

DELTA WETLANDS PROJECT

Particle Tracking Model Analysis

Technical Summary

1.0 Background and Purpose

Delta Wetlands is proposing to initiate a project that would convert two islands in the Central Delta (Bacon Island and Webb Tract) into reservoir islands in order to increase the availability of high-quality water in the Delta for export or outflow. On behalf of Delta Wetlands, Resource Management Associates (RMA) developed models to perform hydrodynamic and particle modeling to evaluate impacts of flow diversions to the Delta Wetlands Project reservoir islands (Webb Tract and Bacon Island).

2.0 RMA Model Description

2.1 RMA Bay Delta Model

RMA has developed and refined a numerical model of the Sacramento-San Joaquin Delta system (Delta model) utilizing the RMA2 and RMA11 finite element models for surface waters. RMA2 (King, 1990) is a generalized free surface hydrodynamic model that is used to compute one-dimensional cross-sectionally averaged and two-dimensional depth-averaged velocity and water surface elevation. RMA11 is a generalized water quality and sediment transport model that uses the hydrodynamic output from RMA2 to drive simulation of dissolved or suspended water quality constituents. As shown in **Figure 1**, the Delta model extends from Martinez to the confluence of the American and Sacramento Rivers and to Vernalis on the San Joaquin River. There is also an alternate configuration of the RMA Bay Delta Model that includes the San Francisco Bay with the tidal boundary applied at the Golden Gate. For computational efficiency the Delta only configuration was used for this study, which is sufficient because the region of interest is far from the Martinez boundary and project conditions do not significantly impact tidal stage at that boundary.

The current version of RMA's Delta model has been developed and continually refined during numerous studies over the past 14 years. The model represents all of the important special characteristics of the Delta including operable gates (Delta Cross Channel, Montezuma Slough, temporary south Delta barriers, etc.), Delta export facilities, Delta Island Consumptive Use (DICU), and wetting and drying in shallow areas. The most comprehensive calibration efforts in recent years were performed during studies for Central Contra Costa Sanitary District (RMA, 2000a), CALFED (RMA, 2000b), Flooded Islands Feasibility Study (RMA, 2005) and Numerical Modeling in Support of Suisun Marsh PEIR/EIS (RMA, 2008).

The model grid was developed from GIS data, USGS digital line graph (DLG) and digital orthoquad (DOQ) images. Bottom elevations and the extent of mudflats were based on bathymetry data collected by National Oceanic and Atmospheric Administration (NOAA), Department of Water Resources (DWR), United States Army Corps of Engineers (USACE) and United States Geologic Survey (USGS). These data sets have been compiled by DWR and can be downloaded from DWR's Cross Section Development Program (CSDP) website at:

<http://baydeltaoffice.water.ca.gov/modeling/deltamodeling/models/csdp/index.html>.

Additional data were collected around Franks Tract by DWR and the USGS in 2004. USGS 10 m resolution Delta Bathymetry grids were obtained from the Access USGS website at:

<http://sfbay.wr.usgs.gov/access/Bathy/Delta/>.

2.2 RMATRK Particle Tracking

The RMATRK particle tracking model simulates particle movement within a flow field generated by the RMA multi-dimensional finite element hydrodynamic model, RMA2. The finite element formulation allows computational networks to be constructed with a mixture of 1-, 2-, and 3-dimensional elements. The particle tracking model performs all tracking in three dimensions by internally considering position within a cross-section for 1-D elements and vertically within depth-averaged elements.

RMATRK includes both streamline tracking and dispersion of particles. Streamline tracking based on the mean velocity field is accomplished with a second order Runge-Kutta solution and proceeds on an element by element tracking scheme in local coordinates. Dispersion is represented by selecting a velocity deviation from a Gaussian distribution scaled by a dispersion coefficient. Dispersion coefficients are specified separately for vertical, longitudinal, and transverse mixing either as a specific value or as a value scaled by water depth and shear velocity. Dispersion coefficients have been calibrated to achieve mixing equivalent to RMA11 model for scalar transport in the RMA Bay Delta Model.

For the Delta Wetlands simulations, particles were simulated as simple, neutrally buoyant particles with no mutual interaction and no independent movement.

3.0 Study Setting

3.1 Boundary Conditions

The simulation period was from January 1 through May 31, 1992. Boundary conditions are specified for all inflow and outflow locations and for flow control structures. The locations of the Delta model monitoring lines are shown in **Figure 2**.

3.2 Tidal Boundary

The tidal boundary for the Delta model is set at Martinez, the western boundary of the model, using the DSM2 predicted Martinez tide (see Chapter 4 in http://baydeltaoffice.water.ca.gov/modeling/deltamodeling/AR2007/2007_Annual_Report_Final.pdf for full description of DSM2 planning tide generation). As applied in the RMA model, these data were shifted to + 0.1 m to account for density effects between the tidal boundary and the Delta.

3.3 Hydrologic Conditions

CALSIM monthly river inflows and exports were applied in the RMA model with two exceptions: daily smoothed Sacramento River flows (see <http://modeling.water.ca.gov/delta/reports/annrpt/2004/2004Ch5.pdf> for a full description of the DSM2 smoothing process), and DSM2-generated 15-minute Clifton Court flows were used.

Time series of inflow boundary conditions are plotted in **Figure 3** and **Figure 4**. These flows are applied for the Sacramento River, San Joaquin River, Yolo Bypass, Cosumnes River, Mokelumne River, and Calaveras River. The model interpolates between the daily average flows at noon each day.

Delta exports applied in the model include State Water Project (SWP, [Clifton Court]), Central Valley Project (CVP), Contra Costa exports at Rock Slough, Old River and Victoria Canal, North Bay Aqueduct intake at Barker Slough, Vallejo intake and Antioch intake. Exports are plotted in **Figure 5** and **Figure 7**. (Note that daily average Clifton Court flows are plotted for easier viewing; however 15 minute flows were applied in the model.) An example of daily average versus 15-minute Clifton Court flows is shown in **Figure 6**.

DICU flows incorporate channel depletions, infiltration, evaporation, and precipitation, as well as Delta island agricultural use (DWR, 1995). DICU values are applied on a monthly average basis and were derived from monthly DSM2 input values (DWR, 1995). These flows are distributed to multiple elements throughout the Delta using an in-house utility program.

4.0 Analytical Methods

4.1 PTM Simulations

Separate hydrodynamic simulations were performed for each island for the period of January through May, 1992. Monthly CALSIM flows were smoothed and applied to model boundary conditions. During the diversion period (February 1992), a constant diversion of 1739 cfs was applied in the Delta Wetlands simulation, divided between the two diversion locations (see **Figure 8** and **Figure 9**). Baseline cases with no diversions were also run for the same period.

Passive particle modeling was used to evaluate the fate of particles released from seven locations throughout the Delta. The release locations are consistent with the California Endangered Species

Act Incidental Take Permit No. 2081-2009-001-03 for longfin smelt (CDFG, 2009a) and are presented in **Figure 10**. Four simulations were run with particles released on January 1, January 15, February 1 and February 15. Each simulation period was 90 days long. At each of the seven release locations, 50,400 particles were released over a 24 hour period at the beginning of each simulation. Each particle was tracked for the entire simulation period of 90 days, or until it was entrained at the State Water Project (SWP) intake, Central Valley Project (CVP) intake, through agricultural diversions, or at the Delta Wetlands facilities. The fate of particles that were not entrained is separated into particles whose location at the end of the simulation is Downstream of Chipps Island, North of the South Delta (as shown in **Figure 2**), and all other locations.

5.0 Results

5.1 Raw Data Results

The data which resulted directly from the 1992 particle tracking simulation or raw data are presented within the tables in Figure 11 and Figure 12 for Webb Tract and Figure 25 and 26 for Bacon Island. However, since the resulting numbers of the analysis were somewhat arbitrary, as they simply presented a number of particles recovered out of the initial 50,400 particles released at the start of the simulation, the data was converted to a percentage format (see Figures 13 – 16 and Figures 27 – 30). This format was then used for the bar graphs which were created to display the un-weighted results by release station (see Figures 17 – 23 and Figures 31 – 37).

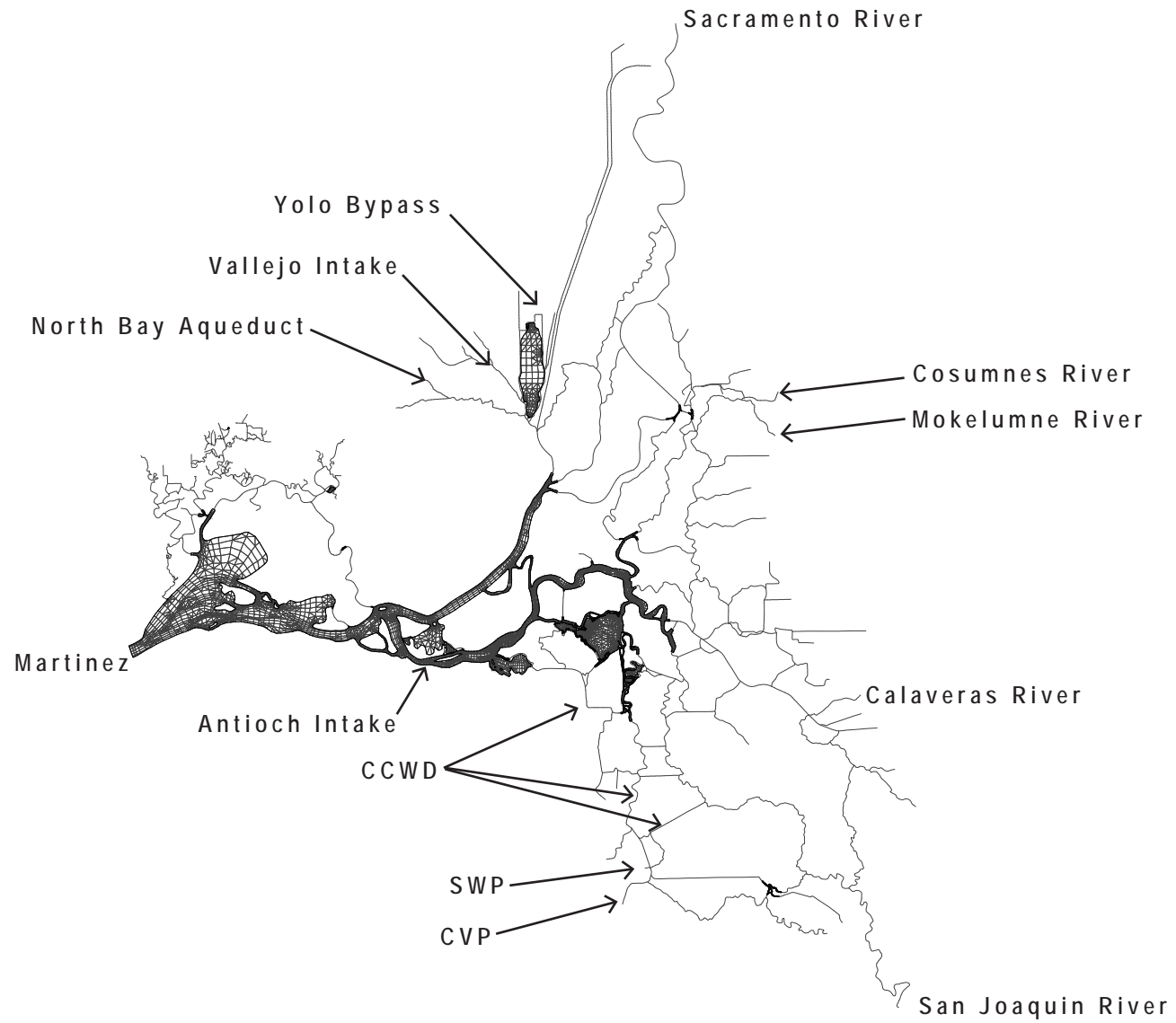
5.2 Weighted Data Results

In order to make the results of the simulation more applicable for use in assessing potential fish movement throughout the Delta (particularly delta smelt and longfin smelt), a weighting system was applied to the data. The specific weighting system used for this data is based on results of analyses performed by CDFG (2009b) regarding the geographic distribution of larval longfin smelt within the Delta. The change in fate of particles was then assessed for particle movement downstream of Chipps Island, movement north of the south Delta, entrainment into the SWP and CVP export facilities, entrainment into Delta agricultural diversions, or entrainment onto Webb Tract or Bacon Island depending on proposed project diversion operations.

Results of these simulation analyses generally show that the changes in particle fate between base conditions and with proposed project diversion operations were typically small (less than 2%). The potential effects on the fate of neutrally buoyant particles were generally similar between different simulations in which water was diverted onto Bacon Island and onto Webb Tract.

6.0 References

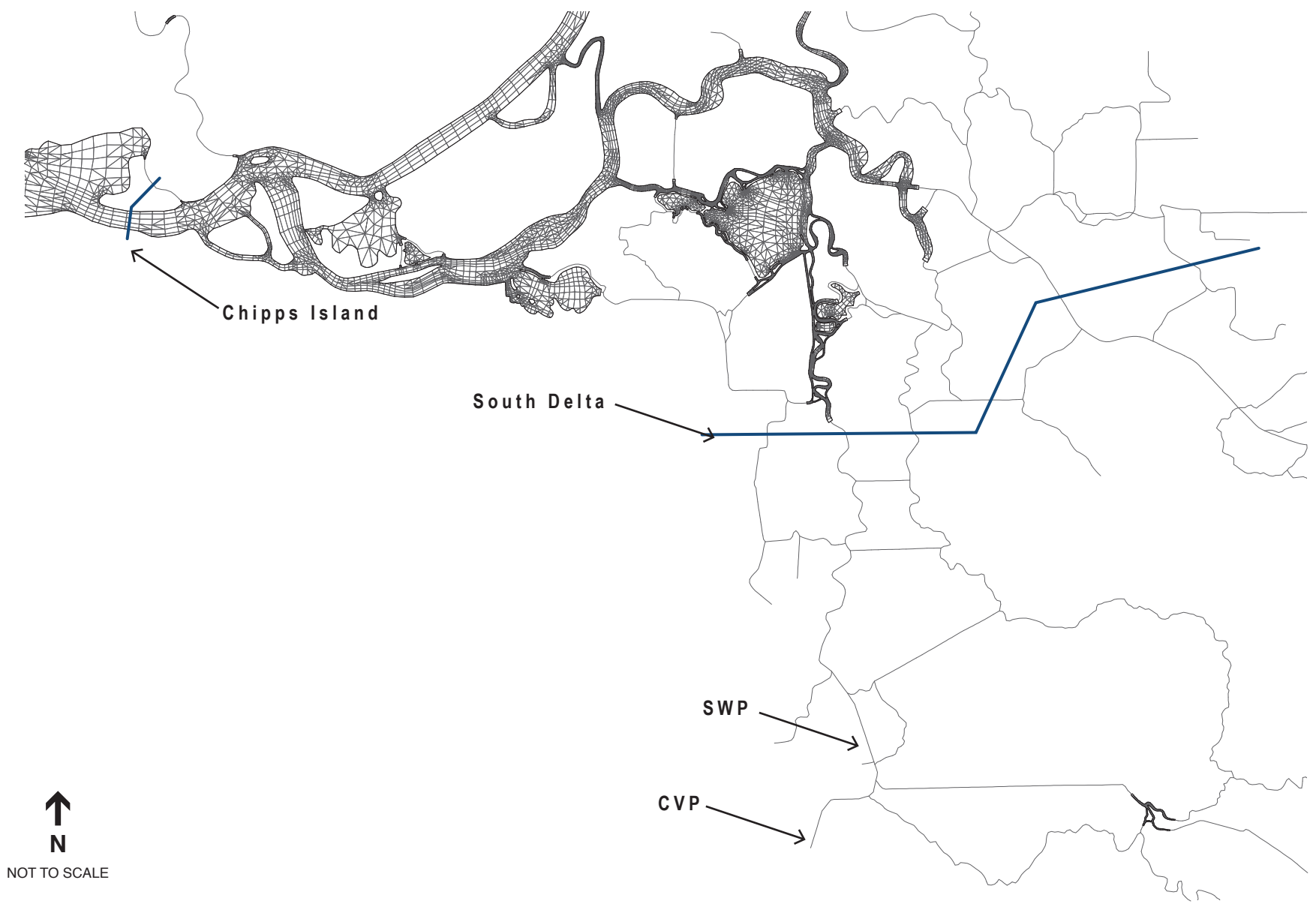
- California Department of Fish and Game (CDFG). 2009a. California Endangered Species Act, Longfin Smelt Incidental Take Permit No. 2081-2009-001-03. Bay Delta Region. February 2009.
- California Department of Fish and Game (CDFG). 2009b. Effects analysis. State Water Project effects on longfin smelt. Prepared by R. Baxter, M. Nobriga, S. Slater, and R. Fujimura. February 2009.
- DWR, 1995. California Department of Water Resources, “Estimation of Delta Island Diversions and Return Flows”, February 1995.
- King, I. P., 1990 “RMA2 – A Two-Dimensional Finite Element Model for Flow in Estuaries and Streams, Version 4.3”, Resource Management Associates.
- RMA, 2008. “Numerical Modeling in Support of Suisun Marsh PEIR/EIS”, March 2008.
- RMA, 2005. “Flooded Islands Feasibility Study: RMA Delta Model Calibration Report”, June 2005.
- RMA, 2000a. “Water Quality Impacts of Central Contra Costa Sanitary District Discharge on San Francisco Bay”.
- RMA, 2000b. “Mathematical Modeling of Hydrodynamic and Water Quality Impacts of Suisun Marsh Levee Breaches”.



