Appendix G, Water Quality Technical Appendix

Attachment G.5 Selenium Modeling Results

The information contained in this attachment supports the quantitative assessment of the project alternatives' effects on selenium concentrations at Delta assessment locations 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 attachment presents the following information.

- The selenium assessment methodology.
- The source water concentrations used in the modeling of selenium at the Delta assessment locations.
- Applicable water quality criteria/objectives for selenium used in the effects assessment.
- Tables presenting modeled selenium concentrations at the Delta assessment locations for the No Action Alternative and the project alternatives.
- Modeling limitations and applicability.

G.5.1 Modeling Methodology

This section describes the analytical framework and development and use of models to estimate selenium concentrations in fish and bird eggs throughout the Delta.

G.5.1.1 Overview of the Modeling Approach and Objectives

CalSim 3.0, Delta Simulation Model II (DSM2), and bioaccumulation modeling were used in sequence to estimate the effects of CVP and SWP operations on water quality relative to selenium in the Delta. CalSim 3.0 simulates flow in California's waterways and DSM2 simulates one-dimensional hydrodynamics in California's Delta. One of the three DSM2 modules, QUAL, simulates one-dimensional source tracking in the Delta. Results from DSM2 were multiplied by concentrations in source waters to the Delta to determine annual average water column selenium concentrations at select Delta locations for all water year types (i.e., wet, above normal, below normal, dry, and critical).

Output from the DSM2-QUAL model (expressed as the percentage of inflow from different sources) was used in combination with measured water column selenium concentrations at source water locations to model concentrations of selenium at assessment locations throughout the Delta. These modeled water column selenium concentrations were used in a Delta-wide selenium bioaccumulation model to estimate selenium concentration in whole-body fish (calibrated with data for Largemouth Bass) and in bird eggs. Selenium concentrations in fish fillets were then estimated from those in whole-body fish. The following sections provide detailed information about the modeling approach for selenium.

In addition to the Delta-wide modeling for fish and birds, selenium uptake and food-chain transfer information from the ecosystem-scale selenium model for the San Francisco Bay-Delta Regional Ecosystem Restoration Implementation Plan (Presser and Luoma 2013) informed the selenium bioaccumulation model for the western Delta. Largemouth Bass have lower selenium bioaccumulation rates than those observed for sturgeon (green sturgeon [*Acipenser medirostris*] and white sturgeon, [*A. transmontanus*]) and is not an appropriate model species that would be protective of sturgeon. Sturgeon differ by feeding, in part, on overbite clams (*Corbula* [*Potamocorbula*] *amurensis*) in Suisun Bay and may do so in the western portion of the Delta under future conditions. Therefore, DSM2-modeled water column selenium concentrations from three western-most assessment locations in the Delta (Sacramento River at Emmaton, San Joaquin River at Antioch, and Montezuma Slough near Beldon's Landing) were used to model selenium bioaccumulation for sturgeon at those three locations to supplement the modeling done for Largemouth Bass.

The results from this suite of physical and biological models are used to inform the understanding of effects of each alternative considered in this EIS on selenium. Modeling objectives included evaluation of the following:

- Changes in water column selenium concentrations under the alternatives as compared to the No Action Alternative.
- Exceedances of fish, wildlife, or human thresholds for selenium effects.

G.5.1.2 Key Components of the Selenium Modeling

To fulfill the objectives of the selenium modeling effort, DSM2 output data were used in combination with source water concentrations to estimate water column selenium concentrations at representative locations throughout the Delta. Water column selenium concentrations were then used to estimate tissue selenium concentrations in Largemouth Bass (as a representative higher trophic-level fish) throughout the Delta and in sturgeon in the western Delta. Estimation of concentrations in Largemouth Bass throughout the Delta included the development and calibration of a bioaccumulation model using measured concentrations in bass (Foe 2010a). In contrast, modeling for sturgeon in the western Delta relied on literature-based model parameters (Presser and Luoma 2013), because data were not available to calibrate the model.

G.5.1.2.1 DSM2 Post-processing

The quantitative assessment for the Delta used a mass-balance approach that applied DSM2-modeled average monthly source water flow fractions for each Delta assessment location. The source water flow fraction output was the percentage of water at each assessment location constituted by the six primary source waters—Sacramento River (SAC), San Joaquin River (SJR), Yolo Bypass (YOL), Eastside Tributaries (EST), San Francisco Bay (BAY), and Delta Agricultural Return Waters (AGR). These flow fractions were used together with source water concentrations to calculate a given concentration at the assessment locations according to equation 1.

$$C_{water,I} = f_{SAC,i}(C_{SAC}) + f_{SJR,i}(C_{SJR}) + f_{YOL,i}(C_{YOL}) + f_{EST,i}(C_{EST}) + f_{BAY,i}(C_{BAY}) + f_{AGR,i}(C_{AGR})$$

Where:

- $C_{water,i}$ = selenium concentration in water (micrograms/liter [µg/L]) at Delta assessment location *i*
- $F_{x,i}$ = modeled average monthly flow fraction from each of the six sources of water to the Delta at assessment location i
- C_X = selenium concentration in water (µg/L) from each of the six inflow sources to the Delta

Source Water Selenium Concentrations

An input to the mass-balance calculation of selenium water concentrations at Delta assessment locations is the concentrations in the primary source waters to the Delta: Sacramento River, San Joaquin River, Yolo Bypass, Eastside Tributaries (i.e., the Cosumnes, Mokelumne, and Calaveras Rivers), San Francisco Bay, and Delta Agricultural Return Waters. Table G.5-1 provides summary statistics for the primary source water concentrations of dissolved selenium, as well as information on the source of the data. Due to data availability, Yolo Bypass concentrations were set equal to Sacramento River concentrations, which is a primary source of flows to the Yolo Bypass.

Both dissolved and total selenium are suitable for purposes of selenium modeling in this assessment because they typically do not differ greatly in the Delta. Statements related to water column selenium concentrations in this attachment would be applicable to either dissolved or total concentrations. Although, recent data at the source water locations (e.g., since 2011 in the San Joaquin River at Vernalis) were only available for dissolved selenium. These recent data are appropriate for use in this assessment because detection limits have decreased in recent decades and concentrations in the San Joaquin River have decreased due to implementation of selenium total maximum daily loads (TMDL) and the Grasslands Bypass Project (Environmental Protection Agency 2015; San Francisco Bay Regional Water Quality Control Board 2008).

Table G.5-1. Source Water Dissolved Selenium Concentrations (in micrograms per liter)

Data Parameter	SAC	SJR	BAY	EST	AGR
Average	0.090	0.370	0.116	0.055	0.110
Minimum	0.040	0.050	0.068	0.030	-
Maximum	0.220	1.50	0.214	0.180	-
75th percentile	0.100	0.460	0.140	0.050	-
99th percentile	0.198	1.21	0.211	0.168	-
Data source	USGS	USGS	CEDEN 2020	USGS	Lucas and Stewart
Station(s)	SAC at Freeport	SJR at Vernalis	Suisun Bay (SU029W, SU034W, SU040W, SU047W, Su050W, SU054W, SU056W)	Cosumnes River at Michigan Bar	Mildred Island
Date range	2007–2020	2000–2020	2008–2019	2012–2015	2000
Non-detect results replaced with reporting limit for statistics	Yes	Yes	No	Yes	-
Data omitted	None	None	15 Values from SAC at Mallard Island all below a high detection limit (1 µg/L)	None	-
Number of data points	174	198	7	17	-

Sources: California Environmental Data Exchange Network 2020; Lucas and Stewart 2007:182; U.S. Geological Survey 2020.
SAC = Sacramento River; SJR = San Joaquin River; BAY = San Francisco Bay; EST = Eastside Tributaries; AGR = Delta Agricultural Return Waters; CEDEN = California Environmental Data Exchange Network; USGS = U.S. Geological Survey.

Source water data for the Sacramento River and San Joaquin River were evaluated to determine whether the primary source water concentration should be represented by a single value or as different values for each month. Analysis of the Sacramento River (ANOVA; $p<0.05$) and San Joaquin River, (ANOVA; $p<0.05$) data indicated significantly different concentrations by month. Therefore, monthly average concentrations were used for these locations in the mass-balance calculations. There were insufficient data for this analysis at the other source water locations; thus, selenium concentrations in San Francisco Bay, Eastside Tributaries, and Delta Agricultural Return Waters are represented by a single average of the entire dataset in the mass-balance calculations. Tables G.5-2 and G.5-3 provide the monthly average dissolved selenium concentrations for the Sacramento River and San Joaquin River.

Table G.5-2. Monthly Average Source Water Dissolved Selenium Concentrations for the Sacramento River (in micrograms per liter)

Data Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Concentration	0.104	0.111	0.107	0.093	0.083	0.084	0.071	0.078	0.077	0.073	0.065	0.077
Number of data points	24	26	13	11	21	19	9	14	3	12	2	20

Table G.5-3. Monthly Average Source Water Dissolved Selenium Concentrations for the San Joaquin River (in micrograms per liter)

Data Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Concentration	0.574	0.514	0.535	0.195	0.159	0.306	0.231	0.276	0.252	0.215	0.265	0.478
Number of data points	24	26	16	12	17	17	15	16	9	11	10	25

Selenium data from agricultural return drains in the Delta were queried from the California Department of Water Resources Water Data Library (California Department of Water Resources 2020). These 356 sample results, collected between 1985 and 1997 from locations distributed around the Delta, were either below the detection limit of 1 µg/L or near the detection limit, ranging from 1 µg/L to 4 µg/L. Given the relatively high detection limit for these analyses and detected concentrations near the reporting limit, these data were not considered sufficiently reliable to use for estimating source water concentrations. Instead, more recent estimates of selenium in agricultural return water from Lucas and Stewart (2007) were used to represent these source waters in Table G.5-1 and in modeling calculations.

G.5.1.2.2 Biota Concentrations

Selenium concentrations in fish tissues and in bird eggs were calculated using calibrated Delta-wide selenium bioaccumulation models, based on ecosystem-scale models developed by Presser and Luoma (2010a, 2010b, 2013). These models used biogeochemical and physiological factors from laboratory and field studies; loading rates, chemical speciation, and transformation to particulate material; bioavailability; bioaccumulation in invertebrates; and trophic transfer to predators. Important components of the methodology included: (1) empirically determined environmental partitioning factors between water and particulate material (K_d) that quantify the effects of dissolved speciation and phase transformation; (2) concentrations of selenium in living and non-living particulates at the base of the foodweb that determine selenium bioavailability to invertebrates; and (3) selenium biodynamic foodweb transfer factors that quantify the physiological potential for bioaccumulation from particulate matter to consumer organisms and from prey to their predators. The modeled water column concentrations and tissue concentrations presented herein are not intended to be predictive in nature. Rather, they are for comparative assessment to identify the potential effect of project alternatives on biota concentrations of selenium relative to the no action alternative.

The following sections describe the bioaccumulation models and calibration of K_d to reflect Delta-specific conditions.

Selenium Concentrations in Particulates

Phase transformation reactions from dissolved to particulate selenium are the primary form by which selenium enters the food web. Presser and Luoma (2010a, 2010b, 2013) used field observations to quantify the relationship between particulate material and dissolved selenium as indicated in Equation 2.

$$C_{particulate} = K_d * C_{water\ column}$$

Where:

- $C_{particulate}$ = selenium concentration in particulate material (µg/kg, dry weight [dw])
- K_d = particulate/water ratio
- $C_{water\ column}$ = selenium concentration in water column (µg/L)

The K_d (also called an "enrichment factor") describes the particulate/water ratio at the moment the sample was taken and should not be interpreted as an equilibrium constant (as it sometimes is mistaken to be). It can vary widely among hydrologic environments and potentially among seasons (Presser and Luoma 2010a, 2010b, 2013; Young et al. 2010). In addition, other factors such as selenium speciation, water residence time, and particle type affect K_d. Selenium typically enters a stream primarily as selenate. If the stream flows into a wetland and the water is retained there with sufficient residence time, recycling of selenium may occur. This results in generation of particulate selenium and conversion to more bioaccumulative selenite and organo-selenium from the less-bioaccumulative dissolved selenate.

Residence time of water containing selenium is usually the most influential factor on the conditions in the receiving aquatic environment. Short water residence times (such as in streams and rivers) limit partitioning of selenium into particulate material. Conversely, longer residence times (such as in sloughs, lakes, and estuaries) allow greater uptake by plants, algae, and microorganisms. Furthermore, environments in downstream portions of a watershed can receive cumulative contributions of upstream recycling in a hydrologic system. Because it is highly site-specific, K_d can be a large source of uncertainty in any selenium model where extrapolations from selenium concentrations in the water column to those in aquatic organism tissues, or from tissue to water column concentrations, are necessary. While K_d can vary among locations and over time, this uncertainty was minimized in Delta tissue bioaccumulation models calibrated with site-specific data. Additional discussion of Delta-specific K_d values used in the bioaccumulation models is provided in Section G.5.1.2.3, *Delta-Wide Bioaccumulation Model Calibration*.

Selenium Concentrations in Invertebrates

Trophic transfer factors (TTFs) describe the transfer of selenium from particulates to prey and to predators. These have been developed using data from laboratory experiments and field studies (Presser and Luoma 2010a, 2010b, 2013). TTFs are species-specific, but the range of TTFs for freshwater invertebrates was found to be similar to TTFs for marine invertebrates determined in laboratory experiments.

TTFs for estimating selenium concentrations in invertebrates were calculated using Equation 3:

$$TTF_{invertebrate} = (C_{invertebrate}) / (C_{particulate})$$

Where:

- $TTF_{invertebrate}$ = trophic transfer factor from particulate material to invertebrate
- $C_{invertebrate}$ = concentration of selenium in invertebrate (µg/g dw)
- $C_{particulate}$ = concentration of selenium in particulate material (µg/g dw)

An average aquatic insect TTF was calculated from TTFs for aquatic insect species with similar bioaccumulative potential, including mayfly (*Baetidae*; *Heptageniidae*; *Ephemerellidae*), caddisfly (*Rhyacophilidae*; *Hydropsychidae*), crane fly (*Tipulidae*), stonefly (*Perlodidae*/*Perlidae*; *Chloroperlidae*), damselfly (*Coenagrionidae*), corixid (*Cenocorixa* spp.), and chironomid (*Chironomus* spp.) aquatic life stages. Species-specific TTFs from Presser and Luoma (2010a, 2010b, 2013) range from 2.1 to 3.2. The average TTF of 2.8 was used in the Delta-wide model.

Selenium Concentrations in Whole-body Fish

The mechanistic equation for modeling selenium bioaccumulation in fish tissue is similar to that for invertebrates if whole-body concentrations are the endpoint (Presser and Luoma 2010a, 2010b, 2013) . This relationship is shown in Equation 4 for a trophic level 2 fish eating invertebrates:

$$TTF_{fish} = C_{fish} / C_{invertebrate}$$

where:

$$C_{invertebrate} = C_{particulate} * TTF_{invertebrate}$$

therefore:

$$C_{fish} = C_{particulate} * TTF_{invertebrate} * TTF_{fish}$$

Where:

- C_{fish} = concentration of selenium in fish (µg/g dw)
- $C_{particulate}$ = concentration of selenium in particulate material (µg/g dw)
- $C_{invertebrate}$ = concentration of selenium in invertebrate (µg/g dw)
- $TTF_{invertebrate}$ = trophic transfer factor from particulate material to invertebrates
- TTF_{fish} = trophic transfer factor from invertebrates to fish

Selenium bioaccumulation into a particular fish species depends on organism physiology and its preferred foods. Variability in fish tissue selenium concentrations for the present modeling is driven more by dietary choices and their respective levels of bioaccumulation (that is, $TTF_{invertebrate}$) than by differences in fish physiology or the dietary transfer to the fish (TTF_{fish}). Higher trophic level 4 fish (e.g., predator fish such as bass consuming forage fish) can be completed by incorporating additional TTFs, as shown in Equation 5:

$$C_{predatorfish} = C_{particulate} * TTF_{invertebrate} * TTF_{foragefish} * TTF_{predatorfish}$$

Where:

- $C_{predatorfish}$ = concentration of selenium in fish (µg/g dw)
- $C_{particulate}$ = concentration of selenium in particulate material (µg/g dw)
- $TTF_{invertebrate}$ = trophic transfer factor from particulate material to invertebrates
- $TTF_{foragefish}$ = trophic transfer factor for invertebrates to foraging fish species
- $TTF_{predatorfish}$ = trophic transfer factor for forage fish to predator species

The fish TTFs reported in Presser and Luoma (2010a) range from 0.5 to 1.6, so the average fish TTF of 1.1 was used for all trophic levels of fish in the Delta-wide model. Modeled selenium concentrations in whole-body fish were used to estimate selenium concentrations in fish fillets, as described below.

Selenium Concentrations in Fish Fillets

Selenium concentrations in whole-body fish from the bioaccumulation model were converted to selenium concentrations in skinless fish fillets for evaluation of potential human health effects. The regression equation provided in Saiki et al. (1991) for Largemouth Bass from the San Joaquin River system was considered to be the most representative of fish in the Delta and was used for the conversion of these selenium concentrations, as shown in Equation 6:

$$SF = (-0.388) + (1.322 * WB)$$

Where:

- SF = selenium concentration in skinless fish fillet (µg/g dw)
- WB = selenium concentration in whole-body fish (µg/g dw)

Dry weight fish fillet selenium concentrations were calculated for comparison with the North Bay TMDL target of 11.3 milligrams per kilogram (mg/kg) dw (San Francisco Bay Regional Water Quality Control Board 2019), which is the same as the Environmental Protection Agency (2021) recommended freshwater selenium ambient chronic water quality criterion for the protection of aquatic life and the proposed criterion for California (Environmental Protection Agency 2018). Fish fillet data were also compared to the Advisory Tissue Level (2.5 µg/g) in wet weight (ww), a benchmark below which adverse effects on human health are unlikely to occur and that is used to inform the need to issue fish consumption guidelines (Office of Environmental Health Hazard Assessment 2017). Wet-weight concentrations were estimated from dry-weight concentrations using the equation provided by Saiki et al. (1991) as shown in Equation 7:

$$WW = DW * (100 – Moist)/100$$

Where:

- *WW* = selenium concentration in wet weight (µg/g ww)
- *DW* = selenium concentration in dry weight (µg/g dw)
- *Moist* = mean moisture content of the species

Because moisture content in fish varies among species, sample handling, and locations, the mean moisture content of 70 percent used by Foe (2010b) was assumed for fish in the Delta. The final equation used to estimate selenium concentration in skinless fish fillets (wet weight) from selenium concentration in whole-body fish (dry weight) is as shown in Equation 8:

$$SF = ([-0.388] + [1.322 * WB]) * 0.3$$

Where:

- *SF* = selenium concentrations in skinless fish fillet (µg/g ww)
- *WB* = selenium concentration in whole-body fish (µg/g dw)

Selenium Concentrations in Bird Eggs

Selenium concentrations in bird tissues can be estimated, but the transfer of selenium into bird eggs is more meaningful for evaluating reproductive effects to birds from selenium (Presser and Luoma 2010a; Ohlendorf and Heinz 2011). Examples of models for selenium transfer to bird eggs are as shown in Equations 9 and 10:

$$C_{birdegg} = C_{particulate} * TTF_{invertebrate} * TTF_{birdegg}$$

(this equation is based on birds, such as shorebirds, eating invertebrates)

or:

$$C_{birdegg} = C_{particulate} * TTF_{invertebrate} * TTF_{fish} * TTF_{birdegg}$$

(this equation is based on birds, such as herons or terns, feeding on small fish)

Where:

- $C_{birdegg}$ = concentration of selenium in bird egg (µg/g dw)
- $C_{particulate}$ = concentration of selenium in particulate material (µg/g dw)
- $TTF_{invertebrate}$ = trophic transfer factor from particulate material to invertebrate
- TTF_{fish} = trophic transfer factor from invertebrate to fish
- $TTF_{birdegg}$ = trophic transfer factor from invertebrate or fish (depending on diet) to bird egg

Presser and Luoma (2010b, 2013) reviewed the available data for selenium bioaccumulation from diet to bird eggs and concluded that the mean $TTF_{birdegg}$ = 2.6 was most appropriate for modeling. This TTF was based on laboratory studies in which mallards (*Anas platyrhynchos*) were fed selenium-fortified diets to evaluate reproductive effects. Mallards are considered sensitive to selenium based on reproductive endpoints. In a previous evaluation of those data, Presser and Luoma (2010a) concluded that a $TTF_{birdegg}$ = 1.8 was appropriate. This and other laboratory studies conducted with black-crowned night-herons (*Nycticorax nycticorax*) by Smith et al (1988), for eastern screech-owls (*Otus asio*) by Wiemeyer and Hoffman (1996), and for American kestrels (*Falco sparverius*) by Santolo et al. (1999) used selenomethionine and reported transfer factors of approximately 1.0 to 2.2, with a mean of 1.5.

However, the form of selenium (selenomethionine) in these laboratory studies differs from mixtures of selenium forms that can occur in nature. In field studies conducted at Kesterson Reservoir and the Volta Wildlife Area reference site, extensive sampling of food-chain biota and bird eggs was conducted from 1983 through 1985, and birds were collected to determine qualitatively the kinds of aquatic organisms they had eaten (Saiki and Lowe 1987; Hothem and Ohlendorf 1989; Schuler et al. 1990; Ohlendorf and Hothem 1995). Based on the kinds of food items found in each of the sampled species and the mean selenium concentrations in those kinds of organisms, a mean selenium concentration was estimated for each species at each site during each nesting season. In contrast to the findings with selenomethionine-supplemented diets in the laboratory, TTFs from diet to eggs were almost always less than 2.0. At the Volta Wildlife Area, where diet and egg selenium concentrations were representative of "background" conditions, transfer factors ranged from 0.63 to 2.0, with a mean of 1.35. At Kesterson, the transfer factors ranged from less than 0.2 to 0.48.

Because selenomethionine in the mallard diet is probably more readily transferred to eggs than are the selenium forms in field-collected food-chain biota, the $TTF_{birdegg}$ = 1.8 value from Presser and Luoma (2010a) was used in the bioaccumulation model.

G.5.1.2.3 Delta-wide Selenium Model Calibration

This section discusses tissue uptake model calibration to identify Delta-specific K_ds using measured and modeled selenium concentrations in water and measured fish tissues reported by Foe (2010a).

The partitioning from water to particulates, such as algae, represents the first step of selenium bioaccumulation into the food web. This factor is highly site-specific, and varies depending on the form of selenium present, water residence time and flow rates, and the type of particulates. For the Delta-wide bioaccumulation models, multiple K_ds were determined to describe different flow regimes based on Delta-specific calibration. Measured and modeled selenium concentrations in water and measured selenium concentrations in fish tissues were used to determine K_ds applicable for all water year types, wet conditions (i.e., above-normal and wet years),] and dry conditions (i.e., below normal, dry, and critical years). The refined Delta-specific K_ds were used in tissue uptake models for fish tissues and bird eggs incorporating modeled water column selenium concentrations following procedures described by Presser and Luoma (2010a, 2010b).

The calibrated Delta-wide selenium bioaccumulation models are considered representative of conditions in the Delta under current and likely future conditions. They incorporate realistic concentrations of water column selenium and they predict selenium concentrations in predatory fish that approximate measured concentrations in whole-body fish. These calibrated models take into account the variable nature of selenium bioaccumulation in relation to water column concentrations, which is reflected by the inverse relationship between K_d and water column selenium concentrations.

Measured Fish Tissue Concentrations for the Delta-Wide Bioaccumulation Model Calibration

Historical fish tissue data for selenium concentrations in whole largemouth bass collected in 2000, 2005, and 2007 were available from Foe (2010a). These samples were collected throughout the Delta at the following locations.

- Big Break
- Cache Slough at Ryer Island
- Franks Tract
- Middle River Bullfrog
- Old River Near Paradise Cut
- Sacramento River Mile 44
- Sacramento River at Veterans Bridge
- San Joaquin River Potato Slough
- San Joaquin River at Vernalis

Selenium Concentrations in Water for the Delta-Wide Bioaccumulation Model Calibration

Estimates of water column selenium exposure concentrations associated with measured fish tissue selenium concentrations were determined using DSM2 flow fraction output similar to the approach described in Section G.5.1.2.1, *DSM2 Post-processing*, but on a quarterly basis instead of a monthly basis. Dissolved or total selenium data were available for six inflow locations to the Delta for the selenium bioaccumulation model development.

- Sacramento River below Knights Landing (just upstream of Yolo Bypass, representing the Bypass source)
- Sacramento River at Freeport (mainstem flow to Delta)
- San Joaquin River at Vernalis (Airport Way) (mainstem flow to Delta)
- Mokelumne, Calaveras, and Cosumnes Rivers (for East Delta tributaries)
- Mildred Island, Center (for Delta Agriculture)
- San Joaquin River near Mallard Island (for Martinez/Suisun Bay)

Geometric mean selenium concentrations from these six Delta source water locations are presented in Table G.5-4. Selenium concentrations in surface water in the San Joaquin River at Vernalis are presented for multiple periods. This is to reflect the lag time for selenium bioaccumulation in piscivorous largemouth bass that may be more than 1 year (Beckon 2016). Vernalis water data over 2 years (1999–2000, 2004–2005, and 2006–2007) were paired with each year when fish were collected to estimate surface water selenium concentrations at fish sampling locations. Insufficient data were available to do this for other source water locations.

These source water concentrations were combined with modeled quarterly average flow fractions for DSM2 output locations near fish tissue sampling locations to calculate water column selenium concentration at those locations. The modeled quarterly and average annual water column selenium concentrations for selected DSM2 output locations are shown in Table G.5-5 for Year 2000, Table G.5-6 for Year 2005, and Table G.5-7 for Year 2007.

Table G.5-4. Selenium Concentrations (in micrograms per liter) in Delta Source Waters used for the Delta-Wide Bioaccumulation Model Calibration

Delta Sources	Representative Inflow Site	Geometric Mean Selenium Concentration (dissolved unless otherwise noted)	Years	Source
AGR	Mildred Island, Center	0.11	2000	Lucas and Stewart 2007
EST	Mokelumne, Calaveras, and Cosumnes Rivers	0.10 [a]	None	None
BAY	SAC at Mallard Island	0.10	2000–2008	San Francisco Estuary Institute 2014
SAC	SAC at Freeport	0.09	2007–2014	U.S. Geological Survey 2014
SJR	SJR at Vernalis (Airport Way)	0.83 [b]	1999–2000	State Water Resources Control Board 2009
SJR	SJR at Vernalis (Airport Way)	0.85 [b]	2004–2005	State Water Resources Control Board 2009
SJR	SJR at Vernalis (Airport Way)	0.58 [b]	2006–2007	State Water Resources Control Board 2009
YOL	SAC below Knights Landing	0.23 [c]	2004, 2007, 2008	California Department of Water Resources 2009

AGR = Delta Agricultural Return Waters; EST = Eastside Tributaries; BAY = San Francisco Bay; SAC = Sacramento River; SJR = San Joaquin River; YOL = Yolo Bypass.
[a] Dissolved selenium concentration is assumed to be 0.1 µg/L due to lack of available data and lack of sources that would be expected to result in concentrations greater than 0.1 µg/L.
[b] Not specified whether total or dissolved selenium; data for 1999–2000 used for bioaccumulation by bass in 2000; data for 2004–2005 for bass in 2005; and data for 2006–2007 for largemouth bass in 2007.
[c] Total selenium concentration in water.

DSM2 data were not available for the Sacramento River at Veterans Bridge, for which there were measured fish tissue data. Therefore, historical data for selenium concentrations in water collected nearby were used to calculate quarterly average water column selenium concentrations. The geometric mean of selenium concentrations in water collected from the Sacramento River below Knights Landing in 2004, 2007, and 2008 (California Department of Water Resources 2009) were used to represent quarterly averages of selenium concentrations in water for Veterans Bridge in all years.

Bioaccumulation Model Calibration for Whole-body Fish

Models estimating whole-body selenium concentrations in fish were refined by modifying dietary composition and input parameters to closely represent measured conditions in the Delta. The ratio of modeled selenium concentration in fish to measured selenium in whole largemouth bass was evaluated to describe the model accuracy and inform model calibration. Successive steps in this model calibration are described in this section.

Model 1 is a basic representation of uptake by a forage fish (Equation 4), while Model 2 calculates sequential bioaccumulation in a more complex food web that included predatory fish eating forage fish (Equation 9). The fish tissue bioaccumulation models use the same TTFs for invertebrates (2.8) and fish (1.1) as discussed in Section G.5.1.2.2. In both Models 1 and 2, the particulate selenium concentration was estimated using Equation 2 and a default K_d of 1,000. The outputs of estimated selenium concentrations and the ratios of predicted-to-observed bass selenium concentrations for Models 1 and 2 are presented in Table G.5-8 and Figure G.5-1 (figures are provided at the end of this attachment).

Models 1 and 2 tended to substantially underestimate the whole-body selenium concentrations in fish compared to bass data reported in Foe (2010a). This was partly because Model 1 estimates selenium concentration in a forage fish (TL-3), whereas bass are a predatory fish with expected higher dietary exposure. Consequently, Model 1 was not further developed as the selenium bioaccumulation model to represent fish in the Delta.

Model 2 is representative of predatory fish, but Model 2 was very similar to Model 1 in distribution of data and in underestimating bass data, even though an additional trophic-level transfer was included in the model. As noted in Section G.5.1.2.2, and described in much greater detail by Presser and Luoma (2010a, 2010b, 2013), the K_d values for uptake from water are far more variable than the TTFs for invertebrates or fish. Models 1 and 2 also reflect the tendency of selenium (as an essential nutrient) to be more bioaccumulative when water column concentrations are low (as described by Stewart et al. [2010]), which they were for the DSM2-modeled concentrations (that is, 0.09 to 0.85 µg/L). Available K_d values from various sampling efforts in the Delta provided by Presser and Luoma (2010b) were reviewed for potential applicability in the modeling effort. Those values varied on the basis of locations within the Delta and Suisun Bay and also by water year and flow characteristics (often greater than 5,000 and sometimes exceeding 10,000). However, efforts to incorporate various selected K_d values (for example, 2,000 or 3,000) into the model uniformly for different DSM2 locations failed to produce ratios of modeled-to-measured fish selenium concentrations that reflected measured fish concentrations (they either over- or underestimated fish selenium concentrations because of variability in site conditions).

The available bass data and the assumed TTFs for invertebrates (2.8) and fish (1.1) were used to back-calculate a location and sample-specific K_d. It was recognized that some of the variability in bioaccumulation may be associated with the TTFs, but there were no reasonable assumptions for selection of alternative values to consider in the model.

When TTFs were held constant, back-calculation of K_d values revealed a concentration-related effect. For water column selenium concentrations in the range of 0.09 to 0.13 µg/L (N = 50), the median K_d was 5,575; when water column selenium concentrations were in the range of 0.14 to 0.40 µg/L (N = 19), the median K_d was 2,431; for water column selenium concentrations in the range of 0.41 to 0.85 µg/L (N = 19), the median K_d was 748. These observations are consistent with an inverse relationship between water column selenium concentrations and bioaccumulation in aquatic organisms (Stewart et al. 2010; Environmental Protection Agency 2021).

Figure G.5-2 shows the log-log regression relation of K_d to water column selenium concentration when all years are included and the TTFs are held constant, while Figure G.5-3 shows the

relationship for normal/wet years (2000 and 2005) and Figure G.5-4 shows the regression for dry years (2007), when the K_ds were generally higher.

Model 3 is a refinement of Model 2 (with TTFs as described previously) by including the K_d estimated from the log-log regression relation for all years (Figure G.5-2). This produced a median ratio of predicted-to-observed whole-body selenium in bass that slightly exceeded 1 (Figure G.5-1); data are provided in Table G.5-9. Because of the noticeable differences between 2007 (the dry year) and the other 2 years, the next step in model calibration was to evaluate 2007 separately from 2000 and 2005.

Model 4 incorporates the log-log relationship between K_d and water selenium concentrations for 2000 and 2005 (Figure G.5-3). Model 5 incorporates log-log relationship between K_d and water selenium concentrations for 2007 (Figure G.5-4 and Table G.5-10). These two models produced ratios of predicted-to-observed whole-body selenium in bass approximating 1, as shown in Figure G.5-1.

As expected in a large, complex, and diverse ecological habitat such as the Delta, variations in the data distribution and in the outputs of models are not surprising. However, it should be noted that the estimated K_d values for Model 3 (674-6,060; Table G.5-9), Model 4 (651-4,997; Table G.5-10), and Model 5 (1,206-8,064; Table G.5-11) are consistent with those summarized by Presser and Luoma (2010b) for the Delta.

Figures G.5-5 and G.5-6 illustrate the distribution of data for selenium concentrations in Largemouth Bass (Foe 2010a) relative to the measured or DSM2-modeled water column selenium concentrations (Tables G.5-5 through G.5-7) and Models 3, 4, and 5 to complement the boxplots shown in Figure G.5-1. There is notably more variability in selenium concentrations in bass between 0.09 and 0.13 µg/L than at higher water column selenium concentrations (as shown in both Figures G.5-5 and G.5-6); most of the higher values are from 2007 and most of the lower ones are from 2005.

