Slough, the simulation data show that a 5 ppm TDS increment will be exceeded approximately 26 percent of the time. For the CCWD intake at Rock Slough, the computed TDS concentration increment never exceeded 20 ppm. At Clifton Court Forebay, the computed salinity increment exceeded 10 ppm less than 4 percent of the time.

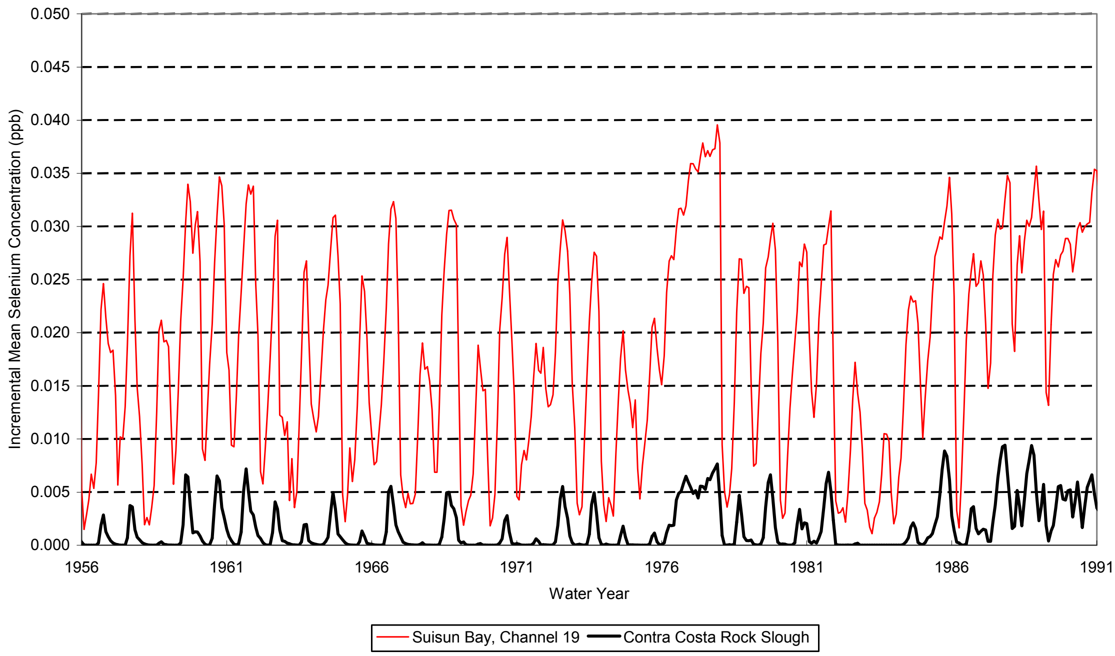


Figure 5.2-5 Chipps Island Discharge (Suisun Bay, Channel 19; Contra Costa Rock Slough), 1956-91, Mean Selenium Increment

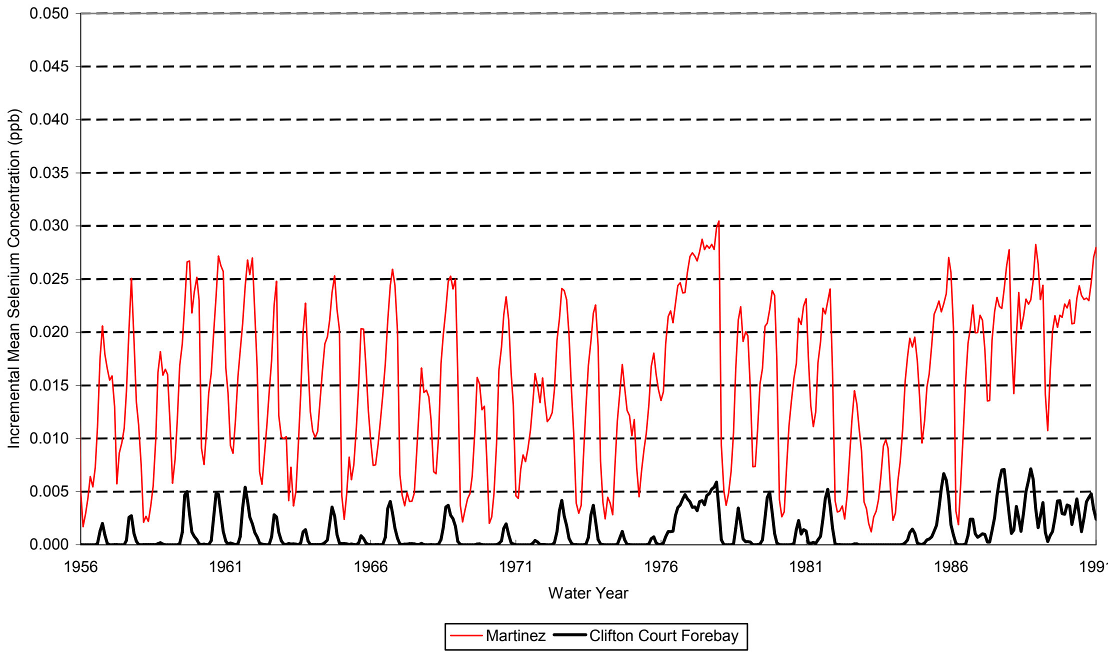


Figure 5.2-6 Chipps Island Discharge (Martinez; Clifton Court Forebay), 1956-91, Mean Selenium Increment

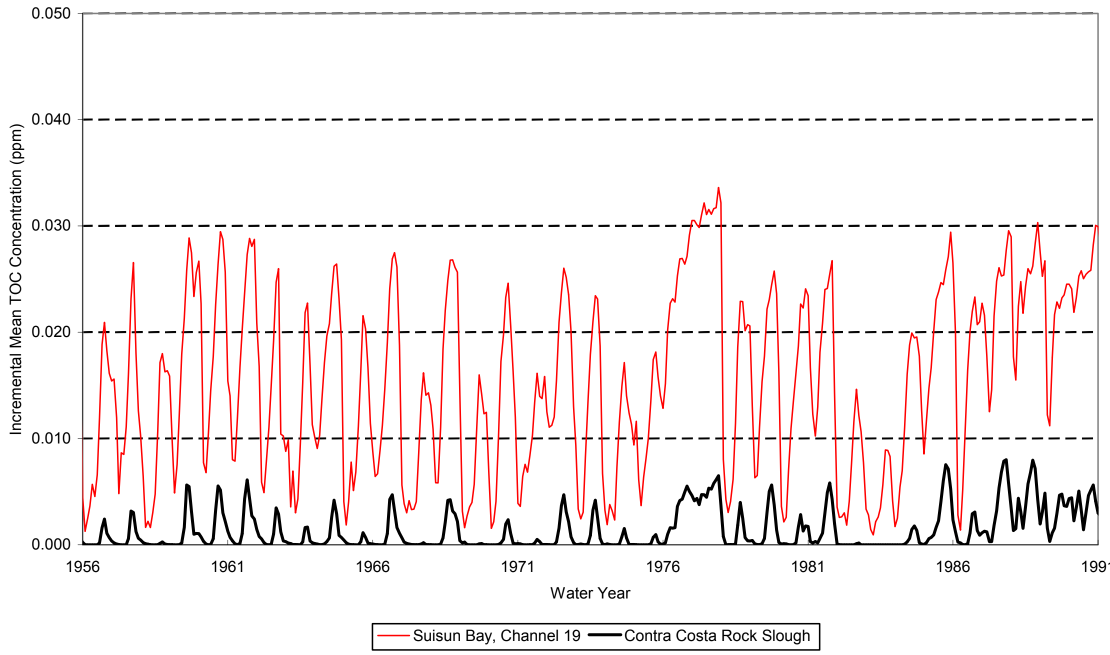


Figure 5.2-7 Chipps Island Discharge (Suisun Bay, Channel 19; Contra Costa Rock Slough), 1956-91, Mean TOC Increment

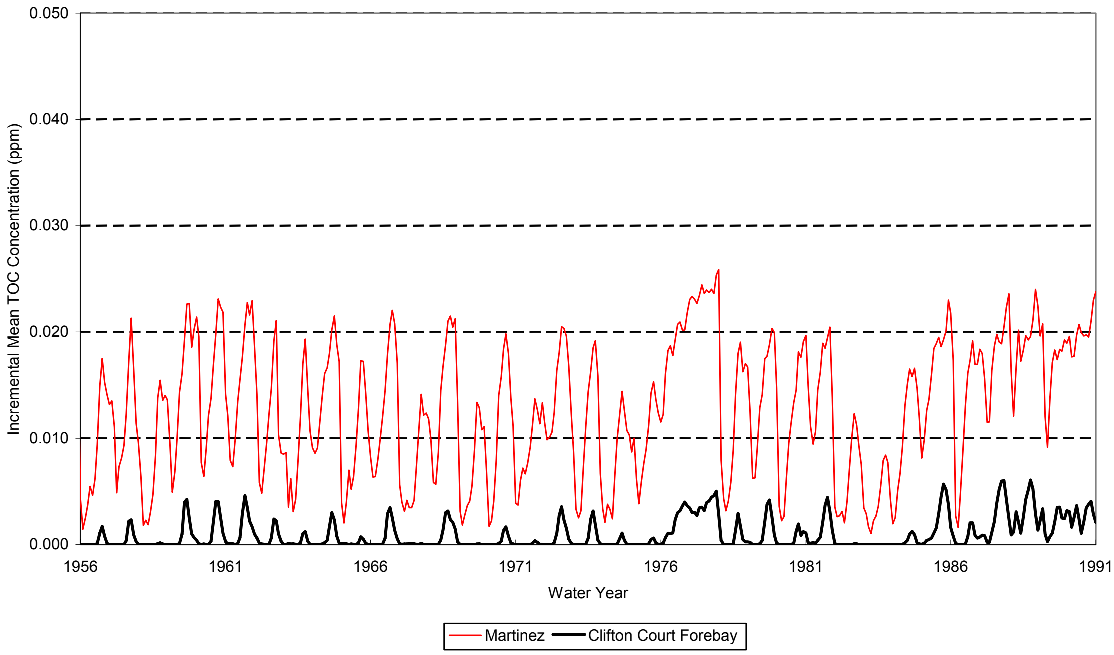


Figure 5.2-8 Chipps Island Discharge (Martinez; Clifton Court Forebay), 1956-91, Mean TOC Increment

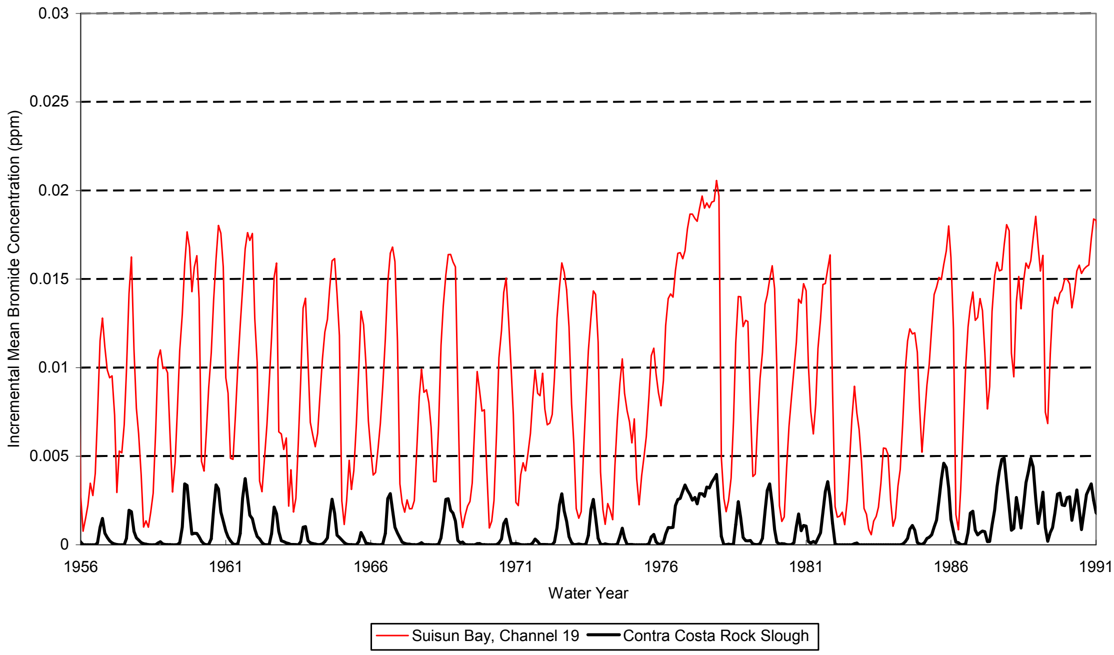


Figure 5.2-9 Chipps Island Discharge (Suisun Bay, Channel 19; Contra Costa Rock Slough), 1956-91, Mean Bromide Increment

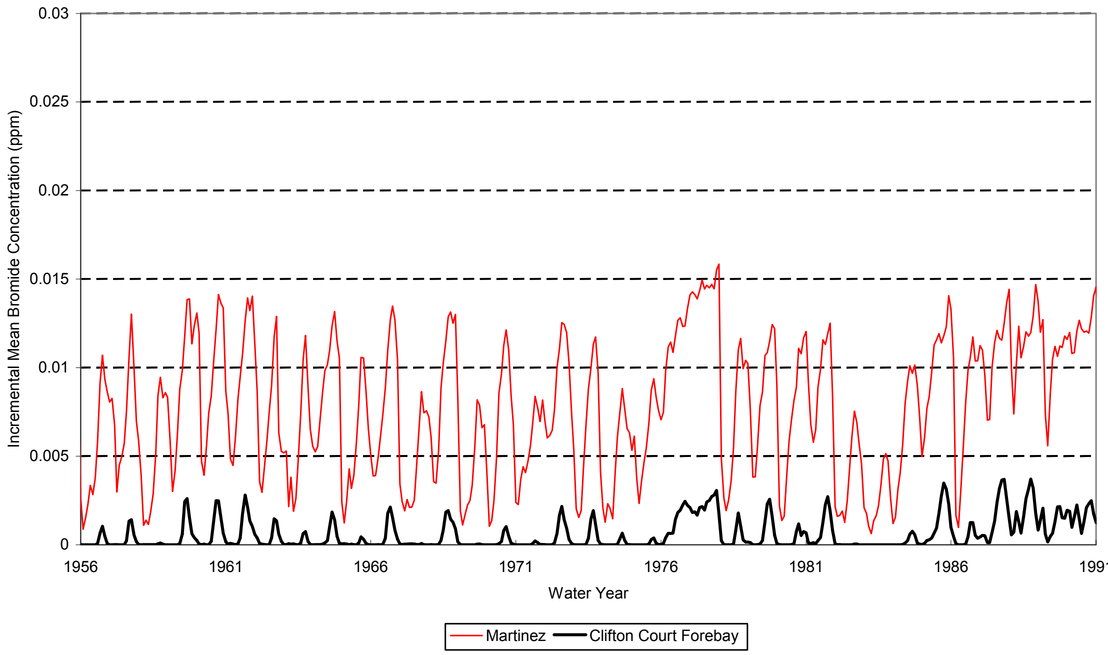


Figure 5.2-10 Chipps Island Discharge (Martinez; Clifton Court Forebay), 1956-91, Mean Bromide Increment

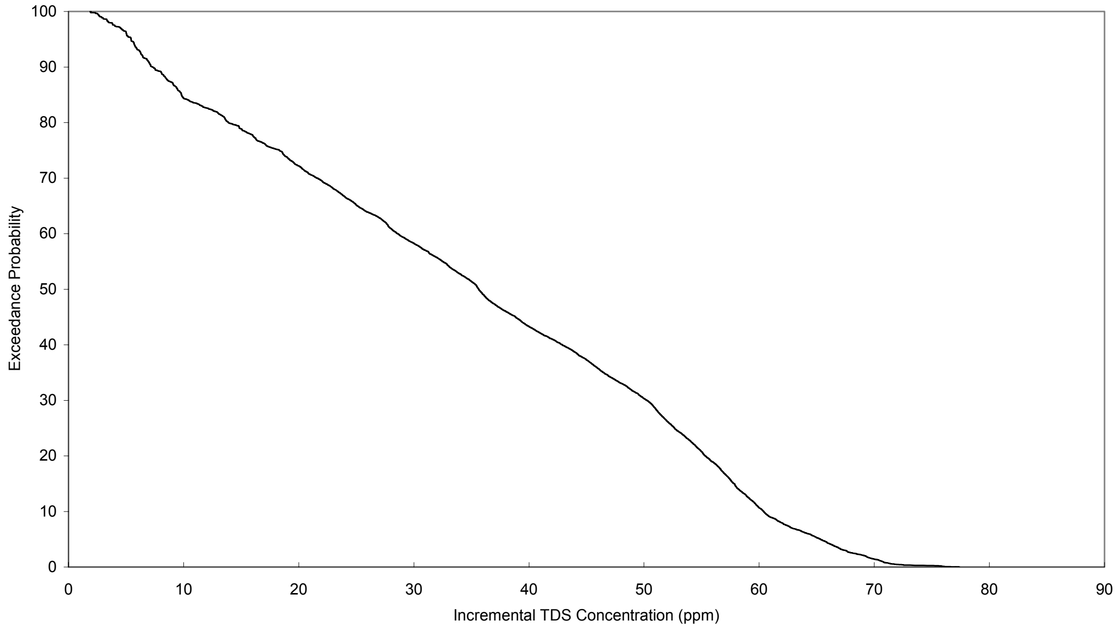


Figure 5.2-11 Exceedance Probability for Incremental TDS (Salinity) at Suisun Bay, Channel 19 Chipps Island Discharge, 1956-91, All Months

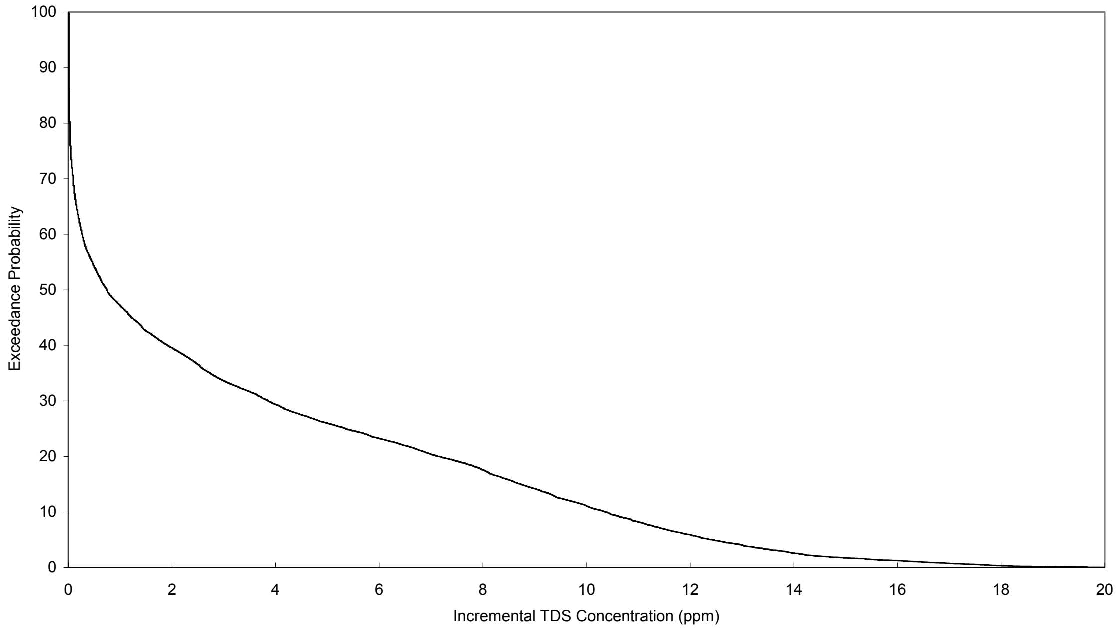


Figure 5.2-12 Exceedance Probability for Incremental TDS (Salinity) at Contra Costa Rock Slough Intake Chipps Island Discharge, 1956-91, All Months

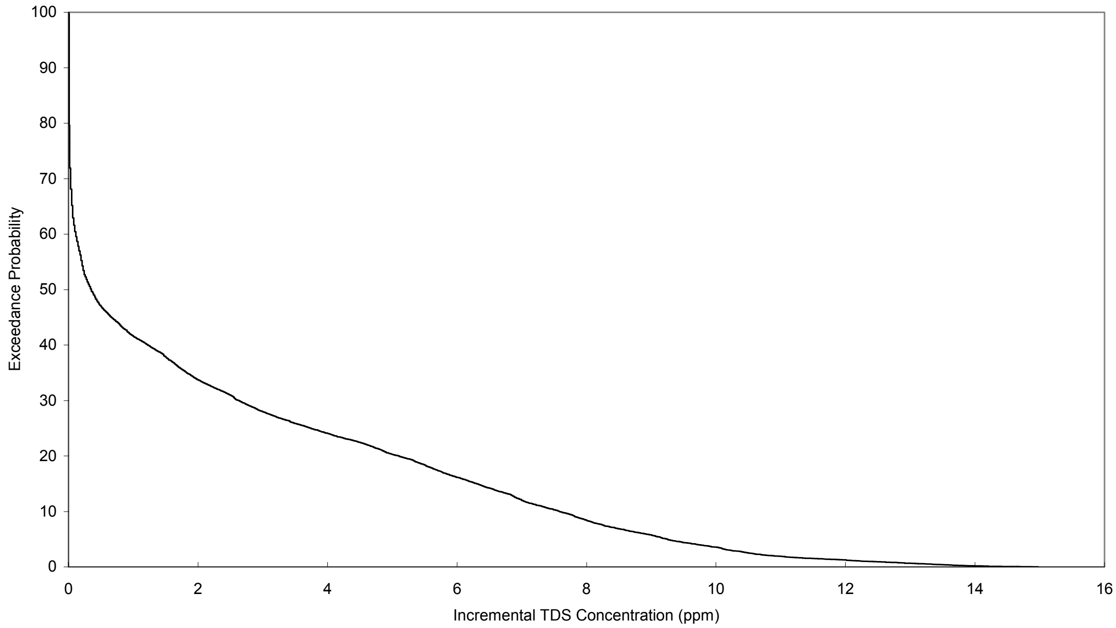


Figure 5.2-13 Exceedance Probability for Incremental TDS (Salinity) at Clifton Court Forebay Chipps Island Discharge, 1956-91, All Months

The simulation data also allow computation of monthly mean increments in TDS (or other constituents) at the three locations considered. For example, Figure 5.2-14 shows the 22-year mean monthly TDS at Pittsburg together with the predicted mean monthly increment in TDS at nearby Suisun Bay from a discharge at Chipps Island of 29.1 cfs at 19,000 ppm TDS. Similar data are shown for the CCWD intake at Rock Slough and Clifton Court Forebay for each month of the year on Figures 5.2-15 and 5.2-16, respectively.

The results presented here correspond to a period that includes a very dry year (1977) and the effect of the reduced net Delta outflow in this period is very evident.

MIKE 21-Predicted Changes in TDS Concentrations

The location of points selected for time series extractions from the MIKE 21 Chipps Island simulation are shown on Figure 5.2-17. Predicted incremental TDS concentrations are generally less than 20 ppm at the drinking water intake at Oakley, 20 to 40 ppm at the Antioch intake, and 40 to 50 ppm at Chipps Island (Figures 5.2-18 and 5.2-19). These incremental changes are less than 1 percent of existing TDS concentrations. The area with incremental changes greater than 20 ppm predominantly extends from Antioch to Carquinez Strait (lower plot on Figure 5.2-20). These concentrations are lower by a factor of approximately two from the FDM over the same simulation period, providing a range of model estimates.