SOURCE: Resource Management Associates, 2011; and ESA, 2011

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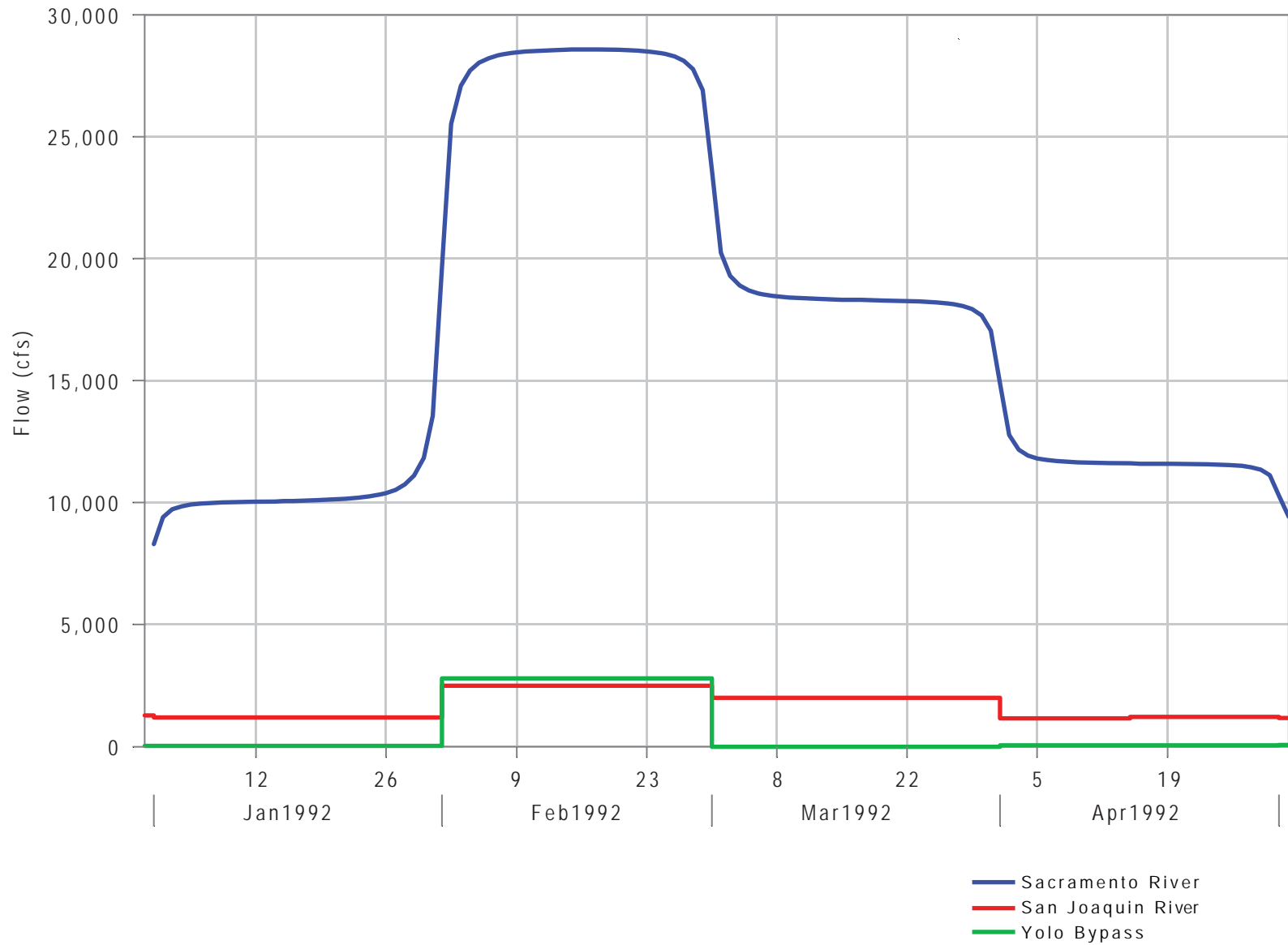
Figure 1
Model Grid with Boundary Condition Locations Shown



SOURCE: Resource Management Associates, 2011; and ESA, 2011

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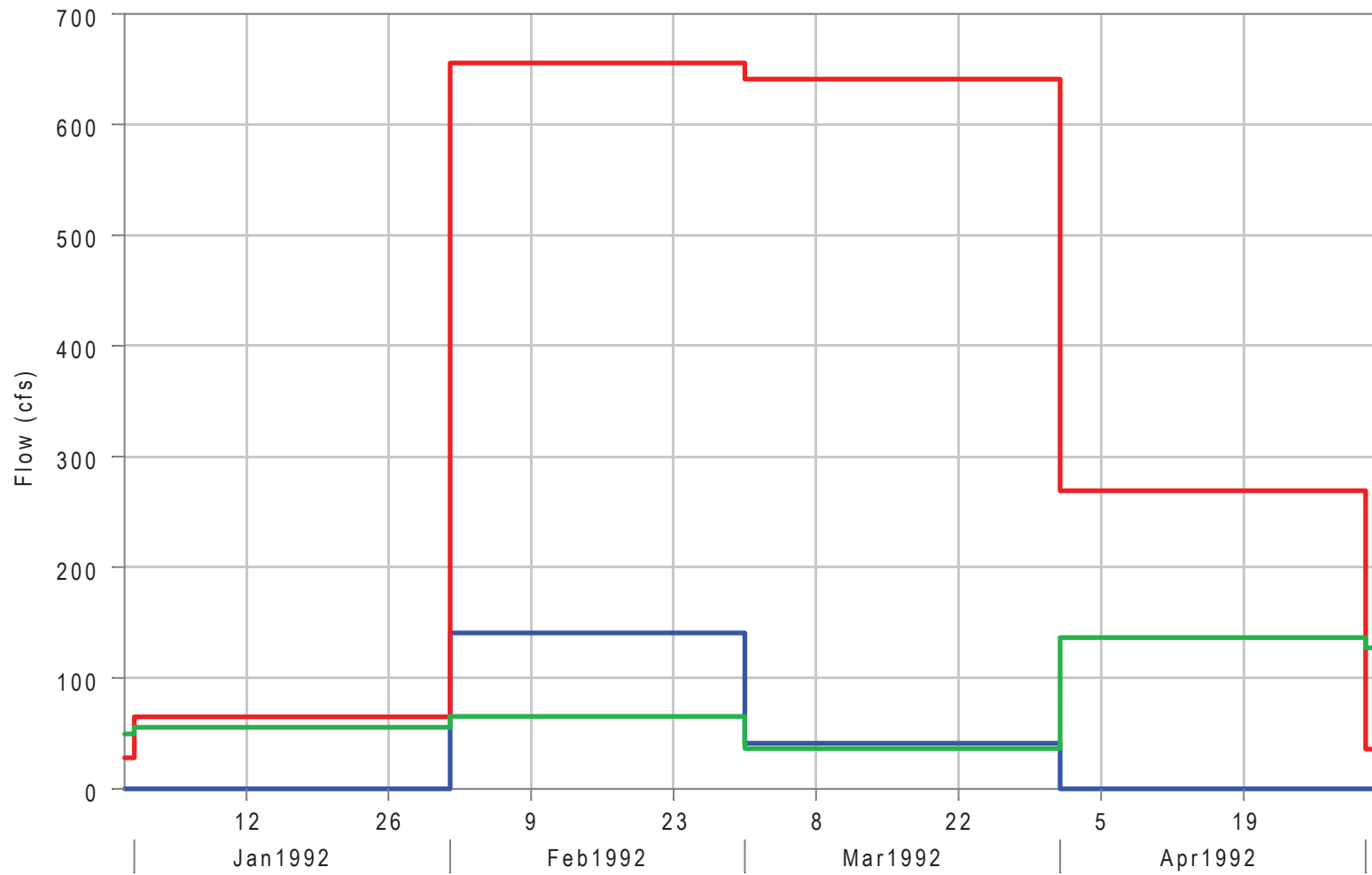
Figure 2
Monitoring Lines



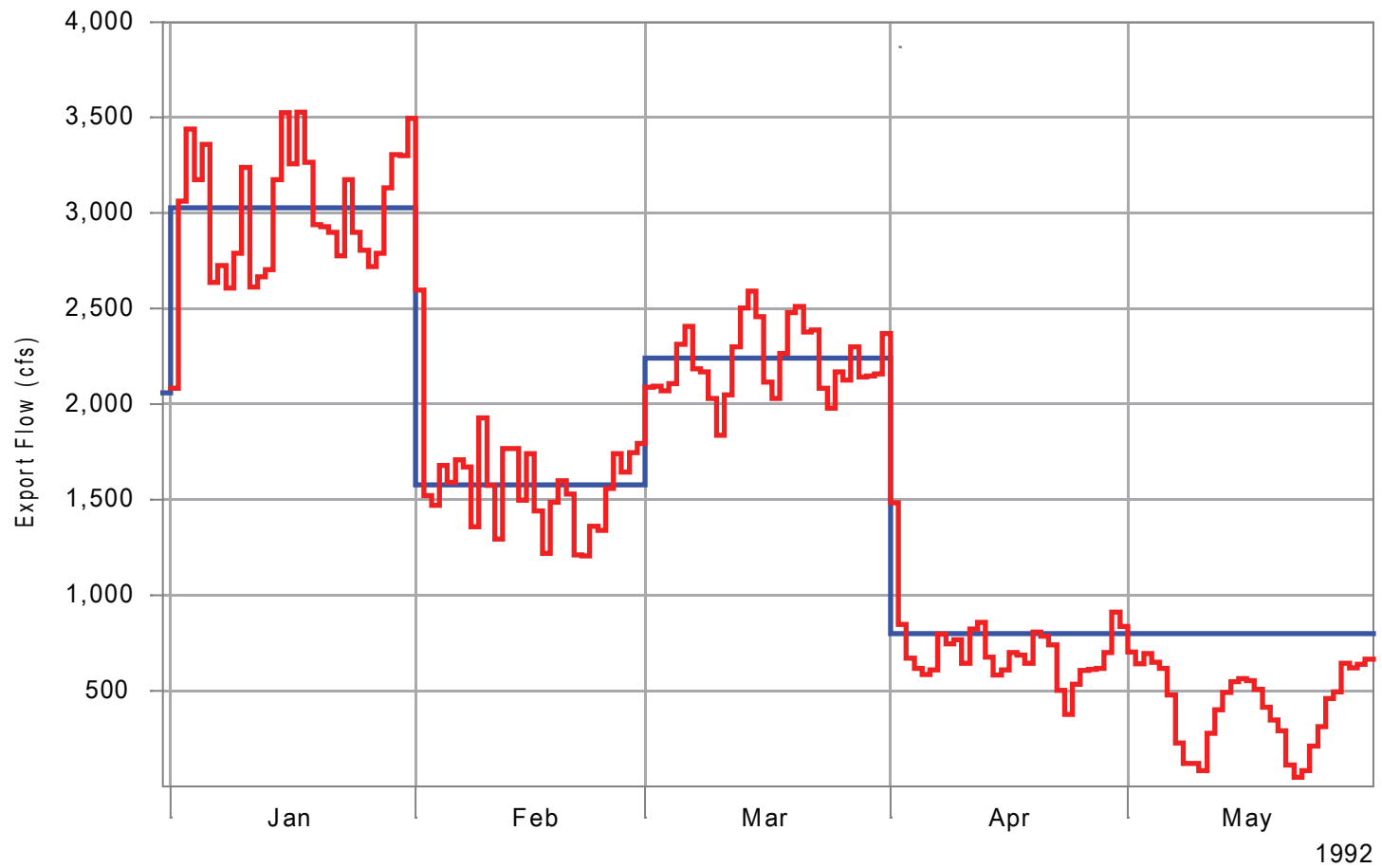
SOURCE: Resource Management Associates, 2011; and ESA, 2011

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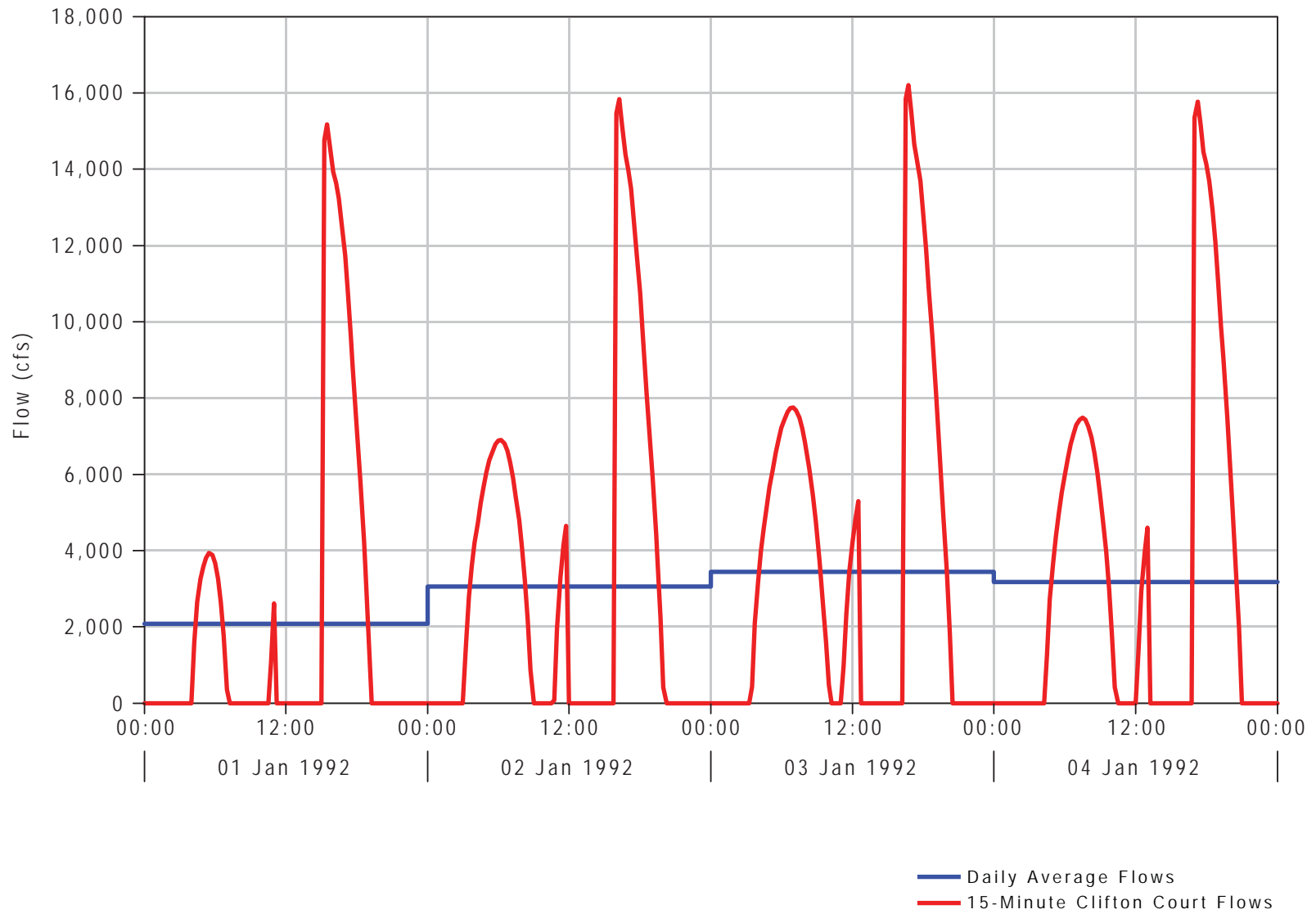
Figure 3
Major River Inflows



— Calaveras River
 — Cosumnes River
 — Mokelumne River



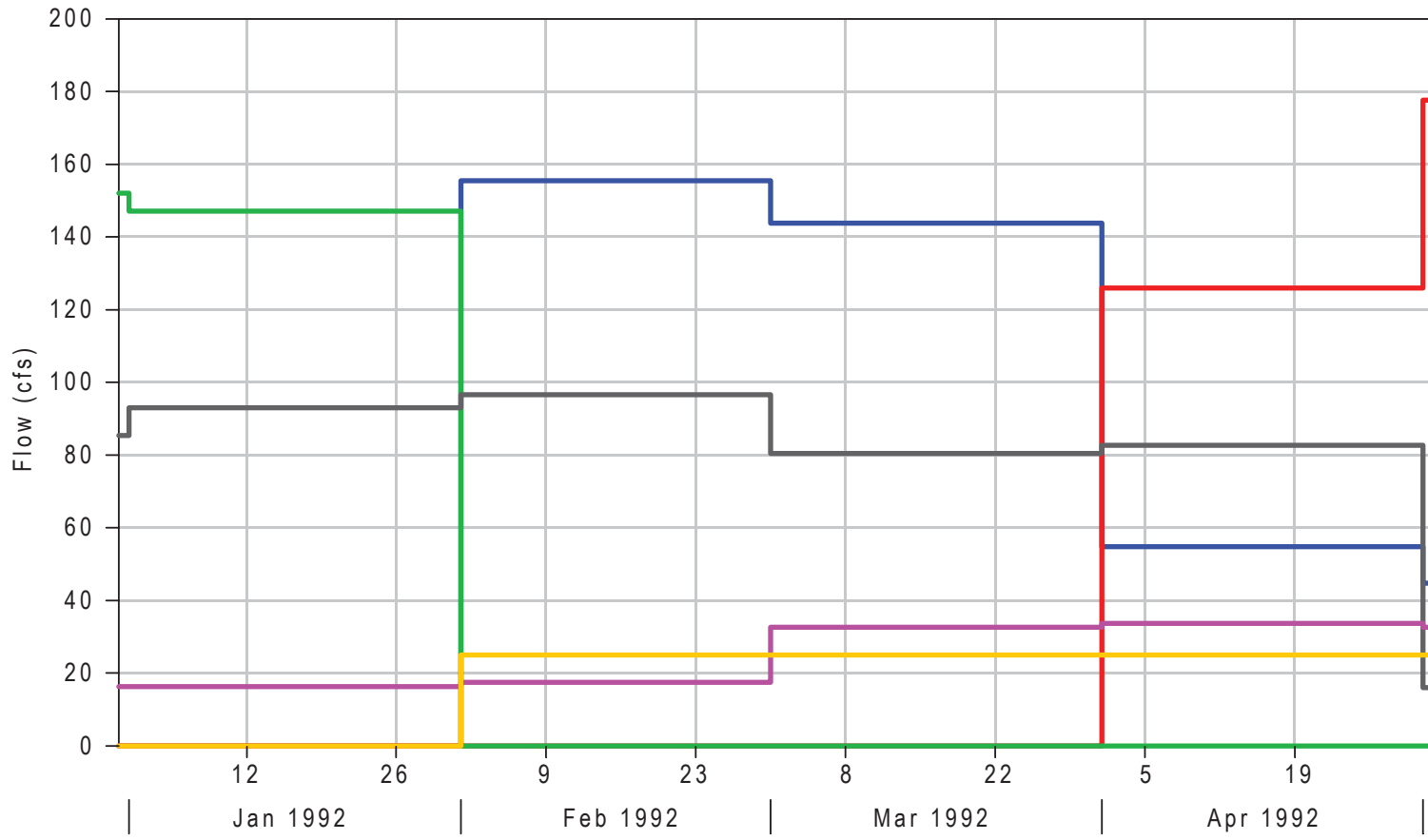
— CVP
 — Clifton Court (Daily Average)



