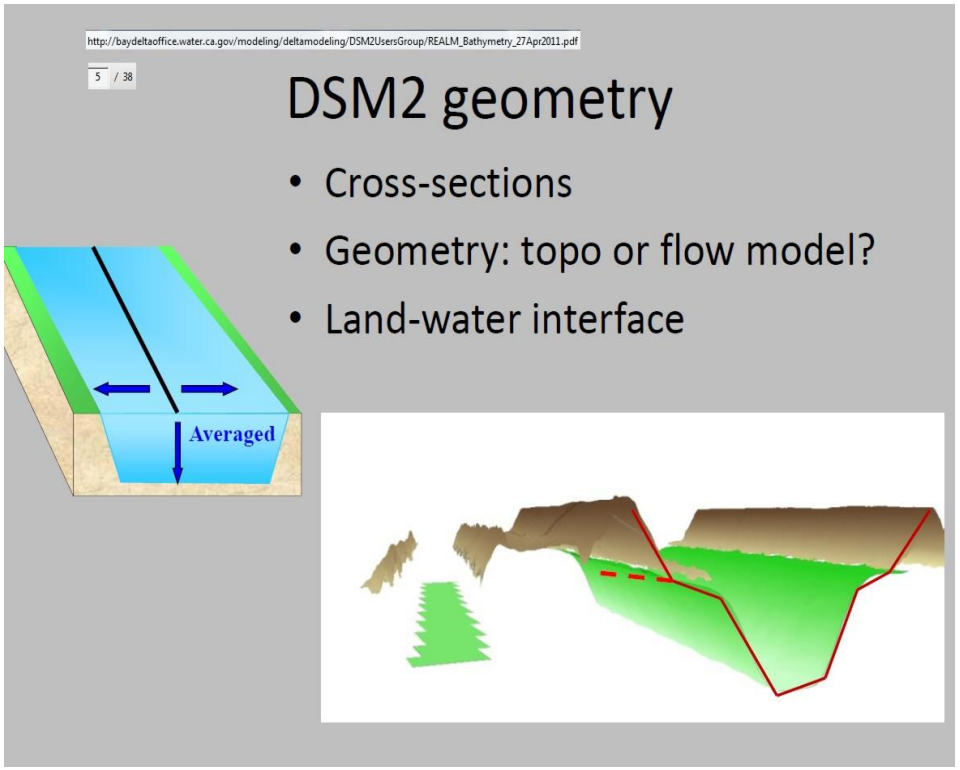


FIGURE 2-2
DSM2 Model Grid in the North Delta Showing the Grid Modifications Performed as Part of the Recalibration Effort

Review of Bathymetry of BDCP and WaterFix…what's changed and what hasn't? BDCP conveyance compared to WaterFix conveyance…its about the QUANTITY OF WATER diverted, not the method of diversion, for purposes of this line of questions:



http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/california_waterfix/exhibits/exhibit104/docs/App_5.B_DSM2_Att1_RevisedDraftBA.pdf

http://cms.capitoltechsolutions.com/ClientData/CaliforniaWaterFix/uploads/App_5.B_DSM2_Att1_RevisedDraftBA.pdf

App_5.B_DSM2_Att1_RevisedDraftBA.pdf 23 / 237

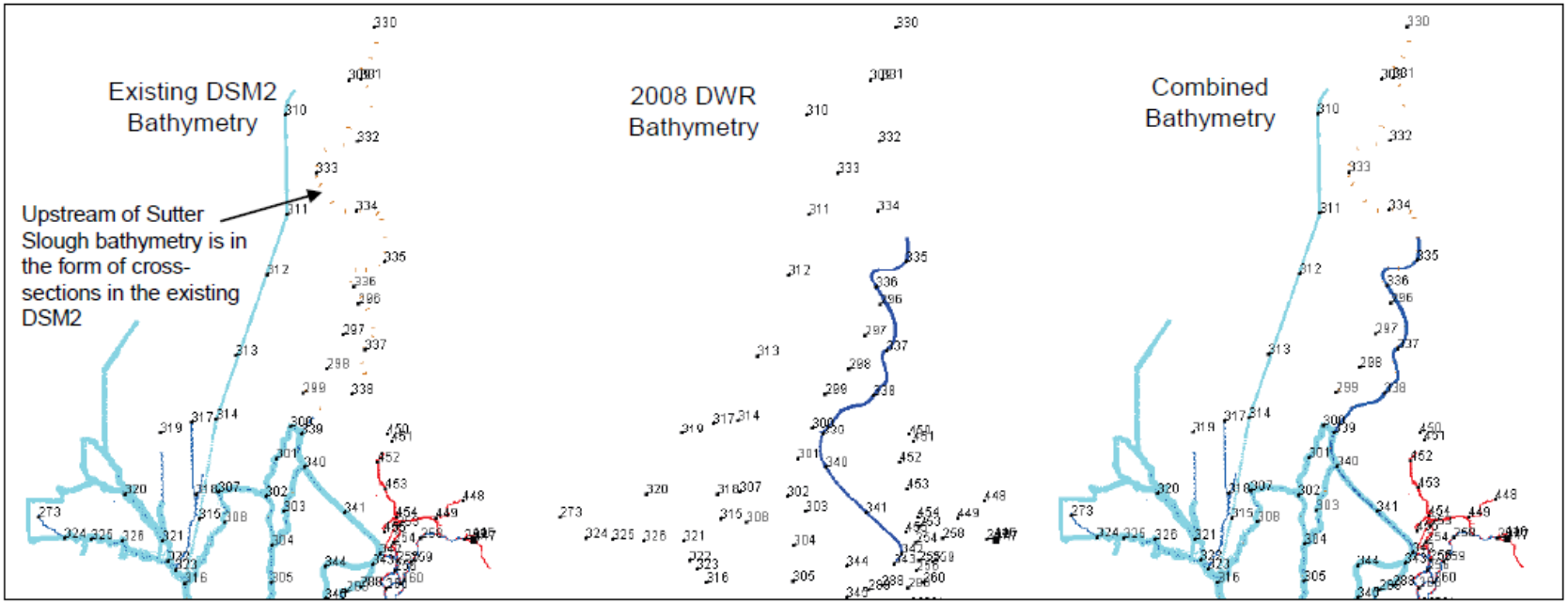
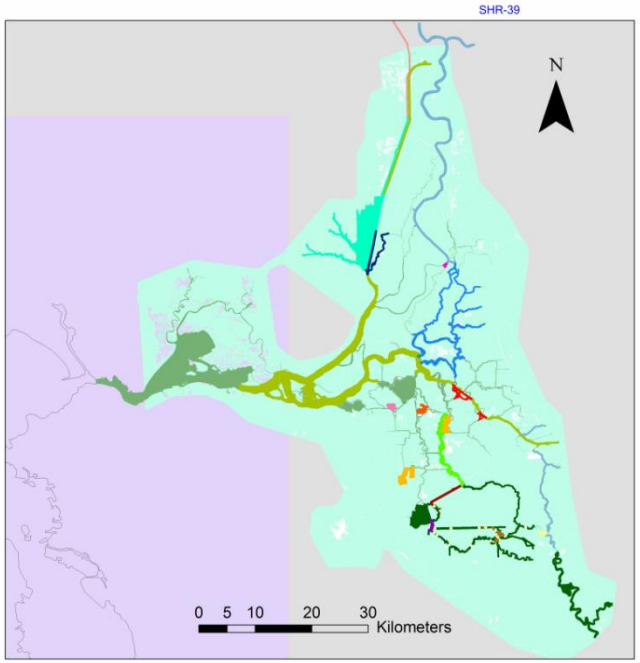


