2001 Regional Monitoring Program

Water Results

Regional Monitoring Program 2001 Results

Water Monitoring Section
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2.1. Background

Water in the San Francisco Estuary has been monitored by the RMP since 1993 to assess the patterns and trends of water quality and contamination in the Estuary, compare contaminant concentrations to regulatory guidelines, and identify general sources of contamination to the Estuary.

In accordance with the recommendations from a five-year external peer review of the RMP in 1997 (Bernstein and O'Connor 1997), the RMP objectives were revised to better address specific management questions in the Estuary (*see* RMP Overview). Consequently, a redesign of the RMP Status and Trends monitoring component began in 2000 to meet the revised RMP objectives (Grosso and Lowe, 2001). RMP water monitoring in 2001 was conducted during a transitional period between the original monitoring design (1993-1999) that sampled three times a year and the new design that was implemented in the summer of 2002 that samples only once a year during the dry season. In 2001, water samples were collected one time in both the wet (February) and dry seasons (July-August) for water quality and trace element analyses. Trace organic contaminants were measured only in the samples collected in the summer.

Water monitoring was conducted at twenty-six RMP stations throughout the Estuary in 2001 (Figure 1.1). Twenty-two sites were sampled as part of the RMP Status and Trends Monitoring component, while two sites located in the sloughs of the Lower South Bay were sampled as part of a Local Effects Monitoring Program in cooperation with the cities of San Jose (C-3-0) and Sunnyvale (C-1-3). In addition, two sites located near the Estuary-watershed interface of the Coyote Creek at Standish Dam (BW10) and in the Alviso Slough, near the mouth of the Guadalupe River (BW15), were monitored as part of the Estuary Interface Pilot (EIP) Study. Leatherbarrow et al. (2002) summarized results of the EIP study from water and sediment samples collected between 1996 and 1999. To compare water-monitoring results among the major reaches of the Estuary, RMP stations were grouped into larger segments (Table 1.3).

The suite of analytes measured in RMP water samples have remained the same over the last few years, except for the addition of methylmercury, cobalt, and manganese in 2000, and iron in 2001 (Table 1.2). To relate contaminant concentrations to general water quality conditions at the time of sampling, the RMP measured conventional water quality parameters, such as salinity, total suspended solids (TSS) and dissolved organic carbon (DOC) (Figures 2.2-2.4). In addition, the U.S. Geological Survey (USGS) collected water quality data (salinity, temperature, dissolved oxygen, suspended sediments, and phytoplankton biomass) on a monthly basis along a transect of the deep water chammels from the extreme South Bay to the confluence of the Sacramento and San Joaquin Rivers. Water quality data from USGS is available on their website at **http://sfbay.wr.usgs.gov/access/wqdata/.**

The RMP measures trace elements in water as dissolved (0.45 µm filtered) and total (or near-total) concentrations (Figures 2.5-2.17). However, laboratory instrumentation problems delayed the analyses of 2001 water samples for total (or near-total) concentrations of several trace metals (silver, cadmium, copper, iron, lead, manganese, nickel, and zinc). Consequently, total (or near-total) concentration data were

only available for arsenic (Figure 2.5b), mercury (Figure 2.12b), methylmercury (Figure 2.13b), and selenium (Figure 2.15b) at the time of this report. Trace organic contaminant concentrations were measured in water only during the dry season (July-August) sampling and reported as dissolved (1 µm filtered) and total (dissolved + particulate) concentrations (Figures 2.18-2.25). Detailed methods for sample collection and laboratory analysis are described in the Field Sampling Manual for the RMP (David et al., 2001) and a summary of analytical methods is located in the *Description of Methods*.

2.2. Water Quality Guidelines

To evaluate potential effects on aquatic organisms and human health, contaminant concentrations were compared to various water quality guidelines (Table 2.1). Concentrations of dissolved trace elements and total (dissolved + particulate) organic contaminants were compared to aquatic life water quality criteria (WQC) and human health WQC, respectively, listed in the U.S. Environmental Protection Agency's California Toxics Rule (CTR) (US EPA, 2000). Trace element concentrations in samples with salinities less than 5 parts per thousand (‰) were compared to freshwater aquatic life criteria for trace elements. Samples designated as estuarine by the San Francisco Bay Regional Water Quality Control Board (Regional Board) were compared to the lower of the freshwater or saltwater guidelines (see below). Water quality criteria for total trace elements were calculated using the conversion table listed in the CTR. Concentrations of six trace elements (cadmium, copper, nickel, lead, silver, and zinc) were compared to freshwater criteria calculated using a hardness factor. For these trace elements, a hardness value ceiling of 400 mg/L was used for calculating hardness dependent criteria by recommendation of the Regional Board.

Several contaminants measured by the RMP do not have criteria set by the CTR and were, therefore, compared to other relevant water quality guidelines (Table 2.1). Total mercury concentrations were compared to the aquatic life objectives for total recoverable mercury listed in the San Francisco Bay Water Quality Control Plan (Basin Plan; SFBRWQCB, 1995). For selenium, the CTR lists a criterion of 5 µg/L for total recoverable selenium that was promulgated for waters in San Francisco Bay and upstream, including the Delta, in the National Toxics Rule (NTR) of 1992 (USEPA, 1992). As with mercury, total PAHs were also compared to the Basin Plan objective (0.031 µg/L). Total diazinon concentrations were compared to a guideline concentration of 40,000 pg/L, or parts per quadrillion (ppq), developed by the California Department of Fish and Game (Menconi and Cox, 1994). Chlorpyrifos and mirex are not listed in the CTR; however, the EPA does have recommended guidelines for these contaminants (US EPA, 1999).

Water samples collected from saltwater, estuarine, or freshwater portions of the Estuary were compared to different water quality criteria for trace elements. The Basin Plan defines sites as (1) freshwater when the salinity is less than 5‰ more than 75% of the time, (2) saltwater when the salinity is greater than 5‰ more than 75% of the time, and (3) estuarine when the salinity is intermediate, estuarine organisms are present for significant periods of time, or when based on an evaluation of the Regional Board (SFBRWQCB, 1995). RMP monitoring stations were designated as freshwater, saltwater, or estuarine based on an evaluation by the Regional Board. The Basin Plan states that the lower of the freshwater and saltwater guidelines apply to estuarine locations. The

following stations were classified as estuarine: Sunnyvale (C-1-3), San Jose (C-3-0), South Bay (BA20), Petaluma River (BD15), San Pablo Bay (BD20), Pinole Point (BD30), Davis Point (BD40), Napa River (BD50), Pacheco Creek (BF10), Grizzly Bay (BF20), Honker Bay (BF40), Sacramento River (BG20), and San Joaquin River (BG30).

Most of the contaminants listed in the CTR have several criteria aimed at protecting aquatic life or human health. RMP contaminant data have generally been compared to the lowest criterion for each contaminant. In general, trace element concentrations were compared to four-day average aquatic life criteria because RMP data were probably indicative of conditions that persisted longer than one day. Trace organic contaminant concentrations were compared to the human health criteria for the consumption of aquatic organisms only, since RMP stations are all downstream of drinking water intakes in the Delta.

2.3. Aquatic Bioassays

The RMP routinely conducts toxicity testing on water samples collected from selected locations in the Estuary to assess the potential for adverse effects on resident organisms. Two distinct components of RMP aquatic toxicity testing include (1) ambient water toxicity testing and (2) episodic toxicity testing in water samples collected after episodic storm events.

Ambient water toxicity was conducted in 2001 using laboratory bioassays with Estuary water samples collected from five RMP stations during wet-season sampling (February) and six stations during dry-season sampling (August) (Figure 2.26). Toxicity was evaluated using a short-term chronic test by exposing *Americamysis bahia* (formerly *Mysidopsis bahia*) to water samples for seven days with survival as the test endpoint. Significant toxicity was determined by statistical comparison (t-tests) of field samples with controls. Tests were conducted as per U.S. EPA guidlelines (USEPA, 1994).

Episodic toxicity testing was conducted at three stations (Napa River, Pacheco Slough, and Mallard Island) in the northern reach of the Estuary from January to June 2001 (Ogle et al., 2002). Toxicity was evaluated using a short-term chronic test by exposing *A. bahia* and *Menidia beryllina* for seven days with survival as the test endpoint. Significant toxicity was determined by statistical comparison (t-tests) of field samples with controls. Tests were conducted as per U.S. EPA guidlelines (USEPA, 1994).

2.4. Trends in Water Quality

The waters of the San Francisco Estuary have been sampled from the same sites since 1989 to determine general spatial and temporal patterns in contaminant concentrations. Flegal et al. (1991) measured concentrations of several trace elements in 1989 and 1990 as a preliminary study of trace element cycling within the San Francisco Estuary. In 1991 and 1992, samples were collected under the State's Bay Protection and Toxic Cleanup Program (BPTCP), which functioned as a Pilot Regional Monitoring Program and a precursor to the current RMP.

The RMP has since focused on temporal trends in contamination by measuring contaminant concentrations on seasonal and annual time scales. Total concentrations of several trace elements and organic contaminants have been averaged for different Bay segments, including the Rivers, Northern Estuary, Central Bay, and South Bay. Mean

concentrations and ranges were plotted for each RMP water sampling date from 1989 through August 2001 (Figures 2.27-2.43).

2.5. Water Monitoring Results in the San Francisco Estuary, 2001

2.5.1. Water Quality in the Estuary

RMP monitoring in 2001 was conducted during one of the driest years since monitoring began in 1993 (Figure 2.1). Delta outflow from the Sacramento-San Joaquin River Delta calculated by the California Department of Water Resources as the Delta Outflow Index (DOI) was well below the 45-year average from 1956 to 2000 throughout most of the year (Harrison, 2002). Prior to RMP winter sampling, two minor storm events occurred in January that increased DOI above 30,000 cfs. A third minor storm event occurred during RMP winter sampling between February 5th and February 14th when DOI reached a maximum of 22,000 cubic feet per second (cfs). Relatively low freshwater flow from the Delta compared to previous winters led to less dilution of surface salinity in RMP water samples; almost all stations had salinities exceeding 5 practical salinity units (psu), except for stations located in close proximity to the Delta, such as Honker Bay (BF40), Sacramento River (BG20), and San Joaquin River (BG30), and the Estuary Interface Pilot Study stations in the Lower South Bay [Guadalupe River (BW15) and Standish Dam (BW10)]. Summer RMP sampling was conducted during conditions of typically low freshwater flow from the Delta in the range of 2,700 to 5,500 cfs. Because RMP monitoring has mostly occurred during wetter-than average years, the lack of freshwater flow from the tributaries created relatively unique hydrological conditions compared to previous years of monitoring.

Winter storms typically mobilize and transport suspended sediment loads and dissolved constituents through the water column as evidenced by higher concentrations of dissolved organic carbon (DOC, Figure 2.2) and total suspended solids (TSS, Figure 2.3) during winter sampling compared to summer sampling at most RMP stations. This seasonal pattern was not necessarily evident, however, in stations located in the Estuary Interface and the Southern Sloughs stations suggesting that different processes may influence the concentrations of DOC and TSS in these locations. During February sampling, concentrations of DOC exceeded 4 mg/L at several stations in close proximity to tributaries: Guadalupe River (BW15), San Jose (C-3-0), Redwood Creek (BA40), and Petaluma River (BD15). However, maximum concentrations of DOC (> 5 mg/L) were measured during the dry season at the Southern Slough stations, San Jose (C-3-0) and Sunnyvale (C-1-3). The maximum concentration of TSS (422 mg/L) was measured at Sunnyvale (C-1-3) during February sampling while high concentrations of TSS (> 100 mg/L) were also measured at Petaluma River (BD15) and several South Bay stations. During the July-August sampling, concentrations of TSS greater than 100 mg/L were also measured at the Estuary Interface and Southern Slough stations.

2.5.2. Contaminant Concentrations in Water

Trace Elements

The cycling and distribution of several trace elements measured by the RMP are influenced by the transport of DOC (Kuwabara et al., 1989), suspended colloids (Sanudo-Wilhelmy et al., 1996), and suspended particles (Schoellhamer, 1996; Conaway et al., 2003). As discussed previously, total (or near-total) concentrations of several trace

elements were not available due to instrumentation problems in the laboratory. Furthermore, total mercury concentrations measured in winter samples were not reported at the time of this report due to a pending QA/QC review. This section will be updated as data become available.

Consistent with previous years of RMP monitoring, concentrations of dissolved trace elements were generally higher in the southern reach and at Petaluma River (BD15) compared to other regions of the Estuary. In February sampling, maximum dissolved concentrations of cadmium (0.11 µg/L), copper (3.0 µg/L), and nickel (12.9 µg/L) were measured at Petaluma River (BD15) (Figures 2.6-2.8, 2.14) and coincided with maximum concentrations of DOC during that cruise. In July-August sampling, dissolved concentrations of all of these trace elements, except cadmium, were highest in South Bay, Southern Slough, or Estuary Interface stations in the southern reaches of the Bay. Samples collected from San Jose (C-3-0) in July-August had maximum dissolved concentrations of nickel (6.5 µg/L), and zinc (10 µg/L) during the RMP summer cruise. Concentrations of trace elements have historically been higher in southern reaches of the Estuary due to a combination of large inputs from anthropogenic sources, benthic sediment fluxes, and limited hydraulic flushing of the South Bay (Flegal et al., 1991).

In July-August sampling, the maximum total mercury concentration (0.15 µg/L) was measured at Guadalupe River (BW15). Mercury concentrations measured in water and sediment have generally been higher at Guadalupe River (BW15) than other RMP stations (Leatherbarrow et al., 2002). This site is located in the Alviso Slough, near the mouth of the Guadalupe River, which is heavily impacted by the historic mercury mining district of New Almaden in the upper watershed (Abu-Saba and Tang, 2000; Thomas et al., 2002).

Total methylmercury concentrations measured during July-August sampling at Standish Dam (BW10, 0.74 ng/L) and the Southern Sloughs (> 0.6 ng/L) were the only samples to contain methylmercury concentrations greater than 0.6 ng/L since the RMP began collecting methylmercury data in February 1999. Elevated concentrations at these stations in the summer are consistent with findings from Conaway et al. (2003), which suggested that production of methylmercury is greater in the southern reaches of the Bay during the summer, and that greater production may be associated with conditions of low dissolved oxygen, high DOC, high nutrient concentrations, and low salinity.

Measurement of mercury and methlymercury requires low levels of detection compared to most trace elements, which makes it difficult to obtain acceptably low concentrations in blank samples. As part of the quality assurance/quality control (QA/QC) procedures of the RMP, contaminant concentrations in QA/QC blanks are compared to concentrations measured in individual samples. When blank samples have concentrations comprising more than 30% of the actual concentrations measured in samples collected at RMP stations, samples are qualified with a “B” for blank contamination. In 2001, numerous RMP samples had concentrations of dissolved mercury (Figure 2.12a) and dissolved and total methylmercury (Figure 2.13a and 2.13b) that were less than three-fold greater than concentrations detected in blank samples; therefore, much of the data collected for these parameters were qualified as “B” and not reported.

As in past years, dissolved and total concentrations of selenium were generally higher in the southern reach of the Estuary compared to other segments (Figures 2.14).

The maximum concentrations measured as dissolved (> 4 ng/L) and total (> 5 ng/L) selenium were found at Guadalupe River (BW15) during both seasons. Since RMP monitoring began in 1993, only samples from Guadalupe River (BW15) have exceeded 5 ng/L. Other stations with selenium concentrations greater than 1 ng/L were Standish Dam (BW10) and the Southern Slough stations. High selenium concentrations in the South Bay may be influenced to some extent by weathering of marine shales in the Coast Ranges of the Santa Clara Valley (Andersen, 1998).

Organic Contaminants

Similar to previous years of RMP water monitoring, concentrations of organic contaminants, including polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and numerous pesticides, were highest in the southern reaches of the Bay. Much of the South Bay and Lower South Bay (south of Dumbarton Bridge) lie adjacent to watersheds with extensive regions of urbanization and areas of historic and current agricultural activity. The southern reach has also historically been influenced by municipal wastewater effluent from three treatment plants. Furthermore, many of these organic contaminants are persistent in sediment of the South Bay, which receives limited seasonal hydraulic flushing from rivers and creeks compared to the northern reach of the Estuary. All of these factors may influence the consistently high concentrations of organic contaminants in the South Bay measured by the RMP.

Guadalupe River (BW15) water samples had the highest total concentrations of Σ PAHs (465 ng/L), Σ PCBs (6,500 pg/L), and the organochlorine (OC) pesticides Σ DDT (2,150 pg/L), Σ Chlordane (1,200 pg/L), and dieldrin (150 pg/L) compared to other sites throughout the Bay (Figures 2.18-2.21, 2.25). Concentrations of Σ PAHs and Σ PCBs were the third and fifth highest concentrations, respectively, ever measured by the RMP. These high contaminant concentrations coincided with high TSS measured at Guadalupe River (BW15, 264 mg/L), which was higher than 96% of all samples collected by the RMP since 1993. As discussed previously, Guadalupe River (BW15) is located near the mouth of the Guadalupe River, which receives drainage from urbanized regions of San Jose and historic and current agricultural areas of the Santa Clara Valley. High concentrations of these contaminants have consistently been measured at this site and other areas in the margins of the Lower South Bay (Leatherbarrow et al., 2002).

Maximum dissolved concentrations of Σ PCBs (870 pg/L), and pesticides, including Σ DDT (570 pg/L), hexachlorocyclohexanes (Σ HCHs) (3,500 pg/L), chlorpyrifos (450 pg/L) and diazinon (22,000 pg/L) were measured at the Southern Slough station at San Jose (C-3-0). San Jose (C-3-0) is located near the mouth of the Coyote Creek, which is the largest watershed in the Santa Clara Valley and is comprised of both urban regions in San Jose and large expanses of agricultural land in the upper watershed. San Jose (C-3-0) is also located downstream of the confluence of Coyote Creek and Artesian Slough, which receives wastewater effluent from the Santa Clara/San Jose Water Pollution Control Plant. High concentrations of organic contaminants at San Jose (C-3-0) may reflect combined influences from the watershed and the treatment plant, as well as the tidal resuspension of persistent contaminants from the sediment of the South Bay.

In the Northern Estuary, seaward gradients of decreasing concentrations from Sacramento River (BG20) were observed for the pesticides Σ Chlordane, Σ DDT,

diazinon, chlopyrifos, and dieldrin (Figures 2.20-2.22, 2.24-2.25). The Sacramento and San Joaquin Rivers drain large agricultural regions of the Central Valley that have had widespread historic and current applications of pesticides.

2.5.3. Contaminant Trends in Water

An objective of the RMP is to determine patterns and trends in contaminant concentrations and distribution in the San Francisco Estuary. Based on simple linear regression using average concentrations, there were apparent decreases in dissolved concentrations of several contaminants (Figures 2.27-2.43). For example, there were apparent decreases in average dissolved selenium concentrations in all segments from 1993 to 2001 (Figure 2.33a) and dissolved copper concentrations in the Rivers, Northern Estuary, and the South Bay from 1989 to 2001 (Figure 2.29a). Furthermore, there were apparent decreases in dissolved concentrations of cadmium, nickel, and silver in the South Bay (Figures 2.28a, 2.32a, and 2.34a, respectively). For organic contaminants, apparent decreasing trends were observed for dissolved concentrations of Σ PCBs, Σ Chlordanes, chlorpyrifos, and Σ HCHs in the South Bay from 1993 to 2001 (Figures 2.37a, 2.38a, 2.39a, and 2.43a, respectively). In the Rivers, average dissolved Σ HCH concentrations decreased from 1993 to 2001 (Figure 2.43a), while dissolved concentrations of Σ PCBs, chlorpyrifos, and Σ HCHs decreased from 1993 to 2001 in the Central Bay (Figures 2.37a, 2.39a, and 2.43a, respectively).

Although these preliminary analyses do not account for the effect of causal factors, such as water quality and hydrologic variability, recent studies have focused on determining long-term trends of selected contaminants with available data from the pilot regional monitoring studies (Flegal et al. 1991) and the RMP. Steding et al. (2000) used isotopic compositions of lead to determine that no significant decrease in dissolved lead concentrations has occurred in San Francisco Bay waters since 1989. This was attributed to benthic remobilization from sediments in the Bay and lengthy retention times of lead in the watersheds adjacent to the Bay and in the Central Valley. Squire et al. (2002) used time series models to provide further evidence of relatively constant concentrations of lead in the Estuary, and also showed that dissolved silver concentrations have significantly decreased in the South Bay over the last decade.

A key finding from Squire et al. (2002) is that decreasing dissolved silver concentrations may have been attributed to reductions in contaminant loading from wastewater treatment plants and a concomitant decline in concentrations in surficial sediment in the South Bay. Furthermore, RMP monitoring has been conducted during mostly wetter-than-average years that followed a lengthy dry period from the mid-1980s to early 1990s. This may have caused progressively decreasing concentrations of dissolved contaminants throughout the period of monitoring from the diluting effects of increased freshwater flow to the Estuary. Over the next two years (2003/ 2004), the RMP will conduct in-depth analyses of trends on all contaminants of interest as part of a ‘ten-year synthesis’ of RMP data. These analyses may provide definitive information on trends of contamination and help determine whether overall water quality has improved in the San Francisco Estuary.

2.5.4. Comparison to Water Quality Guidelines

Numerous water samples collected in 2001 had contaminant concentrations that exceeded water quality guidelines established to protect aquatic and human health in the Bay. For example, 14 of 26 samples (54%) collected during both the July-August cruise had total mercury concentrations exceeding the Basin Plan freshwater guideline (0.012 µg/L) and five (26%) samples were above the saltwater guideline (0.025 µg/L) (Table 2.2). Other trace elements that were measured above guidelines were copper (in 3 samples), nickel (1 sample), and selenium (2 samples). In samples collected in the summer cruise for organic analyses, fifteen of 18 samples (83%) had Σ PCB concentrations exceeding the CTR criterion of 170 pg/L (Table 2.3). Of particular interest is that all samples collected from Guadalupe River (BW15) had contaminant concentrations exceeding criteria for mercury, selenium, Σ PCBs, Σ Chlordane, dieldrin, p,p'-DDE, Σ PAHs, benz(a)anthracene, and benzo(b)fluoranthene.

2.5.5. Effects of Contaminants on Aquatic Organisms

The RMP evaluated ambient water toxicity in samples collected from five stations in February and six stations in August in the northern and southern reaches of the Bay in 2001 (Figure 2.26). Toxicity tests indicated that there was significant toxicity to *A. bahia* at the Southern Slough stations, San Jose (C-3-0) and Sunnyvale (C-1-3), in February (77.5% survival) and again at San Jose (C-3-0) in August (86% survival).

Episodic toxicity monitoring in 2001 was conducted on water samples collected immediately after storms or surface runoff events from the Napa River and Pacheco Slough, both of which drain watersheds in the northern region of the Estuary. Long-term monitoring was also conducted at Mallard Island, which lies just downstream from the confluence of the Sacramento and San Joaquin River. Toxicity was observed in one out of 12 samples (8.3%) from Pacheco Slough and three out of 56 samples (5.4%) from Mallard Island. None of the 14 samples from Napa River were significantly toxic to *A. bahia*. Similarly, none of the 25 samples collected from Napa River and Pacheco Slough were toxic to *M. beryllina*. Compared to results from previous years, this was a reduction in toxicity of Bay water to *A. bahia* that Ogle et al. (2002) attributed to the reduced use of organophosphate pesticides in the watersheds of the Estuary. At each of the stations, none of the samples had concentrations of diazinon and/or chlorpyrifos that exceeded the LC50 for those contaminants. While some toxicity may have been caused by the presence of organophosphate pesticides, the cause of toxicity in the four samples was not determined in the study. This suggests that other factors, such as unidentified contaminants or synergistic effects of several contaminants, may contribute to toxicity to organisms in the San Francisco Estuary.

References

Abu-Saba, K.E. and L. Tang. 2000. Watershed management of mercury in the San Francisco Bay Estuary: Total Maximum Daily Load. Report to U.S. EPA. California Regional Water Quality Control Board, San Francisco Bay Region. Oakland, CA.

Andersen, D.W. 1998. Natural levels of nickel, selenium, and arsenic in the southern San Francisco Bay area. Prepared for the City of San Jose, Environmental Services Department. San Jose, CA.

Bernstein, B. and J. O'Connor. 1997. Five-year program review: Regional Monitoring Program for Trace Substances in the San Francisco Estuary. Prepared for the San Francisco Estuary Institute. Richmond,CA. http://www.sfei.org/rmp/reports/five_year_review.html/five_year_review.pdf

Conaway, C.H., S. Squire, R.P. Mason, and A.R Flegal. 2003. Mercury speciation in the San Francisco Bay Estuary. Marine Chemistry. 80. pp. 199-225.

David, N., D. Bell, and J. Gold. 2001. Field sampling manual for the Regional Monitoring Program for Trace Substances. Prepared for the San Francisco Estuary Institute. Richmond, CA.

Flegal, A.R., G.A. Gill, G.J. Smith, S. Sanudo-Wilhelmy, G. Scelfo, and L.D. Anderson. 1991. Trace element cycles in the San Francisco Bay Estuary: Results from a preliminary study in 1989-1990. Final Report to the State Water Resources Control Board. Institute of Marine Sciences, University of California Santa Cruz, Santa Cruz, CA.

Grosso, C. and S. Lowe. 2001. Deterministic to probabilistic: changing the RMP's sampling design. RMP Winter Newsletter. 6 (2). pp. 1-5.

Harrison, C. 2002. Delta hydrology. IEP Newsletter. Interagency Ecological Program for the San Francisco Estuary. 15 (2). pp. 4-7.

Kuwabara, J.S., C.C.Y. Chang, J.E. Cloern, T.L. Fries, J.A. Davis, and S.N. Luoma. 1989. Trace metal associations in the water column of South San Francisco Bay, California. Estuarine Coastal and Shelf Science. 26. pp. 307-325.

Ogle, R. S., A. Gunther, P. Salop, D. Bell, J. Cotsifas, and J. Gold. 2002. RMP Episodic Ambient Water Toxicity Study. 2000-2001 Annual Report. Ambient water toxicity in the San Francisco Estuary. Prepared for the San Francisco Estuary Regional Monitoring Program. http://www.sfei.org/rmp/reports/episodic_toxicity/Epis_tox_2000.pdf

Leatherbarrow, J.E., R. Hoenicke, and L.J. McKee. 2002. Results of the Estuary Interface Pilot Study, 1996-1999. RMP Technical Report. SFEI Contribution 50. San Francisco Estuary Institute. Oakland, CA.

Menconi, M. and C. Cox. 1994. Hazard assessment of the insecticide diazinon to aquatic organisms in the Sacramento-San Joaquin river system. Administrative Report 94-2. California Department of Fish and Game. Rancho Cordova, CA.

SFBRWQCB. 1995. San Francisco Bay Basin, Region 2: Water Quality Control Plan. California Regional Water Quality Control Board, San Francisco Bay Region. Oakland, CA.

Sanudo-Wilhelmy, S.A., I. Rivera-Duarte, and A.R. Flegal. 1996. Distribution of colloidal trace metals in the San Francisco Bay estuary. Geochimica et Cosmochimica Acta. 60 (24). pp. 4933-4944.

Schoellhamer, D.H. 1996. Time series of trace element concentrations calculated from time series of suspended solids concentrations and RMP water samples. RMP Contribution #16. The San Francisco Estuary Regional Monitoring Program for Trace Substances. United States Geological Survey. Sacramento, CA.

Squire, S., G. Scelfo, J. Revenaugh, and A.R. Flegal. 2002. Decadal trends of silver and lead contamination in San Francisco Bay surface waters. Environmental Science and Technology. 36. pp. 2379-2386.