SOURCE: Resource Management Associates, 2011; and ESA, 2011

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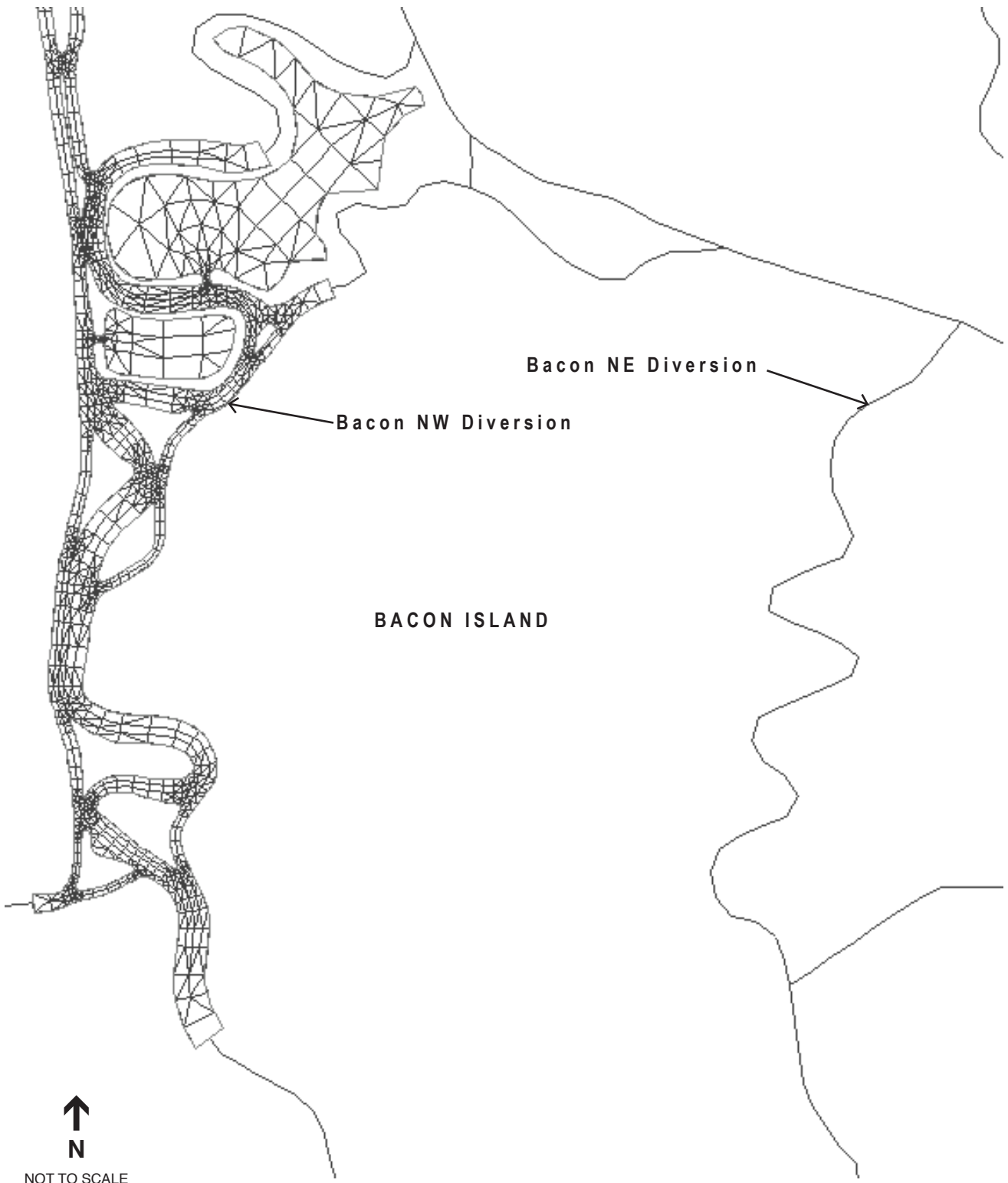
Figure 6
Daily Average and 15-Minute Clifton Court Flows



— CCWD - Rock Slough — CCWD - Old River — CCWD - Victoria Canal
— North Bay Aqueduct — Vallejo — Antioch

SOURCE: Resource Management Associates, 2011; and ESA, 2011

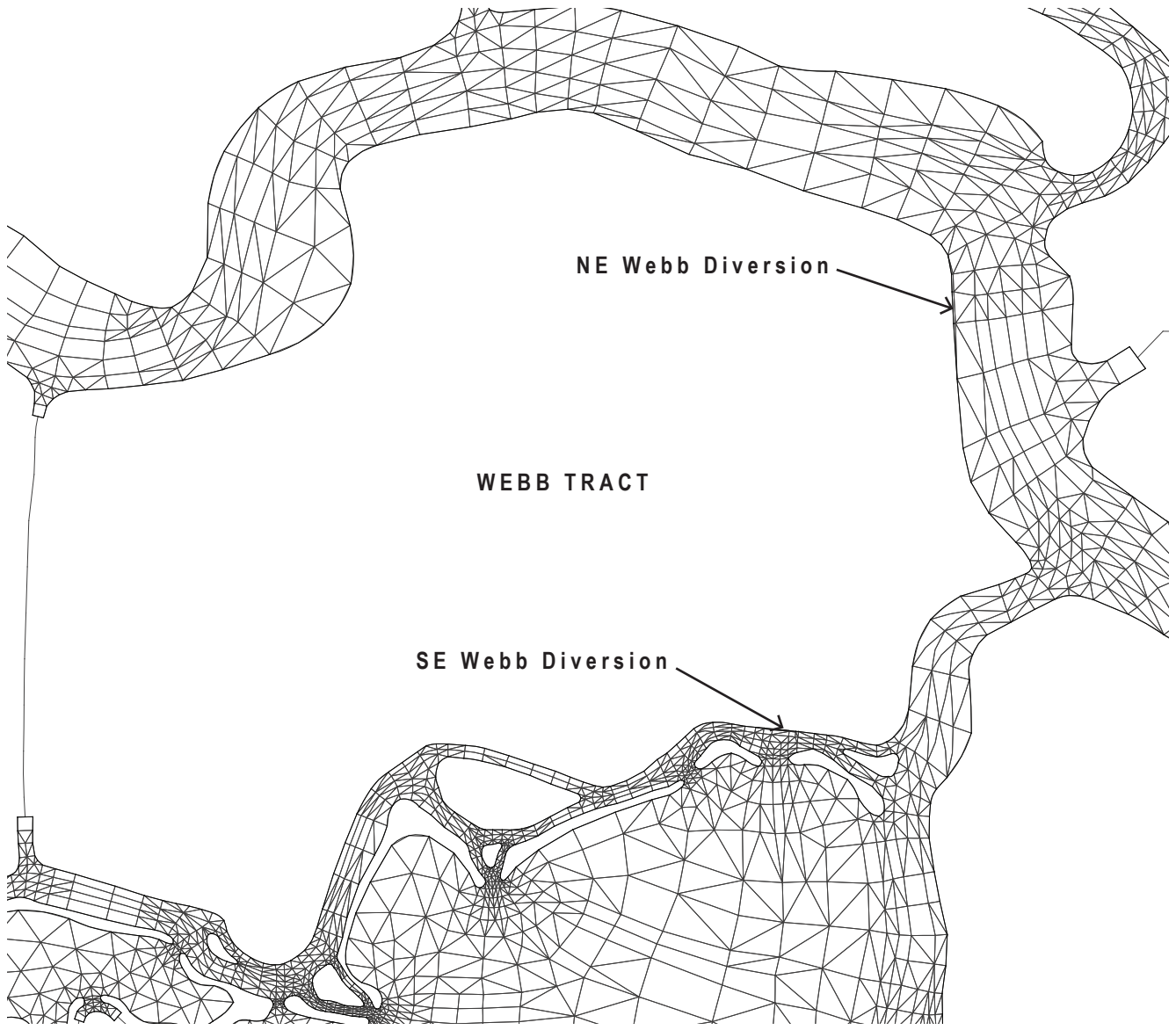
Figure 7
Minor Export Flows



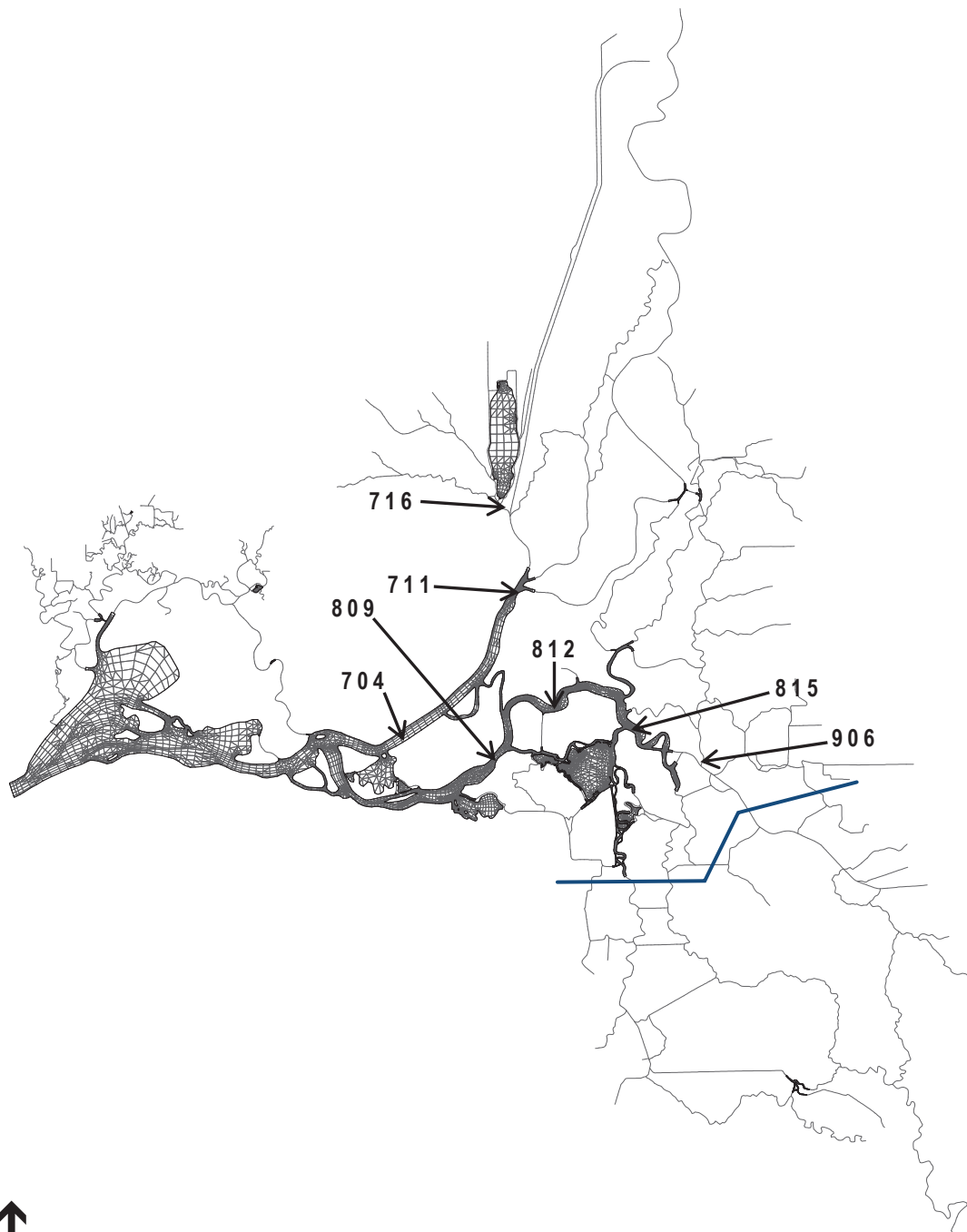
SOURCE: Resource Management Associates, 2011; and ESA, 2011

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Figure 8
Bacon Island Diversion Locations



NOT TO SCALE



NOT TO SCALE

**Base and Webb Diversion Alternative, Raw Data
January 1 – April 1, 1992**

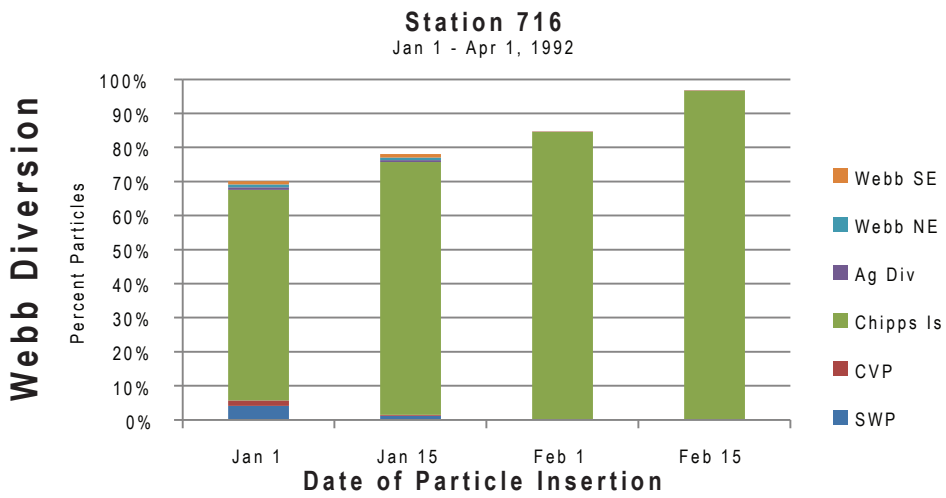
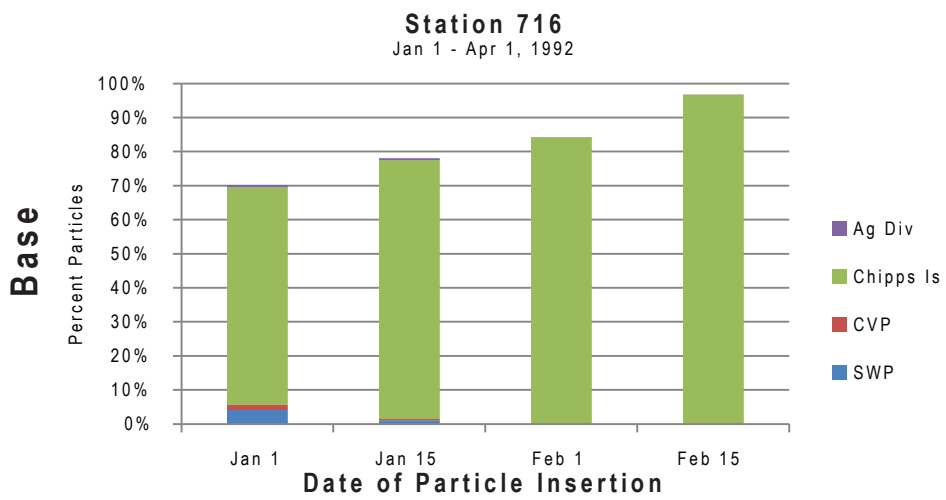
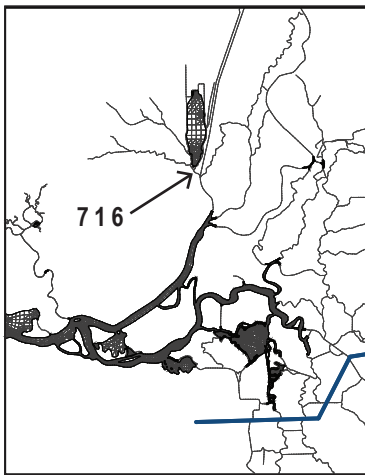
Number of Particles* in Monitoring Regions or Entrained - Raw Model Output															
Particle Source	Downstream of Chipps		North of South Delta		Entrained at SWP		Entrained at CVP		Total Entrained at Pumps		Entrained at Ag Div		Entrained at Webb		
	Base	Webb Diversion	Base	Webb Diversion	Base	Webb Diversion	Base	Webb Diversion	Base	Webb Diversion	Base	Webb Diversion	Base	Webb Diversion	
716	32176	31215	47510	47499	2064	2064	773	781	2837	2845	342	346	N/A	924	
711	34266	32743	43821	43711	4602	4715	1862	1869	6464	6584	212	173	N/A	1440	
704	36783	36282	48658	48648	1263	1252	446	469	1709	1721	72	50	N/A	415	
809	27907	25119	29721	29561	14183	14368	6216	6186	20399	20554	305	330	N/A	2562	
812	14777	13261	15749	16123	22877	22443	11405	11479	34282	33922	329	295	N/A	1844	
815	2987	2610	3221	3229	28207	28173	18444	18483	46651	46656	444	403	N/A	366	
906	254	196	3664	3653	26199	25886	19899	20177	46098	46063	571	588	N/A	48	

