**Appendix G - Attachment 1**

# Appendix G1 Methylmercury Model Documentation

This attachment documents the fish tissue methylmercury modeling performed to estimate methylmercury concentrations in fish throughout the Delta for the assessment presented in Appendix G, *Water Quality Technical Appendix*, prepared in support of the Reinitiation of Consultation on the long-term operations of the Central Valley Project (CVP) and State Water Project (SWP) Environmental Impact Statement (EIS).

This appendix is organized into the following main sections:

- **Section G.1: Modeling Methodology**. This section provides information about the overall modeling framework, modeling tools, and how model input information was obtained and processed.
- **Section G.2: Modeling Simulations and Assumptions**. This section describes the modeling simulations conducted and input assumptions.
- **Section G.3: Modeling Results.** This section presents the modeling results.
- **Section G.4: Model Limitations and Applicability**. This section describes the limitations associated with the model and appropriate use of model results.

## G1.1 Modeling Methodology

This section describes the analytical framework and development and use of the models used to estimate methylmercury concentrations in fish throughout the Delta.

### G1.1.1 Overview of the Modeling Approach and Objectives

CalSim II, Delta Simulation Model II (DSM2), and the Central Valley Regional Water Quality Control Board's (CVRWQCB) fish tissue model for Largemouth Bass (*Micropterus salmoides*) developed for the Delta Methylmercury Total Maximum Daily Load (CVRWQCB TMDL Model) (CVRWQCB 2010a) were used in sequence to develop modeled concentrations of methylmercury in fish tissue at select Delta locations. CalSim II simulates CVP and SWP operations and DSM2 simulates one-dimensional hydrodynamics in the Delta. One of the three DSM2 modules, QUAL, simulates one-dimensional source tracking in the Delta and outputs the flow-percentage at DSM2 nodes. The Total Maximum Daily Limit (TMDL) Model is based on a power curve that uses input water column methylmercury concentrations to model methylmercury concentrations in the fish fillets of standard 350-mm-long Largemouth Bass. Figure G1.1-1 shows the relationships among these modeling tools.

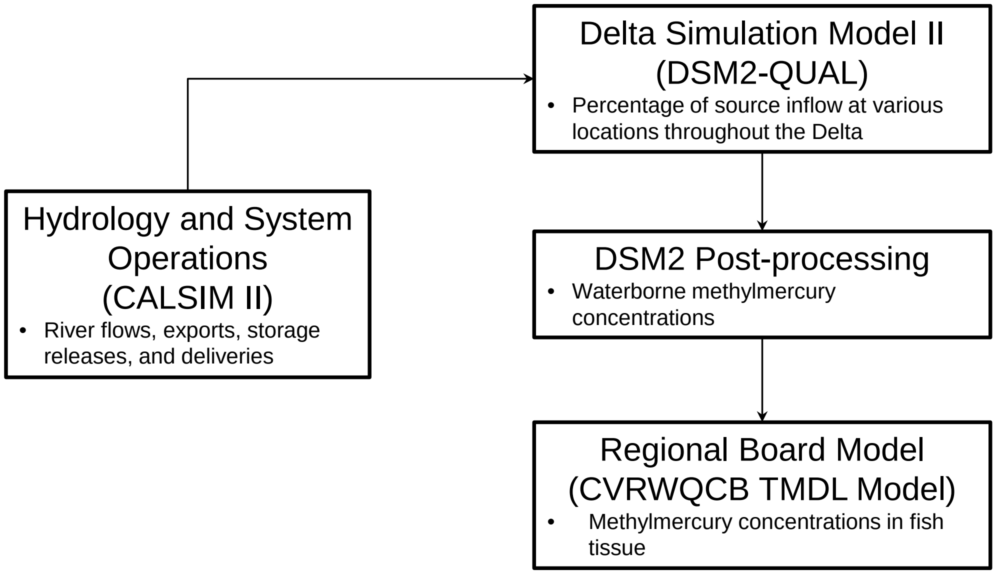


**Figure G1.1-1. Relationships among the Different Predictive Modeling Tools**

## G1.1.2 DSM2 Postprocessing

The period average flow-fraction output from DSM2 was used in mass-balance calculations (processed outside of DSM2) to generate long-term average methylmercury concentrations at selected Delta locations. The flow-fraction output from DSM2 is the percentage of water at each specified Delta location constituted by the six primary source waters—Sacramento River, Yolo Bypass, San Joaquin River, eastside tributaries, San Francisco Bay, and in-Delta agriculture. Water column methylmercury concentrations for each Delta location were calculated using the following mass-balance equation:

$$C_{water} = [(I_1 * C_1)+(I_2 * C_2)+ (I_3 * C_3)+ (I_4 * C_4)+ (I_5 * C_5)+ (I_6 * C_6)]/100$$

Where:

- $C_{water}$ = methylmercury concentration in water (nanograms/liter [ng/L]) at a DSM2 output location
- $I_{1\text{-}6}$ = modeled daily inflow from each of the six sources of water to the Delta for each DSM2 output location (percentage)
- $C_{1\text{-}6}$ = methylmercury concentration in water (ng/L) from each of the six inflow sources to the Delta

The Delta source water concentrations used in the mass-balance calculations are summarized in Table G1.1-1.