Steding. D., C.E. Dunlap, and A.R. Flegal. 2000. New isotopic evidence for chronic lead contamination in the San Francisco Bay estuary system: implications for the persistence of past industrial lead emissions in the biosphere. Proc. Natl. Acad. Sci. USA. 97 (21).

Thomas, M.A., C. H. Conaway, D.J. Steding, M. Marvin-DiPasquale, K.E. Abu-Saba, and A. R. Flegal. 2002. Mercury contamination from historic mining in water and sediment, Guadalupe River and San Francisco Bay, California. Geochemistry: Exploration, Environment, Analysis. 2. pp. 1-7.

USEPA. 1992. Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants. 57 Federal Register 60848. December 22, 1992. United States Environmental Protection Agency.

USEPA. 1994. Short-term methods for estimating the chronic toxicity of effluents and receiving waters to marine and estuarine organisms. Second Edition. EPA-600-4-91-003. United States Environmental Protection Agency. Environmental Monitoring Systems Laboratory. Cincinnati, OH.

USEPA. 1999. National recommended water quality criteria – correction. Office of Water. EPA 822-Z-99-001. United States Environmental Protection Agency.

USEPA. 2000. Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Rule. Federal Register Vol. 65, No. 97, May 18, 2000. United States Environmental Protection Agency.

Table 2.1. Water quality criteria and guidelines. California Toxics Rule (CTR) water quality criteria (USEPA, 2000) are listed except where noted. Dissolved trace element criteria are listed (except for mercury and selenium). Total trace element criteria (not shown) were calculated using procedures specified in the CTR. Criteria for organic compounds are listed on a total basis (dissolved + particulate). Bold and italicized concentrations are hardness dependent criteria and were calculated using a hardness concentration of 100 mg/L. Units are µg/L for all concentrations.

Parameter	Aquatic Life				Human Health	
	Fresh Water		Salt Water		Fresh Water	Salt & Fresh Water
	1-hour	4-day	1-hour	4-day	Water & Organisms	Organisms only
Ag	***3.4***	.	1.9	.	.	.
As	340	150	69	36	.	.
Cd	***4.3***	***2.2***	42	9.3	.	.
Cr VI	16	11	1100	50	.	.
Cu	***13***	***9***	4.8	3.1	1300	.
Hg [A]	2.4	0.012	2.1	0.025	0.05	0.051
Ni	***470***	***52***	74	8	610	4600
Pb	***65***	***2.5***	210	8.1	.	.
Se [B]		5	290	71	.	.
Zn	***120***	***120***	90	81	.	.
Alpha-HCH	.	.	.	.	0.0039	0.013
Acenaphthene	.	.	.	.	1200	2700
Anthracene	.	.	.	.	9600	110000
Benz(a)anthracene	.	.	.	.	0.0044	0.049
Benzo(a)pyrene	.	.	.	.	0.0044	0.049
Benzo(b)fluoranthene	.	.	.	.	0.0044	0.049
Benzo(k)fluoranthene	.	.	.	.	0.0044	0.049
Beta-HCH	.	.	.	.	0.014	0.046
Chlordane	2.4	0.0043	0.09	0.004	0.00057	0.00059
Chlorpyrifos [C]	0.083	0.041	0.011	0.0056	.	.
Chrysene	.	.	.	.	0.0044	0.049
Diazinon [D]	.	.	.	.	.	0.04
Dibenz(a,h)anthracene	.	.	.	.	0.0044	0.049
Dieldrin	0.24	0.056	0.71	0.0019	0.00014	0.00014
Endrin	0.086	0.036	0.037	0.0023	0.76	0.81
Fluoranthene	.	.	.	.	300	370
Fluorene	.	.	.	.	1300	14000
Gamma-HCH	0.095	0.08	0.16	.	0.019	0.063
Heptachlor	0.52	0.0038	0.053	0.0036	0.00021	0.00021
Heptachlor Epoxide	0.52	0.0038	0.053	0.0036	0.0001	0.00011
Hexachlorobenzene	.	.	.	.	0.00075	0.00077
Indeno(1,2,3-cd)pyrene	.	.	.	.	0.0044	0.049
p,p'-DDD	.	.	.	.	0.00083	0.00084
p,p'-DDE	.	.	.	.	0.00059	0.00059
p,p'-DDT	1.1	0.001	0.13	0.001	0.00059	0.00059
Pyrene	.	.	.	.	960	11000
Mirex [C]	.	0.001	.	0.001	.	.
Total PAHs [E]	.	.	.	.	0.031	0.031
Total PCBs	.	0.014	.	0.03	0.00017	0.00017

[A] Mercury guidelines are from the Basin Plan (SFBRWQB, 1995) and are for total recoverable mercury.
[B] Selenium values are region-specific criteria as outlined in the National Toxics Rule (USEPA, 1992) and are for total recoverable selenium.
[C] Chlorpyrifos and mirex criteria from USEPA (1999).
[D] Diazinon guideline is from California Department of Fish and Game (Menconi and Fox, 1994).
[E] Total PAH guideline is from the Basin Plan, 1995 (SFBRWQB, 1995).

Table 2.2. Summary of trace elements that were above water quality criteria (WQC) and guidelines for RMP water samples in 2000. Total concentrations of cadmium, copper, nickel, lead, silver and zinc were not available at time of report production due to analytical problems in the laboratory. WQC used in this comparison are from the U.S. EPA California Toxics Rule (2000) 304(a) Criteria. Only compounds that were above criteria or guidelines are listed. ● = above guideline, NS = not sampled. - = data pending QA review. Units are in µg/L.

			Dissolved Trace Elements				Total Trace Elements			
			Copper 3.1		Nickel 5		Mercury 0.012		Selenium 5	
	Code	Station	February	July	February	July	February	July	February	July
Estuary	BW10	Standish Dam					-	●		
Interface	BW15	Guadalupe River					-	●	●	●
Southern	C-1-3	Sunnyvale					-	●		
Sloughs	C-3-0	San Jose					-			
South Bay	BA10	Coyote Creek		●			-	●		
	BA20	South Bay		●			-	●		
	BA30	Dumbarton Bridge					-			
	BA40	Redwood Creek					-	●		
	BB15	San Bruno Shoal					-			
	BB30	Oyster Point					-			
	BB70	Alameda					-	●		
Central Bay	BC10	Yerba Buena Island					-			
	BC20	Golden Gate	NS		NS		NS	●	NS	
	BC30	Richardson Bay					-			
	BC41	Point Isabel					-			
	BC60	Red Rock					-			
Northern Estuary	BD15	Petaluma River		●	●		-	●		
	BD20	San Pablo Bay					-	●		
	BD30	Pinole Point					-			
	BD40	Davis Point					-	●		
	BD50	Napa River					-			
	BF10	Pacheco Creek					-	●		
	BF20	Grizzly Bay					-	●		
	BF40	Honker Bay					-	●		
Rivers	BG20	Sacramento River					-			
	BG30	San Joaquin River					-			

Table 2.3. Summary of trace organic contaminants that were above water quality guidelines.
Only compounds that were above criteria or guidelines are listed. ● = above guideline, NS = not sampled. Units are µg/L.

			Σ PCBs	Dieldrin	Σ Chlordanes	p,p'-DDE	Total PAHs	Benz(a)anthracene	Benzo(b)fluoranthene
			0.00017	**0.00014**	**0.00059**	**0.00059**	**0.031**	**0.049**	**0.049**
	Code	**Station**							
Estuary	BW10	Standish Dam	●	●		●	●		
Interface	BW15	Guadalupe River	●	●	●	●	●	●	●
Southern Sloughs	C-3-0	San Jose	●			●	●		
South Bay	BA10	Coyote Creek	●				●		
	BA30	Dumbarton Bridge	●				●		
	BA40	Redwood Creek	●						
	BB70	Alameda	●						
Central Bay	BC10	Yerba Buena Island	●						
	BC20	Golden Gate							
	BC60	Red Rock	●						
Northern Estuary	BD15	Petaluma River	●				●		
	BD20	San Pablo Bay	●				●		
	BD30	Pinole Point	●						
	BD40	Davis Point	●				●		
	BD50	Napa River	●				●		
	BF20	Grizzly Bay	●				●		
Rivers	BG20	Sacramento River							
	BG30	San Joaquin River							

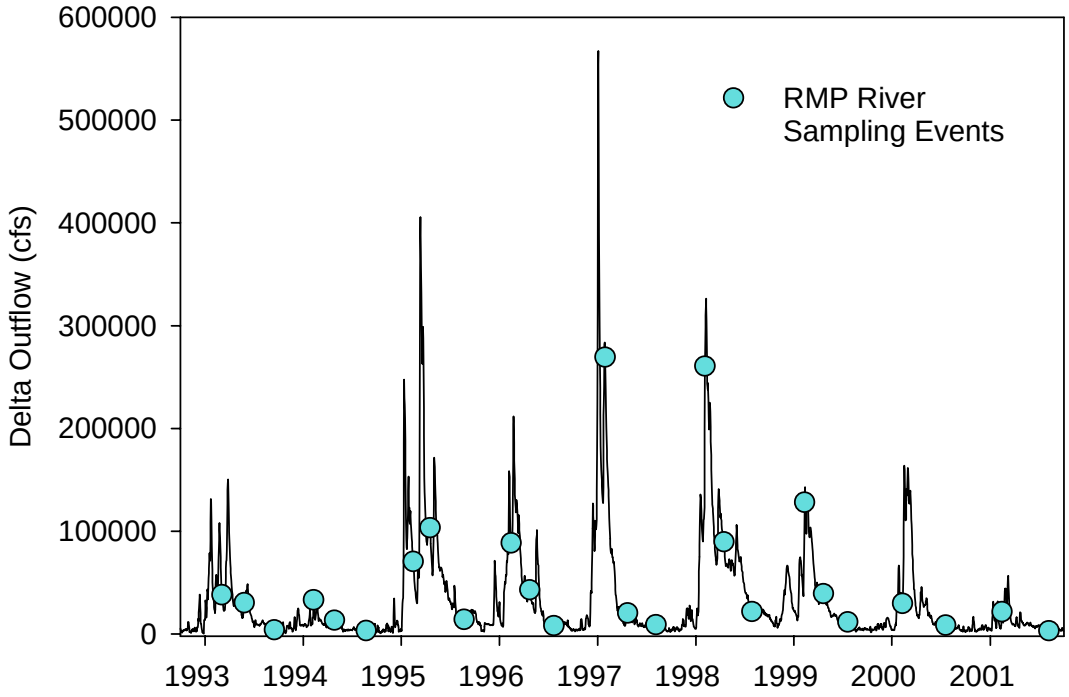

Figure 2.1. RMP sampling events and Delta Outflow from 1993 to 2001. Data points represent seasonal RMP sampling events at Sacramento River (BG20) and San Joaquin River (BG30).

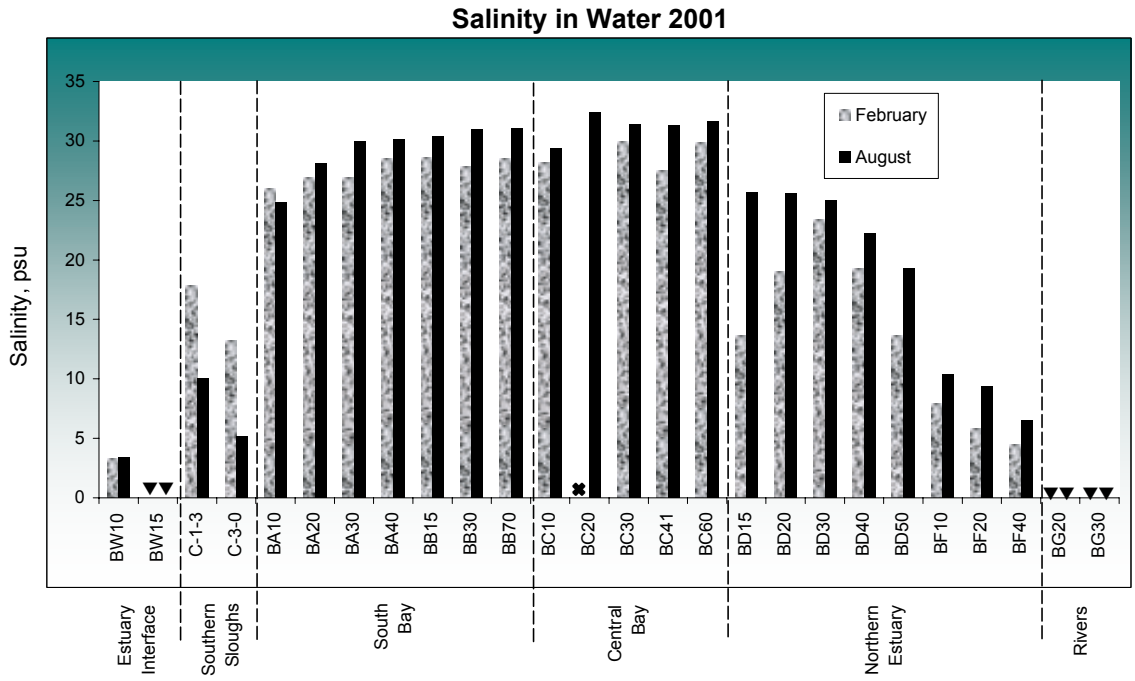

Figure 2.2. Salinity in practical salinity units (psu) at each RMP water station in February and August of 2001. ▼ = indicates salinity was < 2 psu. ✖ = not sampled. Salinities ranged from below detection to 32 psu. The highest salinity was measured at Golden Gate (BC20) in August.

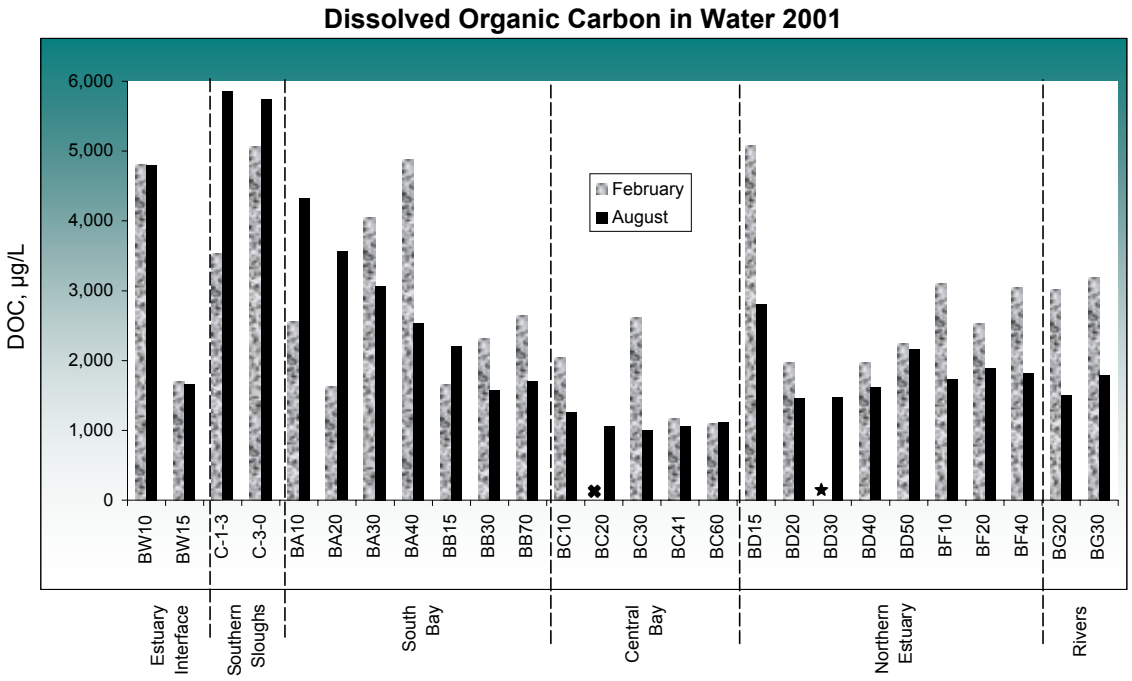

Figure 2.3. Dissolved organic carbon (DOC) in micrograms per liter (µg/L) at each RMP water station in February and August of 2001. ★ = not analyzed. ✖ = not sampled. DOC ranged from 1,000 µg/L to 5,900 µg/L. The highest concentration was measured at Sunnyvale (C-1-3) in August and the lowest was measured at Red Rock (BC60) in February. Average concentrations were highest in the Southern Sloughs (5,800 µg/L) and lowest in the Central Bay (1,100 µg/L), both in August.

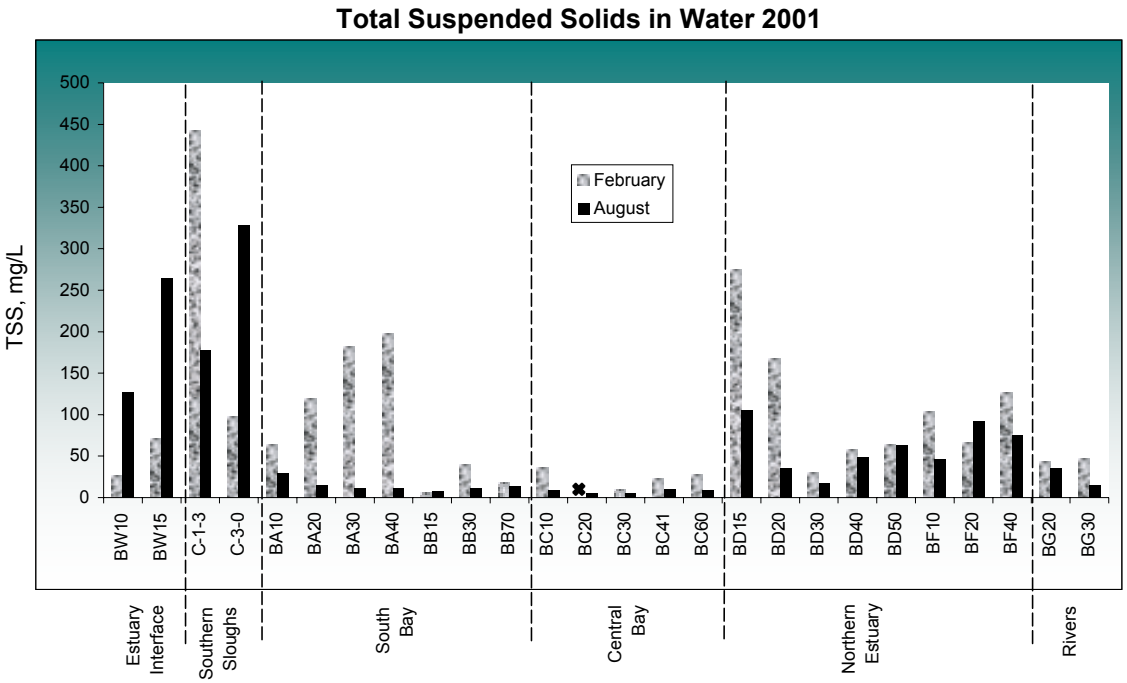

Figure 2.4. Total suspended solids (TSS) in milligrams per liter (mg/L) at each RMP water station in February and August of 2001. ✖ = not sampled. TSS concentrations ranged from 5.2 to 440 mg/L. The highest concentration was measured at Sunnyvale (C-1-3) in February and the lowest was measured at Richardson Bay (BC30) in August. Average concentrations were highest in the Southern Sloughs (270 mg/L) in February and lowest in the Central Bay (7.6 mg/L) in August.

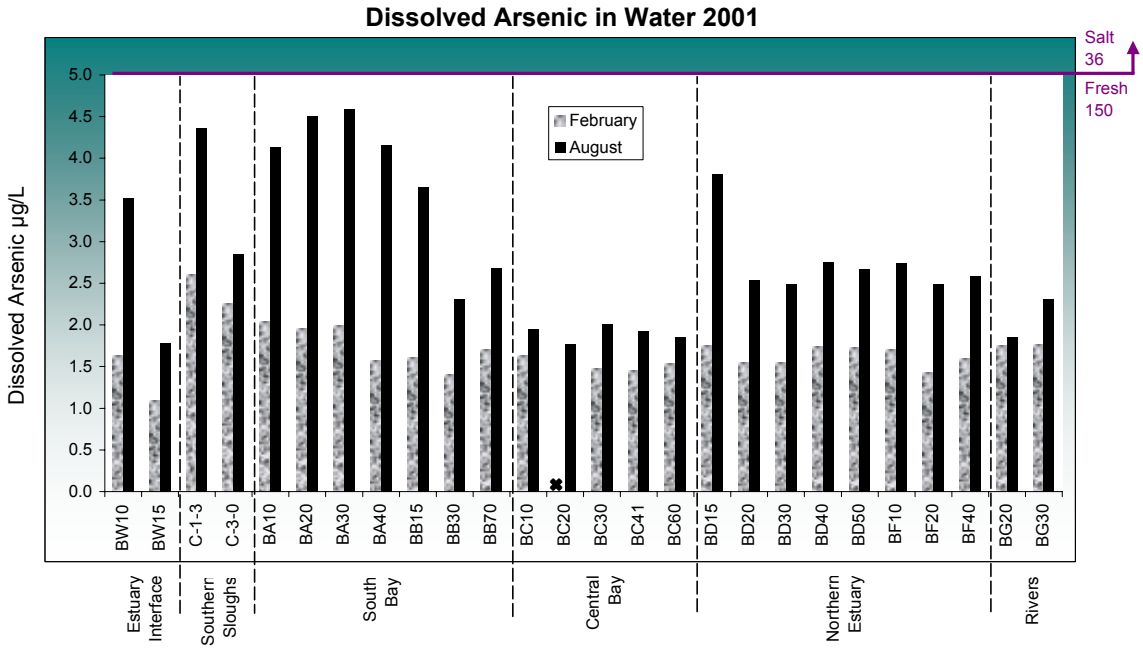

Figure 2.5a. Dissolved arsenic (As) in µg/L (ppb) at each RMP water station in February and August of 2001. ✖ = not sampled. Concentrations ranged from 1.1 to 4.6 µg/L. The highest concentration was measured at Dumbarton Bridge (BA30) in August and the lowest was measured at Guadalupe River (BW15) in February. Average concentrations were highest in the South Bay (3.7 µg/L) in August and lowest in the Estuary Interface (1.4 µg/L) in February. All samples were below the 4-day average WQC for dissolved arsenic (saltwater 36 ppb, freshwater 150 ppb).

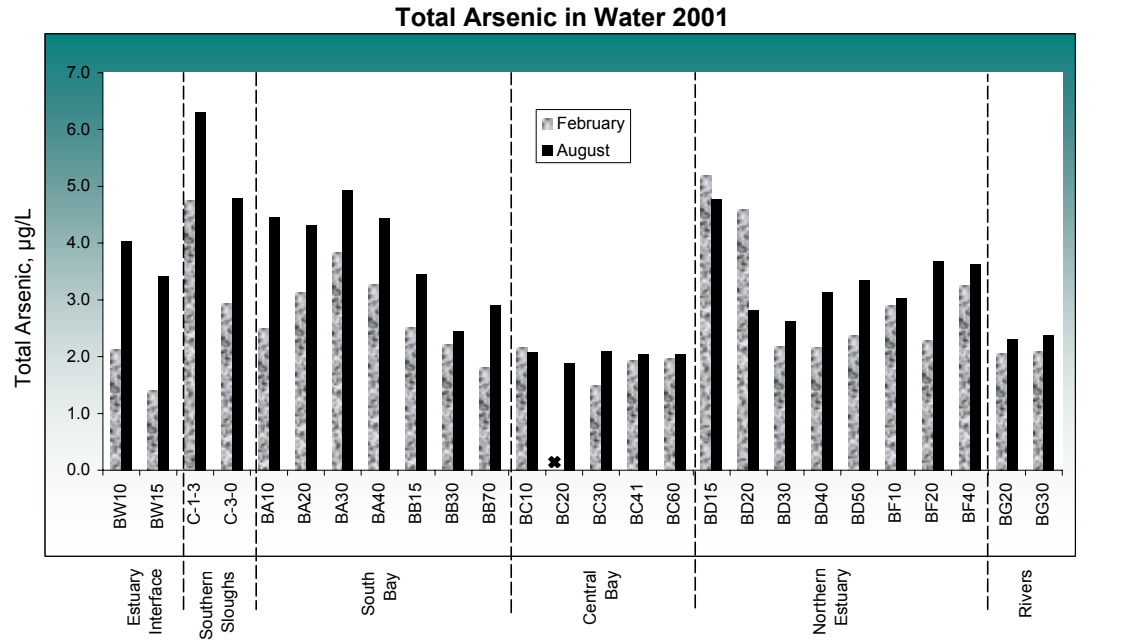

Figure 2.5b. Total arsenic (As) in µg/L (ppb) at each RMP water station in February and August of 2001. ✖ = not sampled. Concentrations ranged from 1.4 to 6.3 µg/L. The highest concentration was measured at Sunnyvale (C-1-3) in August and the lowest was measured at Guadalupe River (BW15) in February. Average concentrations were highest in the Southern Sloughs (5.6 µg/L) in August and lowest in the Estuary Interface (1.8 µg/L) in February.

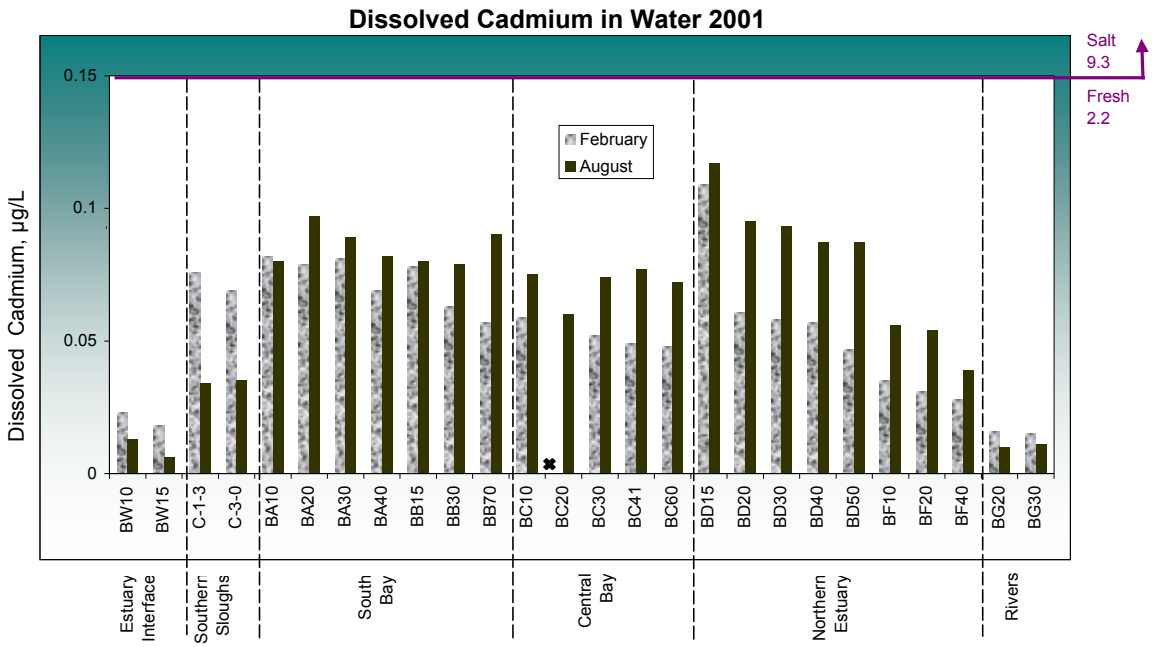

Figure 2.6a. Dissolved cadmium (Cd) in µg/L (ppb) at each RMP water station in February and August of 2001. ✖ = not sampled. Concentrations ranged from 0.006 to 0.12 µg/L. The highest concentration was measured at Petaluma River (BD15) and the lowest was measured at Guadalupe River (BW15), both in August. Average concentrations were highest in the South Bay (0.085 µg/L) and lowest in the Estuary Interface (0.0095 µg/L), both in August. All samples were below the 4-day average WQC for dissolved cadmium (saltwater 9.3 ppb, freshwater 2.2 ppb).