MIKE 21-Predicted Changes in Se Concentrations

Increases in total Se concentrations due to the Delta-Chipps Island Disposal Alternative are not predicted to cause exceedance of the 5 µg/L WQO (upper plot on Figure 5.2-21); however, increases in either dissolved concentrations or concentration adsorbed to suspended or benthic particulate matter may enhance bioaccumulation in marine organisms. Consequently, changes are expressed in this section of the EIS relative to the dissolved and adsorbed parameters.

Predicted dissolved concentrations at six time-series monitoring stations shown on Figure 5.2-17 are generally between 0.1 and 0.25 µg/L (dark lines on Figure 5.2-22). Near the Chipps Island discharge, dissolved concentrations with the Delta-Chipps Island Alternative are shown to exceed 0.14 µg/L 10 percent of the time (light lines on Figure 5.2-23). Although incremental increases in dissolved concentration are generally less than 0.02 µg/L, they are as high as 0.06 µg/L near the Chipps Island discharge (light lines on Figure 5.2-22). As illustrated by the middle plot on Figure 5.2-24, the area affected by the discharge extends into San Pablo Bay, with increases between 0.01 and 0.025 µg/L in most of Suisun Bay (lower plot on Figure 5.2-24).

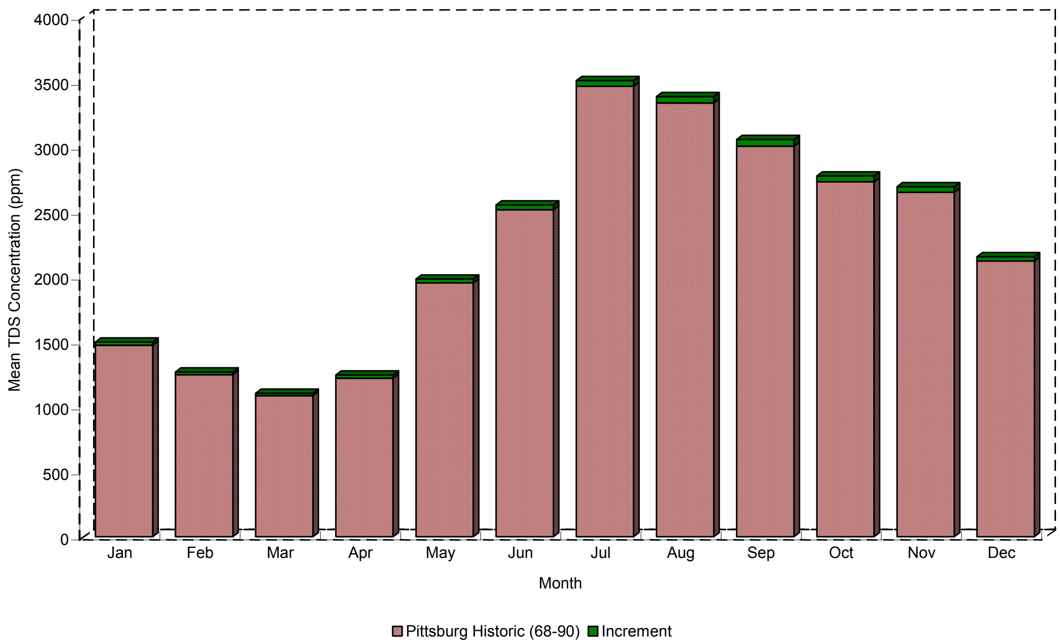


Figure 5.2-14 Suisun Bay, Channel 19, 1956-91, Monthly Mean TDS (Salinity) Mean TDS + Incremental Increase from 29.1 cfs Discharge at Chipps Island

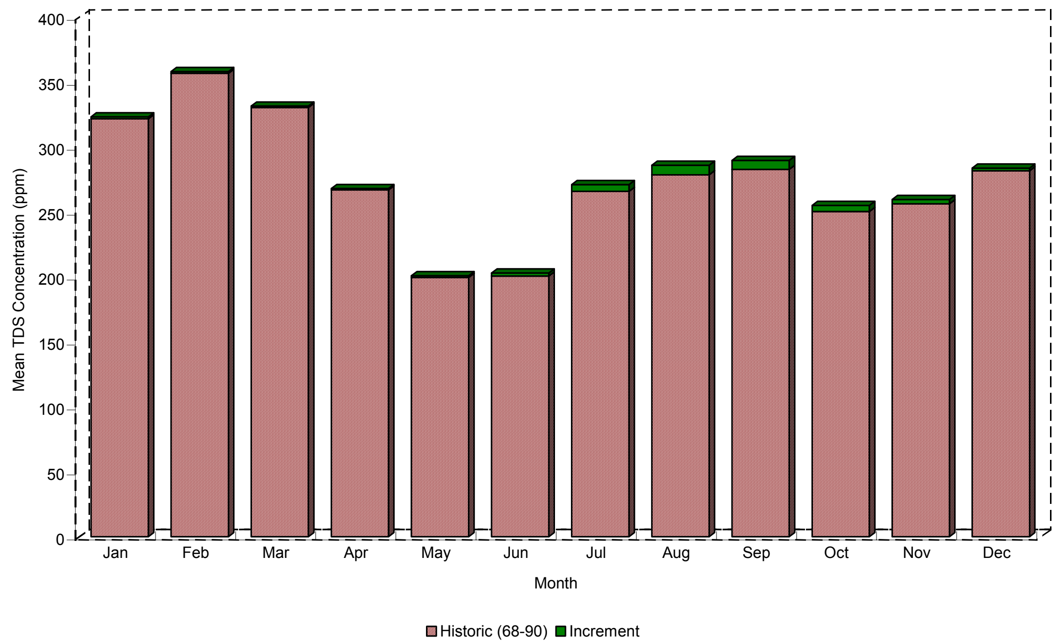


Figure 5.2-15 Contra Costa Intake - Rock Slough, 1956-91, Monthly Mean TDS (Salinity) Mean TDS + Incremental Increase from 29.1 cfs Discharge at Chipps Island

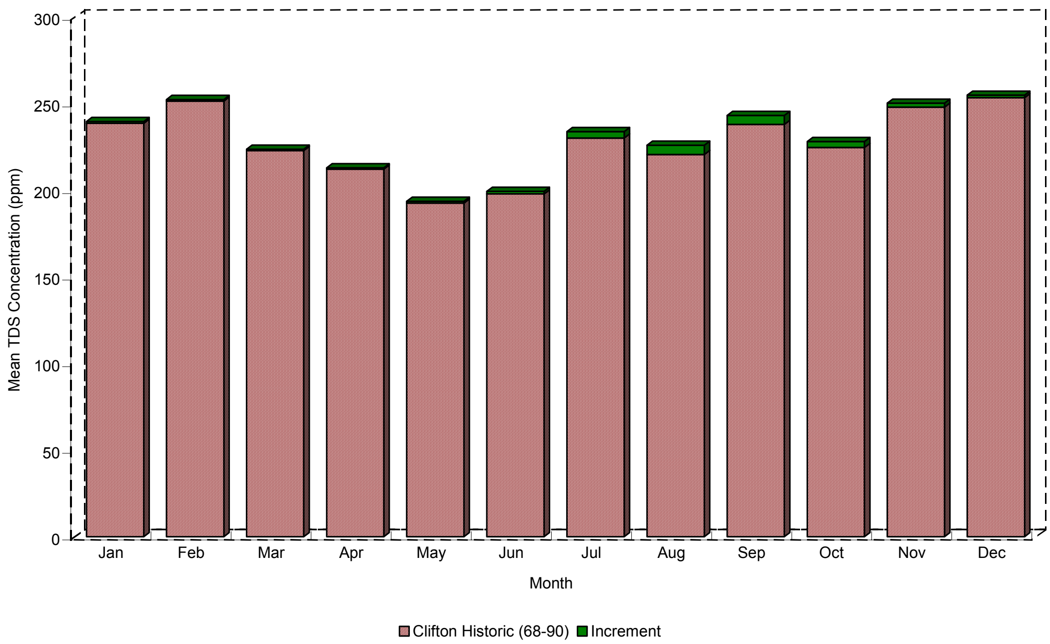
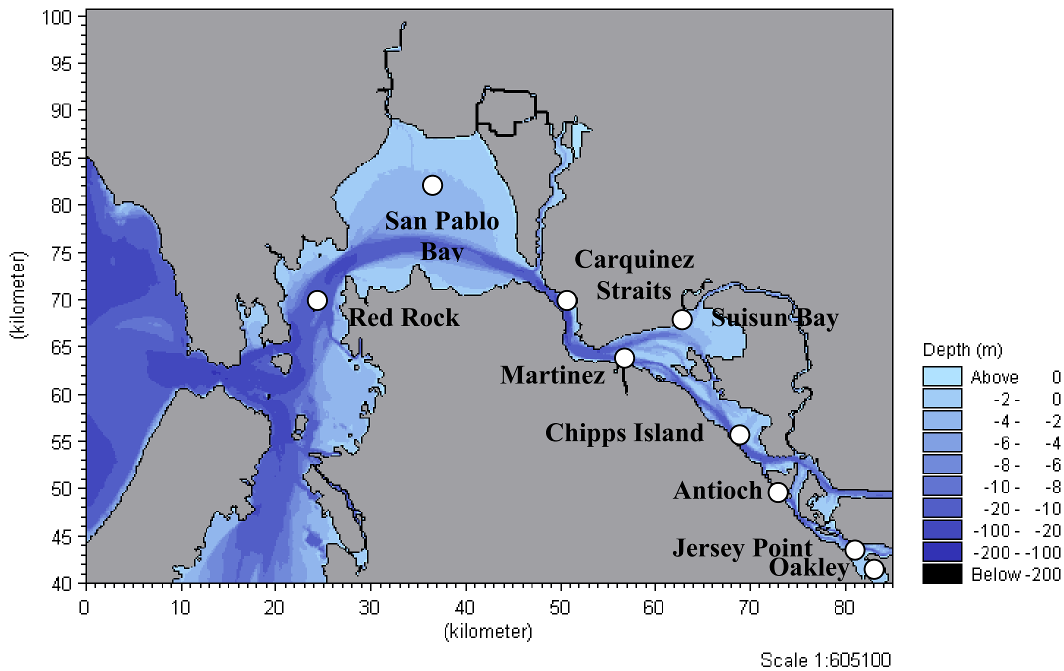
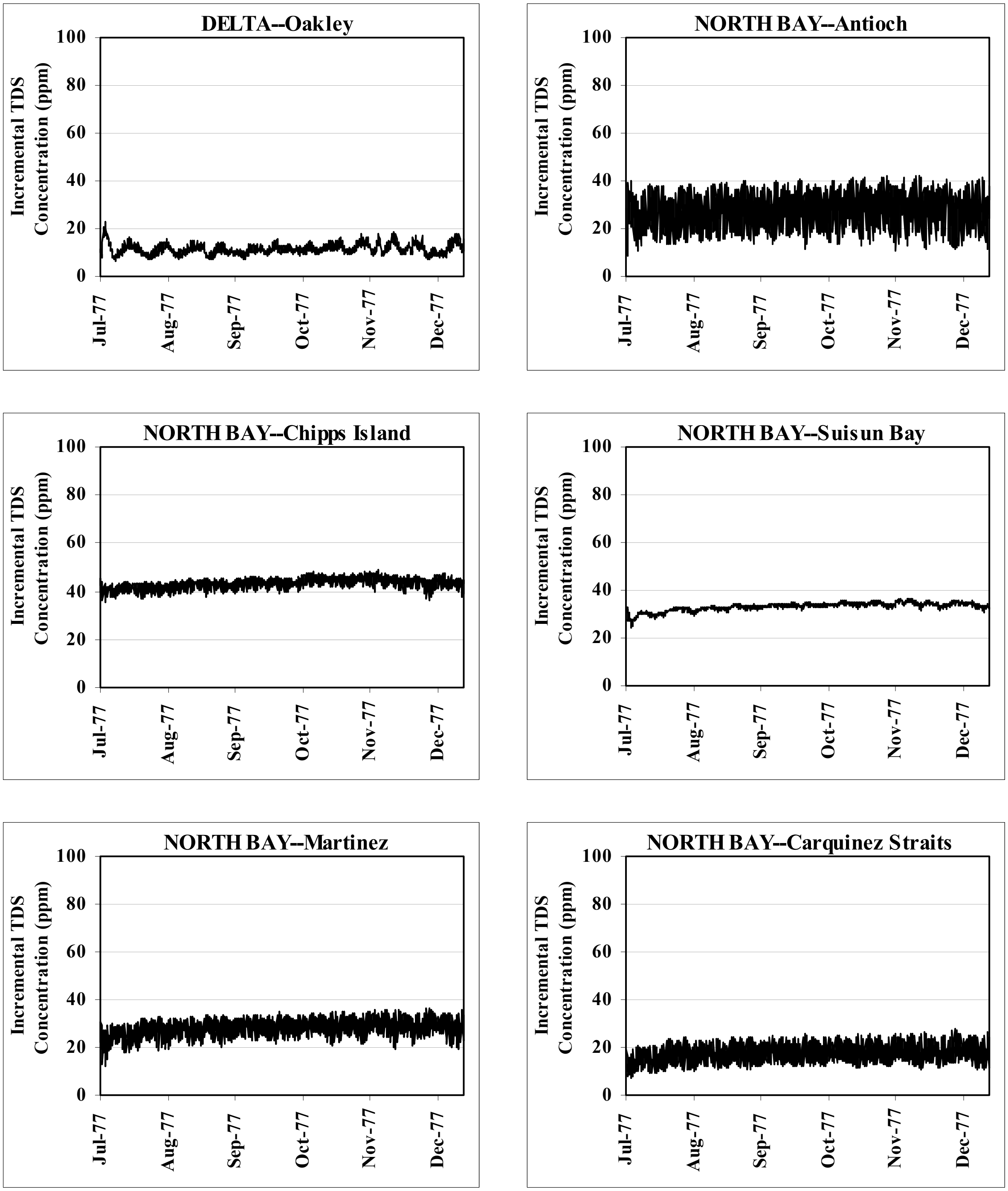


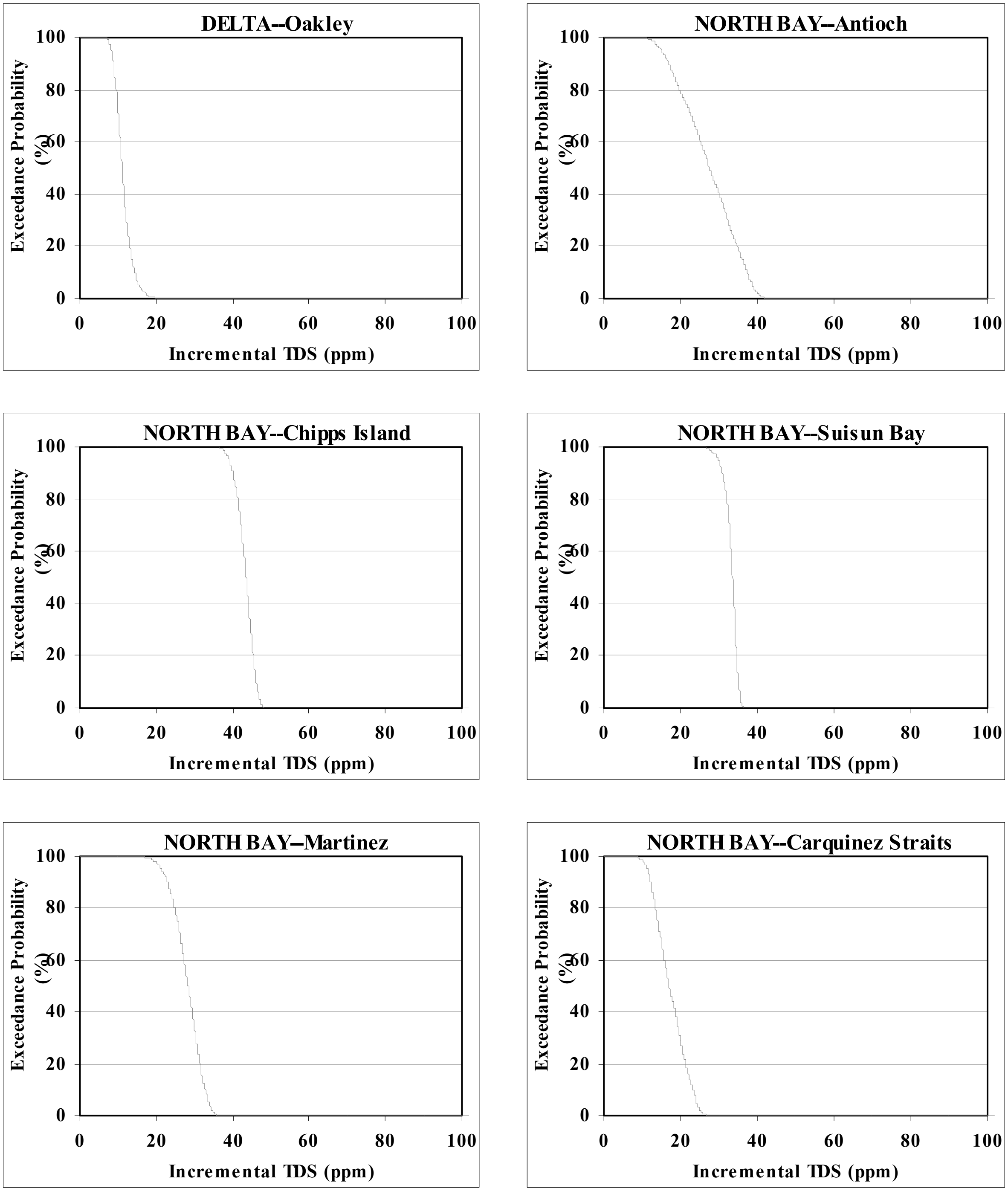
Figure 5.2-16 Clifton Court Forebay, 1956-91, Monthly Mean TDS (Salinity)Mean TDS + Incremental Increase from 29.1 cfs Discharge at Chipps Island



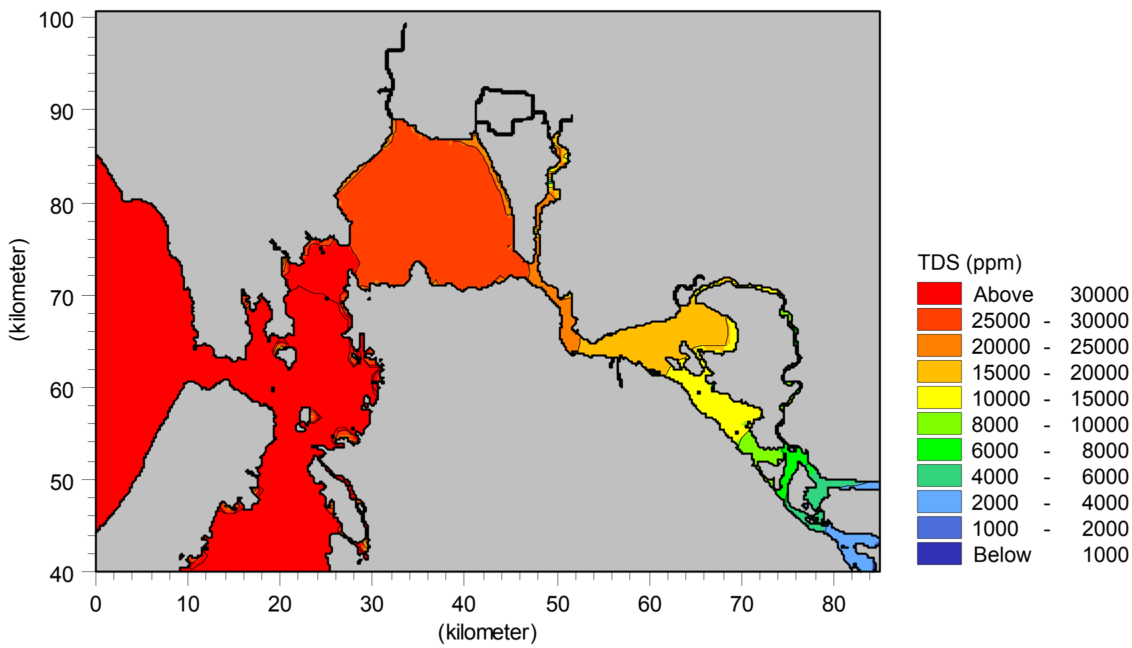
San Luis Drainage Feature Re-evaluation	Bathymetry and Locations Selected for Time Series Analysis of TDS and Selenium Concentrations as a Function of Time	Figure 5.2-17
17324004		

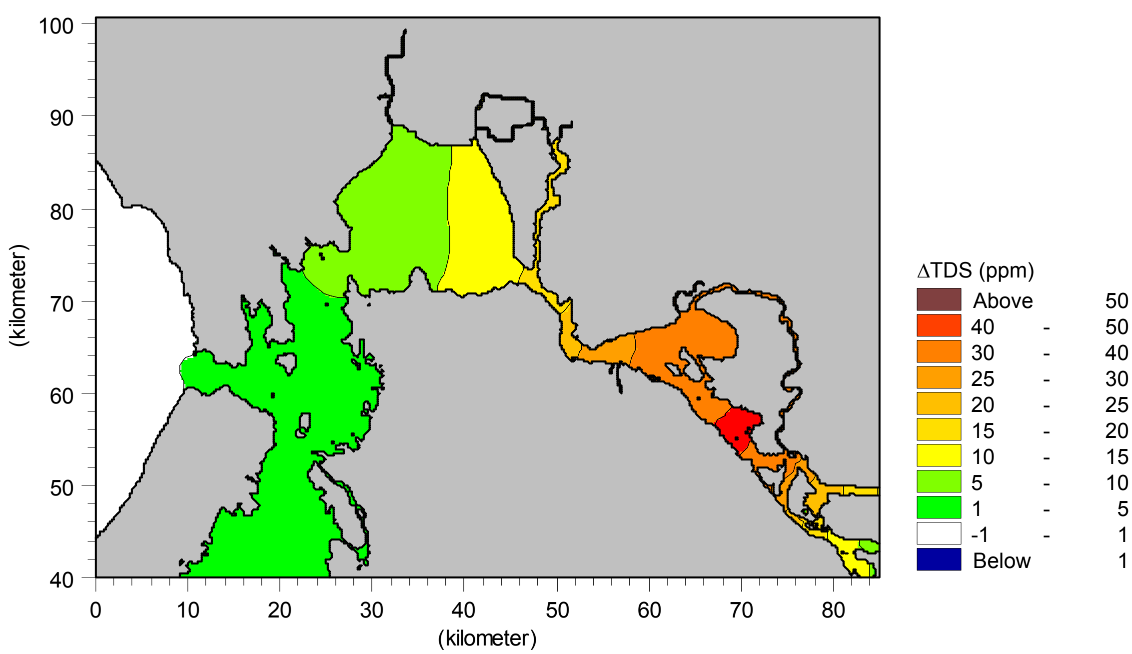


San Luis Drainage Feature Re-evaluation	MIKE 21 Chipps Island Discharge (July-Dec 1977) Total Dissolved Solids Concentrations Expressed as Incremental Change from Baseline Conditions	Figure 5.2-18
17324004		