Water column methylmercury concentrations from the mass balance calculations are shown in Table G1.1-2. Average concentrations are presented for the entire (1922–2003) period modeled and drought (1987–1991) period modeled by DSM2. A key assumption for the mass-balance calculation of water column concentrations of methylmercury is that the methylmercury acts in a conservative manner as the various source waters mix and flow through the Delta, which it does not.

**Table G1.1-1. Methylmercury (Total) Concentrations in Water in Inflow Sources to the Delta**

| Source Water | Station | Concentration in Water (ng/L) | Years | Source |
|---|---|---|---|---|
| Sacramento River | Sacramento River at Freeport | 0.10 | 2000–2003 | CVRWQCB 2010b |
| Yolo Bypass | Prospect Slough (Yolo Bypass) | 0.35 | 2000–2003 | CVRWQCB 2010b |
| San Joaquin River | San Joaquin River at Vernalis | 0.16 | 2000–2004 | CVRWQCB 2010b |
| East Side Tributaries | Mokelumne River at I-5 | 0.17 | 2000–2004 | CVRWQCB 2010b |
| In-Delta Agriculture | Various Delta locations | 0.35 | 2000, 2003 | CVRWQCB 2010b |
| San Francisco Bay | Suisun Bay | 0.033 | 2007–2011; 2013; 2015 | SFEI 2019 |

ng/L = nanogram(s) per liter

### G1.1.3 CVRWQCB TMDL Model

The CVRWQCB TMDL Model is an empirical power curve that uses water column concentrations of methylmercury to estimate methylmercury concentrations in the fish fillets of standard 350-mm-long Largemouth Bass (CVRWQCB 2010a). The CVRWQCB developed the nonlinear model based on Largemouth Bass as grouped in large regions of the Delta (rather than specific locations) compared to average methylmercury concentrations in water for those same general regions (CVRWQCB 2010a). Data were grouped by subareas of the Delta such as Sacramento River, Mokelumne River, Central Delta, San Joaquin River, and West Delta (CVRWQCB 2010a).

Largemouth Bass are excellent indicators of mercury contamination because they have a relatively high level of mercury compared to other species, are piscivorous, are abundantly distributed throughout the Delta, are popular gamefish, and have high site fidelity. Largemouth Bass are therefore representative of spatial patterns of tissue mercury concentrations throughout the aquatic food web, including exposure to humans.

The CVRWQCB TMDL Model used for estimating fish tissue concentrations of methylmercury in Largemouth Bass is presented below.

$$\textit{Fish methylmercury (milligrams/kilogram, wet weight)} = 20.365 \times (\textit{methylmercury in water, ng/L})^{1.6374}$$

*(with* $r^2 = 0.91$*, and P less than 0.05)*

The water column methylmercury concentrations presented in Table G1.1-2 were input into the above equation to generate the fish tissue methylmercury concentrations. The overall construction and calibration of the model were unchanged for the simulations described herein.