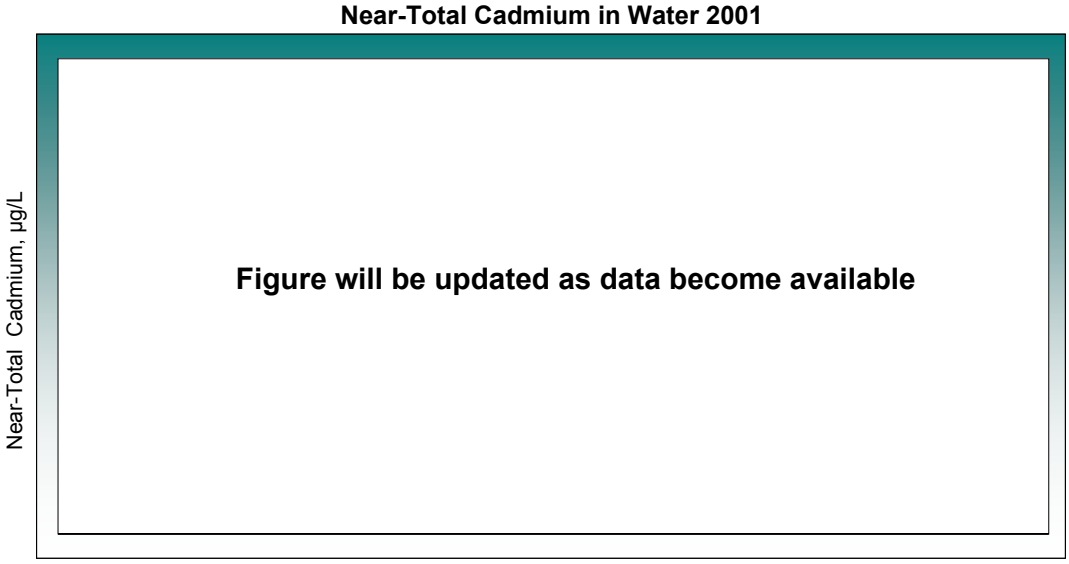

Figure 2.6b. Near-total cadmium (Cd) in µg/L (ppb) at each RMP water station in February and August of 2001. Data for 2001 were not available at time of report production.

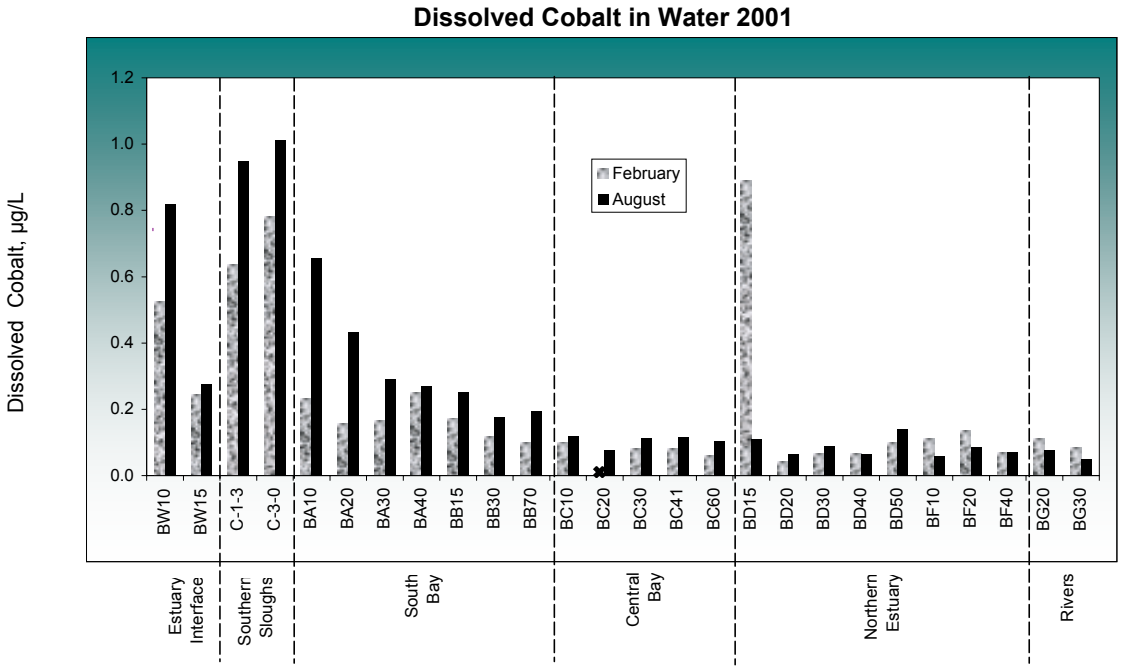

Figure 2.7a. Dissolved cobalt (Co) in µg/L (ppb) at each RMP water station in February and August of 2001. ✖ = not sampled. Concentrations ranged from 0.042 to 1.0 µg/L. The highest concentration was measured at San Jose (C-3-0) in August and the lowest was measured at San Pablo Bay (BD20) in February. Average concentrations were highest in the Southern Sloughs (0.98 µg/L) and lowest in the Rivers (0.063 µg/L), both in August.

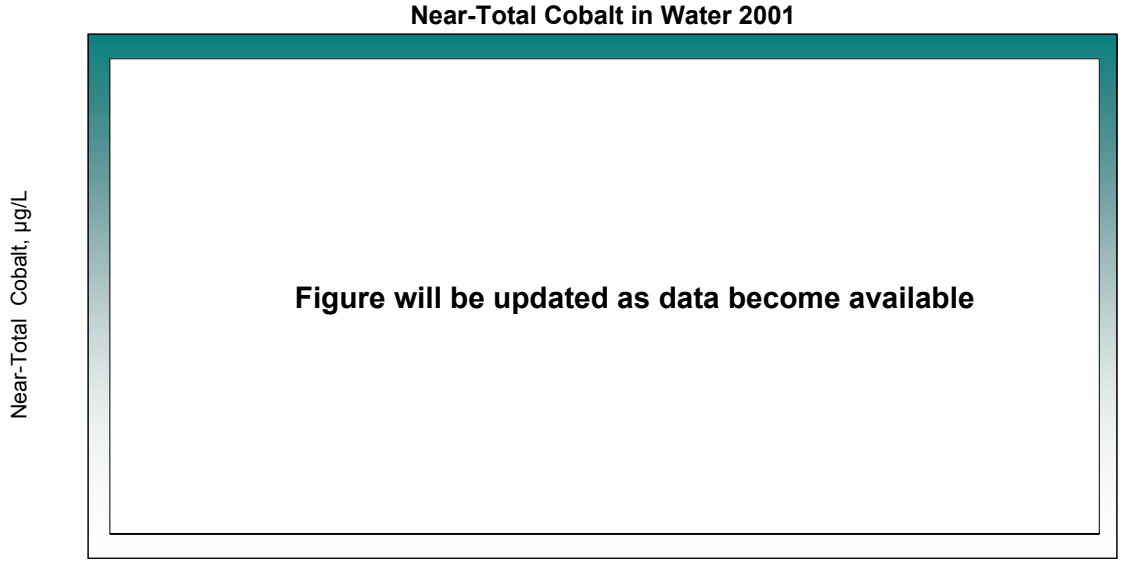

Figure 2.7b. Near-total cobalt (Co) in µg/L (ppb) at each RMP water station in February and August of 2001. Data for 2001 were not available at time of report production.

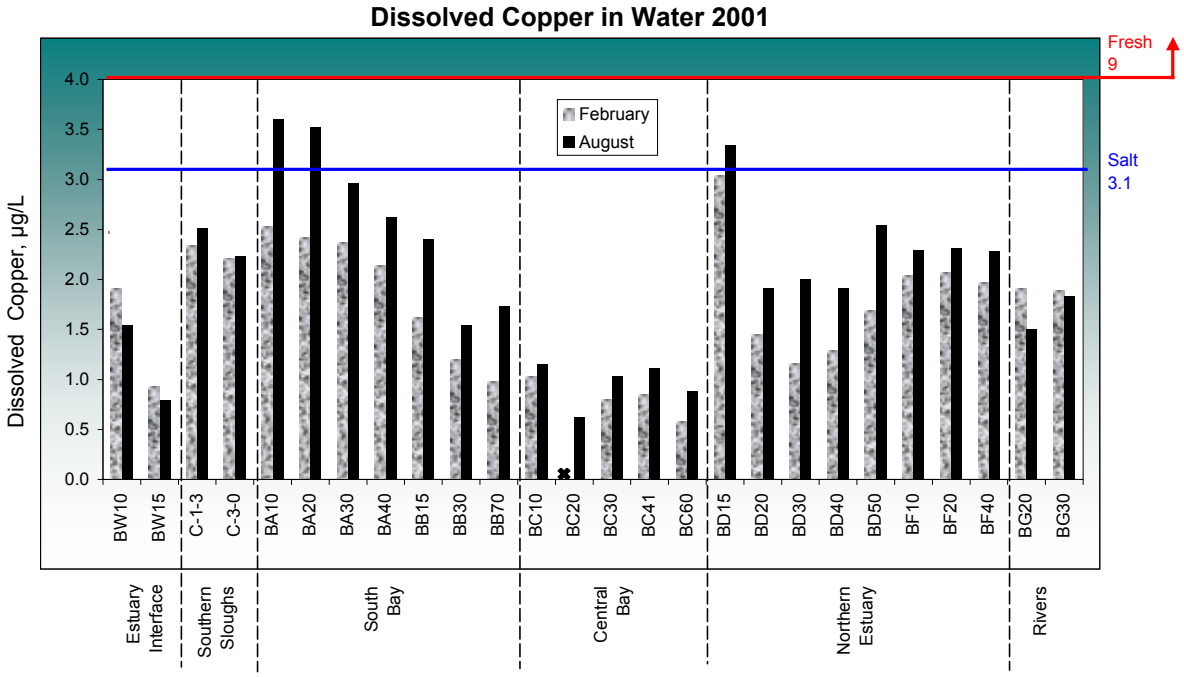

Figure 2.8a. Dissolved copper (Cu) in µg/L (ppb) at each RMP water station in February and August of 2001. ✖ = not sampled. Concentrations ranged from 0.58 to 3.6 µg/L. The highest concentration was measured at Coyote Creek (BA10) in August and the lowest was measured at Red Rock (BC60) in February. Average concentrations were highest in the South Bay (2.6 µg/L) in August and lowest in the Central Bay (0.81 µg/L) in February. Three samples were above the 4-day average WQC for dissolved copper in saltwater (saltwater 3.1 ppb, freshwater 9 ppb).

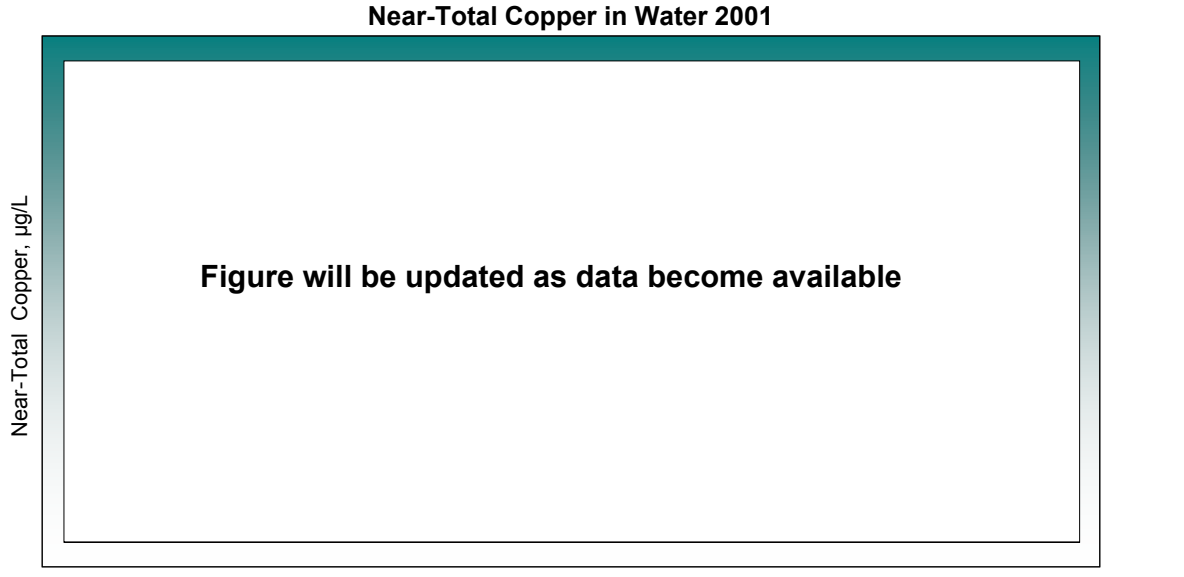

Figure 2.8b. Near-total copper (Cu) in µg/L (ppb) at each RMP water station in February and August of 2001. Data for 2001 were not available at time of report production.

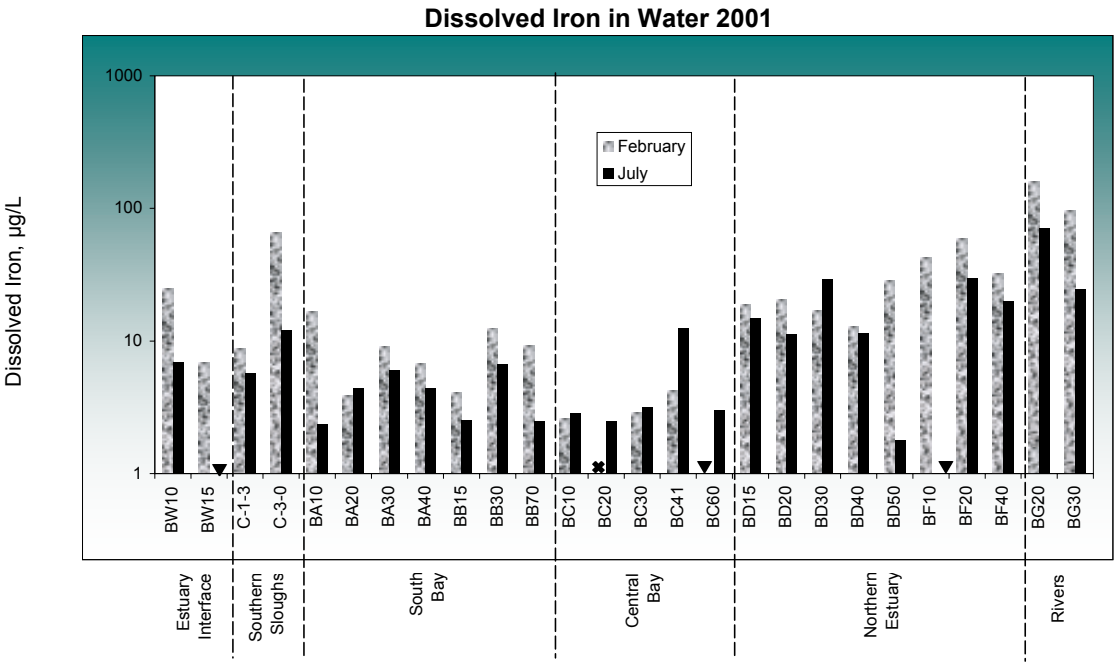

Figure 2.9a. Dissolved iron (Fe) in µg/L (ppb) at each RMP water station in February and August of 2001. ▼ = not detected. ✖ = not sampled. Concentrations ranged from below detection to 160 µg/L. The highest concentration was measured at Sacramento River (BG20) in February. Average concentrations were highest in the Rivers (128 µg/L) and lowest in the Central Bay (2.6 µg/L), both in February.

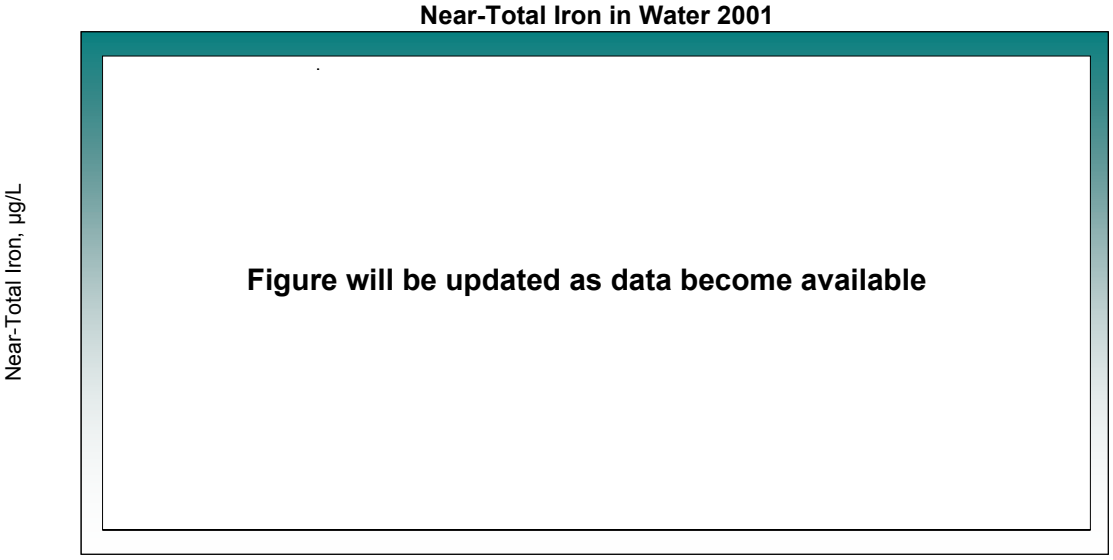

Figure 2.9b. Near-total iron (Fe) in µg/L (ppb) at each RMP water station in February and August of 2001. Data for 2001 were not available at time of report production.

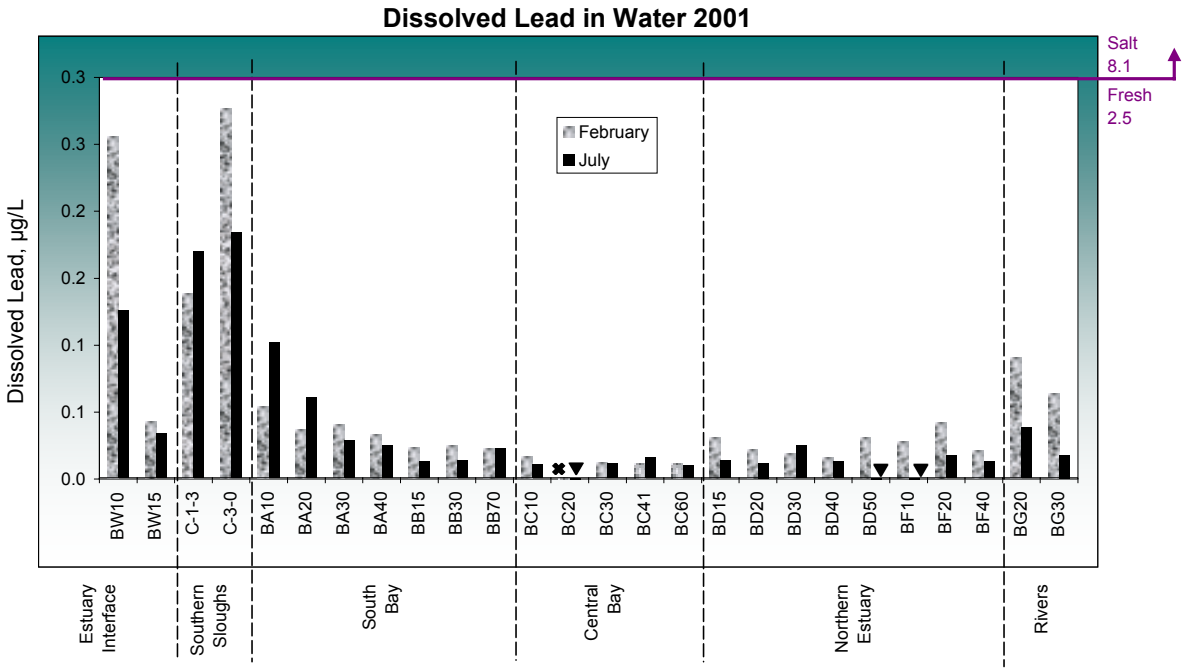

Figure 2.10a. Dissolved lead (Pb) in µg/L (ppb) at each RMP water station in February and August of 2001. ▼ = not detected. ✖ = not sampled. Concentrations ranged from below detection to 0.28 µg/L. The highest concentration was measured at San Jose (C-3-0) in February. Average concentrations were highest in the Southern Sloughs (0.21 µg/L) in February and lowest in the Central Bay (0.010 µg/L) in August. All samples were below the 4-day average WQC for dissolved lead (saltwater 8.1 ppb, freshwater 2.5 ppb).

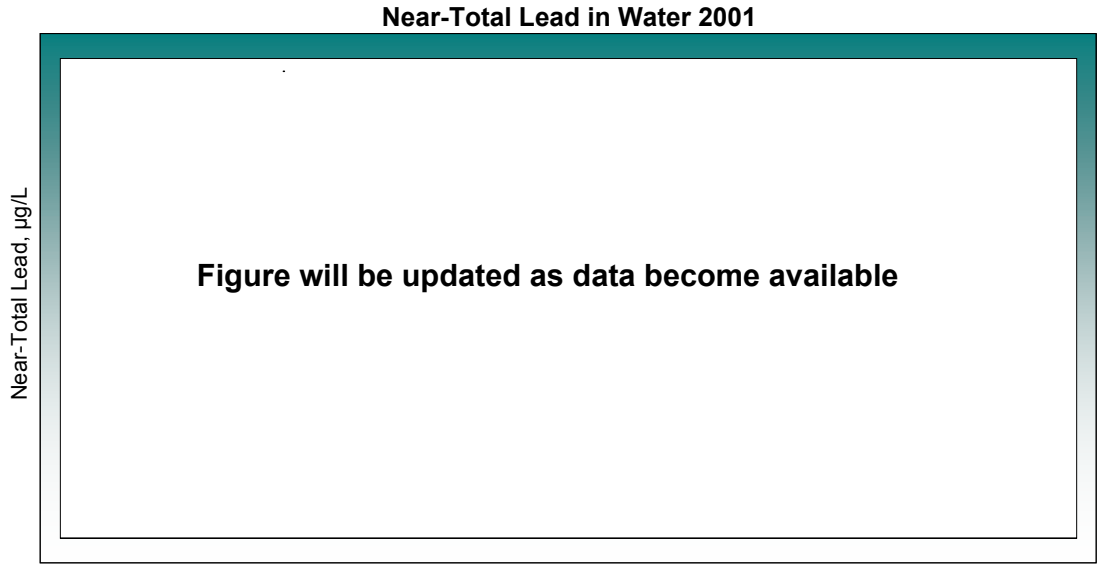

Figure 2.10b. Near-total lead (Pb) in µg/L (ppb) at each RMP water station in February and August of 2001. Data for 2001 were not available at time of report production.

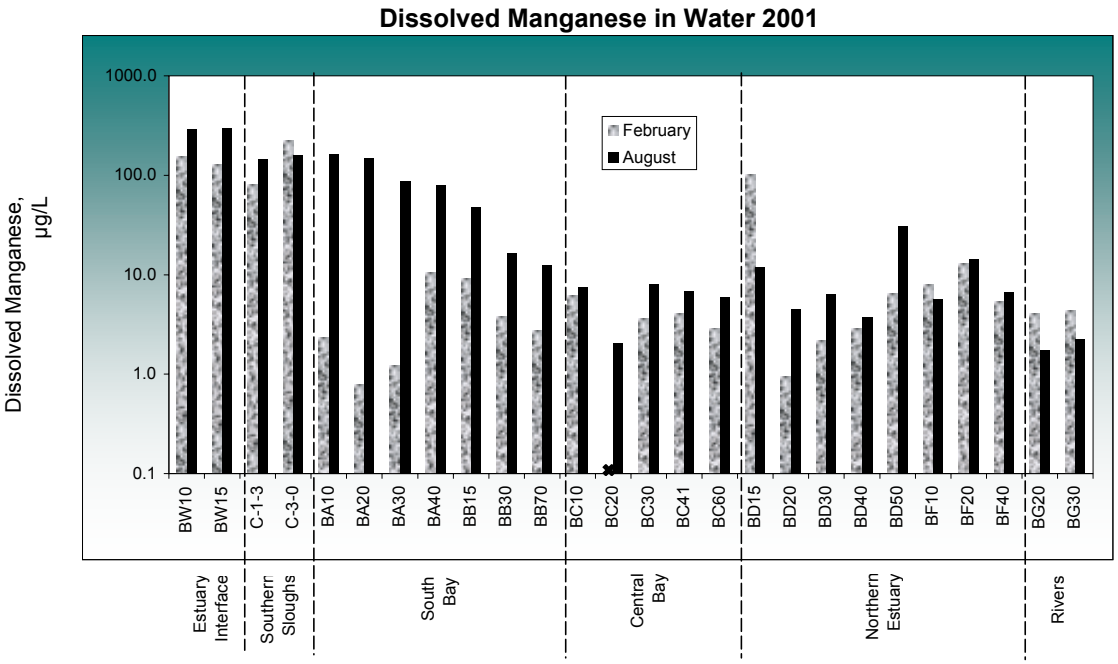

Figure 2.11a. Dissolved manganese (Mn) in µg/L (ppb) at each RMP water station in February and August of 2001. Note logarithmic scale. ✖ = not sampled. Concentrations ranged from 0.79 to 300 µg/L. The highest concentration was measured at Guadalupe River (BW15) in August and the lowest was measured at South Bay (BA20) in February. Average concentrations were highest in the Estuary Interface (290 µg/L) and lowest in the Rivers (2.0 µg/L), both in August.

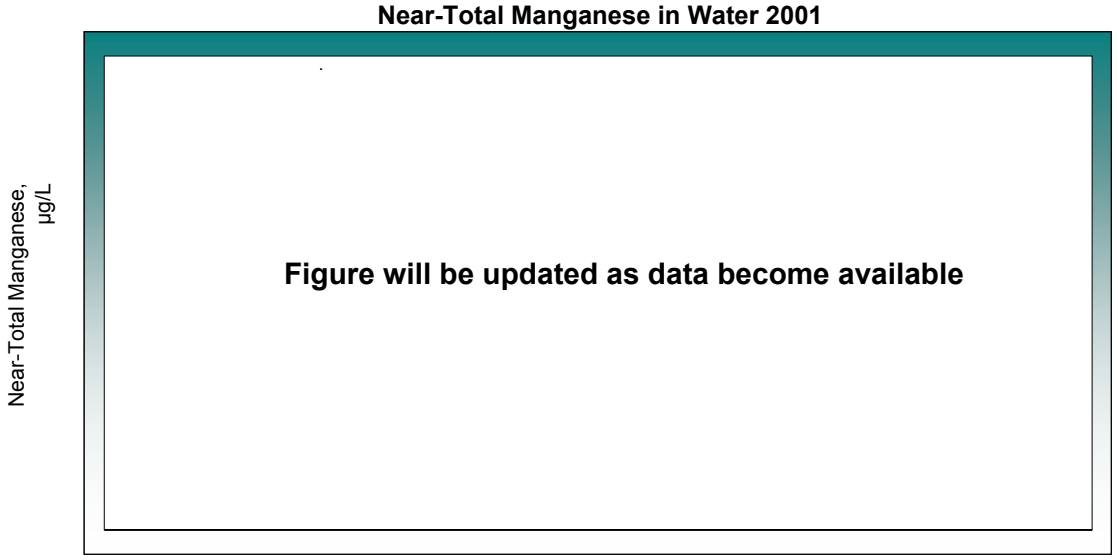

Figure 2.11b. Near-total manganese (Mn) in µg/L (ppb) at each RMP water station in February and August of 2001. Data for 2001 were not available at time of report production.