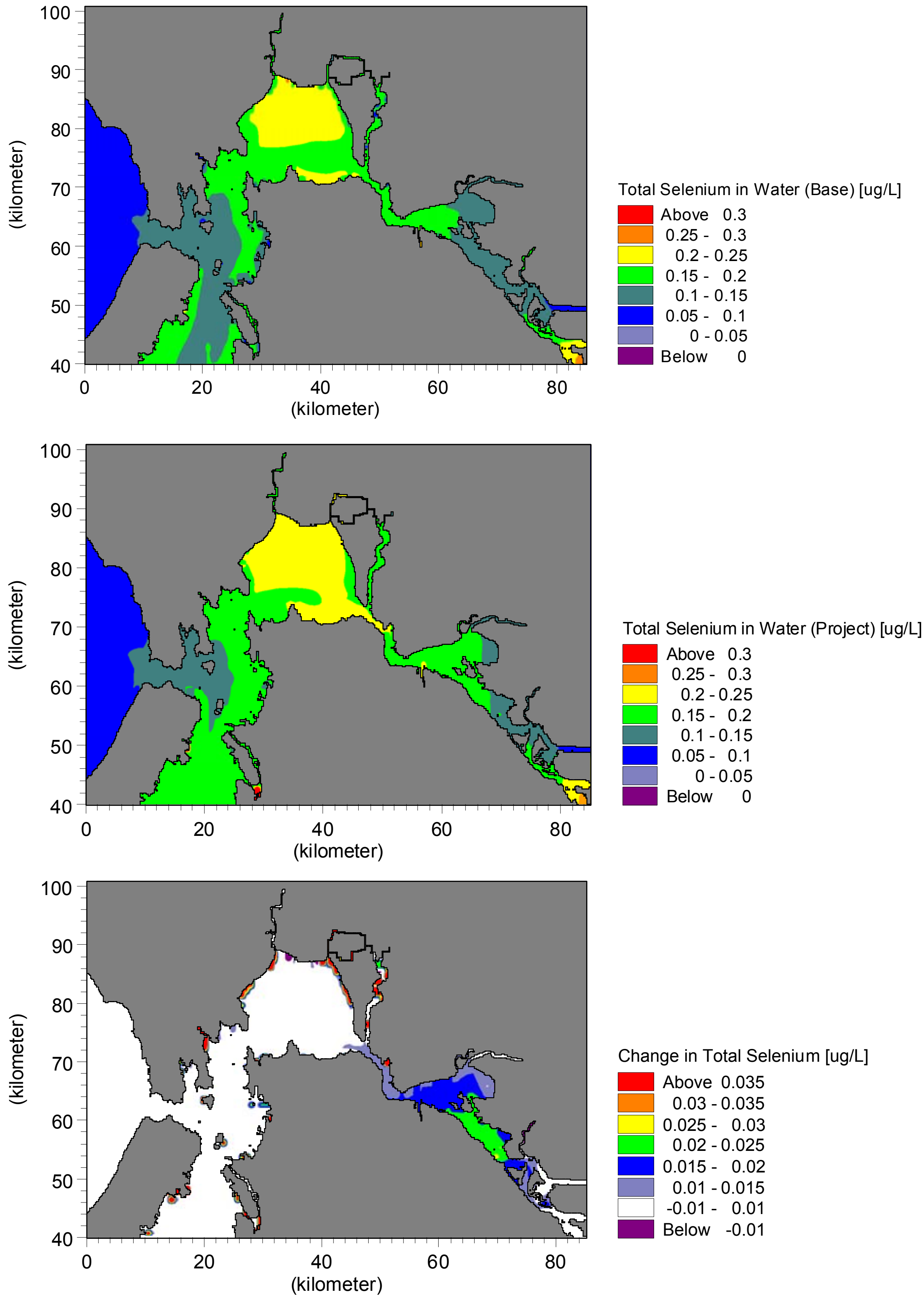


San Luis Drainage Feature Re-evaluation	MIKE 21 Chipps Island Discharge (July-Dec 1977) Probability of Exceedance of Incremental TDS Concentrations	Figure 5.2-19
17324004		

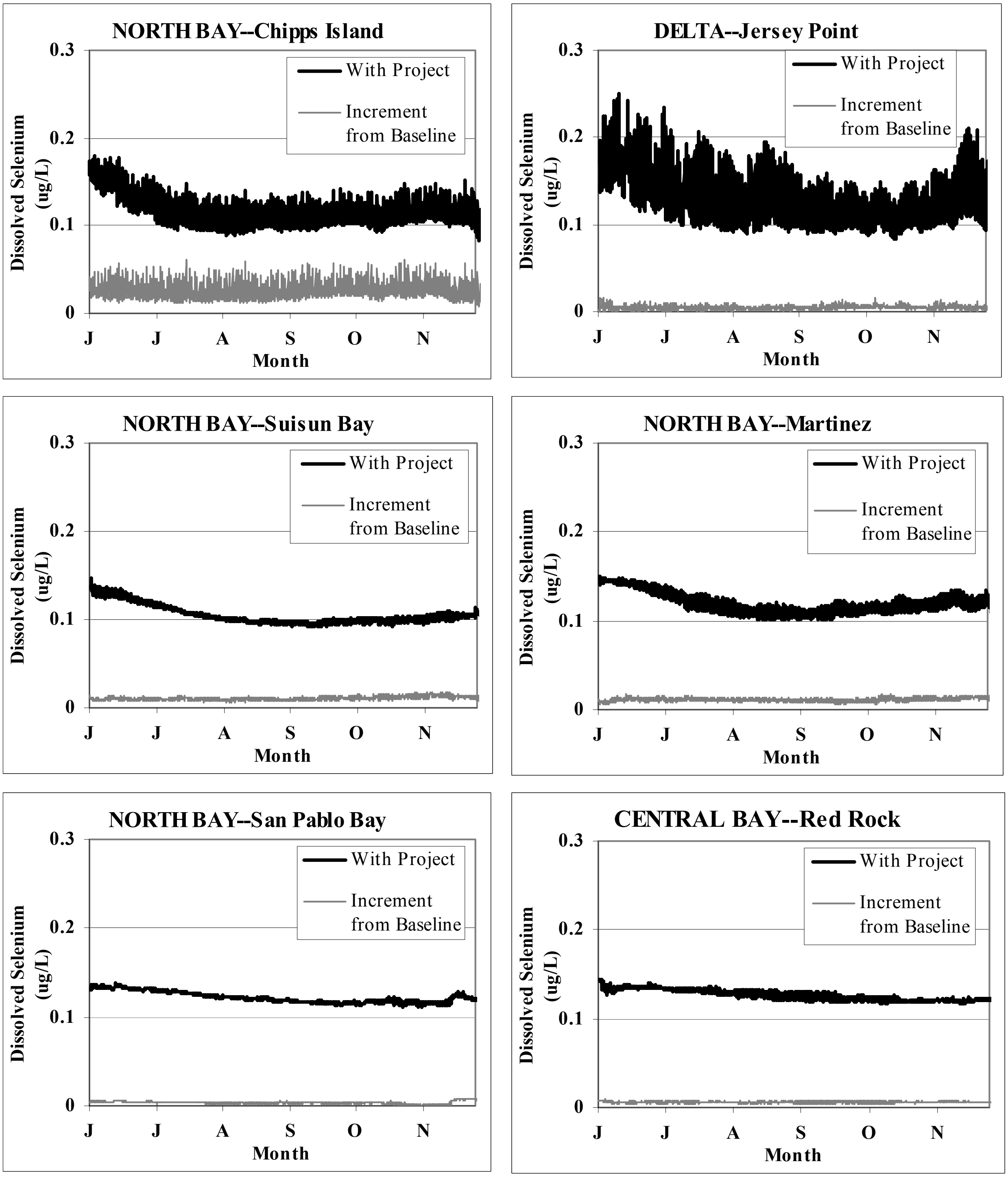




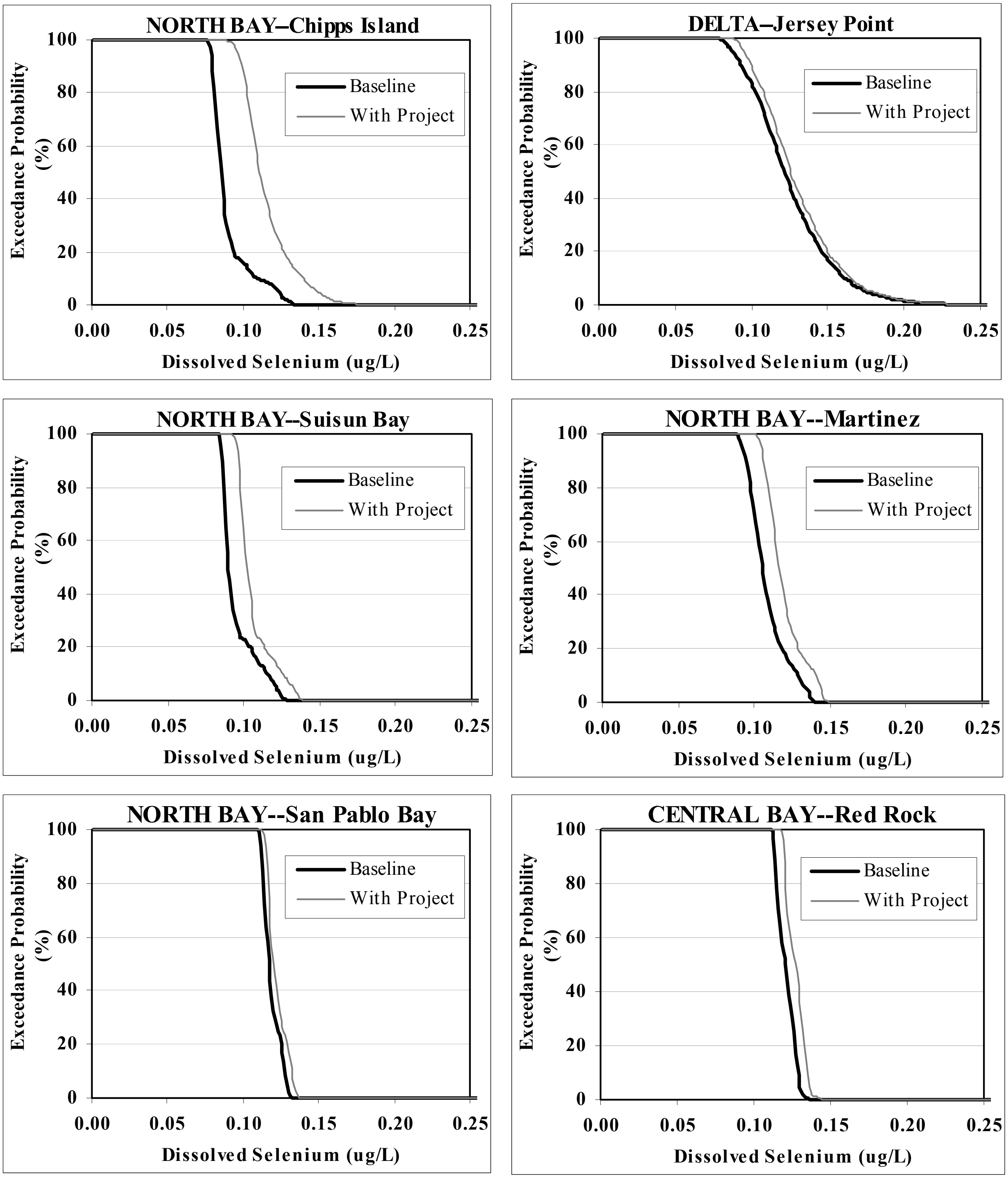
San Luis Drainage Feature Re-evaluation	MIKE 21 Chipps Island Discharge (July-Dec 1977) Mean Total Dissolved Solids Concentration (TOP) Difference from Baseline Conditions (BOTTOM)	Figure 5.2-20
17324004		



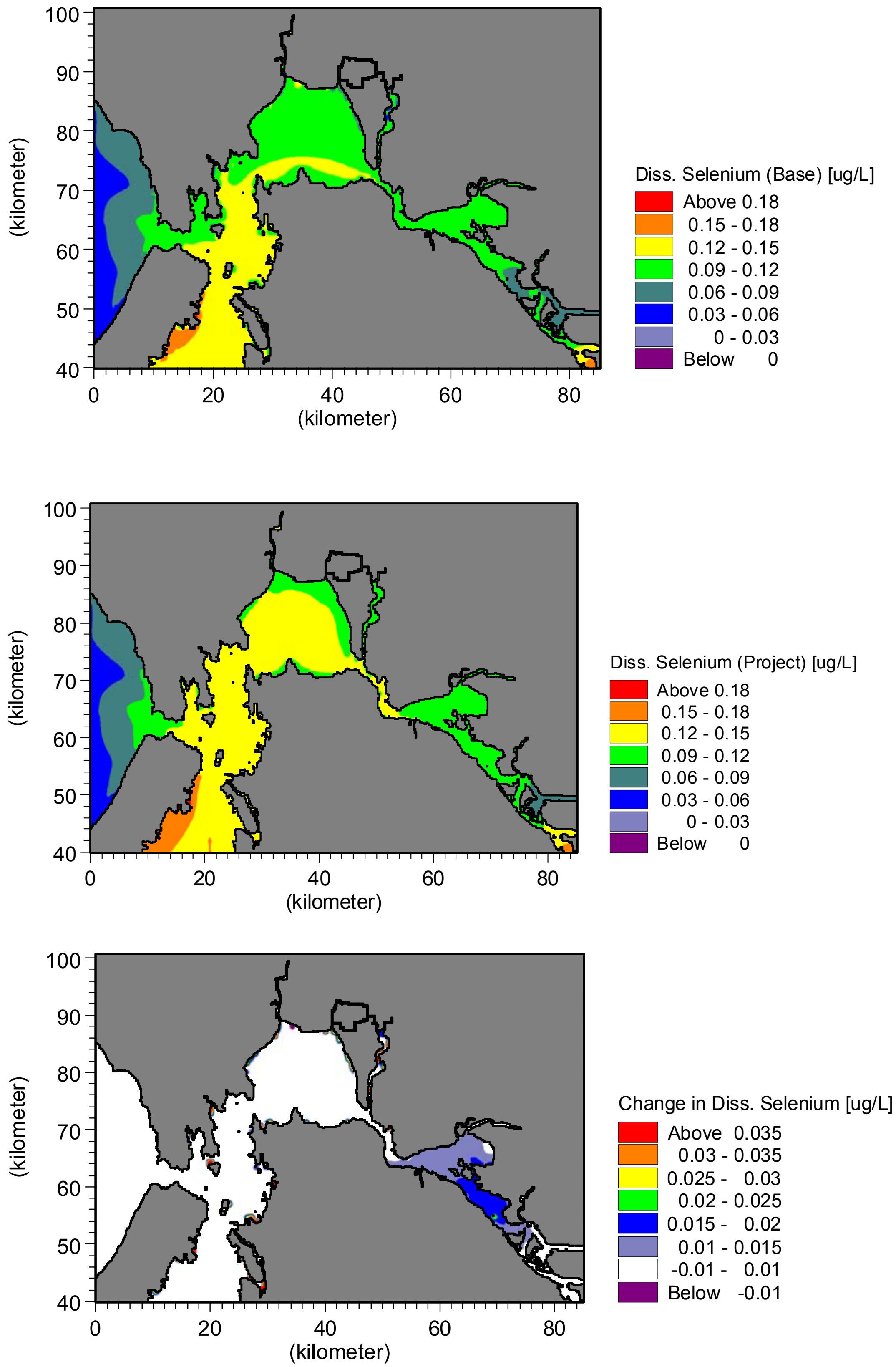
San Luis Drainage Feature Re-evaluation	MIKE 21 Chipps Discharge (June-November 1997) Mean Total Selenium Concentration and Difference from Baseline Conditions	Figure 5.2-21
17324004		



San Luis Drainage Feature Re-evaluation	MIKE 21 Chipps Discharge (June-November 1997) Dissolved Selenium Concentrations Due to Project and Incremental Change from Baseline Conditions	Figure 5.2-22
17324004		



San Luis Drainage Feature Re-evaluation	MIKE 21 Chipps Discharge (June-November 1997) Probability of Exceedance of Dissolved Selenium Concentrations–Baseline and Project Conditions	Figure 5.2-23
17324004		



San Luis Drainage Feature Re-evaluation	MIKE 21 Chipps Discharge (June-November 1997) Mean Dissolved Selenium Concentration and Difference from Baseline Conditions	Figure 5.2-24
17324004		

Predicted adsorbed Se concentrations on suspended sediment are generally 0.3 to 0.7 mg/kg from the Delta to Suisun Bay, and 0.4 to 0.6 mg/kg in San Pablo and Central bays (dark lines on Figure 5.2-25). Incremental increases in adsorbed concentrations range from less than 0.03 mg/kg at Red Rock and San Pablo Bay to as high as 0.08 mg/kg near the Chipps Island discharge (light lines on Figure 5.2-25). Near the Chipps Island discharge, the adsorbed Se concentrations with the Delta-Chipps Island Disposal Alternative are shown to exceed 0.45 mg/kg 10 percent of the time (light line on Figure 5.2-26). Similar to dissolved Se, the area affected by the discharge extends into San Pablo Bay (middle plot on Figure 5.2-27), causing increases between 0.04 and 0.07 mg/kg in most of Suisun Bay (bottom plot on Figure 5.2-27).

Predicted adsorbed Se concentrations on benthic sediment vary between 0.2 and 0.8 mg/kg, with the highest concentrations at the discharge location at Chipps Island (dark lines on Figure 5.2-28). Part of the explanation for the lower concentrations at Jersey Point is that the majority of sediment transported and ultimately deposited near there is from the Sacramento River (with an average adsorbed concentration on suspended sediment of 0.2 mg/kg). Similarly, most of the increases with time at the other stations are a direct consequence of the San Luis Drain discharge (compare dark and light lines on Figures 5.2-28 and 5.2-29). Finally, the high Se concentrations on benthic sediment in the Central Bay are possibly a model artifact, where the effect of sand on the total benthic concentration cannot be included. As illustrated on Figure 5.2-30 (bottom plot), an incremental increase occurs in the benthic Se concentration generally between 0.01 and 0.02 mg/kg, but as high as 0.08 mg/kg near the discharge. The larger increases appearing near the land-water boundaries on Figure 5.2-30 (bottom plot) are a result of model limitations rather than effects of the alternative.

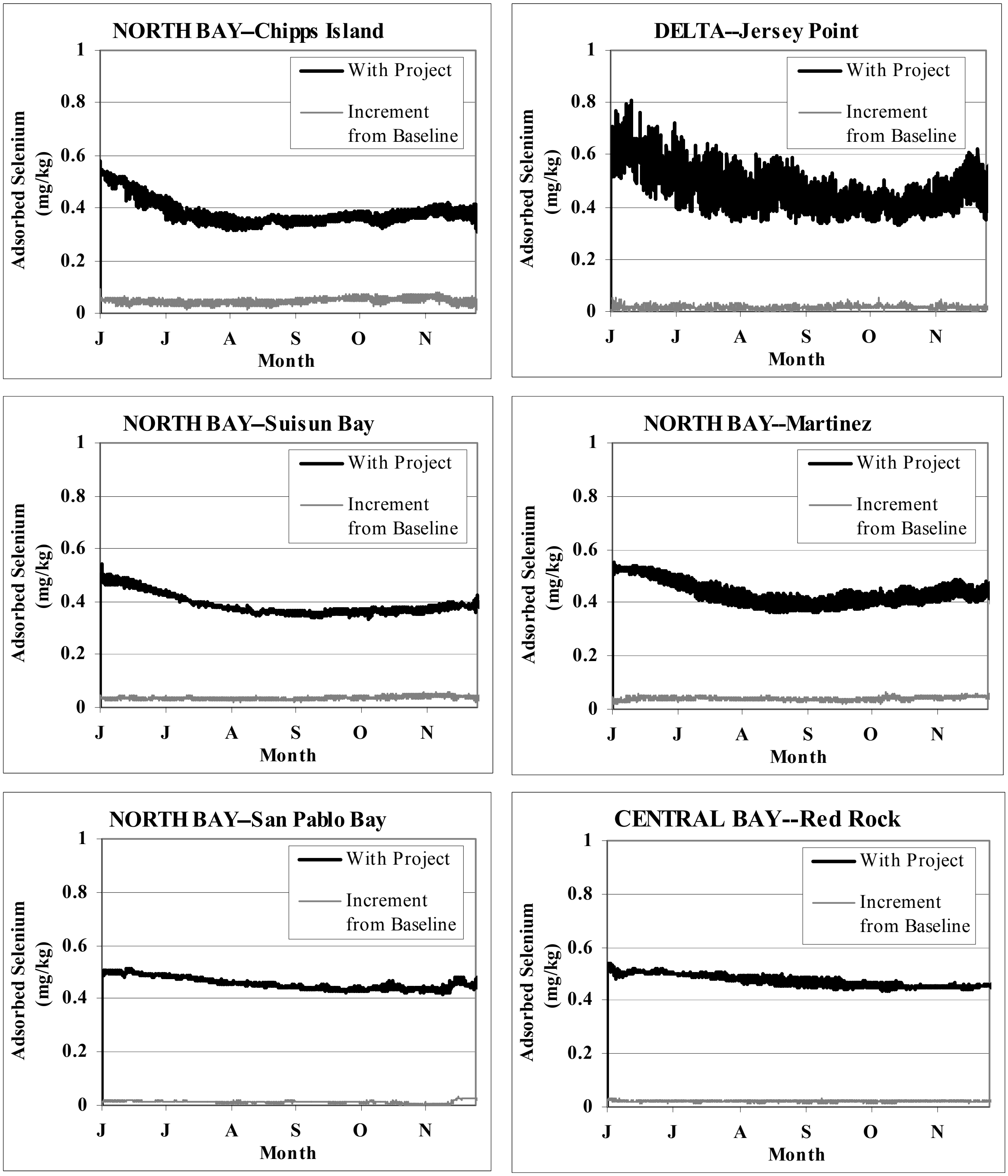
5.2.9.5 Drinking Water Intakes

Disposing drainwater to Chipps Island, in the Delta, poses a threat to the CCWD drinking water supply. Although Chipps Island is located downstream of the nearest CCWD drinking water intake, at Mallard Slough, it is only about a mile away from the intake. In addition, a second drinking water intake, at Rock Slough, is located several miles further upstream.