*Number of particles out of 50,400 input at each particle source

**Base and Webb Diversion Alternative, Raw Data
January 15 – April 15, 1992**

Number of Particles* in Monitoring Regions or Entrained - Raw Model Output															
Particle Source	Downstream of Chipps		North of South Delta		Entrained at SWP		Entrained at CVP		Total Entrained at Pumps		Entrained at Ag Div		Entrained at Webb		
	Base	Webb Diversion	Base	Webb Diversion	Base	Webb Diversion	Base	Webb Diversion	Base	Webb Diversion	Base	Webb Diversion	Base	Webb Diversion	
716	38317	37435	49652	49638	557	579	167	159	724	738	286	275	N/A	875	
711	39573	37579	48017	48093	1760	1664	555	576	2315	2240	156	167	N/A	1928	
704	36405	36282	49964	49961	306	314	120	110	426	424	38	44	N/A	439	
809	38506	34485	39614	39713	7639	7679	2907	2780	10546	10459	349	345	N/A	4127	
812	25679	21173	26847	27209	16870	16723	6271	6086	23141	22809	521	519	N/A	4909	
815	7038	5731	7623	7840	28028	27797	14313	14375	42341	42172	446	420	N/A	1535	
906	1349	967	4987	4960	27887	27715	17209	17359	45096	45074	326	352	N/A	415	

*Number of particles out of 50,400 input at each particle source



**Base and Webb Diversion Alternative, Raw Data
February 1 – May 1, 1992**

Number of Particles* in Monitoring Regions or Entrained - Raw Model Output																
Downstream of Chipps			North of South Delta		Entrained at SWP		Entrained at CVP		Total Entrained at Pumps		Entrained at Ag Div		Entrained at Webb			
Particle Source	Webb		Base	Webb		Base	Webb		Base	Webb		Base	Webb		Base	Webb Diversion
	Base	Diversion		Diversion	Diversion		Diversion	Diversion		Diversion	Diversion					
716	42438	42592	50398	50398	1	1	0	0	1	1	1	1	1	N/A	1	
711	45791	45659	50393	50376	4	17	3	5	7	22	3	6	N/A	62		
704	44946	44926	50400	50400	0	0	0	0	0	0	0	0	N/A	0		
809	50253	49591	50303	50183	70	144	25	63	95	207	11	25	N/A	503		
812	49613	45293	49792	49455	412	690	161	211	573	901	77	137	N/A	3863		
815	40208	21834	41398	43009	6165	5197	2404	1893	8569	7090	791	577	N/A	20284		
906	21316	13347	27176	28159	16179	15581	6106	5732	22285	21313	1798	1601	N/A	9391		

*Number of particles out of 50,400 input at each particle source

**Base and Webb Diversion Alternative, Raw Data
February 15 – May 15, 1992**

Number of Particles* in Monitoring Regions or Entrained - Raw Model Output																
Downstream of Chipps			North of South Delta		Entrained at SWP		Entrained at CVP		Total Entrained at Pumps		Entrained at Ag Div		Entrained at Webb			
Particle Source	Webb		Base	Webb		Base	Webb		Base	Webb		Base	Webb		Base	Webb Diversion
	Base	Diversion		Diversion	Diversion		Diversion	Diversion		Diversion	Diversion					
716	48724	48740	50400	50396	0	2	0	0	0	2	3	4	N/A	2		
711	49389	49425	50390	50363	4	25	4	5	8	30	4	17	N/A	11		
704	48482	48525	50400	50400	0	0	0	0	0	0	1	0	N/A	0		
809	50130	49524	50251	50094	106	196	32	79	138	275	47	103	N/A	337		
812	48982	45013	49443	48931	617	958	249	382	866	1340	269	439	N/A	3171		
815	37871	22950	39908	41716	6585	5344	3137	2732	9722	8076	1570	1229	N/A	17231		
906	15191	9637	21861	23069	17414	16583	8978	8704	26392	25287	3567	3200	N/A	7419		

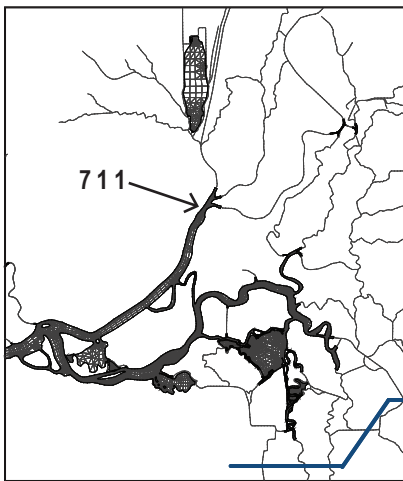
*Number of particles out of 50,400 input at each particle source

**Base and Webb Diversion Alternative
January 1 – April 1, 1992**

Particle Source	Percent of Particles in Monitoring Regions or Entrained													
	Downstream of Chipps		North of South Delta		Entrained at SWP		Entrained at CVP		Total Entrained at Pumps		Entrained at Ag Div		Entrained at Webb	
	Base	Webb Diversion	Base	Webb Diversion	Base	Webb Diversion	Base	Webb Diversion	Base	Webb Diversion	Base	Webb Diversion	Base	Webb Diversion
716	63.8%	61.9%	94.3%	94.2%	4.1%	4.1%	1.5%	1.5%	5.6%	5.6%	0.7%	0.7%	N/A	1.8%
711	68.0%	65.0%	86.9%	86.7%	9.1%	9.4%	3.7%	3.7%	12.8%	13.1%	0.4%	0.3%	N/A	2.9%
704	73.0%	72.0%	96.5%	96.5%	2.5%	2.5%	0.9%	0.9%	3.4%	3.4%	0.1%	0.1%	N/A	0.8%
809	55.4%	49.8%	59.0%	58.7%	28.1%	28.5%	12.3%	12.3%	40.5%	40.8%	0.6%	0.7%	N/A	5.1%
812	29.3%	26.3%	31.2%	32.0%	45.4%	44.5%	22.6%	22.8%	68.0%	67.3%	0.7%	0.6%	N/A	3.7%
815	5.9%	5.2%	6.4%	6.4%	56.0%	55.9%	36.6%	36.7%	92.6%	92.6%	0.9%	0.8%	N/A	0.7%
906	0.5%	0.4%	7.3%	7.2%	52.0%	51.4%	39.5%	40.0%	91.5%	91.4%	1.1%	1.2%	N/A	0.1%

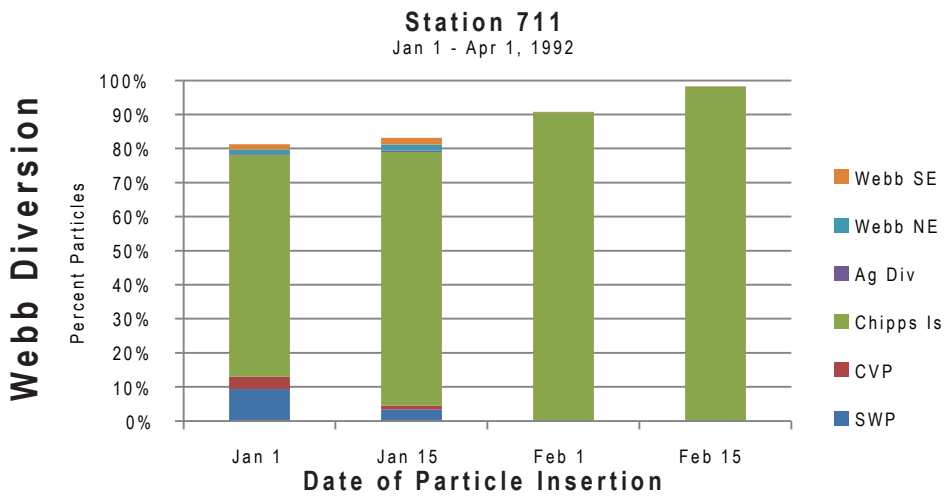
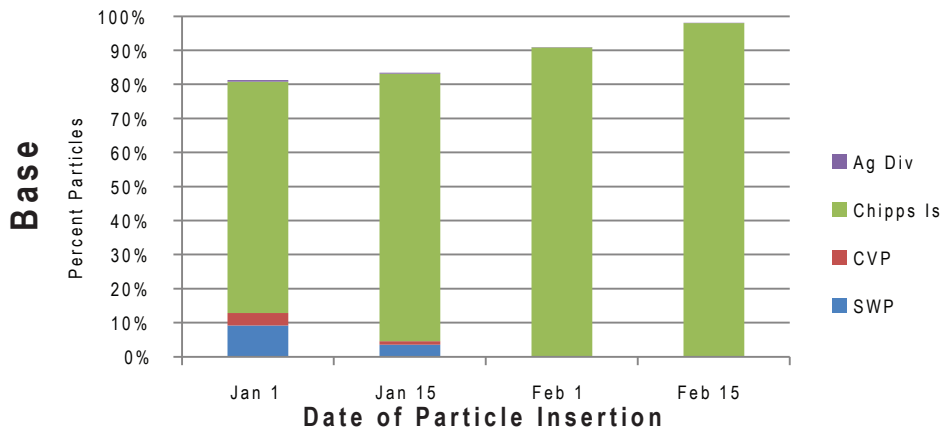
SOURCE: Resource Management Associates, 2011; and ESA, 2011

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Figure 13
Particle Fate After 90 Days



Station 711

Jan 1 - Apr 1, 1992



**Base and Webb Diversion Alternative
January 15 – April 15, 1992**

Particle Source	Percent of Particles in Monitoring Regions or Entrained													
	Downstream of Chipps		North of South Delta		Entrained at SWP		Entrained at CVP		Total Entrained at Pumps		Entrained at Ag Div		Entrained at Webb	
	Base	Webb Diversion	Base	Webb Diversion	Base	Webb Diversion	Base	Webb Diversion	Base	Webb Diversion	Base	Diversion	Base	Diversion
716	76.0%	74.3%	98.5%	98.5%	1.1%	1.1%	0.3%	0.3%	1.4%	1.5%	0.6%	0.5%	N/A	1.7%
711	78.5%	74.6%	95.3%	95.4%	3.5%	3.3%	1.1%	1.1%	4.6%	4.4%	0.3%	0.3%	N/A	3.8%
704	72.2%	72.0%	99.1%	99.1%	0.6%	0.6%	0.2%	0.2%	0.8%	0.8%	0.1%	0.1%	N/A	0.9%
809	76.4%	68.4%	78.6%	78.8%	15.2%	15.2%	5.8%	5.5%	20.9%	20.8%	0.7%	0.7%	N/A	8.2%
812	51.0%	42.0%	53.3%	54.0%	33.5%	33.2%	12.4%	12.1%	45.9%	45.3%	1.0%	1.0%	N/A	9.7%
815	14.0%	11.4%	15.1%	15.6%	55.6%	55.2%	28.4%	28.5%	84.0%	83.7%	0.9%	0.8%	N/A	3.0%
906	2.7%	1.9%	9.9%	9.8%	55.3%	55.0%	34.1%	34.4%	89.5%	89.4%	0.6%	0.7%	N/A	0.8%

SOURCE: Resource Management Associates, 2011; and ESA, 2011

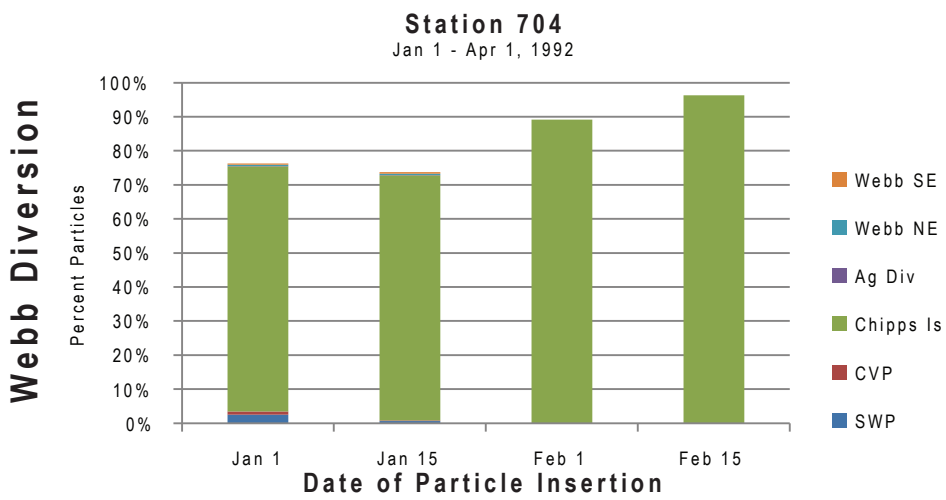
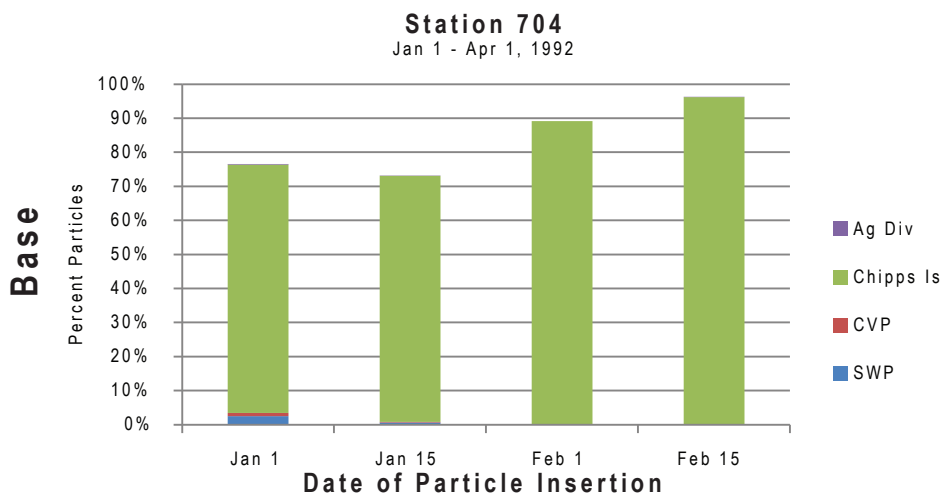
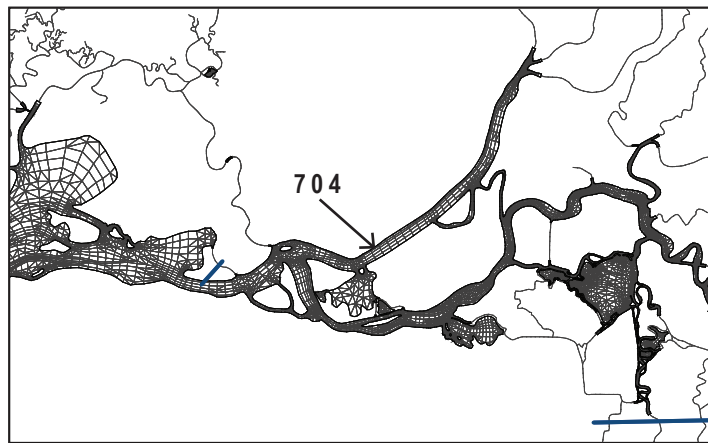
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Figure 14
Particle Fate After 90 Days

**Base and Webb Diversion Alternative
February 1 – May 1, 1992**

Particle Source	Percent of Particles in Monitoring Regions or Entrained														
	Downstream of Chipps		North of South Delta		Entrained at SWP		Entrained at CVP		Total Entrained at Pumps		Entrained at Ag Div		Entrained at Webb		
	Base	Webb Diversion	Base	Webb Diversion	Base	Webb Diversion	Base	Webb Diversion	Base	Webb Diversion	Base	Diversion	Base	Diversion	
716	84.2%	84.5%	100.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	N/A	0.0%
711	90.9%	90.6%	100.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	N/A	0.1%
704	89.2%	89.1%	100.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	N/A	0.0%
809	99.7%	98.4%	99.8%	99.6%	0.1%	0.3%	0.0%	0.1%	0.2%	0.4%	0.0%	0.0%	N/A	1.0%	
812	98.4%	89.9%	98.8%	98.1%	0.8%	1.4%	0.3%	0.4%	1.1%	1.8%	0.2%	0.3%	N/A	7.7%	
815	79.8%	43.3%	82.1%	85.3%	12.2%	10.3%	4.8%	3.8%	17.0%	14.1%	1.6%	1.1%	N/A	40.2%	
906	42.3%	26.5%	53.9%	55.9%	32.1%	30.9%	12.1%	11.4%	44.2%	42.3%	3.6%	3.2%	N/A	18.6%	