FIGURE 2-5
DSM2 and DWR Bathymetry Extent in Delta

Who determined which cross sections should be used on which waterways for which years and why were those determinations made?



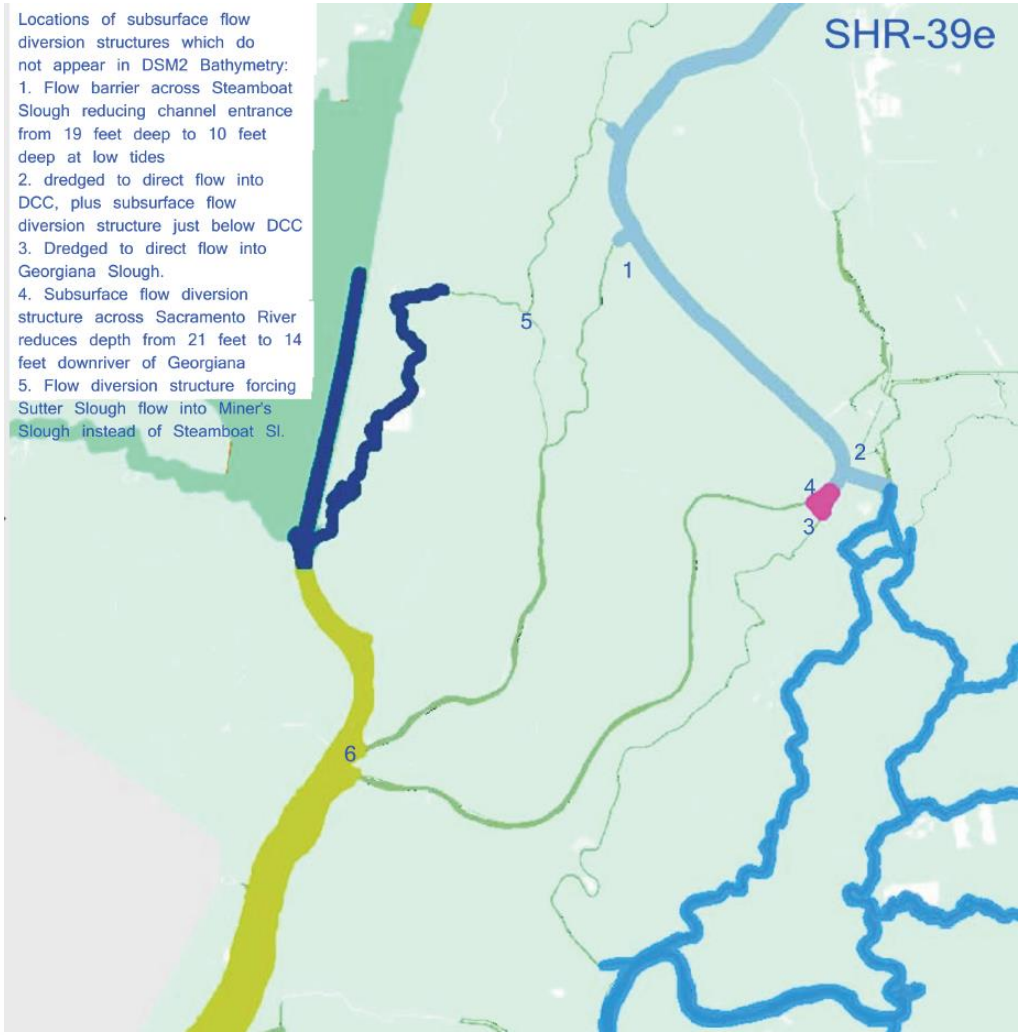
Data Sources

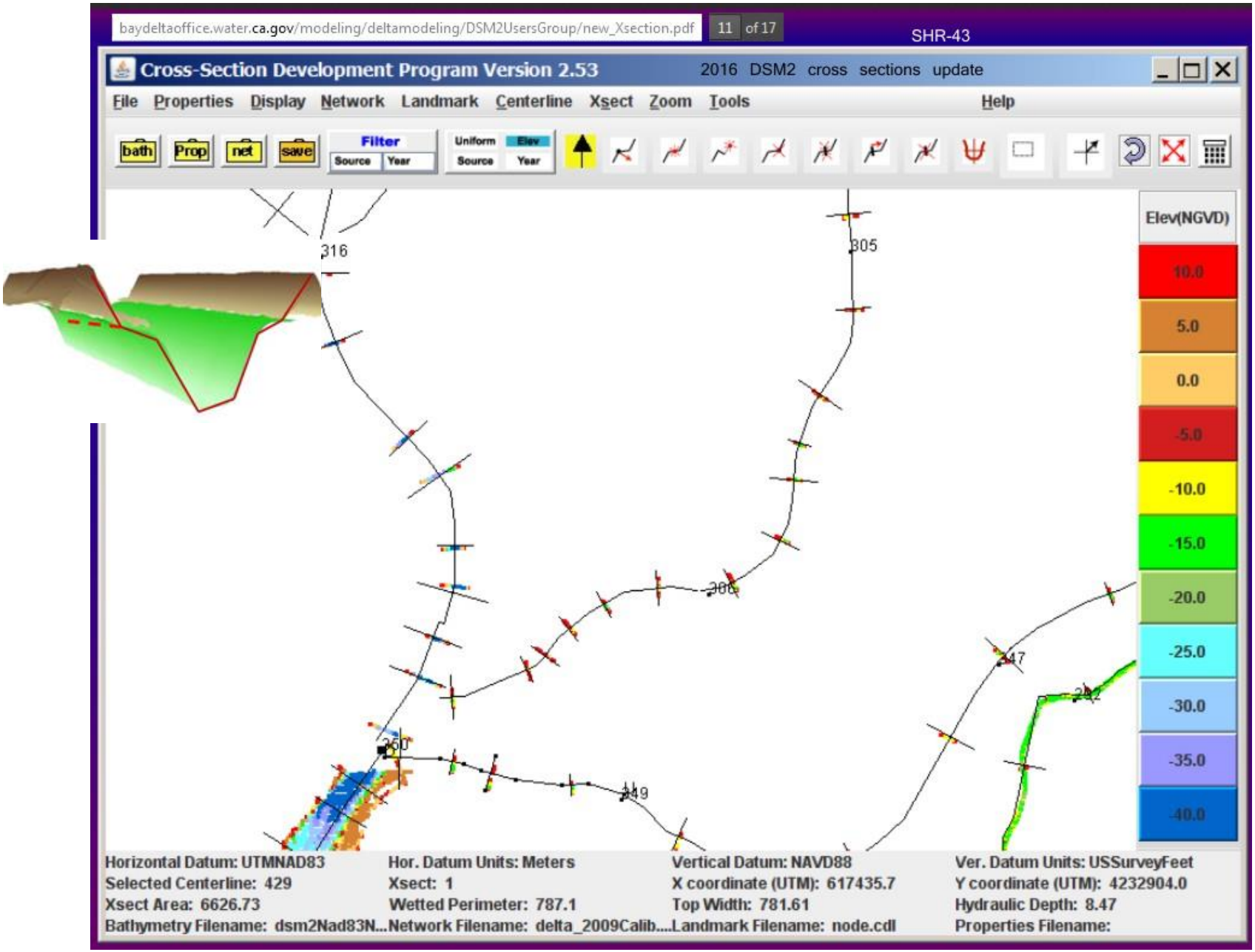
- Miner Slough (multi/single beam, DWR, 2012)
- Columbia and Turner Cuts (multibeam, DWR, 2012)
- Georgiana Slough (multibeam, DWR, 2011)
- North Delta (multibeam, GRS, 2008 & DWR, 2012)
- Old River at Head (multibeam, DWR, 2011)
- South Delta (multibeam, Fugro West, 2010 & DWR, 2011)
- Urban Levee Surveys (multibeam, DWR, 2008)
- Victoria Canal (multibeam, DWR, 2011)