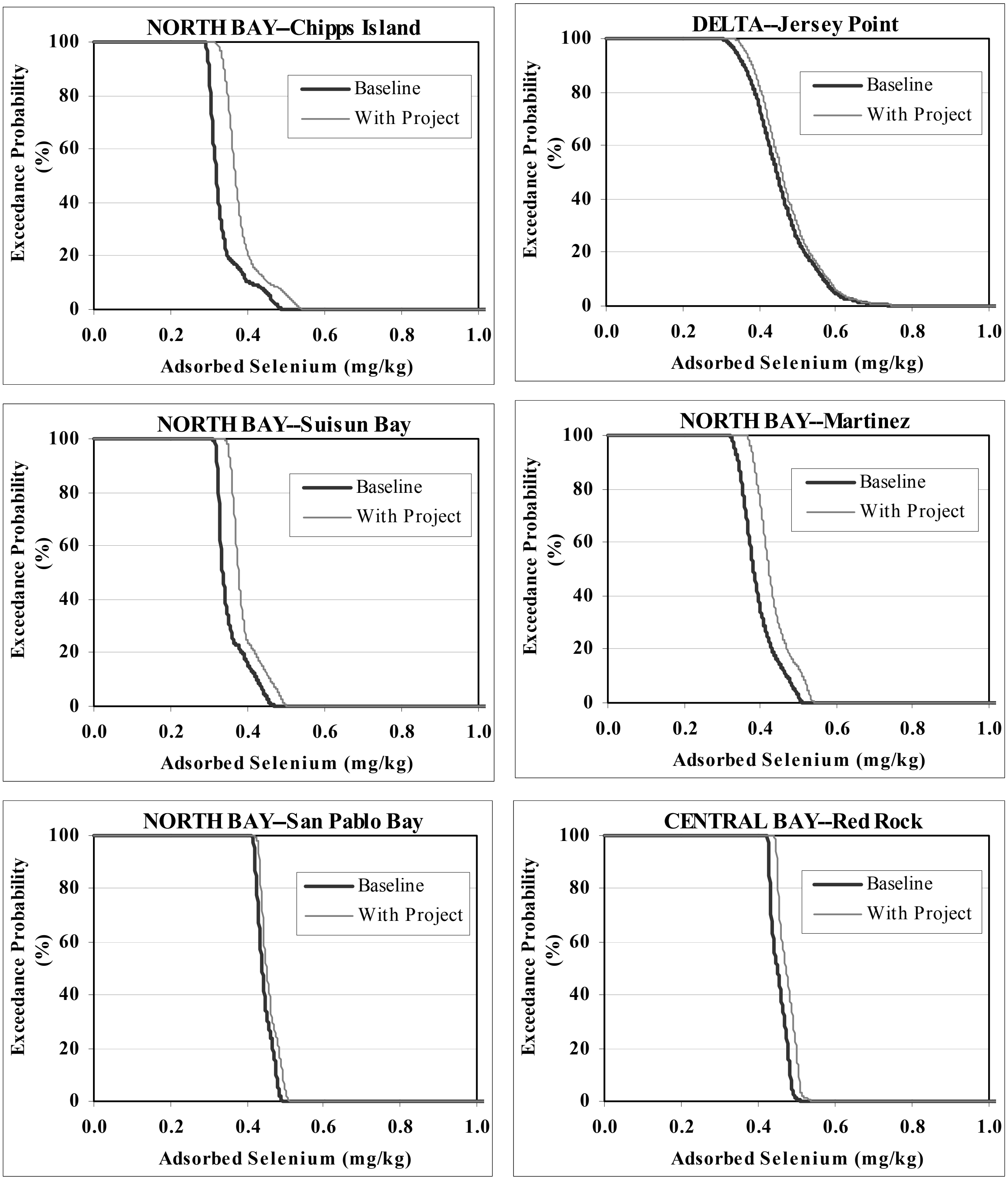
The discussion below identifies only minimal increases in most modeled constituents; however, the addition of drainwater would reverse the decreasing concentrations at the raw water intakes. Additionally the water would impair the intake Delta water enough to make water from Mallard and Rock Sloughs available less frequently, forcing CCWD to rely on storage reservoirs more often. CCWD only uses water from Mallard Slough and Rock Slough when the chloride is below 65 to 100 mg/L. Otherwise, water from Los Vaqueros Reservoir is released and blended with Delta water to maintain the District’s service goal of 65 mg/L chlorides. This supply option requires more water transport and is more expensive for the District.

Bromide

Bromide concentrations are predicted to increase by a maximum of 0.005 mg/L and by an average of 0.001 mg/L at Rock Slough. The MCL for bromide is 0.05 mg/L. Under average conditions and even maximum conditions, the increase would be negligible and is not significant.



San Luis Drainage Feature Re-evaluation	MIKE 21Chipps Discharge (June-November 1997) Adsorbed Selenium Concentrations Due to Project and Incremental Change from Baseline Conditions	Figure 5.2-25
17324004		



San Luis Drainage Feature Re-evaluation	MIKE 21 Chipps Discharge (June-November 1997) Probability of Exceedance of Adsorbed Selenium Concentrations–Baseline and Project Conditions	Figure 5.2-26
17324004		

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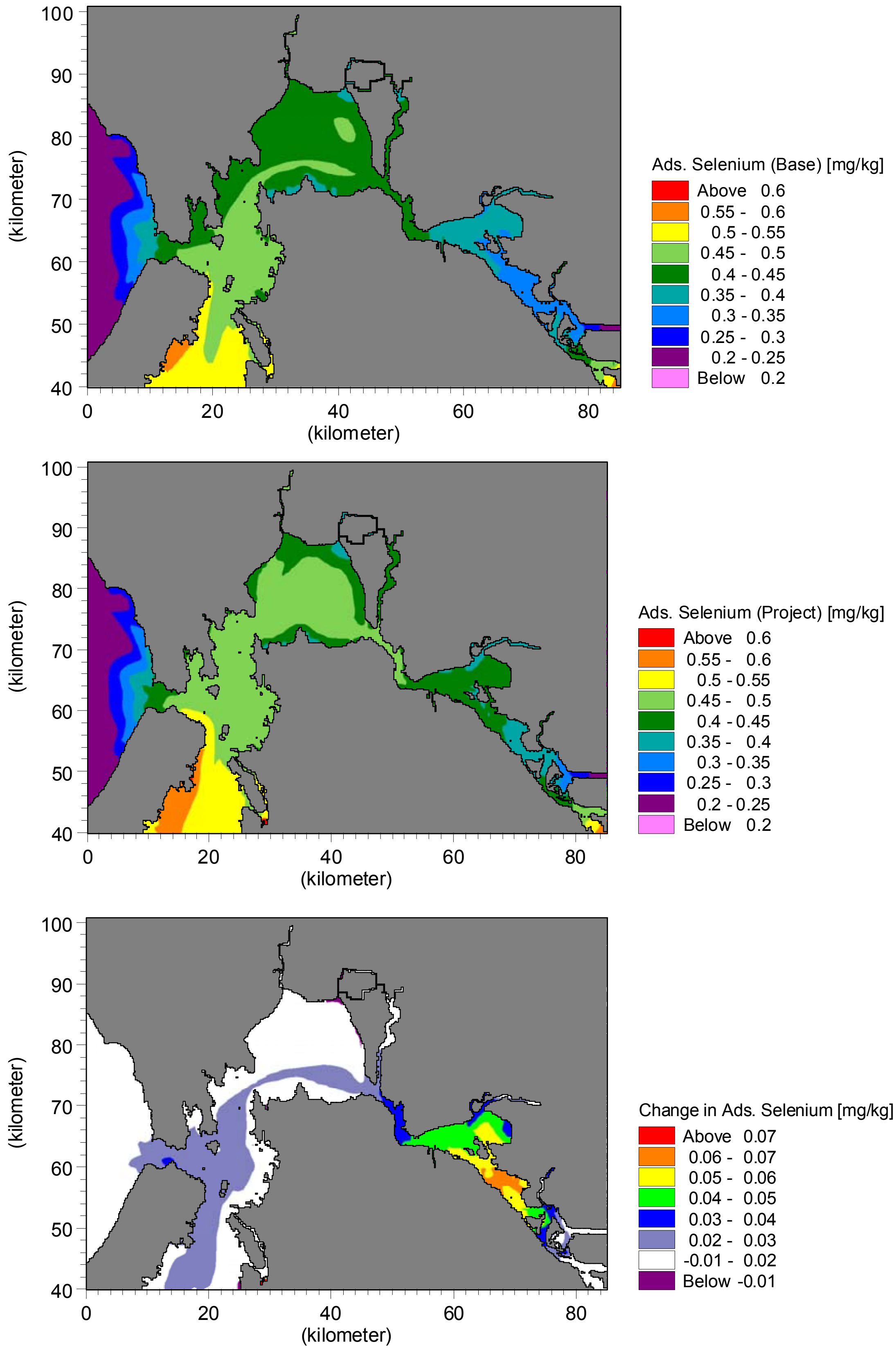
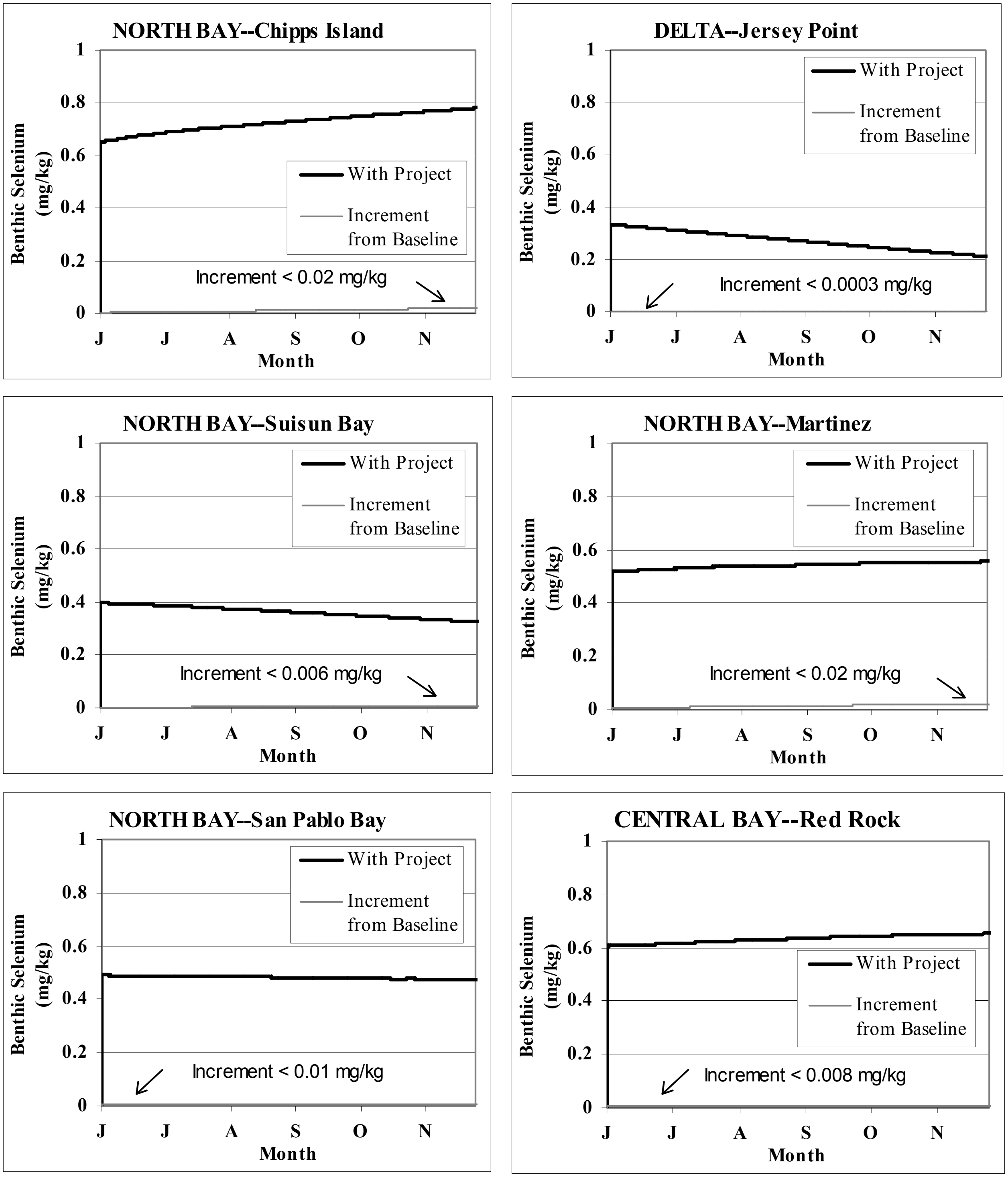
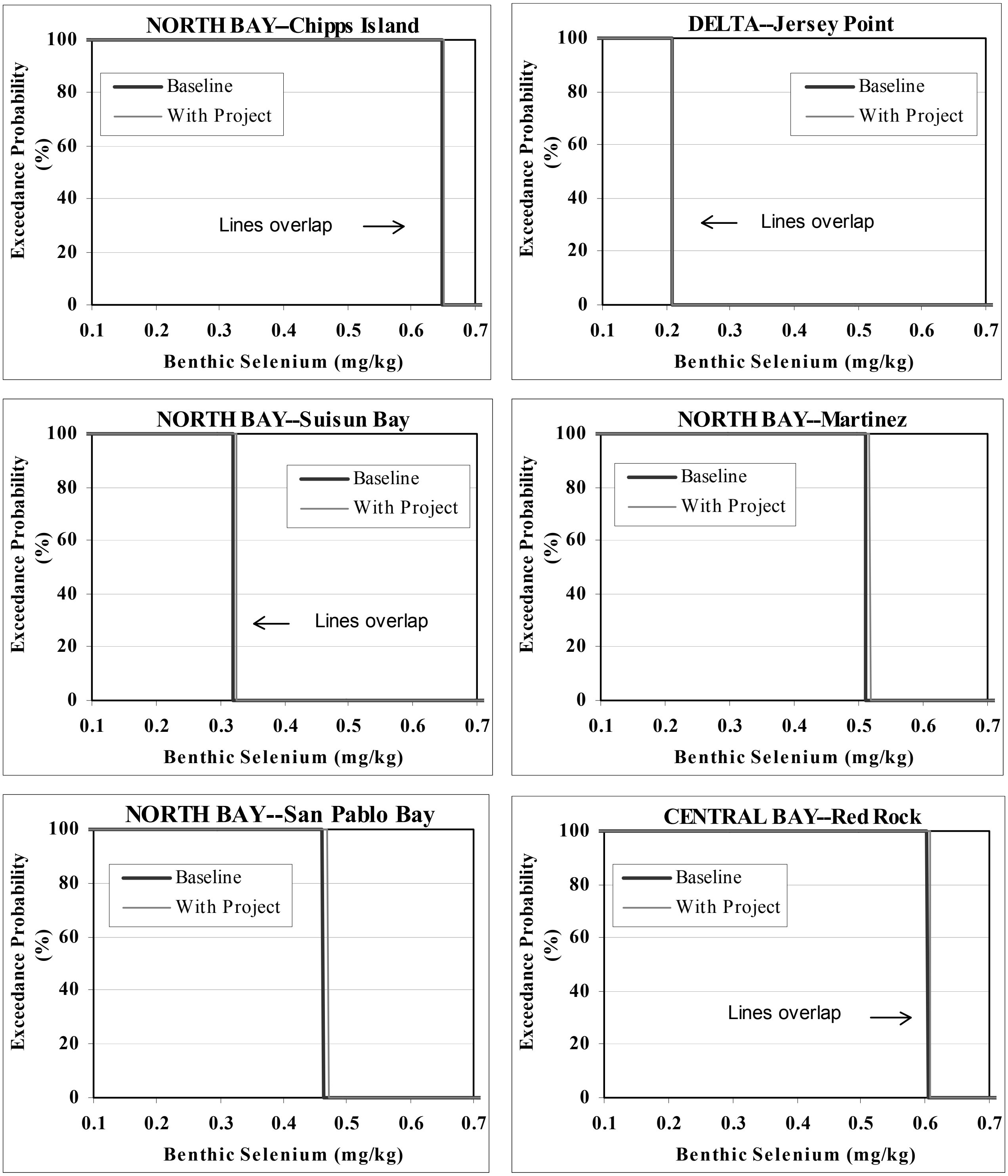


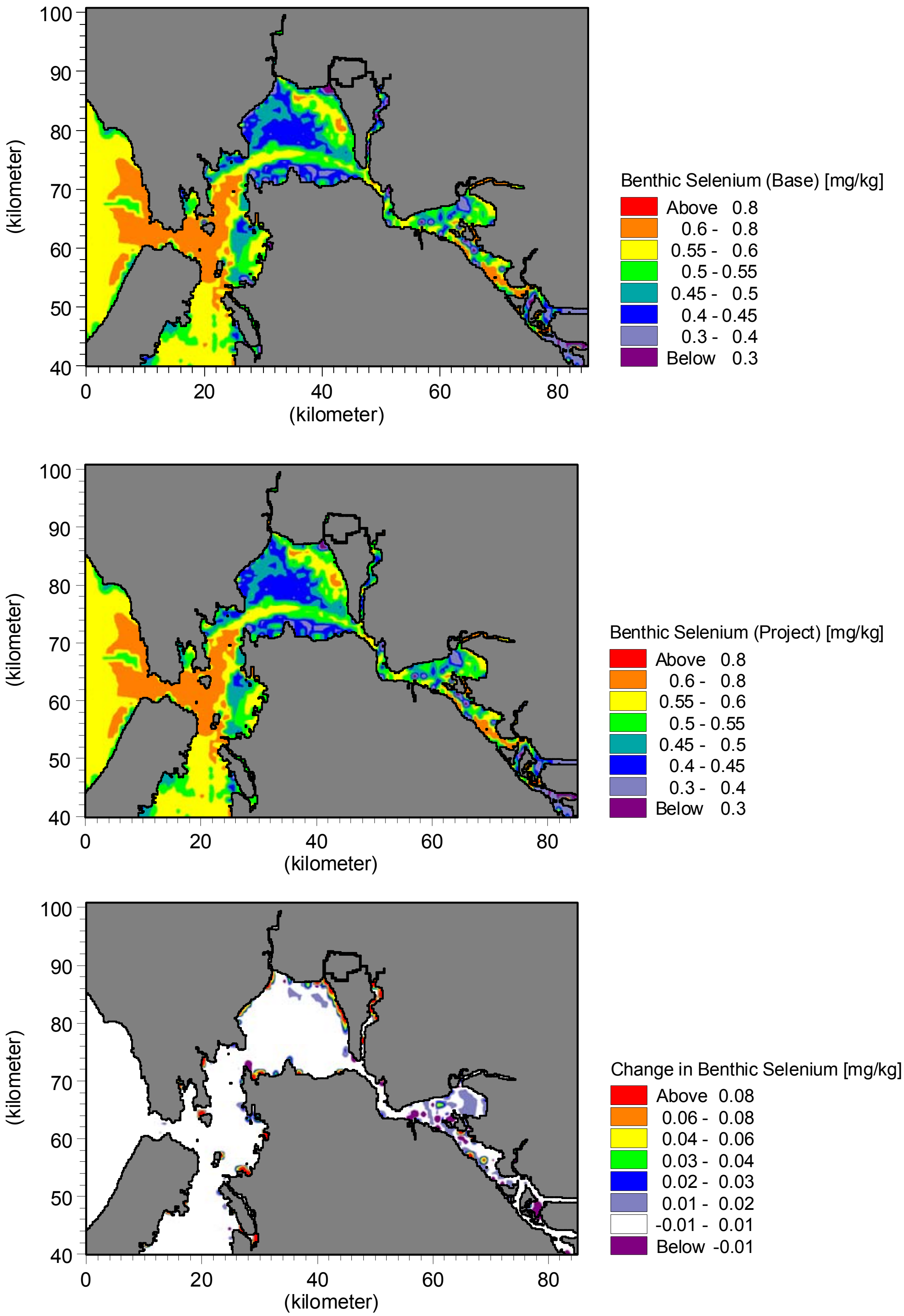
San Luis Drainage Feature Re-evaluation	MIKE 21 Chipps Discharge (June-November 1997) Mean Adsorbed Selenium Concentration and Difference from Baseline Conditions	Figure 5.2-27
17324004		



San Luis Drainage Feature Re-evaluation	MIKE 21 Chipps Discharge (June-November 1997) Benthic Selenium Concentrations Due to Project and Incremental Change from Baseline Conditions	Figure 5.2-28
17324004		



San Luis Drainage Feature Re-evaluation	MIKE 21 Chipps Discharge (June-November 1997) Probability of Exceedance of Benthic Selenium Concentrations–Baseline and Project Conditions	Figure 5.2-29
17324004		



San Luis Drainage Feature Re-evaluation	MIKE 21 Chipps Discharge (June-November 1997) Mean Benthic Selenium Concentration and Difference from Baseline Conditions	Figure 5.2-30
17324004		

Total Organic Carbon

TOC concentrations are predicted to increase by a maximum of 0.005 mg/L and by an average of 0.002 mg/L at Rock Slough. These increases are negligible compared to the existing concentrations, and the effect is not significant.

Total Dissolved Solids

Adding drainwater to the Delta at Chipps Island exacerbates the already high TDS level. The model predicts an increase by 15 to >35 mg/L up to a total concentration range of 4,000 to 10,000 mg/L at Mallard Slough. The increase is less than 5 percent, and water quality standards would not be exceeded due to the additional flow. The effect is not considered significant.

Selenium

The model predicts the level of total Se to increase by less than 0.14 µg/L to a total concentration of 0.1 to 0.27 µg/L in the North Bay. The level of dissolved Se would change by less than 0.07 µg/L for a total concentration range of 0.08 to 0.18 µg/L in the North Bay. The level of adsorbed Se would change by less than 0.08 mg/kg to a total concentration range of 0.3 to 0.6 mg/kg in the North Bay. The level of benthic Se would change by less than 0.02 mg/kg near the discharge for a total concentration range of 0.2 to 0.8 mg/kg in the North Bay. While the predicted changes are all over 4 percent, the total Se concentration is significantly lower than the MCL of 50 µg/L. Therefore, the Delta-Chipps Island Disposal Alternative would not cause a significant effect on drinking water.

Nutrients

No significant increase in nutrient loading is expected to occur as a result of this alternative due to the use of biological treatment systems.

5.2.10 Delta-Carquinez Strait Disposal Alternative

Under this alternative the drainwater would come from a treatment facility collector point at South Dos Palos through the existing San Luis Drain. The drainwater would be conveyed northwest through a new pipeline or open canal and two pump stations and be disposed of at a point in Carquinez Strait near the community of Crockett. The outfall would be affected by ocean tides.

5.2.10.1 Construction Effects

The conveyance system traverses through mostly flat and gently sloping land. Canals would be designed with a concrete lining to reduce infiltration. Construction effects would be mainly limited to soil erosion and resultant turbidity of surface streams. With mitigation effects would be reduced to not significant.

5.2.10.2 Operational Effects

Under the Delta-Carquinez Strait Disposal Alternative permitted discharges from the GDA to the Lower San Joaquin River as a part of the Grassland Bypass Project would be discontinued.

Removal of the water and chemicals from the river is expected to result in a significant beneficial effect to the Se concentration in the Lower San Joaquin River. Improvements in the concentrations of salt and boron would also be significant although not as great as Se, due to the existence of other significant sources of these chemicals to the river.

Removal of drainwater associated with the Grassland Bypass Project from the Lower San Joaquin River would reduce the amount of dilution water required to be released from New Melones Reservoir to achieve the EC water quality objective at Vernalis. Modeling results shown in Appendix D4 indicate for the 10-year period from 1985 through 1995 the average reduction in dilution flow would be 21,000 AF/year. This is a significant beneficial effect to New Melones Reservoir Operations.

As discussed in the Delta-Chipps Island Disposal Alternative, a concern of these Delta Disposal Alternatives is the conveyance route from the San Joaquin Valley to the Delta that may be aligned along the Contra Costa Canal right-of-way in Contra Costa County. This alignment may receive a negative public reaction even if the two conveyances are completely separated. The alternative should be designed such that the conveyance is well away from and hydraulically isolated from the Contra Costa Canal.