Figure G.5-5 shows the available data for 2000, 2005, and 2007 plotted with the Model 3 prediction of selenium concentrations. As noted previously in text and in Figure G.5-1, the model slightly over-predicts the median concentrations in fish on the basis of water column selenium concentrations. This effect is reflected in Figure G.5-1 by the outliers above the 90th percentile bar (that is, the higher over-predictions for fish, which are those from 2000 and 2005). However, overall, the model is within 1 µg/g for all values less than the prediction, and within about 1.2 µg/g for the values greater than the prediction (Figure G.5-5).

Because of the notable differences between data for 2007 compared to combined 2000 and 2005 data, Model 4 was developed for 2000 and 2005 and Model 5 was developed for 2007. Figure G.5-6 shows those model predictions compared to the data. These two models improved the predictions; although, the figure shows greater differences between measured and modeled fish tissue data at lower water column concentrations (that is, less than 0.30 µg/L) than at higher ones. The divergence is generally less than 0.5 µg/g at the higher water column concentrations. The outliers for Model 4 are mostly above the 90th percentile (that is, over-predicting concentrations in fish), rather than below, as shown in Figure G.5-1. For Model 5, the predictions are "tighter" with just a few outliers above or below the 90th percentile.

Evaluation of water-year effects on selenium concentration in bass concluded that Model 4 was relatively predictive of selenium concentration in whole-body bass during normal to wet water years. Model 5 was considered predictive for dry water years (such as 2007). Model 3 incorporates the varying bioaccumulation when all years are considered (that is, 2000, 2005, and 2007). Although Model 3 tends to slightly overestimate selenium bioaccumulation (Table G.5-9 and Figure G.5-1), it was used for estimating selenium concentrations in whole-body fish from average water concentrations because it best describes the relationship between fish tissue and water concentrations for all year types.

G.5.1.2.4 Western Delta Sturgeon Model

In addition to the Delta-wide modeling for fish and birds (calibrated with data for largemouth bass), selenium uptake and food-chain transfer information from the ecosystem-scale selenium model for the San Francisco Bay-Delta Regional Ecosystem Restoration Implementation Plan (Presser and Luoma 2013) informed the selenium bioaccumulation model for sturgeon in the western Delta. The largemouth bass has lower selenium bioaccumulation rates than those observed for sturgeon (green sturgeon [*Acipenser medirostris*] and white sturgeon [*A. transmontanus*]) and is not an appropriate model species that would be protective of sturgeon (Presser and Luoma 2013). Sturgeon differ by feeding, in part, on overbite clams (*Corbula* [*Potamocorbula*] *amurensis*) in Suisun Bay and may do so in the western portion of the Delta under future conditions. Therefore, modeled water column selenium concentrations from three western Delta locations (Sacramento River at Emmaton, San Joaquin River at Antioch, and Montezuma Slough near Beldon's Landing locations) were used to model selenium bioaccumulation for sturgeon.

Presser and Luoma (2013) determined K_d values for San Francisco Bay (including Carquinez Strait – Suisun Bay) during "low flow" conditions (5,986) and "average" conditions (3,317). These values were used to model selenium concentrations in particulates in bioaccumulation modeling for sturgeon under "Drought" and "All" year conditions at the three western Delta locations. By comparison, calibration of the Delta-wide model for two western-most location from which bass had been collected (Big Break) resulted in an average K_d = 3,736 for 2000/2005 (Model 4, normal/wet years) and average K_d = 7,166 for 2007 (Model 5, dry year).

Presser and Luoma (2013) reported a $TTF_{invertebrate}$ of 9.2 (identified as TTF_{prey} in Table 1 of Presser and Luoma [2013]) assuming a sturgeon diet of 50 percent clams and 50 percent amphipods and other crustaceans in their model. This TTF was used to calculate concentrations in sturgeon invertebrate prey for the Sacramento River at Emmaton, San Joaquin River at Antioch, and Montezuma Slough near Beldon's Landing locations.

A TTF of 1.3 from diet to fish (identified as $TTF_{predator}$) was reported for sturgeon in Presser and Luoma (2013) and was used to calculate concentrations of selenium in sturgeon for the three western Delta locations.

Modeling sturgeon tissue selenium concentrations at the three western Delta locations did not require refinement because it relied on recent data provided by Presser and Luoma (2013) and because field data to refine the model were not available.

G.5.2 Modeling Simulations and Assumptions

This section describes the assumptions for the selenium model simulations. The general selenium modeling assumptions described in the following subsection pertain to all alternative model runs.

G.5.2.1 Delta-wide Model Assumptions

The calibrated Delta-wide selenium bioaccumulation models (Models 3, 4, and 5) are considered representative of conditions in the Delta under current and likely future conditions, because they incorporate realistic concentrations of water column selenium and they predict selenium concentrations in predatory fish that approximate measured concentrations in Largemouth Bass. The calibrated models take into account the variable nature of selenium bioaccumulation in relation to water column concentrations, which is reflected by the inverse relationship between K_d and water column selenium concentrations.

Models are not available to quantitatively estimate the level of changes in selenium bioaccumulation as related to residence time, but the effects of residence time are incorporated in the bioaccumulation modeling for selenium through higher K_d values in drought years compared to wet, normal, or all years. If increases in fish tissue or bird egg selenium were to occur, the increases would likely be of concern only where fish tissues or bird eggs are already near or above thresholds of concern. That is, where biota concentrations are currently low and not approaching thresholds of concern (which is the case throughout the Delta, except for sturgeon in the western Delta), changes in residence time alone would not be expected to cause them to then approach or exceed thresholds of concern. In consideration of this factor, although monitoring data for fish tissue or bird eggs in the Delta are sparse, the most likely areas in which biota tissue selenium concentrations would be high enough that additional bioaccumulation due to increased residence time from restoration areas would be a concern are the western Delta and Suisun Bay (discussed below for sturgeon), and the south Delta in areas that receive San Joaquin River water.

The South Delta receives elevated selenium loads from the San Joaquin River. In contrast to Suisun Bay and possibly the western Delta in the future, the south Delta lacks the Overbite Clam (*Corbula* [*Potamocorbula*] *amurensis*), which is considered a key driver of selenium bioaccumulation in Suisun Bay because of its high bioaccumulation of selenium and its role in the benthic food web that includes long-lived sturgeon. The Asian clam, *Corbicula fluminea*, occur in the south Delta. This bivalve also bioaccumulates selenium, but it is not as widespread as the overbite clam and thus likely makes up a smaller fraction of sturgeon diet.

Nonpoint sources of selenium in the San Joaquin Valley that contribute selenium to the Delta are being controlled through a TMDL developed by the Central Valley Regional Water Quality Control Board for the lower San Joaquin River, established limits for the Grassland Bypass Project, and Basin Plan objectives (Central Valley Regional Water Quality Control Board 2001, 2010; State Water Resources Control Board 2010a, 2010b; Environmental Protection Agency 2015) that have resulted in decreasing discharges of selenium from the San Joaquin River to the Delta.

G.5.2.2 Western Delta Sturgeon Assumptions

Modeling for selenium bioaccumulation by sturgeon in the western Delta was based on the most appropriate uptake factors available, which were published by Presser and Luoma (2013) specifically for sturgeon in northern San Francisco Bay estuary. The disparity between larger estimated changes for sturgeon and smaller changes for other biota (that is, whole-body fish, bird eggs, and fish fillets) is attributable largely to differences in modeling approaches, as described previously. The model for most biota was calibrated to account for the varying concentration-dependent uptake from water column selenium concentrations (expressed as the K_d, which is the ratio of selenium concentrations in particulates [as the lowest level of the food chain] relative to the water column concentration) that was exhibited in data for largemouth bass in 2000, 2005, and 2007 at various locations across the Delta. In contrast, the sturgeon modeling could not be similarly calibrated at the three western Delta locations and used literature-derived uptake factors and TTFs for the estuary from Presser and Luoma (2013).

There was a significant negative log-log relationship of K_d to water column selenium concentration that reflected greater bioaccumulation rates for bass at low water column selenium than at higher concentrations. There was no difference in bass selenium concentrations in the Sacramento River at Rio Vista compared to the San Joaquin River at Vernalis in 2000, 2005, and 2007 (Foe 2010a), despite a nearly 10-fold difference in water column selenium concentrations. It is unknown whether this might also occur in the sturgeon food web. Thus, there is more confidence in the site-specific modeling based on the Delta-wide model that was calibrated for bass data than in the estimates for sturgeon based on "fixed" K_d values for all years and for drought years without regard to water column selenium concentration at the three locations in different time periods.

The western Delta and Suisun Bay receive elevated selenium loads from North San Francisco Bay (including San Pablo Bay, Carquinez Strait, and Suisun Bay) and from the San Joaquin River. Point sources of selenium in North San Francisco Bay (that is, refineries) that contribute selenium to Suisun Bay are expected to be reduced through a TMDL developed by the San Francisco Bay Regional Water Quality Control Board (2016) that is expected to result in decreasing discharges of selenium. Nonpoint sources of selenium in the San Joaquin Valley that contribute selenium to the San Joaquin River, and thus the Delta and Suisun Bay, will be controlled through a TMDL developed by the Central Valley Regional Water Quality Control Board (2001) for the lower San Joaquin River, established limits for the GBP, and Basin Plan objectives (Central Valley Regional Water Quality Control Board 2010; State Water Resources Control Board 2010a, 2010b; Environmental Protection Agency 2015) that are expected to result in decreasing discharges of selenium from the San Joaquin River to the Delta. If selenium levels are not sufficiently reduced via these efforts, it is expected that the State Water Resources Control Board and the San Francisco Bay and Central Valley regional Water Quality Control Boards would initiate additional actions to further control sources of selenium.

G.5.2.3 Model Application Methodology

Modeled whole-body fish, bird egg, or fish fillet data can be compared to the following threshold effect benchmarks:

- Whole-body fish for the Delta-wide model were compared to the Level of Concern (4 mg/kg dw; Beckon 2017) and the Toxicity Level (8.5 mg/kg dw; Environmental Protection Agency 2018, 2021) for fish tissue.
- Modeled bird egg selenium concentrations were compared to Level of Concern (6 mg/kg dw) and Toxicity Level (10 mg/kg dw) values from Beckon (2017).
- Fish fillet data were compared to the Advisory Tissue Level (2.5 µg/g ww) for human consumption of fish (Office of Environmental Health Hazard Assessment 2008) and the North Bay TMDL target of 11.3 mg/kg dw (San Francisco Bay Regional Water Quality Control Board 2019).
- Whole-body selenium concentrations in sturgeon were compared to Low Effect (5 mg/kg dw) and High Effect (8 mg/kg dw) guidelines from Presser and Luoma (2013) and the North San Francisco Bay TMDL target (8 mg/kg dw; San Francisco Bay Regional Water Quality Control Board 2016).

Results of comparisons to these benchmarks are expressed as Exceedance Quotients in some of the tables and figures. Annual average selenium concentrations in water did not exceed the 1.5 µg/L criterion for lentic aquatic systems or the 3.1 µg/L criterion for lotic aquatic systems (Environmental Protection Agency 2021), so no Exceedance Quotients were calculated for modeled water concentrations.

G.5.2.3.1 No Action Alternative Model

The No Action Alternative model was completed for five Delta interior, three western Delta, and four major Delta diversion locations. DSM2 post-processing output provided estimates of the water column selenium concentration at each of those 12 locations (Table G.5-9). The Delta-specific selenium bioaccumulation model that was calibrated using Largemouth Bass data from the Delta was then used to estimate selenium concentrations in whole-body fish and then in bird eggs and fish fillets. Selenium concentrations in sturgeon inhabiting the western Delta (represented by three locations) were estimated using recently published literature parameters. Modeled selenium concentrations in whole-body fish (predatory fish throughout the Delta or sturgeon in the western Delta), bird egg, or fish fillet data were compared to the threshold effect benchmarks listed previously. The modeled tissue selenium concentrations themselves serve as a basis for comparison among alternatives.

G.5.2.3.2 Alternative Models

For each of the alternative model simulations, the same procedure as described for the No Action Alternative model was used, with similar assumptions, to estimate water column selenium concentrations and selenium concentrations in fish and in bird eggs. Each alternative model simulation for each type of biota (whole-body fish [either using the Delta-wide model for bass or the western Delta sturgeon model], bird eggs, or fish fillets) was compared to the No Action Alternative.

G.5.3 Modeling Results

The following sections present modeling output for selenium concentrations in water and biota.

G.5.3.1 Results: Water Column Concentrations

Modeled concentrations of dissolved selenium in water are presented in Tables G.5-15 through G.5-29. The tables present the average dissolved selenium concentrations for water years 1922–2021, and average concentrations by water year type (i.e., wet, above normal, below normal, dry, and critical), for the no action alternative and the project alternatives. Differences between the project alternatives and the no action alternative also are presented.

G.5.3.2 Results: Delta-wide Model Whole Body Fish

Modeled concentrations of selenium in whole-body fish are presented in Tables G.5-30 through G.5-44. The tables present the average dissolved selenium concentrations for water years 1922–2021, and average concentrations by water year type (i.e., wet, above normal, below normal, dry, and critical), for the no action alternative and the project alternatives. Differences between the project alternatives and the no action alternative also are presented.

G.5.3.3 Results: Delta-wide Model Fish Fillets

Modeled concentrations of selenium in skinless fish fillets are presented based on dry weight in Tables G.5-45 through G.5-59 and based on wet weight in Tables G.5-60 through G.5-74. The tables present the average dissolved selenium concentrations for water years 1922–2021, and average concentrations by water year type (i.e., wet, above normal, below normal, dry, and critical), for the no action alternative and the project alternatives. Differences between the project alternatives and the no action alternative also are presented.

G.5.3.4 Results: Delta-wide Model Bird Eggs: Invertebrate Diet

Modeled concentrations of selenium in eggs of birds with an invertebrate diet are presented in Tables G.5-75 through G.5-89. The tables present the average dissolved selenium concentrations for water years 1922–2021, and average concentrations by water year type (i.e., wet, above normal, below normal, dry, and critical), for the no action alternative and the project alternatives. Differences between the project alternatives and the no action alternative also are presented.

G.5.3.5 Results: Delta-wide Model Fish Fillets

Modeled concentrations of selenium in eggs of birds with a fish diet are presented in Tables G.5-90 through G.5-104. The tables present the average dissolved selenium concentrations for water years 1922–2021, and average concentrations by water year type (i.e., wet, above normal, below normal, dry, and critical), for the no action alternative and the project alternatives. Differences between the project alternatives and the no action alternative also are presented.

G.5.3.6 Results: Western Delta Sturgeon Model

Modeled concentrations of selenium in whole sturgeon in the western Delta are presented in Tables G.5-105 through G.5-119. The tables present the average dissolved selenium concentrations for water years 1922–2021, and average concentrations by water year type (i.e., wet, above normal, below normal, dry, and critical), for the no action alternative and the project alternatives. Differences between the project alternatives and the no action alternative also are presented.

G.5.3.7 Model Limitations and Applicability

CalSim 3.0 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 selenium model for sturgeon has greater uncertainty than the selenium model for bass because the sturgeon model was not as finely calibrated for varying K_d relative to water column selenium concentrations in the western Delta, as discussed in Sectio G.5.1.2.4. Selenium 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. However, the selenium models are powerful tools that provide estimated selenium concentrations in biota that, when used in a comparative manner, can provide useful insight into how physical system changes could affect selenium bioaccumulation.

G.5.4 References

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Table G.5-5. Modeled Quarterly Average Selenium Concentrations in Water (in micrograms per liter) for DSM2 Output Locations: Year 2000

	Inflow Source	First Quarter Inflow Percentage						Second Quarter Inflow Percentage					
		Delta Ag.	East Delta Tributaries	Sac. R.	San Joaquin R.	Martinez/ Suisun Bay	Yolo Bypass	Delta Ag.	East Delta Tributaries	Sac. R.	San Joaquin R.	Martinez/ Suisun Bay	Yolo Bypass
	Inflow Location	*Mildred Island, Center*	*Mokelumne Calaveras Cosumnes Rivers*	*Freeport*	*Vernalis*	*San Joaquin R. near Mallard Island*	*Sac. R. below Knights Landing*	*Mildred Island, Center*	*Mokelumne Calaveras Cosumnes Rivers*	*Freeport*	*Vernalis*	*San Joaquin R. near Mallard Island*	*Sac. R. below Knights Landing*
	Selenium (µg/L)	0.11	0.10	0.09	0.83	0.10	0.23	0.11	0.10	0.09	0.83	0.10	0.23
DSM2 Output Water Location	Location ID												
Big Break	BIGBRK_MID	2.94	6.88	53.15	6.59	0.18	5.70	2.95	6.37	73.59	13.55	0.27	3.12
Cache Slough	CACHS_LEN	1.46	0	53.38	0	0	31.91	1.24	1.5E-05	85.07	2.5E-05	0	13.25
Cache Slough at Ryer Island	CACHSR_MID	2.88	0	54.86	0	0	20.48	3.36	9.8E-07	79.75	1.9E-06	0	16.25
Cosumnes R.	COSR_LEN	8.1E-06	98.82	0	0	0	0	0	100.00	0	0	0	0
Franks Tract	FRANKST_MID	5.06	11.56	43.94	15.79	0.02	0.32	4.17	9.42	61.16	23.89	0.01	1.22
Little Holland Tract	LHOLND_L0	72.35	0	5.06	0	0	6.50	23.38	8.2E-07	63.10	1.6E-06	0	13.03
Middle R Bullfrog	MIDRBULFRG_LEN	10.54	13.07	18.37	32.20	1.9E-03	3.2E-03	5.49	9.19	14.96	70.17	4.2E-04	0.10
Mildred Island	MILDDRISL_MID	7.47	14.31	22.79	30.23	2.4E-03	1.8E-03	4.77	10.05	18.48	66.48	6.7E-04	0.13
Mok. R. below Cosum.	MOKBCOS_LEN	2.07	96.19	0	0	0	0	1.65	98.35	0	0	0	0
Mok. R. downstream Cosum.	MOKDCOS_MID	2.07	96.43	0	0	0	0	1.68	98.32	0	0	0	0
Old R near Paradise Cut	OLDRNPARADSEC_MID	6.24	0	0	87.26	0	0	14.40	1.67	5.21	78.66	1.2E-05	0.04
Paradise Cut	PARADSECUT_LEN	4.69	0	0	91.37	0	0	2.62	0.06	0.15	97.16	1.5E-07	1.1E-03
Port of Stockton	PORTOSTOCK_L0	1.67	0	0	18.85	0	0	2.22	0	0	60.73	0	0
Sac. R. at Isleton	SACRISLTON_L0	0.33	0	95.77	0	0	0	0.31	0.00	99.60	0	0	5.5E-05
Sac River RM 44	SACR44_L0	0.14	0	97.93	0	0	0	0.11	0	99.81	0	0	0
Sandmound Sl.	SANDMND_MID	6.36	10.51	43.82	12.90	0.03	0.57	5.22	8.81	63.78	20.40	0.03	1.63
Sherman Island	SHERMNILND_L0	1.64	3.45	52.71	3.93	0.60	12.10	2.48	4.95	76.80	10.96	0.96	3.67
SJR Bowman	SJRBOWMN_MID	1.40	0	0	94.03	0	0	1.52	0	0	98.48	0	0
SJR N Hwy4	SJRNHWY4_MID	3.49	0	0	89.96	0	0	1.87	0	0	98.13	0	0
SJR Naval St.	SJRNAVLST_L0	8.89	12.70	0.00	65.44	0	0	2.69	6.26	0	90.94	0	0
SJR Potato Slough	SJRPOTSL_MID	3.15	12.62	55.38	12.40	0.01	0.06	3.05	10.32	65.93	19.73	0.01	0.86
SJR Turner	SJRTURNR_MID	8.81	9.28	2.55	56.31	5.3E-05	1.0E-05	3.33	5.77	0.41	90.39	6.3E-06	2.4E-03
SJR/Pt. Antioch/fish pier	ASRANTFSH_MID	1.92	4.35	55.13	4.50	0.44	10.23	2.45	4.72	77.70	10.28	0.76	3.91
Suisun Bay	SUISNB_LEN	0.81	1.22	45.93	1.24	16.49	15.94	0.92	1.66	49.51	3.61	41.10	2.95
Sycamore Slough	SYCAMOR_MID	6.50	50.69	15.18	0	0	0	5.89	76.86	16.89	2.8E-07	0	0
White Slough	WHITESL_L0	22.32	11.88	17.97	25.51	1.7E-08	6.0E-11	16.54	12.10	16.87	54.46	3.7E-09	6.1E-05
White Slough DS Disappointment Sl.	WHTSLDISPONT_LEN	14.83	22.63	29.02	22.45	5.4E-08	0	12.45	13.97	21.21	52.32	2.2E-09	2.3E-04

Table G.5-5. Continued: Modeled Quarterly Average Selenium Concentrations in Water (in micrograms per liter) for DSM2 Output Locations: Year 2000

	Inflow Source	Third Quarter Inflow Percentage						Fourth Quarter Inflow Percentage						Estimated Waterborne Selenium Concentrations (µg/L)				
		Delta Ag.	East Delta Tributaries	Sac. R.	San Joaquin R.	Martinez/ Suisun Bay	Yolo Bypass	Delta Ag.	East Delta Tributaries	Sac. R.	San Joaquin R.	Martinez/ Suisun Bay	Yolo Bypass					
	Inflow Location	*Mildred Island, Center*	*Mokelumne Calaveras Cosumnes Rivers*	*Freeport*	*Vernalis*	*San Joaquin R. near Mallard Island*	*Sac. R. below Knights Landing*	*Mildred Island, Center*	*Mokelumne Calaveras Cosumnes Rivers*	*Freeport*	*Vernalis*	*San Joaquin R. near Mallard Island*	*Sac. R. below Knights Landing*	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual
	Selenium (µg/L)	0.11	0.10	0.09	0.83	0.10	0.23	0.11	0.10	0.09	0.83	0.10	0.23					
DSM2 Output Water Location	**Location ID**																	
Big Break	BIGBRK_MID	3.13	0.45	85.63	0.44	4.15	6.12	2.13	0.20	84.85	0.02	8.76	3.96	0.13	0.20	0.10	0.10	0.13
Cache Slough	CACHS_LEN	1.66	4.7E-07	85.95	4.3E-07	5.9E-07	12.23	1.32	2.8E-06	89.83	1.1E-07	2.3E-05	8.67	0.12	0.11	0.11	0.10	0.11
Cache Slough at Ryer Island	CACHSR_MID	1.90	9.3E-08	84.53	1.8E-07	9.2E-12	13.38	1.81	1.0E-07	89.45	6.2E-10	3.0E-06	8.54	0.10	0.11	0.11	0.10	0.11
Cosumnes R.	COSR_LEN	0	100.00	0	0	0	0	0	100.00	0	0	0	0	0.10	0.10	0.10	0.10	0.10
Franks Tract	FRANKST_MID	4.04	0.57	90.34	0.41	0.80	3.78	2.76	0.62	91.38	0.12	2.42	2.64	0.19	0.27	0.10	0.10	0.16
Little Holland Tract	LHOLND_L0	18.48	2.2E-07	68.67	4.2E-07	7.2E-13	12.68	19.63	2.6E-09	72.79	0	0	7.42	0.10	0.11	0.11	0.10	0.11
Middle R Bullfrog	MIDRBULFRG_LEN	7.81	6.43	69.63	14.94	0.12	1.02	4.86	6.31	59.79	27.84	1	0.68	0.31	0.61	0.20	0.30	0.36
Mildred Island	MILDDRISL_MID	6.57	4.57	83.28	4.14	0.15	1.25	4.50	6.63	71.28	16.13	0.61	0.82	0.29	0.58	0.12	0.21	0.30
Mok. R. below Cosum.	MOKBCOS_LEN	7.23	92.77	4.7E-09	0	0	0	2.47	97.53	0	0	0	0	0.10	0.10	0.10	0.10	0.10
Mok. R. downstream Cosum.	MOKDCOS_MID	7.08	92.92	0	0	0	0	2.34	97.66	0	0	0	0	0.10	0.10	0.10	0.10	0.10
Old R near Paradise Cut	OLDRNPARADSEC_MID	10.56	3.9E-05	1.3E-04	89.44	8.8E-28	3.0E-07	2.50	1.1E-04	3.5E-04	97.50	2.8E-20	1.7E-07	0.73	0.68	0.75	0.81	0.74
Paradise Cut	PARADSECUT_LEN	3.43	0	0	96.57	0	0	0.96	0	0	99.04	0	0	0.76	0.81	0.81	0.82	0.80
Port of Stockton	PORTOSTOCK_L0	3.09	0	0	81.32	0	0	2.70	0	0	89.89	0	0	0.16	0.51	0.68	0.75	0.52
Sac. R. at Isleton	SACRISLTON_L0	0.44	0	99.55	0	0	1.3E-05	0.28	0	99.72	0	0	1.1E-03	0.09	0.09	0.09	0.09	0.09
Sac River RM 44	SACR44_L0	0.13	0	99.86	0	0	0	0.05	0	99.94	0	0	0	0.09	0.09	0.09	0.09	0.09
Sandmound Sl.	SANDMND_MID	5.24	0.61	87.78	0.49	1.22	4.59	3.31	0.43	89.58	0.06	3.44	3.11	0.17	0.25	0.10	0.10	0.15
Sherman Island	SHERMNILND_L0	2.60	0.40	81.69	0.46	8.21	6.56	1.77	0.11	77.64	0.01	16.46	3.94	0.11	0.18	0.10	0.10	0.12
SJR Bowman	SJRBOWMN_MID	3.00	0	0	97.00	0	0	0.33	0	0	99.67	0	0	0.78	0.82	0.81	0.83	0.81
SJR N Hwy4	SJRNHWY4_MID	3.91	0	0	96.09	0	0	0.72	0	0	99.28	0	0	0.75	0.82	0.80	0.82	0.80
SJR Naval St.	SJRNAVLST_L0	5.98	10.89	0	83.00	0	0	2.02	3.10	0.00	94.84	0	0	0.57	0.76	0.71	0.79	0.71
SJR Potato Slough	SJRPOTSL_MID	2.63	0.35	93.54	0.20	0.45	2.79	2.06	0.80	93.46	0.06	1.47	2.11	0.17	0.24	0.10	0.09	0.15
SJR Turner	SJRTURNR_MID	8.69	13.75	17.87	59.41	0.01	0.16	3.23	4.83	7.34	84.49	0.03	0.05	0.49	0.76	0.53	0.72	0.62
SJR/Pt. Antioch/fish pier	ASRANTFSH_MID	2.64	0.35	83.38	0.38	6.66	6.52	1.82	0.12	80.54	0.01	13.33	4.11	0.12	0.17	0.10	0.10	0.12
Suisun Bay	SUISNB_LEN	0.80	0.23	27.56	0.40	68.55	2.42	0.60	0.03	28.62	0.01	69.16	1.54	0.11	0.13	0.10	0.10	0.11
Sycamore Slough	SYCAMOR_MID	5.04	14.29	80.66	1.2E-31	0	0	4.23	31.10	64.66	0	0	0	0.07	0.10	0.09	0.09	0.09
White Slough	WHITESL_L0	9.89	7.76	82.34	3.8E-03	3.0E-05	5.3E-04	11.19	12.92	75.64	0.24	4.2E-04	6.4E-04	0.26	0.50	0.09	0.10	0.24
White Slough DS Disappointment Sl.	WHTSLDISPONT_LEN	8.74	7.78	83.47	2.4E-03	4.0E-05	5.6E-04	5.28	14.84	79.82	0.05	5.0E-04	7.3E-04	0.25	0.48	0.09	0.09	0.23

Table G.5-6. Modeled Quarterly Average Selenium Concentrations in Water (in micrograms per liter) for DSM2 Output Locations: Year 2005

	Inflow Source	First Quarter Inflow Percentage						Second Quarter Inflow Percentage					
		Delta Ag.	East Delta Tributaries	Sac. R.	San Joaquin R.	Martinez/ Suisun Bay	Yolo Bypass	Delta Ag.	East Delta Tributaries	Sac. R.	San Joaquin R.	Martinez/ Suisun Bay	Yolo Bypass
	Inflow Location	*Mildred Island, Center*	*Mokelumne Calaveras Cosumnes Rivers*	*Freeport*	*Vernalis*	*San Joaquin R. near Mallard Island*	*Sac. R. below Knights Landing*	*Mildred Island, Center*	*Mokelumne Calaveras Cosumnes Rivers*	*Freeport*	*Vernalis*	*San Joaquin R. near Mallard Island*	*Sac. R. below Knights Landing*
	Selenium (µg/L)	0.11	0.10	0.09	0.85	0.10	0.23	0.11	0.10	0.09	0.85	0.10	0.23
DSM2 Output Water Location	Location ID												
Big Break	BIGBRK_MID	5.87	7.57	83.73	2.41	0.24	0.18	2.90	17.21	52.77	26.69	1.6E-03	0.43
Cache Slough	CACHS_LEN	4.89	2.2E-07	93.64	8.E-07	3.8E-07	1.47	1.48	7.1E-07	94.13	8.0E-07	1.1E-08	4.38
Cache Slough at Ryer Island	CACHSR_MID	8.13	3.0E-07	91.14	1.2E-06	1.3E-06	0.73	3.74	2.5E-08	91.89	1.0E-07	2.9E-08	4.38
Cosumnes R.	COSR_LEN	0	100.00	0	0	0	0	0.00	100.00	0.00	0	0	0
Franks Tract	FRANKST_MID	8.65	11.65	72.50	7.E+00	0.19	0.05	4.63	16.63	26.97	51.74	1.1E-04	0.03
Little Holland Tract	LHOLND_L0	97.11	3.2E-09	2.88	9.E-09	3.9E-09	0.01	44.12	6.5E-09	53.25	2E-08	1.2E-08	2.63
Middle R Bullfrog	MIDRBULFRG_LEN	13.67	9.76	28.26	48.24	0.08	0.01	5.55	5.64	2.70	86.11	7.1E-05	8.4E-04
Mildred Island	MILDDRISL_MID	12.36	11.39	32.28	43.87	8.4E-02	0.01	4.81	6.98	2.78	85.43	3.6E-05	6.7E-04
Mok. R. below Cosum.	MOKBCOS_LEN	2.18	97.82	0	0.00	0	0	0.53	99.47	0	0	0	0
Mok. R. downstream Cosum.	MOKDCOS_MID	2.22	97.78	0	0.00	0	0	0.53	99.47	0	0	0	0
Old R near Paradise Cut	OLDRNPARADSEC_MID	8.95	4.7E-05	1.5E-03	91.05	1.4E-05	1.4E-06	1.43	1.7E-07	1.6E-05	98.57	1.7E-08	3.5E-10
Paradise Cut	PARADSECUT_LEN	10.28	1.6E-07	6.8E-07	89.72	1.6E-11	1.7E-08	0.82	0	0	99.18	0	0
Port of Stockton	PORTOSTOCK_L0	4.70	0	0	95.30	0	0	2.83	0	0	97.16	0	0
Sac. R. at Isleton	SACRISLTON_L0	0.55	0	99.45	0.00	0	0	0.18	0	99.82	0.00	0	0
Sac River RM 44	SACR44_L0	0.21	0	99.79	0.00	0	0	0.07	0	99.93	0.00	0	0
Sandmound Sl.	SANDMND_MID	10.51	10.17	74.35	4.65	0.25	0.07	5.35	18.03	32.15	44.41	1.5E-04	0.06
Sherman Island	SHERMNILND_L0	4.89	5.04	87.74	1.52	0.56	0.23	2.43	14.17	61.17	21.31	0.03	0.89
SJR Bowman	SJRBOWMN_MID	1.10	0	0.00	98.90	0	0	0.45	0	0	99.55	0	0
SJR N Hwy4	SJRNHWY4_MID	1.89	0	0.00	98.11	0	0	0.59	0	0	99.41	0	0
SJR Naval St	SJRNAVLST_L0	4.70	5.45	0.00	89.85	0	0	1.06	5.10	0	93.84	0	0
SJR Potato Slough	SJRPOTSL_MID	6.24	16.03	71.18	6.45	0.07	0.03	2.65	23.15	38.61	35.59	1.1E-05	0.01
SJR Turner	SJRTURNR_MID	6.75	4.55	1.37	87.31	0.01	0	1.49	3.20	0.00	95.31	0	0
SJR/Pt. Antioch/fish pier	ASRANTFSH_MID	4.87	5.29	87.53	1.67	0.37	0.27	2.37	13.56	62.61	20.61	0.02	0.84
Suisun Bay	SUISNB_LEN	2.63	1.36	66.87	0.33	28.58	0.23	1.35	6.21	59.91	8.33	22.38	1.82
Sycamore Slough	SYCAMOR_MID	14.41	68.02	17.57	8.8E-17	0	3.5E-29	3.66	95.02	1.31	1.E-18	0	3.9E-33
White Slough	WHITESL_L0	47.62	12.39	33.06	6.93	8.2E-04	2.7E-06	15.95	8.06	2.95	73.04	1.4E-05	1.5E-07
White Slough DS Disappointment Sl.	WHTSLDISPONT_LEN	20.77	29.09	44.03	6.11	2.4E-04	3.6E-06	14.40	8.89	3.00	73.72	7.9E-06	0

Table G.5-6. Continued: Modeled Quarterly Average Selenium Concentrations in Water (in micrograms per liter) for DSM2 Output Locations: Year 2005