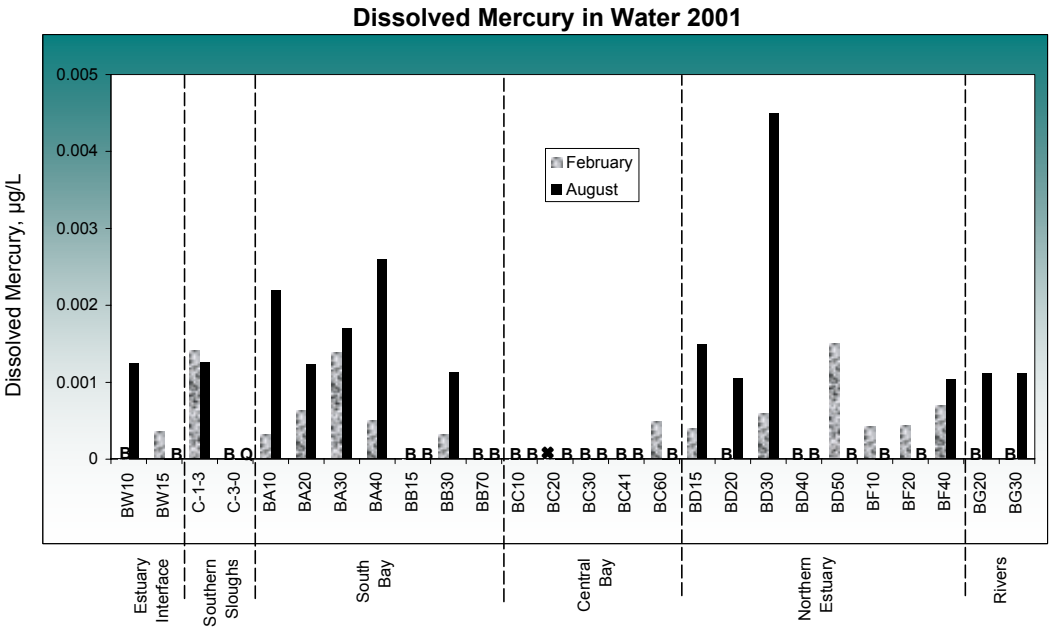

Figure 2.12a. Dissolved mercury (Hg) in µg/L (ppb) at each RMP water station in February and August of 2001. B = blank contamination; concentrations in blank samples comprised > 30% of concentrations in 22 samples collected in 2001. **Q** = outside QA limits. ✖ = not sampled. Concentrations ranged from 0.00032 to 0.0045 µg/L. The highest concentration was measured at Pinole Point (BD30) in August and the lowest was measured at Coyote Creek (BA10) and Oyster Point (BB30) in February. Average concentrations were highest in the Northern Estuary (0.0020 µg/L) in August and lowest in the Estuary Interface (0.00036 µg/L) in February. Mercury is compared to guidelines only on the basis of total mercury.

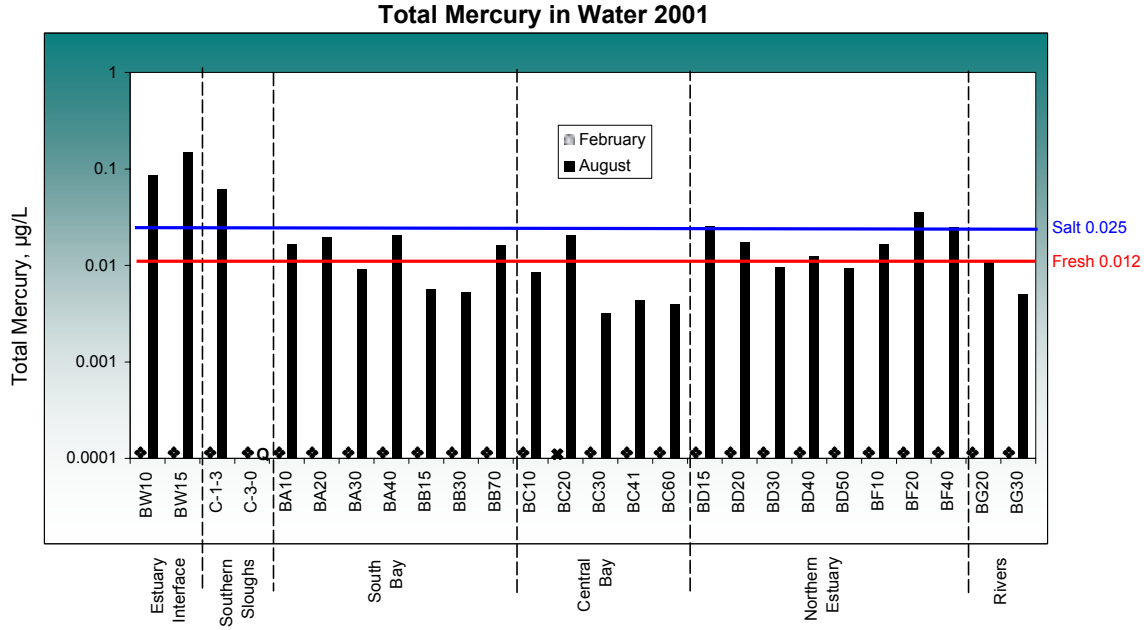

Figure 2.12b. Total mercury (Hg) in µg/L (ppb) at each RMP water station in February and August of 2001. Note logarithmic scale. Q = outside QA limits. ✖ = not sampled. ◆ = data not reported due to pending QA review. Concentrations ranged from 0.0032 to 0.15 µg/L. The highest concentration was measured at Guadalupe River (BW15) and the lowest was measured at Richardson Bay (BC30). Average concentrations were highest in the Estuary Interface (0.12 µg/L) and lowest in the Rivers (0.0079 µg/L). Fourteen samples were above the Basin Plan guideline for total-recoverable mercury in freshwater (saltwater 0.025 ppb, freshwater 0.012 ppb).

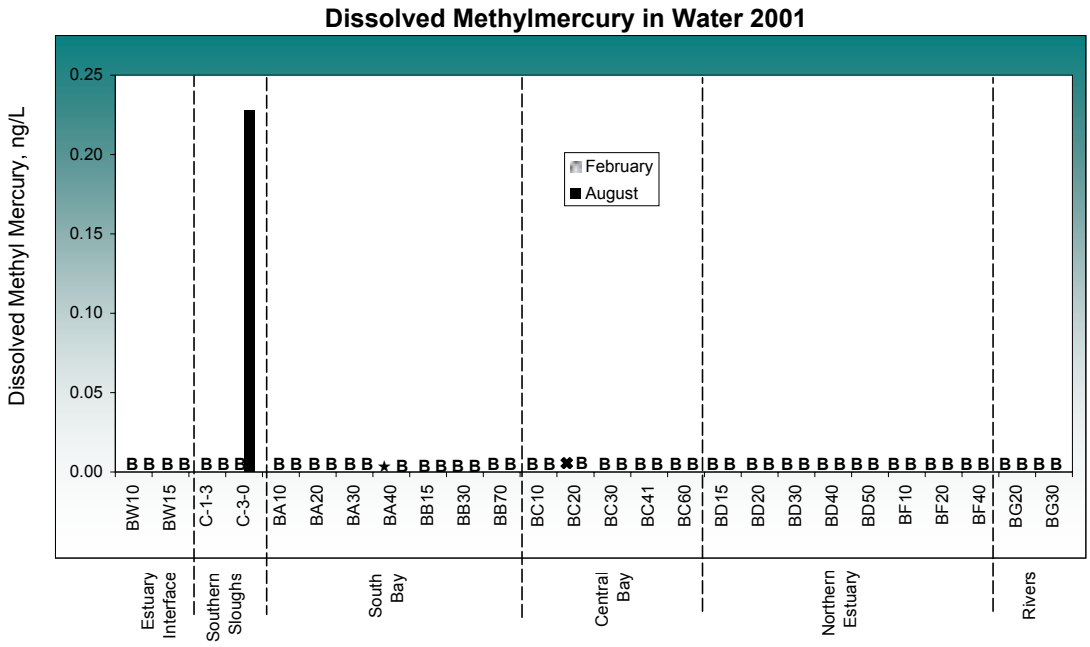

Figure 2.13a. Dissolved methylmercury (MeHg) in ng/L (ppt) at each RMP water station in February and August of 2001. B = blank contamination; concentrations in blank samples comprised > 30% of concentrations in 49 samples collected in 2001.. ★ = not analyzed. ✖ = not sampled. A concentration of 0.23 ng/L was measured at San Jose (C-3-0) in August.

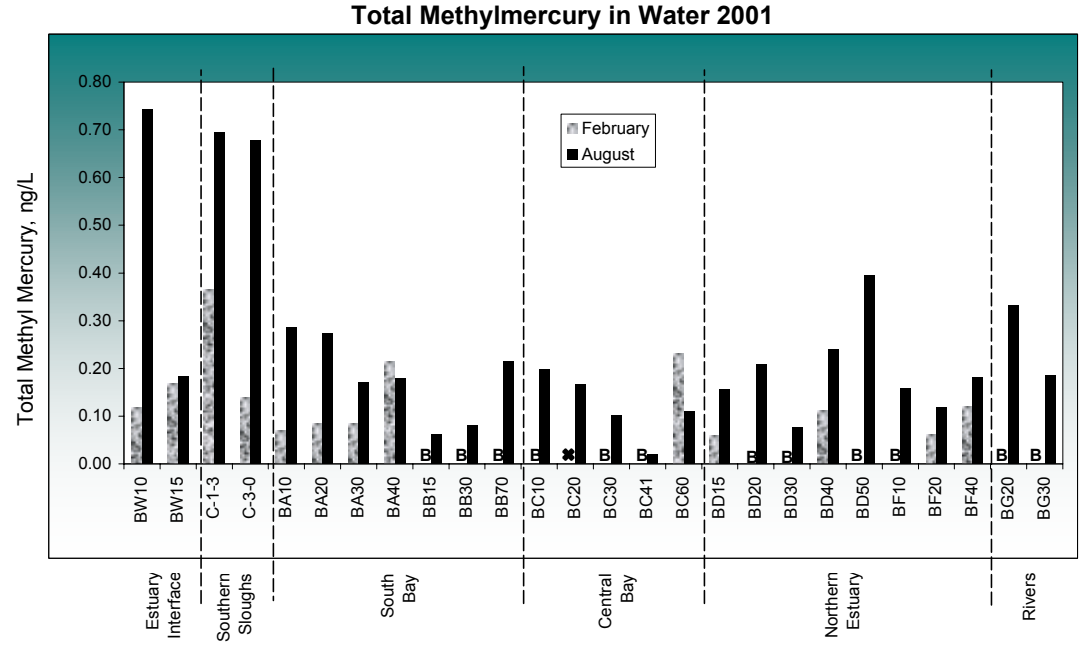

Figure 2.13b. Total methylmercury (MeHg) in ng/L (ppt) at each RMP water station in February and August of 2001. B = blank contamination; concentrations in blank samples comprised > 30% of concentrations in 12 samples collected in 2001.. ✖ = not sampled. Concentrations ranged from 0.02 to 0.74 ng/L. The highest concentration was measured at Standish Dam (BW10) and the lowest was measured at Point Isabel (BD41), both in August. Average concentrations were highest in the Southern Sloughs (0.69 ng/L) in August and lowest in the Northern Estuary (0.089 ng/L) in February.

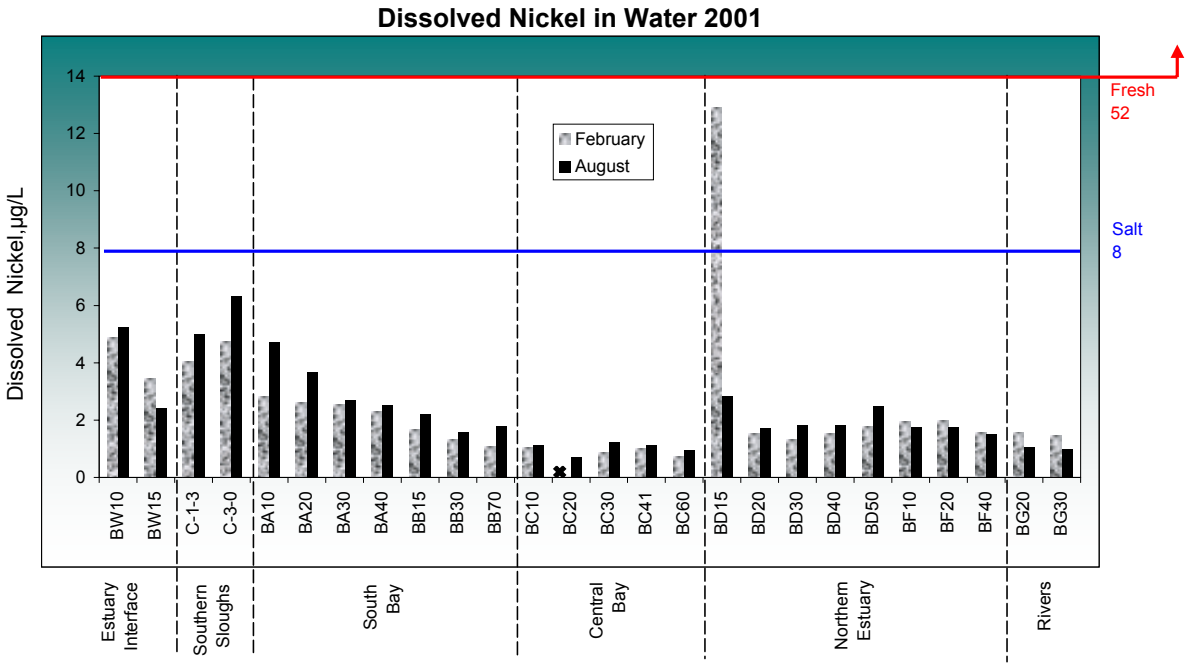

Figure 2.14a. Dissolved nickel (Ni) in µg/L (ppb) at each RMP water station in February and August of 2001. ✖ = not sampled. Concentrations ranged from 0.70 to 12.9 µg/L. The highest concentration was measured at Petaluma River (BD15) in February and the lowest was measured at Golden Gate (BC20) in August. Average concentrations were highest in the South Bay (5.7 µg/L) in August and lowest in the Rivers (0.91 µg/L) in February. One sample at Petaluma River was above the 4-day average WQC for dissolved nickel in saltwater (saltwater 8 ppb, freshwater 52 ppb).

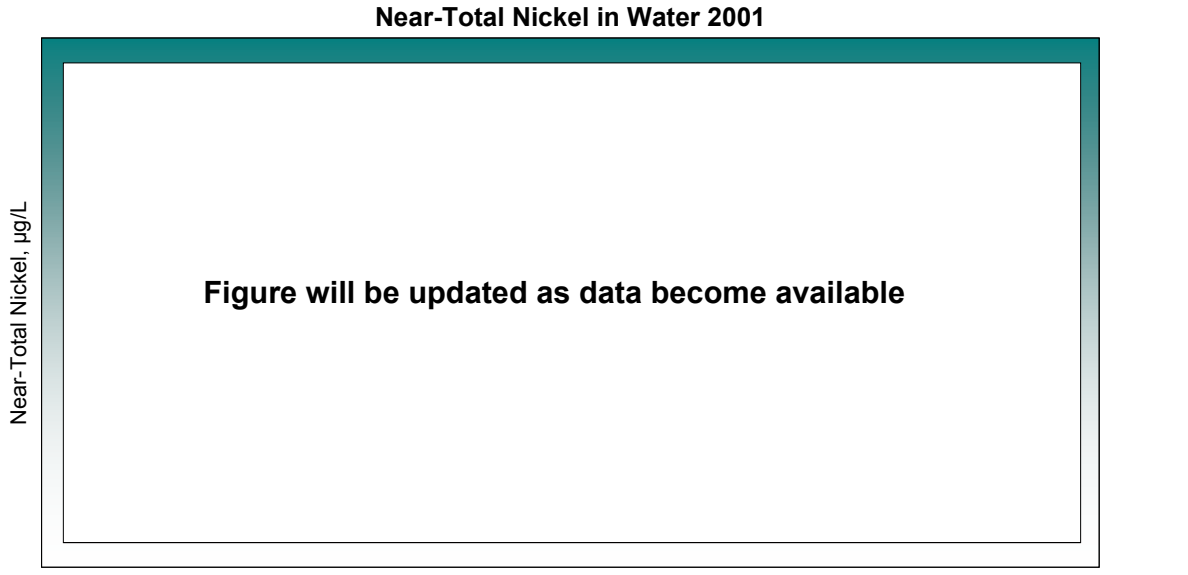

Figure 2.14b. Near-total nickel (Ni) in µg/L (ppb) at each RMP water station in February and August of 2001. Data for 2001 were not available at time of report production.

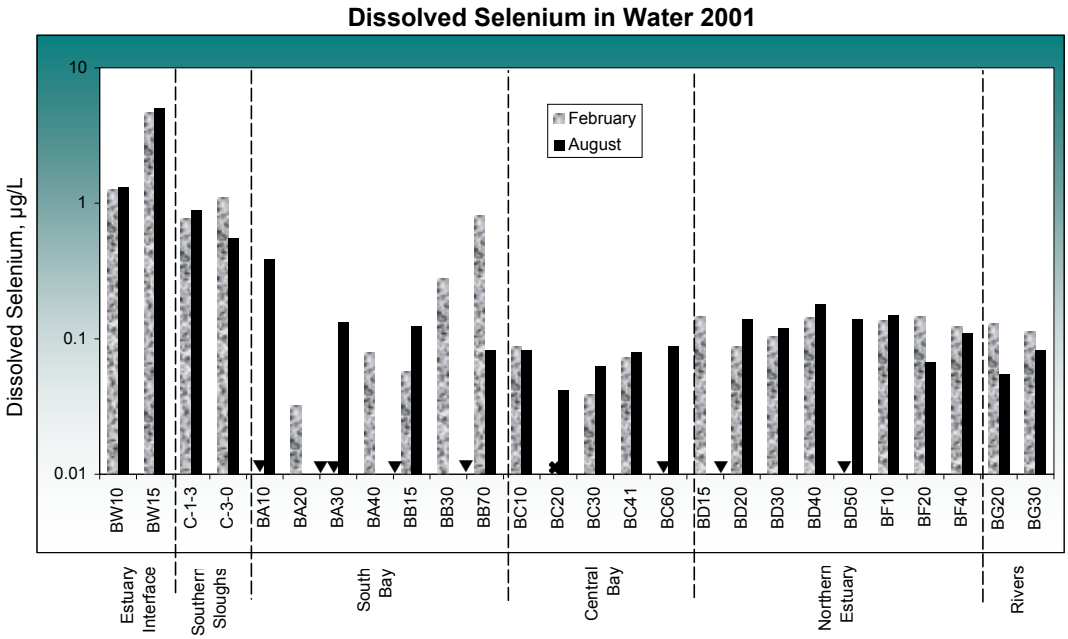

Figure 2.15a. Dissolved selenium (Se) in µg/L (ppb) at each RMP water station in February and August of 2001. Note logarithmic scale. ▼ = not detected. ✖ = not sampled. Concentrations ranged from below detection to 5.0 µg/L. The highest concentration was measured at Guadalupe River (BW15) in August. Average concentrations were highest in the Estuary Interface (3.2 µg/L) in August and lowest in the Central Bay (0.05 µg/L) in February. Selenium is compared to guidelines only on the basis of total selenium.

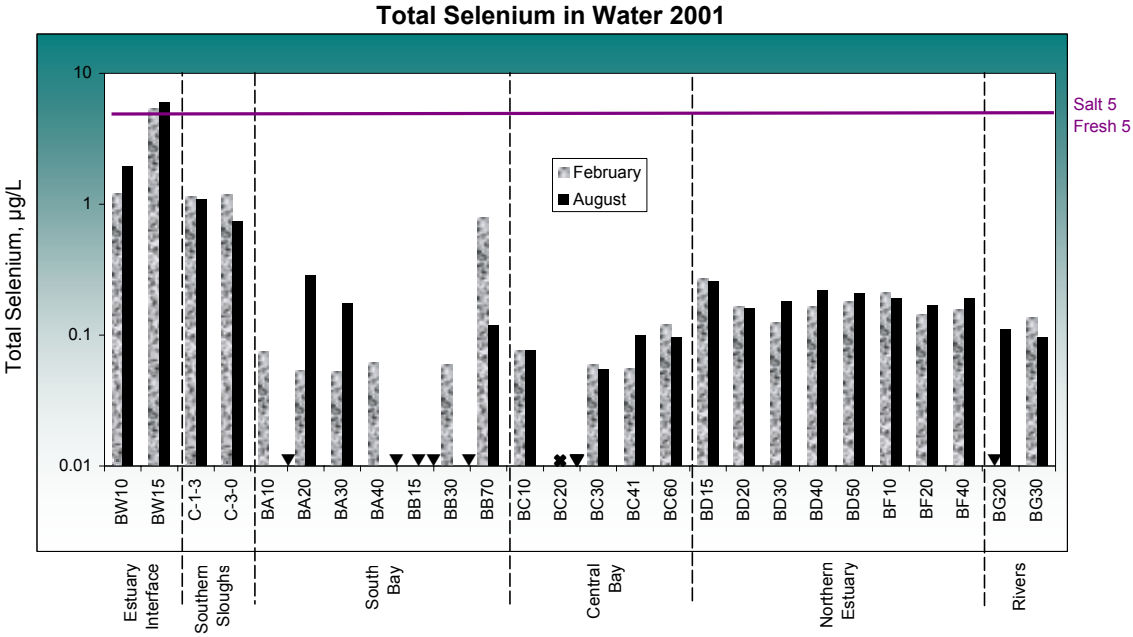

Figure 2.15b. Total selenium (Se) in µg/L (ppb) at each RMP water station in February and August of 2001. Note logarithmic scale. ▼ = not detected. ✖ = not sampled. Concentrations ranged from below detection to 6.1 µg/L. The highest concentration was measured at Guadalupe River (BW15) in August. Average concentrations were highest in the Estuary Interface (4.0 µg/L) and lowest in the Central Bay (0.068 µg/L), both in August. Two samples from Guadalupe River (BW15) were above the 4-day average WQC for total selenium (5.0 µg/L).

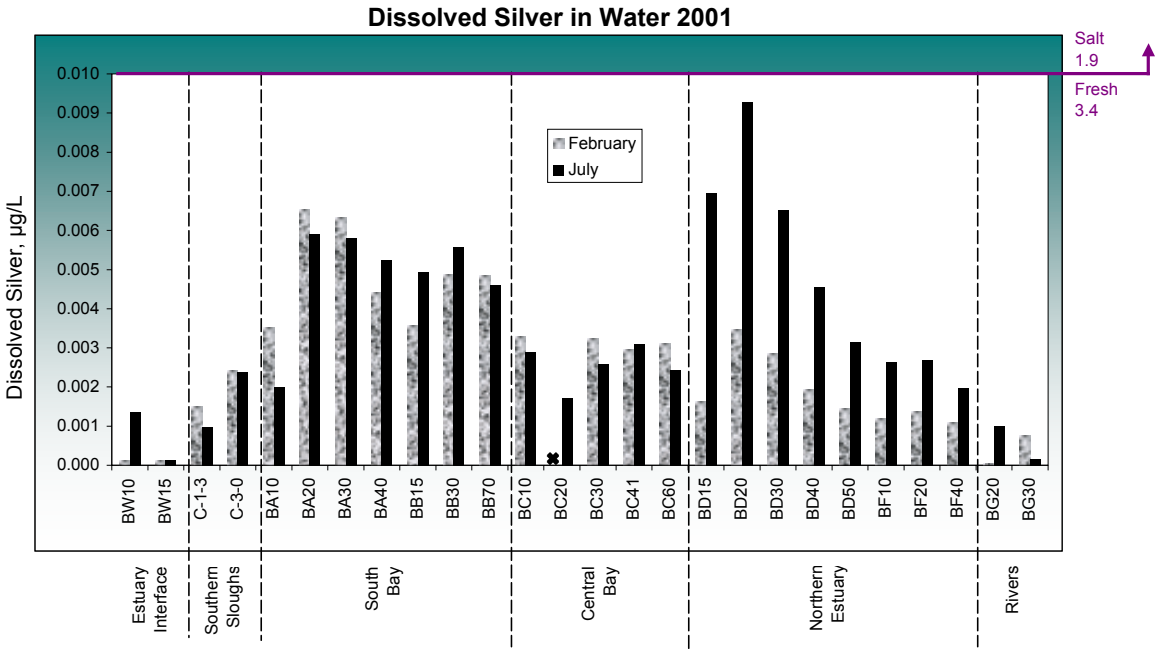

Figure 2.16a. Dissolved silver (Ag) in µg/L (ppb) at each RMP water station in February and August of 2001. ✖ = not sampled. Concentrations ranged from 0.00004 to 0.0093 µg/L. The highest concentration was measured at San Pablo Bay (BD20) in August and the lowest was measured at Sacramento River (BG20) in February. Average concentrations were highest in the South Bay (0.0049 µg/L) in August and lowest in the Estuary Interface (0.0001 µg/L) in February. All samples were below the 1-hour average WQC for dissolved silver (saltwater 1.9 ppb, freshwater 3.4 ppb-hardness dependent).

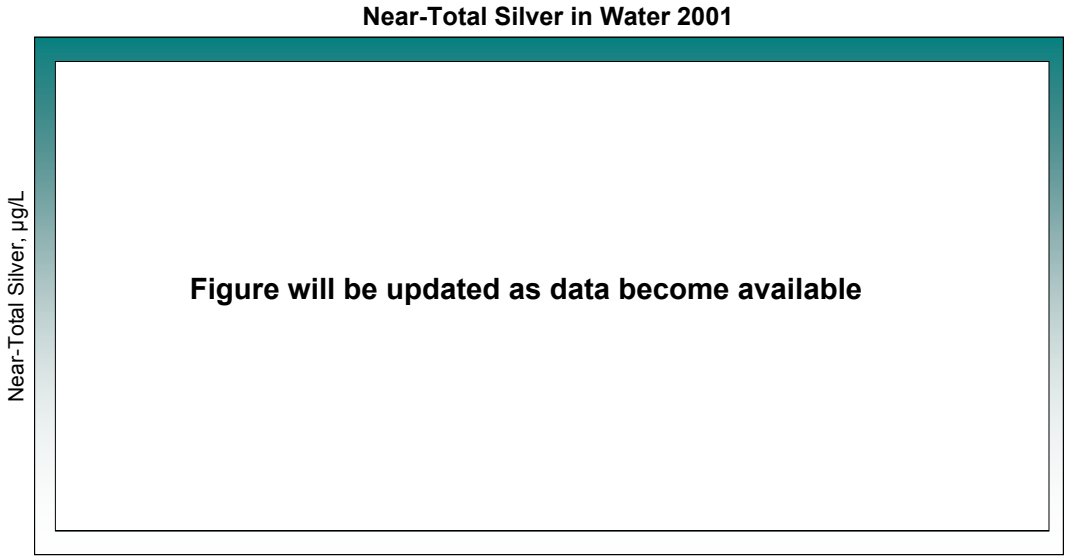

Figure 2.16b. Total silver (Ag) in µg/L (ppb) at each RMP water station in February and August of 2001. Data for 2001 were not available at time of report production.