- West Canal (multibeam, DWR, 2012)
- Liberty Island (single beam, cbec/EDS, 2006, 2009, 2010)
- South Delta Scour Survey (single beam, DWR 2010)
- Grant Line Canal 5 Points Area (DWR, 2009)
- Delta Coves (grading plan, 2005)
- CSDP Bathymetry Data
- Deep Water Ship Channel, COE (2004, 2008)
- Manually Digitized Data - P.E. Smith
- USGS Topo Map
- DWR LiDAR (1m, 2007)
- Foxgrover, Smith, and Jaffe, USGS (10m DEM, 2005)
- NOAA San Francisco Bay DEM (1/3 arc-second) (2010)
- USGS National Elevation Dataset (1/3 arc-sec)

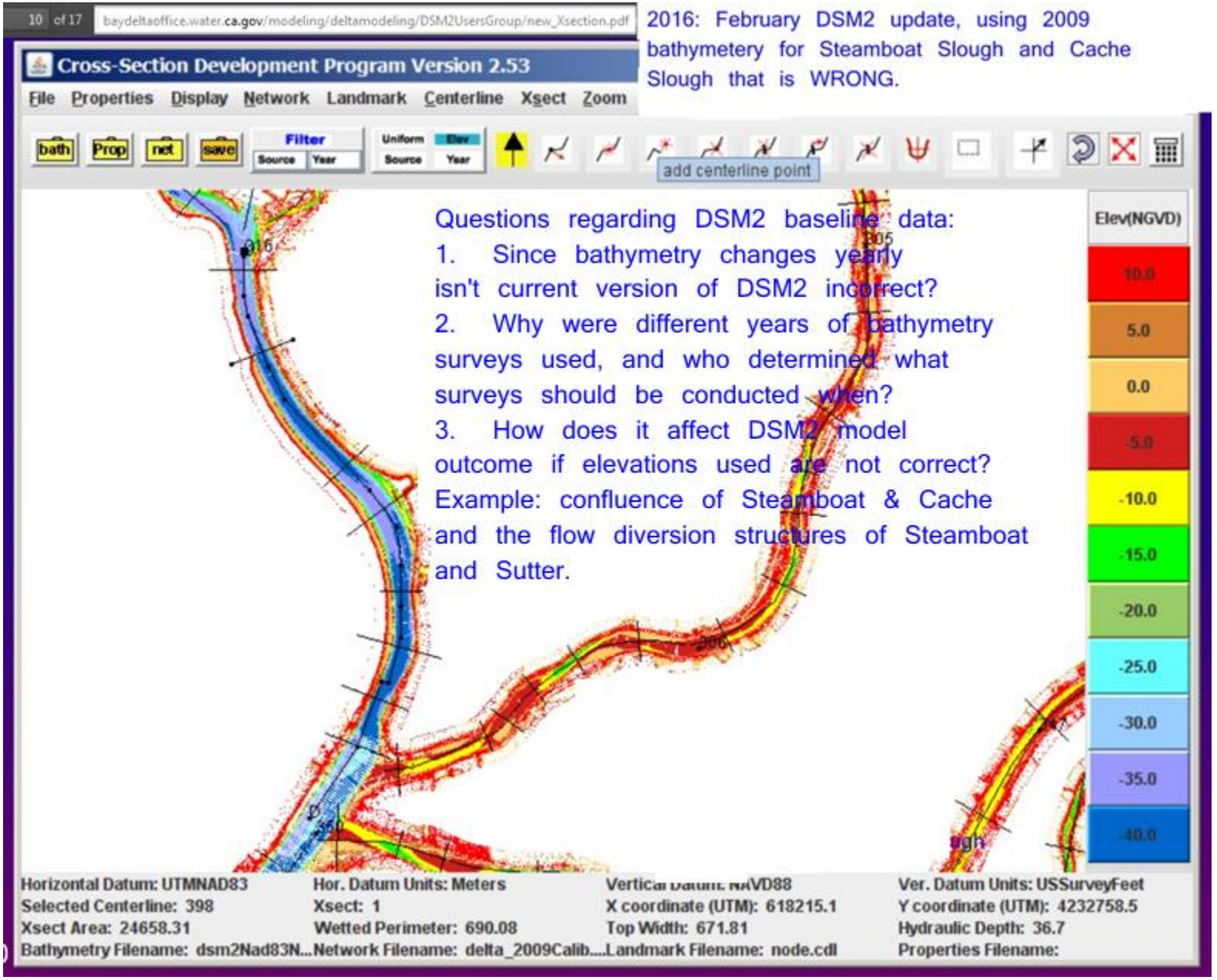
Data for the area west of the Carquinez Strait comes from NOAA's San Francisco Bay DEM