	Inflow Source	Third Quarter Inflow Percentage						Fourth Quarter Inflow Percentage						Estimated Waterborne Selenium Concentrations (µg/L)				
		Delta Ag.	East Delta Tributaries	Sac. R.	San Joaquin R.	Martinez/ Suisun Bay	Yolo Bypass	Delta Ag.	East Delta Tributaries	Sac. R.	San Joaquin R.	Martinez/ Suisun Bay	Yolo Bypass					
	Inflow Location	*Mildred Island, Center*	*Mokelumne Calaveras Cosumnes Rivers*	*Freeport*	*Vernalis*	*San Joaquin R. near Mallard Island*	*Sac. R. below Knights Landing*	*Mildred Island, Center*	*Mokelumne Calaveras Cosumnes Rivers*	*Freeport*	*Vernalis*	*San Joaquin R. near Mallard Island*	*Sac. R. below Knights Landing*	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual
	Selenium (µg/L)	0.11	0.10	0.09	0.85	0.10	0.23	0.11	0.10	0.09	0.85	0.10	0.23					
DSM2 Output Water Location	Location ID																	
Big Break	BIGBRK_MID	3.31	2.21	88.77	1.70	3.98	0.03	2.39	0.24	90.17	0.01	6.48	0.70	0.11	0.30	0.10	0.09	0.15
Cache Slough	CACHS_LEN	1.94	1.7E-05	98.02	1.0E-05	1.6E-06	0.05	2.30	1.2E-05	92.72	4.6E-07	0.00	4.98	0.09	0.10	0.09	0.10	0.09
Cache Slough at Ryer Island	CACHSR_MID	2.15	5.6E-07	97.77	2.6E-07	4.5E-09	0.08	2.66	8.8E-07	96.37	1.9E-08	7.6E-06	0.97	0.09	0.10	0.09	0.09	0.09
Cosumnes R.	COSR_LEN	0	100	0	0	0	0	1.2E-04	100.00	0	0	0	0	0.10	0.10	0.10	0.10	0.10
Franks Tract	FRANKST_MID	4.27	3.20	89.93	1.81	0.77	0.02	3.17	0.81	94.16	0.06	1.74	0.05	0.15	0.49	0.11	0.09	0.21
Little Holland Tract	LHOLND_L0	18.61	5.6E-07	81.24	0.00	0.00	0.16	46.22	6.1E-08	53.77	2.8E-08	2.6E-09	0.01	0.11	0.10	0.09	0.10	0.10
Middle R Bullfrog	MIDRBULFRG_LEN	7.43	12.50	53.07	26.88	0.12	3.1E-03	5.54	8.75	65.65	19.67	0.39	1.1E-03	0.46	0.75	0.30	0.24	0.44
Mildred Island	MILDDRISL_MID	6.73	12.68	65.46	14.98	0.15	3.9E-03	4.81	7.16	77.85	9.71	0.47	1.8E-03	0.43	0.74	0.21	0.17	0.38
Mok. R. below Cosum.	MOKBCOS_LEN	3.05	96.95	0	0	0	0	3.00	97.00	0	0	0	0	0.10	0.10	0.10	0.10	0.10
Mok. R. downstream Cosum.	MOKDCOS_MID	3.05	96.95	0	0	0	0	2.93	97.07	0	0	0	0	0.10	0.10	0.10	0.10	0.10
Old R near Paradise Cut	OLDRNPARADSEC_MID	6.64	0	5.E-09	93.36	0	0	14.49	0.24	3.16	82.09	0.02	8.1E-05	0.78	0.84	0.80	0.72	0.79
Paradise Cut	PARADSECUT_LEN	2.39	0	0	97.61	0	0	1.08	0	0	98.92	0	0	0.77	0.84	0.83	0.84	0.82
Port of Stockton	PORTOSTOCK_L0	2.20	0	0	97.80	0	0	2.20	0	0	97.79	0	0	0.82	0.83	0.83	0.83	0.83
Sac. R. at Isleton	SACRISLTON_L0	0.45	0	99.55	0.00	0	0	0.41	0	99.59	0	0	8.2E-08	0.09	0.09	0.09	0.09	0.09
Sac River RM 44	SACR44_L0	0.14	0	99.86	0.00	0	0	0.17	0	99.83	0	0	0	0.09	0.09	0.09	0.09	0.09
Sandmound Sl.	SANDMND_MID	5.61	3.13	87.97	2.10	1.17	0.02	3.93	0.55	92.97	0.03	2.45	0.07	0.13	0.43	0.11	0.09	0.19
Sherman Island	SHERMNILND_L0	2.76	1.84	86.03	1.72	7.62	0.04	1.95	0.11	84.69	0.01	11.76	1.48	0.10	0.26	0.10	0.09	0.14
SJR Bowman	SJRBOWMN_MID	2.06	0	0	97.94	0	0	0.80	0	0	99.20	0	0	0.84	0.85	0.83	0.84	0.84
SJR N Hwy4	SJRNHWY4_MID	2.64	0	0	97.36	0	0	1.94	0.00	0	98.06	0	0	0.84	0.85	0.83	0.84	0.84
SJR Naval St.	SJRNAVLST_L0	4.11	9.43	0	86.46	0	0	4.97	12.46	0	82.57	0	0	0.77	0.80	0.75	0.72	0.76
SJR Potato Slough	SJRPOTSL_MID	2.75	2.58	93.40	0.83	0.42	0.01	2.16	1.30	95.35	0.02	1.04	0.13	0.14	0.36	0.10	0.09	0.17
SJR Turner	SJRTURNR_MID	6.05	11.77	4.90	77.27	0.01	8.4E-05	5.55	16.96	10.99	66.44	0.06	7.4E-05	0.76	0.81	0.68	0.60	0.71
SJR/Pt. Antioch/fish pier	ASRANTFSH_MID	2.82	1.68	87.76	1.46	6.24	0.03	2.05	0.14	86.70	0.01	9.68	1.42	0.10	0.25	0.10	0.09	0.14
Suisun Bay	SUISNB_LEN	0.83	0.82	31.47	1.16	65.65	0.07	0.68	0.05	32.01	0.03	66.56	0.68	0.10	0.16	0.11	0.10	0.11
Sycamore Slough	SYCAMOR_MID	4.79	40.41	54.81	2.9E-20	0	1.1E-32	5.24	32.04	62.72	2.6E-18	7.7E-14	1.0E-30	0.10	0.10	0.09	0.09	0.10
White Slough	WHITESL_L0	10.03	26.20	63.17	0.61	3.0E-05	8.1E-08	9.32	12.33	78.34	0.01	4.6E-04	4.6E-08	0.15	0.65	0.10	0.09	0.25
White Slough DS Disappointment Sl.	WHTSLDISPONT_LEN	9.10	26.19	64.27	0.45	3.1E-05	0	6.26	14.39	79.35	1.9E-03	6.8E-04	0	0.14	0.65	0.10	0.09	0.25

Table G.5-7. Modeled Quarterly Average Selenium Concentrations in Water (in micrograms per liter) for DSM2 Output Locations: Year 2007

	Inflow Source	First Quarter Inflow Percentage						Second Quarter Inflow Percentage					
		Delta Ag.	East Delta Tributaries	Sac. R.	San Joaquin R.	Martinez/ Suisun Bay	Yolo Bypass	Delta Ag.	East Delta Tributaries	Sac. R.	San Joaquin R.	Martinez/ Suisun Bay	Yolo Bypass
	Inflow Location	*Mildred Island, Center*	*Mokelumne Calaveras Cosumnes Rivers*	*Freeport*	*Vernalis*	*San Joaquin R. near Mallard Island*	*Sac. R. below Knights Landing*	*Mildred Island, Center*	*Mokelumne Calaveras Cosumnes Rivers*	*Freeport*	*Vernalis*	*San Joaquin R. near Mallard Island*	*Sac. R. below Knights Landing*
	Selenium (µg/L)	0.11	0.10	0.09	0.58	0.10	0.23	0.11	0.10	0.09	0.58	0.10	0.23
DSM2 Output Water Location	Location ID												
Big Break	BIGBRK_MID	2.66	1.75	93.01	0.07	2.30	0.21	4.40	3.10	84.13	4.24	1.24	2.89
Cache Slough	CACHS_LEN	1.86	1.4E-05	97.14	2.2E-07	2.8E-05	1.01	1.99	5.1E-04	88.84	8.8E-04	1.6E-05	9.17
Cache Slough at Ryer Island	CACHSR_MID	2.85	1.8E-06	96.46	4.7E-08	1.5E-05	0.68	2.66	1.2E-04	88.76	1.8E-04	1.4E-06	8.58
Cosumnes R.	COSR_LEN	0.00	100.00	0	0	0	0.00	0.01	99.99	0	0	0	0
Franks Tract	FRANKST_MID	3.85	4.08	90.69	0.32	0.94	0.11	6.16	5.35	77.86	9.10	0.16	1.38
Little Holland Tract	LHOLND_L0	29.80	0.00	69.38	1.2E-07	5.3E-05	0.81	22.80	8.0E-05	71.18	1.1E-04	5.2E-06	6.02
Middle R Bullfrog	MIDRBULFRG_LEN	8.32	10.69	59.08	21.39	0.48	0.04	9.69	10.67	38.75	40.64	0.03	0.22
Mildred Island	MILDDRISL_MID	7.42	11.13	68.24	12.63	0.54	0.04	8.53	10.39	42.57	38.23	0.03	0.25
Mok. R. below Cosum.	MOKBCOS_LEN	1.46	98.54	0	0	0	0	6.32	93.68	6.5E-04	0	0	0
Mok. R. downstream Cosum.	MOKDCOS_MID	1.46	98.54	0	0	0	0	6.42	93.58	0	0	0	0
Old R near Paradise Cut	OLDRNPARADSEC_MID	3.95	5E-12	3E-06	96.05	1.7E-16	2.5E-17	15.73	1.81	12.66	69.68	0.02	0.10
Paradise Cut	PARADSECUT_LEN	1.91	0	0	98.09	0	0	4.98	0.11	0.61	94.29	6.7E-04	3.7E-03
Port of Stockton	PORTOSTOCK_L0	1.48	0	0	98.52	0	0	2.29	0	0	97.71	0	0
Sac. R. at Isleton	SACRISLTON_L0	0.45	0	99.55	0	0	2.1E-06	0.63	8.8E-05	99.36	5.7E-08	0	0.01
Sac River RM 44	SACR44_L0	0.20	0	99.80	0	0	0	0.30	0	99.70	0	0	0
Sandmound Sl.	SANDMND_MID	4.47	3.23	90.83	0.17	1.17	0.13	7.20	4.64	79.23	6.98	0.23	1.71
Sherman Island	SHERMNILND_L0	2.14	0.95	92.16	0.04	4.49	0.23	3.69	2.31	83.94	2.94	4.01	3.11
SJR Bowman	SJRBOWMN_MID	0.88	0	0	99.12	0	0	3.52	0	0	96.48	0	0
SJR N Hwy4	SJRNHWY4_MID	1.82	2.8E-08	0	98.18	0	0	4.35	1.4E-07	0	95.65	0	0
SJR Naval St.	SJRNAVLST_L0	4.83	6.83	0	88.35	0	0	5.86	11.12	1.3E-06	83.02	0	0
SJR Potato Slough	SJRPOTSL_MID	2.91	5.22	91.00	0.15	0.61	0.10	4.89	5.67	79.70	8.49	0.10	1.16
SJR Turner	SJRTURNR_MID	7.22	10.11	10.82	71.76	0.08	0.01	7.49	11.95	7.23	73.31	2.9E-03	0.02
SJR/Pt. Antioch/fish pier	ASRANTFSH_MID	2.17	1.01	92.90	0.04	3.62	0.26	3.74	2.30	84.37	3.04	3.24	3.31
Suisun Bay	SUISNB_LEN	0.87	0.23	46.77	0.01	51.97	0.14	0.94	0.51	31.58	0.43	65.55	0.98
Sycamore Slough	SYCAMOR_MID	10.20	72.58	17.22	5.1E-10	9.7E-14	4.3E-29	13.62	50.90	35.47	0.01	4.0E-09	1.1E-07
White Slough	WHITESL_L0	20.35	16.73	61.67	1.25	4.8E-03	2.4E-04	33.31	13.41	23.49	29.78	3.9E-04	3.2E-03
White Slough DS Disappointment Sl.	WHTSLDISPONT_LEN	10.09	24.12	65.07	0.71	4.1E-03	1.9E-04	17.00	13.60	32.29	37.10	1.4E-03	0.01

Table G.5-7. Continued: Modeled Quarterly Average Selenium Concentrations in Water (in micrograms per liter) for DSM2 Output Locations: Year 2007

	Inflow Source	Third Quarter Inflow Percentage						Fourth Quarter Inflow Percentage						Estimated Waterborne Selenium Concentrations (µg/L)				
		Delta Ag.	East Delta Tributaries	Sac. R.	San Joaquin R.	Martinez/ Suisun Bay	Yolo Bypass	Delta Ag.	East Delta Tributaries	Sac. R.	San Joaquin R.	Martinez/ Suisun Bay	Yolo Bypass					
	Inflow Location	*Mildred Island, Center*	*Mokelumne Calaveras Cosumnes Rivers*	*Freeport*	*Vernalis*	*San Joaquin R. near Mallard Island*	*Sac. R. below Knights Landing*	*Mildred Island, Center*	*Mokelumne Calaveras Cosumnes Rivers*	*Freeport*	*Vernalis*	*San Joaquin R. near Mallard Island*	*Sac. R. below Knights Landing*	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual
	Selenium (µg/L)	0.11	0.10	0.09	0.58	0.10	0.23	0.11	0.10	0.09	0.58	0.10	0.23					
DSM2 Output Water Location	**Location ID**																	
Big Break	BIGBRK_MID	3.58	0.32	81.60	0.79	9.45	4.27	2.60	0.11	84.06	0.04	8.53	4.65	0.09	0.12	0.10	0.10	0.10
Cache Slough	CACHS_LEN	1.92	9.1E-06	89.20	1.9E-05	1.6E-06	8.88	1.64	1.9E-05	91.73	8.5E-06	5.1E-04	6.62	0.09	0.10	0.10	0.10	0.10
Cache Slough at Ryer Island	CACHSR_MID	2.16	1.5E-05	88.35	3.1E-05	3.1E-07	9.49	1.96	4.5E-06	90.83	2.8E-06	1.9E-04	7.21	0.09	0.10	0.10	0.10	0.10
Cosumnes R.	COSR_LEN	0.09	99.91	0	0	0	0	0	100.00	0	0	0	0.00	0.10	0.10	0.10	0.10	0.10
Franks Tract	FRANKST_MID	4.86	0.34	88.03	0.84	2.96	2.98	3.19	0.32	91.15	0.17	2.23	2.95	0.09	0.14	0.10	0.10	0.11
Little Holland Tract	LHOLND_L0	18.52	2.4E-05	73.18	0.00	4.9E-07	8.30	21.64	5.2E-07	71.72	1.4E-06	4.9E-05	6.64	0.10	0.10	0.11	0.10	0.10
Middle R Bullfrog	MIDRBULFRG_LEN	8.41	3.92	81.16	4.51	0.87	1.14	5.81	4.90	72.42	15.36	0.57	0.94	0.20	0.29	0.12	0.17	0.19
Mildred Island	MILDDRISL_MID	6.49	1.12	88.25	1.83	1.00	1.30	4.91	4.55	80.81	7.99	0.66	1.08	0.15	0.28	0.10	0.13	0.17
Mok. R. below Cosum.	MOKBCOS_LEN	15.09	84.81	0.10	6.2E-35	0	0	2.30	97.70	0	0	0	0	0.10	0.10	0.10	0.10	0.10
Mok. R. downstream Cosum.	MOKDCOS_MID	15.19	84.81	3.2E-04	0	0	0	2.27	97.73	0	0	0	0	0.10	0.10	0.10	0.10	0.10
Old R near Paradise Cut	OLDRNPARADSEC_MID	10.18	1.9E-05	1.6E-04	89.82	6.9E-08	6.5E-07	2.31	9.2E-04	0.01	97.68	0	9.7E-05	0.56	0.43	0.53	0.57	0.52
Paradise Cut	PARADSECUT_LEN	7.14	0	0	92.86	0	0	1.24	4.1E-03	0.05	98.71	4.1E-04	4.5E-04	0.57	0.55	0.55	0.57	0.56
Port of Stockton	PORTOSTOCK_L0	6.32	0.04	0	93.64	0	0	7.16	0.05	0	92.78	0	0	0.57	0.57	0.55	0.55	0.56
Sac. R. at Isleton	SACRISLTON_L0	0.49	0	99.51	0	0	2.9E-04	0.39	1.0E-08	99.61	0	6.7E-07	0.01	0.09	0.09	0.09	0.09	0.09
Sac River RM 44	SACR44_L0	0.15	0	99.85	0	0	0	0.11	0	99.89	0	0	0	0.09	0.09	0.09	0.09	0.09
Sandmound Sl.	SANDMND_MID	6.15	0.39	84.96	0.98	4.06	3.46	3.79	0.22	89.26	0.10	3.11	3.51	0.09	0.13	0.10	0.10	0.10
Sherman Island	SHERMNILND_L0	2.99	0.32	77.36	0.77	14.22	4.34	2.22	0.06	75.89	0.03	17.11	4.68	0.09	0.11	0.10	0.10	0.10
SJR Bowman	SJRBOWMN_MID	8.49	2.5E-04	0	91.51	0	0	0.91	0	0	99.09	0	0	0.58	0.56	0.54	0.58	0.56
SJR N Hwy4	SJRNHWY4_MID	12.54	0.08	4.0E-26	87.39	0	0	1.89	1.3E-04	0	98.11	0	0	0.57	0.56	0.52	0.57	0.56
SJR Naval St.	SJRNAVLST_L0	12.06	40.15	3.4E-03	47.78	6.2E-07	6.3E-06	4.73	6.37	2.5E-04	88.90	5.4E-09	7.0E-09	0.52	0.50	0.33	0.53	0.47
SJR Potato Slough	SJRPOTSL_MID	3.16	0.19	91.86	0.46	1.88	2.44	2.37	0.33	93.43	0.10	1.44	2.33	0.09	0.13	0.10	0.09	0.10
SJR Turner	SJRTURNR_MID	11.09	11.29	65.50	11.02	0.46	0.63	6.16	6.57	36.18	50.55	0.19	0.35	0.44	0.45	0.15	0.34	0.35
SJR/Pt. Antioch/fish pier	ASRANTFSH_MID	3.00	0.27	79.62	0.65	12.05	4.40	2.27	0.07	78.73	0.03	14.08	4.82	0.09	0.11	0.10	0.10	0.10
Suisun Bay	SUISNB_LEN	0.84	0.16	21.30	0.36	76.08	1.25	0.59	0.02	21.39	0.01	76.63	1.36	0.10	0.10	0.10	0.10	0.10
Sycamore Slough	SYCAMOR_MID	5.33	3.90	90.77	1.9E-16	3.8E-25	1.1E-22	3.69	20.36	75.95	6.0E-19	1.1E-37	2.4E-31	0.10	0.10	0.09	0.09	0.10
White Slough	WHITESL_L0	15.53	1.33	83.05	0.09	1.2E-03	2.0E-03	9.35	8.62	81.98	0.04	3.7E-04	7.1E-04	0.10	0.24	0.09	0.09	0.13
White Slough DS Disappointment Sl.	WHTSLDISPONT_LEN	7.70	1.46	90.83	1.5E-03	1.3E-03	2.2E-03	5.21	9.69	85.06	0.03	9.7E-04	2.1E-03	0.10	0.28	0.09	0.09	0.14

Table G.5-8. Selenium Bioaccumulation from Water (µg/L) to Particulates and Fish (µg/g, dry weight) Using Models 1 and 2

	Year 2000								Year 2005								Year 2007							
	Concentration					Whole-body Bass[1]	Fish-to-Bass Ratio		Concentration					Whole-body Bass[1]	Fish-to-Bass Ratio		Concentration					Whole-body Bass[1]	Fish-to-Bass Ratio	
DSM2 Delta Water Location	DSM2 Water	Particulate from Water	Invert. from Particulate	Model 1 Fish	Model 2 Fish		Model 1	Model 2	DSM2 Water[5]	Particulate from Water	Invert. from Particulate	Model 1 Fish	Model 2 Fish		Model 1	Model 2	DSM2 Water[5]	Particulate from Water	Invert. from Particulate	Model 1 Fish	Model 2 Fish		Model 1	Model 2
First Quarter																								
Sacramento River RM 44	0.09	0.09	0.25	0.27	0.30	2.6	0.10	0.11	0.09	0.09	0.25	0.28	0.31	1.5	0.19	0.21	0.09	0.09	0.25	0.28	0.31	1.8	0.15	0.17
Cache Slough at Ryer Island[2]	0.10	0.10	0.28	0.31	0.34	1.5	0.21	0.23	0.09	0.09	0.26	0.29	0.31	1.7	0.17	0.18	0.09	0.09	0.26	0.28	0.31	2.5	0.11	0.12
San Joaquin River Potato Slough	0.17	0.17	0.47	0.52	0.57	1.4	0.38	0.42	0.14	0.14	0.40	0.44	0.48	1.3	0.33	0.37	0.09	0.09	0.26	0.28	0.31	2.5	0.11	0.13
Franks Tract	0.19	0.19	0.53	0.58	0.64	1.6	0.35	0.39	0.15	0.15	0.41	0.45	0.49	1.1	0.39	0.43	0.09	0.09	0.26	0.29	0.32	3.0	0.10	0.11
Big Break	0.13	0.13	0.35	0.39	0.43	1.6	0.25	0.28	0.11	0.11	0.31	0.34	0.37	1.0	0.33	0.37	0.09	0.09	0.26	0.28	0.31	2.8	0.10	0.11
Middle River Bullfrog	0.31	0.31	0.86	0.95	1.05	NA	NA	NA	0.46	0.46	1.29	1.42	1.56	1.9	0.7	0.8	0.20	0.20	0.55	0.61	0.67	2.1	0.3	0.3
Old River near Paradise Cut[3]	0.73	0.73	2.05	2.25	2.48	NA	NA	NA	0.78	0.78	2.19	2.41	2.66	2.4	1.0	1.1	0.56	0.56	1.57	1.73	1.90	NA	NA	NA
Knights Landing[4]	0.23	0.23	0.64	0.71	0.78	NA	NA	NA	0.23	0.23	0.64	0.71	0.78	2.2	0.3	0.4	0.23	0.23	0.64	0.71	0.78	NA	NA	NA
Vernalis[5]	0.83	0.83	2.32	2.56	2.81	1.7	1.50	1.65	0.85	0.85	2.38	2.62	2.88	1.9	1.38	1.52	0.58	0.58	1.62	1.79	1.97	2.4	0.74	0.82
Second Quarter																								
Sacramento River RM 44	0.09	0.09	0.25	0.28	0.30	2.6	0.11	0.12	0.09	0.09	0.25	0.28	0.30	1.5	0.19	0.21	0.09	0.09	0.25	0.28	0.31	1.8	0.15	0.17
Cache Slough at Ryer Island[2]	0.11	0.11	0.32	0.35	0.38	1.5	0.23	0.26	0.10	0.10	0.27	0.30	0.33	1.7	0.17	0.19	0.10	0.10	0.29	0.32	0.35	2.5	0.12	0.14
San Joaquin River Potato Slough	0.24	0.24	0.67	0.74	0.81	1.4	0.54	0.60	0.36	0.36	1.02	1.12	1.23	1.3	0.86	0.94	0.13	0.13	0.38	0.42	0.46	2.5	0.17	0.18
Franks Tract	0.27	0.27	0.76	0.83	0.92	1.6	0.51	0.56	0.49	0.49	1.36	1.50	1.65	1.1	1.31	1.44	0.14	0.14	0.39	0.43	0.47	3.0	0.14	0.16
Big Break	0.20	0.20	0.55	0.60	0.66	1.6	0.39	0.43	0.30	0.30	0.83	0.91	1.00	1.0	0.89	0.98	0.12	0.12	0.33	0.36	0.39	2.8	0.13	0.14
Middle River Bullfrog	0.61	0.61	1.71	1.88	2.07	NA	NA	NA	0.75	0.75	2.09	2.30	2.53	1.9	1.2	1.3	0.29	0.29	0.82	0.90	0.99	2.1	0.4	0.5
Old River near Paradise Cut[3]	0.68	0.68	1.89	2.08	2.29	NA	NA	NA	0.84	0.84	2.35	2.59	2.84	2.4	1.1	1.2	0.43	0.43	1.22	1.34	1.47	NA	NA	NA
Knights Landing[4]	0.23	0.23	0.64	0.71	0.78	NA	NA	NA	0.23	0.23	0.64	0.71	0.78	2.2	0.3	0.4	0.23	0.23	0.64	0.71	0.78	NA	NA	NA
Vernalis[5]	0.83	0.83	2.32	2.56	2.81	1.7	1.50	1.65	0.85	0.85	2.38	2.62	2.88	1.9	1.38	1.52	0.58	0.58	1.62	1.79	1.97	2.4	0.74	0.82
Third Quarter																								
Sacramento River RM 44	0.09	0.09	0.25	0.28	0.30	2.6	0.11	0.12	0.09	0.09	0.25	0.28	0.31	1.5	0.19	0.21	0.09	0.09	0.25	0.28	0.31	1.8	0.15	0.17
Cache Slough at Ryer Island[2]	0.11	0.11	0.31	0.34	0.37	1.5	0.22	0.25	0.09	0.09	0.25	0.28	0.31	1.7	0.16	0.18	0.10	0.10	0.29	0.32	0.35	2.5	0.13	0.14
San Joaquin River Potato Slough	0.10	0.10	0.27	0.30	0.32	1.4	0.22	0.24	0.10	0.10	0.27	0.30	0.33	1.3	0.23	0.25	0.10	0.10	0.27	0.30	0.33	2.5	0.12	0.13
Franks Tract	0.10	0.10	0.28	0.31	0.34	1.6	0.19	0.20	0.11	0.11	0.29	0.32	0.36	1.1	0.28	0.31	0.10	0.10	0.28	0.31	0.34	3.0	0.10	0.11
Big Break	0.10	0.10	0.29	0.32	0.35	1.6	0.20	0.22	0.10	0.10	0.29	0.32	0.35	1.0	0.31	0.35	0.10	0.10	0.28	0.31	0.34	2.8	0.11	0.12
Middle River Bullfrog	0.20	0.20	0.57	0.63	0.69	NA	NA	NA	0.30	0.30	0.83	0.91	1.01	1.9	0.5	0.5	0.12	0.12	0.32	0.36	0.39	2.1	0.2	0.2
Old River near Paradise Cut[3]	0.75	0.75	2.11	2.32	2.55	NA	NA	NA	0.80	0.80	2.24	2.47	2.71	2.4	1.0	1.1	0.53	0.53	1.49	1.64	1.80	NA	NA	NA
Knights Landing[4]	0.23	0.23	0.64	0.71	0.78	NA	NA	NA	0.23	0.23	0.64	0.71	0.78	2.2	0.3	0.4	0.23	0.23	0.64	0.71	0.78	NA	NA	NA
Vernalis[5]	0.83	0.83	2.32	2.56	2.81	1.7	1.50	1.65	0.85	0.85	2.38	2.62	2.88	1.9	1.38	1.52	0.58	0.58	1.62	1.79	1.97	2.4	0.74	0.82
Fourth Quarter																								
Sacramento River RM 44	0.09	0.09	0.25	0.28	0.30	2.6	0.11	0.12	0.09	0.09	0.25	0.28	0.31	1.5	0.19	0.21	0.09	0.09	0.25	0.28	0.30	1.8	0.15	0.17
Cache Slough at Ryer Island[2]	0.10	0.10	0.29	0.31	0.35	1.5	0.21	0.23	0.09	0.09	0.26	0.28	0.31	1.7	0.16	0.18	0.10	0.10	0.28	0.31	0.34	2.5	0.12	0.13
San Joaquin River Potato Slough	0.09	0.09	0.26	0.29	0.32	1.4	0.21	0.23	0.09	0.09	0.25	0.28	0.31	1.3	0.21	0.24	0.09	0.09	0.26	0.29	0.32	2.5	0.12	0.13
Franks Tract	0.10	0.10	0.27	0.29	0.32	1.6	0.18	0.20	0.09	0.09	0.26	0.28	0.31	1.1	0.25	0.27	0.10	0.10	0.27	0.30	0.32	3.0	0.10	0.11
Big Break	0.10	0.10	0.27	0.30	0.33	1.6	0.19	0.21	0.09	0.09	0.26	0.28	0.31	1.0	0.28	0.31	0.10	0.10	0.27	0.30	0.33	2.8	0.11	0.12
Middle River Bullfrog	0.30	0.30	0.84	0.92	1.01	NA	NA	NA	0.24	0.24	0.68	0.74	0.82	1.9	0.4	0.4	0.17	0.17	0.47	0.52	0.57	2.1	0.2	0.3
Old River near Paradise Cut[3]	0.81	0.81	2.27	2.50	2.75	NA	NA	NA	0.72	0.72	2.01	2.21	2.43	2.4	0.9	1.0	0.57	0.57	1.59	1.75	1.93	NA	NA	NA
Knights Landing[4]	0.23	0.23	0.64	0.71	0.78	NA	NA	NA	0.23	0.23	0.64	0.71	0.78	2.2	0.3	0.4	0.23	0.23	0.64	0.71	0.78	NA	NA	NA
Vernalis[5]	0.83	0.83	2.32	2.56	2.81	1.7	1.50	1.65	0.85	0.85	2.38	2.62	2.88	1.9	1.38	1.52	0.58	0.58	1.62	1.79	1.97	2.4	0.74	0.82

Equations from Presser and Luoma (2010a, 2010b) were used to calculate selenium concentrations for fish. Models 1 and 2 used the default K_d (1000) and the average selenium trophic transfer factors to aquatic insects (2.8) and fish (1.1 for all trophic levels).

[1] Geometric mean calculated from whole-body largemouth bass data presented in Foe (2010a).

[2] Fish data collected at Rio Vista (Foe 2010a) were used to calculate geometric mean whole-body largemouth bass and ratios.

[3] Fish data collected at Old River near Tracy (Foe 2010a) were used to calculate geometric mean whole-body largemouth bass and ratios.

[4] Geometric mean of total selenium concentrations in water collected from years 2004, 2007, and 2008 (California Department of Water Resources 2009) was used to estimate selenium concentrations in particulates and biota (DSM2 data were not available). Fish data collected from Sacramento River at Veterans Bridge (Foe 2010a) were used to calculate geometric mean whole-body largemouth bass and ratios.

[5] Geometric mean of selenium concentrations (total or dissolved was not specified) in water collected from years 1999–2000 (State Water Resources Control Board 2009) was used to estimate Year 2000 selenium concentrations in particulates and biota (DSM2 data were not available); years 2004-2005 were used for Year 2005 estimates; and years 2006-2007 were used for Year 2007 estimates.

Model 1 = TL-3 Fish Eating Invertebrates
Model 2 = TL-4 Fish Eating TL-3 Fish
Invert. = invertebrate
K_d = particulate concentration/water concentration ratio
NA = not available; bass not collected here
RM = river mile
TL = trophic level
µg/g = micrograms per gram.