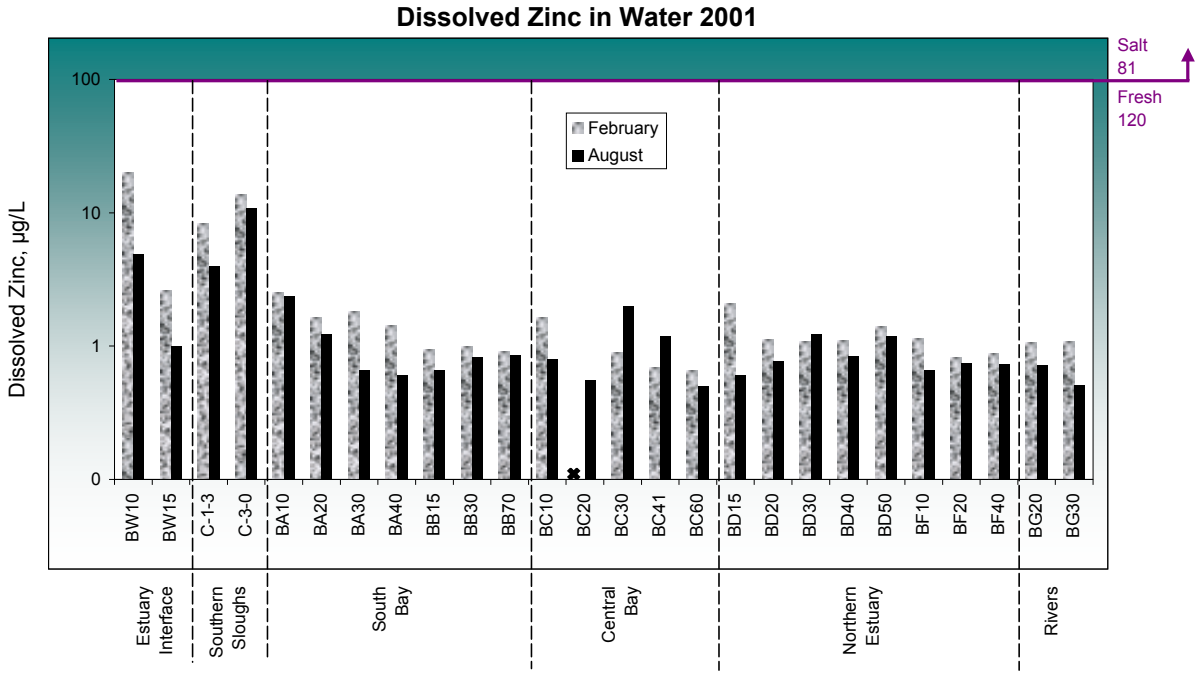

Figure 2.17a. Dissolved zinc (Zn) in µg/L (ppb) at each RMP water station in February and August of 2001. Note logarithmic scale. ✖ = not sampled. Concentrations ranged from 0.50 to 20 µg/L. The highest concentration was measured at Standish Dam (BW10) in February and the lowest was measured at Red Rock (BC60) in August. Average concentrations were highest in the Southern Sloughs (11 µg/L) in February and lowest in the Estuary Interface (0.62 µg/L) in August. All samples were below the 4-day average WQC for dissolved zinc (saltwater 81 ppb, freshwater 120 ppb).

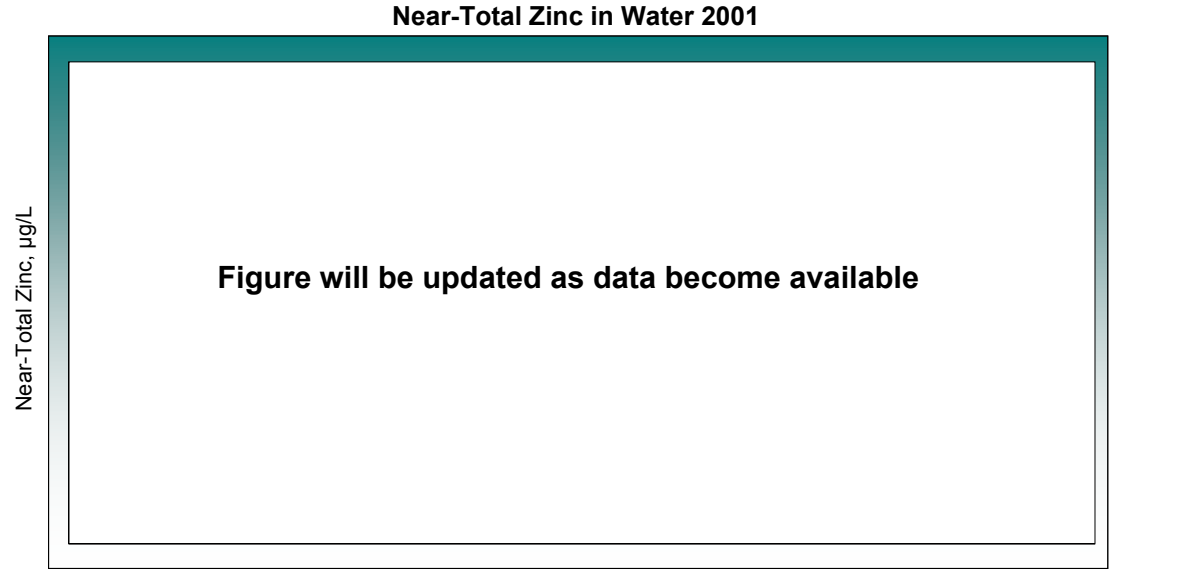

Figure 2.17b. Near-total zinc (Zn) in µg/L (ppb) at each RMP water station in February and August of 2001. Data for 2001 were not available at time of report production.

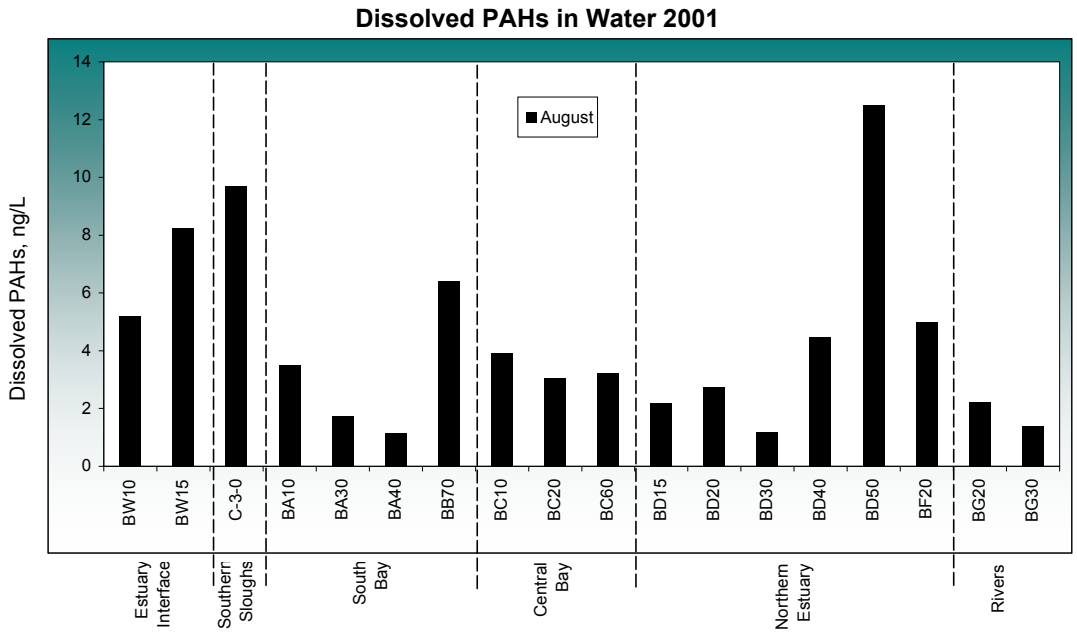

Figure 2.18a. Dissolved PAHs in ng/L (ppt) at each RMP water station in August 2001. Concentrations ranged from 1.2 to 12 ng/L. The highest concentration was measured at Napa River (BD50) and the lowest concentration was measured at Redwood Creek (BA40). On average, concentrations were highest at the Southern Sloughs station, San Jose (C-3-0, 9.7 ng/L), and lowest in the Rivers (1.81 ng/L).

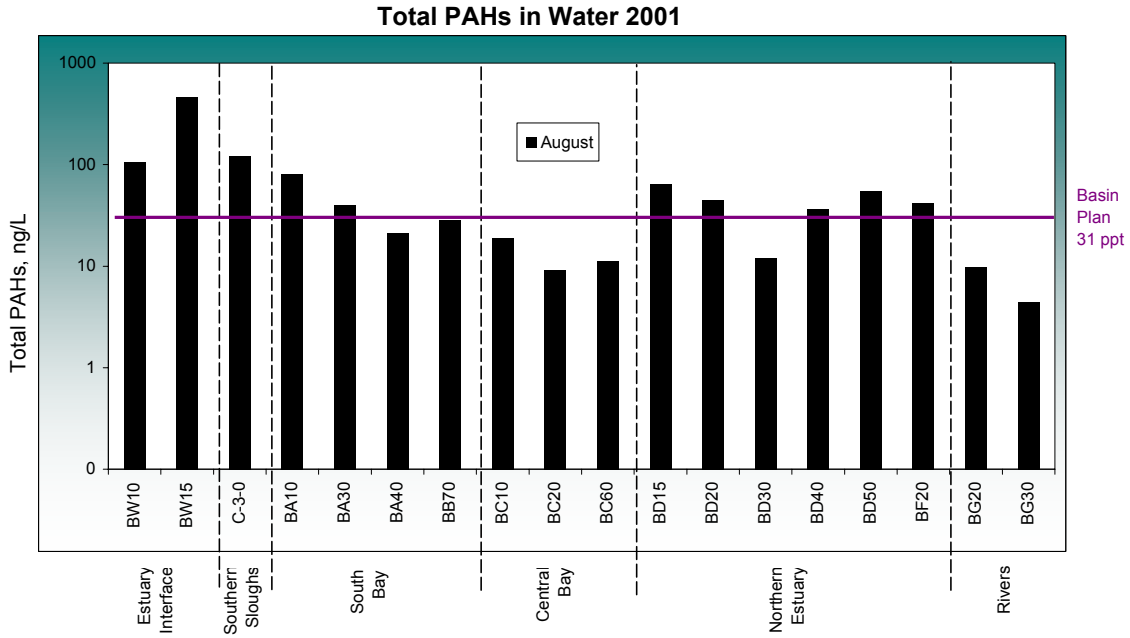

Figure 2.18b. Total PAHs in ng/L (ppt) at each RMP water station in August 2001. Note logarithmic scale. Concentrations ranged from 4.41 to 465 ng/L. The highest concentration was measured at Guadalupe River (BW15) and the lowest concentration was measured at Sacramento River (BG20). Average concentrations were highest in the Estuary Interface (290 ng/L) and lowest in the Rivers (7.1 ng/L). Ten samples exceeded the Basin Plan objective for Total PAHs (31 ng/L). Water quality criteria were also exceeded for the individual PAH congeners benz(a)anthracene (49 ng/L) and benzo(b)fluoranthene (49 ng/L) at Guadalupe River (BW15) in August 2001.

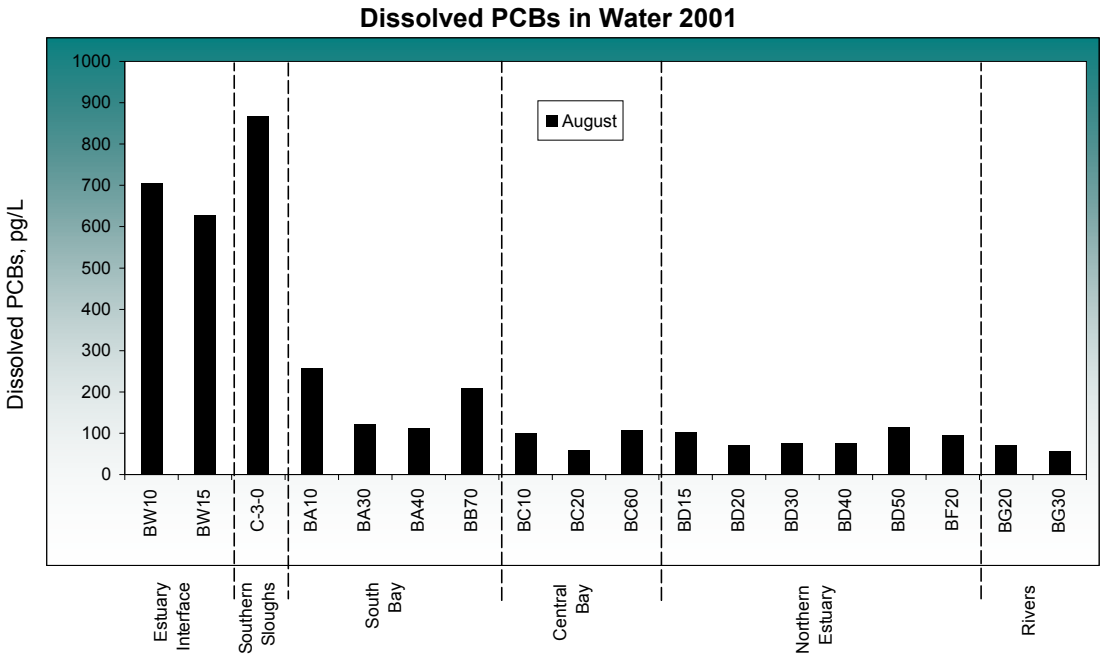

Figure 2.19a. Dissolved PCBs in pg/L (ppq) at each RMP water station in August 2001. Concentrations ranged from 55 to 870 pg/L. The highest concentration was measured at San Jose (C-3-0) and the lowest at San Joaquin River (BG30). On average, concentrations were highest at the Southern Sloughs station, San Jose (C-3-0, 870 pg/L), and lowest in the Rivers (62 pg/L). PCBs are compared to guidelines only on the basis of total PCBs.

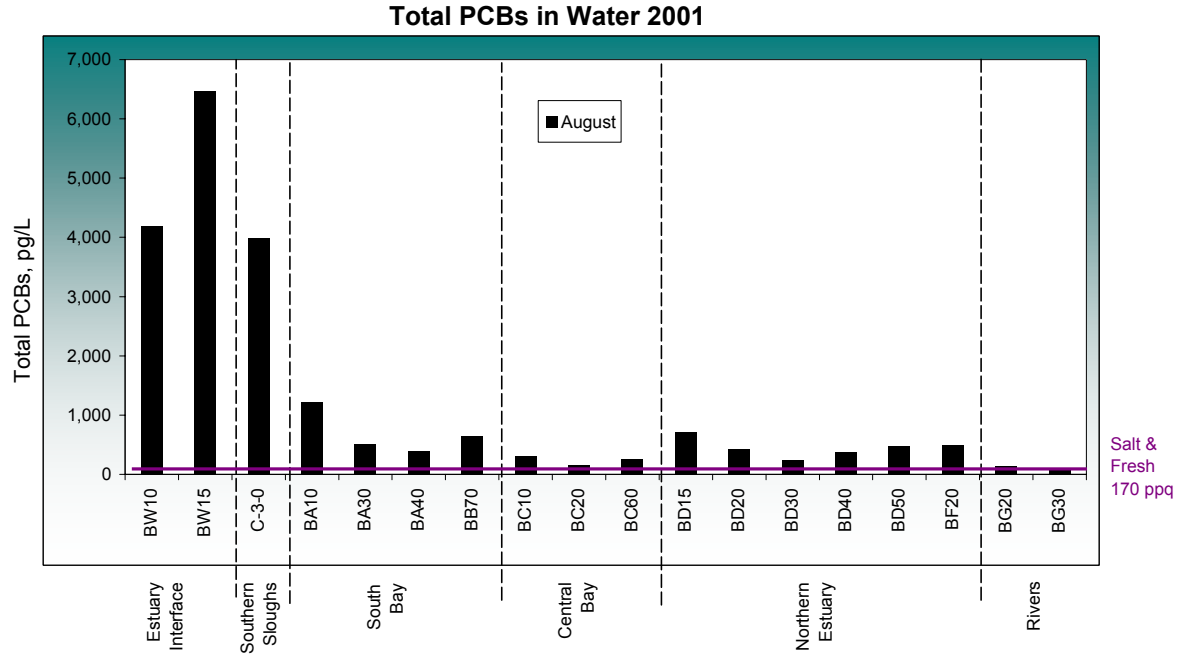

Figure 2.19b. Total PCBs in pg/L (ppq) at each RMP water station in August 2001. Concentrations ranged from 100 to 6,500 pg/L. The highest concentration was measured at Guadalupe River (BW15) and the lowest concentration was measured at San Joaquin River (BG30). Average concentrations were highest in the Estuary Interface (5,300 pg/L) and lowest in the Rivers (130 pg/L). Fifteen samples had PCB concentrations above the human health criterion for total PCBs (organisms only criterion, 0.00017 µg/L).

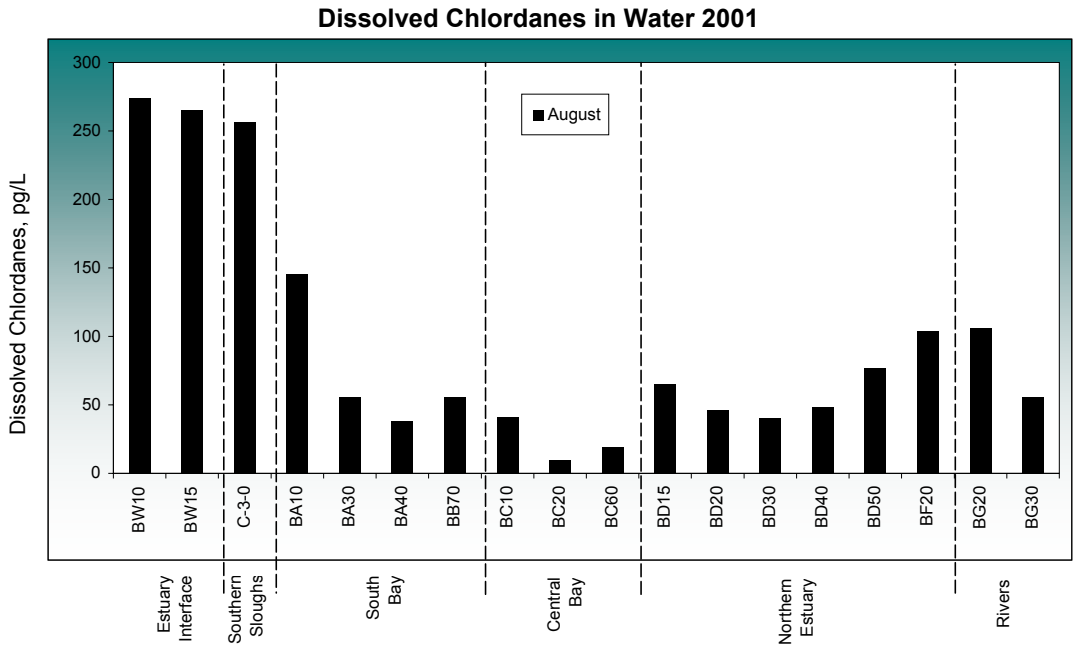

Figure 2.20a. Dissolved Chlordanes in pg/L (ppq) at each RMP water station in August 2001. Note logarithmic scale. Concentrations ranged from 9.6 to 270 pg/L. The highest concentration was measured at Standish Dam (BW10) and the lowest concentration was meaured at Golden Gate (BC20). Average concentrations were highest in the Esuary Interface (270 pg/L) and lowest in the Central Bay (23 pg/L). Chlordanes are compared to guidelines only on the basis of total chlordanes.

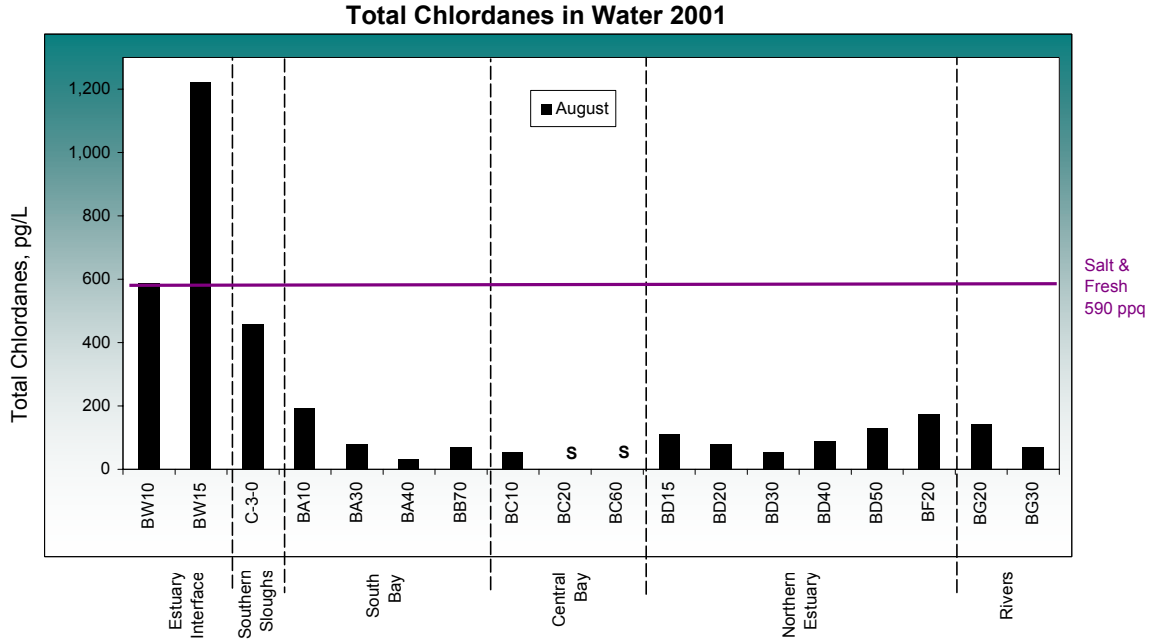

Figure 2.20b. Total Chlordanes in pg/L (ppq) at each RMP water station in August 2001. Note logarithmic scale. **S** indicates compounds generally comprising a significant portion of sum were not quantifiable. Concentrations ranged from 32 to 1,200 pg/L. The highest concentration was measured at Guadalupe River (BW15) and the lowest concentration was measured at Redwood Creek (BA40). Average concentrations were highest in the Estuary Interface (900 pg/L) and lowest at the Central Bay station, Yerba Buena Island (BC10, 53 pg/L). One sample collected from the Estuary Interface stations had concentrations above the human health criterion for total chlordanes (organisms only criterion, 0.00059 µg/L).

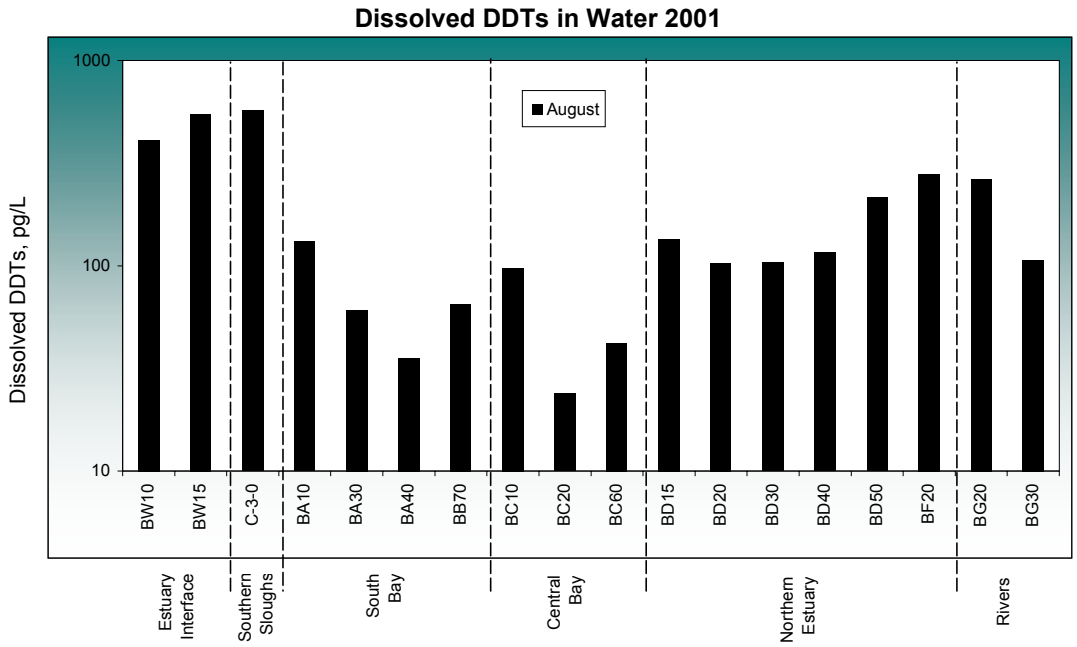

Figure 2.21a. Dissolved DDTs in pg/L (ppq) at each RMP water station in August 2001. Note logarithmic scale. Concentrations ranged from 24 to 570 pg/L. The highest concentration was measured at San Jose (C-3-0) and the lowest concentration was measured at Golden Gate (BC20). Average concentrations were highest at the Southern Sloughs station, San Jose (C-3-0, 570 pg/L), and lowest in the Central Bay (54 pg/L). DDTs are compared to guidelines only on the basis of total DDTs.