Locations of subsurface flow diversion structures which do not appear in DSM2 Bathymetry:

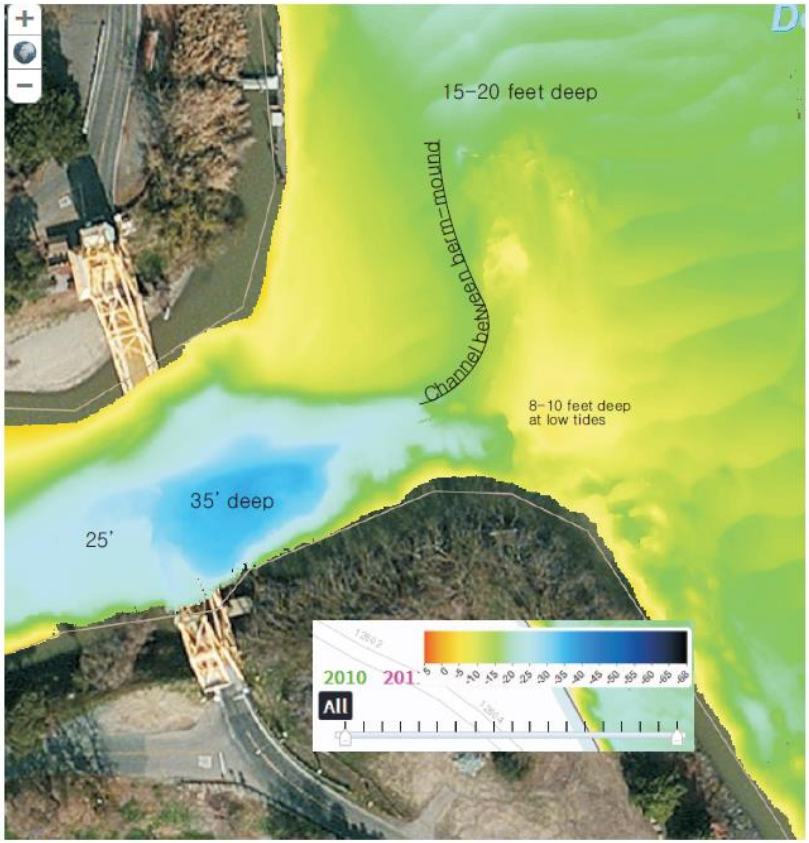
1. Flow barrier across Steamboat Slough reducing channel entrance from 19 feet deep to 10 feet deep at low tides
2. dredged to direct flow into DCC, plus subsurface flow diversion structure just below DCC
3. Dredged to direct flow into Georgiana Slough.
4. Subsurface flow diversion structure across Sacramento River reduces depth from 21 feet to 14 feet downriver of Georgiana
5. Flow diversion structure forcing Sutter Slough flow into Miner's Slough instead of Steamboat Sl.