Table G.5-9. Selenium Bioaccumulation from Water (µg/L) to Particulates and Fish (µg/g, dry weight) Using Model 2 with Estimated K_d from All Years Regression for Model 3

	Year 2000							Year 2005							Year 2007						
	Concentration					Whole-body Bass[1]	Fish-to-Bass Ratio	Concentration					Whole-body Bass[1]	Fish-to-Bass Ratio	Concentration					Whole-body Bass[1]	Fish-to-Bass Ratio
DSM2 Delta Water Location	DSM2 Water	Particulate from Water	Invert. from Particulate	Model 3 Fish	K_d		Model 3	DSM2 Water	Particulate from Water	Invert. from Particulate	Model 3 Fish	K_d		Model 3	DSM2 Water	Particulate from Water	Invert. from Particulate	Model 3 Fish	K_d		Model 3
First Quarter																					
Sacramento River RM 44	0.09	0.54	1.50	1.81	6061	2.6	0.69	0.09	0.54	1.50	1.81	5945	1.5	1.25	0.09	0.54	1.50	1.81	5946	1.8	0.98
Cache Slough at Ryer Island[2]	0.10	0.54	1.50	1.82	5389	1.5	1.22	0.09	0.54	1.50	1.82	5783	1.7	1.05	0.09	0.54	1.50	1.81	5852	2.5	0.71
San Joaquin River Potato Slough	0.17	0.55	1.50	1.85	3229	1.4	1.36	0.14	0.54	1.52	1.84	3724	1.3	1.41	0.09	0.54	1.50	1.81	5819	2.5	0.73
Franks Tract	0.19	0.55	1.53	1.85	2904	1.6	1.13	0.15	0.54	1.52	1.84	3724	1.1	1.61	0.09	0.54	1.50	1.82	5762	3.0	0.61
Big Break	0.13	0.54	1.51	1.83	4295	1.6	1.18	0.11	0.54	1.51	1.82	4873	1.0	1.79	0.09	0.54	1.50	1.81	5850	2.8	0.64
Middle River Bullfrog	0.31	0.56	1.56	1.88	1801	NA	NA	0.46	0.56	1.57	1.90	1221	1.9	1.0	0.20	0.55	1.53	1.86	2773	2.1	0.87
Old River near Paradise Cut[3]	0.73	0.57	1.60	1.93	780	NA	NA	0.78	0.57	1.60	1.94	729	2.4	0.8	0.56	0.57	1.58	1.95	1007	NA	NA
Knights Landing[4]	0.23	0.55	1.54	1.87	2394	NA	NA	0.23	0.55	1.64	1.87	2394	2.2	0.8	0.23	0.55	1.54	1.87	2394	NA	NA
Vernalis[5]	0.83	0.57	1.60	1.94	689	1.7	1.14	0.85	0.57	1.60	1.94	674	1.9	1.02	0.58	0.57	1.59	1.92	976	2.4	0.80
Second Quarter																					
Sacramento River RM 44	0.09	0.54	1.50	1.81	5952	2.6	0.69	0.09	0.54	1.50	1.81	5947	1.5	1.25	0.09	0.54	1.50	1.81	5944	1.8	0.98
Cache Slough at Ryer Island[2]	0.11	0.54	1.51	1.83	4777	1.5	1.22	0.10	0.54	1.50	1.82	5538	1.7	1.05	0.10	0.54	1.50	1.82	5241	2.5	0.72
San Joaquin River Potato Slough	0.24	0.55	1.54	1.87	2309	1.4	1.38	0.36	0.56	1.56	1.89	1537	1.3	1.45	0.13	0.54	1.52	1.84	4020	2.5	0.74
Franks Tract	0.27	0.55	1.55	1.87	2048	1.6	1.14	0.49	0.56	1.58	1.91	1159	1.1	1.67	0.14	0.54	1.52	1.84	3921	3.0	0.61
Big Break	0.20	0.55	1.53	1.86	2800	1.6	1.20	0.30	0.55	1.55	1.88	1876	1.0	1.84	0.12	0.54	1.51	1.83	4645	2.8	0.64
Middle River Bullfrog	0.61	0.57	1.59	1.92	928	NA	NA	0.75	0.57	1.60	1.93	764	1.9	1.0	0.29	0.55	1.55	1.88	1896	2.1	0.9
Old River near Paradise Cut[3]	0.68	0.57	1.59	1.93	842	NA	NA	0.84	0.57	1.60	1.94	682	2.4	0.8	0.43	0.56	1.57	1.90	1291	NA	NA
Knights Landing[4]	0.23	0.55	1.54	1.87	2394	NA	NA	0.23	0.55	1.54	1.87	2394	2.2	0.8	0.23	0.55	1.54	1.87	2394	NA	NA
Vernalis[5]	0.83	0.57	1.60	1.94	689	1.7	1.14	0.85	0.57	1.60	1.94	674	1.9	1.02	0.58	0.57	1.59	1.92	976	2.4	0.80
Third Quarter																					
Sacramento River RM 44	0.09	0.54	1.50	1.81	5947	2.6	0.69	0.09	0.54	1.50	1.81	5946	1.5	1.25	0.09	0.54	1.50	1.81	5946	1.8	0.98
Cache Slough at Ryer Island[2]	0.11	0.54	1.51	1.82	4942	1.5	1.22	0.09	0.54	1.50	1.81	5914	1.7	1.05	0.10	0.54	1.51	1.82	5184	2.5	0.72
San Joaquin River Potato Slough	0.10	0.54	1.50	1.82	5592	1.4	1.34	0.10	0.54	1.50	1.82	5523	1.3	1.39	0.10	0.54	1.50	1.82	5557	2.5	0.73
Franks Tract	0.10	0.54	1.50	1.82	5412	1.6	1.10	0.11	0.54	1.51	1.82	5121	1.1	1.59	0.10	0.54	1.50	1.82	5393	3.0	0.61
Big Break	0.10	0.54	1.50	1.82	5227	1.6	1.17	0.10	0.54	1.51	1.82	5159	1.0	1.79	0.10	0.54	1.50	1.82	5291	2.8	0.64
Middle River Bullfrog	0.20	0.55	1.54	1.86	2688	NA	NA	0.30	0.55	1.55	1.88	1868	1.9	1.0	0.12	0.54	1.51	1.83	4656	2.1	0.86
Old River near Paradise Cut[3]	0.75	0.57	1.60	1.93	757	NA	NA	0.80	0.57	1.60	1.94	714	2.4	0.8	0.53	0.56	1.58	1.91	1061	NA	NA
Knights Landing[4]	0.23	0.55	1.54	1.87	2394	NA	NA	0.23	0.55	1.54	1.87	2394	2.2	0.8	0.23	0.55	1.54	1.87	2394	NA	NA
Vernalis[5]	0.83	0.57	1.60	1.94	689	1.7	1.14	0.85	0.57	1.60	1.94	674	1.9	1.02	0.58	0.57	1.59	1.92	976	2.4	0.80
Fourth Quarter																					
Sacramento River RM 44	0.09	0.54	1.50	1.81	5948	2.6	0.69	0.09	0.54	1.50	1.82	5946	1.5	1.25	0.09	0.54	1.50	1.81	5947	1.8	0.98
Cache Slough at Ryer Island[2]	0.10	0.54	1.50	1.82	5261	1.5	1.22	0.09	0.54	1.50	1.81	5830	1.7	1.05	0.10	0.54	1.50	1.82	5345	2.5	0.71
San Joaquin River Potato Slough	0.09	0.54	1.50	1.82	5704	1.4	1.34	0.09	0.54	1.50	1.81	5885	1.3	1.39	0.09	0.54	1.50	1.82	5678	2.5	0.73
Franks Tract	0.10	0.54	1.50	1.82	5621	1.6	1.10	0.09	0.54	1.50	1.81	5859	1.1	1.59	0.10	0.54	1.50	1.82	5678	3.0	0.61
Big Break	0.10	0.54	1.50	1.82	5534	1.6	1.17	0.09	0.54	1.50	1.82	5809	1.0	1.78	0.10	0.54	1.50	1.82	5470	2.8	0.64
Middle River Bullfrog	0.30	0.55	1.55	1.88	1859	NA	NA	0.24	0.55	1.54	1.87	2283	1.9	1.0	0.17	0.55	1.53	1.85	3241	2.1	0.87
Old River near Paradise Cut[3]	0.81	0.57	1.60	1.94	704	NA	NA	0.72	0.57	1.60	1.93	794	2.4	0.8	0.57	0.57	1.58	1.92	994	NA	NA
Knights Landing[4]	0.23	0.55	1.54	1.87	2394	NA	NA	0.23	0.55	1.54	1.87	2394	2.2	0.8	0.23	0.55	1.54	1.87	2394	NA	NA
Vernalis[5]	0.83	0.57	1.60	1.94	689	1.7	1.14	0.85	0.57	1.60	1.94	676	1.9	1.02	0.58	0.57	1.59	1.92	976	2.4	0.80

Equations from Presser and Luoma (2010a, 2010b) were used to calculate selenium concentrations for fish. Model 3 used the average selenium trophic transfer factors to aquatic insects (2.8) and fish (1.1 for all trophic levels).

[1] Geometric mean calculated from whole-body largemouth bass data presented in Foe (2010a).

[2] Fish data collected at Rio Vista (Foe 2010a) were used to calculate geometric mean whole-body largemouth bass and ratios.

[3] Fish data collected at Old River near Tracy (Foe 2010a) were used to calculate geometric mean whole-body largemouth bass and ratios.

[4] Geometric mean of total selenium concentrations in water collected from years 2004, 2007, and 2008 (California Department of Water Resources 2009) was used to estimate selenium concentrations in particulates and biota (DSM2 data were not available). Fish data collected from Sacramento River at Veterans Bridge (Foe 2010a) were used to calculate geometric mean whole-body largemouth bass and ratios.

[5] Geometric mean of selenium concentrations (total or dissolved was not specified) in water collected from years 1999–2000 (State Water Resources Control Board 2009) was used to estimate Year 2000 selenium concentrations in particulates and biota (DSM2 data were not available); years 2004-2005 were used for Year 2005 estimates; and years 2006-2007 were used for Year 2007 estimates.

Model 3 = Model 2 (TL-4 Fish Eating TL-3 Fish) with K_d estimated using all years regression (log K_d = 2.76-0.97(logDSM2))

Invert. = invertebrate

K_d = particulate concentration/water concentration ratio

NA = not available; bass not collected here

RM = river mile

TL = trophic level

µg/g = micrograms per gram.

Table G.5-10. Selenium Bioaccumulation from Water (µg/L) to Particulates and Fish (µg/g, dry weight) Using Model 2 with Estimated K_d from Normal/Wet Years Regression for Model 4 and Dry Years Regression for Model 5

	Year 2000							Year 2005							Year 2007						
	Concentration					Whole-body Bass[1]	Fish-to-Bass Ratio	Concentration					Whole-body Bass[1]	Fish-to-Bass Ratio	Concentration					Whole-body Bass[1]	Fish-to-Bass Ratio
DSM2 Delta Water Location	DSM2 Water	Particulate from Water	Invert. from Particulate	Model 4 Fish	K_d		Model 4	DSM2 Water	Particulate from Water	Invert. from Particulate	Model 4 Fish	K_d		Model 4	DSM2 Water	Particulate from Water	Invert. from Particulate	Model 5 Fish	K_d		Model 5
First Quarter																					
Sacramento River Mile 44	0.09	0.44	1.24	1.49	4997	2.6	0.57	0.09	0.44	1.24	1.50	4909	1.5	1.03	0.09	0.73	2.03	2.46	8063	1.8	1.33
Cache Slough at Ryer Island[2]	0.10	0.45	1.25	1.51	4481	1.5	1.01	0.09	0.44	1.24	1.50	4784	1.7	0.87	0.09	0.73	2.03	2.46	7929	2.5	0.97
San Joaquin River Potato Slough	0.17	0.47	1.32	1.59	2786	1.4	1.17	0.14	0.46	1.30	1.57	3260	1.3	1.20	0.09	0.73	2.03	2.46	7883	2.5	0.99
Franks Tract	0.19	0.48	1.33	1.61	2525	1.6	0.98	0.15	0.46	1.30	1.57	3181	1.1	1.37	0.09	0.73	2.03	2.46	7802	3.0	0.82
Big Break	0.13	0.46	1.28	1.55	3630	1.6	1.00	0.11	0.45	1.26	1.53	4082	1.0	1.50	0.09	0.73	2.03	2.46	7926	2.8	0.87
Middle River Bullfrog	0.31	0.50	1.40	1.69	1621	NA	NA	0.46	0.52	1.46	1.76	1130	1.9	0.90	0.20	0.71	2.00	2.42	3616	2.1	1.14
Old River near Paradise Cut[3]	0.73	0.55	1.53	1.85	745	NA	NA	0.78	0.55	1.54	1.86	700	2.4	0.80	0.56	0.70	1.96	2.37	1247	NA	NA
Knights Landing[4]	0.23	0.49	1.36	1.64	2111	NA	NA	0.23	0.49	1.36	1.64	2111	2.2	0.70	0.23	0.71	1.99	2.41	3098	NA	NA
Vernalis[5]	0.83	0.52	1.55	1.87	665	1.7	1.10	0.85	0.55	1.55	1.87	651	1.9	0.99	0.58	0.70	1.96	2.37	1206	2.4	0.99
Second Quarter																					
Sacramento River Mile 44	0.09	0.44	1.24	1.50	4914	2.6	0.57	0.09	0.44	1.24	1.50	4910	1.5	1.03	0.09	0.73	2.03	2.46	8061	1.8	1.33
Cache Slough at Ryer Island[2]	0.11	0.45	1.27	1.53	4007	1.5	1.03	0.10	0.45	1.25	1.51	4596	1.7	0.87	0.10	0.72	2.03	2.45	7061	2.5	0.96
San Joaquin River Potato Slough	0.24	0.49	1.36	1.65	2041	1.4	1.22	0.36	0.51	1.42	1.72	1399	1.3	1.32	0.13	0.72	2.02	2.44	5343	2.5	0.98
Franks Tract	0.27	0.49	1.38	1.67	1826	1.6	1.02	0.49	0.52	1.46	1.77	1077	1.1	1.55	0.14	0.72	2.02	2.44	5204	3.0	0.82
Big Break	0.20	0.48	1.34	1.62	2441	1.6	1.04	0.30	0.50	1.39	1.69	1683	1.0	1.65	0.12	0.72	2.02	2.45	6220	2.8	0.86
Middle River Bullfrog	0.61	0.54	1.50	1.81	876	NA	NA	0.75	0.55	1.53	1.85	732	1.9	1.00	0.29	0.71	1.99	2.40	2424	2.1	1.1
Old River near Paradise Cut[3]	0.68	0.54	1.51	1.83	801	NA	NA	0.84	0.55	1.55	1.87	658	2.4	0.80	0.43	0.70	1.97	2.38	1617	NA	NA
Knights Landing[4]	0.23	0.49	1.36	1.64	2111	NA	NA	0.23	0.49	1.36	1.64	2111	2.2	0.70	0.23	0.71	1.99	2.41	3098	NA	NA
Vernalis[5]	0.83	0.55	1.55	1.87	665	1.7	1.10	0.85	0.55	1.55	1.87	651	1.9	0.99	0.58	0.70	1.96	2.37	1206	2.4	0.99
Third Quarter																					
Sacramento River Mile 44	0.09	0.44	1.24	1.50	4910	2.6	0.57	0.09	0.44	1.24	1.50	4910	1.5	1.03	0.09	0.73	2.03	2.46	8064	1.8	1.33
Cache Slough at Ryer Island[2]	0.11	0.45	1.26	1.53	4135	1.5	1.02	0.09	0.44	1.24	1.50	4885	1.7	0.87	0.10	0.72	2.03	2.45	6980	2.5	0.96
San Joaquin River Potato Slough	0.10	0.44	1.25	1.51	4637	1.4	1.11	0.10	0.45	1.25	1.51	4584	1.3	1.15	0.10	0.72	2.03	2.46	7510	2.5	0.99
Franks Tract	0.10	0.45	1.25	1.51	4499	1.6	0.92	0.11	0.45	1.26	1.52	4274	1.1	1.33	0.10	0.72	2.03	2.45	7276	3.0	0.82
Big Break	0.10	0.45	1.25	1.52	4356	1.6	0.98	0.10	0.45	1.26	1.52	4304	1.0	1.49	0.10	0.72	2.03	2.45	7131	2.8	0.87
Middle River Bullfrog	0.20	0.48	1.34	1.63	2350	NA	NA	0.30	0.50	1.39	1.69	1677	1.9	0.90	0.12	0.72	2.02	2.45	6235	2.1	1.15
Old River near Paradise Cut[3]	0.75	0.55	1.53	1.85	725	NA	NA	0.80	0.55	1.54	1.86	687	2.4	0.80	0.53	0.70	1.96	2.37	1317	NA	NA
Knights Landing[4]	0.23	0.49	1.36	1.64	2111	NA	NA	0.23	0.49	1.36	1.64	2111	2.2	0.70	0.23	0.71	1.99	2.41	3098	NA	NA
Vernalis[5]	0.83	0.55	1.55	1.87	665	1.7	1.10	0.85	0.55	1.55	1.87	651	1.9	0.99	0.58	0.70	1.96	2.37	1206	2.4	0.99
Fourth Quarter																					
Sacramento River Mile 44	0.09	0.44	1.24	1.50	4911	2.6	0.57	0.09	0.44	1.24	1.50	4909	1.5	1.03	0.09	0.73	2.03	2.46	8064	1.8	1.33
Cache Slough at Ryer Island[2]	0.10	0.45	1.25	1.52	4383	1.5	1.02	0.09	0.44	1.24	1.50	4820	1.7	0.87	0.10	0.72	2.03	2.45	7209	2.5	0.96
San Joaquin River Potato Slough	0.09	0.44	1.24	1.50	4723	1.4	1.11	0.09	0.44	1.24	1.50	4862	1.3	1.15	0.09	0.73	2.03	2.46	7682	2.5	0.99
Franks Tract	0.10	0.44	1.24	1.51	4660	1.6	0.91	0.09	0.44	1.24	1.50	4843	1.1	1.31	0.10	0.73	2.03	2.46	7564	3.0	0.82
Big Break	0.10	0.45	1.25	1.51	4593	1.6	0.97	0.09	0.44	1.24	1.50	4804	1.0	1.47	0.10	0.72	2.03	2.46	7386	2.8	0.87
Middle River Bullfrog	0.30	0.50	1.40	1.69	1669	NA	NA	0.24	0.49	1.37	1.65	2020	1.9	0.90	0.17	0.72	2.01	2.43	4260	2.1	1.14
Old River near Paradise Cut[3]	0.81	0.55	1.54	1.87	678	NA	NA	0.72	0.54	1.52	1.84	759	2.4	0.80	0.57	0.70	1.96	2.37	1229	NA	NA
Knights Landing[4]	0.23	0.49	1.36	1.64	2111	NA	NA	0.23	0.49	1.36	1.64	2111	2.2	0.70	0.23	0.71	1.99	2.41	3098	NA	NA
Vernalis[5]	0.83	0.55	1.55	1.87	665	1.27	1.10	0.85	0.55	1.55	1.87	651	1.9	0.99	0.58	0.70	1.96	2.37	1206	2.4	0.99

Equations from Presser and Luoma (2010a, 2010b) were used to calculate selenium concentrations for fish.
Models 4 and 5 used the average selenium trophic transfer factors to aquatic insects (2.8) and fish (1.1 for all trophic levels).
[1] Geometric mean calculated from whole-body largemouth bass data presented in Foe (2010a).
[2] Fish data collected at Rio Vista (Foe 2010a) were used to calculate geometric mean whole-body largemouth bass and ratios.
[3] Fish data collected at Old River near Tracy (Foe 2010a) were used to calculate geometric mean whole-body largemouth bass and ratios.
[4] Geometric mean of total selenium concentrations in water collected from years 2004, 2007, and 2008 (California Department of Water Resources 2009) was used to estimate selenium concentrations in particulates and biota (DSM2 data were not available). Fish data collected from Sacramento River at Veterans Bridge (Foe 2010a) were used to calculate geometric mean whole-body largemouth bass and ratios.
[5] Geometric mean of selenium concentrations (total or dissolved was not specified) in water collected from years 1999–2000 (State Water Resources Control Board 2009) was used to estimate Year 2000 selenium concentrations in particulates and biota (DSM2 data were not available); years 2004-2005 were used for Year 2005 estimates; and years 2006-2007 were used for Year 2007 estimates.

Model 4 = Model 2 (TL-4 Fish Eating TL-3 Fish) with K_d estimated using normal/wet years regression (log K_d = 2.75-0.90(logDSM2)).
Model 5 = Model 2 (TL-4 Fish Eating TL-3 Fish) with K_d estimated using dry years (2007) regression (log K_d = 2.84-1.02(logDSM2))
Invert. = invertebrate
K_d = particulate concentration/water concentration ratio
NA = not available; bass not collected here
RM = river mile
TL = trophic level
µg/g = micrograms per gram.

Table G.5-11. Selenium Bioaccumulation from Water (µg/L) to Particulates, Whole-body Fish (µg/g, dry weight), and Bird Eggs (µg/g, dry weight) Using Model 2 with Estimated K_d from Normal/Wet Years Regression for Model 4 and Dry Years Regression for Model 5

	Year 2000									Year 2005									Year 2007								
	Concentration					Whole-body Bass[1]	Fish-to-Bass Ratio	Bird Eggs		Concentration					Whole-body Bass[1]	Fish-to-Bass Ratio	Bird Eggs		Concentration					Whole-body Bass[1]	Fish-to-Bass Ratio	Bird Eggs	
DSM2 Delta Water Location	DSM2 Water	Particulate from Water	Invert. from Particulate	Model 4 Fish	K_d		Model 4	From Invert.	From Fish	DSM2 Water	Particulate from Water	Invert. from Particulate	Model 4 Fish	K_d		Model 4	From Invert.	From Fish	DSM2 Water	Particulate from Water	Invert. from Particulate	Model 5 Fish	K_d		Model 5	From Invert.	From Fish
First Quarter																											
Sacramento River Mile 44	0.09	0.44	1.24	1.49	4997	2.6	0.57	2.22	2.69	0.09	0.44	1.24	1.50	4909	1.5	1.03	2.23	2.70	0.09	0.73	2.03	2.46	8063	1.8	1.33	3.66	4.43
Cache Slough at Ryer Island[2]	0.10	0.45	1.25	1.51	4481	1.5	1.01	2.25	2.72	0.09	0.44	1.24	1.50	4784	1.7	0.87	2.23	2.70	0.09	0.73	2.03	2.46	7929	2.5	0.97	3.66	4.43
San Joaquin River Potato Slough	0.17	0.47	1.32	1.59	2786	1.4	1.17	2.37	2.87	0.14	0.46	1.30	1.57	3260	1.3	1.20	2.33	2.82	0.09	0.73	2.03	2.46	7883	2.5	0.99	3.66	4.43
Franks Tract	0.19	0.48	1.33	1.61	2525	1.6	0.98	2.40	2.90	0.15	0.46	1.30	1.57	3181	1.1	1.37	2.34	2.83	0.09	0.73	2.03	2.46	7802	3.0	0.82	3.66	4.42
Big Break	0.13	0.46	1.28	1.55	3630	1.6	1.00	2.30	2.79	0.11	0.45	1.26	1.53	4082	1.0	1.50	2.27	2.75	0.09	0.73	2.03	2.46	7926	2.8	0.87	3.66	4.43
Middle River Bullfrog	0.31	0.50	1.40	1.69	1621	NA	NA	2.52	3.05	0.46	0.52	1.46	1.76	1130	1.9	0.9	2.62	3.17	0.20	0.71	2.00	2.42	3616	2.1	1.14	3.60	4.36
Old River near Paradise Cut[3]	0.73	0.55	1.53	1.85	745	NA	NA	2.75	3.32	0.78	0.55	1.54	1.86	700	2.4	0.8	2.77	3.35	0.56	0.70	1.96	2.37	1247	NA	NA	3.53	4.27
Knights Landing[4]	0.23	0.49	1.36	1.64	2111	NA	NA	2.45	2.96	0.23	0.49	1.36	1.64	2111	2.2	0.7	2.45	2.96	0.23	0.71	1.99	2.41	3098	NA	NA	3.59	4.34
Vernalis[5]	0.83	0.55	1.55	1.87	665	1.7	1.10	2.78	3.37	0.85	0.55	1.55	1.87	651	1.9	0.99	2.79	3.37	0.58	0.70	1.96	2.37	1206	2.4	0.99	3.53	4.27
Second Quarter																											
Sacramento River Mile 44	0.09	0.44	1.24	1.50	4914	2.6	0.57	2.23	2.70	0.09	0.44	1.24	1.50	4910	1.5	1.03	2.23	2.70	0.09	0.73	2.03	2.46	8061	1.8	1.33	3.66	4.43
Cache Slough at Ryer Island[2]	0.11	0.45	1.27	1.53	4007	1.5	1.03	2.28	2.76	0.10	0.45	1.25	1.51	4596	1.7	0.87	2.24	2.72	0.10	0.72	2.03	2.45	7061	2.5	0.96	3.65	4.42
San Joaquin River Potato Slough	0.24	0.49	1.36	1.65	2041	1.4	1.22	2.46	2.97	0.36	0.51	1.42	1.72	1399	1.3	1.32	2.56	3.10	0.13	0.72	2.02	2.44	5343	2.5	0.98	3.63	4.39
Franks Tract	0.27	0.49	1.38	1.67	1826	1.6	1.02	2.49	3.01	0.49	0.52	1.46	1.77	1077	1.1	1.55	2.64	3.19	0.14	0.72	2.02	2.44	5204	3.0	0.82	3.63	4.39
Big Break	0.20	0.48	1.34	1.62	2441	1.6	1.04	2.41	2.91	0.30	0.50	1.39	1.69	1683	1.0	1.65	2.51	3.04	0.12	0.72	2.02	2.45	6220	2.8	0.86	3.64	4.40
Middle River Bullfrog	0.61	0.54	1.50	1.81	876	NA	NA	2.70	3.26	0.75	0.55	1.53	1.85	732	1.9	1.0	2.75	3.33	0.29	0.71	1.99	2.40	2424	2.1	1.1	3.57	4.32
Old River near Paradise Cut[3]	0.68	0.54	1.51	1.83	801	NA	NA	2.73	3.30	0.84	0.55	1.55	1.87	658	2.4	0.8	2.79	3.37	0.43	0.70	1.97	2.38	1617	NA	NA	3.55	4.29
Knights Landing[4]	0.23	0.49	1.36	1.64	2111	NA	NA	2.45	2.96	0.23	0.49	1.36	1.64	2111	2.2	0.7	2.45	2.96	0.23	0.71	1.99	2.41	3098	NA	NA	3.59	4.34
Vernalis[5]	0.83	0.55	1.55	1.87	665	1.7	1.10	2.78	3.37	0.85	0.55	1.55	1.87	651	1.9	0.99	2.79	3.37	0.58	0.70	1.96	2.37	1206	2.4	0.99	3.53	4.27
Third Quarter																											
Sacramento River Mile 44	0.09	0.44	1.24	1.50	4910	2.6	0.57	2.23	2.70	0.09	0.44	1.24	1.50	4910	1.5	1.03	2.23	2.70	0.09	0.73	2.03	2.46	8064	1.8	1.33	3.66	4.43
Cache Slough at Ryer Island[2]	0.11	0.45	1.26	1.53	4135	1.5	1.02	2.27	2.75	0.09	0.44	1.24	1.50	4885	1.7	0.87	2.23	2.70	0.10	0.72	2.03	2.45	6980	2.5	0.96	3.65	4.41
San Joaquin River Potato Slough	0.10	0.44	1.25	1.51	4637	1.4	1.11	2.24	2.71	0.10	0.45	1.25	1.51	4584	1.3	1.15	2.24	2.72	0.10	0.72	2.03	2.46	7510	2.5	0.99	3.65	4.42
Franks Tract	0.10	0.45	1.25	1.51	4499	1.6	0.92	2.25	2.72	0.11	0.45	1.26	1.52	4274	1.1	1.33	2.26	2.74	0.10	0.72	2.03	2.45	7276	3.0	0.82	3.65	4.42
Big Break	0.10	0.45	1.25	1.52	4356	1.6	0.98	2.26	2.73	0.10	0.45	1.26	1.52	4304	1.0	1.49	2.26	2.74	0.10	0.72	2.03	2.45	7131	2.8	0.87	3.65	4.42
Middle River Bullfrog	0.20	0.48	1.34	1.63	2350	NA	NA	2.42	2.93	0.30	0.50	1.39	1.69	1677	1.9	0.9	2.51	3.04	0.12	0.72	2.02	2.45	6235	2.1	1.15	3.64	4.40
Old River near Paradise Cut[3]	0.75	0.55	1.53	1.85	725	NA	NA	2.76	3.33	0.80	0.55	1.54	1.86	687	2.4	0.8	2.77	3.35	0.53	0.70	1.96	2.37	1317	NA	NA	3.53	4.27
Knights Landing[4]	0.23	0.49	1.36	1.64	2111	NA	NA	2.45	2.96	0.23	0.49	1.36	1.64	2111	2.2	0.7	2.45	2.96	0.23	0.71	1.99	2.41	3098	NA	NA	3.59	4.34
Vernalis[5]	0.83	0.55	1.55	1.87	665	1.7	1.10	2.78	3.37	0.85	0.55	1.55	1.87	651	1.9	0.99	2.79	3.37	0.58	0.70	1.96	2.37	1206	2.4	0.99	3.53	4.27
Fourth Quarter																											
Sacramento River Mile 44	0.09	0.44	1.24	1.50	4911	2.6	0.57	2.23	2.70	0.09	0.44	1.24	1.50	4909	1.5	1.03	2.23	2.70	0.09	0.73	2.03	2.46	8064	1.8	1.33	3.66	4.43
Cache Slough at Ryer Island[2]	0.10	0.45	1.25	1.52	4383	1.5	1.02	2.26	2.73	0.09	0.44	1.24	1.50	4820	1.7	0.87	2.23	2.70	0.10	0.72	2.03	2.45	7209	2.5	0.96	3.65	4.42
San Joaquin River Potato Slough	0.09	0.44	1.24	1.50	4723	1.4	1.11	2.24	2.71	0.09	0.44	1.24	1.50	4862	1.3	1.15	2.23	2.70	0.09	0.73	2.03	2.46	7682	2.5	0.99	3.66	4.42
Franks Tract	0.10	0.44	1.24	1.51	4660	1.6	0.91	2.24	2.71	0.09	0.44	1.24	1.50	4843	1.1	1.31	2.23	2.70	0.10	0.73	2.03	2.46	7564	3.0	0.82	3.65	4.42
Big Break	0.10	0.45	1.25	1.51	4593	1.6	0.97	2.24	2.72	0.09	0.44	1.24	1.50	4804	1.0	1.47	2.23	2.70	0.10	0.72	2.03	2.46	7386	2.8	0.87	3.65	4.42
Middle River Bullfrog	0.30	0.50	1.40	1.69	1669	NA	NA	2.51	3.04	0.24	0.49	1.37	1.65	2020	1.9	0.9	2.46	2.98	0.17	0.72	2.01	2.43	4260	2.1	1.14	3.61	4.37
Old River near Paradise Cut[3]	0.81	0.55	1.54	1.87	678	NA	NA	2.78	3.36	0.72	0.54	1.52	1.84	759	2.4	0.8	2.74	3.32	0.57	0.70	1.96	2.37	1229	NA	NA	3.53	4.27
Knights Landing[4]	0.23	0.49	1.36	1.64	2111	NA	NA	2.45	2.96	0.23	0.49	1.36	1.64	2111	2.2	0.7	2.45	2.96	0.23	0.71	1.99	2.41	3098	NA	NA	3.59	4.34
Vernalis[5]	0.83	0.55	1.55	1.87	665	1.7	1.10	2.78	3.37	0.85	0.55	1.55	1.87	651	1.9	0.99	2.79	3.37	0.58	0.70	1.96	2.37	1206	2.4	0.99	3.53	4.27

[1] Geometric mean calculated from whole-body largemouth bass data presented in Foe (2010a).
[2] Fish data collected at Rio Vista (Foe 2010a) were used to calculate geometric mean whole-body largemouth bass and ratios.
[3] Fish data collected at Old River near Tracy (Foe 2010a) were used to calculate geometric mean whole-body largemouth bass and ratios.
[4] Geometric mean of total selenium concentrations in water collected from years 2004, 2007, and 2008 (California Department of Water Resources 2009) was used to estimate selenium concentrations in particulates and biota (DSM2 data were not available). Fish data collected from Sacramento River at Veterans Bridge (Foe 2010a) were used to calculate geometric mean whole-body largemouth bass and ratios.
[5] Geometric mean of selenium concentrations (total or dissolved was not specified) in water collected from years 1999–2000 (State Water Resources Control Board 2009) was used to estimate Year 2000 selenium concentrations in particulates and biota (DSM2 data were not available); years 2004-2005 were used for Year 2005 estimates; and years 2006-2007 were used for Year 2007 estimates.