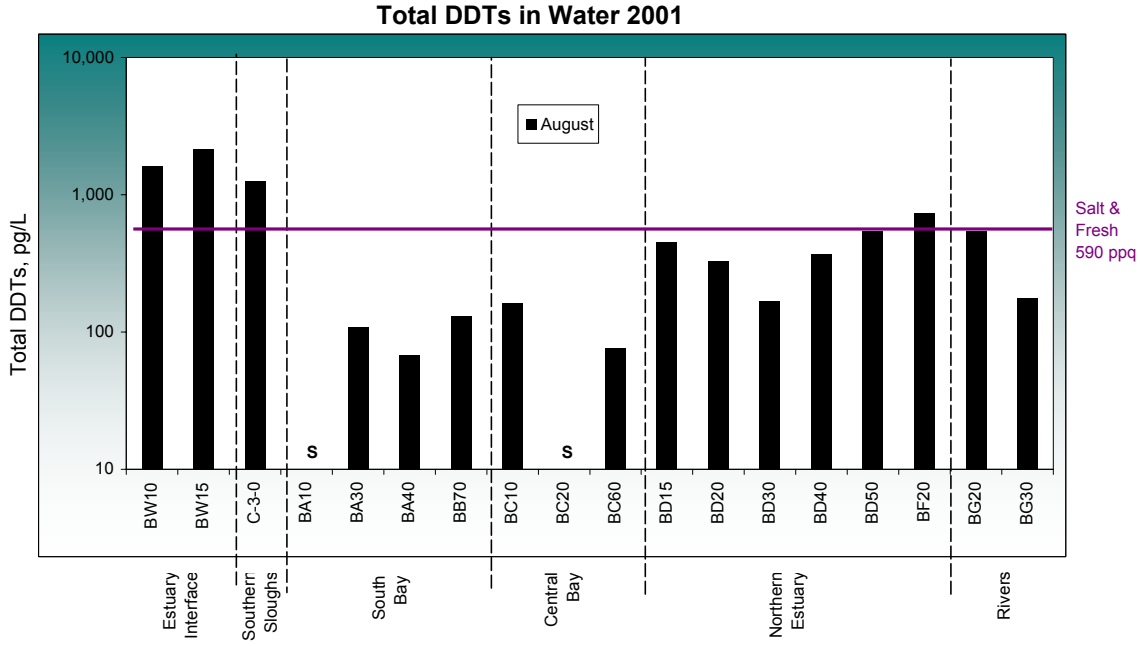

Figure 2.21b. Total DDTs in pg/L (ppq) at each RMP water station in August 2001. Note logarithmic scale. **S** indicates compounds generally comprising a significant portion of sum were not quantifiable. Concentrations ranged from 68 to 2,200 pg/L. The highest concentration was measured at Guadalupe River (BW15) and the lowest concentration was measured at Redwood Creek (BA40). Average concentrations were highest in the Estuary Interface (1,900 pg/L) and lowest in the South Bay (100 pg/L). Three samples had concentrations of p,p'-DDE above the human health criterion (0.00059 µg/L)

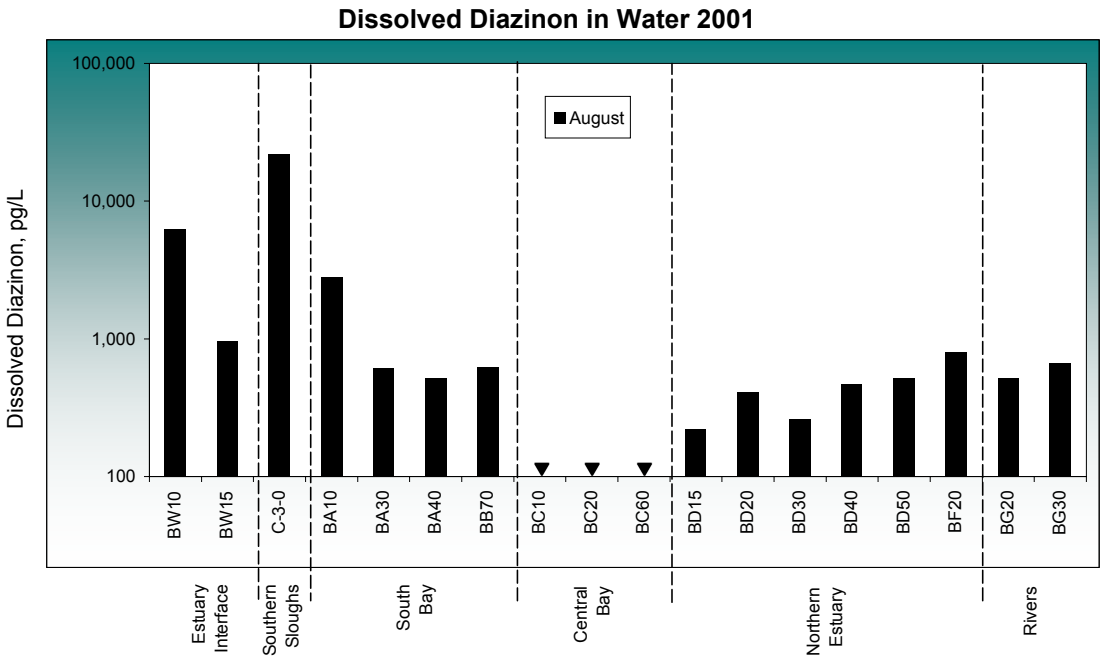

Figure 2.22a. Dissolved diazinon in pg/L (ppq) at each RMP water station in August 2001. Note logarithmic scale. ▼ = not detected. Concentrations ranged from below detection to 22,000 pg/L. The highest concentration was measured at San Jose (C-3-0). On average, concentrations were highest at the Southern Sloughs station, San Jose (C-3-0, 22,000 pg/L), and lowest in the Central Bay (▼). Diazinon is compared to guidelines only on the basis of total diazinon.

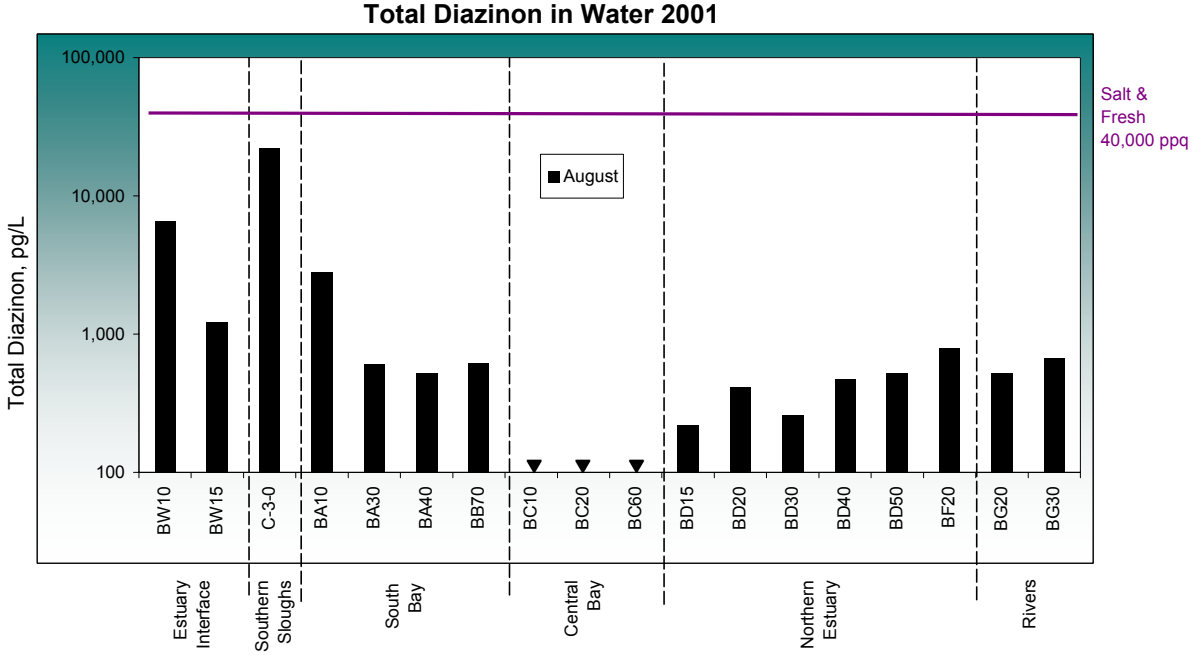

Figure 2.22b. Total diazinon in pg/L (ppq) at each RMP water station in August 2001. Note logarithmic scale. ▼ = not detected. Concentrations ranged from below detection to 22,000 pg/L. The highest concentration was measured at San Jose (C-3-0). On average, concentrations were highest at the Southern Sloughs station, San Jose (C-3-0, 22,000 pg/L), and lowest in the Central Bay (▼). All of the samples were below the EPA water quality criterion for total diazinon (40,000 ppq).

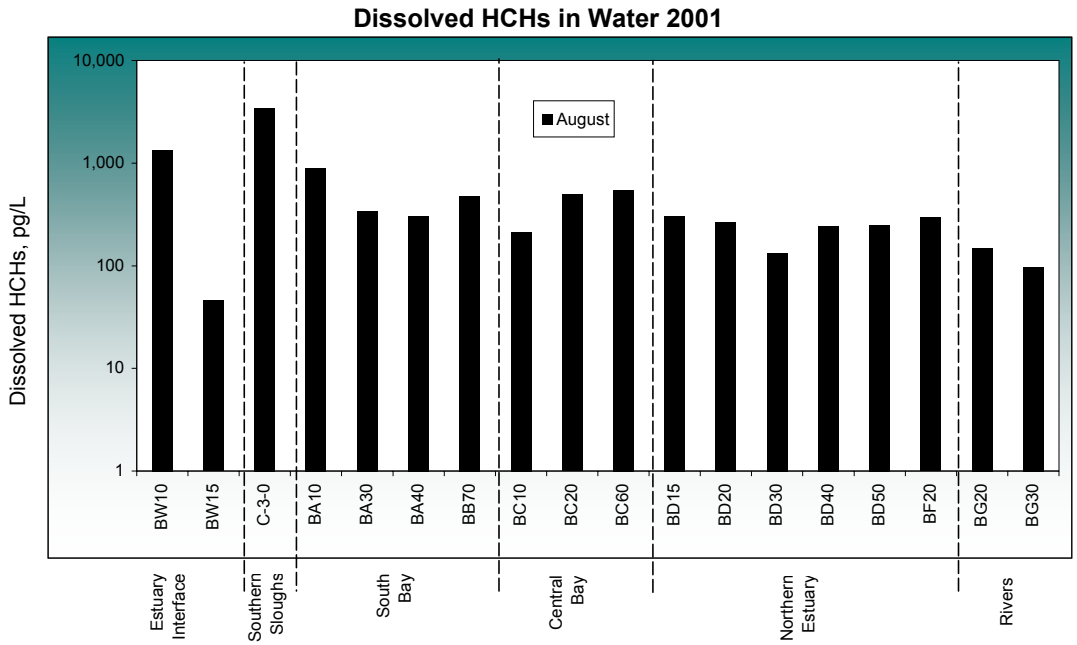

Figure 2.23a. Dissolved HCHs in pg/L (ppq) at each RMP water station in August 2001. Note logarithmic scale. Concentrations ranged from 46 to 3,500 pg/L. The highest concentration was measured at San Jose (C-3-0) and the lowest concentration was measured at Guadalupe River (BW15). On average, concentrations were highest in the Southern Sloughs station, San Jose (C-3-0, 3,500 pg/L), and lowest in the Rivers (120 pg/L). There are no water quality criteria for dissolved HCHs.

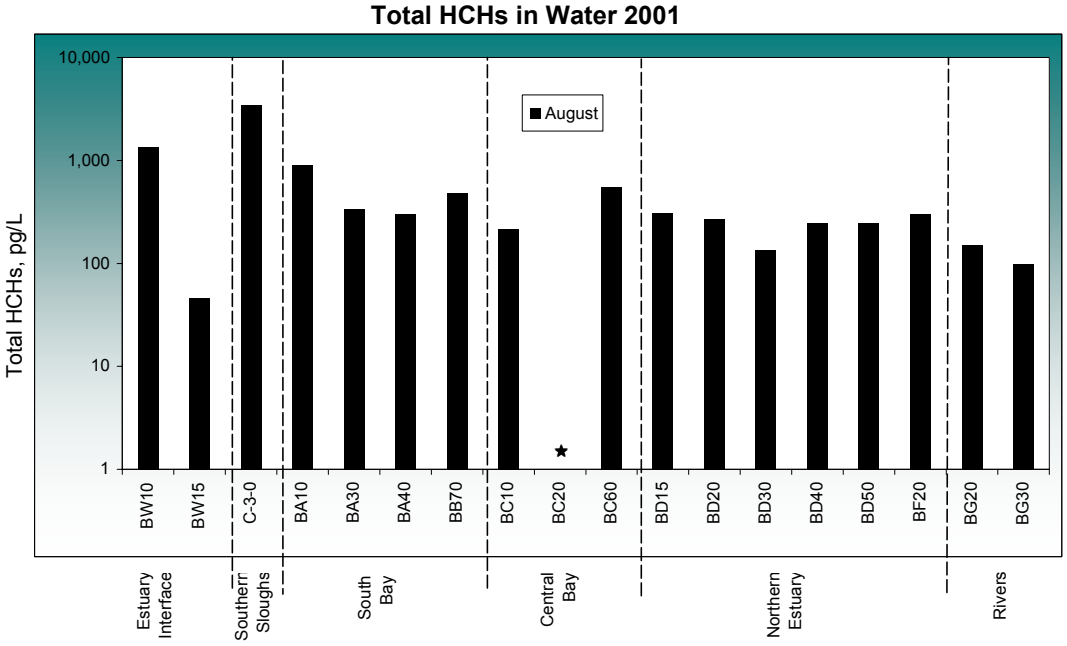

Figure 2.23b. Total HCHs in pg/L (ppq) at each RMP water station in August 2001. Note logarithmic scale. ★ = not available. Concentrations ranged from 46 to 3,500 pg/L. The highest concentration was measured at San Jose (C-3-0). On average, concentrations were highest at the Southern Sloughs station, San Jose (C-3-0, 3,500 pg/L), and lowest in the Rivers (120 pg/L). Water quality criteria exist only for individual HCH compounds, none of which were exceeded in 2001.

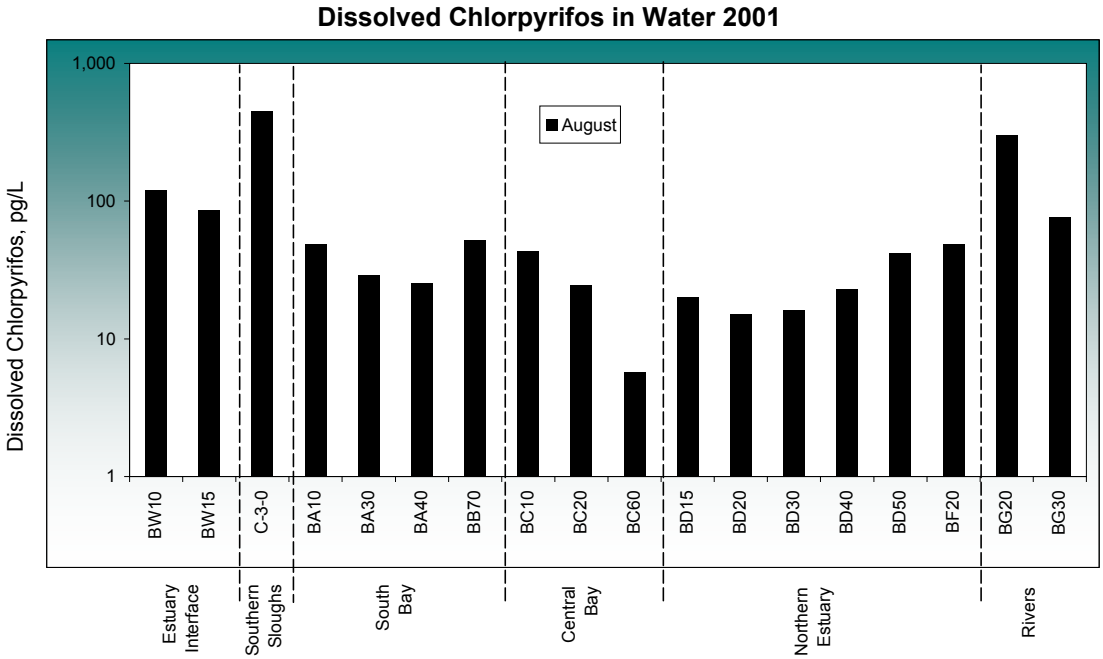

Figure 2.24a. Dissolved chlorpyrifos in pg/L (ppq) at each RMP water station in August 2001. Note logarithmic scale. Concentrations ranged from 5.7 to 450 pg/L. The highest concentration was measured at San Jose (C-3-0) and the lowest concentration was measured at Red Rock (BC60). On average, concentrations were highest at the Southern Sloughs station, San Jose (C-3-0, 450 pg/L), and lowest in the Central Bay (25 pg/L). Chlorpyrifos is compared to guidelines only on the basis of total chlorpyrifos.

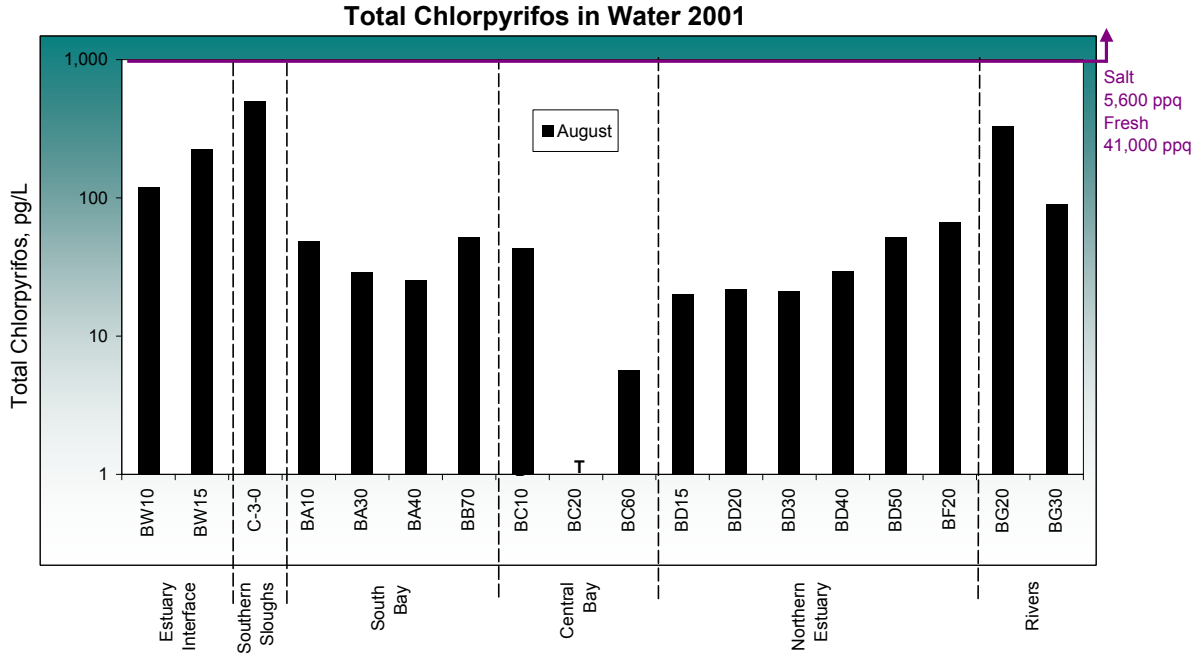

Figure 2.24b. Total Chlorpyrifos in pg/L (ppq) at each RMP water station in August 2001. Note logarithmic scale. **T** indicates a total value could not be calculated. Concentrations ranged from 5.7 to 500 pg/L. The highest concentration was measured at San Jose (C-3-0) and the lowest concentration was measured at Red Rock (BC60). Average concentrations were highest at the Southern Sloughs station, San Jose (C-3-0, 500 pg/L), and lowest in the Central Bay (25 pg/L). No samples were above the 4-day WQO for total chlorpyrifos (saltwater 0.0056 ppb, freshwater 0.041 ppb)

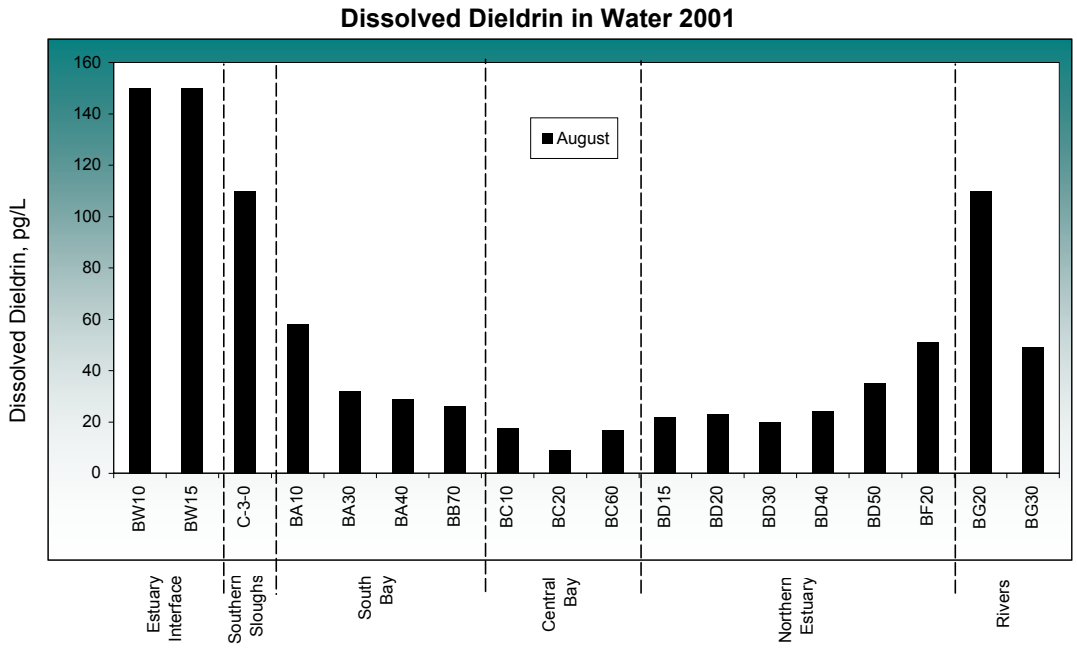

Figure 2.25a. Dissolved dieldrin in pg/L (ppq) at each RMP water station in August 2001. Note logarithmic scale. Concentrations ranged from 9.3 to 150 pg/L. The highest concentration was measured at Standish Dam (BW10) and Guadalupe River (BW15), and the lowest concentration was measured at Golden Gate (BC20). Average concentrations were highest in the Estuary Interface (150 pg/L) and lowest in the Central Bay (15 pg/L). Dieldrin is compared to guidelines only on the basis of total dieldrin.

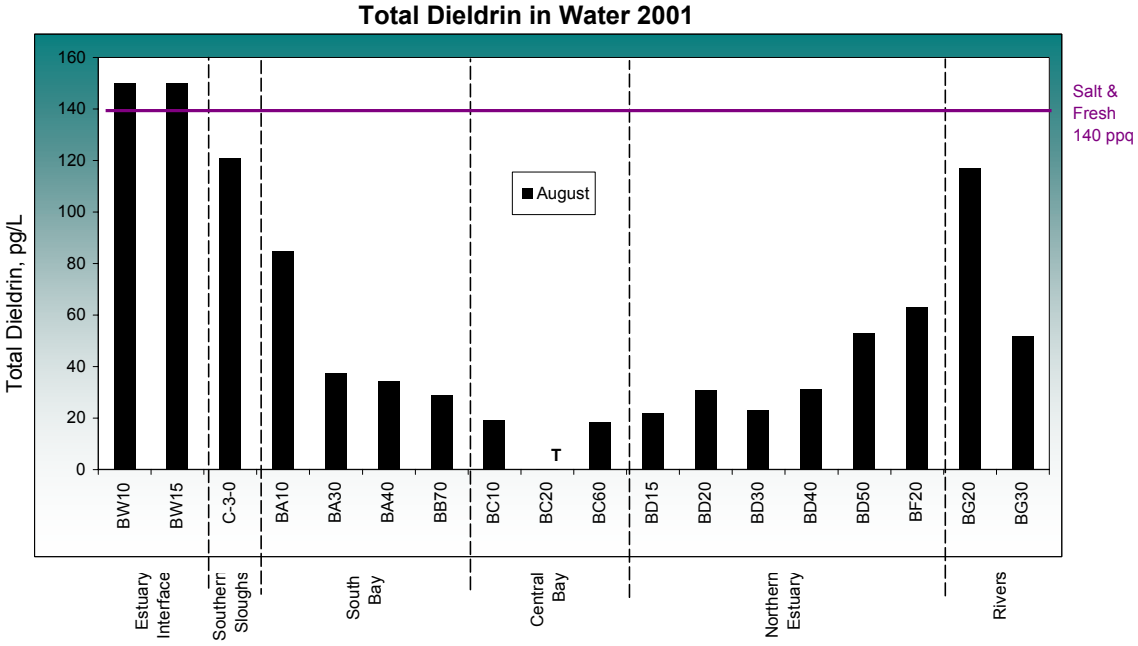

Figure 2.25b. Total Dieldrin in pg/L (ppq) at each RMP water station in August 2001. Note logarithmic scale. **T** indicates a total value could not be calculated. Concentrations ranged from 18 to 150 pg/L. The highest concentration was measured at Standish Dam (BW10) and Guadalupe River (BW15), and the lowest concentration was measured at Red Rock (BC60). Average concentrations were highest in the Estuary Interface (150 pg/L) and lowest in the Central Bay (19 pg/L). The two samples collected at the Estuary Interface stations were above the human health criterion for total dieldrin (organisms only criterion,

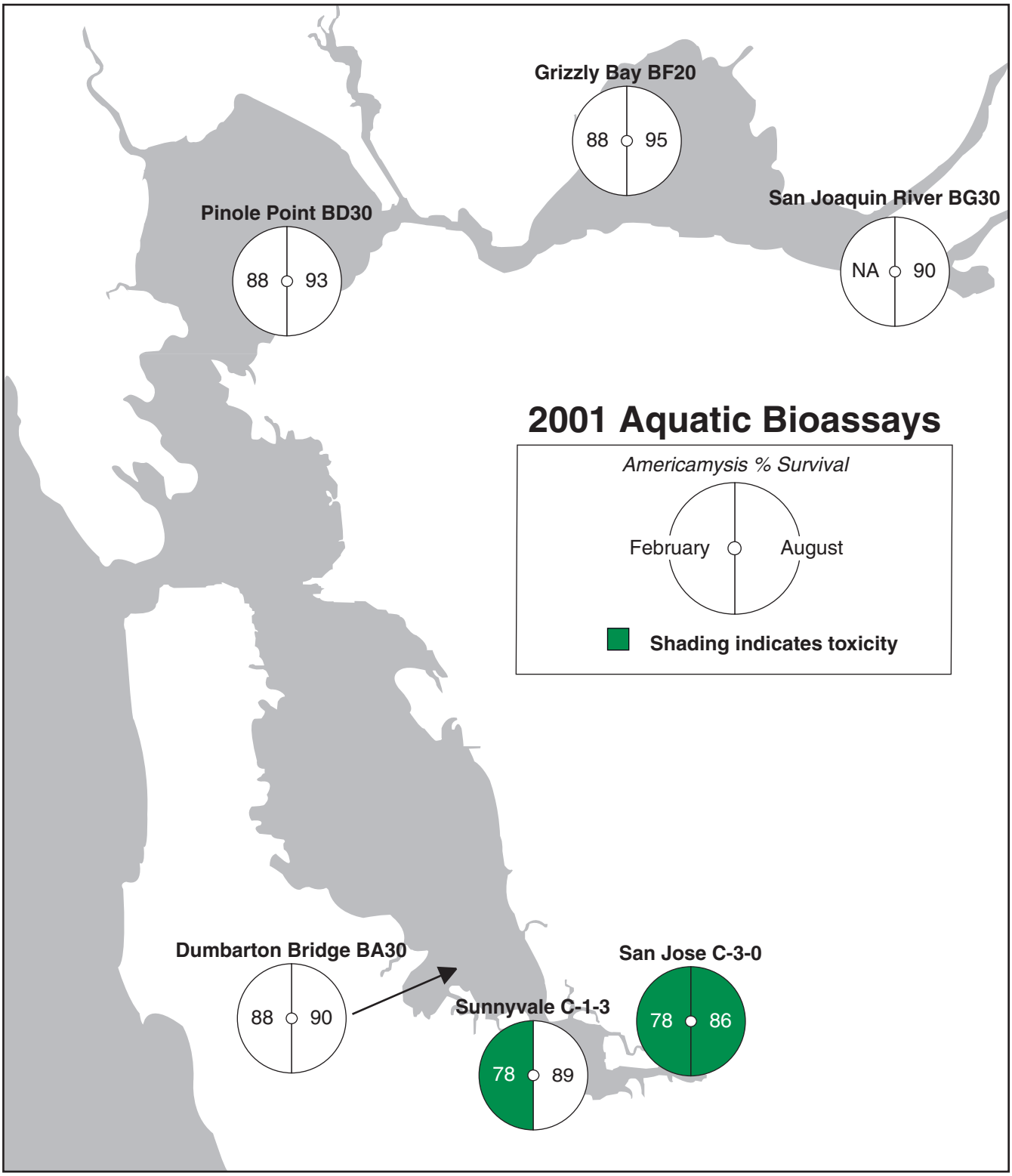

Figure 2.26. Aquatic bioassay results for 2001. NA = not available. Significant toxicity in a seven-day *Americamysis bahia* (formerly *Mysidopsis bahia)* test was observed at San Jose (C-3-0) in both February and August, and at Sunnyvale (C-1-3) in February. Toxicity was determined by statistical comparison to controls in clean artificial seawater.