5.2.10.3 Near-Field Changes

Results for all three Delta diffuser options are very similar. Under worst-case zero velocity conditions (both summer and winter), the contribution of the plume to Se concentrations would fall below 5 µg/L (the CTR criterion) at a depth of approximately 5.3 meters, approximately 0.3 meter above the diffuser ports. At this elevation, the plume would have traveled a horizontal distance of approximately 1.1 meters in the direction of the port angle. Under 0.91 meter/second current conditions (both summer and winter), the contribution of the plume to Se concentrations would fall below 5 µg/L at a depth of more than 5.3 meters, less than 0.2 meter above the diffuser ports. Assuming Delta flow in the same direction as the port angle, at this elevation the plume would have traveled a horizontal distance of approximately 0.7 meter in the direction of the port angle. If Delta flow is in the opposite direction to the port angle, the plume would travel a maximum horizontal distance of 0.5 meter before its contribution to Se concentrations would fall below 5 µg/L. Since diffusion occurs rapidly with each option, individual plumes from each port would not merge before the contribution to Se concentrations falls below 5 µg/L. Instead, individual port plumes would have a diameter of approximately 1.2 meters and remain distinct above each port, over the length of the diffuser. At the point at which the contribution of the plume to Se concentrations falls below 5 µg/L, absolute concentrations of TDS, TOC, and bromide would vary widely based on ambient concentrations. However, at that point the contributions of the plume to TOC and bromide concentrations are estimated at 4.25 and 2.6 ppm, respectively. The TDS concentration at the 5 µg/L Se contour of the plume is approximately 19,000 mg/L, which is close to ambient concentration. In summary, WQOs would be met outside of the mixing zone, and the effect is not significant.

5.2.10.4 Far-Field Changes

Changes in TDS Concentrations

Predicted incremental TDS concentrations at the time-series monitoring stations shown on Figure 5.2-17 are less than 5 ppm at the drinking water intake at Oakley, 5 to 10 ppm at the Antioch intake, and 20 to 30 ppm at the Carquinez Strait discharge (Figures 5.2-31 and 5.2-32). These incremental changes are less than 1 percent of existing TDS concentrations. The area with incremental changes greater than 20 ppm is predominantly restricted to Carquinez Strait (lower plot on Figure 5.2-33). This effect is not significant due to the high ambient TDS concentrations at these locations.

Changes in Selenium Concentrations

Increases in total Se concentrations due to the project are not predicted to cause exceedance of the 5 µg/L WQO (upper plot on Figure 5.2-34); however, increases in either dissolved concentrations or concentration adsorbed to suspended or benthic particulate matter may enhance bioaccumulation to marine organisms. Consequently, changes are expressed in this section relative to the dissolved and adsorbed parameters.

Predicted dissolved concentrations at the six time-series monitoring stations shown on Figure 5.2-17 are generally less than 0.2 µg/L (dark lines on Figure 5.2-35). The exception is in the vicinity of Jersey Point, where concentrations are typically between 0.08 and 0.25 µg/L. Near the Carquinez Strait discharge, dissolved Se concentrations with the project are typically between 0.10 and 0.16 µg/L. Although increases in dissolved concentration are less than 0.01 µg/L at the easternmost Jersey Point station, they are as high as 0.02 µg/L near the Carquinez Strait discharge (light lines on the figure). The probability of dissolved concentrations exceeding 0.14 µg/L at this station consequently increase from 0 to 14 percent (Figure 5.2-36). As illustrated by the middle and lower plots on Figure 5.2-37, the area affected by the discharge is elongated from Carquinez Strait in the direction of the Pacific Ocean, with increases between 0.01 and 0.015 µg/L near the main channel of San Pablo Bay (lower plot on Figure 5.2-37).

Predicted adsorbed Se concentrations on suspended sediment are generally between 0.3 and 0.6 mg/kg, with the highest concentrations reaching 0.8 mg/kg near Jersey Point. Adsorbed Se concentrations near Carquinez Strait are generally between 0.4 and 0.6 mg/kg (dark lines on Figure 5.2-38). Although increases in adsorbed concentration are less than 0.03 mg/kg at the easternmost Jersey Point station, they are as high as 0.07 µg/L near the Carquinez Strait discharge (light lines on the figure). The probability of adsorbed concentrations exceeding 0.5 µg/L at this station increase from 4 to 22 percent (Figure 5.2-39). Similar to dissolved Se, the area affected by the discharge is elongated from Carquinez Strait in the direction of the Pacific Ocean boundary (middle and lower plots on Figure 5.2-40), causing increases between 0.03 and 0.05 mg/kg to occur near the main channel from the Golden Gate to Carquinez Strait (bottom plot on Figure 5.2-40).

Predicted adsorbed Se concentrations on benthic sediment are generally between 0.2 and 0.4 mg/kg near the Delta and Suisun Bay, 0.4 to 0.6 mg/kg near Carquinez Strait, and 0.4 to 0.7 mg/kg in San Pablo and Central bays (dark curves on Figure 5.2-41). Part of the explanation for the lower concentrations near the Delta is that the majority of sediment transported and ultimately deposited near there is from the Sacramento River (with an average adsorbed concentration on suspended sediment of 0.2 mg/kg). Only a small increase near Carquinez Strait is a direct consequence of the San Luis Drain discharge (compare dark and light lines on Figures 5.2-41 and 5.2-42). Finally, the higher Se concentration on benthic sediment in the Central Bay is possibly a model artifact, where the effect of sand on the total benthic concentration cannot be included. As illustrated on Figure 5.2-43 (bottom plot), an incremental increase of between 0.01 and 0.02 mg/kg occurs in the benthic Se concentration in San Pablo Bay. Higher increases are mainly shown to occur at land-water boundaries and are due to limitations of the model.

5.2.10.5 Drinking Water Supplies

Disposing water to Carquinez Strait, in the Delta, does not pose as much threat to drinking water supplies as the Delta-Chipps Island Disposal Alternative because the Strait has more tidal action and is farther removed from the drinking water intakes. Although the nearest CCWD drinking water intake, Mallard Slough, is located far upstream from Carquinez Strait, the drainwater would still mix and migrate upstream, possibly affecting the CCWD drinking water intakes.

Bromide

No significant effect is predicted for bromide based on the results of the far-field modeling for Chipps Island Discharge (which did not show significant effects) and the fact that the Carquinez drainage location is further down the estuary.

Total Organic Carbon

No significant effect is predicted for TOC based on the results of the far-field modeling for Chipps Island Discharge (which did not show significant effects) and the fact that the Carquinez drainage location is further down the estuary.

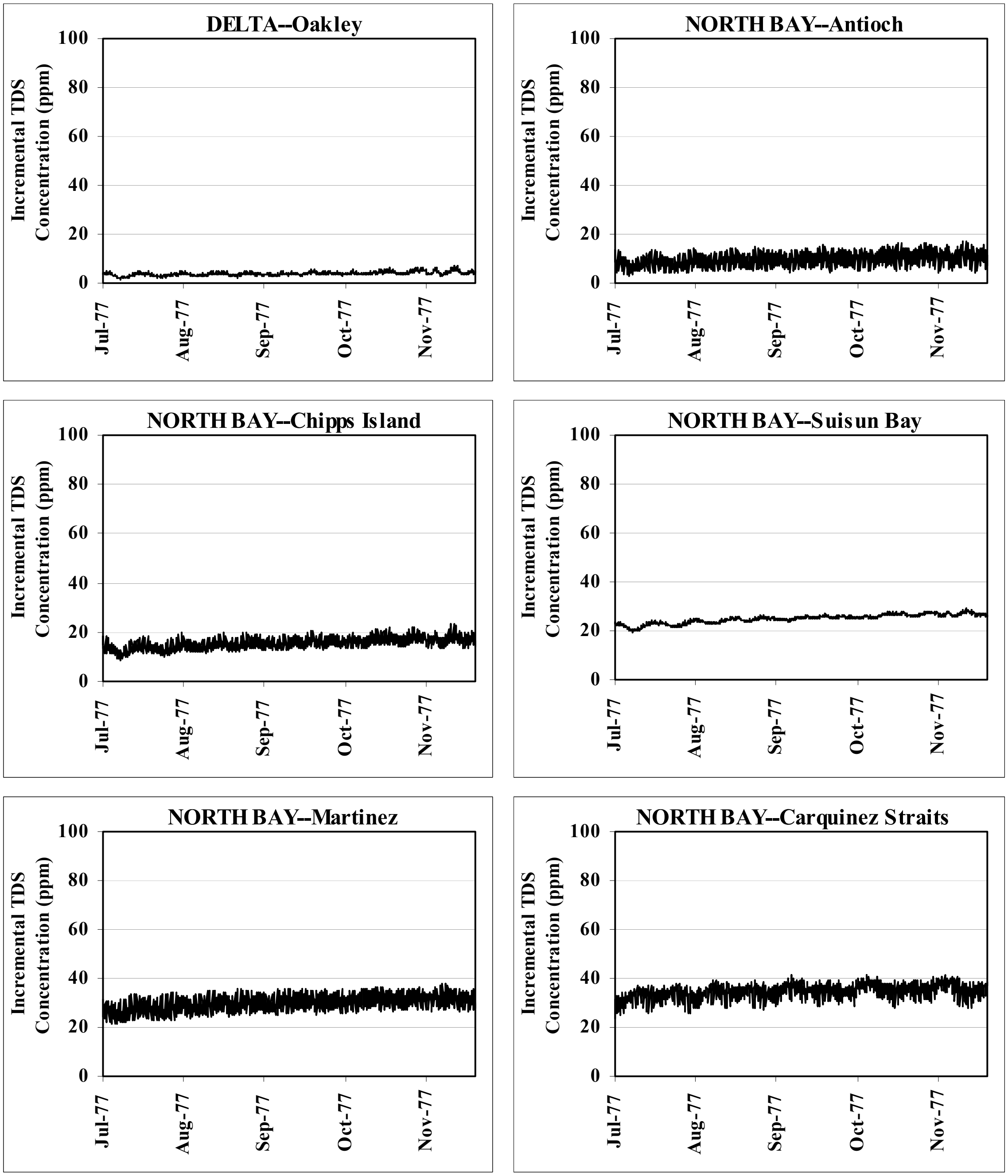
Total Dissolved Solids

The model predicts the TDS level at the Mallard Slough drinking water intake to increase by 3 to 15 mg/L to a total concentration range of 2,000 to 10,000 mg/L. Current concentrations at Mallard Slough are already extremely high in TDS with an average of 2,290 mg/L and range of 80 to 7,500 mg/L. Adding drainwater to the Delta at Carquinez Strait would not significantly impair the Mallard Slough TDS level.

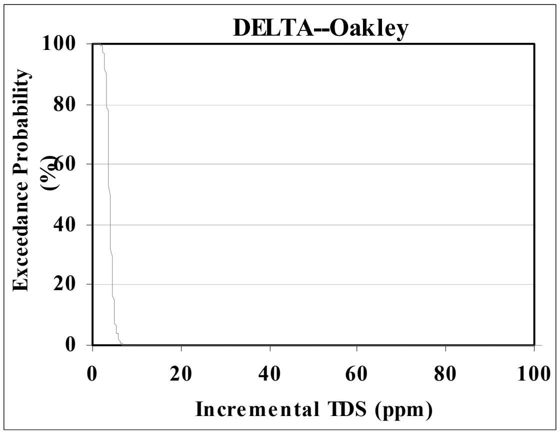
Based on numerical modeling at a flow of 29.1 cfs of drainwater to the Delta at Carquinez Strait, this alternative provides a negligible increase in the total estuary flow of salts and concentrations at the Rock Slough and Old River intakes.

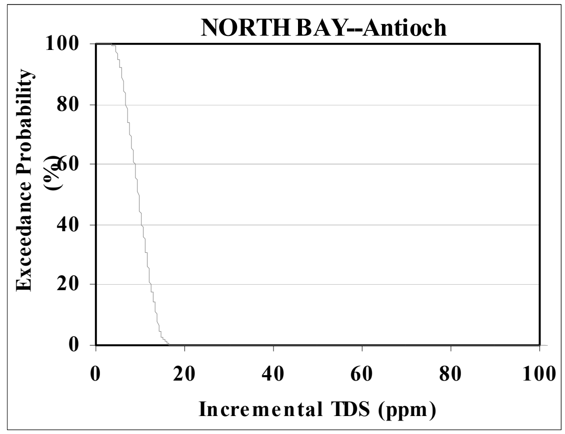
Selenium

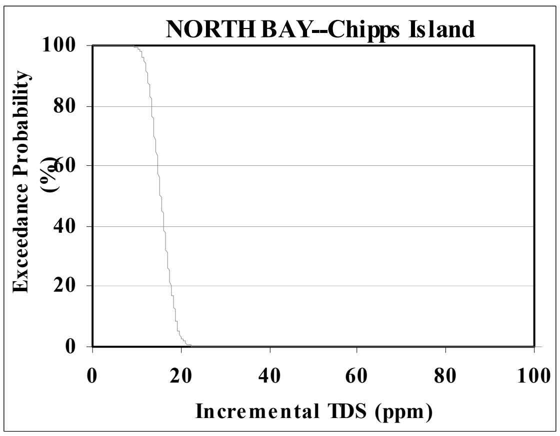
The model predicts the level of total Se to increase by less than 0.04 µg/L to a total concentration range of 0.1 to 0.27 µg/L in the North Bay. The level of dissolved Se would change by less than 0.02 µg/L to a total concentration range of 0.08 to 0.16 µg/L. The level of adsorbed Se will increase by less than 0.07 mg/kg to a total concentration range of 0.3 to 0.6 mg/kg. Benthic Se is also predicted to increase, by less than 0.01 mg/kg near the discharge, to a total amount of 0.2 to 0.8 mg/kg in the North Bay. While the predicted changes are all over 3 percent, they would not cause any drinking water standards to be violated and are, therefore, not considered significant.

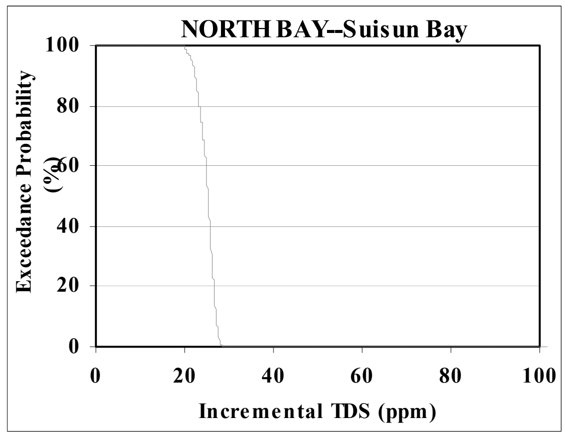


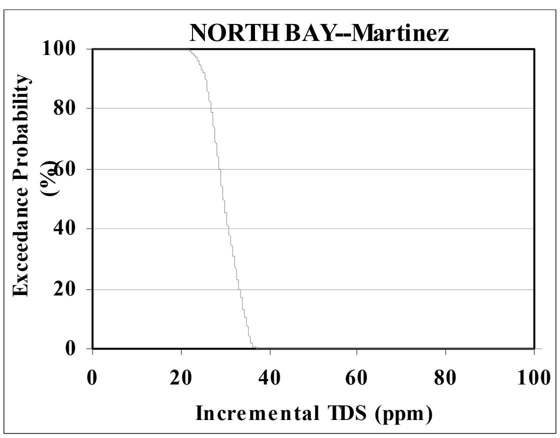
San Luis Drainage Feature Re-evaluation	MIKE 21 Carquinez Discharge (July-Dec 1977) Total Dissolved Solids Concentrations Expressed as Incremental Change from Baseline Conditions	Figure 5.2-31
17324004		

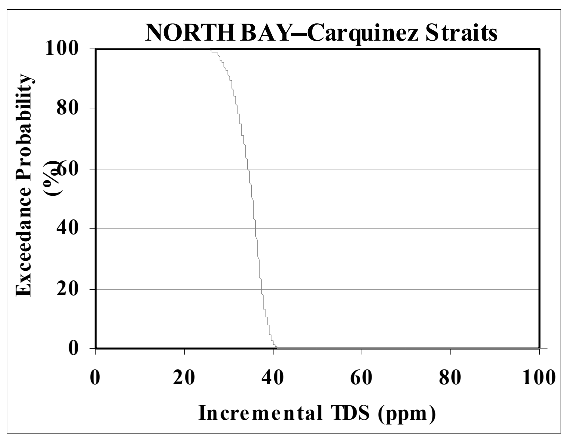




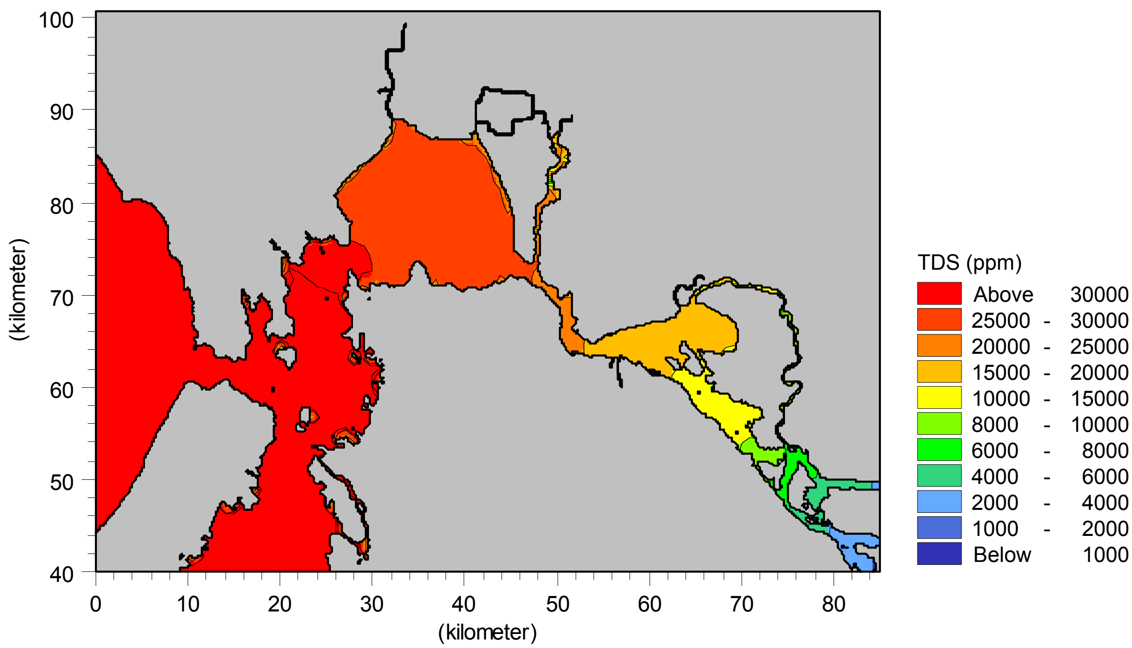


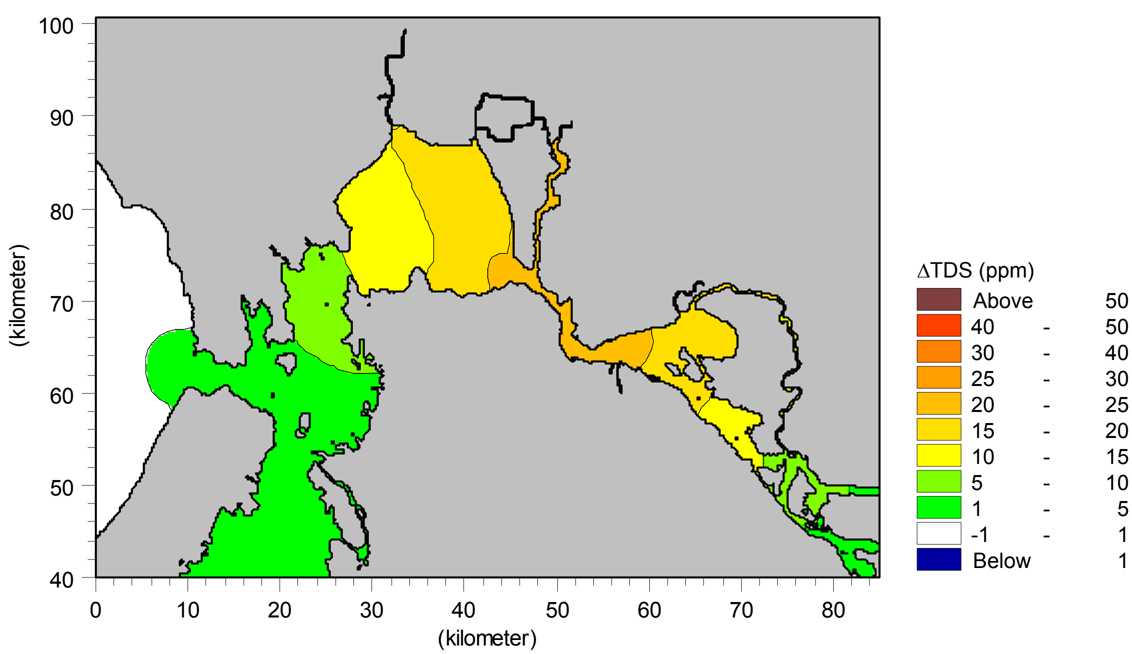




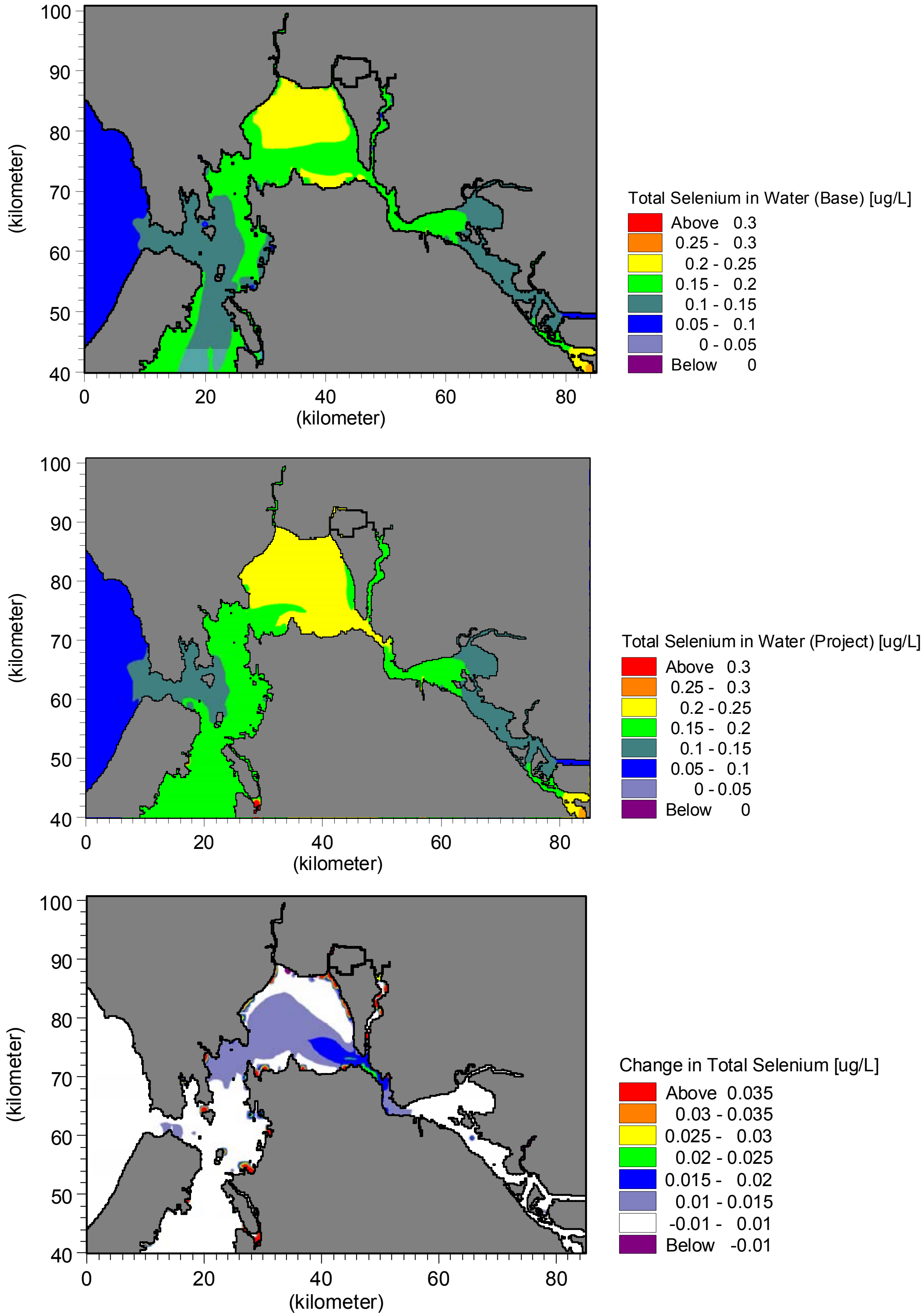


San Luis Drainage Feature Re-evaluation	MIKE 21 Carquinez Discharge (July-Dec 1977) Probability of Exceedance of Incremental TDS Concentrations	Figure 5.2-32
17324004		