Invert. = invertebrate
K_d = particulate concentration/water concentration ratio
NA = not available; bass not collected here
RM = river mile
TL = trophic level
µg/g = micrograms per gram

Table G.5-12. Selenium Bioaccumulation from Water (in micrograms per liter) to Particulates and Fish (in micrograms per gram, dry weight) Using Models 1 and 2

	Year 2000								Year 2005								Year 2007							
	Concentration					Measured	Fish-to-Bass Ratio		Concentration					Measured	Fish-to-Bass Ratio		Concentration					Measured	Fish-to-Bass Ratio	
DSM2 Delta Water Location	Modeled Water	Particulate from Water	Invert. from Particulate	Model 1 Fish	Model 2 Fish	Whole Large-mouth Bass[1]	Model 1	Model 2	Modeled Water[5]	Particulate from Water	Invert. from Particulate	Model 1 Fish	Model 2 Fish	Whole Large-mouth Bass[1]	Model 1	Model 2	Modeled Water[5]	Particulate from Water	Invert. from Particulate	Model 1 Fish	Model 2 Fish	Whole Large-mouth Bass[1]	Model 1	Model 2
First Quarter																								
Sacramento River Mile 44	0.09	0.09	0.25	0.27	0.30	2.6	0.10	0.11	0.09	0.09	0.25	0.28	0.31	1.5	0.19	0.21	0.09	0.09	0.25	0.28	0.31	1.8	0.15	0.17
Cache Slough at Ryer Island[2]	0.10	0.10	0.28	0.31	0.34	1.5	0.21	0.23	0.09	0.09	0.26	0.29	0.31	1.7	0.17	0.18	0.09	0.09	0.26	0.28	0.31	2.5	0.11	0.12
San Joaquin River Potato Slough	0.17	0.17	0.47	0.52	0.57	1.4	0.38	0.42	0.14	0.14	0.40	0.44	0.48	1.3	0.33	0.37	0.09	0.09	0.26	0.28	0.31	2.5	0.11	0.13
Franks Tract	0.19	0.19	0.53	0.58	0.64	1.6	0.35	0.39	0.15	0.15	0.41	0.45	0.49	1.1	0.39	0.43	0.09	0.09	0.26	0.29	0.32	3.0	0.10	0.11
Big Break	0.13	0.13	0.35	0.39	0.43	1.6	0.25	0.28	0.11	0.11	0.31	0.34	0.37	1.0	0.33	0.37	0.09	0.09	0.26	0.28	0.31	2.8	0.10	0.11
Middle River Bullfrog	0.31	0.31	0.86	0.95	1.05	NA	NA	NA	0.46	0.46	1.29	1.42	1.56	1.9	0.7	0.8	0.20	0.20	0.55	0.61	0.67	2.1	0.3	0.3
Old River near Paradise Cut[3]	0.73	0.73	2.05	2.25	2.48	NA	NA	NA	0.78	0.78	2.19	2.41	2.66	2.4	1.0	1.1	0.56	0.56	1.57	1.73	1.90	NA	NA	NA
Knights Landing[4]	0.23	0.23	0.64	0.71	0.78	NA	NA	NA	0.23	0.23	0.64	0.71	0.78	2.2	0.3	0.4	0.23	0.23	0.64	0.71	0.78	NA	NA	NA
Vernalis[5]	0.83	0.83	2.32	2.56	2.81	1.7	1.50	1.65	0.85	0.85	2.38	2.62	2.88	1.9	1.38	1.52	0.58	0.58	1.62	1.79	1.97	2.4	0.74	0.82
Second Quarter																								
Sacramento River Mile 44	0.09	0.09	0.25	0.28	0.30	2.6	0.11	0.12	0.09	0.09	0.25	0.28	0.30	1.5	0.19	0.21	0.09	0.09	0.25	0.28	0.31	1.8	0.15	0.17
Cache Slough at Ryer Island[2]	0.11	0.11	0.32	0.35	0.38	1.5	0.23	0.26	0.10	0.10	0.27	0.30	0.33	1.7	0.17	0.19	0.10	0.10	0.29	0.32	0.35	2.5	0.12	0.14
San Joaquin River Potato Slough	0.24	0.24	0.67	0.74	0.81	1.4	0.54	0.60	0.36	0.36	1.02	1.12	1.23	1.3	0.86	0.94	0.13	0.13	0.38	0.42	0.46	2.5	0.17	0.18
Franks Tract	0.27	0.27	0.76	0.83	0.92	1.6	0.51	0.56	0.49	0.49	1.36	1.50	1.65	1.1	1.31	1.44	0.14	0.14	0.39	0.43	0.47	3.0	0.14	0.16
Big Break	0.20	0.20	0.55	0.60	0.66	1.6	0.39	0.43	0.30	0.30	0.83	0.91	1.00	1.0	0.89	0.98	0.12	0.12	0.33	0.36	0.39	2.8	0.13	0.14
Middle River Bullfrog	0.61	0.61	1.71	1.88	2.07	NA	NA	NA	0.75	0.75	2.09	2.30	2.53	1.9	1.2	1.3	0.29	0.29	0.82	0.90	0.99	2.1	0.4	0.5
Old River near Paradise Cut[3]	0.68	0.68	1.89	2.08	2.29	NA	NA	NA	0.84	0.84	2.35	2.59	2.84	2.4	1.1	1.2	0.43	0.43	1.22	1.34	1.47	NA	NA	NA
Knights Landing[4]	0.23	0.23	0.64	0.71	0.78	NA	NA	NA	0.23	0.23	0.64	0.71	0.78	2.2	0.3	0.4	0.23	0.23	0.64	0.71	0.78	NA	NA	NA
Vernalis[5]	0.83	0.83	2.32	2.56	2.81	1.7	1.50	1.65	0.85	0.85	2.38	2.62	2.88	1.9	1.38	1.52	0.58	0.58	1.62	1.79	1.97	2.4	0.74	0.82
Third Quarter																								
Sacramento River Mile 44	0.09	0.09	0.25	0.28	0.30	2.6	0.11	0.12	0.09	0.09	0.25	0.28	0.31	1.5	0.19	0.21	0.09	0.09	0.25	0.28	0.31	1.8	0.15	0.17
Cache Slough at Ryer Island[2]	0.11	0.11	0.31	0.34	0.37	1.5	0.22	0.25	0.09	0.09	0.25	0.28	0.31	1.7	0.16	0.18	0.10	0.10	0.29	0.32	0.35	2.5	0.13	0.14
San Joaquin River Potato Slough	0.10	0.10	0.27	0.30	0.32	1.4	0.22	0.24	0.10	0.10	0.27	0.30	0.33	1.3	0.23	0.25	0.10	0.10	0.27	0.30	0.33	2.5	0.12	0.13
Franks Tract	0.10	0.10	0.28	0.31	0.34	1.6	0.19	0.20	0.11	0.11	0.29	0.32	0.36	1.1	0.28	0.31	0.10	0.10	0.28	0.31	0.34	3.0	0.10	0.11
Big Break	0.10	0.10	0.29	0.32	0.35	1.6	0.20	0.22	0.10	0.10	0.29	0.32	0.35	1.0	0.31	0.35	0.10	0.10	0.28	0.31	0.34	2.8	0.11	0.12
Middle River Bullfrog	0.20	0.20	0.57	0.63	0.69	NA	NA	NA	0.30	0.30	0.83	0.91	1.01	1.9	0.5	0.5	0.12	0.12	0.32	0.36	0.39	2.1	0.2	0.2
Old River near Paradise Cut[3]	0.75	0.75	2.11	2.32	2.55	NA	NA	NA	0.80	0.80	2.24	2.47	2.71	2.4	1.0	1.1	0.53	0.53	1.49	1.64	1.80	NA	NA	NA
Knights Landing[4]	0.23	0.23	0.64	0.71	0.78	NA	NA	NA	0.23	0.23	0.64	0.71	0.78	2.2	0.3	0.4	0.23	0.23	0.64	0.71	0.78	NA	NA	NA
Vernalis[5]	0.83	0.83	2.32	2.56	2.81	1.7	1.50	1.65	0.85	0.85	2.38	2.62	2.88	1.9	1.38	1.52	0.58	0.58	1.62	1.79	1.97	2.4	0.74	0.82
Fourth Quarter																								
Sacramento River Mile 44	0.09	0.09	0.25	0.28	0.30	2.6	0.11	0.12	0.09	0.09	0.25	0.28	0.31	1.5	0.19	0.21	0.09	0.09	0.25	0.28	0.30	1.8	0.15	0.17
Cache Slough at Ryer Island[2]	0.10	0.10	0.29	0.31	0.35	1.5	0.21	0.23	0.09	0.09	0.26	0.28	0.31	1.7	0.16	0.18	0.10	0.10	0.28	0.31	0.34	2.5	0.12	0.13
San Joaquin River Potato Slough	0.09	0.09	0.26	0.29	0.32	1.4	0.21	0.23	0.09	0.09	0.25	0.28	0.31	1.3	0.21	0.24	0.09	0.09	0.26	0.29	0.32	2.5	0.12	0.13
Franks Tract	0.10	0.10	0.27	0.29	0.32	1.6	0.18	0.20	0.09	0.09	0.26	0.28	0.31	1.1	0.25	0.27	0.10	0.10	0.27	0.30	0.32	3.0	0.10	0.11
Big Break	0.10	0.10	0.27	0.30	0.33	1.6	0.19	0.21	0.09	0.09	0.26	0.28	0.31	1.0	0.28	0.31	0.10	0.10	0.27	0.30	0.33	2.8	0.11	0.12
Middle River Bullfrog	0.30	0.30	0.84	0.92	1.01	NA	NA	NA	0.24	0.24	0.68	0.74	0.82	1.9	0.4	0.4	0.17	0.17	0.47	0.52	0.57	2.1	0.2	0.3
Old River near Paradise Cut[3]	0.81	0.81	2.27	2.50	2.75	NA	NA	NA	0.72	0.72	2.01	2.21	2.43	2.4	0.9	1.0	0.57	0.57	1.59	1.75	1.93	NA	NA	NA
Knights Landing[4]	0.23	0.23	0.64	0.71	0.78	NA	NA	NA	0.23	0.23	0.64	0.71	0.78	2.2	0.3	0.4	0.23	0.23	0.64	0.71	0.78	NA	NA	NA
Vernalis[5]	0.83	0.83	2.32	2.56	2.81	1.7	1.50	1.65	0.85	0.85	2.38	2.62	2.88	1.9	1.38	1.52	0.58	0.58	1.62	1.79	1.97	2.4	0.74	0.82

Equations from Presser and Luoma (2010a, 2010b) were used to calculate selenium concentrations for fish. Models 1 and 2 used the default K_d (1000) and the average selenium trophic transfer factors to aquatic insects (2.8) and fish (1.1 for all trophic levels).

[1] Geometric mean calculated from whole largemouth bass data presented in Foe (2010a).

[2] Fish data collected at Rio Vista (Foe 2010a) were used to calculate geometric mean whole largemouth bass and ratios.

[3] Fish data collected at Old River near Tracy (Foe 2010a) were used to calculate geometric mean whole largemouth bass and ratios.

[4] Geometric mean of total selenium concentrations in water collected from years 2004, 2007, and 2008 (California Department of Water Resources 2009) was used to estimate selenium concentrations in particulates and biota. Fish data collected from Sacramento River at Veterans Bridge (Foe 2010a) were used to calculate geometric mean whole largemouth bass and ratios.

[5] Geometric mean of selenium concentrations (total or dissolved was not specified) in water collected from years 1999–2000 (State Water Resources Control Board 2009) was used to estimate Year 2000 selenium concentrations in particulates and biota (DSM2 data were not available); years 2004-2005 were used for Year 2005 estimates; and years 2006–2007 were used for Year 2007 estimates.

Invert. = invertebrate
Model 1 = Trophic level 3 fish-eating invertebrates.
Model 2 = Trophic level 4 fish-eating trophic level 3 fish
K_d = particulate concentration/water concentration ratio
NA = not available; bass not collected here

Table G.5-13. Selenium Bioaccumulation from Water (in micrograms per liter) to Particulates and Fish (in micrograms per gram dry weight) Using Model 3 with Estimated K_d from All Years Regression

	Year 2000							Year 2005							Year 2007						
	Concentration					Measured	Fish-to-Bass Ratio	Concentration					Measured	Fish-to-Bass Ratio	Concentration					Measured	Fish-to-Bass Ratio
DSM2 Delta Water Location	Modeled Water	Particulate from Water	Invert. from Particulate	Model 3 Fish	K_d	Whole Largemouth Bass[1]	Model 3	Modeled Water	Particulate from Water	Invert. from Particulate	Model 3 Fish	K_d	Whole Largemouth Bass[1]	Model 3	Modeled Water	Particulate from Water	Invert. from Particulate	Model 3 Fish	K_d	Whole Largemouth Bass[1]	Model 3
First Quarter																					
Sacramento River Mile 44	0.09	0.54	1.50	1.81	6061	2.6	0.69	0.09	0.54	1.50	1.81	5945	1.5	1.25	0.09	0.54	1.50	1.81	5946	1.8	0.98
Cache Slough at Ryer Island[2]	0.10	0.54	1.50	1.82	5389	1.5	1.22	0.09	0.54	1.50	1.82	5783	1.7	1.05	0.09	0.54	1.50	1.81	5852	2.5	0.71
San Joaquin River Potato Slough	0.17	0.55	1.50	1.85	3229	1.4	1.36	0.14	0.54	1.52	1.84	3724	1.3	1.41	0.09	0.54	1.50	1.81	5819	2.5	0.73
Franks Tract	0.19	0.55	1.53	1.85	2904	1.6	1.13	0.15	0.54	1.52	1.84	3724	1.1	1.61	0.09	0.54	1.50	1.82	5762	3.0	0.61
Big Break	0.13	0.54	1.51	1.83	4295	1.6	1.18	0.11	0.54	1.51	1.82	4873	1.0	1.79	0.09	0.54	1.50	1.81	5850	2.8	0.64
Middle River Bullfrog	0.31	0.56	1.56	1.88	1801	NA	NA	0.46	0.56	1.57	1.90	1221	1.9	1.0	0.20	0.55	1.53	1.86	2773	2.1	0.87
Old River near Paradise Cut[3]	0.73	0.57	1.60	1.93	780	NA	NA	0.78	0.57	1.60	1.94	729	2.4	0.8	0.56	0.57	1.58	1.95	1007	NA	NA
Knights Landing[4]	0.23	0.55	1.54	1.87	2394	NA	NA	0.23	0.55	1.64	1.87	2394	2.2	0.8	0.23	0.55	1.54	1.87	2394	NA	NA
Vernalis[5]	0.83	0.57	1.60	1.94	689	1.7	1.14	0.85	0.57	1.60	1.94	674	1.9	1.02	0.58	0.57	1.59	1.92	976	2.4	0.80
Second Quarter																					
Sacramento River Mile 44	0.09	0.54	1.50	1.81	5952	2.6	0.69	0.09	0.54	1.50	1.81	5947	1.5	1.25	0.09	0.54	1.50	1.81	5944	1.8	0.98
Cache Slough at Ryer Island[2]	0.11	0.54	1.51	1.83	4777	1.5	1.22	0.10	0.54	1.50	1.82	5538	1.7	1.05	0.10	0.54	1.50	1.82	5241	2.5	0.72
San Joaquin River Potato Slough	0.24	0.55	1.54	1.87	2309	1.4	1.38	0.36	0.56	1.56	1.89	1537	1.3	1.45	0.13	0.54	1.52	1.84	4020	2.5	0.74
Franks Tract	0.27	0.55	1.55	1.87	2048	1.6	1.14	0.49	0.56	1.58	1.91	1159	1.1	1.67	0.14	0.54	1.52	1.84	3921	3.0	0.61
Big Break	0.20	0.55	1.53	1.86	2800	1.6	1.20	0.30	0.55	1.55	1.88	1876	1.0	1.84	0.12	0.54	1.51	1.83	4645	2.8	0.64
Middle River Bullfrog	0.61	0.57	1.59	1.92	928	NA	NA	0.75	0.57	1.60	1.93	764	1.9	1.0	0.29	0.55	1.55	1.88	1896	2.1	0.9
Old River near Paradise Cut[3]	0.68	0.57	1.59	1.93	842	NA	NA	0.84	0.57	1.60	1.94	682	2.4	0.8	0.43	0.56	1.57	1.90	1291	NA	NA
Knights Landing[4]	0.23	0.55	1.54	1.87	2394	NA	NA	0.23	0.55	1.54	1.87	2394	2.2	0.8	0.23	0.55	1.54	1.87	2394	NA	NA
Vernalis[5]	0.83	0.57	1.60	1.94	689	1.7	1.14	0.85	0.57	1.60	1.94	674	1.9	1.02	0.58	0.57	1.59	1.92	976	2.4	0.80
Third Quarter																					
Sacramento River Mile 44	0.09	0.54	1.50	1.81	5947	2.6	0.69	0.09	0.54	1.50	1.81	5946	1.5	1.25	0.09	0.54	1.50	1.81	5946	1.8	0.98
Cache Slough at Ryer Island[2]	0.11	0.54	1.51	1.82	4942	1.5	1.22	0.09	0.54	1.50	1.81	5914	1.7	1.05	0.10	0.54	1.51	1.82	5184	2.5	0.72
San Joaquin River Potato Slough	0.10	0.54	1.50	1.82	5592	1.4	1.34	0.10	0.54	1.50	1.82	5523	1.3	1.39	0.10	0.54	1.50	1.82	5557	2.5	0.73
Franks Tract	0.10	0.54	1.50	1.82	5412	1.6	1.10	0.11	0.54	1.51	1.82	5121	1.1	1.59	0.10	0.54	1.50	1.82	5393	3.0	0.61
Big Break	0.10	0.54	1.50	1.82	5227	1.6	1.17	0.10	0.54	1.51	1.82	5159	1.0	1.79	0.10	0.54	1.50	1.82	5291	2.8	0.64
Middle River Bullfrog	0.20	0.55	1.54	1.86	2688	NA	NA	0.30	0.55	1.55	1.88	1868	1.9	1.0	0.12	0.54	1.51	1.83	4656	2.1	0.86
Old River near Paradise Cut[3]	0.75	0.57	1.60	1.93	757	NA	NA	0.80	0.57	1.60	1.94	714	2.4	0.8	0.53	0.56	1.58	1.91	1061	NA	NA
Knights Landing[4]	0.23	0.55	1.54	1.87	2394	NA	NA	0.23	0.55	1.54	1.87	2394	2.2	0.8	0.23	0.55	1.54	1.87	2394	NA	NA
Vernalis[5]	0.83	0.57	1.60	1.94	689	1.7	1.14	0.85	0.57	1.60	1.94	674	1.9	1.02	0.58	0.57	1.59	1.92	976	2.4	0.80
Fourth Quarter																					
Sacramento River Mile 44	0.09	0.54	1.50	1.81	5948	2.6	0.69	0.09	0.54	1.50	1.82	5946	1.5	1.25	0.09	0.54	1.50	1.81	5947	1.8	0.98
Cache Slough at Ryer Island[2]	0.10	0.54	1.50	1.82	5261	1.5	1.22	0.09	0.54	1.50	1.81	5830	1.7	1.05	0.10	0.54	1.50	1.82	5345	2.5	0.71
San Joaquin River Potato Slough	0.09	0.54	1.50	1.82	5704	1.4	1.34	0.09	0.54	1.50	1.81	5885	1.3	1.39	0.09	0.54	1.50	1.82	5678	2.5	0.73
Franks Tract	0.10	0.54	1.50	1.82	5621	1.6	1.10	0.09	0.54	1.50	1.81	5859	1.1	1.59	0.10	0.54	1.50	1.82	5678	3.0	0.61
Big Break	0.10	0.54	1.50	1.82	5534	1.6	1.17	0.09	0.54	1.50	1.82	5809	1.0	1.78	0.10	0.54	1.50	1.82	5470	2.8	0.64
Middle River Bullfrog	0.30	0.55	1.55	1.88	1859	NA	NA	0.24	0.55	1.54	1.87	2283	1.9	1.0	0.17	0.55	1.53	1.85	3241	2.1	0.87
Old River near Paradise Cut[3]	0.81	0.57	1.60	1.94	704	NA	NA	0.72	0.57	1.60	1.93	794	2.4	0.8	0.57	0.57	1.58	1.92	994	NA	NA
Knights Landing[4]	0.23	0.55	1.54	1.87	2394	NA	NA	0.23	0.55	1.54	1.87	2394	2.2	0.8	0.23	0.55	1.54	1.87	2394	NA	NA
Vernalis[5]	0.83	0.57	1.60	1.94	689	1.7	1.14	0.85	0.57	1.60	1.94	676	1.9	1.02	0.58	0.57	1.59	1.92	976	2.4	0.80

Equations from Presser and Luoma (2010a, 2010b) were used to calculate selenium concentrations for fish. Model 3 used the average selenium trophic transfer factors to aquatic insects (2.8) and fish (1.1 for all trophic levels).

[1] Geometric mean calculated from whole largemouth bass data presented in Foe (2010a).

[2] Fish data collected at Rio Vista (Foe 2010a) were used to calculate geometric mean whole largemouth bass and ratios.

[3] Fish data collected at Old River near Tracy (Foe 2010a) were used to calculate geometric mean whole largemouth bass and ratios.

[4] Geometric mean of total selenium concentrations in water collected from years 2004, 2007, and 2008 (California Department of Water Resources 2009) was used to estimate selenium concentrations in particulates and biota. Fish data collected from Sacramento River at Veterans Bridge (Foe 2010a) were used to calculate geometric mean whole largemouth bass and ratios.

Model 3 = Model 2 (trophic level 4 fish-eating trophic level 3 fish) with K_d estimated using all years regression (log K_d = 2.76-0.97(logDSM2))

Invert. = invertebrate

K_d = particulate concentration/water concentration ratio

NA = not available; bass not collected here

Table G.5-14. Selenium Bioaccumulation from Water (in micrograms per liter) to Particulates and Fish (in micrograms per gram dry weight) Using Estimated K_d from Above Normal and Wet Years Regression for Model 4 and Dry Years Regression for Model 5

	Year 2000							Year 2005							Year 2007						
	Concentration					Measured Whole Large-mouth Bass[1]	Fish-to-Bass Ratio	Concentration					Measured Whole Large-mouth Bass[1]	Fish-to-Bass Ratio	Concentration					Measured Whole Large-mouth Bass[1]	Fish-to-Bass Ratio
DSM2 Delta Water Location	Modeled Water	Particulate from Water	Invert. from Particulate	Model 4 Fish	K_d		Model 4	Modeled Water	Particulate from Water	Invert. from Particulate	Model 4 Fish	K_d		Model 4	Modeled Water	Particulate from Water	Invert. from Particulate	Model 5 Fish	K_d		Model 5
First Quarter																					
Sacramento River Mile 44	0.09	0.44	1.24	1.49	4997	2.6	0.57	0.09	0.44	1.24	1.50	4909	1.5	1.03	0.09	0.73	2.03	2.46	8063	1.8	1.33
Cache Slough at Ryer Island[2]	0.10	0.45	1.25	1.51	4481	1.5	1.01	0.09	0.44	1.24	1.50	4784	1.7	0.87	0.09	0.73	2.03	2.46	7929	2.5	0.97
San Joaquin River Potato Slough	0.17	0.47	1.32	1.59	2786	1.4	1.17	0.14	0.46	1.30	1.57	3260	1.3	1.20	0.09	0.73	2.03	2.46	7883	2.5	0.99
Franks Tract	0.19	0.48	1.33	1.61	2525	1.6	0.98	0.15	0.46	1.30	1.57	3181	1.1	1.37	0.09	0.73	2.03	2.46	7802	3.0	0.82
Big Break	0.13	0.46	1.28	1.55	3630	1.6	1.00	0.11	0.45	1.26	1.53	4082	1.0	1.50	0.09	0.73	2.03	2.46	7926	2.8	0.87
Middle River Bullfrog	0.31	0.50	1.40	1.69	1621	NA	NA	0.46	0.52	1.46	1.76	1130	1.9	0.90	0.20	0.71	2.00	2.42	3616	2.1	1.14
Old River near Paradise Cut[3]	0.73	0.55	1.53	1.85	745	NA	NA	0.78	0.55	1.54	1.86	700	2.4	0.80	0.56	0.70	1.96	2.37	1247	NA	NA
Knights Landing[4]	0.23	0.49	1.36	1.64	2111	NA	NA	0.23	0.49	1.36	1.64	2111	2.2	0.70	0.23	0.71	1.99	2.41	3098	NA	NA
Vernalis[5]	0.83	0.52	1.55	1.87	665	1.7	1.10	0.85	0.55	1.55	1.87	651	1.9	0.99	0.58	0.70	1.96	2.37	1206	2.4	0.99
Second Quarter																					
Sacramento River Mile 44	0.09	0.44	1.24	1.50	4914	2.6	0.57	0.09	0.44	1.24	1.50	4910	1.5	1.03	0.09	0.73	2.03	2.46	8061	1.8	1.33
Cache Slough at Ryer Island[2]	0.11	0.45	1.27	1.53	4007	1.5	1.03	0.10	0.45	1.25	1.51	4596	1.7	0.87	0.10	0.72	2.03	2.45	7061	2.5	0.96
San Joaquin River Potato Slough	0.24	0.49	1.36	1.65	2041	1.4	1.22	0.36	0.51	1.42	1.72	1399	1.3	1.32	0.13	0.72	2.02	2.44	5343	2.5	0.98
Franks Tract	0.27	0.49	1.38	1.67	1826	1.6	1.02	0.49	0.52	1.46	1.77	1077	1.1	1.55	0.14	0.72	2.02	2.44	5204	3.0	0.82
Big Break	0.20	0.48	1.34	1.62	2441	1.6	1.04	0.30	0.50	1.39	1.69	1683	1.0	1.65	0.12	0.72	2.02	2.45	6220	2.8	0.86
Middle River Bullfrog	0.61	0.54	1.50	1.81	876	NA	NA	0.75	0.55	1.53	1.85	732	1.9	1.00	0.29	0.71	1.99	2.40	2424	2.1	1.1
Old River near Paradise Cut[3]	0.68	0.54	1.51	1.83	801	NA	NA	0.84	0.55	1.55	1.87	658	2.4	0.80	0.43	0.70	1.97	2.38	1617	NA	NA
Knights Landing[4]	0.23	0.49	1.36	1.64	2111	NA	NA	0.23	0.49	1.36	1.64	2111	2.2	0.70	0.23	0.71	1.99	2.41	3098	NA	NA
Vernalis[5]	0.83	0.55	1.55	1.87	665	1.7	1.10	0.85	0.55	1.55	1.87	651	1.9	0.99	0.58	0.70	1.96	2.37	1206	2.4	0.99
Third Quarter																					
Sacramento River Mile 44	0.09	0.44	1.24	1.50	4910	2.6	0.57	0.09	0.44	1.24	1.50	4910	1.5	1.03	0.09	0.73	2.03	2.46	8064	1.8	1.33
Cache Slough at Ryer Island[2]	0.11	0.45	1.26	1.53	4135	1.5	1.02	0.09	0.44	1.24	1.50	4885	1.7	0.87	0.10	0.72	2.03	2.45	6980	2.5	0.96
San Joaquin River Potato Slough	0.10	0.44	1.25	1.51	4637	1.4	1.11	0.10	0.45	1.25	1.51	4584	1.3	1.15	0.10	0.72	2.03	2.46	7510	2.5	0.99
Franks Tract	0.10	0.45	1.25	1.51	4499	1.6	0.92	0.11	0.45	1.26	1.52	4274	1.1	1.33	0.10	0.72	2.03	2.45	7276	3.0	0.82
Big Break	0.10	0.45	1.25	1.52	4356	1.6	0.98	0.10	0.45	1.26	1.52	4304	1.0	1.49	0.10	0.72	2.03	2.45	7131	2.8	0.87
Middle River Bullfrog	0.20	0.48	1.34	1.63	2350	NA	NA	0.30	0.50	1.39	1.69	1677	1.9	0.90	0.12	0.72	2.02	2.45	6235	2.1	1.15
Old River near Paradise Cut[3]	0.75	0.55	1.53	1.85	725	NA	NA	0.80	0.55	1.54	1.86	687	2.4	0.80	0.53	0.70	1.96	2.37	1317	NA	NA
Knights Landing[4]	0.23	0.49	1.36	1.64	2111	NA	NA	0.23	0.49	1.36	1.64	2111	2.2	0.70	0.23	0.71	1.99	2.41	3098	NA	NA
Vernalis[5]	0.83	0.55	1.55	1.87	665	1.7	1.10	0.85	0.55	1.55	1.87	651	1.9	0.99	0.58	0.70	1.96	2.37	1206	2.4	0.99
Fourth Quarter																					
Sacramento River Mile 44	0.09	0.44	1.24	1.50	4911	2.6	0.57	0.09	0.44	1.24	1.50	4909	1.5	1.03	0.09	0.73	2.03	2.46	8064	1.8	1.33
Cache Slough at Ryer Island[2]	0.10	0.45	1.25	1.52	4383	1.5	1.02	0.09	0.44	1.24	1.50	4820	1.7	0.87	0.10	0.72	2.03	2.45	7209	2.5	0.96
San Joaquin River Potato Slough	0.09	0.44	1.24	1.50	4723	1.4	1.11	0.09	0.44	1.24	1.50	4862	1.3	1.15	0.09	0.73	2.03	2.46	7682	2.5	0.99
Franks Tract	0.10	0.44	1.24	1.51	4660	1.6	0.91	0.09	0.44	1.24	1.50	4843	1.1	1.31	0.10	0.73	2.03	2.46	7564	3.0	0.82
Big Break	0.10	0.45	1.25	1.51	4593	1.6	0.97	0.09	0.44	1.24	1.50	4804	1.0	1.47	0.10	0.72	2.03	2.46	7386	2.8	0.87
Middle River Bullfrog	0.30	0.50	1.40	1.69	1669	NA	NA	0.24	0.49	1.37	1.65	2020	1.9	0.90	0.17	0.72	2.01	2.43	4260	2.1	1.14
Old River near Paradise Cut[3]	0.81	0.55	1.54	1.87	678	NA	NA	0.72	0.54	1.52	1.84	759	2.4	0.80	0.57	0.70	1.96	2.37	1229	NA	NA
Knights Landing[4]	0.23	0.49	1.36	1.64	2111	NA	NA	0.23	0.49	1.36	1.64	2111	2.2	0.70	0.23	0.71	1.99	2.41	3098	NA	NA
Vernalis[5]	0.83	0.55	1.55	1.87	665	1.27	1.10	0.85	0.55	1.55	1.87	651	1.9	0.99	0.58	0.70	1.96	2.37	1206	2.4	0.99

Equations from Presser and Luoma (2010a, 2010b) were used to calculate selenium concentrations for fish. Models 4 and 5 used the average selenium trophic transfer factors to aquatic insects (2.8) and fish (1.1 for all trophic levels).

[1] Geometric mean calculated from whole largemouth bass data presented in Foe (2010a).

[2] Fish data collected at Rio Vista (Foe 2010a) were used to calculate geometric mean whole largemouth bass and ratios.

[3] Fish data collected at Old River near Tracy (Foe 2010a) were used to calculate geometric mean whole largemouth bass and ratios.

[4] Geometric mean of total selenium concentrations in water collected from years 2004, 2007, and 2008 (California Department of Water Resources 2009) was used to estimate selenium concentrations in particulates and biota (DSM2 data were not available). Fish data collected from Sacramento River at Veterans Bridge (Foe 2010a) were used to calculate geometric mean whole largemouth bass and ratios.