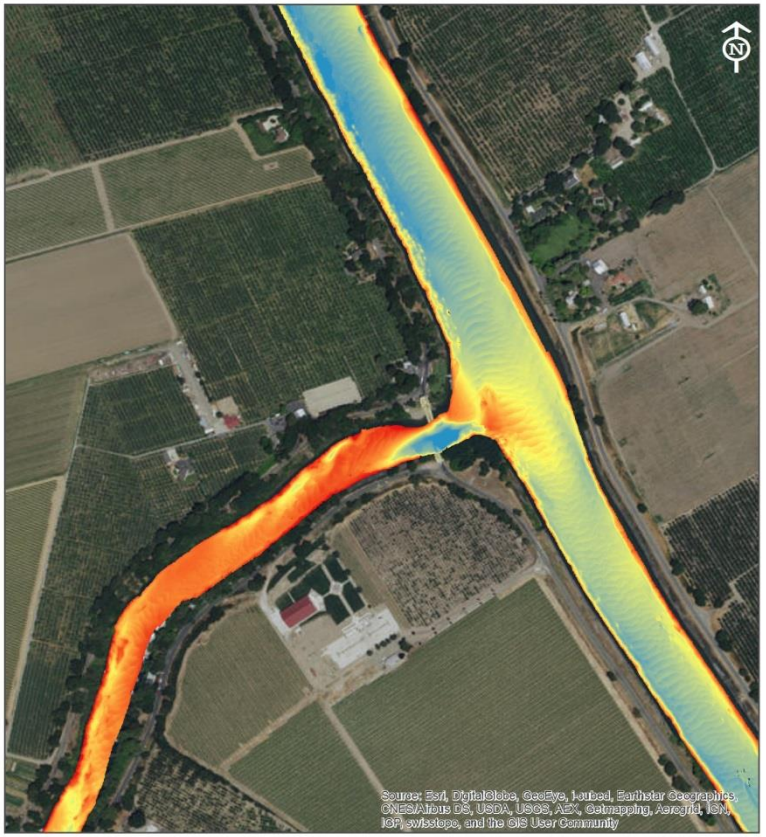

baydeltaoffice.water.ca.gov/modeling/deltamodeling/DSM2UsersGroup/new_Xsection.pdf
11 of 17
SHR-43
Cross-Section Development Program Version 2.53
2016 DSM2 cross sections update
File Properties Display Network Landmark Centerline Xsect Zoom Tools Help
bath Prop net save
Filter
Source Year
Uniform Elev
Source Year
Elev(NGVD)
10.0
5.0
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
316
305
306
347
350
349
Horizontal Datum: UTMNAD83
Selected Centerline: 429
Xsect Area: 6626.73
Bathymetry Filename: dsm2Nad83N...
Hor. Datum Units: Meters
Xsect: 1
Wetted Perimeter: 787.1
Network Filename: delta_2009Calib....
Vertical Datum: NAVD88
X coordinate (UTM): 617435.7
Top Width: 781.61
Landmark Filename: node.cdl
Ver. Datum Units: USSurveyFeet
Y coordinate (UTM): 4232904.0
Hydraulic Depth: 8.47
Properties Filename:


10 of 17
baydeltaoffice.water.ca.gov/modeling/deltamodeling/DSM2UsersGroup/new_Xsection.pdf
2016: February DSM2 update, using 2009 bathymetery for Steamboat Slough and Cache Slough that is WRONG.
Cross-Section Development Program Version 2.53
File Properties Display Network Landmark Centerline Xsect Zoom
bath Prop net save
Filter
Source Year
Uniform Elev
Source Year
add centerline point
Questions regarding DSM2 baseline data:
1. Since bathymetry changes yearly isn't current version of DSM2 incorrect?
2. Why were different years of bathymetry surveys used, and who determined what surveys should be conducted when?
3. How does it affect DSM2 model outcome if elevations used are not correct?
Example: confluence of Steamboat & Cache and the flow diversion structures of Steamboat and Sutter.
Elev(NGVD)
10.0
5.0
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
Horizontal Datum: UTMNAD83
Hor. Datum Units: Meters
Vertical Datum: NAVD88
Ver. Datum Units: USSurveyFeet
Selected Centerline: 398
Xsect: 1
X coordinate (UTM): 618215.1
Y coordinate (UTM): 4232758.5
Xsect Area: 24658.31
Wetted Perimeter: 690.08
Top Width: 671.81
Hydraulic Depth: 36.7
Bathymetry Filename: dsm2Nad83N...
Network Filename: delta_2009Calib....
Landmark Filename: node.cdl
Properties Filename:

Screen shot of data provided by DWR under FOI request
in 2015, shows 2010 or 2011 survey by DWR/USGS: Steamboat Slough



Steamboat Slough and
Sacramento River Junction



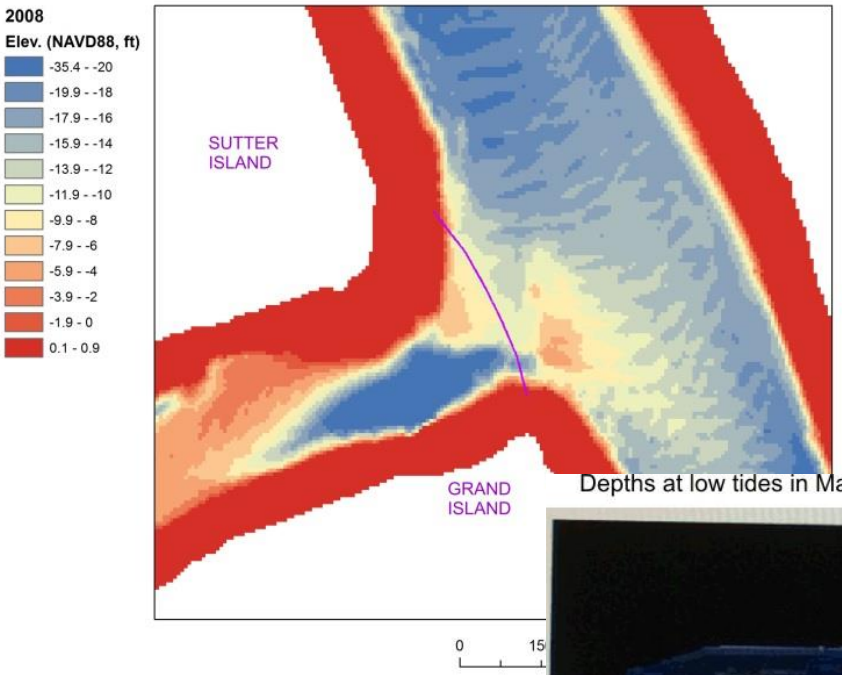
0 250 500 1,000 Feet

Elevation (ft)
High : 0.933752
Low : -35.3887

Survey Date: 3/11/14, 4/2/14
Elevation: NAVD88, Feet
Coordinate System: CA State Plane Zone II
Datum (horizontal): NAD 83
Reviewed by: Shawn Mayr
Base Map: ESRI

STATE OF CALIFORNIA
Department of Water Resources
Division of Integrated Regional Water Management
North Central Region Office
Bathymetry and Technical Support

Data provided by Paul Marshall, DWR 6/17/14



Depths at low tides in May 2014

2009 DSM2 user group presentation: Please describe what is being portrayed regarding flows, but Ignore the red asterisk which was added as reference for my following question.

baydeltaoffice.water.ca.gov/modeling/deltamodeling/DSM2UsersGroup/DSMUG2009jan.pdf

Look at the grid of DSM2 from WaterFix modeling and describe how it has been updated, if at all, for flow on lower Steamboat Slough: What should be expect as Impacts on this waterway at the Snug Harbor location specifically for low flows, low tides, timing of low tides, drinking water quality, water level, water temperature from June through October and salmon migration through this natural waterway?