SOURCE: Resource Management Associates, 2011; and ESA, 2011

Delta Wetlands Project . 209629
Figure 15
Particle Fate After 90 Days

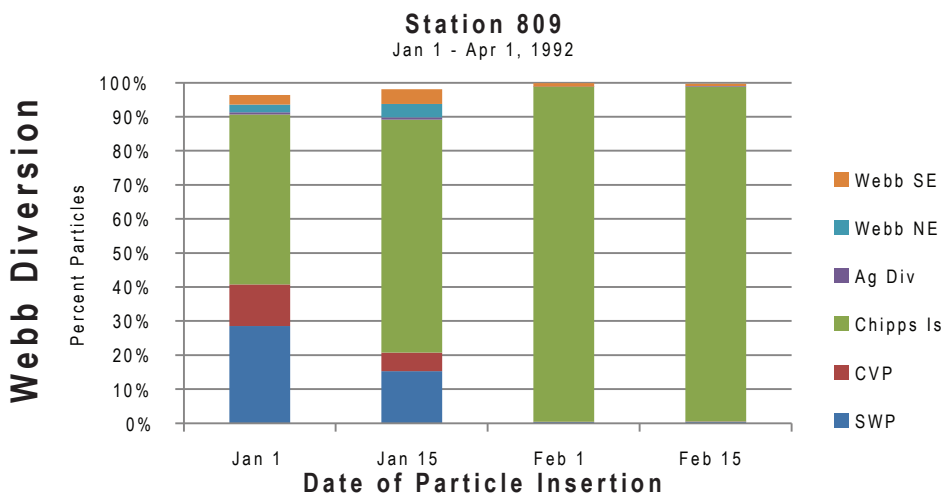
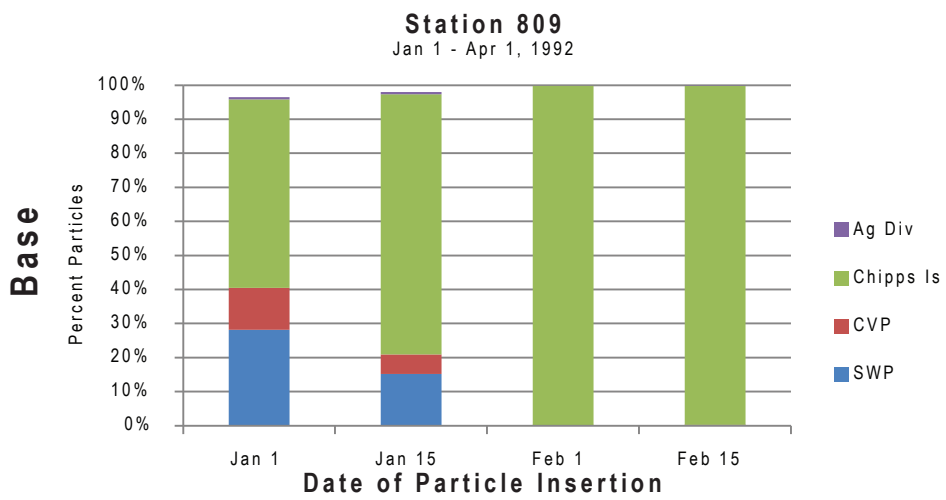
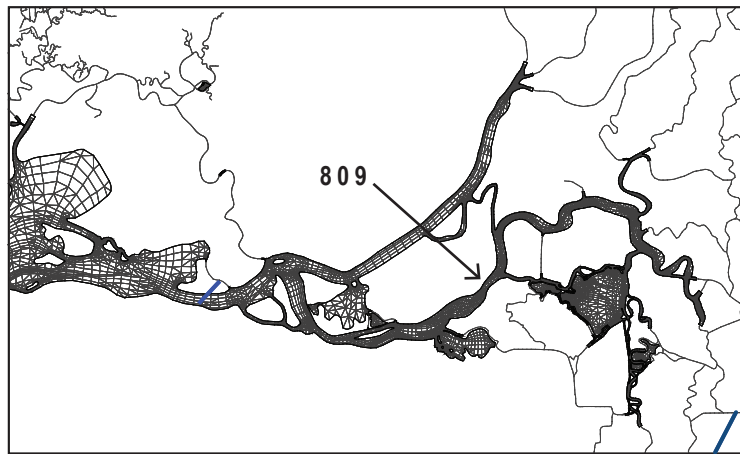


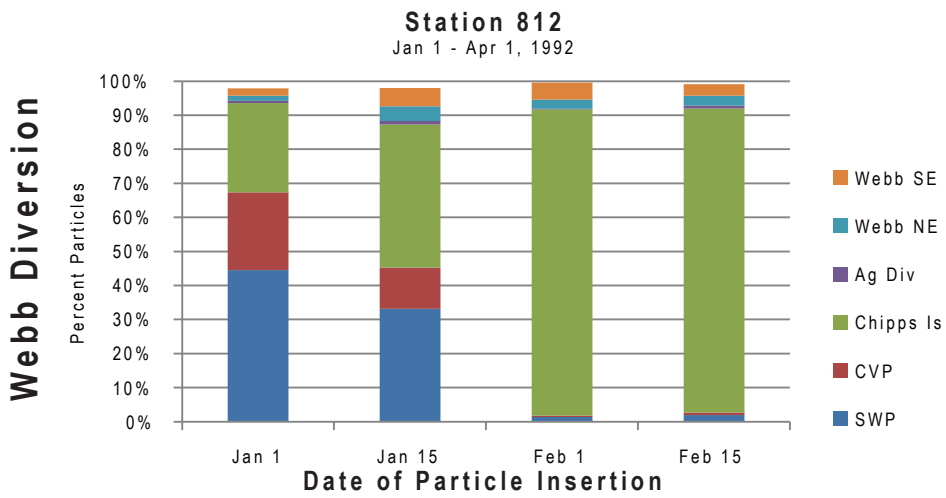
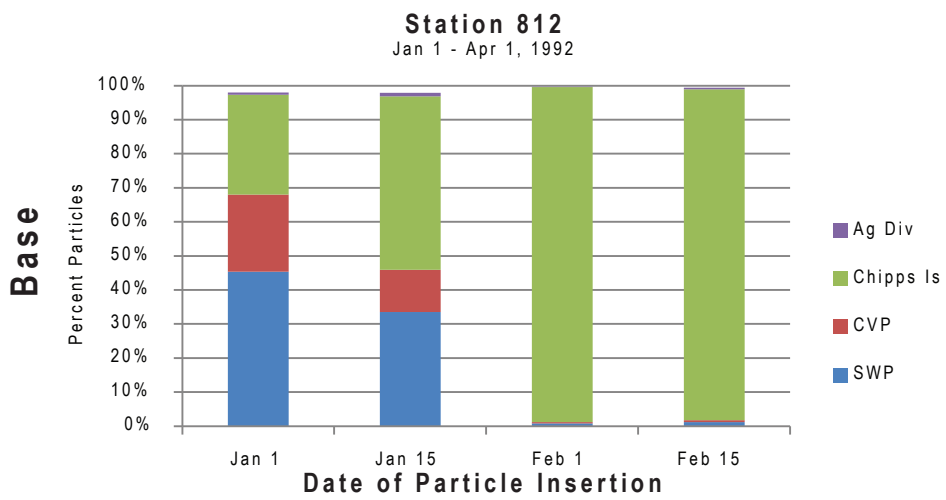
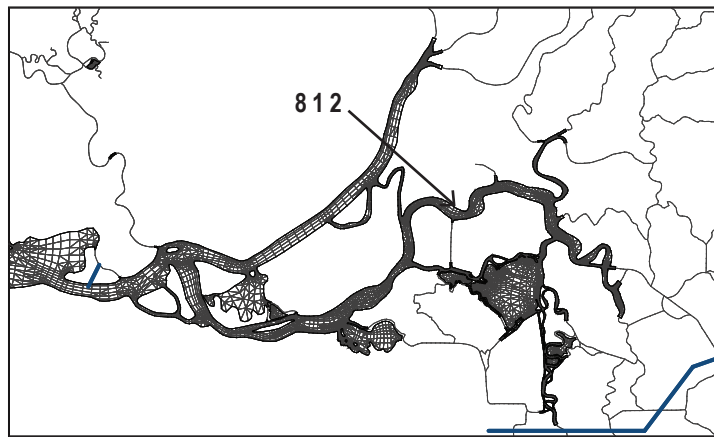
**Base and Webb Diversion Alternative
February 15 – May 15, 1992**

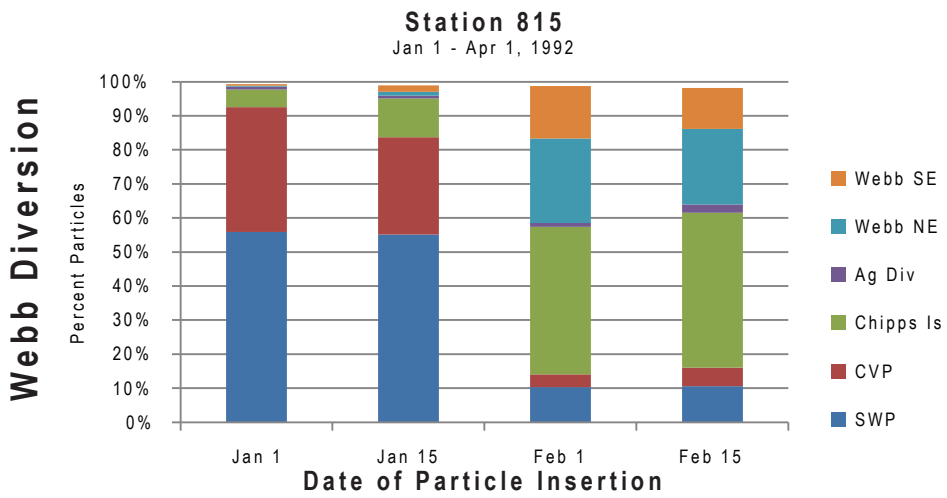
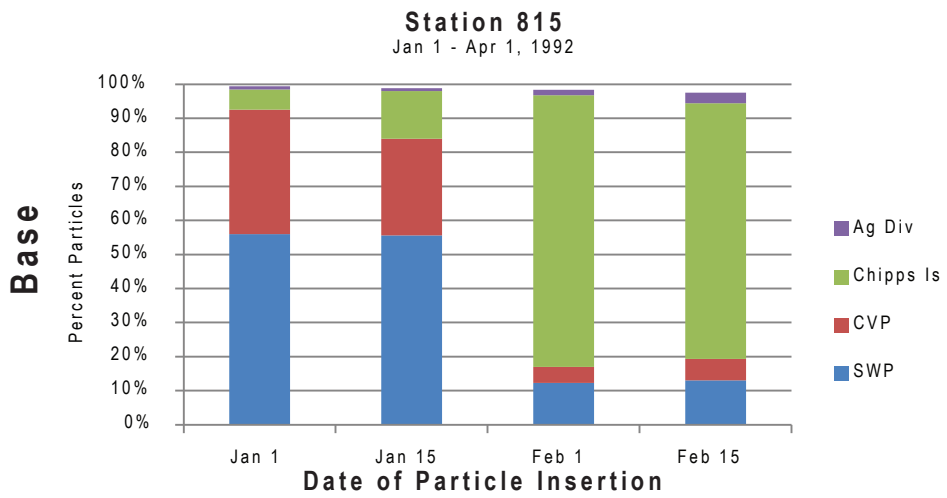
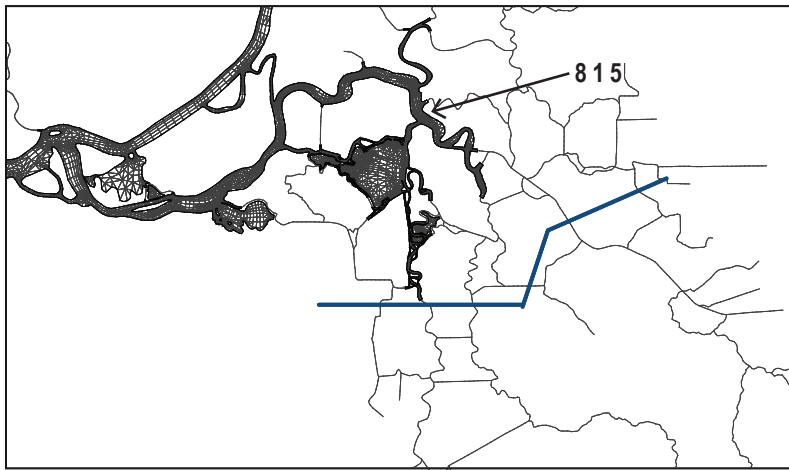
Particle Source	Percent of Particles in Monitoring Regions or Entrained													
	Downstream of Chipps		North of South Delta		Entrained at SWP		Entrained at CVP		Total Entrained at Pumps		Entrained at Ag Div		Entrained at Webb	
	Base	Webb Diversion	Base	Webb Diversion	Base	Webb Diversion	Base	Webb Diversion	Base	Webb Diversion	Base	Diversion	Base	Diversion
716	96.7%	96.7%	100.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	N/A	0.0%
711	98.0%	98.1%	100.0%	99.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	N/A	0.0%
704	96.2%	96.3%	100.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	N/A	0.0%
809	99.5%	98.3%	99.7%	99.4%	0.2%	0.4%	0.1%	0.2%	0.3%	0.5%	0.1%	0.2%	N/A	0.7%
812	97.2%	89.3%	98.1%	97.1%	1.2%	1.9%	0.5%	0.8%	1.7%	2.7%	0.5%	0.9%	N/A	6.3%
815	75.1%	45.5%	79.2%	82.8%	13.1%	10.6%	6.2%	5.4%	19.3%	16.0%	3.1%	2.4%	N/A	34.2%
906	30.1%	19.1%	43.4%	45.8%	34.6%	32.9%	17.8%	17.3%	52.4%	50.2%	7.1%	6.3%	N/A	14.7%

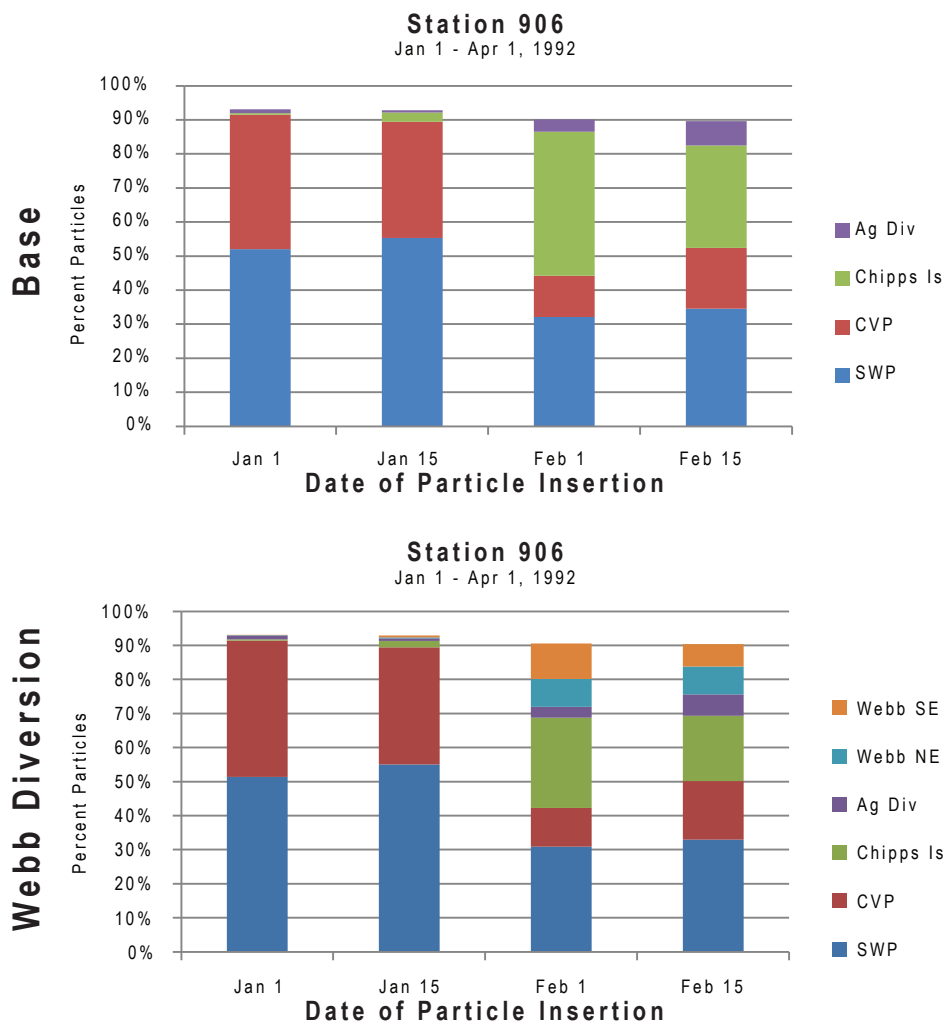
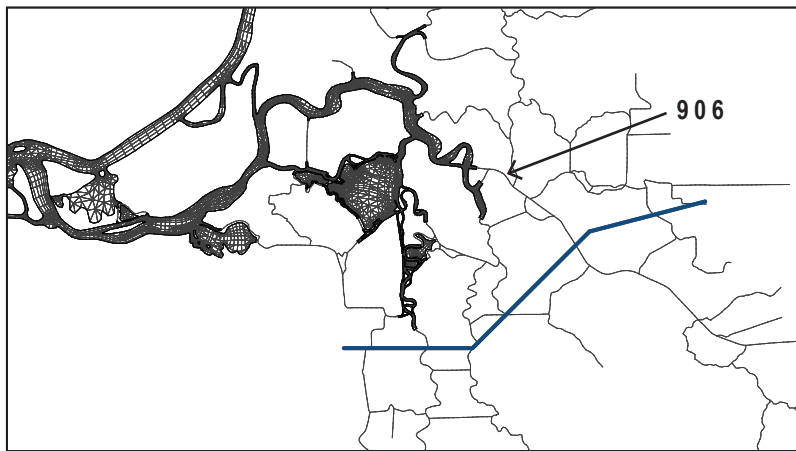
SOURCE: Resource Management Associates, 2011; and ESA, 2011