Model 4 = Model 2 (trophic level 4 fish eating trophic level 3 fish) with K_d estimated using normal and wet years regression (log K_d = 2.75-0.90(logDSM2))

Model 5 = Model 2 (trophic level 4 fish eating trophic level 3 fish) with K_d estimated using dry years (2007) regression (log K_d = 2.84-1.02(logDSM2))

Invert. = invertebrate

K_d = particulate concentration/water concentration ratio

NA = not available; bass not collected here

Table G.5-15. Modeled Period Average Total Selenium Concentrations in Water (in micrograms per liter), NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.13	0.17	0.14	0.12	0.11	0.11
Turner Cut	0.23	0.25	0.23	0.22	0.20	0.21
San Joaquin River at San Andreas Landing	0.09	0.09	0.09	0.09	0.09	0.09
San Joaquin River at Jersey Point	0.10	0.11	0.09	0.09	0.09	0.09
Victoria Canal	0.15	0.19	0.15	0.14	0.12	0.13
Sacramento River at Emmaton	0.09	0.09	0.09	0.09	0.09	0.09
San Joaquin River at Antioch	0.10	0.11	0.10	0.09	0.09	0.09
Montezuma Slough near Beldon Landing	0.10	0.10	0.10	0.10	0.10	0.10
Barker Slough at North Bay Aqueduct	0.09	0.09	0.09	0.09	0.09	0.09
Contra Costa Water District Pumping Plant #1	0.11	0.14	0.11	0.10	0.09	0.10
Banks Pumping Plant	0.19	0.22	0.19	0.18	0.16	0.18
Jones Pumping Plant	0.21	0.24	0.21	0.20	0.19	0.20

[1] "All" water years (1922–2021) represent the 100-year period modeled. DSM2

Table G.5-16. Modeled Period Average Total Selenium Concentrations in Water (in micrograms per liter), ALT1

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.13	0.16	0.13	0.11	0.10	0.11
Turner Cut	0.21	0.25	0.22	0.21	0.19	0.20
San Joaquin River at San Andreas Landing	0.09	0.09	0.09	0.09	0.09	0.09
San Joaquin River at Jersey Point	0.09	0.10	0.09	0.09	0.09	0.09
Victoria Canal	0.14	0.18	0.14	0.13	0.12	0.12
Sacramento River at Emmaton	0.09	0.09	0.09	0.09	0.09	0.09
San Joaquin River at Antioch	0.10	0.10	0.09	0.09	0.09	0.09
Montezuma Slough near Beldon Landing	0.10	0.10	0.10	0.10	0.11	0.11
Barker Slough at North Bay Aqueduct	0.09	0.09	0.09	0.09	0.09	0.09
Contra Costa Water District Pumping Plant #1	0.10	0.13	0.10	0.09	0.09	0.09
Banks Pumping Plant	0.17	0.21	0.17	0.16	0.15	0.17
Jones Pumping Plant	0.20	0.24	0.20	0.19	0.18	0.19

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-17. Modeled Period Average Total Selenium Concentrations in Water (in micrograms per liter), ALT1 minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	-0.01	-0.01	-0.01	-0.01	0.00
Turner Cut	-0.02	0.00	-0.01	-0.01	-0.01	-0.01
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	-0.01	-0.01	0.00	0.00	0.00	0.00
Victoria Canal	-0.01	-0.01	-0.01	-0.01	0.00	-0.01
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	-0.01	-0.01	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.01	0.01
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	-0.01	-0.01	-0.01	-0.01	0.00	-0.01
Banks Pumping Plant	-0.02	-0.01	-0.02	-0.02	-0.01	-0.01
Jones Pumping Plant	-0.01	0.00	-0.01	-0.01	-0.01	-0.01

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-18. Modeled Period Average Total Selenium Concentrations in Water (in micrograms per liter), Alt2wTUCPwoVA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.13	0.17	0.14	0.12	0.11	0.11
Turner Cut	0.23	0.25	0.23	0.22	0.20	0.21
San Joaquin River at San Andreas Landing	0.09	0.09	0.09	0.09	0.09	0.09
San Joaquin River at Jersey Point	0.09	0.10	0.09	0.09	0.09	0.09
Victoria Canal	0.15	0.19	0.15	0.14	0.12	0.13
Sacramento River at Emmaton	0.09	0.09	0.09	0.09	0.09	0.09
San Joaquin River at Antioch	0.10	0.10	0.09	0.09	0.09	0.09
Montezuma Slough near Beldon Landing	0.10	0.10	0.10	0.10	0.10	0.10
Barker Slough at North Bay Aqueduct	0.09	0.09	0.09	0.09	0.09	0.09
Contra Costa Water District Pumping Plant #1	0.11	0.13	0.11	0.10	0.09	0.10
Banks Pumping Plant	0.19	0.22	0.19	0.18	0.17	0.18
Jones Pumping Plant	0.21	0.24	0.21	0.20	0.19	0.20

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-19. Modeled Period Average Total Selenium Concentrations in Water (in micrograms per liter), Alt2wTUCPwoVA minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.00	0.00	0.00	0.00	0.00
Turner Cut	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	-0.01	-0.01	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	0.00	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	-0.01	-0.01	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	-0.01	0.00	0.00	0.00	0.00
Banks Pumping Plant	0.00	0.00	0.00	0.00	0.01	0.00
Jones Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-20. Modeled Period Average Total Selenium Concentrations in Water (in micrograms per liter), Alt2woTUCPwoVA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.13	0.17	0.14	0.12	0.11	0.11
Turner Cut	0.23	0.25	0.23	0.22	0.20	0.21
San Joaquin River at San Andreas Landing	0.09	0.09	0.09	0.09	0.09	0.09
San Joaquin River at Jersey Point	0.09	0.10	0.09	0.09	0.09	0.09
Victoria Canal	0.15	0.19	0.15	0.14	0.12	0.13
Sacramento River at Emmaton	0.09	0.09	0.09	0.09	0.09	0.09
San Joaquin River at Antioch	0.10	0.10	0.09	0.09	0.09	0.09
Montezuma Slough near Beldon Landing	0.10	0.10	0.10	0.10	0.10	0.10
Barker Slough at North Bay Aqueduct	0.09	0.09	0.09	0.09	0.09	0.09
Contra Costa Water District Pumping Plant #1	0.11	0.13	0.11	0.10	0.09	0.10
Banks Pumping Plant	0.19	0.22	0.19	0.18	0.17	0.18
Jones Pumping Plant	0.21	0.24	0.21	0.20	0.19	0.20

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-21. Modeled Period Average Total Selenium Concentrations in Water (in micrograms per liter), Alt2woTUCPwoVA minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.00	0.00	0.00	0.00	0.00
Turner Cut	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	-0.01	-0.01	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	0.00	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	-0.01	-0.01	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	-0.01	0.00	0.00	0.00	0.00
Banks Pumping Plant	0.00	0.00	0.00	0.00	0.01	0.00
Jones Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-22. Modeled Period Average Total Selenium Concentrations in Water (in micrograms per liter), Alt2woTUCPDeltaVA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.13	0.17	0.14	0.13	0.11	0.11
Turner Cut	0.23	0.25	0.23	0.23	0.21	0.21
San Joaquin River at San Andreas Landing	0.09	0.09	0.09	0.09	0.09	0.09
San Joaquin River at Jersey Point	0.10	0.10	0.09	0.09	0.09	0.09
Victoria Canal	0.15	0.19	0.16	0.14	0.13	0.13
Sacramento River at Emmaton	0.09	0.09	0.09	0.09	0.09	0.09
San Joaquin River at Antioch	0.10	0.10	0.10	0.09	0.09	0.09
Montezuma Slough near Beldon Landing	0.10	0.10	0.10	0.10	0.10	0.10
Barker Slough at North Bay Aqueduct	0.09	0.09	0.09	0.09	0.09	0.09
Contra Costa Water District Pumping Plant #1	0.11	0.13	0.11	0.10	0.09	0.10
Banks Pumping Plant	0.19	0.22	0.19	0.18	0.17	0.18
Jones Pumping Plant	0.21	0.24	0.22	0.21	0.19	0.20

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-23. Modeled Period Average Total Selenium Concentrations in Water (in micrograms per liter), Alt2woTUCPDeltaVA minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.00	0.00	0.01	0.00	0.00
Turner Cut	0.00	0.00	0.00	0.01	0.01	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	-0.01	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.01	0.00	0.01	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	-0.01	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	-0.01	0.00	0.00	0.00	0.00
Banks Pumping Plant	0.00	0.00	0.00	0.00	0.01	0.00
Jones Pumping Plant	0.00	0.00	0.01	0.01	0.00	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-24. Modeled Period Average Total Selenium Concentrations in Water (in micrograms per liter), Alt2woTUCPAllVA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.13	0.17	0.14	0.13	0.11	0.11
Turner Cut	0.23	0.25	0.23	0.23	0.21	0.21
San Joaquin River at San Andreas Landing	0.09	0.09	0.09	0.09	0.09	0.09
San Joaquin River at Jersey Point	0.10	0.10	0.09	0.09	0.09	0.09
Victoria Canal	0.15	0.19	0.16	0.14	0.13	0.13
Sacramento River at Emmaton	0.09	0.09	0.09	0.09	0.09	0.09
San Joaquin River at Antioch	0.10	0.10	0.10	0.09	0.09	0.09
Montezuma Slough near Beldon Landing	0.10	0.10	0.10	0.10	0.10	0.10
Barker Slough at North Bay Aqueduct	0.09	0.09	0.09	0.09	0.09	0.09
Contra Costa Water District Pumping Plant #1	0.11	0.13	0.11	0.10	0.09	0.10
Banks Pumping Plant	0.19	0.22	0.19	0.18	0.17	0.18
Jones Pumping Plant	0.21	0.24	0.22	0.21	0.19	0.20

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-25. Modeled Period Average Total Selenium Concentrations in Water (in micrograms per liter), Alt2woTUCPAllVA minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.00	0.00	0.01	0.00	0.00
Turner Cut	0.00	0.00	0.00	0.01	0.01	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	-0.01	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.01	0.00	0.01	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	-0.01	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	-0.01	0.00	0.00	0.00	0.00
Banks Pumping Plant	0.00	0.00	0.00	0.00	0.01	0.00
Jones Pumping Plant	0.00	0.00	0.01	0.01	0.00	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-26. Modeled Period Average Total Selenium Concentrations in Water (in micrograms per liter), ALT3

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.15	0.18	0.15	0.14	0.12	0.12
Turner Cut	0.24	0.27	0.26	0.25	0.22	0.22
San Joaquin River at San Andreas Landing	0.09	0.10	0.09	0.09	0.09	0.09
San Joaquin River at Jersey Point	0.10	0.12	0.10	0.10	0.09	0.09
Victoria Canal	0.17	0.22	0.18	0.16	0.14	0.13
Sacramento River at Emmaton	0.09	0.09	0.09	0.09	0.09	0.09
San Joaquin River at Antioch	0.10	0.12	0.10	0.10	0.09	0.09
Montezuma Slough near Beldon Landing	0.10	0.11	0.10	0.10	0.10	0.10
Barker Slough at North Bay Aqueduct	0.09	0.09	0.09	0.09	0.09	0.09
Contra Costa Water District Pumping Plant #1	0.13	0.17	0.13	0.12	0.10	0.10
Banks Pumping Plant	0.22	0.25	0.23	0.22	0.20	0.19
Jones Pumping Plant	0.24	0.27	0.25	0.23	0.22	0.21

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-27. Modeled Period Average Total Selenium Concentrations in Water (in micrograms per liter), ALT3 minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.02	0.01	0.01	0.02	0.01	0.01
Turner Cut	0.01	0.02	0.03	0.03	0.02	0.01
San Joaquin River at San Andreas Landing	0.00	0.01	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.01	0.01	0.01	0.00	0.00
Victoria Canal	0.02	0.03	0.03	0.02	0.02	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.01	0.00	0.01	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.01	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.02	0.03	0.02	0.02	0.01	0.00
Banks Pumping Plant	0.03	0.03	0.04	0.04	0.04	0.01
Jones Pumping Plant	0.03	0.03	0.04	0.03	0.03	0.01

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-28. Modeled Period Average Total Selenium Concentrations in Water (in micrograms per liter), ALT4

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.13	0.17	0.14	0.12	0.11	0.11
Turner Cut	0.23	0.26	0.23	0.22	0.20	0.21
San Joaquin River at San Andreas Landing	0.09	0.09	0.09	0.09	0.09	0.09
San Joaquin River at Jersey Point	0.09	0.10	0.09	0.09	0.09	0.09
Victoria Canal	0.15	0.19	0.15	0.14	0.12	0.13
Sacramento River at Emmaton	0.09	0.09	0.09	0.09	0.09	0.09
San Joaquin River at Antioch	0.10	0.10	0.09	0.09	0.09	0.09
Montezuma Slough near Beldon Landing	0.10	0.10	0.10	0.10	0.10	0.10
Barker Slough at North Bay Aqueduct	0.09	0.09	0.09	0.09	0.09	0.09
Contra Costa Water District Pumping Plant #1	0.11	0.13	0.11	0.10	0.09	0.10
Banks Pumping Plant	0.19	0.22	0.19	0.18	0.16	0.17
Jones Pumping Plant	0.21	0.24	0.21	0.20	0.19	0.20

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-29. Modeled Period Average Total Selenium Concentrations in Water (in micrograms per liter), ALT4 minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.00	0.00	0.00	0.00	0.00
Turner Cut	0.00	0.01	0.00	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	-0.01	-0.01	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	0.00	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	-0.01	-0.01	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	-0.01	0.00	0.00	0.00	0.00
Banks Pumping Plant	0.00	0.00	0.00	0.00	0.00	-0.01
Jones Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-30. Modeled Period Average Total Selenium Concentrations in Whole-Body Fish (in milligrams per kilogram dry weight), NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	1.81	1.59	1.57	2.44	2.45	2.45
Turner Cut	1.80	1.62	1.62	2.42	2.42	2.42
San Joaquin River at San Andreas Landing	1.82	1.54	1.54	2.46	2.46	2.46
San Joaquin River at Jersey Point	1.82	1.55	1.54	2.46	2.46	2.46
Victoria Canal	1.81	1.60	1.58	2.44	2.44	2.44
Sacramento River at Emmaton	1.82	1.54	1.54	2.46	2.46	2.46
San Joaquin River at Antioch	1.82	1.55	1.54	2.46	2.46	2.46
Montezuma Slough near Beldon Landing	1.82	1.55	1.55	2.46	2.45	2.45
Barker Slough at North Bay Aqueduct	1.82	1.54	1.54	2.46	2.46	2.46
Contra Costa Water District Pumping Plant #1	1.82	1.57	1.55	2.46	2.46	2.46
Banks Pumping Plant	1.81	1.61	1.60	2.43	2.43	2.43
Jones Pumping Plant	1.81	1.62	1.61	2.42	2.42	2.42

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-31. Modeled Period Average Total Selenium Concentrations in Whole-Body Fish (in milligrams per kilogram dry weight), ALT1

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	1.82	1.59	1.57	2.45	2.45	2.45
Turner Cut	1.81	1.62	1.61	2.42	2.42	2.42
San Joaquin River at San Andreas Landing	1.82	1.54	1.54	2.46	2.46	2.46
San Joaquin River at Jersey Point	1.82	1.55	1.54	2.46	2.46	2.46
Victoria Canal	1.81	1.60	1.58	2.44	2.45	2.45
Sacramento River at Emmaton	1.82	1.54	1.54	2.46	2.46	2.46
San Joaquin River at Antioch	1.82	1.55	1.54	2.46	2.46	2.46
Montezuma Slough near Beldon Landing	1.82	1.55	1.55	2.45	2.45	2.45
Barker Slough at North Bay Aqueduct	1.82	1.54	1.54	2.46	2.46	2.46
Contra Costa Water District Pumping Plant #1	1.82	1.57	1.55	2.46	2.46	2.46
Banks Pumping Plant	1.81	1.60	1.59	2.43	2.43	2.43
Jones Pumping Plant	1.81	1.62	1.60	2.42	2.43	2.42

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-32. Modeled Period Average Total Selenium Concentrations in Whole-Body Fish (in milligrams per kilogram dry weight), ALT1 minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.01	0.00	0.00	0.01	0.00	0.00
Turner Cut	0.01	0.00	-0.01	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	0.01	0.01
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	-0.01	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.00	0.00	0.00	0.00	0.00
Banks Pumping Plant	0.00	-0.01	-0.01	0.00	0.00	0.00
Jones Pumping Plant	0.00	0.00	-0.01	0.00	0.01	0.00

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-33. Modeled Period Average Total Selenium Concentrations in Whole-Body Fish (in milligrams per kilogram dry weight), Alt2wTUCPwoVA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	1.81	1.59	1.57	2.44	2.45	2.45
Turner Cut	1.80	1.62	1.62	2.42	2.42	2.42
San Joaquin River at San Andreas Landing	1.82	1.54	1.54	2.46	2.46	2.46
San Joaquin River at Jersey Point	1.82	1.55	1.54	2.46	2.46	2.46
Victoria Canal	1.81	1.60	1.58	2.44	2.44	2.44
Sacramento River at Emmaton	1.82	1.54	1.54	2.46	2.46	2.46
San Joaquin River at Antioch	1.82	1.55	1.54	2.46	2.46	2.46
Montezuma Slough near Beldon Landing	1.82	1.55	1.55	2.46	2.45	2.45
Barker Slough at North Bay Aqueduct	1.82	1.54	1.54	2.46	2.46	2.46
Contra Costa Water District Pumping Plant #1	1.82	1.57	1.55	2.46	2.46	2.46
Banks Pumping Plant	1.81	1.61	1.60	2.43	2.43	2.43
Jones Pumping Plant	1.81	1.62	1.61	2.42	2.42	2.42

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-34. Modeled Period Average Total Selenium Concentrations in Whole-Body Fish (in milligrams per kilogram dry weight), Alt2wTUCPwoVA minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.00	0.00	0.00	0.00	0.00
Turner Cut	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	0.00	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.00	0.00	0.00	0.00	0.00
Banks Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00
Jones Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-35. Modeled Period Average Total Selenium Concentrations in Whole-Body Fish (in milligrams per kilogram dry weight), Alt2woTUCPwoVA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	1.81	1.59	1.57	2.44	2.45	2.45
Turner Cut	1.80	1.62	1.61	2.42	2.42	2.42
San Joaquin River at San Andreas Landing	1.82	1.54	1.54	2.46	2.46	2.46
San Joaquin River at Jersey Point	1.82	1.55	1.54	2.46	2.46	2.46
Victoria Canal	1.81	1.60	1.58	2.44	2.44	2.44
Sacramento River at Emmaton	1.82	1.54	1.54	2.46	2.46	2.46
San Joaquin River at Antioch	1.82	1.55	1.54	2.46	2.46	2.46
Montezuma Slough near Beldon Landing	1.82	1.55	1.55	2.46	2.45	2.45
Barker Slough at North Bay Aqueduct	1.82	1.54	1.54	2.46	2.46	2.46
Contra Costa Water District Pumping Plant #1	1.82	1.57	1.55	2.46	2.46	2.46
Banks Pumping Plant	1.81	1.61	1.60	2.43	2.43	2.43
Jones Pumping Plant	1.81	1.62	1.61	2.42	2.42	2.42

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-36. Modeled Period Average Total Selenium Concentrations in Whole-Body Fish (in milligrams per kilogram dry weight), Alt2woTUCPwoVA minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.00	0.00	0.00	0.00	0.00
Turner Cut	0.00	0.00	-0.01	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	0.00	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.00	0.00	0.00	0.00	0.00
Banks Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00
Jones Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-37. Modeled Period Average Total Selenium Concentrations in Whole-Body Fish (in milligrams per kilogram dry weight), Alt2woTUCPDeltaVA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	1.81	1.59	1.57	2.44	2.45	2.45
Turner Cut	1.80	1.62	1.62	2.42	2.42	2.42
San Joaquin River at San Andreas Landing	1.82	1.54	1.54	2.46	2.46	2.46
San Joaquin River at Jersey Point	1.82	1.55	1.54	2.46	2.46	2.46
Victoria Canal	1.81	1.60	1.58	2.44	2.44	2.44
Sacramento River at Emmaton	1.82	1.54	1.54	2.46	2.46	2.46
San Joaquin River at Antioch	1.82	1.55	1.54	2.46	2.46	2.46
Montezuma Slough near Beldon Landing	1.82	1.55	1.55	2.46	2.45	2.45
Barker Slough at North Bay Aqueduct	1.82	1.54	1.54	2.46	2.46	2.46
Contra Costa Water District Pumping Plant #1	1.82	1.57	1.55	2.45	2.46	2.46
Banks Pumping Plant	1.81	1.61	1.60	2.42	2.43	2.43
Jones Pumping Plant	1.81	1.62	1.61	2.42	2.42	2.42

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-38. Modeled Period Average Total Selenium Concentrations in Whole-Body Fish (in milligrams per kilogram dry weight), Alt2woTUCPDeltaVA minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.00	0.00	0.00	0.00	0.00
Turner Cut	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	0.00	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.00	0.00	-0.01	0.00	0.00
Banks Pumping Plant	0.00	0.00	0.00	-0.01	0.00	0.00
Jones Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-39. Modeled Period Average Total Selenium Concentrations in Whole-Body Fish (in milligrams per kilogram dry weight), Alt2woTUCPAllVA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	1.81	1.59	1.57	2.44	2.45	2.45
Turner Cut	1.80	1.62	1.62	2.41	2.42	2.42
San Joaquin River at San Andreas Landing	1.82	1.54	1.54	2.46	2.46	2.46
San Joaquin River at Jersey Point	1.82	1.55	1.54	2.46	2.46	2.46
Victoria Canal	1.81	1.60	1.58	2.44	2.44	2.44
Sacramento River at Emmaton	1.82	1.54	1.54	2.46	2.46	2.46
San Joaquin River at Antioch	1.82	1.55	1.54	2.46	2.46	2.46
Montezuma Slough near Beldon Landing	1.82	1.55	1.55	2.46	2.45	2.45
Barker Slough at North Bay Aqueduct	1.82	1.54	1.54	2.46	2.46	2.46
Contra Costa Water District Pumping Plant #1	1.82	1.57	1.56	2.45	2.46	2.46
Banks Pumping Plant	1.81	1.61	1.60	2.42	2.43	2.43
Jones Pumping Plant	1.81	1.62	1.61	2.42	2.42	2.42

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-40. Modeled Period Average Total Selenium Concentrations in Whole-Body Fish (in milligrams per kilogram dry weight), Alt2woTUCPAllVA minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.00	0.00	0.00	0.00	0.00
Turner Cut	0.00	0.00	0.00	-0.01	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	0.00	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.00	0.01	-0.01	0.00	0.00
Banks Pumping Plant	0.00	0.00	0.00	-0.01	0.00	0.00
Jones Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-41. Modeled Period Average Total Selenium Concentrations in Whole-Body Fish (in milligrams per kilogram dry weight), ALT3

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	1.81	1.60	1.58	2.44	2.44	2.45
Turner Cut	1.80	1.63	1.62	2.41	2.41	2.42
San Joaquin River at San Andreas Landing	1.82	1.55	1.54	2.46	2.46	2.46
San Joaquin River at Jersey Point	1.82	1.56	1.55	2.46	2.46	2.46
Victoria Canal	1.81	1.61	1.59	2.43	2.44	2.44
Sacramento River at Emmaton	1.82	1.54	1.54	2.46	2.46	2.46
San Joaquin River at Antioch	1.82	1.56	1.55	2.46	2.46	2.46
Montezuma Slough near Beldon Landing	1.82	1.55	1.55	2.45	2.45	2.45
Barker Slough at North Bay Aqueduct	1.82	1.54	1.54	2.46	2.46	2.46
Contra Costa Water District Pumping Plant #1	1.81	1.59	1.57	2.45	2.45	2.45
Banks Pumping Plant	1.81	1.62	1.61	2.42	2.42	2.42
Jones Pumping Plant	1.80	1.63	1.62	2.41	2.42	2.42

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-42. Modeled Period Average Total Selenium Concentrations in Whole-Body Fish (in milligrams per kilogram dry weight), ALT3 minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.01	0.01	0.00	-0.01	0.00
Turner Cut	0.00	0.01	0.00	-0.01	-0.01	0.00
San Joaquin River at San Andreas Landing	0.00	0.01	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.01	0.01	0.00	0.00	0.00
Victoria Canal	0.00	0.01	0.01	-0.01	0.00	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.01	0.01	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	-0.01	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	-0.01	0.02	0.02	-0.01	-0.01	-0.01
Banks Pumping Plant	0.00	0.01	0.01	-0.01	-0.01	-0.01
Jones Pumping Plant	-0.01	0.01	0.01	-0.01	0.00	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-43. Modeled Period Average Total Selenium Concentrations in Whole-Body Fish (in milligrams per kilogram dry weight), ALT4

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	1.81	1.59	1.57	2.44	2.45	2.45
Turner Cut	1.80	1.62	1.62	2.42	2.42	2.42
San Joaquin River at San Andreas Landing	1.82	1.54	1.54	2.46	2.46	2.46
San Joaquin River at Jersey Point	1.82	1.55	1.54	2.46	2.46	2.46
Victoria Canal	1.81	1.60	1.58	2.44	2.44	2.44
Sacramento River at Emmaton	1.82	1.54	1.54	2.46	2.46	2.46
San Joaquin River at Antioch	1.82	1.55	1.54	2.46	2.46	2.46
Montezuma Slough near Beldon Landing	1.82	1.55	1.55	2.46	2.45	2.45
Barker Slough at North Bay Aqueduct	1.82	1.54	1.54	2.46	2.46	2.46
Contra Costa Water District Pumping Plant #1	1.82	1.57	1.55	2.46	2.46	2.46
Banks Pumping Plant	1.81	1.61	1.60	2.43	2.43	2.43
Jones Pumping Plant	1.81	1.62	1.61	2.42	2.42	2.42

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-44. Modeled Period Average Total Selenium Concentrations in Whole-Body Fish (in milligrams per kilogram dry weight), ALT4 minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	-0.01	0.00	0.00	-0.01	0.00	0.00
Turner Cut	-0.01	0.00	0.01	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	-0.01	-0.01
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.01	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.00	0.00	0.00	0.00	0.00
Banks Pumping Plant	0.00	0.01	0.01	0.00	0.00	0.00
Jones Pumping Plant	0.00	0.00	0.01	0.00	-0.01	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-45. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram dry weight), NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	2.00	1.71	1.69	2.84	2.85	2.85
Turner Cut	1.99	1.75	1.75	2.81	2.81	2.81
San Joaquin River at San Andreas Landing	2.02	1.65	1.65	2.86	2.86	2.86
San Joaquin River at Jersey Point	2.02	1.66	1.65	2.86	2.86	2.86
Victoria Canal	2.00	1.73	1.70	2.84	2.84	2.84
Sacramento River at Emmaton	2.02	1.65	1.65	2.86	2.86	2.86
San Joaquin River at Antioch	2.02	1.66	1.65	2.86	2.86	2.86
Montezuma Slough near Beldon Landing	2.02	1.66	1.66	2.86	2.85	2.85
Barker Slough at North Bay Aqueduct	2.02	1.65	1.65	2.86	2.86	2.86
Contra Costa Water District Pumping Plant #1	2.02	1.69	1.66	2.86	2.86	2.86
Banks Pumping Plant	2.00	1.74	1.73	2.82	2.82	2.82
Jones Pumping Plant	2.00	1.75	1.74	2.81	2.81	2.81

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-46. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram dry weight), ALT1

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	2.02	1.71	1.69	2.85	2.85	2.85
Turner Cut	2.00	1.75	1.74	2.81	2.81	2.81
San Joaquin River at San Andreas Landing	2.02	1.65	1.65	2.86	2.86	2.86
San Joaquin River at Jersey Point	2.02	1.66	1.65	2.86	2.86	2.86
Victoria Canal	2.00	1.73	1.70	2.84	2.85	2.85
Sacramento River at Emmaton	2.02	1.65	1.65	2.86	2.86	2.86
San Joaquin River at Antioch	2.02	1.66	1.65	2.86	2.86	2.86
Montezuma Slough near Beldon Landing	2.02	1.66	1.66	2.85	2.85	2.85
Barker Slough at North Bay Aqueduct	2.02	1.65	1.65	2.86	2.86	2.86
Contra Costa Water District Pumping Plant #1	2.02	1.69	1.66	2.86	2.86	2.86
Banks Pumping Plant	2.00	1.73	1.71	2.82	2.82	2.82
Jones Pumping Plant	2.00	1.75	1.73	2.81	2.82	2.81

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-47. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram dry weight), ALT1 minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.02	0.00	0.00	0.01	0.00	0.00
Turner Cut	0.01	0.00	-0.01	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	0.01	0.01
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	-0.01	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.00	0.00	0.00	0.00	0.00
Banks Pumping Plant	0.00	-0.01	-0.02	0.00	0.00	0.00
Jones Pumping Plant	0.00	0.00	-0.01	0.00	0.01	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-48. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram dry weight), Alt2wTUCPwoVA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	2.00	1.71	1.69	2.84	2.85	2.85
Turner Cut	1.99	1.75	1.75	2.81	2.81	2.81
San Joaquin River at San Andreas Landing	2.02	1.65	1.65	2.86	2.86	2.86
San Joaquin River at Jersey Point	2.02	1.66	1.65	2.86	2.86	2.86
Victoria Canal	2.00	1.73	1.70	2.84	2.84	2.84
Sacramento River at Emmaton	2.02	1.65	1.65	2.86	2.86	2.86
San Joaquin River at Antioch	2.02	1.66	1.65	2.86	2.86	2.86
Montezuma Slough near Beldon Landing	2.02	1.66	1.66	2.86	2.85	2.85
Barker Slough at North Bay Aqueduct	2.02	1.65	1.65	2.86	2.86	2.86
Contra Costa Water District Pumping Plant #1	2.02	1.69	1.66	2.86	2.86	2.86
Banks Pumping Plant	2.00	1.74	1.73	2.82	2.82	2.82
Jones Pumping Plant	2.00	1.75	1.74	2.81	2.81	2.81

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-49. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram dry weight), Alt2wTUCPwoVA minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.00	0.00	0.00	0.00	0.00
Turner Cut	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	0.00	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.00	0.00	0.00	0.00	0.00
Banks Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00
Jones Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-50. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram dry weight), Alt2woTUCPwoVA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	2.00	1.71	1.69	2.84	2.85	2.85
Turner Cut	1.99	1.75	1.74	2.81	2.81	2.81
San Joaquin River at San Andreas Landing	2.02	1.65	1.65	2.86	2.86	2.86
San Joaquin River at Jersey Point	2.02	1.66	1.65	2.86	2.86	2.86
Victoria Canal	2.00	1.73	1.70	2.84	2.84	2.84
Sacramento River at Emmaton	2.02	1.65	1.65	2.86	2.86	2.86
San Joaquin River at Antioch	2.02	1.66	1.65	2.86	2.86	2.86
Montezuma Slough near Beldon Landing	2.02	1.66	1.66	2.86	2.85	2.85
Barker Slough at North Bay Aqueduct	2.02	1.65	1.65	2.86	2.86	2.86
Contra Costa Water District Pumping Plant #1	2.02	1.69	1.66	2.86	2.86	2.86
Banks Pumping Plant	2.00	1.74	1.73	2.82	2.82	2.82
Jones Pumping Plant	2.00	1.75	1.74	2.81	2.81	2.81

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-51. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram dry weight), Alt2woTUCPwoVA minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.00	0.00	0.00	0.00	0.00
Turner Cut	0.00	0.00	-0.01	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	0.00	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.00	0.00	0.00	0.00	0.00
Banks Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00
Jones Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-52. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram dry weight), Alt2woTUCPDeltaVA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	2.00	1.71	1.69	2.84	2.85	2.85
Turner Cut	1.99	1.75	1.75	2.81	2.81	2.81
San Joaquin River at San Andreas Landing	2.02	1.65	1.65	2.86	2.86	2.86
San Joaquin River at Jersey Point	2.02	1.66	1.65	2.86	2.86	2.86
Victoria Canal	2.00	1.73	1.70	2.84	2.84	2.84
Sacramento River at Emmaton	2.02	1.65	1.65	2.86	2.86	2.86
San Joaquin River at Antioch	2.02	1.66	1.65	2.86	2.86	2.86
Montezuma Slough near Beldon Landing	2.02	1.66	1.66	2.86	2.85	2.85
Barker Slough at North Bay Aqueduct	2.02	1.65	1.65	2.86	2.86	2.86
Contra Costa Water District Pumping Plant #1	2.02	1.69	1.66	2.85	2.86	2.86
Banks Pumping Plant	2.00	1.74	1.73	2.81	2.82	2.82
Jones Pumping Plant	2.00	1.75	1.74	2.81	2.81	2.81

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-53. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram dry weight), Alt2woTUCPDeltaVA minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.00	0.00	0.00	0.00	0.00
Turner Cut	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	0.00	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.00	0.00	-0.01	0.00	0.00
Banks Pumping Plant	0.00	0.00	0.00	-0.01	0.00	0.00
Jones Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-54. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram dry weight), Alt2woTUCPAllVA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	2.00	1.71	1.69	2.84	2.85	2.85
Turner Cut	1.99	1.75	1.75	2.80	2.81	2.81
San Joaquin River at San Andreas Landing	2.02	1.65	1.65	2.86	2.86	2.86
San Joaquin River at Jersey Point	2.02	1.66	1.65	2.86	2.86	2.86
Victoria Canal	2.00	1.73	1.70	2.84	2.84	2.84
Sacramento River at Emmaton	2.02	1.65	1.65	2.86	2.86	2.86
San Joaquin River at Antioch	2.02	1.66	1.65	2.86	2.86	2.86
Montezuma Slough near Beldon Landing	2.02	1.66	1.66	2.86	2.85	2.85
Barker Slough at North Bay Aqueduct	2.02	1.65	1.65	2.86	2.86	2.86
Contra Costa Water District Pumping Plant #1	2.02	1.69	1.67	2.85	2.86	2.86
Banks Pumping Plant	2.00	1.74	1.73	2.81	2.82	2.82
Jones Pumping Plant	2.00	1.75	1.74	2.81	2.81	2.81

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-55. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram dry weight), Alt2woTUCPAllVA minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.00	0.00	0.00	0.00	0.00
Turner Cut	0.00	0.00	0.00	-0.01	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	0.00	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.00	0.01	-0.01	0.00	0.00
Banks Pumping Plant	0.00	0.00	0.00	-0.01	0.00	0.00
Jones Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-56. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram dry weight), ALT3

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	2.00	1.73	1.70	2.84	2.84	2.85
Turner Cut	1.99	1.77	1.75	2.80	2.80	2.81
San Joaquin River at San Andreas Landing	2.02	1.66	1.65	2.86	2.86	2.86
San Joaquin River at Jersey Point	2.02	1.67	1.66	2.86	2.86	2.86
Victoria Canal	2.00	1.74	1.71	2.82	2.84	2.84
Sacramento River at Emmaton	2.02	1.65	1.65	2.86	2.86	2.86
San Joaquin River at Antioch	2.02	1.67	1.66	2.86	2.86	2.86
Montezuma Slough near Beldon Landing	2.02	1.66	1.66	2.85	2.85	2.85
Barker Slough at North Bay Aqueduct	2.02	1.65	1.65	2.86	2.86	2.86
Contra Costa Water District Pumping Plant #1	2.00	1.71	1.69	2.85	2.85	2.85
Banks Pumping Plant	2.00	1.75	1.74	2.81	2.81	2.81
Jones Pumping Plant	1.99	1.77	1.75	2.80	2.81	2.81

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-57. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram dry weight), ALT3 minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.02	0.01	0.00	-0.01	0.00
Turner Cut	0.00	0.02	0.00	-0.01	-0.01	0.00
San Joaquin River at San Andreas Landing	0.00	0.01	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.01	0.01	0.00	0.00	0.00
Victoria Canal	0.00	0.01	0.01	-0.02	0.00	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.01	0.01	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	-0.01	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	-0.02	0.02	0.03	-0.01	-0.01	-0.01
Banks Pumping Plant	0.00	0.01	0.01	-0.01	-0.01	-0.01
Jones Pumping Plant	-0.01	0.02	0.01	-0.01	0.00	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-58. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram dry weight), ALT4

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	2.00	1.71	1.69	2.84	2.85	2.85
Turner Cut	1.99	1.75	1.75	2.81	2.81	2.81
San Joaquin River at San Andreas Landing	2.02	1.65	1.65	2.86	2.86	2.86
San Joaquin River at Jersey Point	2.02	1.66	1.65	2.86	2.86	2.86
Victoria Canal	2.00	1.73	1.70	2.84	2.84	2.84
Sacramento River at Emmaton	2.02	1.65	1.65	2.86	2.86	2.86
San Joaquin River at Antioch	2.02	1.66	1.65	2.86	2.86	2.86
Montezuma Slough near Beldon Landing	2.02	1.66	1.66	2.86	2.85	2.85
Barker Slough at North Bay Aqueduct	2.02	1.65	1.65	2.86	2.86	2.86
Contra Costa Water District Pumping Plant #1	2.02	1.69	1.66	2.86	2.86	2.86
Banks Pumping Plant	2.00	1.74	1.73	2.82	2.82	2.82
Jones Pumping Plant	2.00	1.75	1.74	2.81	2.81	2.81