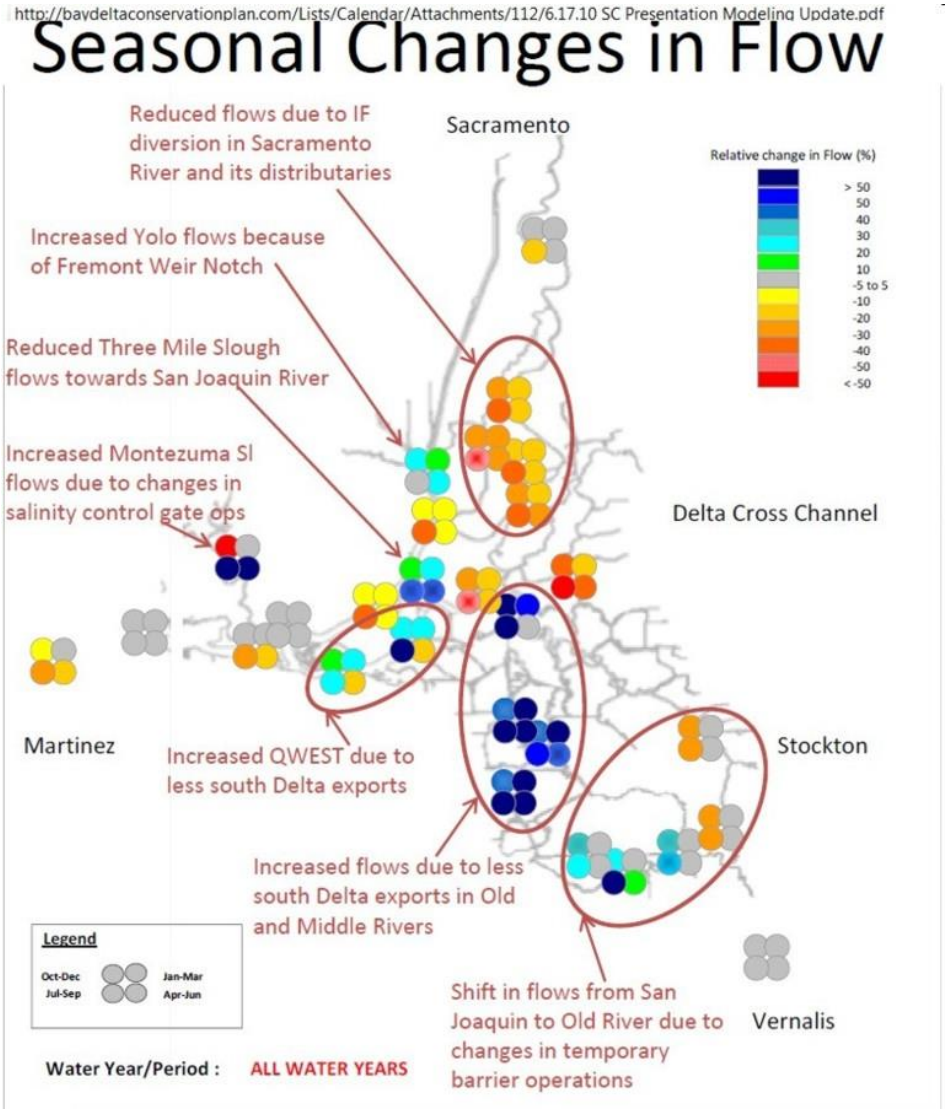
When questioned, BDCP staff provided the following as estimated impacts to North Delta waterways. 9-25-2010 meeting at Grand Island Mansion and also at the link shown in the screen print:

Does the impact in the North Delta waterways look correct to you, as it is based on 9000 cfs diversion from the North Delta upriver from Steamboat and Sutter Slough?

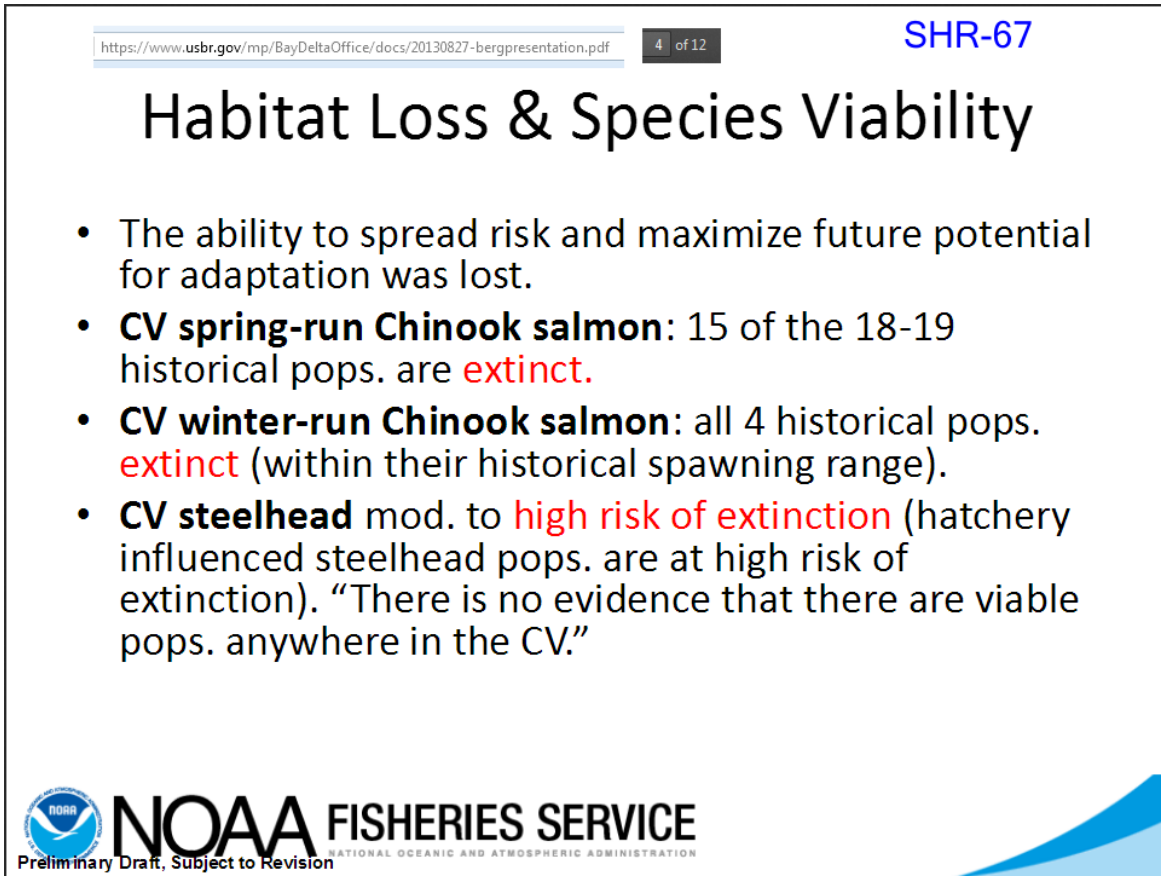
It shows a change in outflow on Steamboat and Sutter Sloughs of 20% to 40%. Is this a correct Assumption for the WaterFix modeling of flow remaining in the Delta below the three or four North Delta intakes?