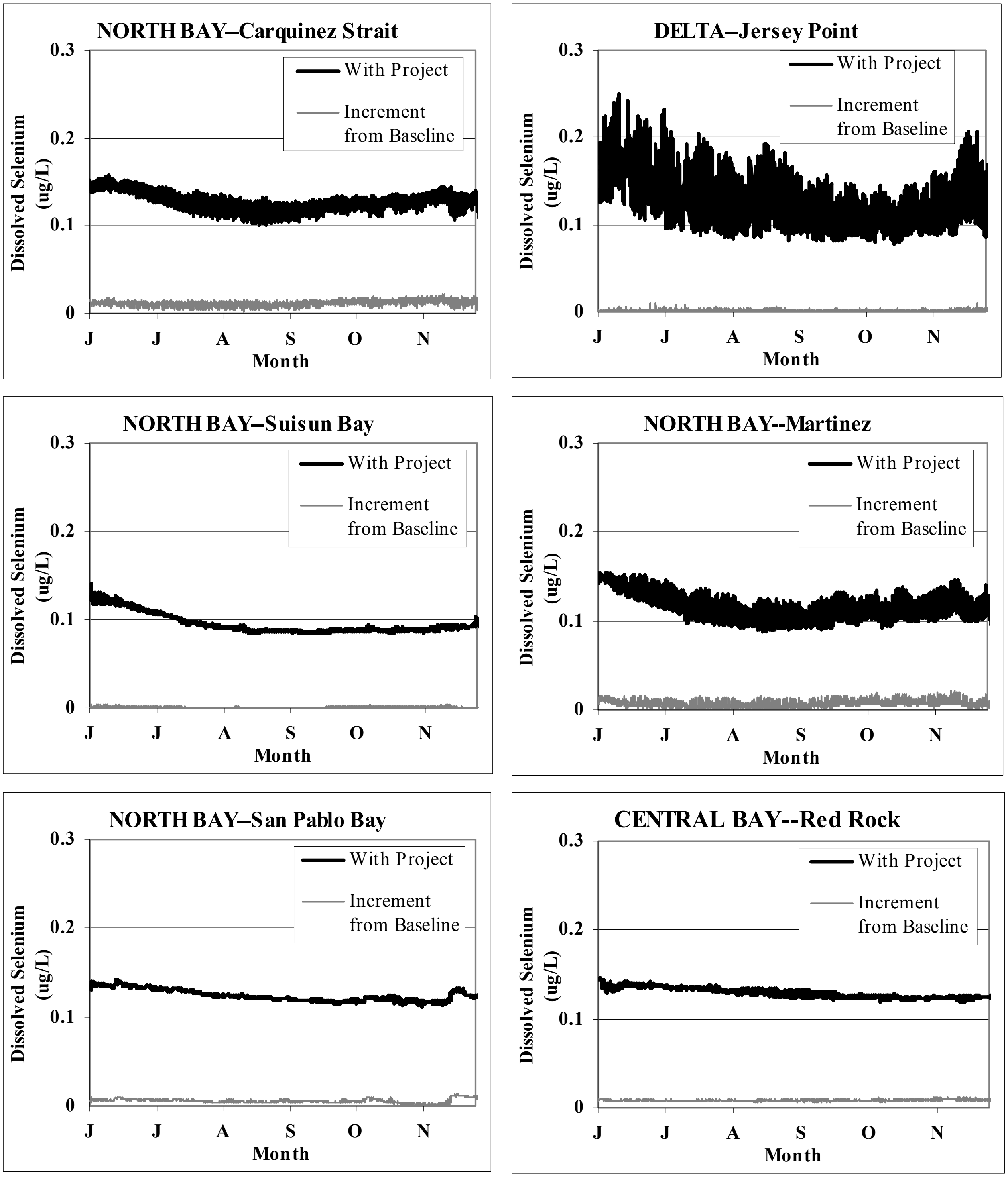




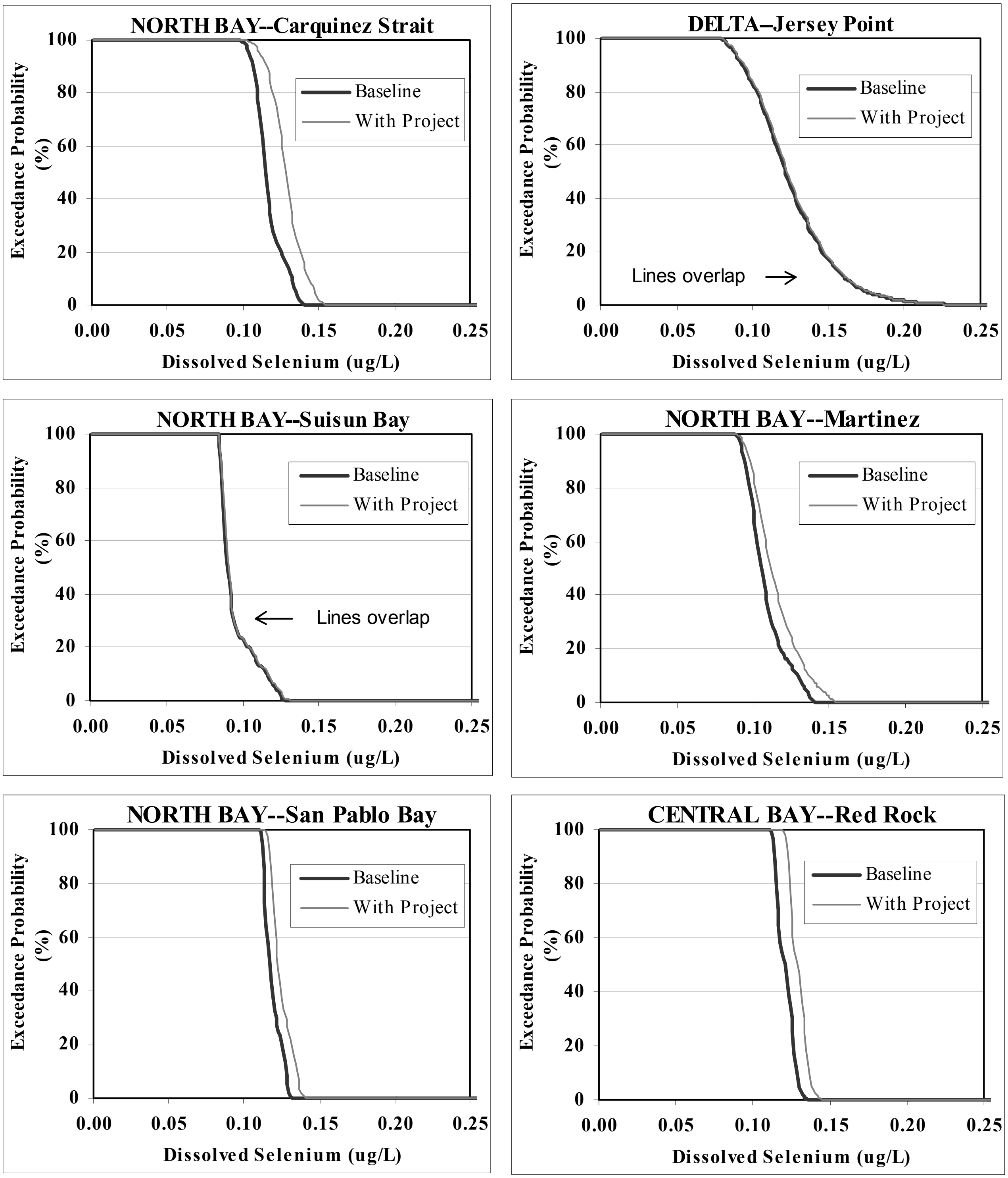
San Luis Drainage Feature Re-evaluation	MIKE 21 Carquinez Discharge (July-Dec 1977) Mean Total Dissolved Solids Concentration (TOP) Difference from Baseline Conditions (BOTTOM)	Figure 5.2-33
17324004		



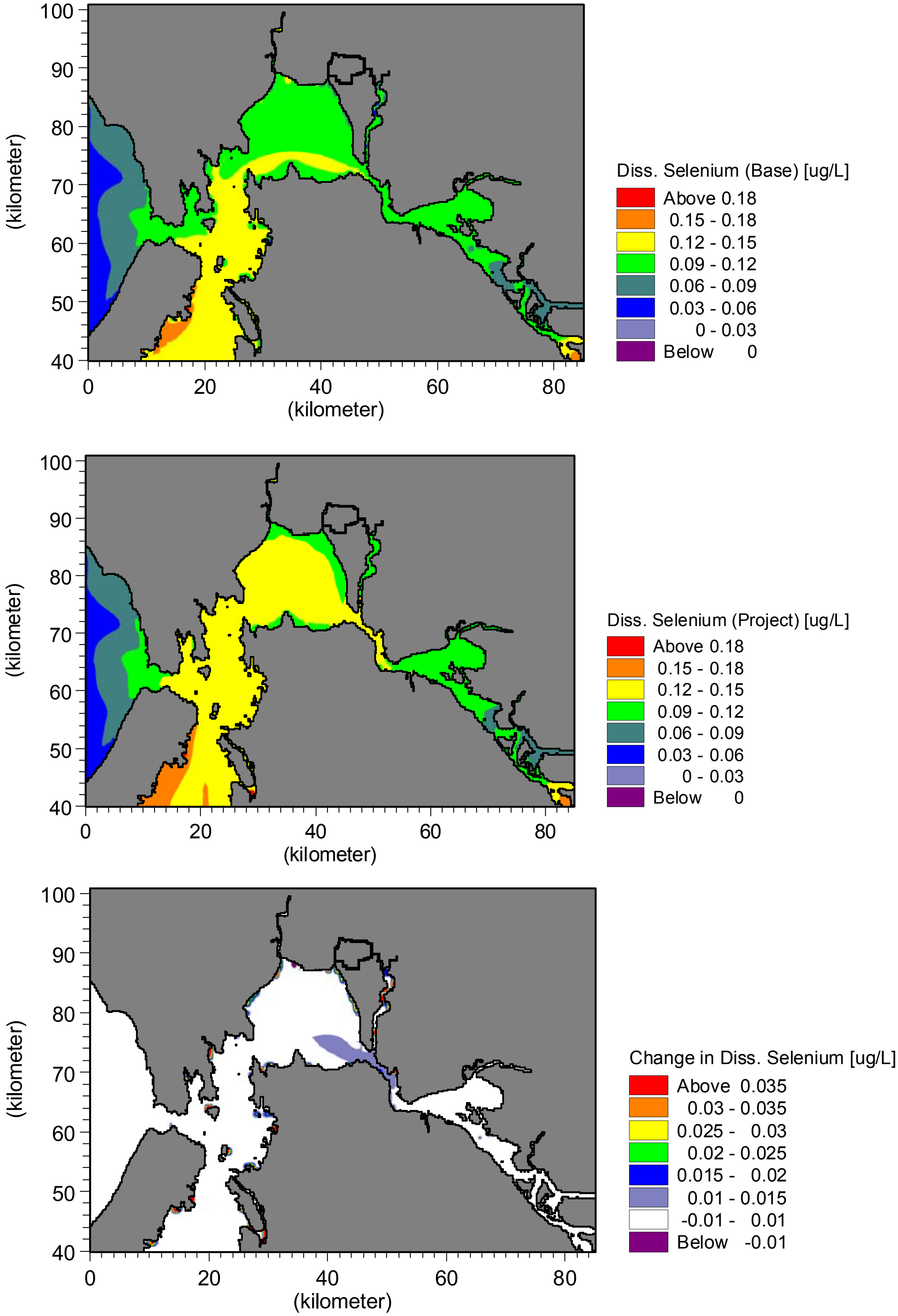
San Luis Drainage Feature Re-evaluation	MIKE 21 Carquinez Discharge (June-November 1997) Mean Total Selenium Concentration and Difference from Baseline Conditions	Figure 5.2-34
17324004		



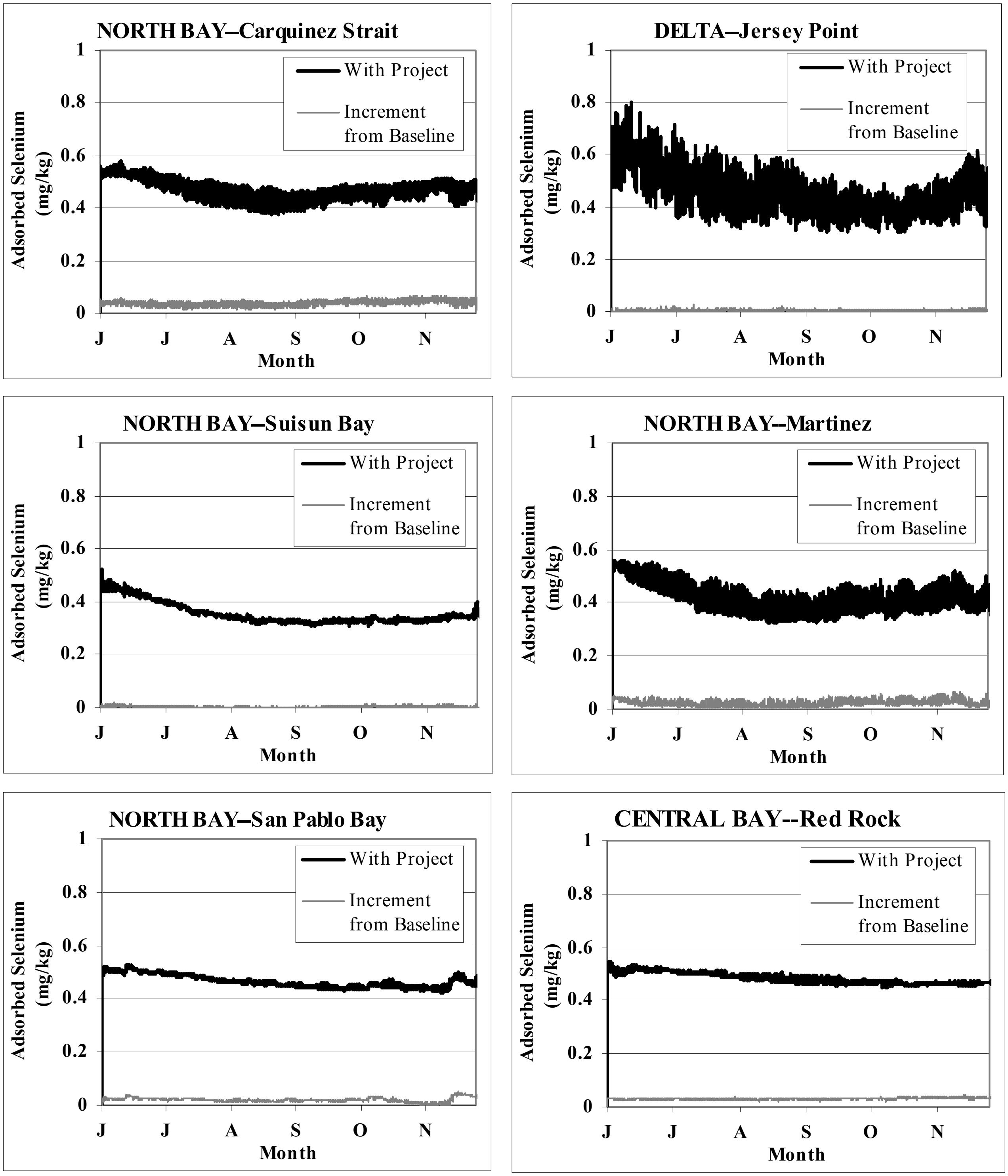
San Luis Drainage Feature Re-evaluation	MIKE 21 Carquinez Discharge (June-November 1997) Dissolved Selenium Concentrations Due to Project and Incremental Change from Baseline Conditions	Figure 5.2-35
17324004		



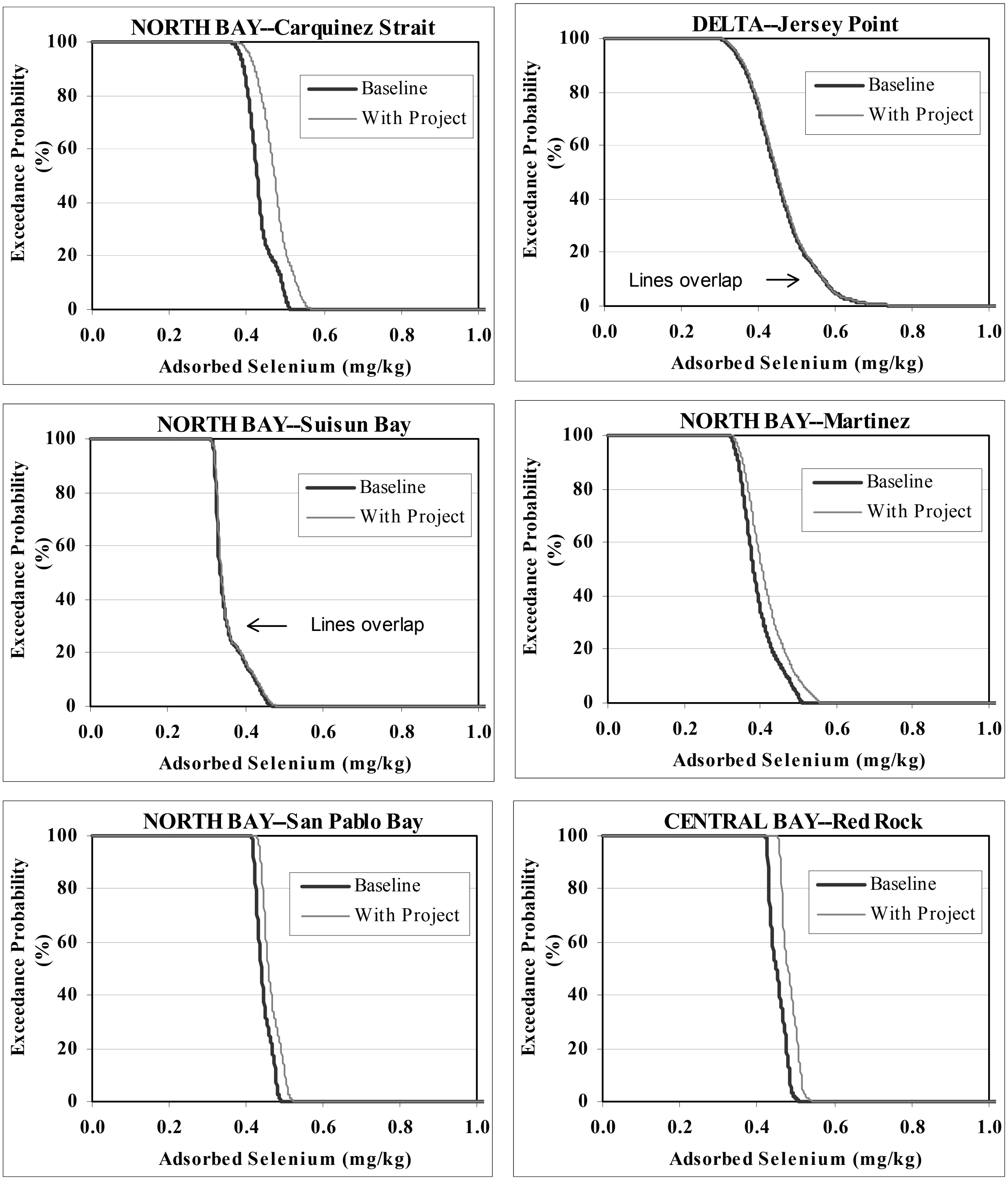
San Luis Drainage Feature Re-evaluation	MIKE 21 Carquinez Discharge (June-November 1997) Probability of Exceedance of Dissolved Selenium Concentrations–Baseline and Project Conditions	Figure 5.2-36
17324004		



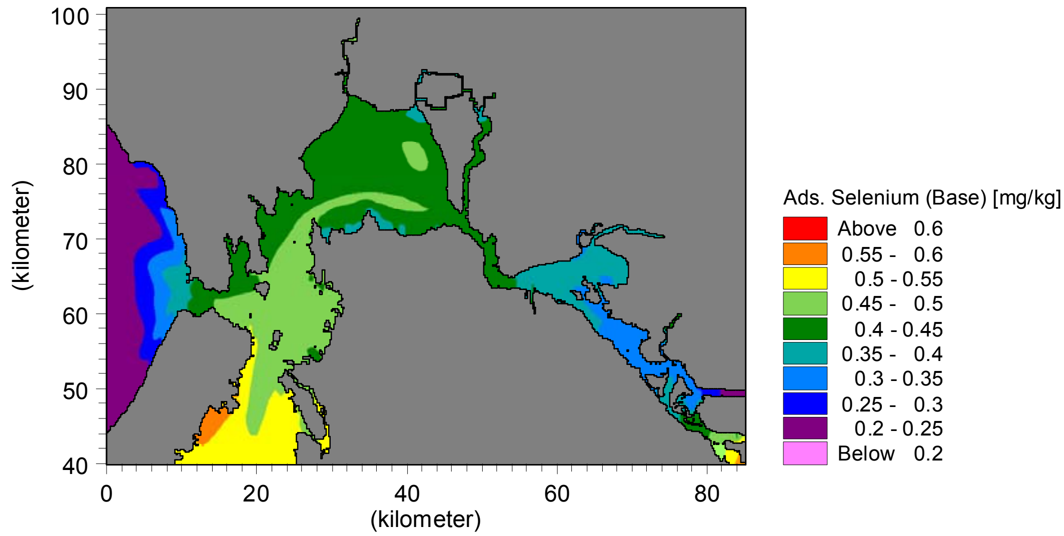
San Luis Drainage Feature Re-evaluation	MIKE 21 Carquinez Discharge (June-November 1997) Mean Dissolved Selenium Concentration and Difference from Baseline Conditions	Figure 5.2-37
17324004		