**Table G1.1-2. Modeled Methylmercury Concentrations in Water**

| Location | Period[1] | Period Average Concentration (ng/L) | | | | |
|---|---|---|---|---|---|---|
| | | No Action Alternative | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 |
| **Delta Interior** | | | | | | |
| San Joaquin River at Stockton | All | 0.17 | 0.17 | 0.17 | 0.17 | 0.17 |
| | Drought | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 |
| Turner Cut | All | 0.17 | 0.17 | 0.17 | 0.17 | 0.17 |
| | Drought | 0.17 | 0.17 | 0.17 | 0.17 | 0.17 |
| San Joaquin River at San Andreas Landing | All | 0.12 | 0.11 | 0.11 | 0.12 | 0.12 |
| | Drought | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 |
| San Joaquin River at Jersey Point | All | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 |
| | Drought | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 |
| Victoria Canal | All | 0.15 | 0.15 | 0.15 | 0.15 | 0.16 |
| | Drought | 0.15 | 0.15 | 0.14 | 0.15 | 0.15 |
| **Western Delta** | | | | | | |
| Sacramento River at Emmaton | All | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 |
| | Drought | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 |
| San Joaquin River at Antioch | All | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 |
| | Drought | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| Montezuma Slough at Hunter Cut/ Beldon's Landing | All | 0.10 | 0.09 | 0.09 | 0.09 | 0.10 |
| | Drought | 0.08 | 0.08 | 0.07 | 0.07 | 0.08 |
| **Major Diversions (Pumping Stations)** | | | | | | |
| Barker Slough at North Bay Aqueduct Intake | All | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 |
| | Drought | 0.13 | 0.13 | 0.13 | 0.12 | 0.13 |
| Contra Costa Pumping Plant #1 | All | 0.14 | 0.14 | 0.13 | 0.14 | 0.14 |
| | Drought | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 |
| Banks Pumping Plant | All | 0.15 | 0.14 | 0.14 | 0.14 | 0.15 |
| | Drought | 0.15 | 0.14 | 0.14 | 0.14 | 0.15 |
| Jones Pumping Plant | All | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 |
| | Drought | 0.15 | 0.15 | 0.14 | 0.14 | 0.15 |

[1] "All" water years 1922–2003 represent the 82-year period modeled using DSM2; "drought" represents a 5-consecutive-year (water years 1987–1991) drought period consisting of dry and critical water year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).
ng/L = nanograms per liter

# G1.2 Modeling Simulations and Assumptions

This section describes the assumptions for the CVRWQCB TMDL Model simulations.

### G1.2.1 Location Assumptions

The CVRWQCB TMDL Model was based on data for Largemouth Bass as grouped in large regions of the Delta, rather than specific locations, compared to average methylmercury concentrations in water for those same general regions (CVRWQCB 2010a). As such, the model provides a Delta-specific, general, long-term average relationship between co-located water column methylmercury concentrations and methylmercury concentrations in Largemouth Bass fillets.

### G1.2.2 Normalization and Tissue Type Assumptions

As discussed above, Largemouth Bass are excellent indicators of long-term average mercury exposure, risk, and the spatial pattern for both ecological and human health effects. A fish tissue mercury dataset was available for Largemouth Bass from locations across the Delta. It is important to standardize concentrations to the same length fish for establishment of the model and for model predictions because of the well-established positive relationship between fish length and age and tissue mercury concentrations (e.g., Alpers et al. 2008). This same normalization technique was used by the CVRWQCB for the TMDL Model (CVRWQCB 2010a). The 350-mm size fish is an appropriate size representative of human health consumption and risk. The standardized size allows the best comparison among locations and alternatives. The fillet concentrations predicted by the TMDL Model are expected to be slightly different from whole-body fish concentrations as consumed by wildlife, but allow for comparison between alternative to determine relative effects to fish and wildlife as well as estimating effects to human consumers.

### G1.2.3 Model Application

To evaluate differences between the No Action Alternative and Alternatives 1 through 4, modeled fish tissue methylmercury concentrations were compared directly for percent change relative to the No Action Alternative and to the CVRWQCB's fish tissue objective of 0.24 milligrams per kilogram (mg/kg), wet weight, for trophic level 4 fish (CVRWQCB 2018). The comparison of each fish tissue concentration to the fish tissue objective is expressed as an exceedance quotient (EQ).

## G1.3 Modeling Results

Output data resulting from the TMDL Model simulations for each alternative are presented in Tables G1.5-1 through G1.5-5 and Figures G1.5-1 and G1.5-2. Outputs from the TMDL Model are average fish tissue methylmercury concentrations for the entire (1922–2003) period modeled and the five-year (1987–1991) drought period modeled using DSM2.

## G1.4 Model Limitations and Applicability

CalSim II and DSM2 are planning level models, not predictive models. Further, mathematical models like DSM2 can only approximate processes of physical systems. Models are inherently inexact because the mathematical description of the physical system is imperfect and the understanding of interrelated physical processes is incomplete.

The goal of the CVRWQCB TMDL Model was to establish the linkage between the 0.24 mg/kg tissue mercury TMDL target (which is now the Delta water quality objective for trophic level 4 fish) to a water column concentration goal for methylmercury of 0.066 ng/l. The model results are presented with the recognition of the imprecision of predicting fish tissue concentrations from estimates of methylmercury concentrations for specific Delta locations, but with the knowledge that Largemouth Bass are probably the best indicator of fish tissue contamination. Results provide an estimated mean tissue concentration as would be expected based on the input water column concentration.