Delta Wetlands Project . 209629
Figure 16
Particle Fate After 90 Days









**Base and Bacon Diversion Alternative, Raw Data
January 1 – April 1, 1992**

Number of Particles* in Monitoring Regions or Entrained - Raw Model Output																	
Downstream of Chipps			North of South Delta		Entrained at SWP		Entrained at CVP		Total Entrained at Pumps		Entrained at Ag Div		Entrained at Bacon				
Particle Source	Bacon		Base	Bacon		Base	Bacon		Base	Bacon		Base	Bacon		Base	Bacon	
	Base	Diversion		Diversion	Diversion		Diversion	Diversion		Diversion	Diversion		Diversion	Diversion			
716	32176	31310	47510	47591	2064	2042	773	726	2837	2768	342	307	N/A	1009			
711	34266	32881	43821	44126	4602	4395	1862	1782	6464	6177	212	188	N/A	1654			
704	36783	36387	48658	48784	1263	1123	446	474	1709	1597	72	64	N/A	466			
809	27907	25373	29721	30428	14183	13687	6216	6062	20399	19749	305	261	N/A	3272			
812	14777	13022	15749	16685	22877	22194	11405	11172	34282	33366	329	290	N/A	2777			
815	2987	2524	3221	3431	28207	28102	18444	18367	46651	46469	444	422	N/A	681			
906	254	175	3664	3719	26199	26210	19899	19807	46098	46017	571	589	N/A	156			

*Number of particles out of 50,400 input at each particle source

**Base and Bacon Diversion Alternative, Raw Data
January 15 – April 15, 1992**

Number of Particles* in Monitoring Regions or Entrained - Raw Model Output																	
Downstream of Chipps			North of South Delta		Entrained at SWP		Entrained at CVP		Total Entrained at Pumps		Entrained at Ag Div		Entrained at Bacon				
Particle Source	Bacon		Base	Bacon		Base	Bacon		Base	Bacon		Base	Bacon		Base	Bacon	
	Base	Diversion		Diversion	Diversion		Diversion	Diversion		Diversion	Diversion		Diversion	Diversion			
716	38317	37762	49652	49730	557	512	167	141	724	653	286	269	N/A	604			
711	39573	38280	48017	48189	1760	1646	555	500	2315	2146	156	157	N/A	1435			
704	36405	36389	49964	49957	306	331	120	103	426	434	38	37	N/A	311			
809	38506	35059	39614	40209	7639	7296	2907	2694	10546	9990	349	279	N/A	4088			
812	25679	20875	26847	28614	16870	15615	6271	5868	23141	21483	521	413	N/A	6816			
815	7038	4911	7623	8926	28028	27183	14313	13971	42341	41154	446	321	N/A	3655			
906	1349	590	4987	5289	27887	27584	17209	17208	45096	44792	326	294	N/A	1211			

*Number of particles out of 50,400 input at each particle source

**Base and Bacon Diversion Alternative, Raw Data
February 1 – May 1, 1992**

Number of Particles* in Monitoring Regions or Entrained - Raw Model Output																
Downstream of Chipps			North of South Delta		Entrained at SWP		Entrained at CVP		Total Entrained at Pumps		Entrained at Ag Div		Entrained at Bacon			
Particle Source	Bacon		Base	Bacon		Base	Bacon		Base	Bacon		Base	Bacon		Base	Bacon
	Base	Diversion		Diversion	Diversion		Diversion	Diversion		Diversion	Diversion					
716	42438	42608	50398	50400	1	0	0	0	1	0	1	0	1	1	N/A	3
711	45791	45782	50393	50376	4	15	3	7	7	22	3	12	3	12	N/A	30
704	44946	45066	50400	50400	0	0	0	0	0	0	0	0	0	0	N/A	0
809	50253	49923	50303	50211	70	134	25	49	95	183	11	35	11	35	N/A	200
812	49613	47595	49792	49194	412	881	161	279	573	1160	77	146	77	146	N/A	1269
815	40208	28054	41398	40200	6165	7433	2404	2410	8569	9843	791	733	791	733	N/A	10920
906	21316	7925	27176	31732	16179	13692	6106	4440	22285	18132	1798	1000	1798	1000	N/A	19134

*Number of particles out of 50,400 input at each particle source

**Base and Bacon Diversion Alternative, Raw Data
February 15 – May 15, 1992**

Number of Particles* in Monitoring Regions or Entrained - Raw Model Output																
Downstream of Chipps			North of South Delta		Entrained at SWP		Entrained at CVP		Total Entrained at Pumps		Entrained at Ag Div		Entrained at Bacon			
Particle Source	Bacon		Base	Bacon		Base	Bacon		Base	Bacon		Base	Bacon		Base	Bacon
	Base	Diversion		Diversion	Diversion		Diversion	Diversion		Diversion	Diversion					
716	48724	48335	50400	50370	0	17	0	6	0	23	3	17	3	17	N/A	0
711	49389	49019	50390	50304	4	64	4	16	8	80	4	37	4	37	N/A	8
704	48482	48374	50400	50398	0	1	0	0	0	1	1	3	1	3	N/A	0
809	50130	47745	50251	49048	106	812	32	351	138	1163	47	347	47	347	N/A	127
812	48982	43259	49443	46131	617	2588	249	1101	866	3689	269	1030	269	1030	N/A	499
815	37871	28756	39908	35593	6585	8843	3137	4353	9722	13196	1570	2450	1570	2450	N/A	3248
906	15191	9758	21861	23017	17414	16211	8978	8628	26392	24839	3567	3560	3567	3560	N/A	6651

*Number of particles out of 50,400 input at each particle source

**Base and Bacon Diversion Alternative
January 1 – April 1, 1992**

Particle Source	Percent of Particles in Monitoring Regions or Entrained													
	Downstream of Chipps		North of South Delta		Entrained at SWP		Entrained at CVP		Total Entrained at Pumps		Entrained at Ag Div		Entrained at Bacon	
	Base	Bacon Diversion	Base	Bacon Diversion	Base	Bacon Diversion	Base	Bacon Diversion	Base	Bacon Diversion	Base	Bacon Diversion	Base	Bacon Diversion
716	63.8%	62.1%	94.3%	94.4%	4.1%	4.1%	1.5%	1.4%	5.6%	5.5%	0.7%	0.6%	N/A	2.0%
711	68.0%	65.2%	86.9%	87.6%	9.1%	8.7%	3.7%	3.5%	12.8%	12.3%	0.4%	0.4%	N/A	3.3%
704	73.0%	72.2%	96.5%	96.8%	2.5%	2.2%	0.9%	0.9%	3.4%	3.2%	0.1%	0.1%	N/A	0.9%
809	55.4%	50.3%	59.0%	60.4%	28.1%	27.2%	12.3%	12.0%	40.5%	39.2%	0.6%	0.5%	N/A	6.5%
812	29.3%	25.8%	31.2%	33.1%	45.4%	44.0%	22.6%	22.2%	68.0%	66.2%	0.7%	0.6%	N/A	5.5%
815	5.9%	5.0%	6.4%	6.8%	56.0%	55.8%	36.6%	36.4%	92.6%	92.2%	0.9%	0.8%	N/A	1.4%
906	0.5%	0.3%	7.3%	7.4%	52.0%	52.0%	39.5%	39.3%	91.5%	91.3%	1.1%	1.2%	N/A	0.3%

**Base and Bacon Diversion Alternative
January 15 – April 15, 1992**

Particle Source	Percent of Particles in Monitoring Regions or Entrained													
	Downstream of Chipps		North of South Delta		Entrained at SWP		Entrained at CVP		Total Entrained at Pumps		Entrained at Ag Div		Entrained at Bacon	
	Base	Bacon Diversion	Base	Bacon Diversion	Base	Bacon Diversion	Base	Bacon Diversion	Base	Bacon Diversion	Base	Bacon Diversion	Base	Bacon Diversion
716	76.0%	74.9%	98.5%	98.7%	1.1%	1.0%	0.3%	0.3%	1.4%	1.3%	0.6%	0.5%	N/A	1.2%
711	78.5%	76.0%	95.3%	95.6%	3.5%	3.3%	1.1%	1.0%	4.6%	4.3%	0.3%	0.3%	N/A	2.8%
704	72.2%	72.2%	99.1%	99.1%	0.6%	0.7%	0.2%	0.2%	0.8%	0.9%	0.1%	0.1%	N/A	0.6%
809	76.4%	69.6%	78.6%	79.8%	15.2%	14.5%	5.8%	5.3%	20.9%	19.8%	0.7%	0.6%	N/A	8.1%
812	51.0%	41.4%	53.3%	56.8%	33.5%	31.0%	12.4%	11.6%	45.9%	42.6%	1.0%	0.8%	N/A	13.5%
815	14.0%	9.7%	15.1%	17.7%	55.6%	53.9%	28.4%	27.7%	84.0%	81.7%	0.9%	0.6%	N/A	7.3%
906	2.7%	1.2%	9.9%	10.5%	55.3%	54.7%	34.1%	34.1%	89.5%	88.9%	0.6%	0.6%	N/A	2.4%

**Base and Bacon Diversion Alternative
February 1 – May 1, 1992**

Particle Source	Percent of Particles in Monitoring Regions or Entrained														
	Downstream of Chipps		North of South Delta		Entrained at SWP		Entrained at CVP		Total Entrained at Pumps		Entrained at Ag Div		Entrained at Bacon		
	Base	Bacon Diversion	Base	Bacon Diversion	Base	Bacon Diversion	Base	Bacon Diversion	Base	Bacon Diversion	Base	Bacon Diversion	Base	Bacon Diversion	
716	84.2%	84.5%	100.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	N/A	0.0%
711	90.9%	90.8%	100.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	N/A	0.1%
704	89.2%	89.4%	100.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	N/A	0.0%
809	99.7%	99.1%	99.8%	99.6%	0.1%	0.3%	0.0%	0.1%	0.2%	0.4%	0.0%	0.1%	N/A	0.4%	
812	98.4%	94.4%	98.8%	97.6%	0.8%	1.7%	0.3%	0.6%	1.1%	2.3%	0.2%	0.3%	N/A	2.5%	
815	79.8%	55.7%	82.1%	79.8%	12.2%	14.7%	4.8%	4.8%	17.0%	19.5%	1.6%	1.5%	N/A	21.7%	
906	42.3%	15.7%	53.9%	63.0%	32.1%	27.2%	12.1%	8.8%	44.2%	36.0%	3.6%	2.0%	N/A	38.0%	

SOURCE: Resource Management Associates, 2011; and ESA, 2011

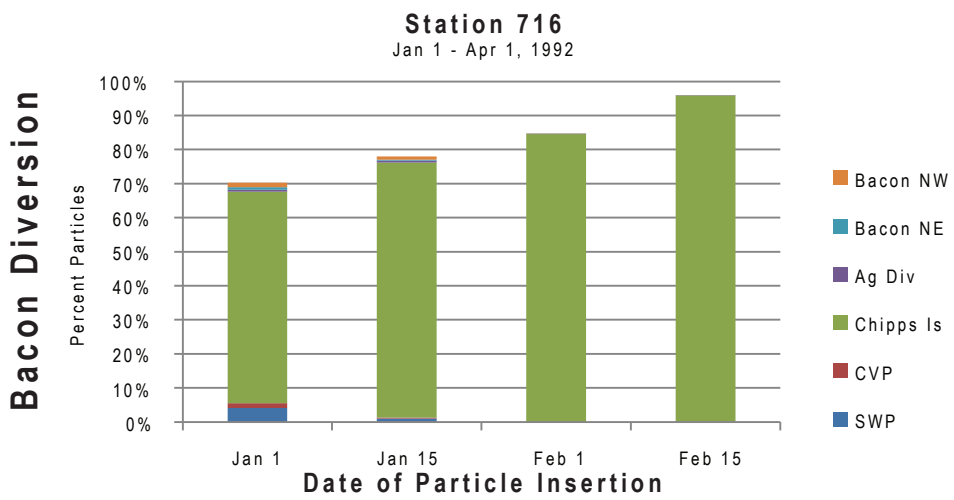
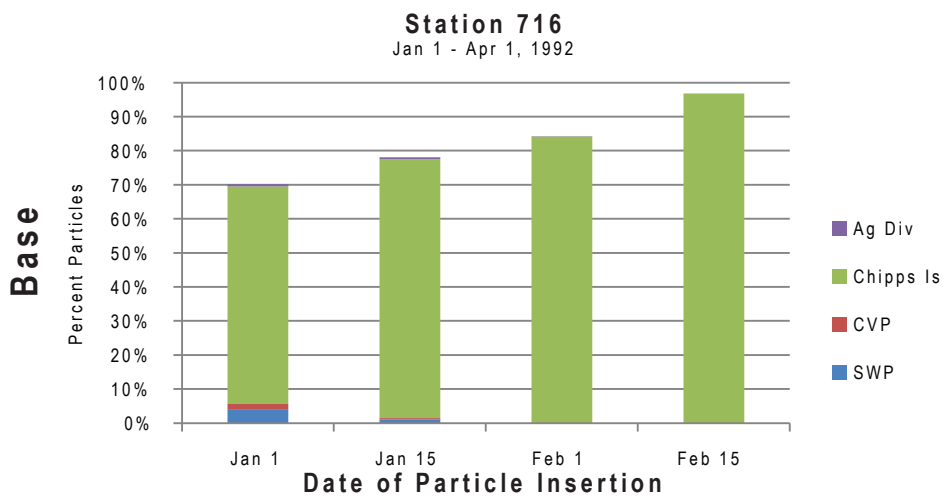
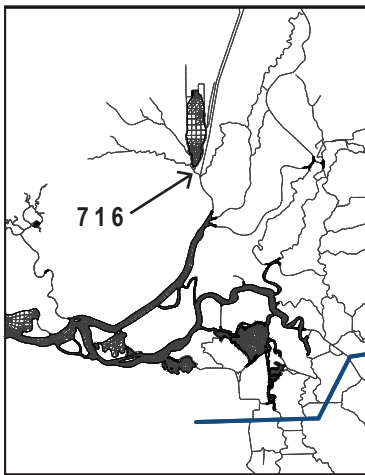
Delta Wetlands Project . 209629
Figure 29
Particle Fate After 90 Days

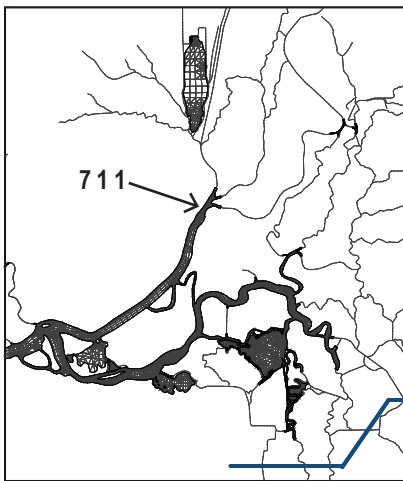
**Base and Bacon Diversion Alternative
February 15 – May 15, 1992**

Particle Source	Percent of Particles in Monitoring Regions or Entrained														
	Downstream of Chipps		North of South Delta		Entrained at SWP		Entrained at CVP		Total Entrained at Pumps		Entrained at Ag Div		Entrained at Bacon		
	Base	Bacon Diversion	Base	Bacon Diversion	Base	Bacon Diversion	Base	Bacon Diversion	Base	Bacon Diversion	Base	Bacon Diversion	Base	Bacon Diversion	
716	96.7%	95.9%	100.0%	99.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	N/A	0.0%
711	98.0%	97.3%	100.0%	99.8%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.1%	N/A	0.0%
704	96.2%	96.0%	100.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	N/A	0.0%
809	99.5%	94.7%	99.7%	97.3%	0.2%	1.6%	0.1%	0.7%	0.3%	2.3%	0.1%	0.7%	N/A	0.3%	
812	97.2%	85.8%	98.1%	91.5%	1.2%	5.1%	0.5%	2.2%	1.7%	7.3%	0.5%	2.0%	N/A	1.0%	
815	75.1%	57.1%	79.2%	70.6%	13.1%	17.5%	6.2%	8.6%	19.3%	26.2%	3.1%	4.9%	N/A	6.4%	
906	30.1%	19.4%	43.4%	45.7%	34.6%	32.2%	17.8%	17.1%	52.4%	49.3%	7.1%	7.1%	N/A	13.2%	