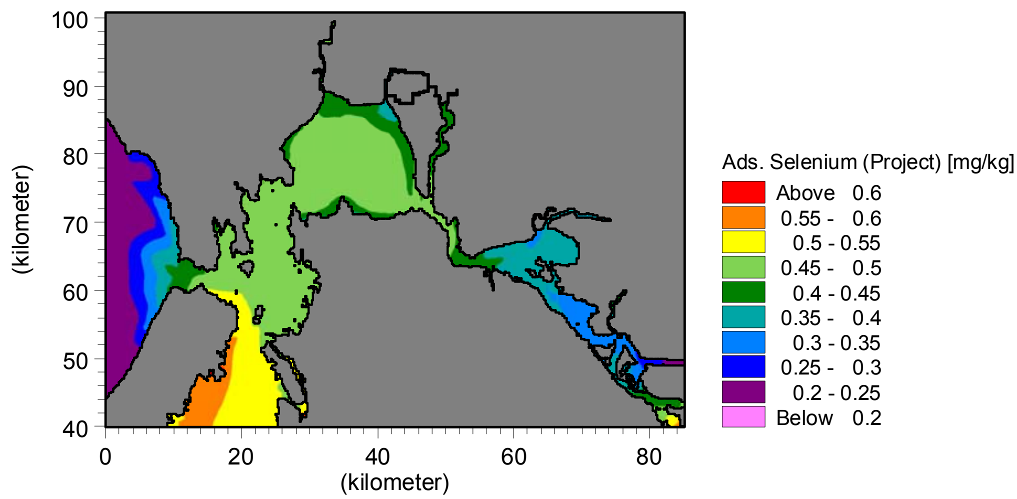


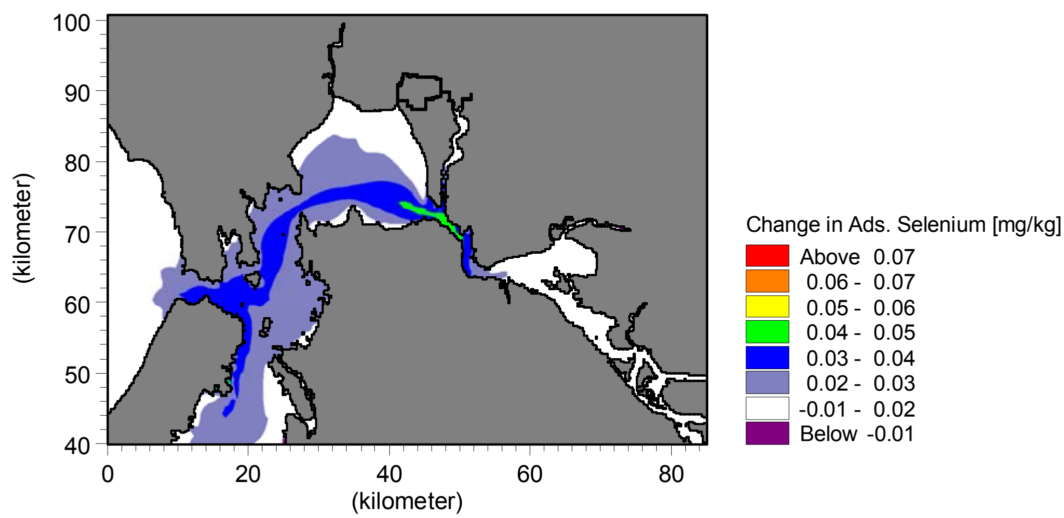
San Luis Drainage Feature Re-evaluation	MIKE 21 Carquinez Discharge (June-November 1997) Adsorbed Selenium Concentrations Due to Project and Incremental Change from Baseline Conditions	Figure 5.2-38
17324004		



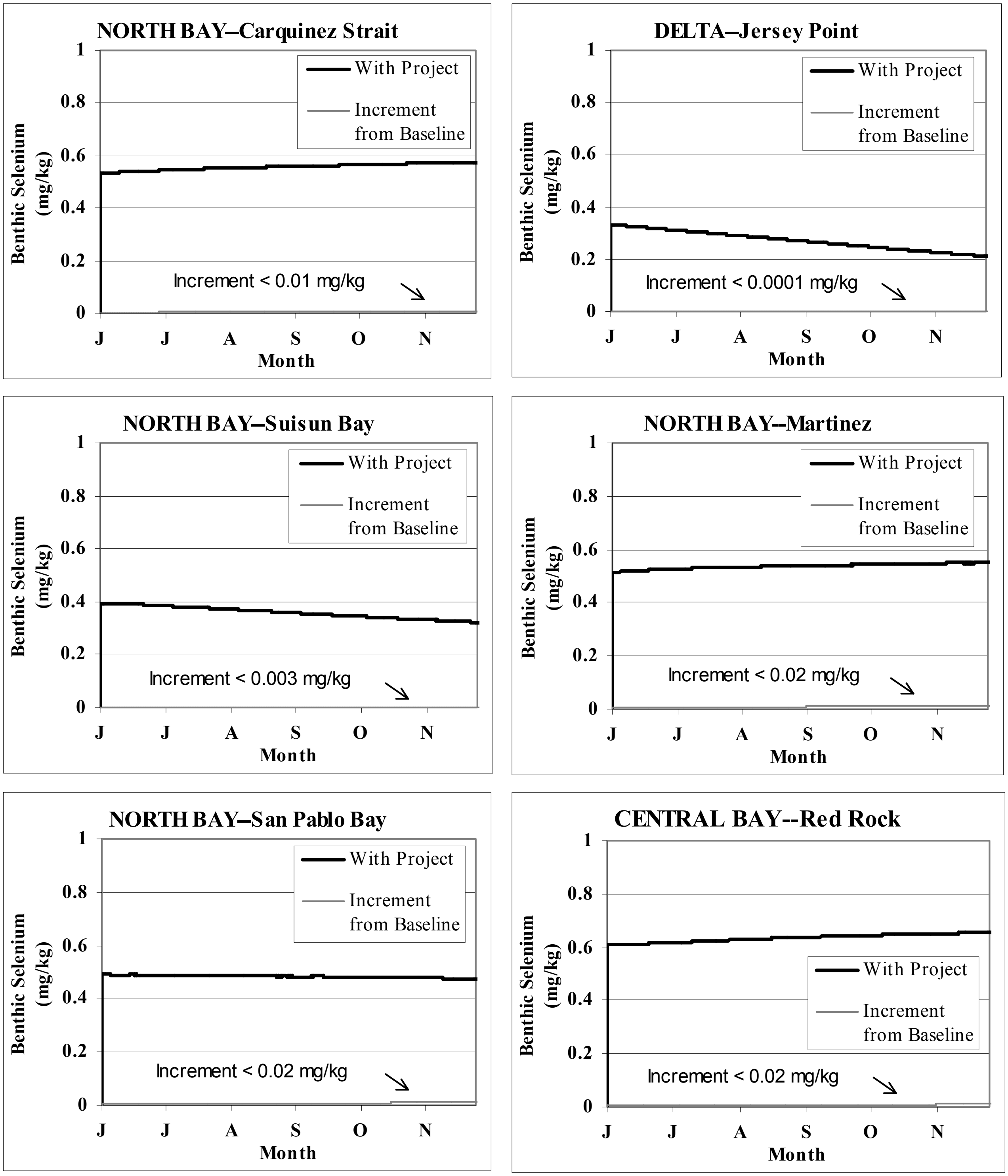
San Luis Drainage Feature Re-evaluation	MIKE 21 Carquinez Discharge (June-November 1997) Probability of Exceedance of Adsorbed Selenium Concentrations–Baseline and Project Conditions	Figure 5.2-39
17324004		



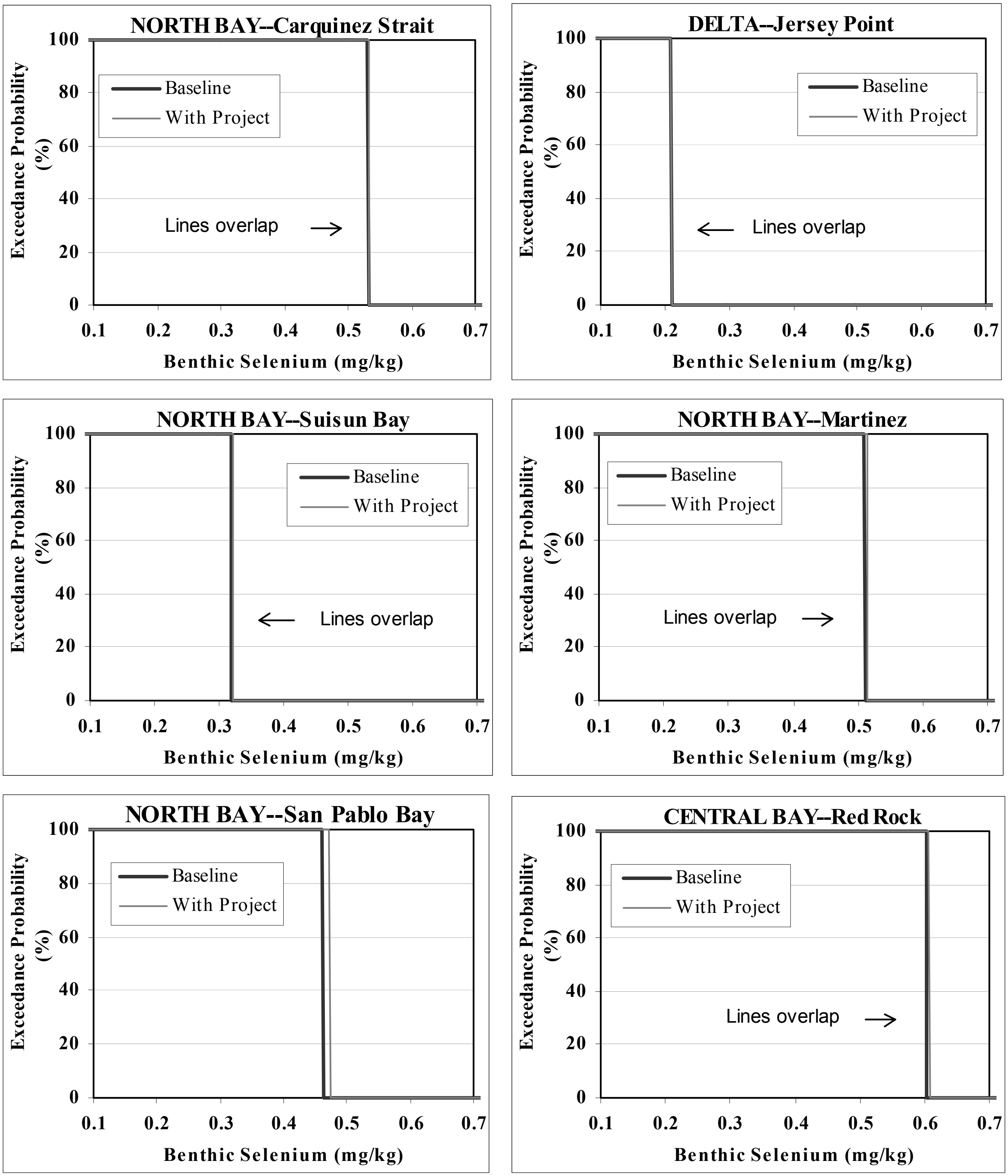




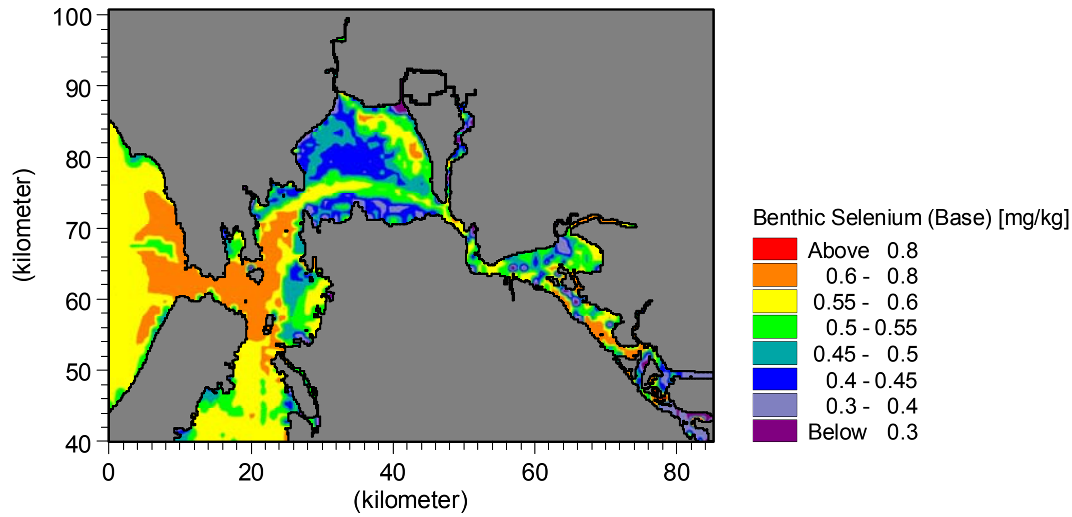
San Luis Drainage Feature Re-evaluation 17324004	MIKE 21 Carquinez Discharge (June-November 1997) Mean Adsorbed Selenium Concentration and Difference from Baseline Conditions	Figure 5.2-40

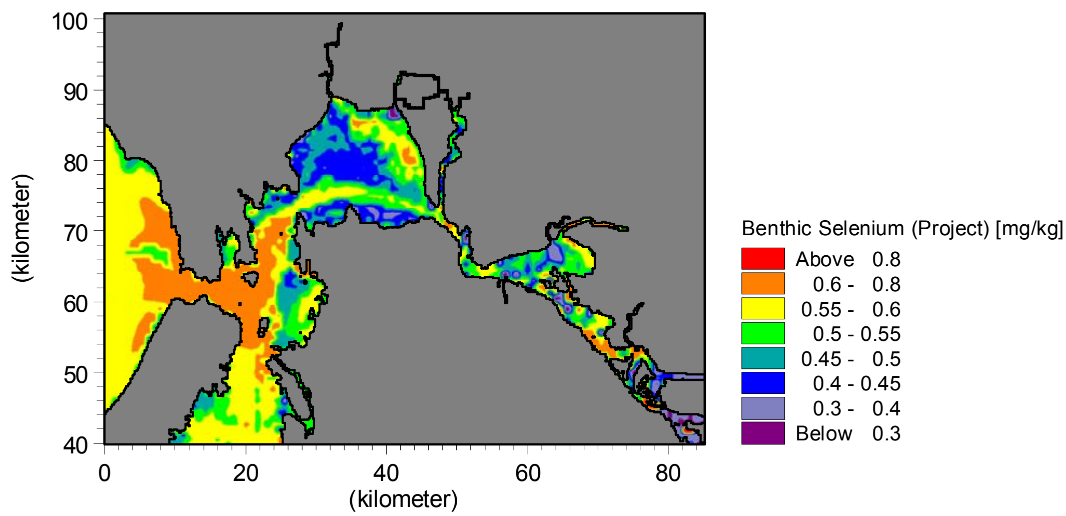


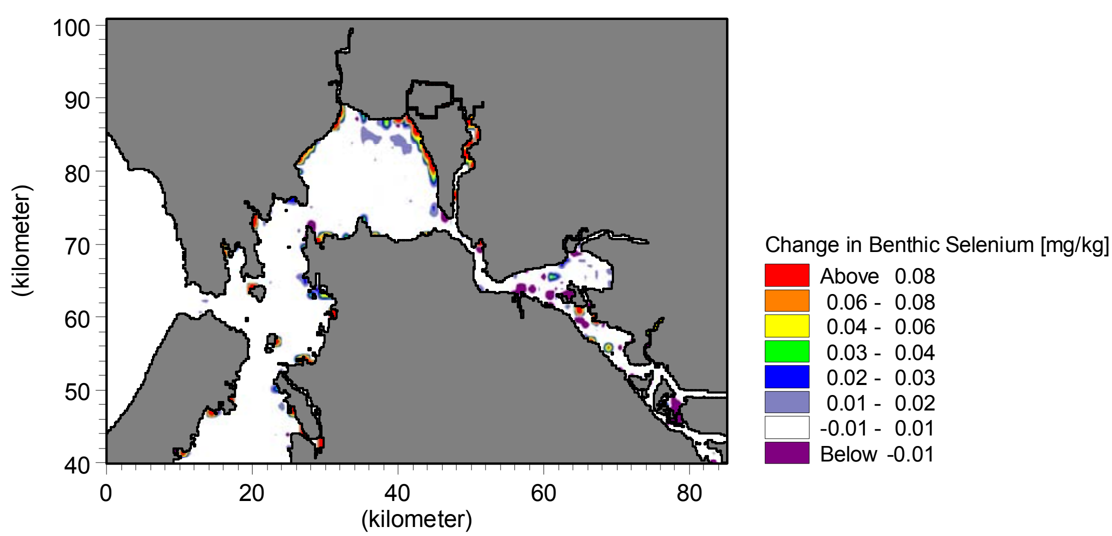
San Luis Drainage Feature Re-evaluation	MIKE 21 Carquinez Discharge (June-November 1997) Benthic Selenium Concentrations Due to Project and Incremental Change from Baseline Conditions	Figure 5.2-41
17324004		



San Luis Drainage Feature Re-evaluation	MIKE 21 Carquinez Discharge (June-November 1997) Probability of Exceedance of Benthic Selenium Concentrations–Baseline and Project Conditions	Figure 5.2-42
17324004		







San Luis Drainage Feature Re-evaluation	MIKE 21 Carquinez Discharge (June-November 1997) Mean Benthic Selenium Concentration and Difference from Baseline Conditions	Figure 5.2-43
17324004		

Nutrients

No significant increase in nutrient loading is expected to occur as a result of this alternative.

5.2.11 Bay-Delta Modeling Results Summary for Delta Disposal Alternatives

5.2.11.1 FDM-Predicted Changes in TDS Concentrations

For the Contra Costa intake at Rock Slough, the simulation data show the probability that a 5 ppm TDS increment would be exceeded about 30 percent of the time. For the Contra Costa intake at Rock Slough, the computed TDS concentration increment never exceeded 20 ppm. At Clifton Court Forebay, the computed salinity increment exceeded 10 ppm less than 10 percent of the time.

5.2.11.2 MIKE 21-Predicted Changes in TDS Concentrations

During an extreme drought period such as 1977, average TDS concentrations at the drinking water intakes at Oakley and Antioch are predicted to increase by 10 and 30 ppm due to a Chipps Island discharge (Table 5.2-8). For a Carquinez Strait discharge, incremental changes are predicted to be between 0 and 10 ppm, respectively. Given that average concentrations are between 3,000 and 7,000 ppm, the water during this period is unusable for drinking water even without the discharge.

Table 5.2-8
Mean Total Dissolved Solids Concentration (July–December 1977)

Station Name	Total Dissolved Solids (ppm)		
	Existing Conditions	Chipps Island Discharge Increment	Carquinez Strait Discharge Increment
Oakley	3,380	10	0
Antioch	6,740	40	10
Chipps Island	10,290	50	20
Suisun Bay	15,780	40	20
Martinez	18,600	40	30
Carquinez Strait	23,600	20	30

5.2.11.3 MIKE 21-Predicted Changes in Selenium Concentrations

Incremental changes in dissolved Se are predicted to be between 0.01 and 0.03 µg/L at the discharge location (Table 5.2-9). The area of increases in concentration near the discharge location is larger for the Chipps Island discharge due to the greater tidal flushing and dispersion that occurs near Carquinez Strait. Incremental changes in adsorbed concentrations in the vicinity of the Chipps Island and Carquinez Strait discharges are predicted to be 0.05 and 0.04 mg/kg, respectively (Table 5.2-10), which increases the concentration at both locations by about 15 percent. Incremental changes due to the Chipps Island discharge are spread over a larger area, which is similar to the trend found for dissolved Se. Finally, benthic Se concentrations are predicted to change the least on a relative basis (Table 5.2-11); however, it is unclear from the time-series results that a steady-state concentration has been obtained after a 1-year simulation period. In no cases are the incremental changes described in this section of the EIS large enough to cause total concentrations to exceed WQOs.

Table 5.2-9
Mean Dissolved Selenium Concentration (June–November)

Station Name	Dissolved Se (µg/L)		
	Existing Conditions	Chipps Island Discharge Increment	Carquinez Strait Discharge Increment
Jersey Point	0.13	0.005	0.001
Chipps Island	0.09	0.026	---
Suisun Bay	0.09	0.011	0.001
Martinez	0.11	0.011	0.007
Carquinez Strait	0.12	---	0.012
San Pablo Bay	0.12	0.003	0.006
Red Rock	0.12	0.006	0.008

Table 5.2-10
Mean Adsorbed Selenium Concentration (June-November)

Station Name	Adsorbed Se on Suspended Sediment (mg/kg)		
	Existing Conditions	Chipps Island Discharge Increment	Carquinez Strait Discharge Increment
Jersey Point	0.46	0.02	0.003
Chipps Island	0.33	0.05	---
Suisun Bay	0.35	0.04	0.003
Martinez	0.39	0.04	0.022
Carquinez Strait	0.43	---	0.040
San Pablo Bay	0.44	0.01	0.021
Red Rock	0.45	0.02	0.031

Table 5.2-11
Mean Benthic Selenium Concentration (June–November)

Station Name	Adsorbed Se on Benthic Sediment (mg/kg)		
	Existing Conditions	Chipps Island Discharge Increment	Carquinez Strait Discharge Increment
Jersey Point	0.27	0.000	0.000
Chipps Island	0.71	0.011	---
Suisun Bay	0.36	0.005	0.001
Martinez	0.53	0.014	0.010
Carquinez Strait	0.55	---	0.005
San Pablo Bay	0.48	0.007	0.008
Red Rock	0.63	0.006	0.008

5.2.12 Cumulative Effects

Cumulative effects from other ongoing projects are included in the evaluation of the incremental, small effects associated with the action alternatives through use of recent data in the existing conditions and affected environment characterization. For future projects, such as implementation of TMDLs for Se in the San Joaquin River Basin, it was assumed that required actions needed to comply with discharge requirements would be taken under both the action and no action alternatives. As a result, the cumulative effects of future projects to comply with TMDLs are included in the analysis of effects on the San Joaquin River. Other specific programs that could result in changes to the affected environment are described below.

5.2.12.1 Development of Total Maximum Daily Loads for Salt and Boron

Issues related to salt and boron in the San Joaquin River are currently being addressed through the Basin Plan Amendment and the development of TMDLs for these parameters by the Regional Board. The TMDL development process includes participation of all dischargers to the river including the GAF. Under the draft TMDL, allowable discharge loads for salt and boron were developed for all categories of point and nonpoint source dischargers. The allowable loads take into account the assimilative capacity of the receiving water and background sources and margin of safety, and would be designed to achieve the applicable TDS and boron WQOs in the San Joaquin River. Load allocations in the draft TMDL are already included in the San Joaquin River model baseline.

5.2.12.2 San Joaquin Valley Drainage Implementation Program

The San Joaquin Valley Drainage Implementation Program is a Federal-State interagency organization developed to implement actions needed to effectively manage agricultural drainage. The focus of this program for the past decade is implementation of the Management Plan for Agricultural Drainage Waters for the Western San Joaquin Valley, also known as the Rainbow Report, the developed in the 1980s (SJVDP 1990). Development and implementation of the In-Valley Alternative is consistent with the actions planned by the Drainage Program.