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-59. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram dry weight), ALT4 minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	-0.02	0.00	0.00	-0.01	0.00	0.00
Turner Cut	-0.01	0.00	0.01	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	-0.01	-0.01
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.01	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.00	0.00	0.00	0.00	0.00
Banks Pumping Plant	0.00	0.01	0.02	0.00	0.00	0.00
Jones Pumping Plant	0.00	0.00	0.01	0.00	-0.01	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-60. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram wet weight), NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.60	0.51	0.51	0.85	0.86	0.86
Turner Cut	0.60	0.53	0.53	0.84	0.84	0.84
San Joaquin River at San Andreas Landing	0.61	0.49	0.49	0.86	0.86	0.86
San Joaquin River at Jersey Point	0.61	0.50	0.49	0.86	0.86	0.86
Victoria Canal	0.60	0.52	0.51	0.85	0.85	0.85
Sacramento River at Emmaton	0.61	0.49	0.49	0.86	0.86	0.86
San Joaquin River at Antioch	0.61	0.50	0.49	0.86	0.86	0.86
Montezuma Slough near Beldon Landing	0.61	0.50	0.50	0.86	0.86	0.86
Barker Slough at North Bay Aqueduct	0.61	0.49	0.49	0.86	0.86	0.86
Contra Costa Water District Pumping Plant #1	0.61	0.51	0.50	0.86	0.86	0.86
Banks Pumping Plant	0.60	0.52	0.52	0.85	0.85	0.85
Jones Pumping Plant	0.60	0.53	0.52	0.84	0.84	0.84

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-61. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram wet weight), ALT1

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.61	0.51	0.51	0.86	0.86	0.86
Turner Cut	0.60	0.53	0.52	0.84	0.84	0.84
San Joaquin River at San Andreas Landing	0.61	0.49	0.49	0.86	0.86	0.86
San Joaquin River at Jersey Point	0.61	0.50	0.49	0.86	0.86	0.86
Victoria Canal	0.60	0.52	0.51	0.85	0.86	0.86
Sacramento River at Emmaton	0.61	0.49	0.49	0.86	0.86	0.86
San Joaquin River at Antioch	0.61	0.50	0.49	0.86	0.86	0.86
Montezuma Slough near Beldon Landing	0.61	0.50	0.50	0.86	0.86	0.86
Barker Slough at North Bay Aqueduct	0.61	0.49	0.49	0.86	0.86	0.86
Contra Costa Water District Pumping Plant #1	0.61	0.51	0.50	0.86	0.86	0.86
Banks Pumping Plant	0.60	0.52	0.51	0.85	0.85	0.85
Jones Pumping Plant	0.60	0.53	0.52	0.84	0.85	0.84

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-62. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram wet weight), ALT1 minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.01	0.00	0.00	0.01	0.00	0.00
Turner Cut	0.00	0.00	-0.01	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	0.01	0.01
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.00	0.00	0.00	0.00	0.00
Banks Pumping Plant	0.00	0.00	-0.01	0.00	0.00	0.00
Jones Pumping Plant	0.00	0.00	0.00	0.00	0.01	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-63. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram wet weight), Alt2wTUCPwoVA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.60	0.51	0.51	0.85	0.86	0.86
Turner Cut	0.60	0.53	0.53	0.84	0.84	0.84
San Joaquin River at San Andreas Landing	0.61	0.49	0.49	0.86	0.86	0.86
San Joaquin River at Jersey Point	0.61	0.50	0.49	0.86	0.86	0.86
Victoria Canal	0.60	0.52	0.51	0.85	0.85	0.85
Sacramento River at Emmaton	0.61	0.49	0.49	0.86	0.86	0.86
San Joaquin River at Antioch	0.61	0.50	0.49	0.86	0.86	0.86
Montezuma Slough near Beldon Landing	0.61	0.50	0.50	0.86	0.86	0.86
Barker Slough at North Bay Aqueduct	0.61	0.49	0.49	0.86	0.86	0.86
Contra Costa Water District Pumping Plant #1	0.61	0.51	0.50	0.86	0.86	0.86
Banks Pumping Plant	0.60	0.52	0.52	0.85	0.85	0.85
Jones Pumping Plant	0.60	0.53	0.52	0.84	0.84	0.84

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-64. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram wet weight), Alt2wTUCPwoVA minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.00	0.00	0.00	0.00	0.00
Turner Cut	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	0.00	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.00	0.00	0.00	0.00	0.00
Banks Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00
Jones Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-65. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram wet weight), Alt2woTUCPwoVA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.60	0.51	0.51	0.85	0.86	0.86
Turner Cut	0.60	0.53	0.52	0.84	0.84	0.84
San Joaquin River at San Andreas Landing	0.61	0.49	0.49	0.86	0.86	0.86
San Joaquin River at Jersey Point	0.61	0.50	0.49	0.86	0.86	0.86
Victoria Canal	0.60	0.52	0.51	0.85	0.85	0.85
Sacramento River at Emmaton	0.61	0.49	0.49	0.86	0.86	0.86
San Joaquin River at Antioch	0.61	0.50	0.49	0.86	0.86	0.86
Montezuma Slough near Beldon Landing	0.61	0.50	0.50	0.86	0.86	0.86
Barker Slough at North Bay Aqueduct	0.61	0.49	0.49	0.86	0.86	0.86
Contra Costa Water District Pumping Plant #1	0.61	0.51	0.50	0.86	0.86	0.86
Banks Pumping Plant	0.60	0.52	0.52	0.85	0.85	0.85
Jones Pumping Plant	0.60	0.53	0.52	0.84	0.84	0.84

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-66. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram wet weight), Alt2woTUCPwoVA minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.00	0.00	0.00	0.00	0.00
Turner Cut	0.00	0.00	-0.01	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	0.00	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.00	0.00	0.00	0.00	0.00
Banks Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00
Jones Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-67. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram wet weight), Alt2woTUCPDeltaVA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.60	0.51	0.51	0.85	0.86	0.86
Turner Cut	0.60	0.53	0.53	0.84	0.84	0.84
San Joaquin River at San Andreas Landing	0.61	0.49	0.49	0.86	0.86	0.86
San Joaquin River at Jersey Point	0.61	0.50	0.49	0.86	0.86	0.86
Victoria Canal	0.60	0.52	0.51	0.85	0.85	0.85
Sacramento River at Emmaton	0.61	0.49	0.49	0.86	0.86	0.86
San Joaquin River at Antioch	0.61	0.50	0.49	0.86	0.86	0.86
Montezuma Slough near Beldon Landing	0.61	0.50	0.50	0.86	0.86	0.86
Barker Slough at North Bay Aqueduct	0.61	0.49	0.49	0.86	0.86	0.86
Contra Costa Water District Pumping Plant #1	0.61	0.51	0.50	0.86	0.86	0.86
Banks Pumping Plant	0.60	0.52	0.52	0.84	0.85	0.85
Jones Pumping Plant	0.60	0.53	0.52	0.84	0.84	0.84

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-68. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram wet weight), Alt2woTUCPDeltaVA minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.00	0.00	0.00	0.00	0.00
Turner Cut	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	0.00	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.00	0.00	0.00	0.00	0.00
Banks Pumping Plant	0.00	0.00	0.00	-0.01	0.00	0.00
Jones Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-69. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram wet weight), Alt2woTUCPAllVA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.60	0.51	0.51	0.85	0.86	0.86
Turner Cut	0.60	0.53	0.53	0.84	0.84	0.84
San Joaquin River at San Andreas Landing	0.61	0.49	0.49	0.86	0.86	0.86
San Joaquin River at Jersey Point	0.61	0.50	0.49	0.86	0.86	0.86
Victoria Canal	0.60	0.52	0.51	0.85	0.85	0.85
Sacramento River at Emmaton	0.61	0.49	0.49	0.86	0.86	0.86
San Joaquin River at Antioch	0.61	0.50	0.49	0.86	0.86	0.86
Montezuma Slough near Beldon Landing	0.61	0.50	0.50	0.86	0.86	0.86
Barker Slough at North Bay Aqueduct	0.61	0.49	0.49	0.86	0.86	0.86
Contra Costa Water District Pumping Plant #1	0.61	0.51	0.50	0.86	0.86	0.86
Banks Pumping Plant	0.60	0.52	0.52	0.84	0.85	0.85
Jones Pumping Plant	0.60	0.53	0.52	0.84	0.84	0.84

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-70. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram wet weight), Alt2woTUCPAllVA minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.00	0.00	0.00	0.00	0.00
Turner Cut	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	0.00	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.00	0.00	0.00	0.00	0.00
Banks Pumping Plant	0.00	0.00	0.00	-0.01	0.00	0.00
Jones Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-71. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram wet weight), ALT3

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.60	0.52	0.51	0.85	0.85	0.86
Turner Cut	0.60	0.53	0.53	0.84	0.84	0.84
San Joaquin River at San Andreas Landing	0.61	0.50	0.49	0.86	0.86	0.86
San Joaquin River at Jersey Point	0.61	0.50	0.50	0.86	0.86	0.86
Victoria Canal	0.60	0.52	0.51	0.85	0.85	0.85
Sacramento River at Emmaton	0.61	0.49	0.49	0.86	0.86	0.86
San Joaquin River at Antioch	0.61	0.50	0.50	0.86	0.86	0.86
Montezuma Slough near Beldon Landing	0.61	0.50	0.50	0.86	0.86	0.86
Barker Slough at North Bay Aqueduct	0.61	0.49	0.49	0.86	0.86	0.86
Contra Costa Water District Pumping Plant #1	0.60	0.51	0.51	0.86	0.86	0.86
Banks Pumping Plant	0.60	0.53	0.52	0.84	0.84	0.84
Jones Pumping Plant	0.60	0.53	0.53	0.84	0.84	0.84

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-72. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram wet weight), ALT3 minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.01	0.00	0.00	-0.01	0.00
Turner Cut	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.01	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.01	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	0.00	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.01	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	-0.01	0.00	0.01	0.00	0.00	0.00
Banks Pumping Plant	0.00	0.01	0.00	-0.01	-0.01	-0.01
Jones Pumping Plant	0.00	0.00	0.01	0.00	0.00	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-73. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram wet weight), ALT4

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.60	0.51	0.51	0.85	0.86	0.86
Turner Cut	0.60	0.53	0.53	0.84	0.84	0.84
San Joaquin River at San Andreas Landing	0.61	0.49	0.49	0.86	0.86	0.86
San Joaquin River at Jersey Point	0.61	0.50	0.49	0.86	0.86	0.86
Victoria Canal	0.60	0.52	0.51	0.85	0.85	0.85
Sacramento River at Emmaton	0.61	0.49	0.49	0.86	0.86	0.86
San Joaquin River at Antioch	0.61	0.50	0.49	0.86	0.86	0.86
Montezuma Slough near Beldon Landing	0.61	0.50	0.50	0.86	0.86	0.86
Barker Slough at North Bay Aqueduct	0.61	0.49	0.49	0.86	0.86	0.86
Contra Costa Water District Pumping Plant #1	0.61	0.51	0.50	0.86	0.86	0.86
Banks Pumping Plant	0.60	0.52	0.52	0.85	0.85	0.85
Jones Pumping Plant	0.60	0.53	0.52	0.84	0.84	0.84

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-74. Modeled Period Average Total Selenium Concentrations in Fish Fillets (in milligrams per kilogram wet weight), ALT4 minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	-0.01	0.00	0.00	-0.01	0.00	0.00
Turner Cut	0.00	0.00	0.01	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	-0.01	-0.01
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.00	0.00	0.00	0.00	0.00
Banks Pumping Plant	0.00	0.00	0.01	0.00	0.00	0.00
Jones Pumping Plant	0.00	0.00	0.00	0.00	-0.01	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-75. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Invertebrate Diet (in milligrams per kilogram dry weight), NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	2.70	2.36	2.34	3.64	3.65	3.64
Turner Cut	2.69	2.41	2.40	3.59	3.60	3.60
San Joaquin River at San Andreas Landing	2.71	2.29	2.29	3.66	3.66	3.66
San Joaquin River at Jersey Point	2.71	2.31	2.30	3.66	3.66	3.66
Victoria Canal	2.70	2.38	2.35	3.63	3.64	3.63
Sacramento River at Emmaton	2.71	2.29	2.29	3.66	3.66	3.66
San Joaquin River at Antioch	2.71	2.31	2.30	3.66	3.66	3.66
Montezuma Slough near Beldon Landing	2.71	2.30	2.30	3.65	3.65	3.65
Barker Slough at North Bay Aqueduct	2.71	2.29	2.29	3.66	3.66	3.66
Contra Costa Water District Pumping Plant #1	2.70	2.34	2.31	3.65	3.66	3.65
Banks Pumping Plant	2.69	2.40	2.38	3.61	3.62	3.61
Jones Pumping Plant	2.69	2.41	2.39	3.60	3.61	3.60

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-76. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Invertebrate Diet (in milligrams per kilogram dry weight), ALT1

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	2.70	2.36	2.33	3.64	3.65	3.65
Turner Cut	2.69	2.41	2.39	3.60	3.61	3.60
San Joaquin River at San Andreas Landing	2.71	2.29	2.29	3.66	3.66	3.66
San Joaquin River at Jersey Point	2.71	2.31	2.29	3.66	3.66	3.66
Victoria Canal	2.70	2.37	2.35	3.63	3.64	3.64
Sacramento River at Emmaton	2.71	2.29	2.29	3.66	3.66	3.66
San Joaquin River at Antioch	2.71	2.31	2.30	3.66	3.66	3.66
Montezuma Slough near Beldon Landing	2.71	2.31	2.31	3.65	3.65	3.65
Barker Slough at North Bay Aqueduct	2.71	2.29	2.29	3.66	3.66	3.66
Contra Costa Water District Pumping Plant #1	2.71	2.33	2.30	3.66	3.66	3.66
Banks Pumping Plant	2.69	2.39	2.36	3.62	3.62	3.61
Jones Pumping Plant	2.69	2.41	2.39	3.60	3.61	3.61

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-77. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Invertebrate Diet (in milligrams per kilogram dry weight), ALT1 minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.00	-0.01	0.00	0.00	0.01
Turner Cut	0.00	0.00	-0.01	0.01	0.01	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	-0.01	0.00	0.00	0.00
Victoria Canal	0.00	-0.01	0.00	0.00	0.00	0.01
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.01	0.01	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.01	-0.01	-0.01	0.01	0.00	0.01
Banks Pumping Plant	0.00	-0.01	-0.02	0.01	0.00	0.00
Jones Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.01

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-78. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Invertebrate Diet (in milligrams per kilogram dry weight), Alt2wTUCPwoVA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	2.70	2.36	2.34	3.64	3.65	3.64
Turner Cut	2.68	2.41	2.40	3.59	3.60	3.60
San Joaquin River at San Andreas Landing	2.71	2.29	2.29	3.66	3.66	3.66
San Joaquin River at Jersey Point	2.71	2.31	2.30	3.66	3.66	3.66
Victoria Canal	2.70	2.38	2.35	3.63	3.64	3.63
Sacramento River at Emmaton	2.71	2.29	2.29	3.66	3.66	3.66
San Joaquin River at Antioch	2.71	2.31	2.30	3.66	3.66	3.66
Montezuma Slough near Beldon Landing	2.71	2.30	2.30	3.65	3.65	3.65
Barker Slough at North Bay Aqueduct	2.71	2.29	2.29	3.66	3.66	3.66
Contra Costa Water District Pumping Plant #1	2.70	2.34	2.31	3.65	3.66	3.65
Banks Pumping Plant	2.69	2.39	2.38	3.61	3.62	3.61
Jones Pumping Plant	2.69	2.41	2.39	3.60	3.61	3.60

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-79. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Invertebrate Diet (in milligrams per kilogram dry weight), Alt2wTUCPwoVA minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.00	0.00	0.00	0.00	0.00
Turner Cut	-0.01	0.00	0.00	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	0.00	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.00	0.00	0.00	0.00	0.00
Banks Pumping Plant	0.00	-0.01	0.00	0.00	0.00	0.00
Jones Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-80. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Invertebrate Diet (in milligrams per kilogram dry weight), Alt2woTUCPwoVA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	2.70	2.36	2.34	3.64	3.65	3.64
Turner Cut	2.68	2.41	2.40	3.59	3.60	3.60
San Joaquin River at San Andreas Landing	2.71	2.29	2.29	3.66	3.66	3.66
San Joaquin River at Jersey Point	2.71	2.31	2.30	3.66	3.66	3.66
Victoria Canal	2.70	2.38	2.35	3.63	3.64	3.63
Sacramento River at Emmaton	2.71	2.29	2.29	3.66	3.66	3.66
San Joaquin River at Antioch	2.71	2.31	2.30	3.66	3.66	3.66
Montezuma Slough near Beldon Landing	2.71	2.30	2.30	3.65	3.65	3.65
Barker Slough at North Bay Aqueduct	2.71	2.29	2.29	3.66	3.66	3.66
Contra Costa Water District Pumping Plant #1	2.71	2.34	2.31	3.65	3.66	3.65
Banks Pumping Plant	2.69	2.39	2.38	3.61	3.61	3.61
Jones Pumping Plant	2.69	2.41	2.39	3.60	3.61	3.60

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-81. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Invertebrate Diet (in milligrams per kilogram dry weight), Alt2woTUCPwoVA minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.00	0.00	0.00	0.00	0.00
Turner Cut	-0.01	0.00	0.00	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	0.00	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.01	0.00	0.00	0.00	0.00	0.00
Banks Pumping Plant	0.00	-0.01	0.00	0.00	-0.01	0.00
Jones Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-82. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Invertebrate Diet (in milligrams per kilogram dry weight), Alt2woTUCPDeltaVA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	2.70	2.36	2.34	3.63	3.64	3.64
Turner Cut	2.68	2.41	2.40	3.59	3.60	3.60
San Joaquin River at San Andreas Landing	2.71	2.29	2.29	3.66	3.66	3.66
San Joaquin River at Jersey Point	2.71	2.31	2.30	3.66	3.66	3.66
Victoria Canal	2.70	2.38	2.35	3.63	3.63	3.63
Sacramento River at Emmaton	2.71	2.29	2.29	3.66	3.66	3.66
San Joaquin River at Antioch	2.71	2.31	2.30	3.66	3.66	3.66
Montezuma Slough near Beldon Landing	2.71	2.30	2.30	3.65	3.65	3.65
Barker Slough at North Bay Aqueduct	2.71	2.29	2.29	3.66	3.66	3.66
Contra Costa Water District Pumping Plant #1	2.70	2.34	2.31	3.65	3.66	3.65
Banks Pumping Plant	2.69	2.40	2.38	3.61	3.61	3.61
Jones Pumping Plant	2.69	2.41	2.40	3.60	3.60	3.60

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-83. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Invertebrate Diet (in milligrams per kilogram dry weight), Alt2woTUCPDeltaVA minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.00	0.00	-0.01	-0.01	0.00
Turner Cut	-0.01	0.00	0.00	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	-0.01	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.00	0.00	0.00	0.00	0.00
Banks Pumping Plant	0.00	0.00	0.00	0.00	-0.01	0.00
Jones Pumping Plant	0.00	0.00	0.01	0.00	-0.01	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-84. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Invertebrate Diet (in milligrams per kilogram dry weight), Alt2woTUCPAllVA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	2.70	2.36	2.34	3.63	3.64	3.64
Turner Cut	2.68	2.41	2.40	3.59	3.60	3.60
San Joaquin River at San Andreas Landing	2.71	2.29	2.29	3.66	3.66	3.66
San Joaquin River at Jersey Point	2.71	2.31	2.30	3.66	3.66	3.66
Victoria Canal	2.70	2.38	2.35	3.63	3.63	3.63
Sacramento River at Emmaton	2.71	2.29	2.29	3.66	3.66	3.66
San Joaquin River at Antioch	2.71	2.31	2.30	3.66	3.66	3.66
Montezuma Slough near Beldon Landing	2.71	2.30	2.30	3.65	3.65	3.65
Barker Slough at North Bay Aqueduct	2.71	2.29	2.29	3.66	3.66	3.66
Contra Costa Water District Pumping Plant #1	2.70	2.34	2.31	3.65	3.66	3.65
Banks Pumping Plant	2.69	2.40	2.38	3.61	3.61	3.61
Jones Pumping Plant	2.69	2.41	2.40	3.60	3.60	3.60

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-85. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Invertebrate Diet (in milligrams per kilogram dry weight), Alt2woTUCPAllVA minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.00	0.00	-0.01	-0.01	0.00
Turner Cut	-0.01	0.00	0.00	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	-0.01	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.00	0.00	0.00	0.00	0.00
Banks Pumping Plant	0.00	0.00	0.00	0.00	-0.01	0.00
Jones Pumping Plant	0.00	0.00	0.01	0.00	-0.01	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-86. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Invertebrate Diet (in milligrams per kilogram dry weight), ALT3

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	2.70	2.37	2.35	3.63	3.64	3.64
Turner Cut	2.68	2.42	2.42	3.59	3.59	3.60
San Joaquin River at San Andreas Landing	2.71	2.30	2.30	3.66	3.66	3.66
San Joaquin River at Jersey Point	2.71	2.32	2.30	3.65	3.66	3.66
Victoria Canal	2.69	2.39	2.37	3.62	3.63	3.63
Sacramento River at Emmaton	2.71	2.29	2.29	3.66	3.66	3.66
San Joaquin River at Antioch	2.71	2.32	2.30	3.65	3.66	3.66
Montezuma Slough near Beldon Landing	2.71	2.31	2.30	3.65	3.65	3.65
Barker Slough at North Bay Aqueduct	2.71	2.29	2.29	3.66	3.66	3.66
Contra Costa Water District Pumping Plant #1	2.70	2.37	2.33	3.64	3.65	3.65
Banks Pumping Plant	2.69	2.41	2.40	3.60	3.60	3.61
Jones Pumping Plant	2.68	2.42	2.41	3.59	3.59	3.60

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-87. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Invertebrate Diet (in milligrams per kilogram dry weight), ALT3 minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.01	0.01	-0.01	-0.01	0.00
Turner Cut	-0.01	0.01	0.02	0.00	-0.01	0.00
San Joaquin River at San Andreas Landing	0.00	0.01	0.01	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.01	0.00	-0.01	0.00	0.00
Victoria Canal	-0.01	0.01	0.02	-0.01	-0.01	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.01	0.00	-0.01	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.01	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.03	0.02	-0.01	-0.01	0.00
Banks Pumping Plant	0.00	0.01	0.02	-0.01	-0.02	0.00
Jones Pumping Plant	-0.01	0.01	0.02	-0.01	-0.02	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-88. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Invertebrate Diet (in milligrams per kilogram dry weight), ALT4

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	2.70	2.36	2.34	3.64	3.65	3.64
Turner Cut	2.68	2.41	2.40	3.59	3.60	3.60
San Joaquin River at San Andreas Landing	2.71	2.29	2.29	3.66	3.66	3.66
San Joaquin River at Jersey Point	2.71	2.31	2.29	3.66	3.66	3.66
Victoria Canal	2.70	2.38	2.35	3.63	3.64	3.64
Sacramento River at Emmaton	2.71	2.29	2.29	3.66	3.66	3.66
San Joaquin River at Antioch	2.71	2.31	2.30	3.66	3.66	3.66
Montezuma Slough near Beldon Landing	2.71	2.30	2.30	3.65	3.65	3.65
Barker Slough at North Bay Aqueduct	2.71	2.29	2.29	3.66	3.66	3.66
Contra Costa Water District Pumping Plant #1	2.71	2.34	2.31	3.65	3.66	3.65
Banks Pumping Plant	2.69	2.39	2.38	3.61	3.62	3.61
Jones Pumping Plant	2.69	2.41	2.39	3.60	3.61	3.60

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-89. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Invertebrate Diet (in milligrams per kilogram dry weight), ALT4 minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.00	0.01	0.00	0.00	-0.01
Turner Cut	-0.01	0.00	0.01	-0.01	-0.01	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.01	0.00	0.00	0.00	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	-0.01	-0.01	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.01	0.01	-0.01	0.00	-0.01
Banks Pumping Plant	0.00	0.00	0.02	-0.01	0.00	0.00
Jones Pumping Plant	0.00	0.00	0.00	0.00	0.00	-0.01

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-90. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Fish Diet (in milligrams per kilogram dry weight), NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	3.26	2.86	2.83	4.39	4.41	4.41
Turner Cut	3.24	2.92	2.92	4.36	4.36	4.36
San Joaquin River at San Andreas Landing	3.28	2.77	2.77	4.43	4.43	4.43
San Joaquin River at Jersey Point	3.28	2.79	2.77	4.43	4.43	4.43
Victoria Canal	3.26	2.88	2.84	4.39	4.39	4.39
Sacramento River at Emmaton	3.28	2.77	2.77	4.43	4.43	4.43
San Joaquin River at Antioch	3.28	2.79	2.77	4.43	4.43	4.43
Montezuma Slough near Beldon Landing	3.28	2.79	2.79	4.43	4.41	4.41
Barker Slough at North Bay Aqueduct	3.28	2.77	2.77	4.43	4.43	4.43
Contra Costa Water District Pumping Plant #1	3.28	2.83	2.79	4.43	4.43	4.43
Banks Pumping Plant	3.26	2.90	2.88	4.37	4.37	4.37
Jones Pumping Plant	3.26	2.92	2.90	4.36	4.36	4.36

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-91. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Fish Diet (in milligrams per kilogram dry weight), ALT1

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	3.28	2.86	2.83	4.41	4.41	4.41
Turner Cut	3.26	2.92	2.90	4.36	4.36	4.36
San Joaquin River at San Andreas Landing	3.28	2.77	2.77	4.43	4.43	4.43
San Joaquin River at Jersey Point	3.28	2.79	2.77	4.43	4.43	4.43
Victoria Canal	3.26	2.88	2.84	4.39	4.41	4.41
Sacramento River at Emmaton	3.28	2.77	2.77	4.43	4.43	4.43
San Joaquin River at Antioch	3.28	2.79	2.77	4.43	4.43	4.43
Montezuma Slough near Beldon Landing	3.28	2.79	2.79	4.41	4.41	4.41
Barker Slough at North Bay Aqueduct	3.28	2.77	2.77	4.43	4.43	4.43
Contra Costa Water District Pumping Plant #1	3.28	2.83	2.79	4.43	4.43	4.43
Banks Pumping Plant	3.26	2.88	2.86	4.37	4.37	4.37
Jones Pumping Plant	3.26	2.92	2.88	4.36	4.37	4.36

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-92. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Fish Diet (in milligrams per kilogram dry weight), ALT1 minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.02	0.00	0.00	0.02	0.00	0.00
Turner Cut	0.02	0.00	-0.02	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	0.02	0.02
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	-0.02	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.00	0.00	0.00	0.00	0.00
Banks Pumping Plant	0.00	-0.02	-0.02	0.00	0.00	0.00
Jones Pumping Plant	0.00	0.00	-0.02	0.00	0.01	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-93. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Fish Diet (in milligrams per kilogram dry weight), Alt2wTUCPwoVA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	3.26	2.86	2.83	4.39	4.41	4.41
Turner Cut	3.24	2.92	2.92	4.36	4.36	4.36
San Joaquin River at San Andreas Landing	3.28	2.77	2.77	4.43	4.43	4.43
San Joaquin River at Jersey Point	3.28	2.79	2.77	4.43	4.43	4.43
Victoria Canal	3.26	2.88	2.84	4.39	4.39	4.39
Sacramento River at Emmaton	3.28	2.77	2.77	4.43	4.43	4.43
San Joaquin River at Antioch	3.28	2.79	2.77	4.43	4.43	4.43
Montezuma Slough near Beldon Landing	3.28	2.79	2.79	4.43	4.41	4.41
Barker Slough at North Bay Aqueduct	3.28	2.77	2.77	4.43	4.43	4.43
Contra Costa Water District Pumping Plant #1	3.28	2.83	2.79	4.43	4.43	4.43
Banks Pumping Plant	3.26	2.90	2.88	4.37	4.37	4.37
Jones Pumping Plant	3.26	2.92	2.90	4.36	4.36	4.36

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-94. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Fish Diet (in milligrams per kilogram dry weight), Alt2wTUCPwoVA minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.00	0.00	0.00	0.00	0.00
Turner Cut	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	0.00	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.00	0.00	0.00	0.00	0.00
Banks Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00
Jones Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-95. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Fish Diet (in milligrams per kilogram dry weight), Alt2woTUCPwoVA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	3.26	2.86	2.83	4.39	4.41	4.41
Turner Cut	3.24	2.92	2.90	4.36	4.36	4.36
San Joaquin River at San Andreas Landing	3.28	2.77	2.77	4.43	4.43	4.43
San Joaquin River at Jersey Point	3.28	2.79	2.77	4.43	4.43	4.43
Victoria Canal	3.26	2.88	2.84	4.39	4.39	4.39
Sacramento River at Emmaton	3.28	2.77	2.77	4.43	4.43	4.43
San Joaquin River at Antioch	3.28	2.79	2.77	4.43	4.43	4.43
Montezuma Slough near Beldon Landing	3.28	2.79	2.79	4.43	4.41	4.41
Barker Slough at North Bay Aqueduct	3.28	2.77	2.77	4.43	4.43	4.43
Contra Costa Water District Pumping Plant #1	3.28	2.83	2.79	4.43	4.43	4.43
Banks Pumping Plant	3.26	2.90	2.88	4.37	4.37	4.37
Jones Pumping Plant	3.26	2.92	2.90	4.36	4.36	4.36

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-96. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Fish Diet (in milligrams per kilogram dry weight), Alt2woTUCPwoVA minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.00	0.00	0.00	0.00	0.00
Turner Cut	0.00	0.00	-0.02	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	0.00	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.00	0.00	0.00	0.00	0.00
Banks Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00
Jones Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-97. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Fish Diet (in milligrams per kilogram dry weight), Alt2woTUCPDeltaVA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	3.26	2.86	2.83	4.39	4.41	4.41
Turner Cut	3.24	2.92	2.92	4.36	4.36	4.36
San Joaquin River at San Andreas Landing	3.28	2.77	2.77	4.43	4.43	4.43
San Joaquin River at Jersey Point	3.28	2.79	2.77	4.43	4.43	4.43
Victoria Canal	3.26	2.88	2.84	4.39	4.39	4.39
Sacramento River at Emmaton	3.28	2.77	2.77	4.43	4.43	4.43
San Joaquin River at Antioch	3.28	2.79	2.77	4.43	4.43	4.43
Montezuma Slough near Beldon Landing	3.28	2.79	2.79	4.43	4.41	4.41
Barker Slough at North Bay Aqueduct	3.28	2.77	2.77	4.43	4.43	4.43
Contra Costa Water District Pumping Plant #1	3.28	2.83	2.79	4.41	4.43	4.43
Banks Pumping Plant	3.26	2.90	2.88	4.36	4.37	4.37
Jones Pumping Plant	3.26	2.92	2.90	4.36	4.36	4.36

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-98. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Fish Diet (in milligrams per kilogram dry weight), Alt2woTUCPDeltaVA minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.00	0.00	0.00	0.00	0.00
Turner Cut	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	0.00	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.00	0.00	-0.02	0.00	0.00
Banks Pumping Plant	0.00	0.00	0.00	-0.01	0.00	0.00
Jones Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-99. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Fish Diet (in milligrams per kilogram dry weight), Alt2woTUCPAllVA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	3.26	2.86	2.83	4.39	4.41	4.41
Turner Cut	3.24	2.92	2.92	4.34	4.36	4.36
San Joaquin River at San Andreas Landing	3.28	2.77	2.77	4.43	4.43	4.43
San Joaquin River at Jersey Point	3.28	2.79	2.77	4.43	4.43	4.43
Victoria Canal	3.26	2.88	2.84	4.39	4.39	4.39
Sacramento River at Emmaton	3.28	2.77	2.77	4.43	4.43	4.43
San Joaquin River at Antioch	3.28	2.79	2.77	4.43	4.43	4.43
Montezuma Slough near Beldon Landing	3.28	2.79	2.79	4.43	4.41	4.41
Barker Slough at North Bay Aqueduct	3.28	2.77	2.77	4.43	4.43	4.43
Contra Costa Water District Pumping Plant #1	3.28	2.83	2.81	4.41	4.43	4.43
Banks Pumping Plant	3.26	2.90	2.88	4.36	4.37	4.37
Jones Pumping Plant	3.26	2.92	2.90	4.36	4.36	4.36

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-100. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Fish Diet (in milligrams per kilogram dry weight), Alt2woTUCPAllVA minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.00	0.00	0.00	0.00	0.00
Turner Cut	0.00	0.00	0.00	-0.02	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	0.00	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.00	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.00	0.02	-0.02	0.00	0.00
Banks Pumping Plant	0.00	0.00	0.00	-0.01	0.00	0.00
Jones Pumping Plant	0.00	0.00	0.00	0.00	0.00	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-101. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Fish Diet (in milligrams per kilogram dry weight), ALT3

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	3.26	2.88	2.84	4.39	4.39	4.41
Turner Cut	3.24	2.93	2.92	4.34	4.34	4.36
San Joaquin River at San Andreas Landing	3.28	2.79	2.77	4.43	4.43	4.43
San Joaquin River at Jersey Point	3.28	2.81	2.79	4.43	4.43	4.43
Victoria Canal	3.26	2.90	2.86	4.37	4.39	4.39
Sacramento River at Emmaton	3.28	2.77	2.77	4.43	4.43	4.43
San Joaquin River at Antioch	3.28	2.81	2.79	4.43	4.43	4.43
Montezuma Slough near Beldon Landing	3.28	2.79	2.79	4.41	4.41	4.41
Barker Slough at North Bay Aqueduct	3.28	2.77	2.77	4.43	4.43	4.43
Contra Costa Water District Pumping Plant #1	3.26	2.86	2.83	4.41	4.41	4.41
Banks Pumping Plant	3.26	2.92	2.90	4.36	4.36	4.36
Jones Pumping Plant	3.24	2.93	2.92	4.34	4.36	4.36