SOURCE: Resource Management Associates, 2011; and ESA, 2011

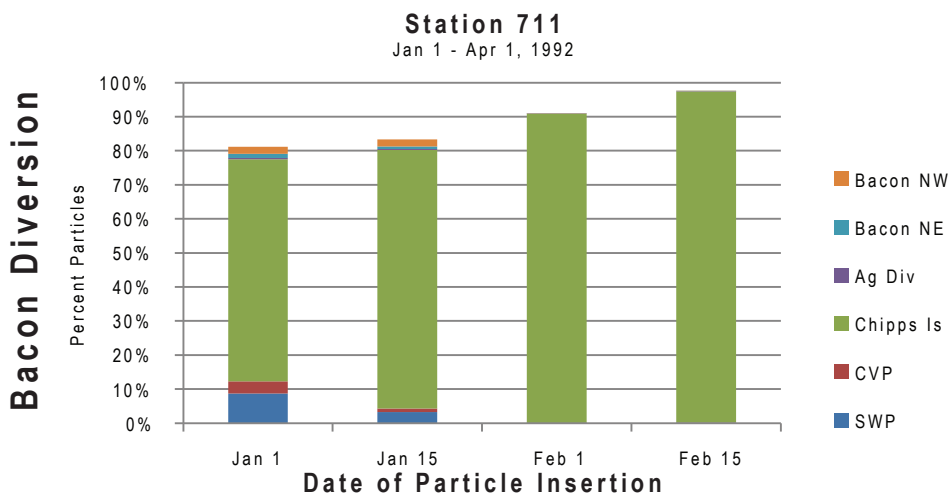
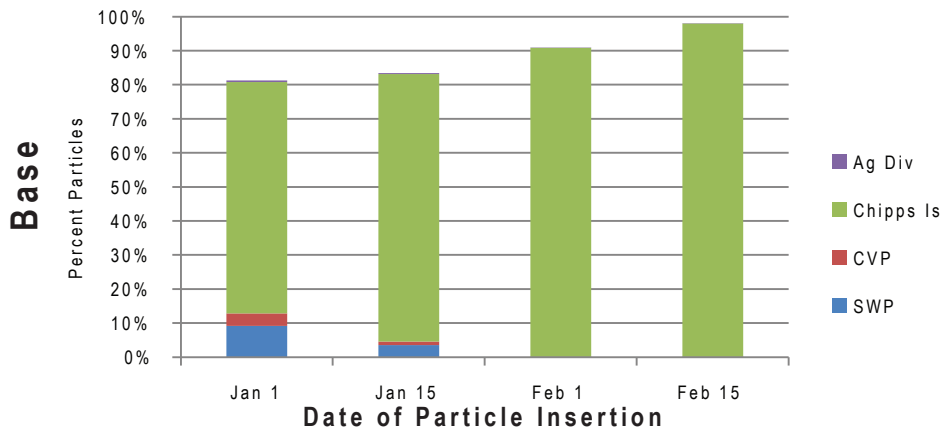
Delta Wetlands Project . 209629
Figure 30
Particle Fate After 90 Days

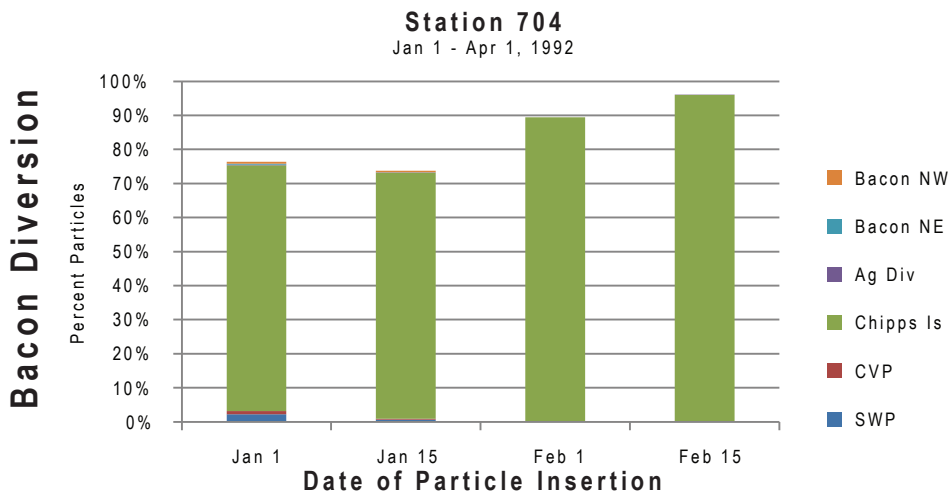
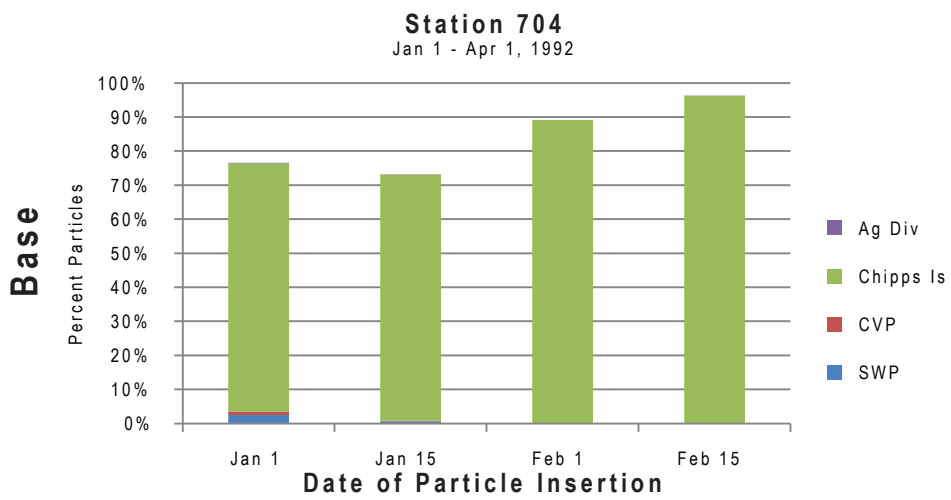
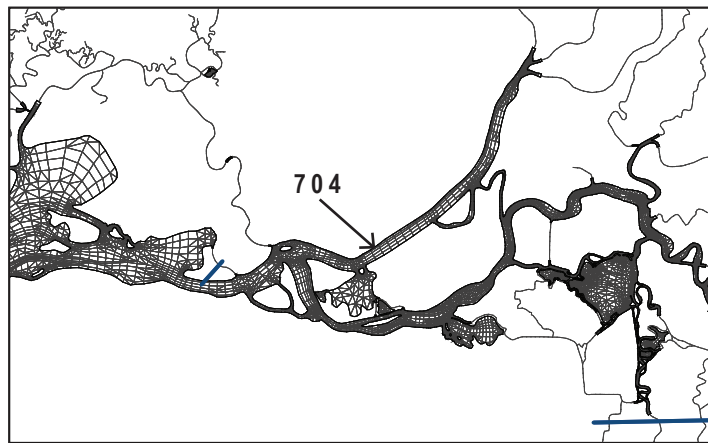


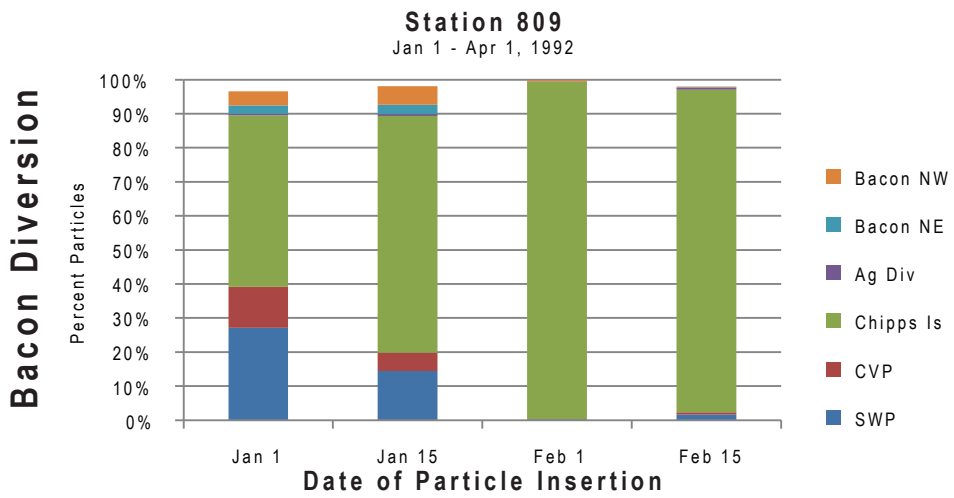
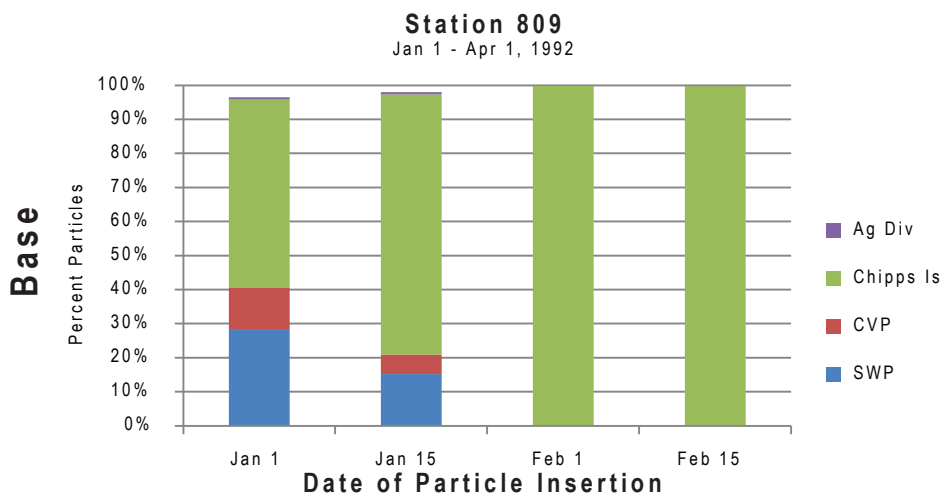
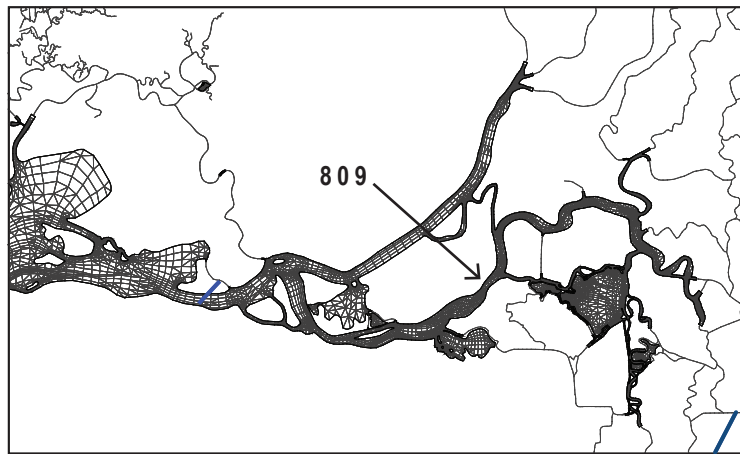


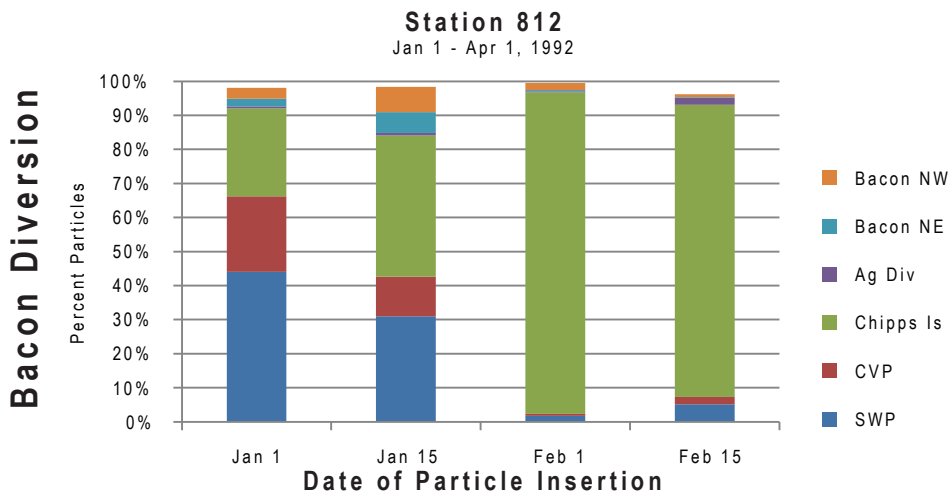
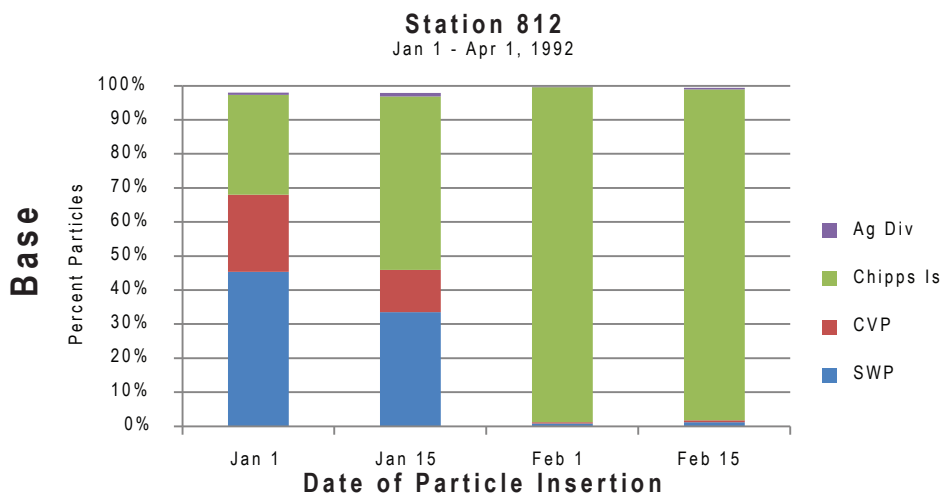
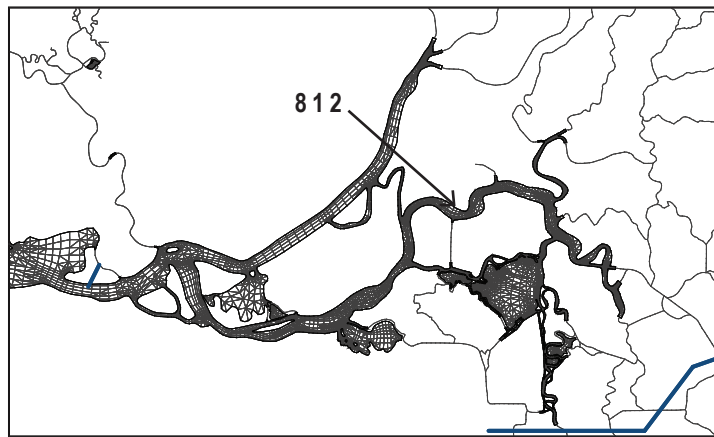
Station 711