Mercury concentrations for inflow sources to the Delta (for example, agriculture in the Delta, Yolo Bypass, Eastside Tributaries) also present uncertainty in the modeling because of limited data.

For the reasons discussed above, the water column concentration and fish tissue concentration results presented herein are not predictive in nature. Rather, they are for comparative assessment to identify the effect the alternatives would have on fish tissue methylmercury concentrations relative to the No Action Alternative.

## G1.5 References

Alpers, C. N., C. Eagles-Smith, C. Foe, S. Klasing, M. C. Marvin-DiPasquale, D. G. Slotton, and L. Windham-Meyers. 2008. Mercury Conceptual Model. Sacramento (CA): Delta Regional Ecosystem Restoration Implementation Plan. January 24. Available: http://www.science.calwater.ca.gov/pdf/drerip/drerip_mercury_conceptual_model_final_012408.pdf. Accessed: March 13, 2019.

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**Table G1.5-1. Methylmercury Concentrations in 350 millimeter Largemouth Bass Fillets for the No Action Alternative**

| Location | Period[1] | Estimated Concentrations of Methylmercury (mg/kg, wet weight) | Exceedance Quotients[2] |
|---|---|---|---|
| | | No Action Alternative | No Action Alternative |
| Delta Interior | | | |
| San Joaquin River at Stockton | All | 1.12 | 4.7 |
| | Drought | 1.20 | 5.0 |
| Turner Cut | All | 1.10 | 4.6 |
| | Drought | 1.13 | 4.7 |
| San Joaquin River at San Andreas Landing | All | 0.60 | 2.5 |
| | Drought | 0.57 | 2.4 |
| San Joaquin River at Jersey Point | All | 0.63 | 2.6 |
| | Drought | 0.56 | 2.3 |
| Victoria Canal | All | 0.95 | 4.0 |
| | Drought | 0.93 | 3.9 |
| Western Delta | | | |
| Sacramento River at Emmaton | All | 0.62 | 2.6 |
| | Drought | 0.53 | 2.2 |
| San Joaquin River at Antioch | All | 0.57 | 2.4 |
| | Drought | 0.47 | 2.0 |
| Montezuma Slough at Hunter Cut/Beldon's Landing | All | 0.44 | 1.8 |
| | Drought | 0.30 | 1.3 |
| Major Diversions (Pumping Stations) | | | |
| Barker Slough at North Bay Aqueduct Intake | All | 0.84 | 3.5 |
| | Drought | 0.69 | 2.9 |
| Contra Costa Pumping Plant #1 | All | 0.81 | 3.4 |
| | Drought | 0.75 | 3.1 |
| Banks Pumping Plant | All | 0.88 | 3.7 |
| | Drought | 0.89 | 3.7 |
| Jones Pumping Plant | All | 0.93 | 3.9 |
| | Drought | 0.93 | 3.9 |

[1] "All" water years 1922–2003 represent the 82-year period modeled using DSM2; "drought" represents a 5-consecutive-year (water years 1987–1991) drought period consisting of dry and critical water year types (as defined by the Sacramento Valley 40 30-30 water year hydrologic classification index)
[2] Exceedance Quotient = tissue concentration / 0.24 mg/kg
mg/kg - milligrams per kilogram

**Table G1.5-2. Methylmercury Concentrations in 350 millimeter Largemouth Bass Fillets for Alternative 1, and Comparison to No Action Alternative**

| Location | Period[1] | Estimated Concentrations of Methylmercury (mg/kg, wet weight) | % Change In Methylmercury Concentrations Compared to No Action Alternative[2] | Exceedance Quotients[3] |
|---|---|---|---|---|
| | | Alternative 1 | Alternative 1 | Alternative 1 |
| Delta Interior | | | | |
| San Joaquin River at Stockton | All | 1.13 | 1 | 4.7 |
| | Drought | 1.22 | 2 | 5.1 |
| Turner Cut | All | 1.09 | -1 | 4.5 |
| | Drought | 1.09 | -3 | 4.5 |
| San Joaquin River at San Andreas Landing | All | 0.58 | -2 | 2.4 |
| | Drought | 0.56 | -2 | 2.3 |
| San Joaquin River at Jersey Point | All | 0.61 | -3 | 2.5 |
| | Drought | 0.55 | -2 | 2.3 |
| Victoria Canal | All | 0.92 | -4 | 3.8 |
| | Drought | 0.87 | -7 | 3.6 |
| Western Delta | | | | |
| Sacramento River at Emmaton | All | 0.61 | -1 | 2.5 |
| | Drought | 0.52 | -1 | 2.2 |
| San Joaquin River at Antioch | All | 0.55 | -4 | 2.3 |
| | Drought | 0.46 | -3 | 1.9 |
| Montezuma Slough at Hunter Cut/Beldon's Landing | All | 0.42 | -3 | 1.8 |
| | Drought | 0.29 | -3 | 1.2 |
| Major Diversions (Pumping Stations) | | | | |
| Barker Slough at North Bay Aqueduct Intake | All | 0.85 | 1 | 3.5 |
| | Drought | 0.69 | -0.3 | 2.9 |
| Contra Costa Pumping Plant #1 | All | 0.78 | -4 | 3.2 |
| | Drought | 0.71 | -5 | 3.0 |
| Banks Pumping Plant | All | 0.85 | -4 | 3.5 |
| | Drought | 0.82 | -7 | 3.4 |
| Jones Pumping Plant | All | 0.91 | -2 | 3.8 |
| | Drought | 0.89 | -4 | 3.7 |