In the DSM2 model, what programming was used to direct flows into DCC (DXC?) and Georgiana Slough? In other words, what percent of 5,000 cfs Of bypass flows below the proposed intakes were modeled to flow into

___% Sutter Slough
___% Steamboat Slough
___% Delta Cross Channel
___% Georgiana Slough
___% Sacramento River below Georgiana Slough
___% Sacramento River water flowing past Ida Island
___% of Sacramento River water reaching Rio Vista



How does it impact the Delta if the modeling flow numbers are ***wrong***?
Water quality for fish, animals and humans may be impacted in what ways?
If all salmon species are allowed to become extinct, does that mean the flow limits that are intended to protec
Salmon will become moot or not need to be enforced?



http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/california_waterfix/exhibits/exhibit104/ that was Linked to http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/california_waterfix/exhibits/exhibit104/docs/App_5.E_EFH_Assessment_RevisedDraftBA.pdf see page 3

Questions that have come up:

1. Should there be a companion petition/request to extend the time allowed to:
   * Complete Construction of the "green dot" intake, and
   * Complete Beneficial Use under the relevant State Water Project permits?

   2. As stated in the Board's petition notice, the time authorized by the SWRCB for DWR to complete construction and use of the SWP is 12/31/2000 and 12/31/2009, respectively. Those dates have expired. In 1967 the Water Board adopted D-1275 which authorized the issuance of water right Permits nos. 16478, 16479, 16481 and 16482. Together, these permits authorized SWP diversion at/from:
   1. Oroville and Thermalito Complex on the Feather River;
   2. Italian Slough in the South Delta (later changed to Old River @ Clifton Court Forebay in 2000);
   3. San Luis Creek at San Luis Reservoir; and
   4. The Lower Sacramento River near Hood, (i.e. the "green dot" on the WF maps) appears to be where the Peripheral Canal intake was to be, and ***haven't those permits expired***? So either the permits have expired or they were extended, and if so when was that hearing and what is the extension date, or if this hearing is intended to be used for the extension why isn't there more discussion about that facility impact?

   Of these four sources listed above, only the Sacramento River diversion intake has not been constructed, right?. .. (Unless there is a subsurface siphon that is not disclosed on maps and in modeling documents.)

As noted in DWR's testimony, diversion from the lower Sacramento River near the intake #3 location is still authorized by the permits, but only if additional time to construct the diversion facilities is granted by the Board. However this requirement is absent from the WaterFix hearing issues because DWR did not include a revised request for time extension with its petition to change and add points of diversion and re-diversion to its permits.

Can the record show that SWRCB recognizes that there appears to be a deficiency regarding the timing of construction of the 4th water right or the "green dot" right being apparently included in this process without the provision of any modeling data regarding this other intake? Or if the time to build the intake for the "Peripheral Canal Act " was extended, please have the record show that computer modeling does not appear to reflect impacts to flow, water quality and water rights when combined with the proposed WaterFix facilities.

Related issues that should be addressed if a comprehensive solution is desired:

* Please explain about the “cold-storage” of lower Sacramento River water rights since 1982 (when California voters rejected Proposition 9, the Peripheral Canal Act) which was mentioned in the 2008 Order revoking USBR's Auburn Dam permits, and how cold storage applies to this proceeding?
* What do the “Complete Construction” and “Complete Use” deadlines in Condition 6 of DWR’s permits mean, and ***how do they pertain to the SWP's Sacramento River source and California WaterFix intake(s***);
* Isn’t there a need for Petitioners DWR/USBR to file **NEW** (junior-priority) water right application for the lower Sacramento River to move forward with WaterFix in a manner that's fair to Sac Valley water diverters who filed permit applications after 1951; and
* Has a hearing been scheduled on USBR’s petition for time extensions for the “green dot” diversion off the Sacramento River? Hasn’t this petition has been pending for years.? The CEQA, diligence, and possible injury issues surrounding USBR’s time extension petition overlap with the ones raised by WaterFix and should therefore be combined with the WaterFix hearing, right?

Steamboat, Sutter, Miner's
And Cache Slough flow
And stage data was NOT
Included in DSM2 2009
Recalibration...**why**?

Testimony on 8/24/16 indicates
These waterways are now
Included or have been "looked
At" by modelers. When was the
updated data provided to the
CALSIM II or DSM2 modelers? By
Whom? Will you provide a copy
Of the output or effects to verify
Your testimony is correct?