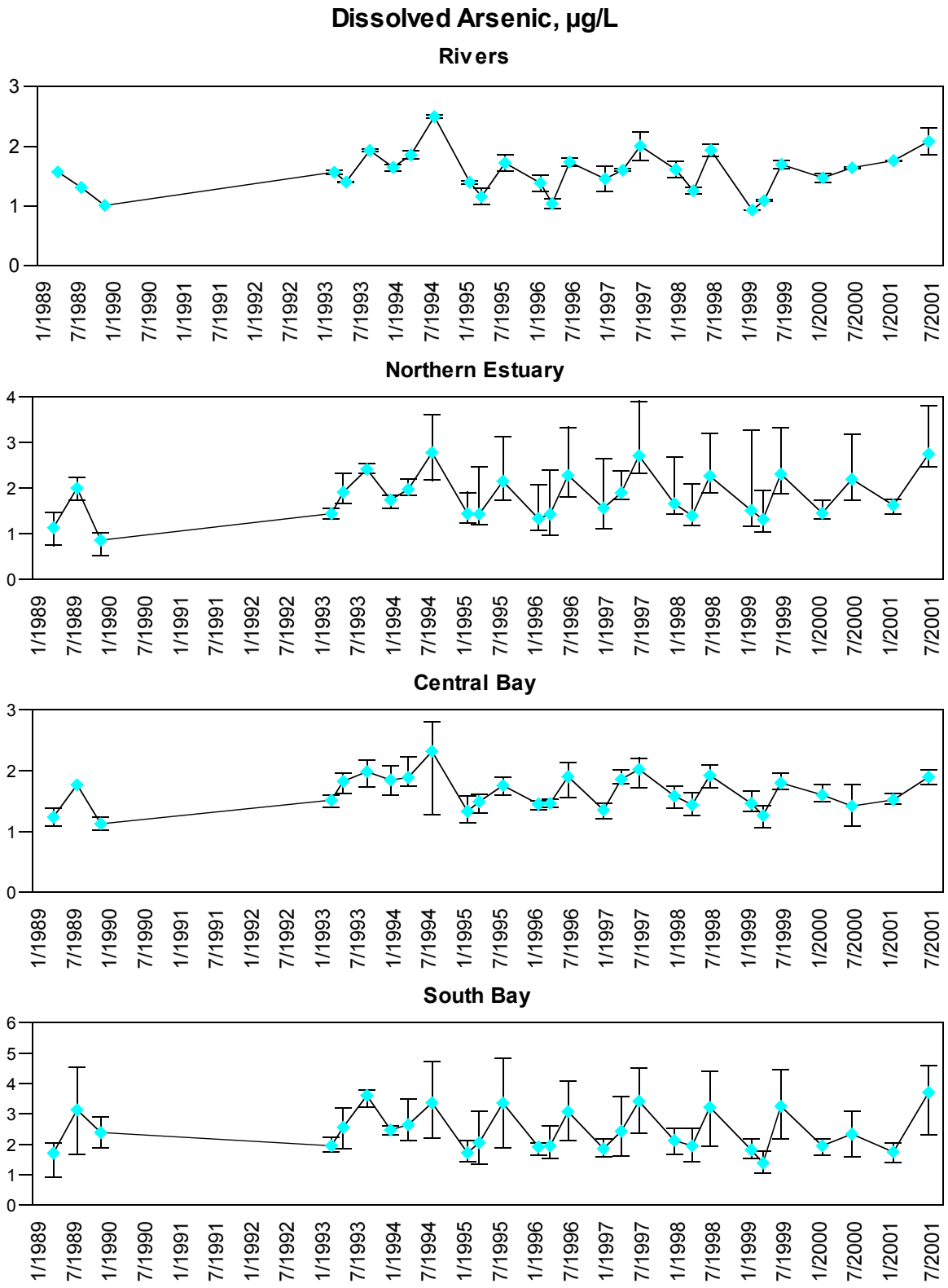

Figure 2.27a. Average dissolved arsenic concentrations in water (µg/L) in each Estuary reach from 1989–2001. Note different y-axis scales. The vertical bars represent range of values. The sample size varies between sites and between seasons.

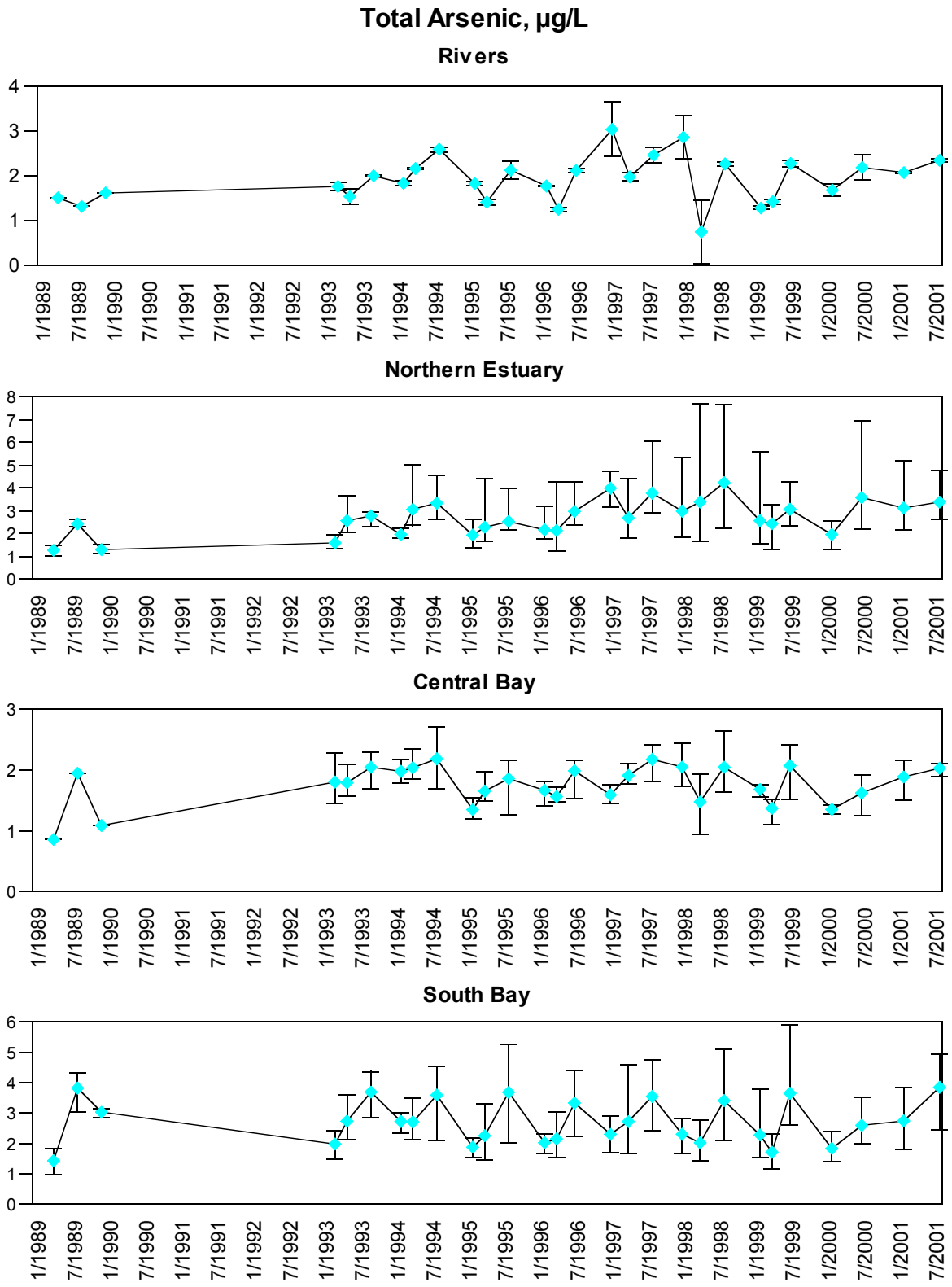

Figure 2.27b. Average total arsenic concentrations in water (µg/L) in each Estuary reach from 1989–2001. Note different y-axis scales. The vertical bars represent range of values. The sample size varies between sites and between seasons.

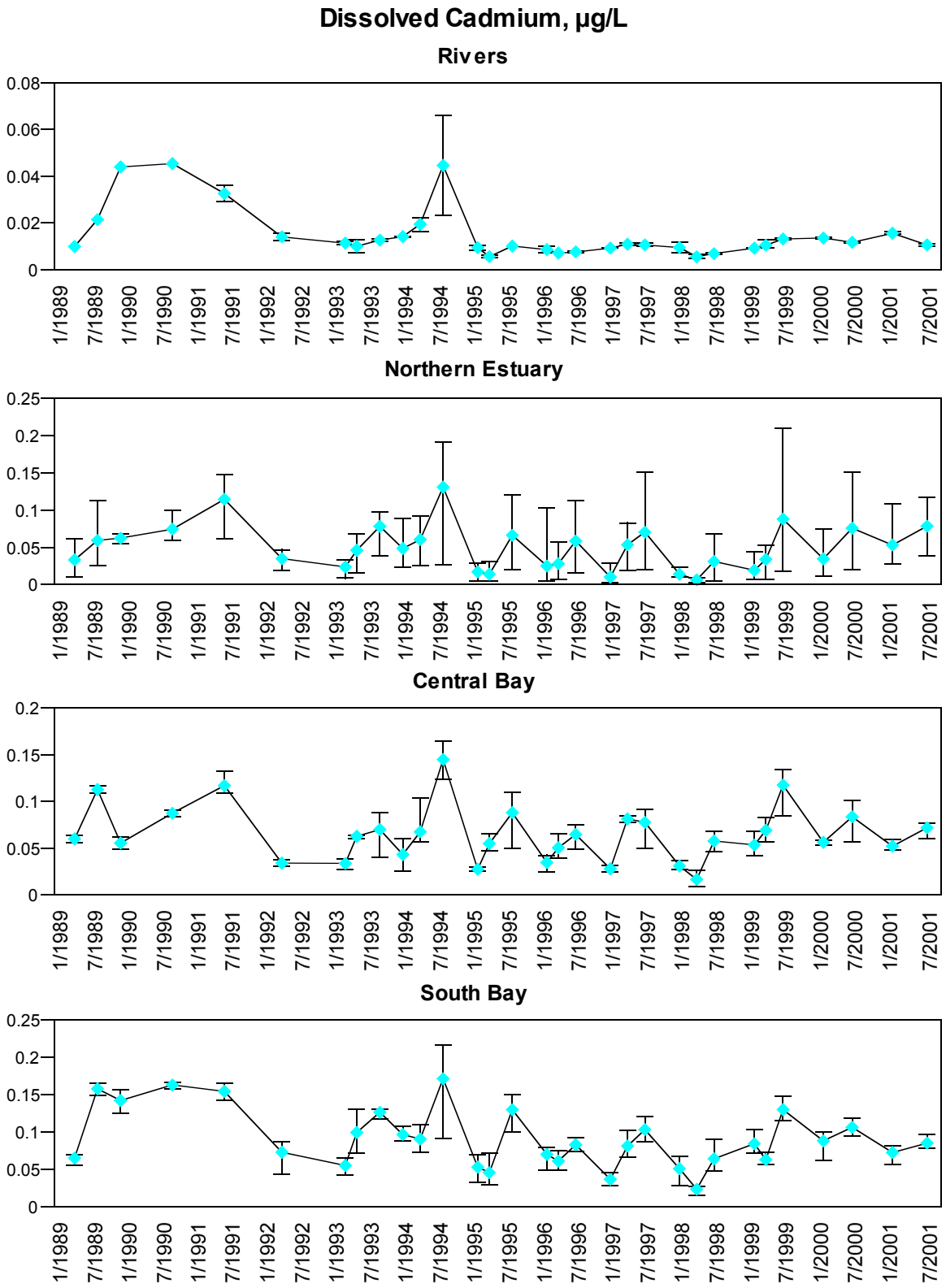

Figure 2.28a. Average dissolved cadmium concentrations in water (µg/L) in each Estuary reach from 1989–2001. Note different y-axis scales. The vertical bars represent range of values. The sample size varies between sites and between seasons.

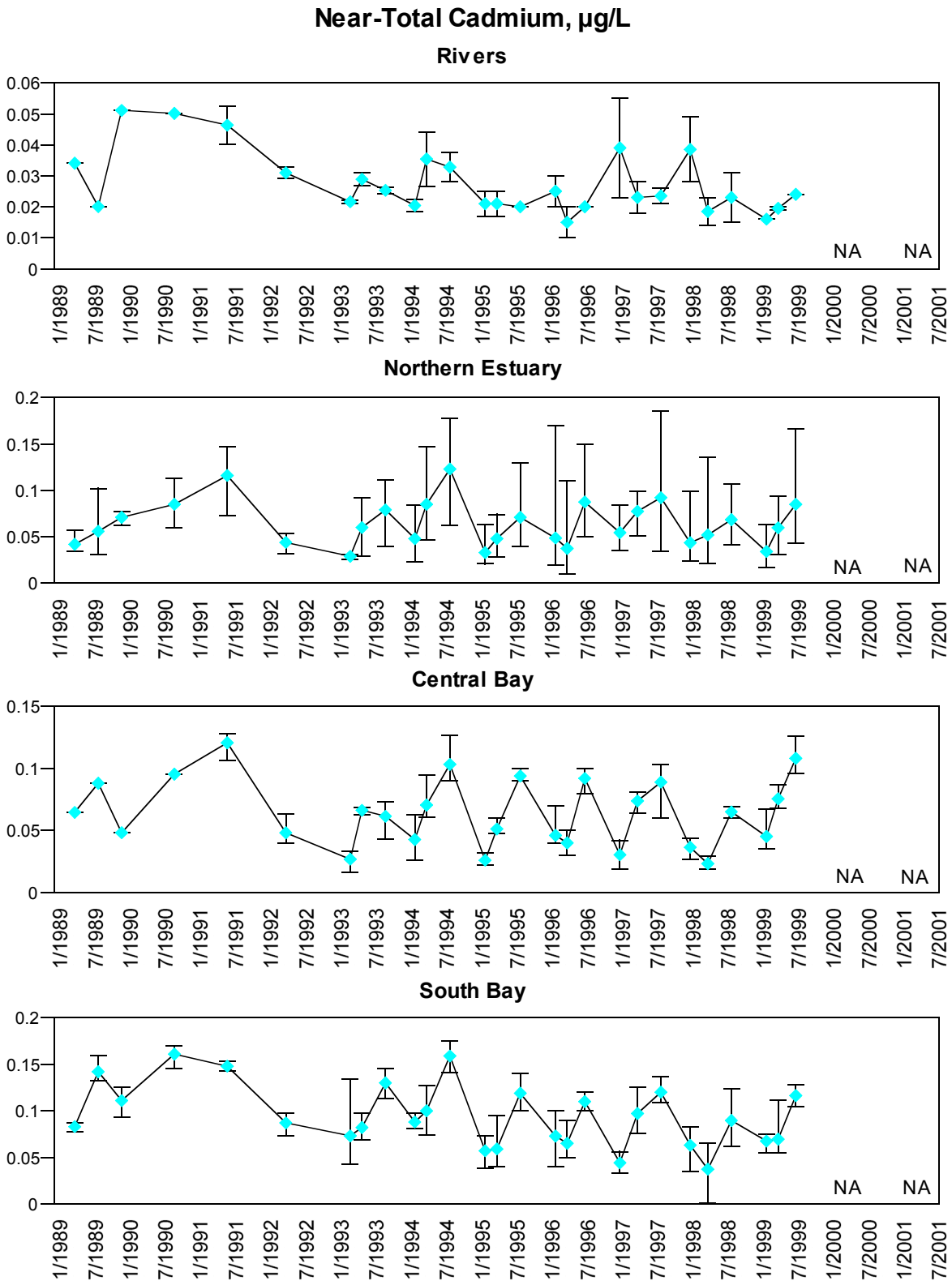

Figure 2.28b. Average near-total cadmium concentrations in water (µg/L) in each Estuary reach from 1998-2001. Note different y-axis scales. The vertical bars represent range of values. The sample size varies between sites and between seasons. NA = data for 2000 were not available at the time of report production.

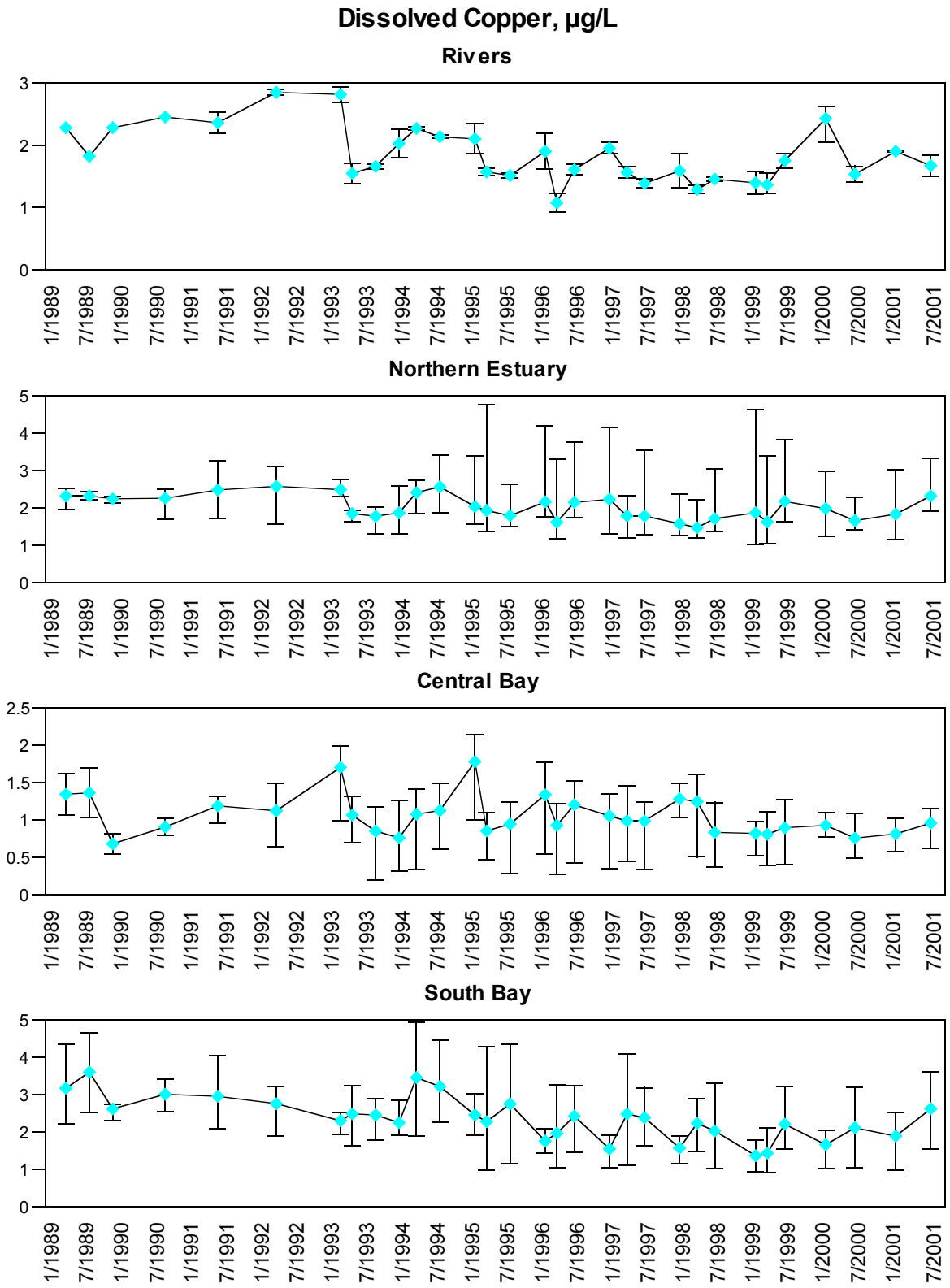

Figure 2.29a. Average dissolved copper concentrations in water (µg/L) in each Estuary reach from 1989–2001. Note different y-axis scales. The vertical bars represent range of values.

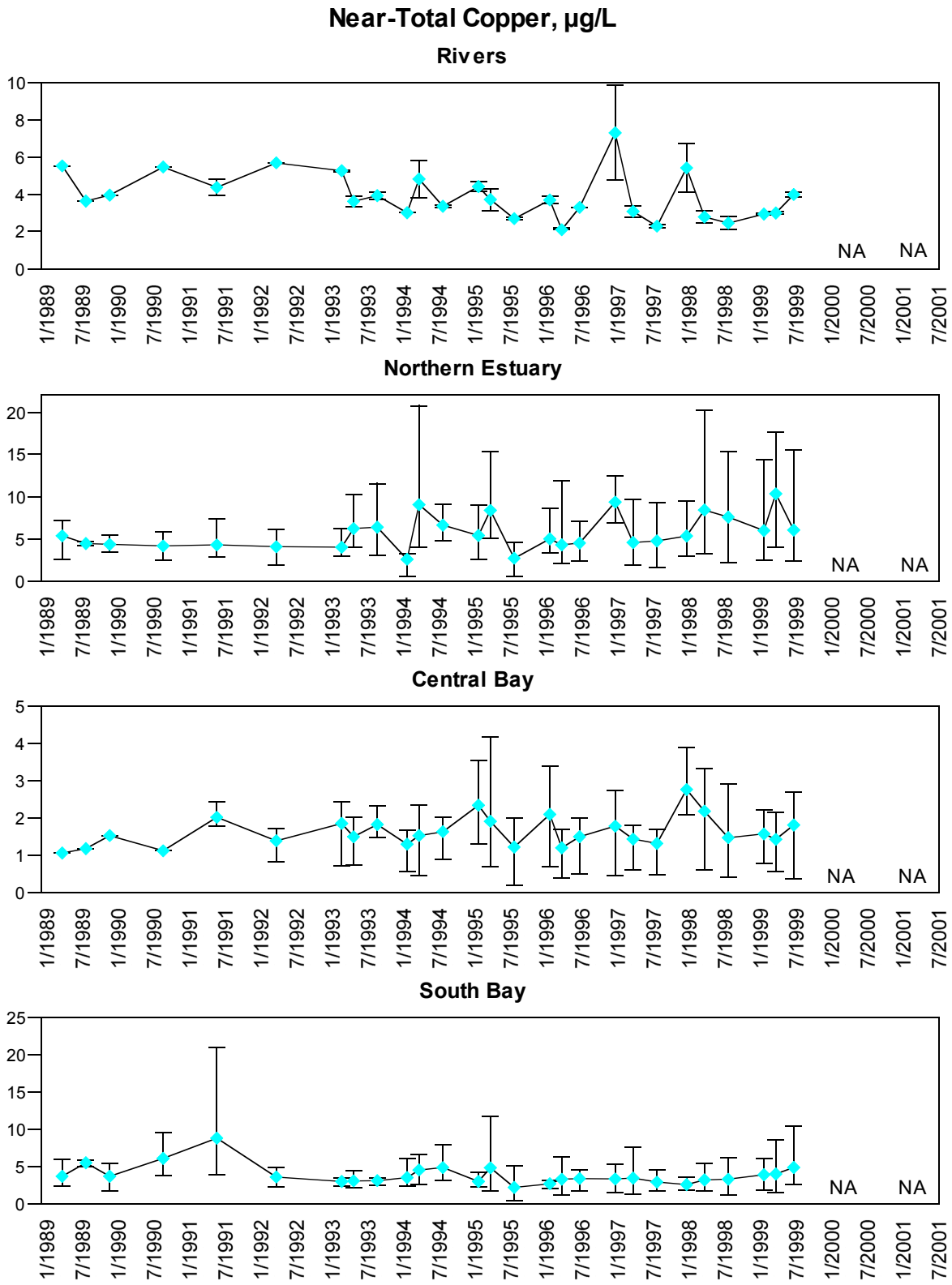

Figure 2.29b. Average near-total copper concentrations in water (µg/L) in each Estuary reach from 1989–2001. Note different y-axis scales. The vertical bars represent range of values. NA = data for 2000 and 2001 were not available at the time of report production.

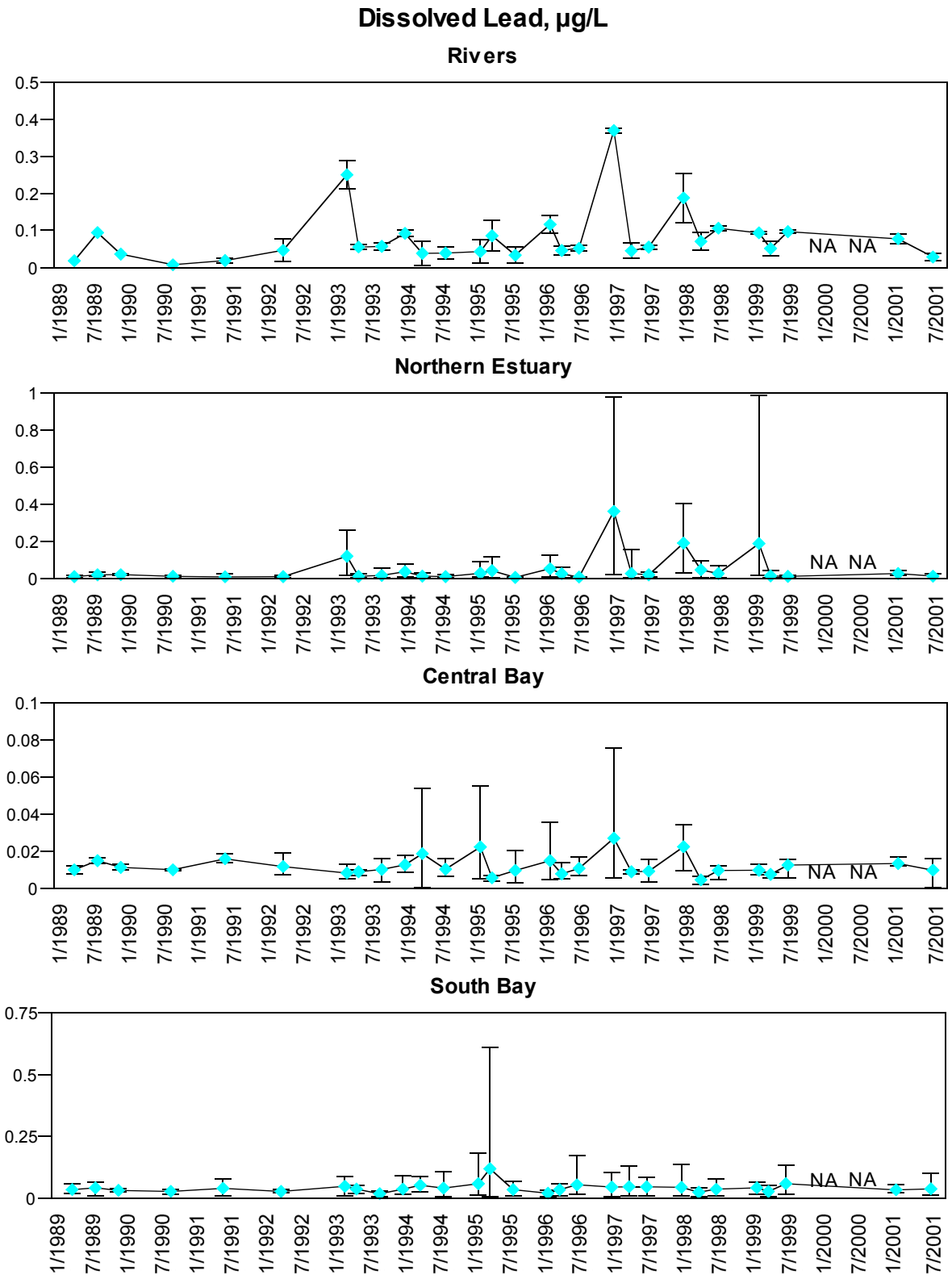

Figure 2.30a. Average dissolved lead concentrations in water (µg/L) in each Estuary reach from 1989–2001. Note different y-axis scales. NA = data for 2000 were not available at the time of report production due to instrumentation problems in the laboratory. The vertical bars represent range of values.