[1] "All" water years 1922–2003 represent the 82-year period modeled using DSM2; "drought" represents a 5-consecutive-year (water years 1987–1991) drought period consisting of dry and critical water year types (as defined by the Sacramento Valley 40 30-30 water year hydrologic classification index)
[2] % change indicates a negative change (increased concentrations) relative to the No Action Alternative when values are positive and a positive change (lowered concentrations) relative to the No Action Alternative when values are negative.
[3] Exceedance Quotient = tissue concentration / 0.24 mg/kg
mg/kg - milligrams per kilogram

**Table G1.5-3. Methylmercury Concentrations in 350 millimeter Largemouth Bass Fillets for Alternative 2, and Comparison to No Action Alternative**

| Location | Period[1] | Estimated Concentrations of Methylmercury (mg/kg, wet weight) | % Change In Methylmercury Concentrations Compared to No Action Alternative[2] | Exceedance Quotients[3] |
|---|---|---|---|---|
| | | Alternative 2 | Alternative 2 | Alternative 2 |
| Delta Interior | | | | |
| San Joaquin River at Stockton | All | 1.13 | 1 | 4.7 |
| | Drought | 1.22 | 1 | 5.1 |
| Turner Cut | All | 1.08 | -2 | 4.5 |
| | Drought | 1.08 | -4 | 4.5 |
| San Joaquin River at San Andreas Landing | All | 0.58 | -3 | 2.4 |
| | Drought | 0.55 | -2 | 2.3 |
| San Joaquin River at Jersey Point | All | 0.61 | -3 | 2.5 |
| | Drought | 0.55 | -3 | 2.3 |
| Victoria Canal | All | 0.89 | -6 | 3.7 |
| | Drought | 0.85 | -9 | 3.5 |
| Western Delta | | | | |
| Sacramento River at Emmaton | All | 0.61 | -1 | 2.5 |
| | Drought | 0.52 | -2 | 2.2 |
| San Joaquin River at Antioch | All | 0.54 | -5 | 2.3 |
| | Drought | 0.45 | -4 | 1.9 |
| Montezuma Slough at Hunter Cut/Beldon's Landing | All | 0.42 | -5 | 1.7 |
| | Drought | 0.29 | -4 | 1.2 |
| Major Diversions (Pumping Stations) | | | | |
| Barker Slough at North Bay Aqueduct Intake | All | 0.85 | 1 | 3.5 |
| | Drought | 0.69 | -0.3 | 2.9 |
| Contra Costa Pumping Plant #1 | All | 0.75 | -7 | 3.1 |
| | Drought | 0.69 | -7 | 2.9 |
| Banks Pumping Plant | All | 0.82 | -7 | 3.4 |
| | Drought | 0.80 | -10 | 3.3 |
| Jones Pumping Plant | All | 0.88 | -6 | 3.7 |
| | Drought | 0.85 | -8 | 3.5 |

[1] "All" water years 1922–2003 represent the 82-year period modeled using DSM2; "drought" represents a 5-consecutive-year (water years 1987–1991) drought period consisting of dry and critical water year types (as defined by the Sacramento Valley 40 30-30 water year hydrologic classification index)
[2] % change indicates a negative change (increased concentrations) relative to the No Action Alternative when values are positive and a positive change (lowered concentrations) relative to the No Action Alternative when values are negative.
[3] Exceedance Quotient = tissue concentration / 0.24 mg/kg
mg/kg - milligrams per kilogram