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-102. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Fish Diet (in milligrams per kilogram dry weight), ALT3 minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	0.00	0.02	0.01	0.00	-0.02	0.00
Turner Cut	0.00	0.01	0.00	-0.02	-0.02	0.00
San Joaquin River at San Andreas Landing	0.00	0.02	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.02	0.02	0.00	0.00	0.00
Victoria Canal	0.00	0.02	0.02	-0.02	0.00	0.00
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.02	0.02	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	-0.02	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	-0.02	0.03	0.04	-0.02	-0.02	-0.02
Banks Pumping Plant	0.00	0.02	0.02	-0.01	-0.01	-0.01
Jones Pumping Plant	-0.02	0.01	0.02	-0.02	0.00	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-103. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Fish Diet (in milligrams per kilogram dry weight), ALT4

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	3.26	2.86	2.83	4.39	4.41	4.41
Turner Cut	3.24	2.92	2.92	4.36	4.36	4.36
San Joaquin River at San Andreas Landing	3.28	2.77	2.77	4.43	4.43	4.43
San Joaquin River at Jersey Point	3.28	2.79	2.77	4.43	4.43	4.43
Victoria Canal	3.26	2.88	2.84	4.39	4.39	4.39
Sacramento River at Emmaton	3.28	2.77	2.77	4.43	4.43	4.43
San Joaquin River at Antioch	3.28	2.79	2.77	4.43	4.43	4.43
Montezuma Slough near Beldon Landing	3.28	2.79	2.79	4.43	4.41	4.41
Barker Slough at North Bay Aqueduct	3.28	2.77	2.77	4.43	4.43	4.43
Contra Costa Water District Pumping Plant #1	3.28	2.83	2.79	4.43	4.43	4.43
Banks Pumping Plant	3.26	2.90	2.88	4.37	4.37	4.37
Jones Pumping Plant	3.26	2.92	2.90	4.36	4.36	4.36

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-104. Modeled Period Average Total Selenium Concentrations in Bird Eggs, Fish Diet (in milligrams per kilogram dry weight), ALT4 minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
San Joaquin River at Empire Tract	-0.02	0.00	0.00	-0.02	0.00	0.00
Turner Cut	-0.02	0.00	0.02	0.00	0.00	0.00
San Joaquin River at San Andreas Landing	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Jersey Point	0.00	0.00	0.00	0.00	0.00	0.00
Victoria Canal	0.00	0.00	0.00	0.00	-0.02	-0.02
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	0.00
San Joaquin River at Antioch	0.00	0.00	0.00	0.00	0.00	0.00
Montezuma Slough near Beldon Landing	0.00	0.00	0.00	0.02	0.00	0.00
Barker Slough at North Bay Aqueduct	0.00	0.00	0.00	0.00	0.00	0.00
Contra Costa Water District Pumping Plant #1	0.00	0.00	0.00	0.00	0.00	0.00
Banks Pumping Plant	0.00	0.02	0.02	0.00	0.00	0.00
Jones Pumping Plant	0.00	0.00	0.02	0.00	-0.01	0.00

[1] "All" water years 1922–2021 represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-105. Modeled Period Average Total Selenium Concentrations in Western Delta Sturgeon (milligrams per kilogram dry weight), NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
Sacramento River at Emmaton	0.72	0.72	0.72	1.30	1.30	1.34
San Joaquin River at Antioch	3.82	4.15	3.75	6.62	6.57	6.76
Montezuma Slough near Beldon Landing	3.97	4.01	3.84	7.04	7.15	7.36

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-106. Modeled Period Average Total Selenium Concentrations in Western Delta Sturgeon (milligrams per kilogram dry weight), ALT1

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
Sacramento River at Emmaton	0.72	0.72	0.71	1.30	1.30	1.33
San Joaquin River at Antioch	3.79	4.11	3.71	6.54	6.56	6.69
Montezuma Slough near Beldon Landing	4.13	4.09	4.06	7.41	7.53	7.68

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-107. Modeled Period Average Total Selenium Concentrations in Western Delta Sturgeon (milligrams per kilogram dry weight), ALT1 minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
Sacramento River at Emmaton	0.00	0.00	-0.01	0.00	0.00	-0.01
San Joaquin River at Antioch	-0.03	-0.04	-0.04	-0.08	-0.01	-0.07
Montezuma Slough near Beldon Landing	0.16	0.08	0.22	0.37	0.38	0.32

[1] "All" water years (1922–2021) represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-108. Modeled Period Average Total Selenium Concentrations in Western Delta Sturgeon (milligrams per kilogram dry weight), Alt2wTUCPwoVA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
Sacramento River at Emmaton	0.72	0.72	0.71	1.30	1.30	1.34
San Joaquin River at Antioch	3.79	4.10	3.71	6.59	6.56	6.74
Montezuma Slough near Beldon Landing	3.94	3.98	3.80	7.00	7.13	7.33

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-109. Modeled Period Average Total Selenium Concentrations in Western Delta Sturgeon (milligrams per kilogram dry weight), Alt2wTUCPwoVA minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
Sacramento River at Emmaton	0.00	0.00	-0.01	0.00	0.00	0.00
San Joaquin River at Antioch	-0.03	-0.05	-0.04	-0.03	-0.01	-0.02
Montezuma Slough near Beldon Landing	-0.03	-0.03	-0.04	-0.04	-0.02	-0.03

[1] "All" water years (1922–2021) represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-110. Modeled Period Average Total Selenium Concentrations in Western Delta Sturgeon (milligrams per kilogram dry weight), Alt2woTUCPwoVA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
Sacramento River at Emmaton	0.72	0.72	0.71	1.30	1.30	1.33
San Joaquin River at Antioch	3.79	4.09	3.71	6.59	6.56	6.71
Montezuma Slough near Beldon Landing	3.94	3.98	3.80	7.01	7.13	7.32

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-111. Modeled Period Average Total Selenium Concentrations in Western Delta Sturgeon (milligrams per kilogram dry weight), Alt2woTUCPwoVA minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
Sacramento River at Emmaton	0.00	0.00	-0.01	0.00	0.00	-0.01
San Joaquin River at Antioch	-0.03	-0.06	-0.04	-0.03	-0.01	-0.05
Montezuma Slough near Beldon Landing	-0.03	-0.03	-0.04	-0.03	-0.02	-0.04

[1] "All" water years (1922–2021) represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-112. Modeled Period Average Total Selenium Concentrations in Western Delta Sturgeon (milligrams per kilogram dry weight), Alt2woTUCPDeltaVA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
Sacramento River at Emmaton	0.72	0.72	0.72	1.30	1.31	1.33
San Joaquin River at Antioch	3.81	4.11	3.75	6.64	6.58	6.72
Montezuma Slough near Beldon Landing	3.95	3.99	3.82	7.02	7.13	7.33

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-113. Modeled Period Average Total Selenium Concentrations in Western Delta Sturgeon (milligrams per kilogram dry weight), Alt2woTUCPDeltaVA minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.01	-0.01
San Joaquin River at Antioch	-0.01	-0.04	0.00	0.02	0.01	-0.04
Montezuma Slough near Beldon Landing	-0.02	-0.02	-0.02	-0.02	-0.02	-0.03

[1] "All" water years (1922–2021) represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-114. Modeled Period Average Total Selenium Concentrations in Western Delta Sturgeon (milligrams per kilogram dry weight), Alt2woTUCPAllVA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
Sacramento River at Emmaton	0.72	0.72	0.72	1.30	1.30	1.33
San Joaquin River at Antioch	3.81	4.11	3.75	6.64	6.58	6.70
Montezuma Slough near Beldon Landing	3.94	3.99	3.81	7.01	7.12	7.32

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-115. Modeled Period Average Total Selenium Concentrations in Western Delta Sturgeon (milligrams per kilogram dry weight), Alt2woTUCPAllVA minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
Sacramento River at Emmaton	0.00	0.00	0.00	0.00	0.00	-0.01
San Joaquin River at Antioch	-0.01	-0.04	0.00	0.02	0.01	-0.06
Montezuma Slough near Beldon Landing	-0.03	-0.02	-0.03	-0.03	-0.03	-0.04

[1] "All" water years (1922–2021) represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-116. Modeled Period Average Total Selenium Concentrations in Western Delta Sturgeon (milligrams per kilogram dry weight), ALT3

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
Sacramento River at Emmaton	0.74	0.75	0.74	1.33	1.32	1.34
San Joaquin River at Antioch	3.99	4.55	3.95	6.84	6.65	6.76
Montezuma Slough near Beldon Landing	4.03	4.15	3.90	7.10	7.23	7.33

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-117. Modeled Period Average Total Selenium Concentrations in Western Delta Sturgeon (milligrams per kilogram dry weight), ALT3 minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
Sacramento River at Emmaton	0.02	0.03	0.02	0.03	0.02	0.00
San Joaquin River at Antioch	0.17	0.40	0.20	0.22	0.08	0.00
Montezuma Slough near Beldon Landing	0.06	0.14	0.06	0.06	0.08	-0.03

[1] "All" water years (1922–2021) represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.

Table G.5-118. Modeled Period Average Total Selenium Concentrations in Western Delta Sturgeon (milligrams per kilogram dry weight), ALT4

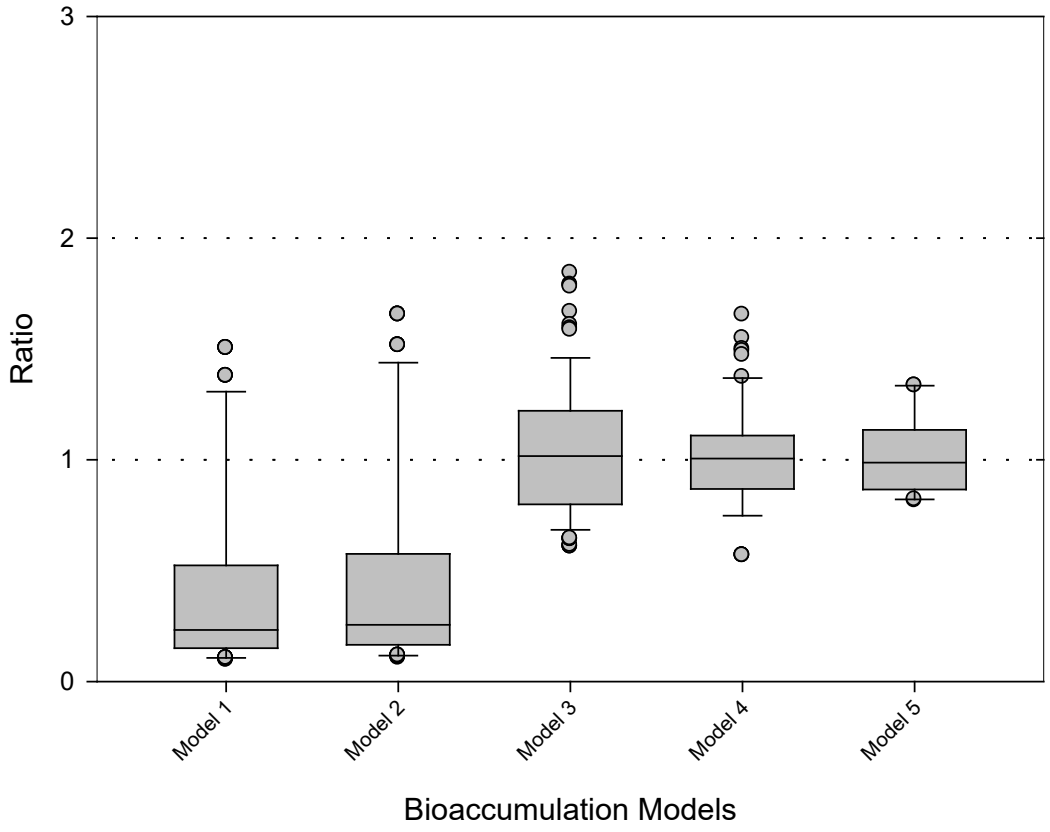
Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
Sacramento River at Emmaton	0.72	0.72	0.71	1.30	1.30	1.34
San Joaquin River at Antioch	3.79	4.09	3.71	6.58	6.55	6.74
Montezuma Slough near Beldon Landing	3.95	3.98	3.80	7.00	7.20	7.32

[1] "All" water years (1922–2021) represent the 100-year period modeled.

Table G.5-119. Modeled Period Average Total Selenium Concentrations in Western Delta Sturgeon (milligrams per kilogram dry weight), ALT4 minus NAA

Assessment Location	All Years[1]	Wet Years	Above Normal Years	Below Normal Years	Dry Years	Critical Years
Sacramento River at Emmaton	0.00	0.00	-0.01	0.00	0.00	0.00
San Joaquin River at Antioch	-0.03	-0.06	-0.04	-0.04	-0.02	-0.02
Montezuma Slough near Beldon Landing	-0.02	-0.03	-0.04	-0.04	0.05	-0.04

[1] "All" water years (1922–2021) represent the 100-year period modeled.
% change indicates increased concentrations relative to the No Action Alternative when values are positive and lower concentrations relative to the No Action Alternative when values are negative.



For Models 1 and 2, default values (K_d = 1000, TTF_{invert} = 2.8, TTF_{fish} = 1.1) were used in calculations as follows:

Model 1=Trophic level 3 (TL-3) fish eating invertebrates

Model 2= TL-4 fish eating TL-3 fish

Model 3=Model 2 with K_d estimated using all years regression (log Kd = 2.76-0.97(logDSM2))

Model 4=Model 2 with K_d estimated using normal/wet years (2000/2005) regression (log Kd = 2.75-0.90(logDSM2))

Model 5=Model 2 with K_d estimated using dry years (2007) regression (logKd = 2.84-1.02(logDSM2))

Figure G.5-1. Ratios of Predicted Selenium Concentrations in Fish Models 1 through 5 to Observed Selenium Concentrations in Largemouth Bass

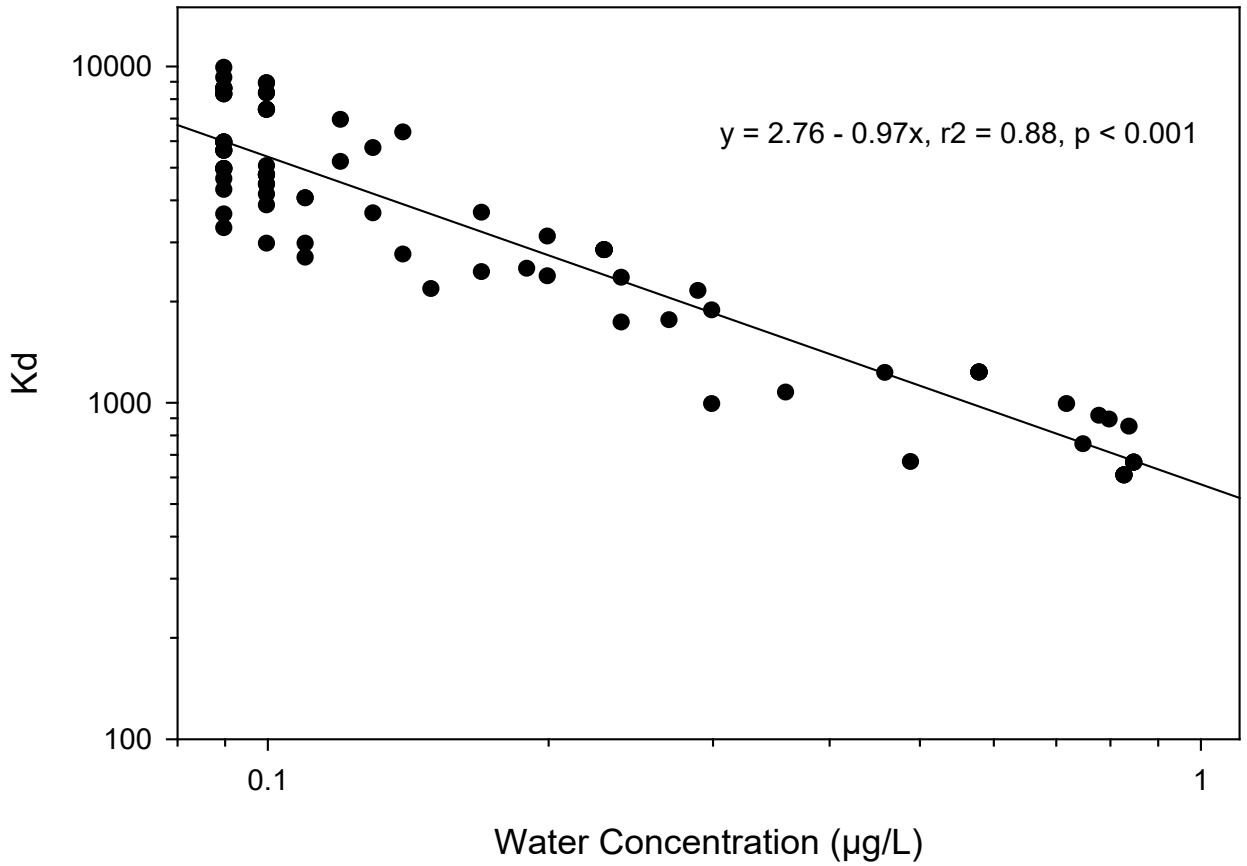


Figure G.5-2. Log-log Regression Relation of Estimated K_d to Water column Selenium Concentration for Model 3 in All Years (Based on Years 2000, 2005, and 2007)

To predict the K_d (y) from water concentrations using the regression equation, take the log of the water concentration (x), multiply it by the slope (-0.97), which gives a positive number for x<1 (i.e., water column selenium concentrations less than 1 µg/L); then add this number to the intercept (2.76) and take the antilog.

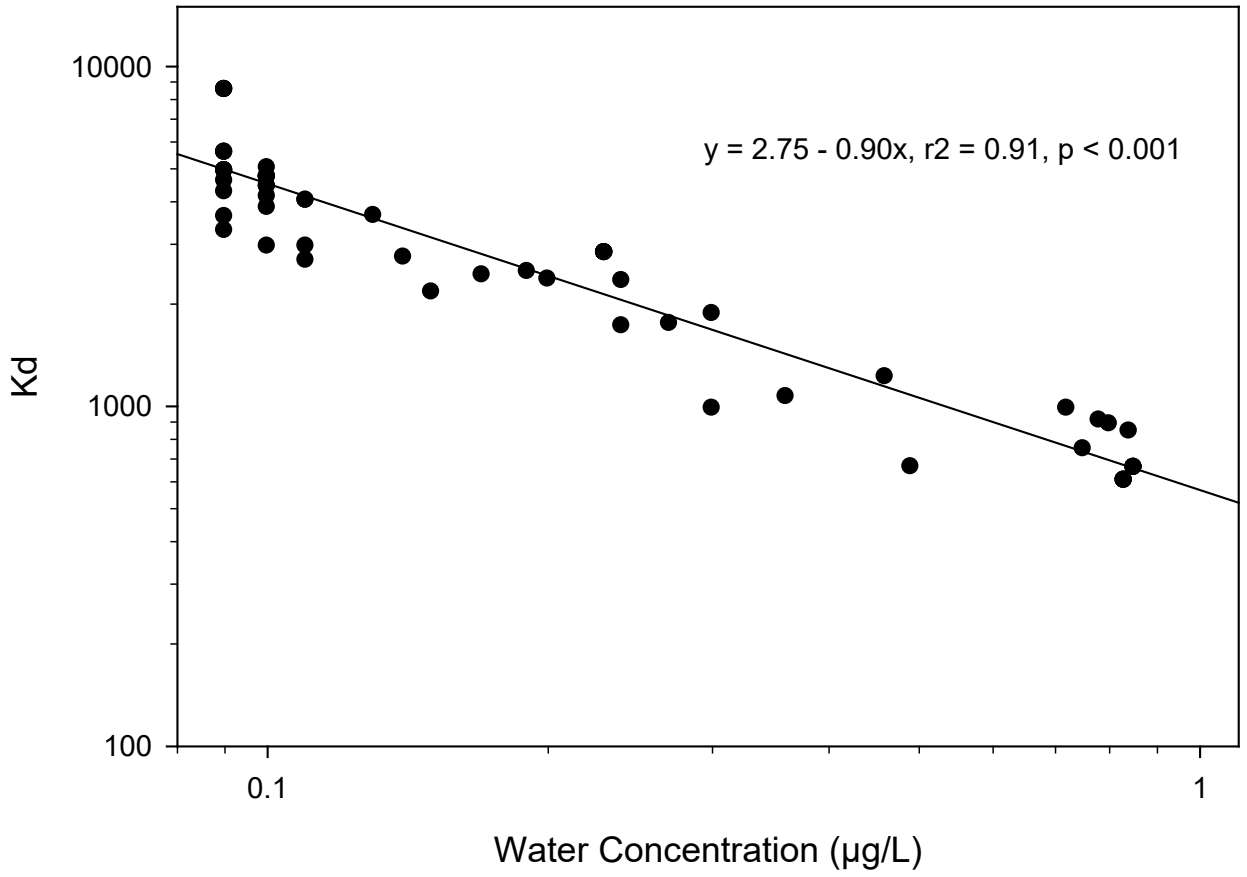


Figure G.5-3. Log-log Regression Relation of Estimated K_d to Water column Selenium Concentration for Model 4 in Normal/Wet Years (Based on Years 2000 and 2005)

To predict the K_d (y) from water concentrations using the regression equation, take the log of the water concentration (x), multiply it by the slope (-0.90), which gives a positive number for x<1 (i.e., water column selenium concentrations less than 1 µg/L); then add this number to the intercept (2.75) and take the antilog.

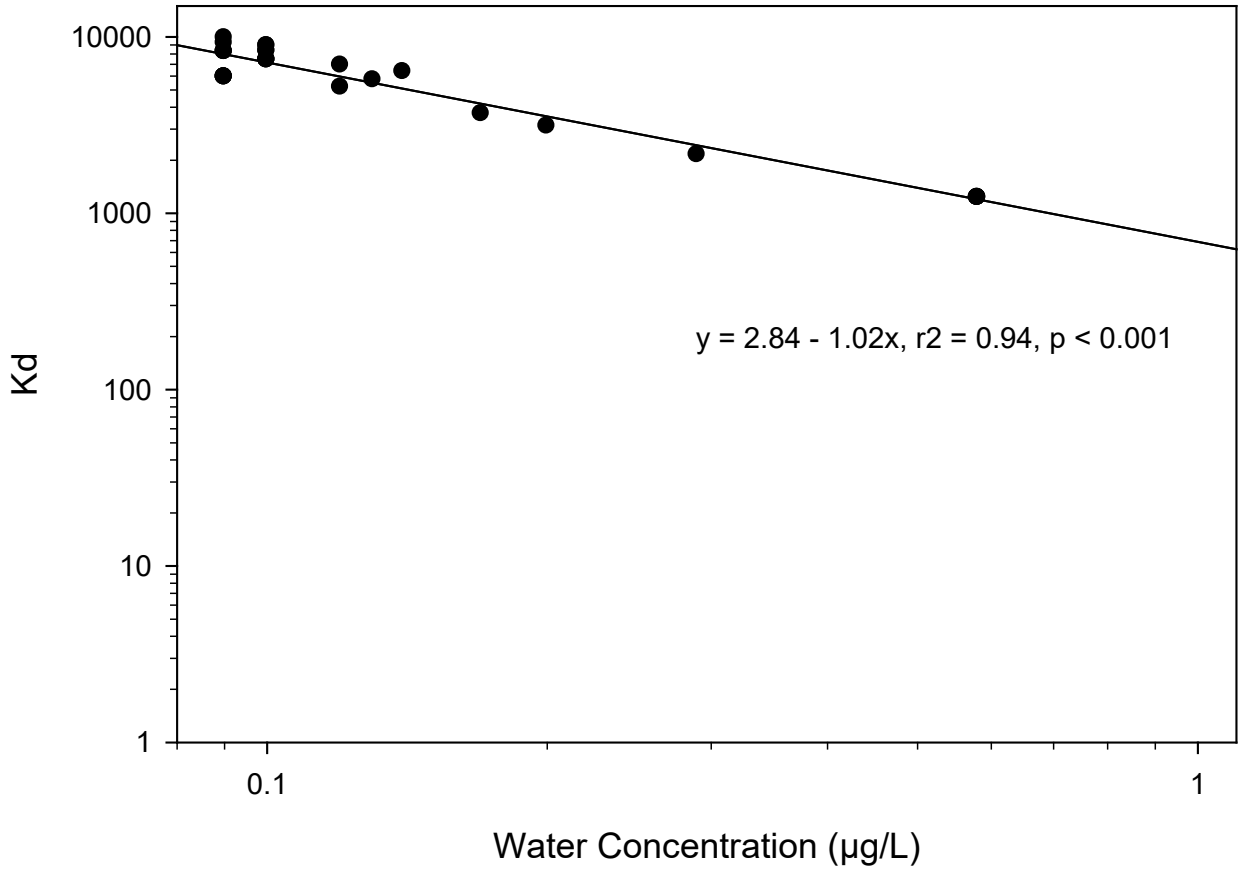


Figure G.5-4. Log-log Regression Relation of Estimated K_d to Water column Selenium Concentration for Model 5 in Dry Years (Based on Year 2007)

To predict the K_d (y) from water concentrations using the regression equation, take the log of the water concentration (x), multiply it by the slope (-1.02), which gives a positive number for x<1 (i.e., water column selenium concentrations less than 1 µg/L); then add this number to the intercept (2.84) and take the antilog.

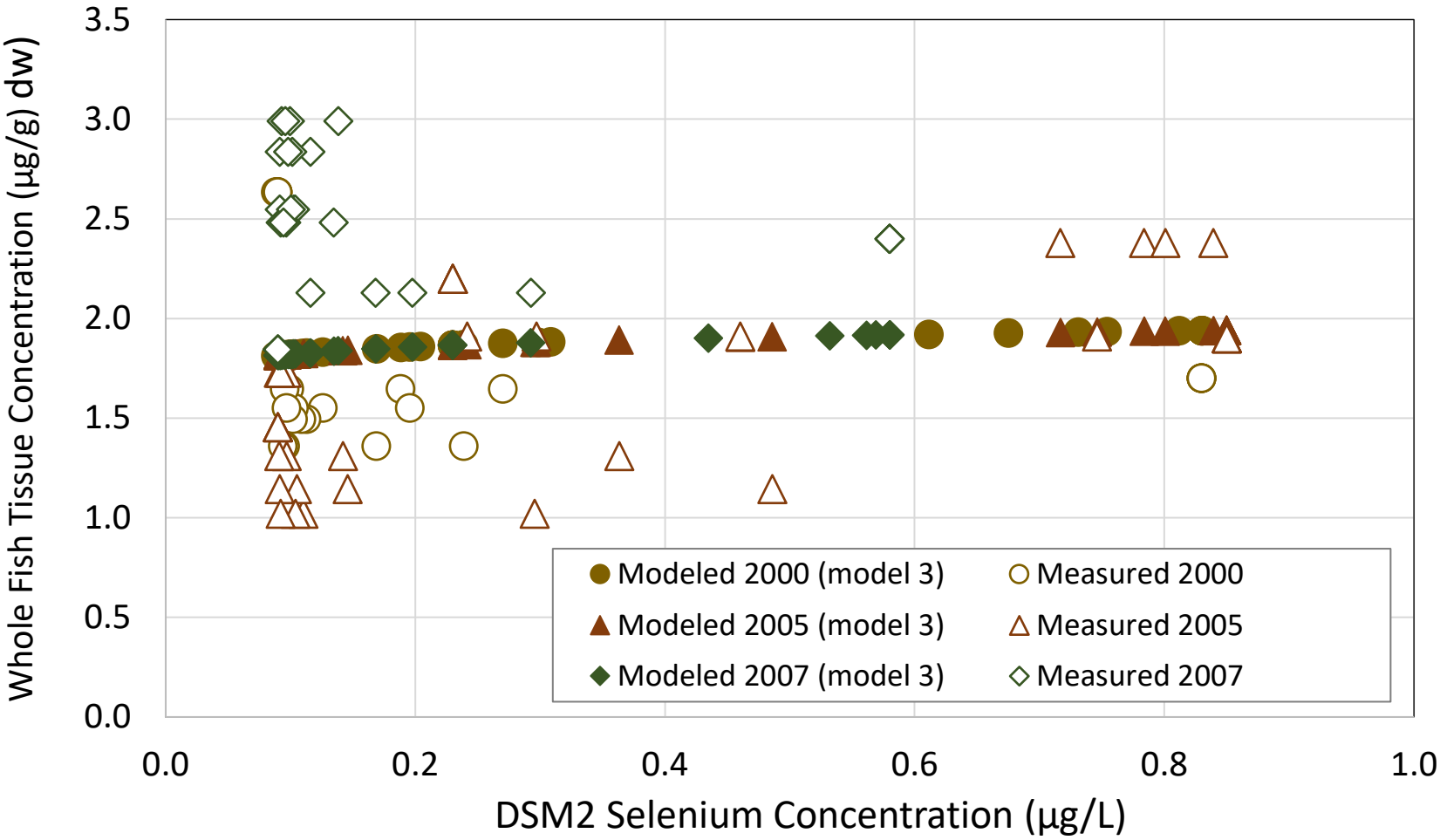


Figure G.5-5. Distribution of Data for Selenium Concentrations in Largemouth Bass Relative to Water Column Selenium for Model 3

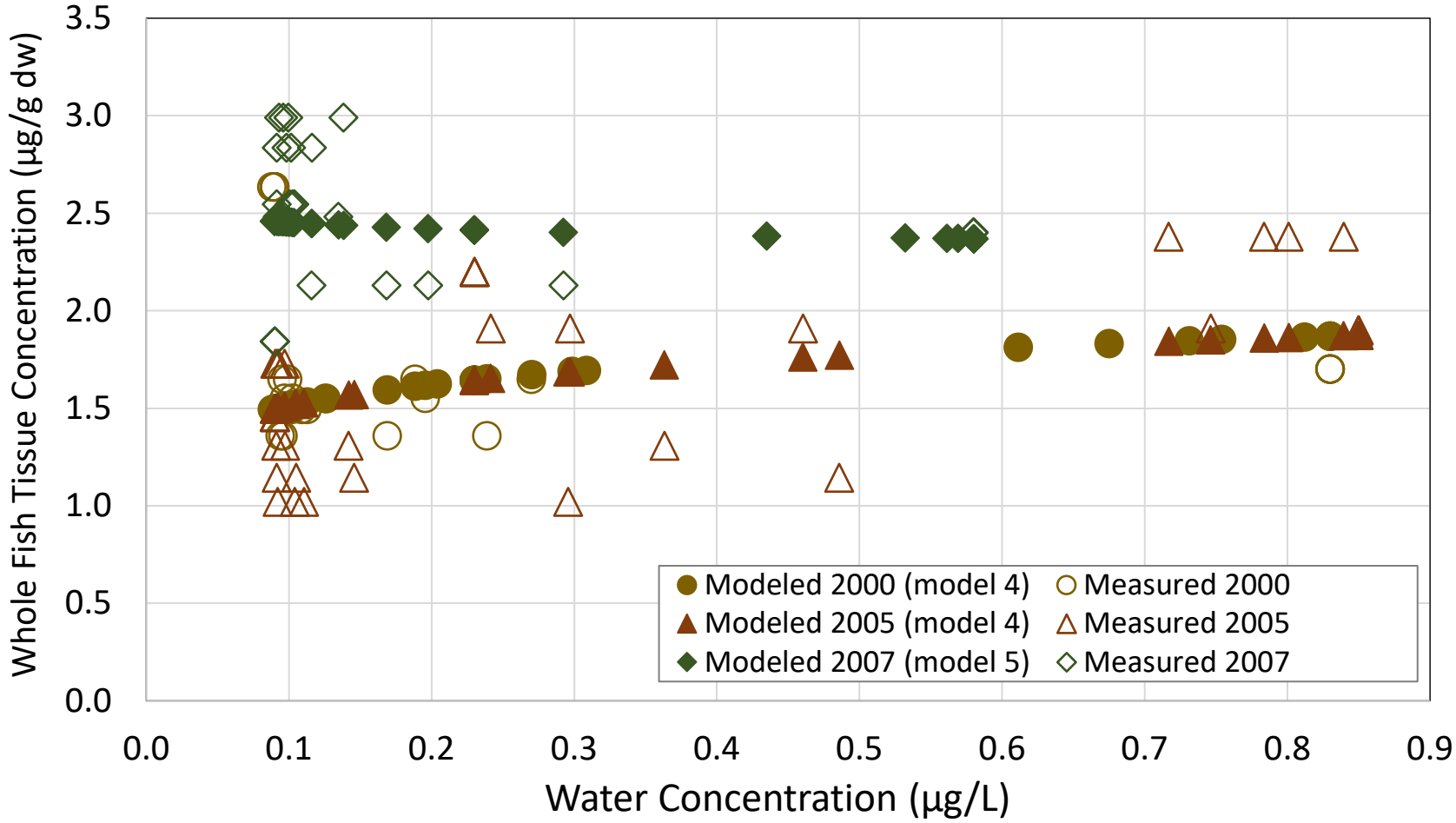


Figure G.5-6. Distribution of Data for Selenium Concentrations in Largemouth Bass Relative to Water Column Selenium for Model 4 and Model 5