5.2.12.3 Central Valley Project Improvement Act

The CVPIA amends the previous authorizations of the CVP to include fish and wildlife protection, restoration, and mitigation as project purposes having equal priority with irrigation and domestic uses and fish and wildlife enhancement as a project purpose equal to power generation (Reclamation and Service 1999). In response to these requirements the U.S. Department of the Interior is developing programs to improve environmental conditions and modify operations, management, and physical facilities of the CVP. The primary element in the preferred alternative described in the Final Programmatic EIS potentially affecting the project area involves acquisition and delivery of an additional 110,000 AF per year of water for fish and wildlife on the San Joaquin River and tributaries.

Refuges in the project area receiving approximately 270,000 AF per year are hydrologically connected to San Joaquin River. Delivery of this additional water to wetlands and its subsequent release back to the San Joaquin River, primarily during April and May, could result in higher river flows that could provide additional assimilative capacity in the San Joaquin River and tributaries for Se during these months. This is a potential beneficial effect for the San Joaquin River.

Wetland water releases are elevated in TDS and organic carbon, constituents of concern to municipal drinking water supplies. Therefore, the load of organic carbon and TDS discharged to the San Joaquin River may increase as a result of the CVPIA. The Final Programmatic EIS indicated effects to drinking water agencies that remove water from the Delta could be significant during the spring and early summer for dissolved organic carbon. Effects for TDS were not significant for the Delta following mitigation and not significant (generally less than 10 percent different) for the San Joaquin River at Vernalis. Therefore, the action alternatives would remove drainwater from the River, thereby resulting in a benefit to the San Joaquin River and south Delta.

5.2.12.4 Interim South Delta Program

The Interim South Delta Program is a program of actions proposed by DWR designed to improve the quality of diverted water while protecting fisheries resources in the south Delta. The Interim South Delta Program facilities include three flow control structures (located at Middle River, Grant Line Canal, and Old River) and a fish control structure at the head of Old River (CALFED 2000a). The action alternatives would not interfere with this program, as drainwater would be removed from the River.

5.2.12.5 CALFED Bay-Delta Program

The CALFED Bay-Delta Program was established in 1995. CALFED is a consortium of five State and ten Federal agencies with management and regulatory responsibilities in the Bay-Delta. The State and Federal agencies pledged to (1) coordinate their implementation of water quality standards to protect the Bay-Delta, (2) coordinate the operation of the State Water Project and CVP, which both involve transporting freshwater through the Delta to points south, and (3) develop a process to establish a long-term Bay-Delta solution that will address four categories of problems: ecosystem quality, water quality, water supply reliability, and levee system vulnerability (CALFED 2000a). For water quality the primary concern was focused on effects to drinking water and agricultural supplies derived from the Bay-Delta due to elevated salts, organic carbon, and bromide.

The CALFED Final Programmatic EIR/EIS was released in 2000 (CALFED 2000a). The preferred CALFED alternative includes construction of an operable barrier at the head of Old River as well as construction of other operable barriers, or their equivalent, taking into account fisheries, water quality, and water storage needs in the south Delta. The effects evaluation in the Programmatic EIR/EIS indicates salinity would be improved at the major diversions to the State Water Project and CVP (Clifton Court Forebay), resulting in lower salt loads in irrigation deliveries water. This effect would be beneficial to agriculture. The effect on drainwater quality and production would likely also be beneficial, although factors that cannot currently be predicted (such as water delivery volumes) make it difficult to predict the effect of this action. Results of the analysis also indicate the salinity of drinking water diversions at Rock Slough would decrease, which would result in cumulative effects that are beneficial.

5.2.12.6 Vernalis Adaptive Management Plan

The VAMP is designed to provide augmented flows to the San Joaquin River to benefit fish migration. This plan (implemented under the San Joaquin River Agreement) resulted in the planned releases of up to 110,000 AF (or more under some hydrologic conditions) during the April to May period, and an additional 12,500 AF of flow during the month of October. Approximately 80,000 AF of supplemental flow occurred in Water Year 1999. The influence of these flows is included in the receiving water model, which used hydrology data from Water Year 1999 as the calibration year for the Above Normal condition (see Appendix D, Section D4). Therefore, cumulative effects of these flows have already been included in the analysis of the action alternatives.

5.2.12.7 Water Transfer Program for the San Joaquin River Exchange Contractors Water Authority

The Exchange Contractors have been making water available for transfer to San Joaquin Valley wildlife refuges since 1998. Reclamation has been purchasing water for transfer to the refuges as Incremental Level 4 water designated in the CVPIA Section 3406(d)(2). The proposed transfer program for 2005–2014 calls for water development of up to 130,000 AF/year including up to 80,000 AF/year from conservation/tailwater recovery. Tailwater recapture efforts would increase by 16,365 feet (10,365 AF above the baseline) during noncritical years to develop 80,000 AF of transfer water, with a commensurate reduction in return flows to the San Joaquin River and small reductions in flows at Vernalis. For each acre-foot of water recaptured, an acre-foot of water is removed from the river. The water quality of the tailwater is typically worse than the melded quality of water at Vernalis. Consequently, the removal of tailwater by the Exchange Contractors would improve water quality at Vernalis. If water is subsequently transferred to the refuges, some of the beneficial impact is negated due to return flows from the refuges. The combined effect of water development with water transfer to either the refuges and/or to other CVP contractors is explained in the Section 4 of the Final EIS/EIR on the proposed program (URS 2004).

5.2.12.8 Other Ocean Discharges in the Vicinity of Point Estero

Other discharges in the vicinity of Point Estero are described in Section 5.1. These discharges consist of treated municipal sewage, power plant cooling waters, and return flows from aquaculture. Cumulative effects could be present if the mixing zones for these discharges interacted and similar constituents were discharged under the Ocean Disposal Alternative. It is not expected that the discharge mixing zones would overlap, so no specific modeling has been conducted to evaluate the potential for overlap of the mixing zones based on the locations of the outfalls. Furthermore, none of the types of discharges that are present in the area are known to have specific compliance issues with Se.

5.2.13 Environmental Effects Summary

The following sections and tables summarize the evaluation of effects relative to the No Action Alternative and existing conditions. Tables 5.2-12 through 5.2-19 summarize the effects of the No Action Alternative and action alternatives on surface water resources.

5.2.13.1 No Action Alternative

- Under the No Action Alternative, water quality for Se, TDS, and boron in the Lower San Joaquin River would continue to improve compared to existing conditions due to the implementation of control strategies by individual farmers to comply with the TMDL requirements for these constituents, but seepage and storm flows from the GDA into wetland channels would adversely affect the river.

5.2.13.2 In-Valley Disposal Alternative

- Under the In-Valley Disposal Alternative, water quality for Se, TDS, and boron in the San Joaquin River would improve compared to No Action and existing conditions due to the disposal of drainwater currently discharged to the river by the Grassland Bypass Project to be redirected to the In-Valley Disposal Alternative facilities. In comparison to No Action, the beneficial effect is significant.
- TDS in the Bay-Delta at drinking water intakes would not change significantly compared to No Action . Improvements in the water quality of the Lower San Joaquin River would be offset by lower New Melones Reservoir dilution releases required to comply with the Vernalis EC water quality objectives.
- Reservoir operations at New Melones would be beneficially affected by the reduction in required flow releases to meet the Vernalis EC water quality objective as a result of the In-Valley Disposal Alternative. This is a significant beneficial effect compared to No Action.
- Water quality in the Point Estero vicinity would not be affected by the In-Valley Disposal Alternative. The effect is not significant compared to the No Action Alternative.

5.2.13.3 In-Valley/Groundwater Quality Land Retirement Alternative

- Under the In-Valley/Groundwater Quality Land Retirement Alternative, water quality for Se, TDS, and boron in the San Joaquin River would improve compared to No Action and existing conditions due to the disposal of drainwater currently discharged to the river by the Grassland Bypass Project to be redirected to the In-Valley/Groundwater Quality Land Retirement Alternative facilities. In comparison to No Action, the beneficial effect is significant.
- TDS in the Bay-Delta at drinking water intakes would not change significantly compared to No Action . Improvements in the water quality of the Lower San Joaquin River would be offset by lower New Melones Reservoir dilution releases required to comply with the Vernalis EC water quality objectives.
- Reservoir operations at New Melones would be beneficially affected by the reduction in required flow releases to meet the Vernalis EC water quality objective as a result of the In-Valley/Groundwater Quality Land Retirement Alternative. This is a significant beneficial effect compared to No Action.
- Water quality in the vicinity of Point Estero would not be affected by the In-Valley/Groundwater Quality Land Retirement Alternative. The effect is not significant compared to the No Action Alternative.

5.2.13.4 In-Valley/Water Needs Land Retirement Alternative

- Under the In-Valley/Water Needs Land Retirement Alternative, water quality for Se, TDS, and boron in the Lower San Joaquin River would improve compared to No Action and existing conditions due to the disposal of drainwater currently discharged to the river by the Grassland Bypass Project to be redirected to the In-Valley/Water Needs Land Retirement Alternative facilities. In comparison to No Action, the beneficial effect is significant.
- TDS in the Bay-Delta at drinking water intakes would not change compared to both No Action and existing conditions. Improvements in the water quality of the Lower San Joaquin River would be offset by lower New Melones Reservoir dilution releases required to comply with the Vernalis EC water quality objectives. The effect is not significant compared to the No Action Alternative.
- Reservoir operations at New Melones would be beneficially affected by the reduction in required flow releases to meet the Vernalis EC water quality objective as a result of the In-Valley/Water Needs Land Retirement Alternative. This is a significant beneficial effect compared to the No Action Alternative.
- Water quality in the Point Estero vicinity would not be affected by the In-Valley/Water Needs Land Retirement Alternative. The effect is not significant compared to the No Action Alternative.

5.2.13.5 In-Valley/Drainage-Impaired Area Land Retirement Alternative

- Under the In-Valley/Drainage-Impaired Area Land Retirement Alternative, water quality for Se, TDS, and boron in the Lower San Joaquin River would improve compared to No Action and existing conditions due to the disposal of drainwater currently discharged to the river by the Grassland Bypass Project to be redirected to the In-Valley/Drainage-Impaired Area Land Retirement Alternative facilities. In comparison to No Action, the beneficial effect is significant.
- TDS in the Bay-Delta at drinking water intakes would not change compared to both No Action and existing conditions. Improvements in the water quality of the Lower San Joaquin River would be offset by lower New Melones Reservoir dilution releases required to comply with the Vernalis EC water quality objectives. The effect is not significant compared to the No Action Alternative.
- Reservoir operations at New Melones would be beneficially affected by the reduction in required flow releases to meet the Vernalis EC water quality objective as a result of the In-Valley/Drainage-Impaired Area Land Retirement Alternative. This is a significant beneficial effect compared to the No Action Alternative.
- Water quality in the Point Estero vicinity would not be affected by the In-Valley/Drainage-Impaired Area Land Retirement Alternative. The effect is not significant compared to the No Action Alternative.

5.2.13.6 Ocean Disposal Alternative

- Under the Ocean Disposal Alternative, water quality for Se, TDS, and boron in the Lower San Joaquin River would improve compared to No Action and existing conditions due to the disposal of drainwater currently discharged to the river by the Grassland Bypass Project to be redirected to the Ocean Disposal Alternative facilities. In comparison to existing conditions, the beneficial effect is significant.
- TDS in the Bay-Delta at drinking water intakes would not change compared to both No Action and existing conditions. Improvements in the water quality of the Lower San Joaquin River would be offset by lower New Melones Reservoir dilution releases required to comply with the Vernalis EC water quality objectives. The effect is not significant compared to the No Action Alternative.
- Reservoir operations at New Melones would be beneficially affected by the reduction in required flow releases to meet the Vernalis EC water quality objective as a result of the Ocean Disposal Alternative. This is a significant beneficial effect compared to the No Action Alternative.
- Water quality in Point Estero would be degraded in the mixing zone around the diffuser. Outside of the mixing zone, water quality is not predicted to exceed WQOs, resulting in no significant effect compared to the No Action Alternative.

5.2.13.7 Delta-Chipps Island Disposal Alternative

- Under the Delta-Chipps Island Disposal Alternative, water quality for Se, TDS, and boron in the Lower San Joaquin River would improve compared to No Action and existing conditions due to the disposal of drainwater currently discharged to the river by the Grassland Bypass Project to be redirected to the Delta-Chipps Island Disposal Alternative facilities. In comparison to No Action, the beneficial effect is significant.
- Reservoir operations at New Melones would be beneficially affected by the reduction in required flow releases to meet the Vernalis EC water quality objective as a result of the Delta-Chipps Island Disposal Alternative. This is a significant beneficial effect compared to the No Action Alternative.
- For the CCWD intake at Rock Slough, the simulation data show that TDS increases would be less than 20 ppm. Seventy percent of the time, the increase would be less than 5 ppm. For water supply intakes to the State and Federal water projects located at Clifton Court Forebay, the predicted TDS increase would always be less than 16 ppm. Ninety-five percent of the time, the increases would be less than 10 ppm. Bromide, TOC, and Se would also increase at the drinking water intakes. These increases would be either less than 5 percent (bromide, TOC) or would not cause exceedances of a drinking water MCL (Se) and are not significant compared to the No Action Alternative.
- Water quality in the Bay-Delta would be degraded in the mixing zone around the diffuser. Outside of the mixing zone water quality is not predicted to exceed water quality objectives, resulting in no significant effect compared to the No Action Alternative.
- Water quality in the vicinity of Point Estero would not be affected by the Delta-Chipps Island Disposal Alternative. The effect is not significant compared to the No Action Alternative.

5.2.13.8 Delta-Carquinez Strait Disposal Alternative

- Under the Delta-Carquinez Strait Disposal Alternative, water quality for Se, TDS, and boron in the Lower San Joaquin River would improve compared to No Action and existing conditions due to the disposal of drainwater currently discharged to the river by the Grassland Bypass Project to be redirected to the Delta-Carquinez Strait Disposal Alternative facilities. In comparison to the No Action Alternative, the beneficial effect is significant.
- Reservoir operations at New Melones would be beneficially affected by the reduction in required flow releases to meet the Vernalis EC water quality objective as a result of the Delta-Carquinez Strait Disposal Alternative. This is a significant beneficial effect compared to the No Action Alternative.
- For the CCWD intake at Rock Slough and the water supply intakes to the State and Federal water projects located at Clifton Court Forebay, the simulation data show TDS increases would be less than those modeled for the Delta-Chipps Island Disposal Alternative. The effect is not significant compared to the No Action Alternative.
- Water quality in the Bay-Delta would be degraded in the mixing zone around the diffuser. Outside of the mixing zone, water quality would not be predicted to exceed WQOs. The effect is not significant compared to the No Action Alternative.
- Water quality in the Point Estero vicinity would not be affected by either of the Delta Disposal Alternatives.

Table 5.2-12
Summary Comparison of Effects of No Action

Affected Resource and Area of Potential Effect	No Action Alternative Compared to Existing Conditions
Delta Drinking Water Intakes	No effect.
Water Quality in San Joaquin river and Tributaries	Water quality improves over planning period due to implementation of TMDLs, but is somewhat offset by deterioration from seepage into wetlands. Minimal effect.
New Melones Reservoir Operations	Water quality improves in the Lower San Joaquin River over planning period due to implementation of TMDLs, but is somewhat offset by deterioration from seepage into wetlands. Minimal effect.
Bay-Delta Water Quality	No effect.
Ocean Water Quality	No effect.

Table 5.2-13
Summary Comparison of Effects of In-Valley Disposal Alternative

Affected Resource and Area of Potential Effect	In-Valley Disposal Compared to No Action	In-Valley Disposal Compared to Existing Conditions
Delta Drinking Water Intakes	Drainwater no longer disposed to the San Joaquin River. No significant effect.	Drainwater no longer disposed to the San Joaquin River. No effect.
Water Quality in San Joaquin River and Tributaries	San Joaquin River no longer receives drainwater. Significant beneficial effect.	San Joaquin River no longer receives drainwater. Beneficial effect.
New Melones Reservoir Operations	Lower dilution flow releases required. Significant beneficial effect.	Lower dilution flow releases required. Beneficial effect.
Bay-Delta Water Quality	Drainwater no longer disposed to the San Joaquin River. Significant beneficial effect.	Drainwater no longer disposed to the San Joaquin River. Beneficial effect.
Ocean Water Quality	No changes occur to the ocean. No significant effect.	No changes occur to the ocean. No effect.
Construction Impacts	No significant effect.	Minimal effect.

Table 5.2-14
Summary Comparison of Effects of
In-Valley/Groundwater Quality Land Retirement Alternative

Affected Resource and Area of Potential Effect	In-Valley/Groundwater Quality Land Retirement Compared to No Action	In-Valley/Groundwater Quality Land Retirement Compared to Existing Conditions
Delta Drinking Water Intakes	Drainwater no longer disposed to the San Joaquin River. No significant effect.	Drainwater no longer disposed to the San Joaquin River. No effect.
Water Quality in San Joaquin River and Tributaries	San Joaquin River no longer receives drainwater. Significant beneficial effect.	San Joaquin River no longer receives drainwater. Beneficial effect.
New Melones Reservoir Operations	Lower dilution flow releases required. Significant beneficial effect.	Lower dilution flow releases required. Beneficial effect.
Bay-Delta Water Quality	Drainwater no longer disposed to the San Joaquin River. Significant beneficial effect.	Drainwater no longer disposed to the San Joaquin River. Beneficial effect.
Ocean Water Quality	No changes occur to the ocean. No significant effect.	No changes occur to the ocean. No effect.
Construction Impacts	No significant effect.	Minimal effect.

Table 5.2-15
Summary Comparison of Effects of
In-Valley/Water Needs Land Retirement Alternative

Affected Resource and Area of Potential Effect	In-Valley/Water Needs Land Retirement Compared to No Action	In-Valley/Water Needs Land Retirement Compared to Existing Conditions
Delta Drinking Water Intakes	Drainwater no longer disposed to the San Joaquin River. No significant effect.	Drainwater no longer disposed to the San Joaquin River. No effect.
Water Quality in San Joaquin River and Tributaries	San Joaquin River no longer receives drainwater. Significant beneficial effect.	San Joaquin River no longer receives drainwater. Beneficial effect.
New Melones Reservoir Operations	Lower dilution flow releases required. Significant beneficial effect.	Lower dilution flow releases required. Beneficial effect.
Bay-Delta Water Quality	Drainwater no longer disposed to the San Joaquin River. Significant beneficial effect.	Drainwater no longer disposed to the San Joaquin River. Beneficial effect.
Ocean Water Quality	No changes occur to the ocean. No significant effect.	No changes occur to the ocean. No effect.
Construction Impacts	No significant effect.	Minimal effect.

Table 5.2-16
Summary Comparison of Effects of
In-Valley/Drainage-Impaired Area Land Retirement Alternative

Affected Resource and Area of Potential Effect	In-Valley/Drainage-Impaired Area Land Retirement Compared to No Action	In-Valley/Drainage-Impaired Area Land Retirement Compared to Existing Conditions
Delta Drinking Water Intakes	Drainwater no longer disposed to the San Joaquin River. No significant effect.	Drainwater no longer disposed to the San Joaquin River. No effect.
Water Quality in San Joaquin River and Tributaries	San Joaquin River no longer receives drainwater. Significant beneficial effect.	San Joaquin River no longer receives drainwater. Beneficial effect.
New Melones Reservoir Operations	Lower dilution flow releases required. Significant beneficial effect.	Lower dilution flow releases required. Beneficial effect.
Bay-Delta Water Quality	Drainwater no longer disposed to the San Joaquin River. Significant beneficial effect.	Drainwater no longer disposed to the San Joaquin River. Beneficial effect.
Ocean Water Quality	No changes occur to the ocean. No significant effect.	No changes occur to the ocean. No effect.
Construction Impacts	No significant effect.	Minimal effect.

Table 5.2-17
Summary Comparison of Effects of Ocean Disposal Alternative

Affected Resource and Area of Potential Effect	Ocean Disposal Compared to No Action	Ocean Disposal Compared to Existing Conditions
Delta Drinking Water Intakes	Drainwater no longer disposed to the San Joaquin River. No significant effect.	Drainwater no longer disposed to the San Joaquin River. No effect.
Water Quality in San Joaquin River and Tributaries	San Joaquin River no longer receives drainwater. Significant beneficial effect.	San Joaquin River no longer receives drainwater. Beneficial effect.
New Melones Reservoir Operations	Lower dilution flow releases required. Significant beneficial effect.	Lower dilution flow releases required. Beneficial effect.
Bay-Delta Water Quality	Drainwater no longer disposed to the San Joaquin River. Significant beneficial effect.	Drainwater no longer disposed to the San Joaquin River. Beneficial effect.
Ocean Water Quality	Water quality degraded in the vicinity of the diffuser, WQOs met outside of mixing zone. No significant effect.	Water quality degraded in the vicinity of the diffuser, WQOs met outside of mixing zone. Minimal effect.
Construction Impacts	No significant effect.	Minimal effect.

Table 5.2-18
Summary Comparison of Effects of Delta-Chipps Island Disposal Alternative

Affected Resource and Area of Potential Effect	Delta-Chipps Island Disposal Compared to No Action	Delta-Chipps Island Disposal Compared to Existing Conditions
Delta Drinking Water Intakes	Treated drainwater is disposed near Mallard and Rock Slough, Se, TDS, Bromide and TOC are expected to increase but the increase would not cause MCLs to be exceeded. No significant effect.	Treated drainwater is disposed near Mallard and Rock Slough, Se, TDS, Bromide and TOC are expected to increase but the increase would not cause MCLs to be exceeded. Minimal effect.
Water Quality in San Joaquin River and Tributaries	San Joaquin River no longer receives drainwater. Significant beneficial effect.	San Joaquin River no longer receives drainwater. Beneficial effect.
New Melones Reservoir Operations	Lower dilution flow releases required. Significant beneficial effect.	Lower dilution flow releases required. Beneficial effect.
Bay-Delta Water Quality	Water quality degraded in the vicinity of the diffuser, WQOs met outside of mixing zone. No significant effect.	Water quality degraded in the vicinity of the diffuser, WQOs met outside of mixing zone. Minimal effect.
Ocean Water Quality	No significant effect.	No effect.
Construction Impacts	No significant effect.	Minimal effect.

Table 5.2-19
Summary Comparison of Effects of Delta-Carquinez Strait Disposal Alternative

Affected Resource and Area of Potential Effect	Delta-Carquinez Strait Disposal Compared to No Action	Delta-Carquinez Strait Disposal Compared to Existing Conditions
Delta Drinking Water Intakes	Treated drainwater is disposed near Mallard and Rock Slough. Se, TDS, bromide, and TOC are expected to increase, but the increase will not cause MCLs to be exceeded. No significant effect.	Treated drainwater is disposed near Mallard and Rock Slough. Se, TDS, bromide, and TOC are expected to increase, but the increase will not cause MCLs to be exceeded. Minimal effect.
Water Quality in San Joaquin River and Tributaries	San Joaquin River no longer receives drainwater. Significant beneficial effect.	San Joaquin River no longer receives drainwater. Beneficial effect.
New Melones Reservoir Operations	Lower dilution flow releases required. Significant beneficial effect.	Lower dilution flow releases required. Beneficial effect.
Bay-Delta Water Quality	Water quality degraded in the vicinity of the diffuser. WQOs met outside of mixing zone. No significant effect.	Water quality degraded in the vicinity of the diffuser. WQOs met outside of mixing zone. Minimal effect.
Ocean Water Quality	No significant effect.	No effect.
Construction Impacts	No significant effect.	Minimal effect.

5.2.14 Mitigation Recommendations

With no significant adverse effect on surface water resources, no mitigation measures are recommended.