**Table G1.5-4. Methylmercury Concentrations in 350 millimeter Largemouth Bass Fillets for Alternative 3, and Comparison to No Action Alternative**

| Location | Period[1] | Estimated Concentrations of Methylmercury (mg/kg, wet weight) | % Change In Methylmercury Concentrations Compared to No Action Alternative[2] | Exceedance Quotients[3] |
|---|---|---|---|---|
| | | Alternative 3 | Alternative 3 | Alternative 3 |
| Delta Interior | | | | |
| San Joaquin River at Stockton | All | 1.12 | 0.2 | 4.7 |
| | Drought | 1.21 | 1 | 5.1 |
| Turner Cut | All | 1.10 | 0 | 4.6 |
| | Drought | 1.12 | -1 | 4.7 |
| San Joaquin River at San Andreas Landing | All | 0.59 | -1 | 2.5 |
| | Drought | 0.57 | 0 | 2.4 |
| San Joaquin River at Jersey Point | All | 0.62 | -2 | 2.6 |
| | Drought | 0.55 | -2 | 2.3 |
| Victoria Canal | All | 0.91 | -4 | 3.8 |
| | Drought | 0.87 | -7 | 3.6 |
| Western Delta | | | | |
| Sacramento River at Emmaton | All | 0.61 | -1 | 2.5 |
| | Drought | 0.52 | -1 | 2.2 |
| San Joaquin River at Antioch | All | 0.56 | -3 | 2.3 |
| | Drought | 0.46 | -2 | 1.9 |
| Montezuma Slough at Hunter Cut/Beldon's Landing | All | 0.39 | -12 | 1.6 |
| | Drought | 0.26 | -15 | 1.1 |
| Major Diversions (Pumping Stations) | | | | |
| Barker Slough at North Bay Aqueduct Intake | All | 0.78 | -8 | 3.2 |
| | Drought | 0.60 | -14 | 2.5 |
| Contra Costa Pumping Plant #1 | All | 0.77 | -5 | 3.2 |
| | Drought | 0.71 | -5 | 2.9 |
| Banks Pumping Plant | All | 0.83 | -6 | 3.5 |
| | Drought | 0.81 | -9 | 3.4 |
| Jones Pumping Plant | All | 0.89 | -5 | 3.7 |
| | Drought | 0.86 | -7 | 3.6 |

[1] "All" water years 1922–2003 represent the 82-year period modeled using DSM2; "drought" represents a 5-consecutive-year (water years 1987–1991) drought period consisting of dry and critical water year types (as defined by the Sacramento Valley 40 30-30 water year hydrologic classification index)
2 % change indicates a negative change (increased concentrations) relative to the No Action Alternative when values are positive and a positive change (lowered concentrations) relative to the No Action Alternative when values are negative.
[3] Exceedance Quotient = tissue concentration / 0.24 mg/kg
mg/kg - milligrams per kilogram

**Table G1.5-5. Methylmercury Concentrations in 350 millimeter Largemouth Bass Fillets for Alternative 4, and Comparison to No Action Alternative**

| Location | Period[1] | Estimated Concentrations of Methylmercury (mg/kg, wet weight) | % Change In Methylmercury Concentrations Compared to No Action Alternative[2] | Exceedance Quotients[3] |
|---|---|---|---|---|
| | | Alternative 4 | Alternative 4 | Alternative 4 |
| Delta Interior | | | | |
| San Joaquin River at Stockton | All | 1.13 | 0.4 | 4.7 |
| | Drought | 1.22 | 1.1 | 5.1 |
| Turner Cut | All | 1.10 | 0.3 | 4.6 |
| | Drought | 1.12 | -0.7 | 4.7 |
| San Joaquin River at San Andreas Landing | All | 0.60 | 0.1 | 2.5 |
| | Drought | 0.57 | 0.3 | 2.4 |
| San Joaquin River at Jersey Point | All | 0.63 | 0.0 | 2.6 |
| | Drought | 0.56 | 0.1 | 2.3 |
| Victoria Canal | All | 0.97 | 2.0 | 4.0 |
| | Drought | 0.93 | -0.1 | 3.9 |
| Western Delta | | | | |
| Sacramento River at Emmaton | All | 0.62 | 0.0 | 2.6 |
| | Drought | 0.53 | 0.0 | 2.2 |
| San Joaquin River at Antioch | All | 0.56 | -1.6 | 2.3 |
| | Drought | 0.47 | -0.7 | 2.0 |
| Montezuma Slough at Hunter Cut/Beldon's Landing | All | 0.44 | -0.7 | 1.8 |
| | Drought | 0.30 | -0.4 | 1.3 |
| Major Diversions (Pumping Stations) | | | | |
| Barker Slough at North Bay Aqueduct Intake | All | 0.85 | 1.0 | 3.5 |
| | Drought | 0.69 | -0.9 | 2.9 |
| Contra Costa Pumping Plant #1 | All | 0.84 | 3.5 | 3.5 |
| | Drought | 0.76 | 1.4 | 3.2 |
| Banks Pumping Plant | All | 0.89 | 0.9 | 3.7 |
| | Drought | 0.89 | -0.1 | 3.7 |
| Jones Pumping Plant | All | 0.93 | -0.1 | 3.9 |
| | Drought | 0.92 | -0.4 | 3.8 |