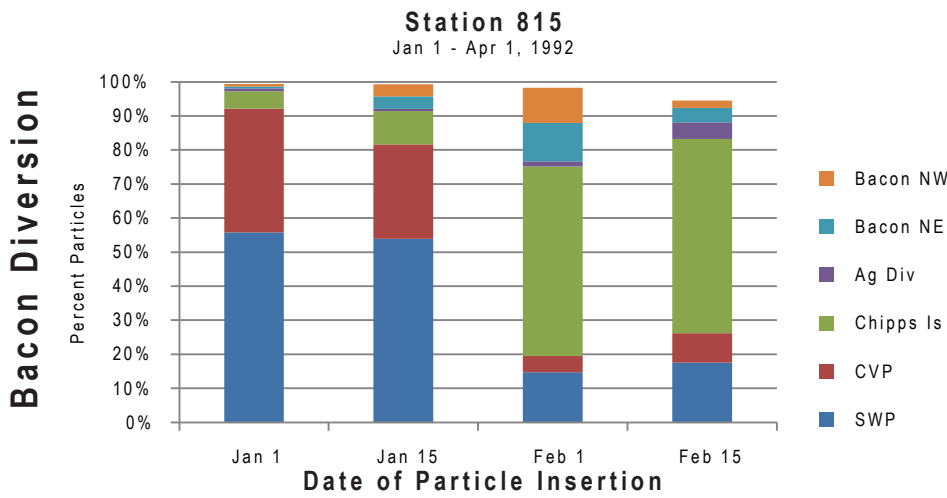
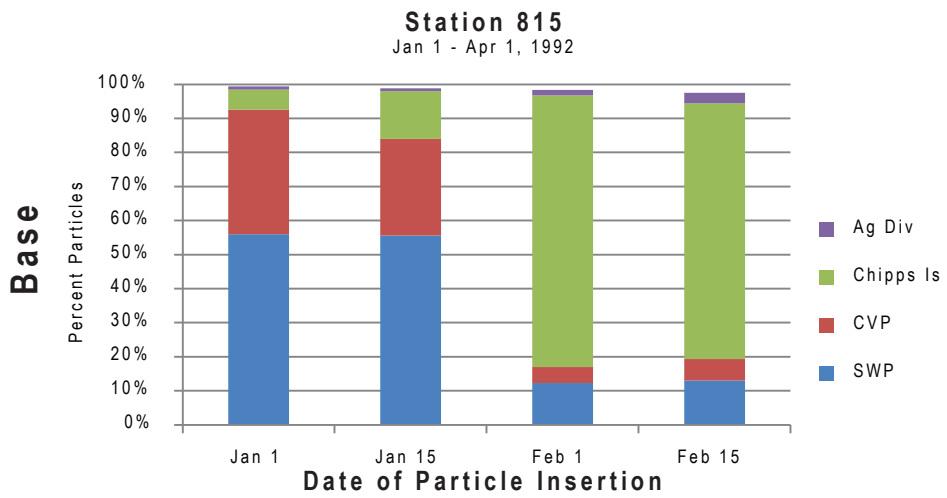
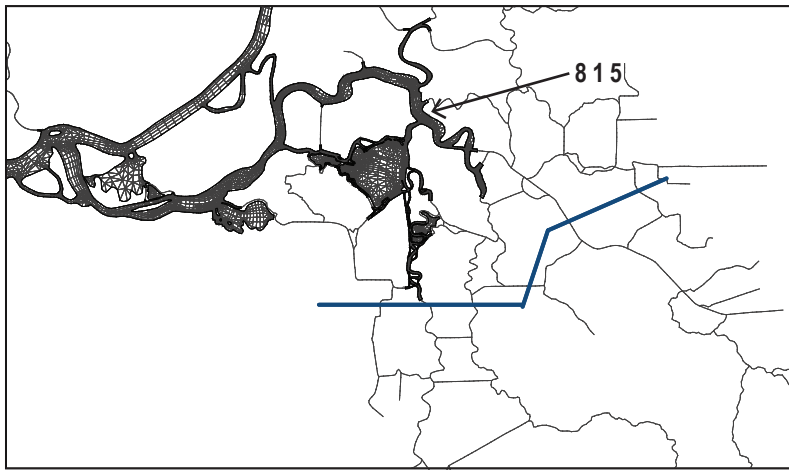
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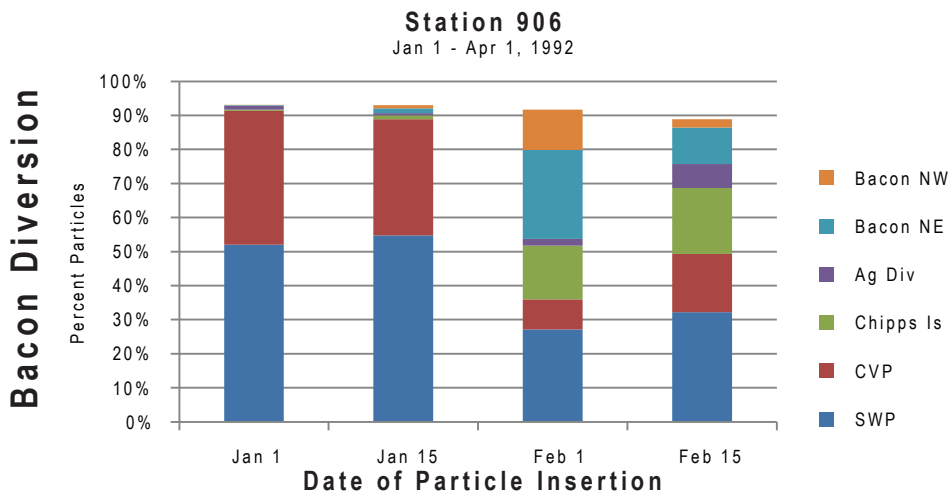
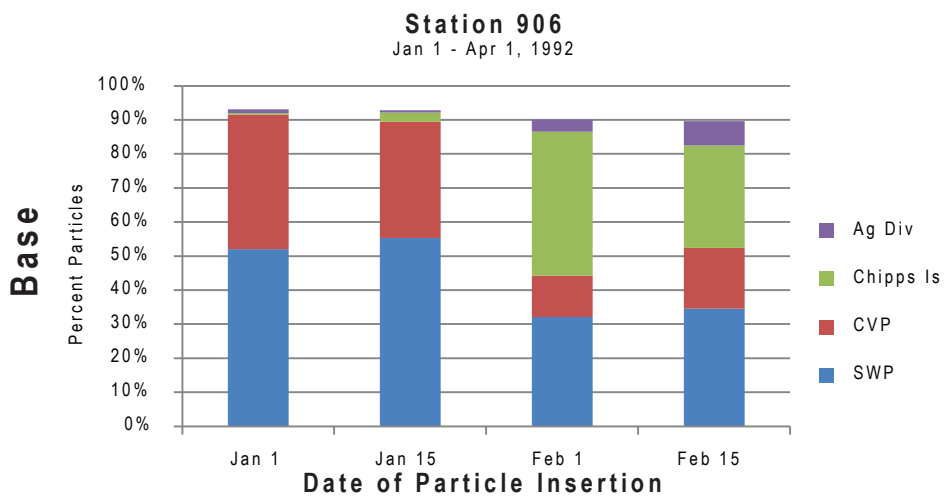
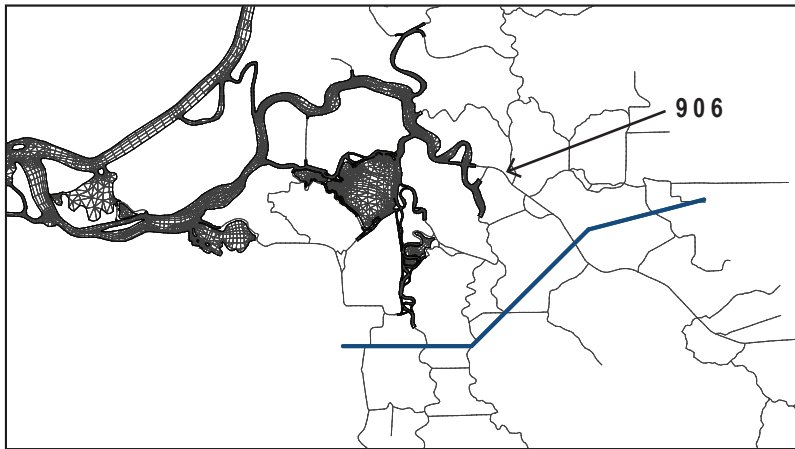












**Base and Bacon Diversion Alternative, Weighted Results
January 1 – April 1, 1992**

Particle Source	Percent of Particles in Monitoring Regions or Entrained																											
	Downstream of Chipps				North of South Delta				Entrained at SWP				Entrained at CVP				Total Entrained at Pumps				Entrained at AgDiv				Entrained at Bacon			
	Base Case	With Diversion	Average Change	Weighted Change	Base	Diversion	Average Change	Weighted Change	Base	Diversion	Average Change	Weighted Change	Base	Diversion	Average Change	Weighted Change	Base	Diversion	Average Change	Weighted Change	Base	Diversion	Average Change	Weighted Change	Base	Diversion	Average Change	Weighted Change
716	63.84%	62.12%	-1.72%	-0.21%	94.27%	94.43%	0.16%	0.02%	4.10%	4.05%	-0.04%	-0.01%	1.53%	1.44%	-0.09%	-0.01%	5.63%	5.49%	-0.14%	-0.02%	0.68%	0.61%	-0.07%	-0.01%	N/A	2.00%	2.00%	0.24%
711	67.99%	65.24%	-2.75%	-0.19%	86.95%	87.55%	0.61%	0.04%	9.13%	8.72%	-0.41%	-0.03%	3.69%	3.54%	-0.16%	-0.01%	12.83%	12.26%	-0.57%	-0.04%	0.42%	0.37%	-0.05%	0.00%	N/A	3.28%	3.28%	0.23%
704	72.98%	72.20%	-0.79%	-0.50%	96.54%	96.79%	0.25%	0.16%	2.51%	2.23%	-0.28%	-0.18%	0.88%	0.94%	0.06%	0.04%	3.39%	3.17%	-0.22%	-0.14%	0.14%	0.13%	-0.02%	-0.01%	N/A	0.92%	0.92%	0.58%
809	55.37%	50.34%	-5.03%	-0.40%	58.97%	60.37%	1.40%	0.11%	28.14%	27.16%	-0.98%	-0.08%	12.33%	12.03%	-0.31%	-0.02%	40.47%	39.18%	-1.29%	-0.10%	0.61%	0.52%	-0.09%	-0.01%	N/A	6.49%	6.49%	0.52%
812	29.32%	25.84%	-3.48%	-0.17%	31.25%	33.11%	1.86%	0.09%	45.39%	44.04%	-1.36%	-0.07%	22.63%	22.17%	-0.46%	-0.02%	68.02%	66.20%	-1.82%	-0.09%	0.65%	0.58%	-0.08%	0.00%	N/A	5.51%	5.51%	0.28%
815	5.93%	5.01%	-0.92%	-0.03%	6.39%	6.81%	0.42%	0.01%	55.97%	55.76%	-0.21%	-0.01%	36.60%	36.44%	-0.15%	0.00%	92.56%	92.20%	-0.36%	-0.01%	0.88%	0.84%	-0.04%	0.00%	N/A	1.35%	1.35%	0.04%
906	0.50%	0.35%	-0.16%	0.00%	7.27%	7.38%	0.11%	0.00%	51.98%	52.00%	0.02%	0.00%	39.48%	39.30%	-0.18%	0.00%	91.46%	91.30%	-0.16%	0.00%	1.13%	1.17%	0.04%	0.00%	N/A	0.31%	0.31%	0.01%
Combined			-2.12%	-1.50%			0.69%	0.44%			-0.47%	-0.36%			-0.19%	-0.04%			-0.65%	-0.40%			-0.04%	-0.03%			2.84%	1.89%

**Base and Bacon Diversion Alternative, Weighted Results
January 15 – April 15, 1992**

Particle Source	Percent of Particles in Monitoring Regions or Entrained																											
	Downstream of Chipps				North of South Delta				Entrained at SWP				Entrained at CVP				Total Entrained at Pumps				Entrained at AgDiv				Entrained at Bacon			
	Base Case	With Diversion	Average Change	Weighted Change	Base	Diversion	Average Change	Weighted Change	Base	Diversion	Average Change	Weighted Change	Base	Diversion	Average Change	Weighted Change	Base	Diversion	Average Change	Weighted Change	Base	Diversion	Average Change	Weighted Change	Base	Diversion	Average Change	Weighted Change
716	76.03%	74.92%	-1.10%	-0.13%	98.52%	98.67%	0.15%	0.02%	1.11%	1.02%	-0.09%	-0.01%	0.33%	0.28%	-0.05%	-0.01%	1.44%	1.30%	-0.14%	-0.02%	0.57%	0.53%	-0.03%	0.00%	N/A	1.20%	1.20%	0.14%
711	78.52%	75.95%	-2.57%	-0.18%	95.27%	95.61%	0.34%	0.02%	3.49%	3.27%	-0.23%	-0.02%	1.10%	0.99%	-0.11%	-0.01%	4.59%	4.26%	-0.34%	-0.02%	0.31%	0.31%	0.00%	0.00%	N/A	2.85%	2.85%	0.20%
704	72.23%	72.20%	-0.03%	-0.02%	99.13%	99.12%	-0.01%	-0.01%	0.61%	0.66%	0.05%	0.03%	0.24%	0.20%	-0.03%	-0.02%	0.85%	0.86%	0.02%	0.01%	0.08%	0.07%	0.00%	0.00%	N/A	0.62%	0.62%	0.39%
809	76.40%	69.56%	-6.84%	-0.55%	78.60%	79.78%	1.18%	0.09%	15.16%	14.48%	-0.68%	-0.05%	5.77%	5.35%	-0.42%	-0.03%	20.92%	19.82%	-1.10%	-0.09%	0.69%	0.55%	-0.14%	-0.01%	N/A	8.11%	8.11%	0.65%
812	50.95%	41.42%	-9.53%	-0.48%	53.27%	56.77%	3.51%	0.18%	33.47%	30.98%	-2.49%	-0.12%	12.44%	11.64%	-0.80%	-0.04%	45.91%	42.63%	-3.29%	-0.16%	1.03%	0.82%	-0.21%	-0.01%	N/A	13.52%	13.52%	0.68%
815	13.96%	9.74%	-4.22%	-0.13%	15.13%	17.71%	2.59%	0.08%	55.61%	53.93%	-1.68%	-0.05%	28.40%	27.72%	-0.68%	-0.02%	84.01%	81.65%	-2.36%	-0.07%	0.88%	0.64%	-0.25%	-0.01%	N/A	7.25%	7.25%	0.22%
906	2.68%	1.17%	-1.51%	-0.03%	9.89%	10.49%	0.60%	0.01%	55.33%	54.73%	-0.60%	-0.01%	34.14%	34.14%	0.00%	0.00%	89.48%	88.87%	-0.60%	-0.01%	0.65%	0.58%	-0.06%	0.00%	N/A	2.40%	2.40%	0.05%
Combined			-3.69%	-1.51%			1.19%	0.39%			-0.82%	-0.24%			-0.30%	-0.13%			-1.12%	-0.37%			-0.10%	-0.04%			5.14%	2.32%

**Base and Bacon Diversion Alternative, Weighted Results
February 1 – May 1, 1992**

Particle Source	Percent of Particles in Monitoring Regions or Entrained																											
	Downstream of Chipps				North of South Delta				Entrained at SWP				Entrained at CVP				Total Entrained at Pumps				Entrained at AgDiv				Entrained at Bacon			
	Base Case	With Diversion	Average Change	Weighted Change	Base	Diversion	Average Change	Weighted Change	Base	Diversion	Average Change	Weighted Change	Base	Diversion	Average Change	Weighted Change	Base	Diversion	Average Change	Weighted Change	Base	Diversion	Average Change	Weighted Change	Base	Diversion	Average Change	Weighted Change
716	84.20%	84.54%	0.34%	0.04%	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.01%	0.00%
711	90.86%	90.84%	-0.02%	0.00%	99.99%	99.95%	-0.03%	0.00%	0.01%	0.03%	0.02%	0.00%	0.01%	0.01%	0.00%	0.01%	0.00%	0.04%	0.03%	0.00%	0.01%	0.02%	0.02%	0.00%	N/A	0.06%	0.06%	0.00%
704	89.18%	89.42%	0.24%	0.15%	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	/N/A	0.00%	0.00%	0.00%
809	99.71%	99.05%	-0.65%	-0.05%	99.81%	99.63%	-0.18%	-0.01%	0.14%	0.27%	0.13%	0.01%	0.05%	0.10%	0.05%	0.00%	0.19%	0.36%	0.17%	0.01%	0.02%	0.07%	0.05%	0.00%	N/A	0.40%	0.40%	0.03%
812	98.44%	94.43%	-4.00%	-0.20%	98.79%	97.61%	-1.19%	-0.06%	0.82%	1.75%	0.93%	0.05%	0.32%	0.55%	0.23%	0.01%	1.14%	2.30%	1.16%	0.06%	0.15%	0.29%	0.14%	0.01%	N/A	2.52%	2.52%	0.13%
815	79.78%	55.66%	-24.12%	-0.72%	82.14%	79.76%	-2.38%	-0.07%	12.23%	14.75%	2.52%	0.08%	4.77%	4.78%	0.01%	0.00%	17.00%	19.53%	2.53%	0.08%	1.57%	1.45%	-0.12%	0.00%	N/A	21.67%	21.67%	0.65%
906	42.29%	15.72%	-26.57%	-0.53%	53.92%	62.96%	9.04%	0.18%	32.10%	27.17%	-4.93%	-0.10%	12.12%	8.81%	-3.31%	-0.07%	44.22%	35.98%	-8.24%	-0.16%	3.57%	1.98%	-1.58%	-0.03%	N/A	37.96%	37.96%	0.76%
Combined			-7.83%	-1.32%			0.75%	0.03%			-0.19%	0.03%			-0.43%	-0.05%			-0.62%	-0.01%			-0.21%	-0.02%			8.94%	1.57%

**Base and Bacon Diversion Alternative, Weighted Results
February 15 – May 15, 1992**

Particle Source	Percent of Particles in Monitoring Regions or Entrained																											
	Downstream of Chipps				North of South Delta				Entrained at SWP				Entrained at CVP				Total Entrained at Pumps				Entrained at AgDiv				Entrained at Bacon			
	Base Case	With Diversion	Average Change	Weighted Change	Base	Diversion	Average Change	Weighted Change	Base	Diversion	Average Change	Weighted Change	Base	Diversion	Average Change	Weighted Change	Base	Diversion	Average Change	Weighted Change	Base	Diversion	Average Change	Weighted Change	Base	Diversion	Average Change	Weighted Change
716	96.67%	95.90%	-0.77%	-0.09%	100.00%	99.94%	-0.06%	-0.01%	0.00%	0.03%	0.03%	0.00%	0.00%	0.01%	0.01%	0.00%	0.00%	0.05%	0.05%	0.01%	0.01%	0.03%	0.03%	0.00%	N/A	0.00%	0.00%	0.00%
711	97.99%	97.26%	-0.73%	-0.05%	99.98%	99.81%	-0.17%	-0.01%	0.01%	0.13%	0.12%	0.01%	0.01%	0.03%	0.02%	0.00%	0.02%	0.16%	0.14%	0.01%	0.01%	0.07%	0.07%	0.00%	N/A	0.02%	0.02%	0.00%
704	96.19%	95.98%	-0.21%	-0.14%	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	N/A	0.00%	0.00%	0.00%
809	99.46%	94.73%	-4.73%	-0.38%	99.70%	97.32%	-2.39%	-0.19%	0.21%	1.61%	1.40%	0.11%	0.06%	0.70%	0.63%	0.05%	0.27%	2.31%	2.03%	0.16%	0.09%	0.69%	0.60%	0.05%	N/A	0.25%	0.25%	0.02%
812	97.19%	85.83%	-11.36%	-0.57%	98.10%	91.53%	-6.57%	-0.33%	1.22%	5.13%	3.91%	0.20%	0.49%	2.18%	1.69%	0.08%	1.72%	7.32%	5.60%	0.28%	0.53%	2.04%	1.51%	0.08%	N/A	0.99%	0.99%	0.05%
815	75.14%	57.06%	-18.09%	-0.54%	79.18%	70.62%	-8.56%	-0.26%	13.07%	17.55%	4.48%	0.13%	6.22%	8.64%	2.41%	0.07%	19.29%	26.18%	6.89%	0.21%	3.12%	4.86%	1.75%	0.05%	N/A	6.44%	6.44%	0.19%
906	30.14%	19.36%	-10.78%	-0.22%	43.38%	45.67%	2.29%	0.05%	34.55%	32.16%	-2.39%	-0.05%	17.81%	17.12%	-0.69%	-0.01%	52.37%	49.28%	-3.08%	-0.06%	7.08%	7.06%	-0.01%	0.00%	N/A	13.20%	13.20%	0.26%
Combined			-6.67%	-1.98%			-2.21%	-0.75%			1.08%	0.41%			0.58%	0.20%			1.66%	0.60%			0.56%	0.19%			2.99%	0.53%