TABLE 4-3
List of Hydrodynamics Calibration Locations

Location	Short Name	Flow	Stage
Sacramento River at Freeport	RSAC155	✓	✓
Sacramento River above Delta Cross Channel	RSAC128	✓	✓
Sacramento River downstream from Georgiana Slough	RSAC123	✓	✓
Sacramento River at Rio Vista	RSAC101	✓	✓
Sacramento River at Martinez	RSAC054		✓
San Joaquin River at Mossdale	RSAN087		✓
San Joaquin River at Stockton	RSAN063	✓	✓
Stockton Ship Channel at Burns Cutoff	RSAN058		✓
San Joaquin River at San Andreas Landing	RSAN032		✓
Three Mile Slough	SLTRM004	✓	✓
San Joaquin River at Jersey Point	RSAN018	✓	✓
San Joaquin River at Antioch	RSAN007		✓
Old River at Head	ROLD074		✓
Old River at Tracy Boulevard	ROLD059		✓
Old river near Delta Mendota Canal	ROLD047		✓
Old River at Highway 4 (near Byron)	ROLD034	✓	✓
Old River at Bacon Island	ROLD024	✓	✓
Middle River at Borden Highway	RMID023		✓
Grant Line Canal at Tracy Boulevard Bridge	CHGRL009	✓	✓
Georgiana Slough	GEORG_SL	✓	✓
Montezuma Slough at Beldons	SLMZU011		✓
Dutch Slough	SLDUT007	✓	✓
Cross Delta Flow (RSAC128 - RSAC123)	X-Delta Flow	✓	

*what about Steamboat, Sutter, Miner and Cache Sloughs?

DSM2 stage estimates: OOPS On 1-1-2006 and why stage and river flows matter:

4.5.2 Stage Calibration Metrics

In addition to predicted flows, the recalibration effort also included analysis of predicted stages at key locations in the Delta. The recalibration effort attempted to reduce amplitude and phase errors in predicted stage. While RMS errors in tidally-averaged water level were analyzed, potential discrepancies in datum data lessened the importance of this parameter.

The recalibration process resulted in improved DSM2 stage predictions at all the locations in the north Delta. Figure 4-13 shows the stage metrics for Rio Vista location. The mean error in tidal range has dropped from 46 percent in the 2000 calibration to 11 percent. Similarly, the mean phase error in the recalibrated DSM2 has dropped from 17 to 4 minutes. However, the mean tidally-averaged stage is 0.66 foot lower than the observed data. These results are not significantly different from the 2000 calibration, which had an error of 0.71 foot. It is uncertain whether this error is related to any datum issues. In Georgiana Slough the mean error in tidal range is at 10 percent compared to the 36 percent in the 2000 calibration as shown in Figure 4-14. The mean phase error decreased from 26 minutes in the 2000 calibration to 15 minutes. Georgiana Slough is a good example to show how the discrepancies in datum result in high RMSE and mean error even though the tidal metrics show significant improvement. Therefore, tidally-averaged metrics were not used as the key metric in assessing the stage calibration.

Figure 4-15 summarizes the tidal stage metrics for several locations in the north Delta. Plot a shows the mean error in the tidal range as percentage of the mean observed tidal range for the current recalibration and the 2000 calibration. The mean error in the tidal range is less than 13 percent at all the locations in the north Delta with significant improvements compared to the 2000 calibration. Similarly, the mean phase error has decreased significantly at all the locations in the north Delta compared to 2000 calibration, with the highest error of 32 minutes at Freeport.

Figure 4-16 shows the summary of tidal metrics for stage at several locations in the western and central Delta. Again, the mean error in the tidal range has reduced significantly compared to 2000 calibration with the highest error at 17 percent. With the exception of Antioch, the mean phase error has also reduced at all the locations with highest error at 5 minutes. At Antioch, the error has increased by 5 minutes compared to 2000 calibration to 25 minutes.

The mean error in the tidal range for all the locations in the South Delta and upper San Joaquin River have slightly reduced compared to 2000 calibration as shown in the plot a of Figure 4-17. However, the phase errors have increased in the current recalibration with the maximum error of 32 minutes at the Head of Old River.

Are or were the modelers told there are humans who drink the water from the sloughs and from the Shallow wells of the Delta?

https://www.sciencebase.gov/catalog/item/55ad2901e4b066a24924099b

USGS science for a changing world

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System → USGS Data Release Products → Location and population ser…

Location and population served by domestic wells in California

Go to View

Dates

Publication Date : 2015-08-21
Time Period : 1990-01-01

Citation

Johnson, T.D. and Belitz, K., 2015, Location and population served by domestic wells in California: U.S. Geological Survey data release, http://dx.doi.org/10.5066/F70R9MFW.

Summary

This dataset identifies the number of individually-owned domestic wells, and the number of households relying upon domestic water supply in the state of California. The number of wells and households are summarized for each Public Land Survey System (PLSS) section. The well locations were determined from more than 635,000 scanned well-completion reports (WCRs) provided by the California Department of Water Resources in 2011. This is only a partial sample of the total number of WCRs (estimated at 1 to 2 million in total). The number of domestic wells was estimated based upon a spatially distributed and randomized survey that determined the Township Ratio (TR) for each township in the state (4,692 in total). Each township generally contains 36 sections (6 x 6). The total number of wells within a section was multiplied by the corresponding TR to estimate the number of domestic wells within each section. See the "TRatio" column in the attribute table. Each section within the same township will have the same Township Ratio. The domestic household data are from the 1990 US Census. These data were provided at the census tract level and were subsequently aggregated to PLSS sections that contained a domestic well. In the case where census tract data identified households using domestic supply, but there were no domestic wells within the tract, the household data were distributed evenly to all sections within the tract. In San Luis Obispo County, the scanned WCRs were incomplete. Therefore, a surrogate method was used. The total number of households reported by the 1990 census did not change; only the distribution of where those households existed within the tract

... show more ...

Contacts

Map »

Spatial Services

ScienceBase WMS :
https://www.sciencebase.gov/catal

ScienceBase WFS :
https://www.sciencebase.gov/catal

Communities

- USGS California Water Science Center
- USGS Data Release Products

Associated Items

- *related to* Identifying the location and population served by domestic wells in California

View Associated Items