[1] "All" water years 1922–2003 represent the 82-year period modeled using DSM2; "drought" represents a 5-consecutive-year (water years 1987–1991) drought period consisting of dry and critical water year types (as defined by the Sacramento Valley 40 30-30 water year hydrologic classification index)
[2] % change indicates a negative change (increased concentrations) relative to the No Action Alternative when values are positive and a positive change (lowered concentrations) relative to the No Action Alternative when values are negative.
[3] Exceedance Quotient = tissue concentration / 0.24 mg/kg
mg/kg - milligrams per kilogram

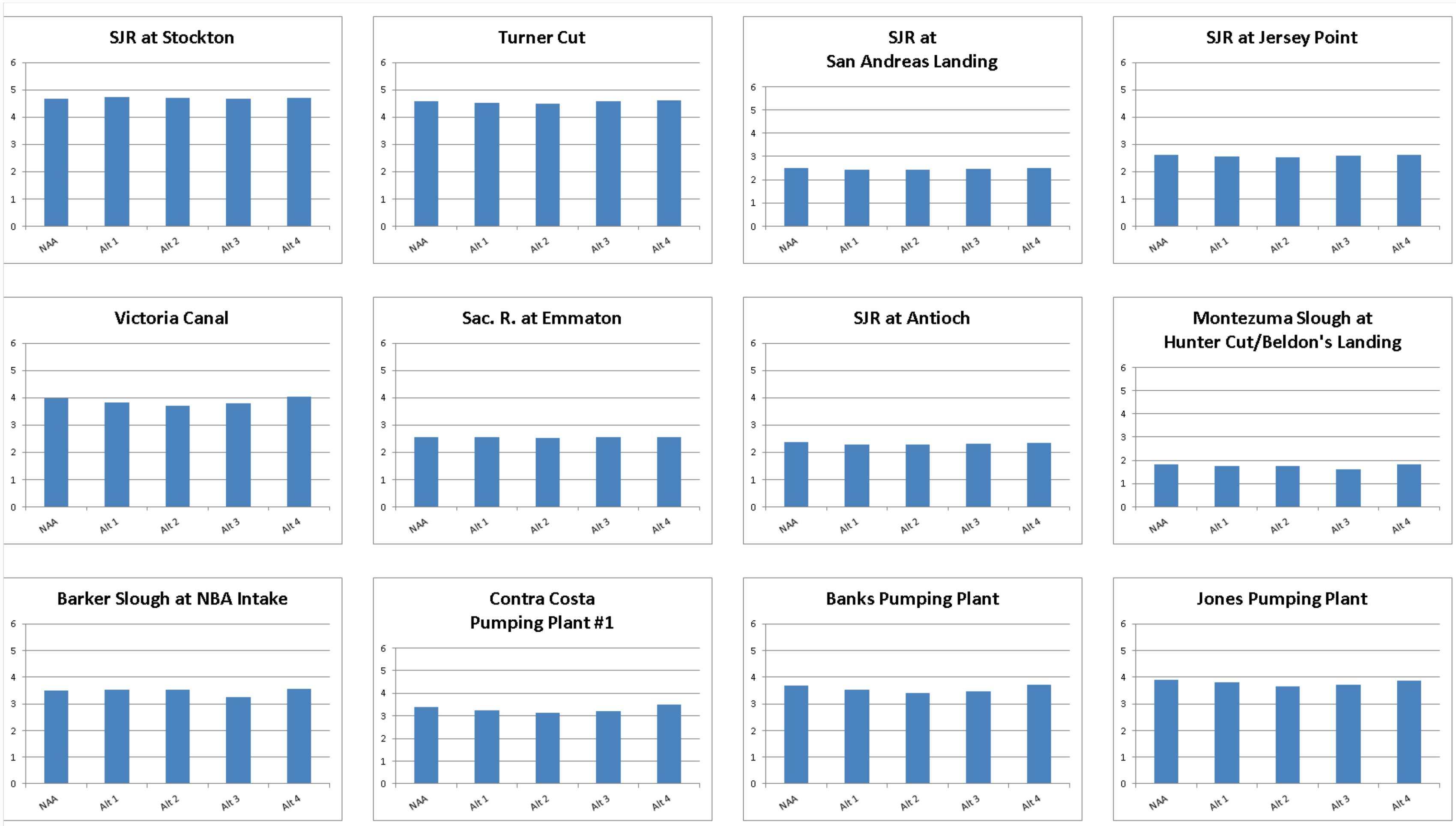


**Figure G1.5-1. Level of Concern Exceedance Quotients for Mercury Concentrations in 350 millimeter Largemouth Bass Fillets for All Years**

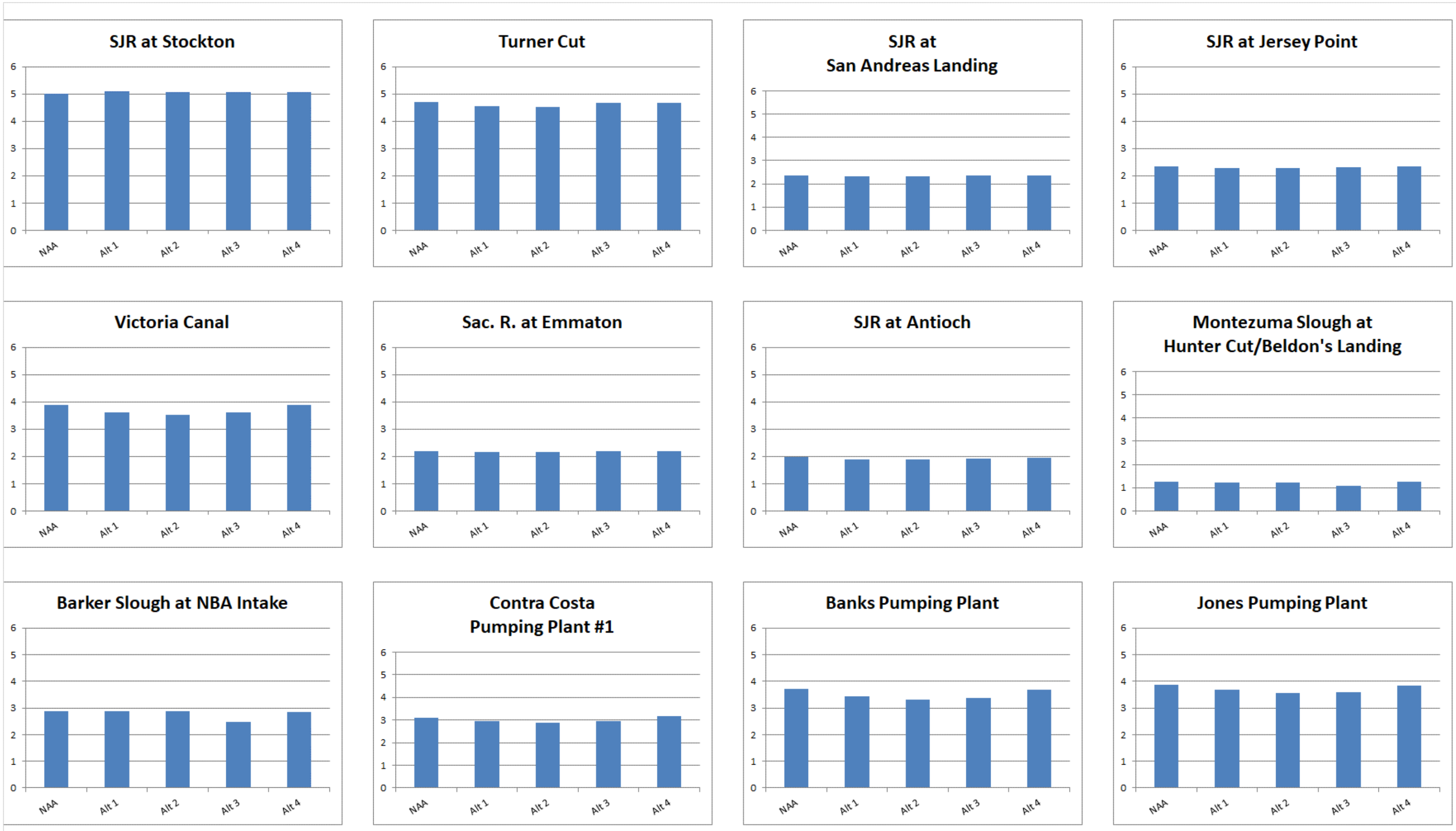


**Figure G1.5-2. Level of Concern Exceedance Quotients for Mercury Concentrations in 350 millimeter Largemouth Bass Fillets for Drought Years**

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