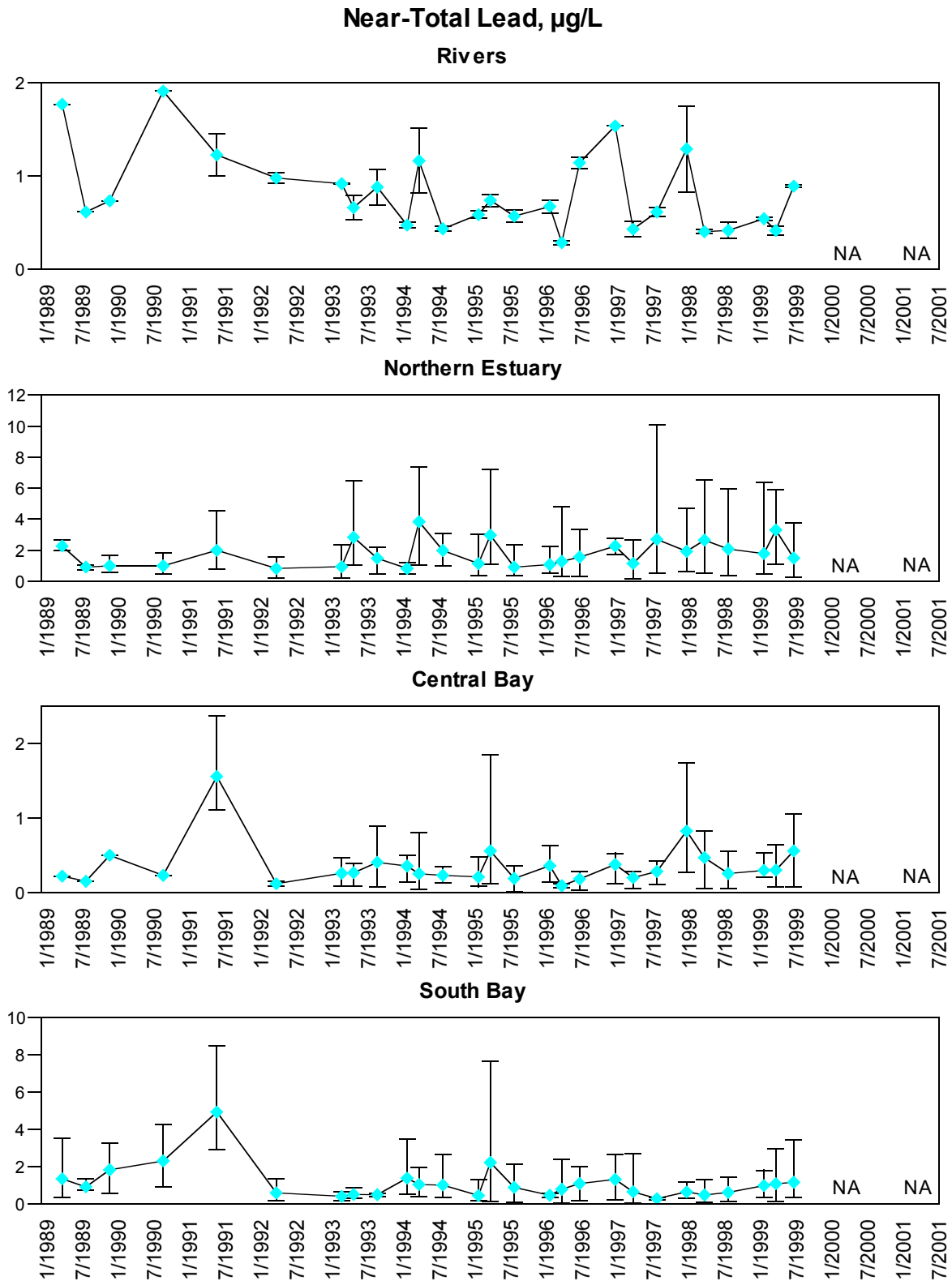

Figure 2.30b. Average near-total lead concentrations in water (µg/L) in each Estuary reach from 1989–2001. Note different y-axis scales. The vertical bars represent range of values. NA = data for 2000 and 2001 were not available at the time of report production.

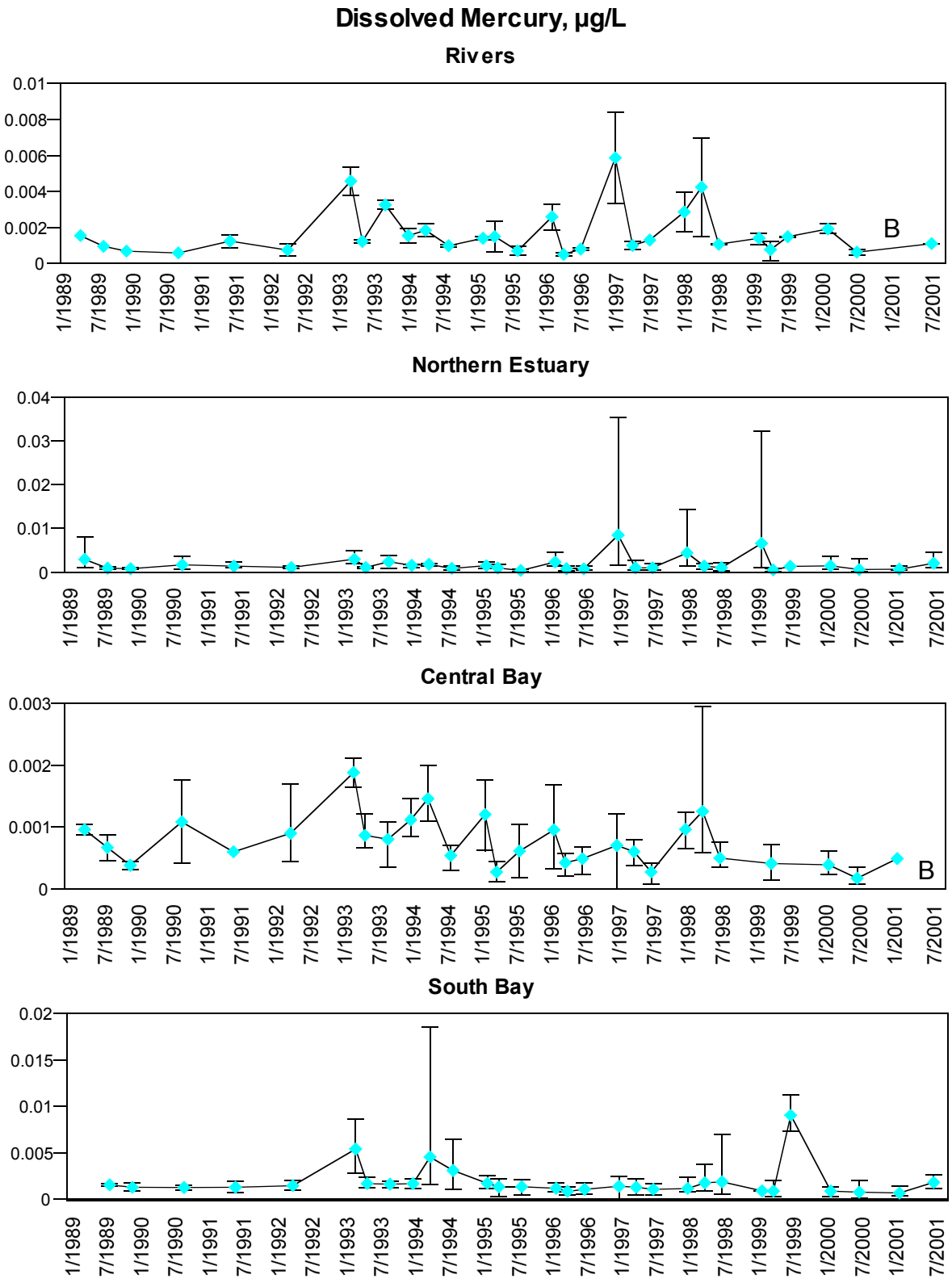

Figure 2.31a. Average dissolved mercury concentrations in water (µg/L) in each Estuary reach from 1989–2001. Note different y-axis scales. B = blank contamination. The vertical bars represent range of values.

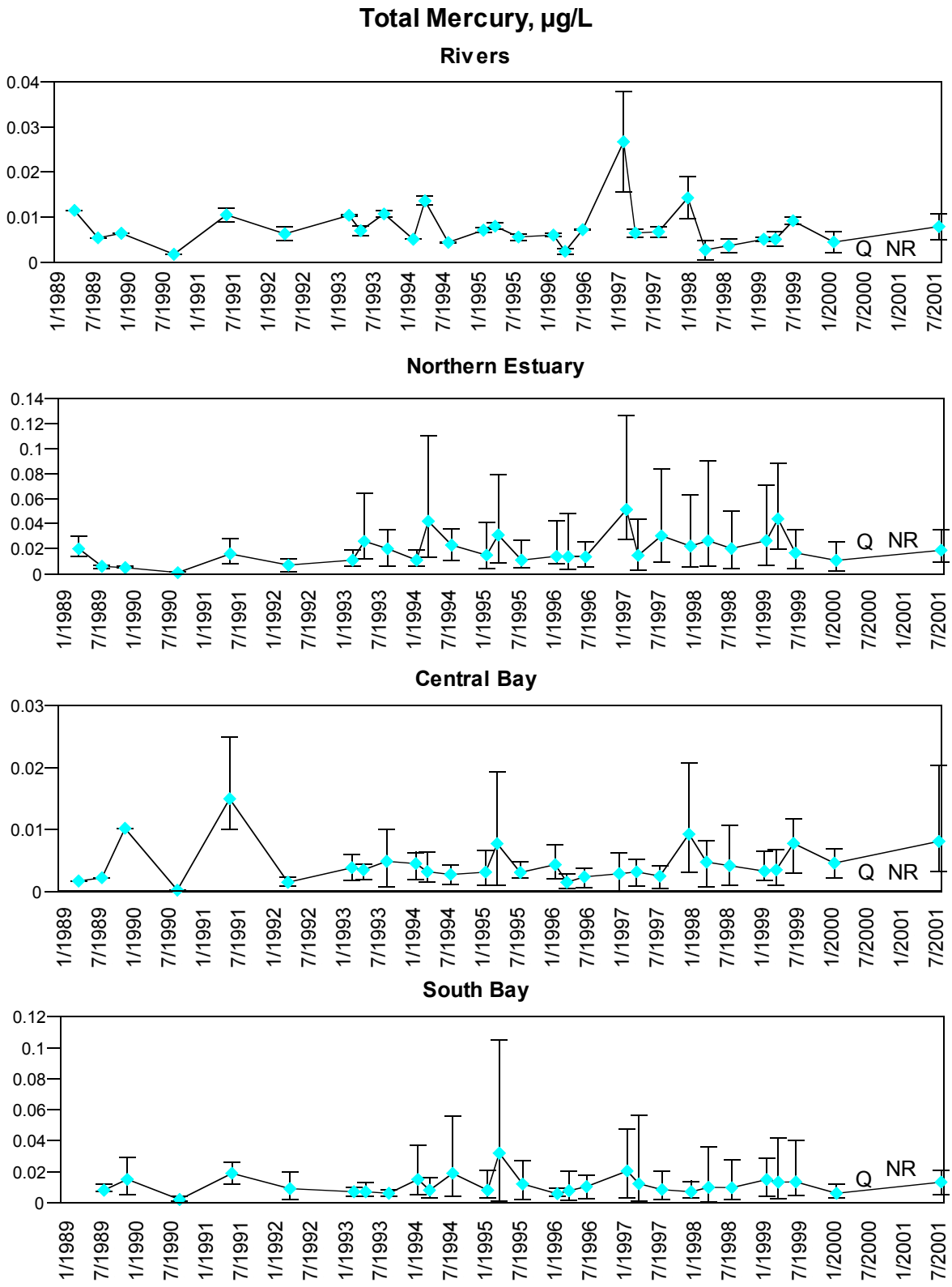

Figure 2.31b. Average total mercury concentrations in water (µg/L) in each Estuary reach from 1989–2001. Note different y-axis scales. The vertical bars represent range of values. Q = outside QA limits, poor precision between analyses; NR = not reported due to pending QA review.

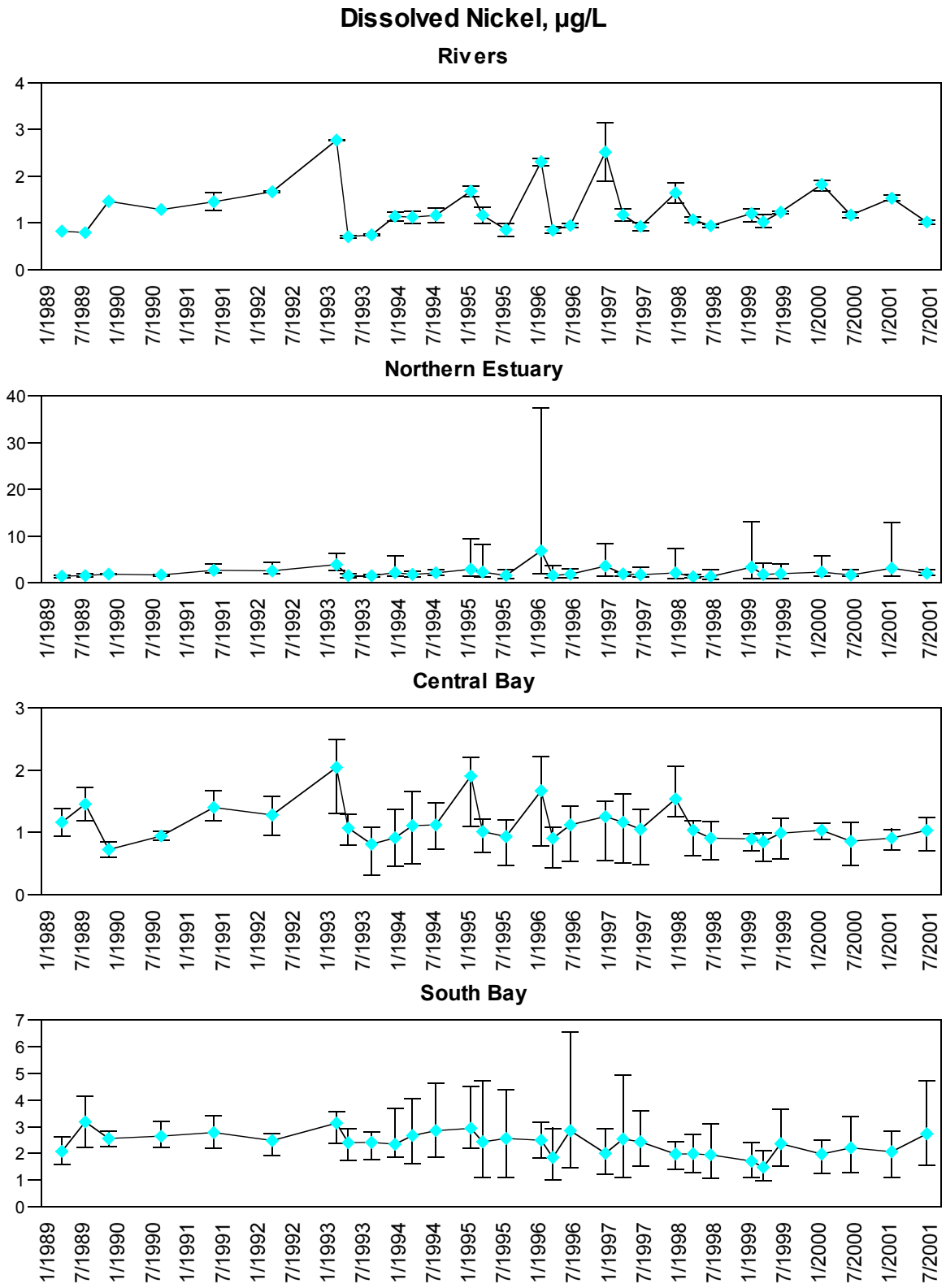

Figure 2.32a. Average dissolved nickel concentrations in water (µg/L) in each Estuary reach from 1989–2001. Note different y-axis scales. The vertical bars represent range of values.

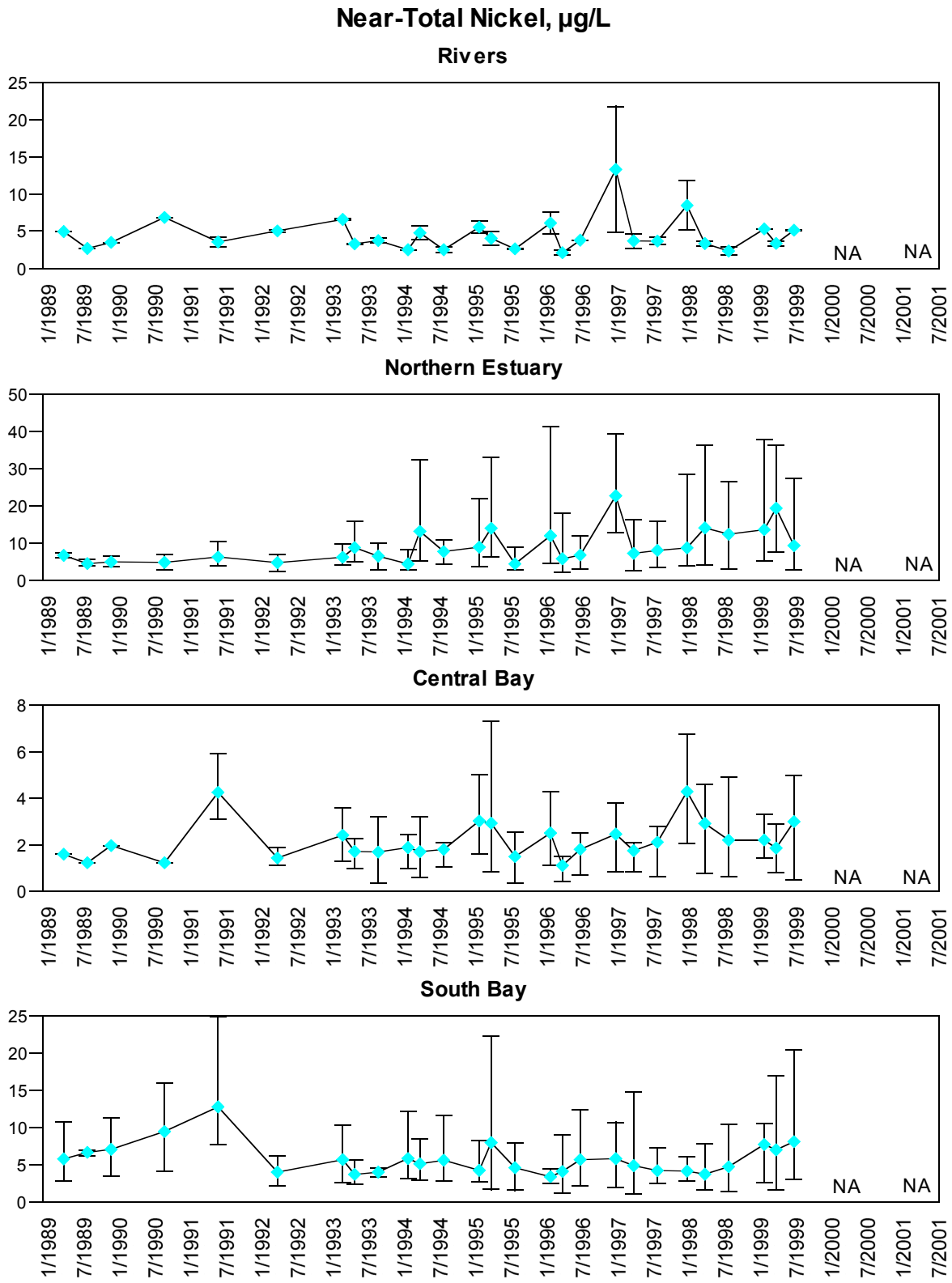

Figure 2.32b. Average near-total nickel concentrations in water (µg/L) in each Estuary reach from 1989–2001. Note different y-axis scales. The vertical bars represent range of values. NA = data for 2000 and 2001 were not available at the time of report production.

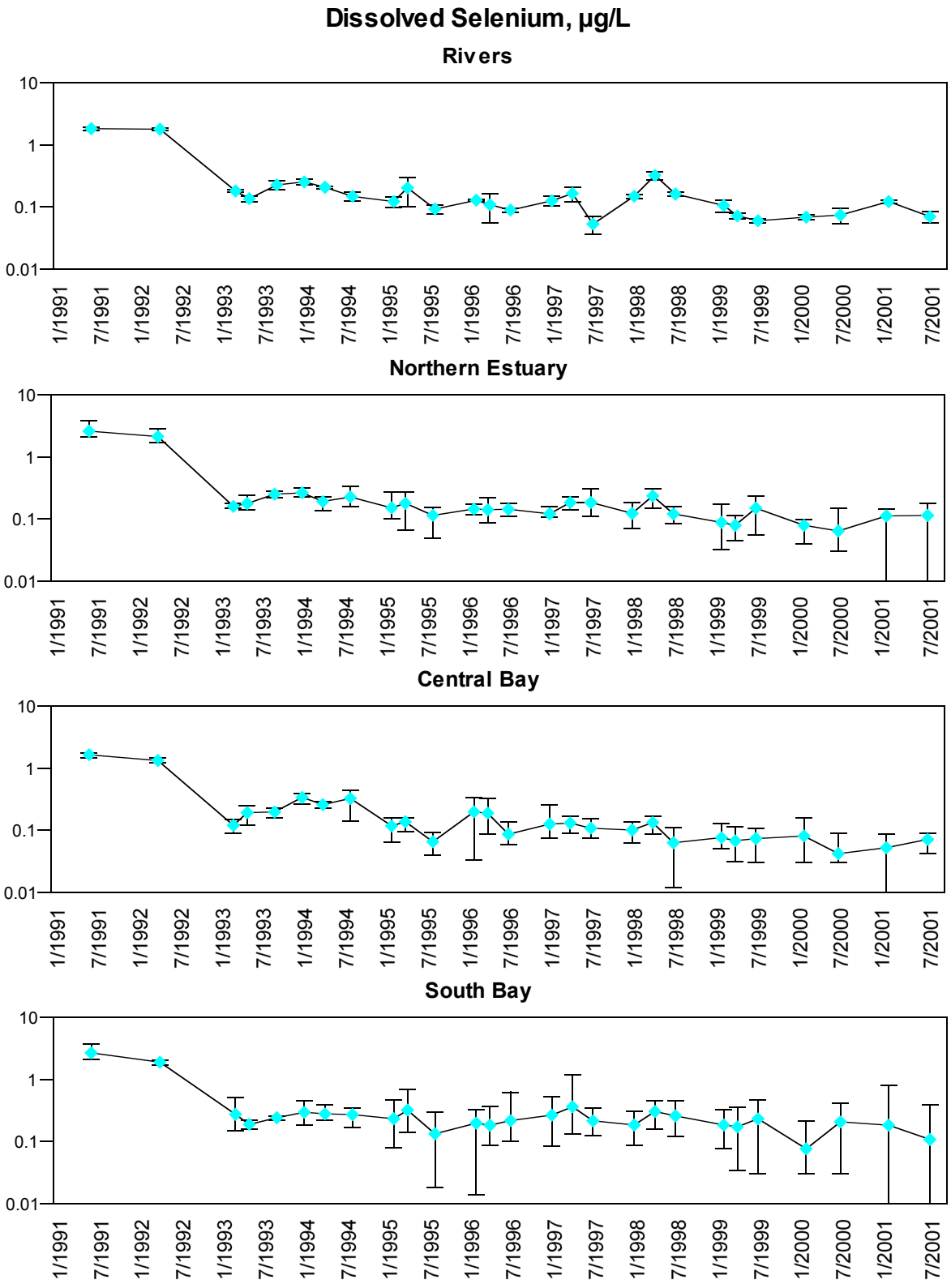

Figure 2.33a. Average dissolved selenium concentrations in water (µg/L) in each Estuary reach from 1991–2001. Note different y-axis scales. The vertical bars represent range of values.

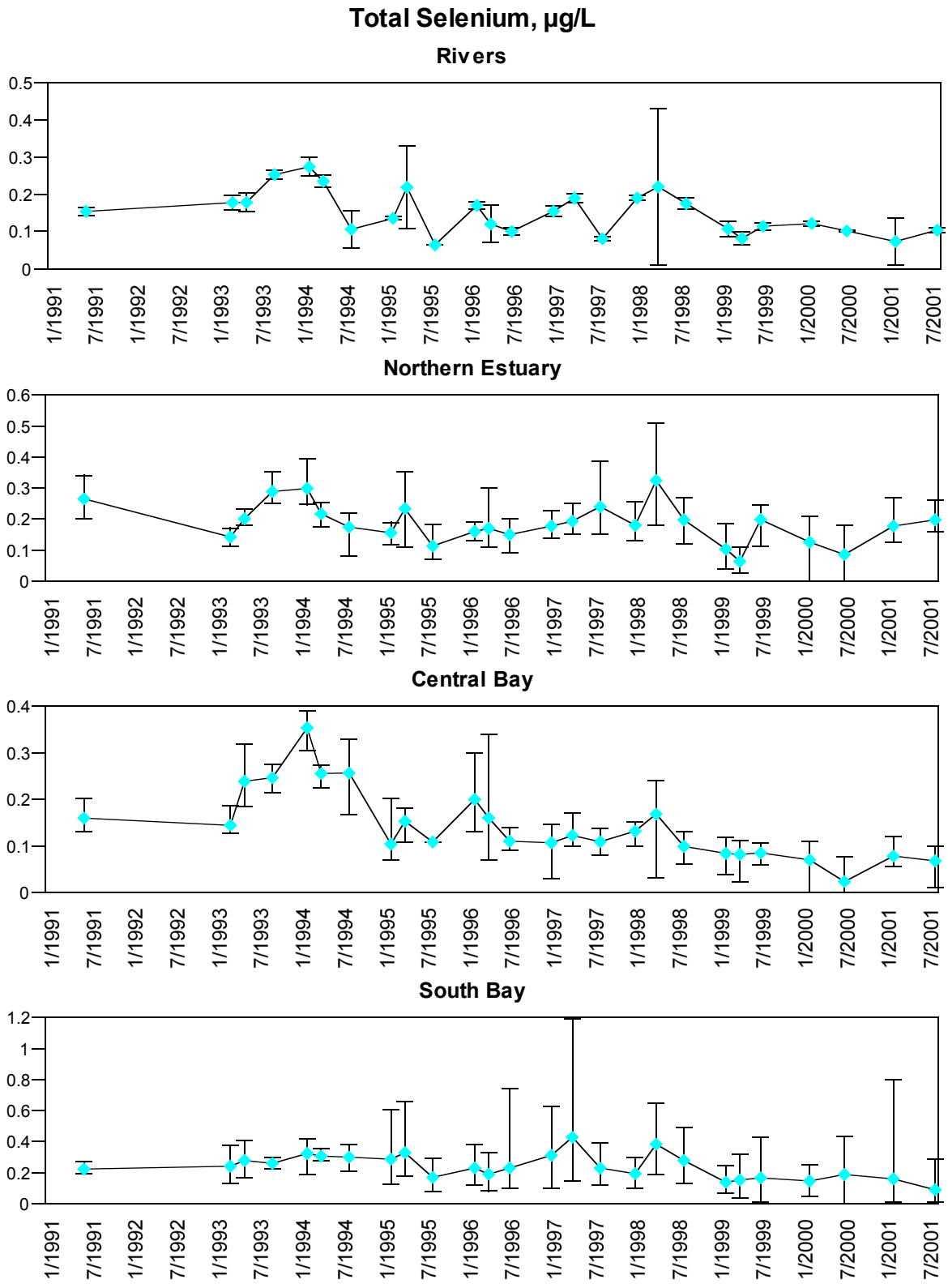

Figure 2.33b. Average total selenium concentrations in water (µg/L) in each Estuary reach from 1991–2001. Note different y-axis scales. The vertical bars represent range of values.

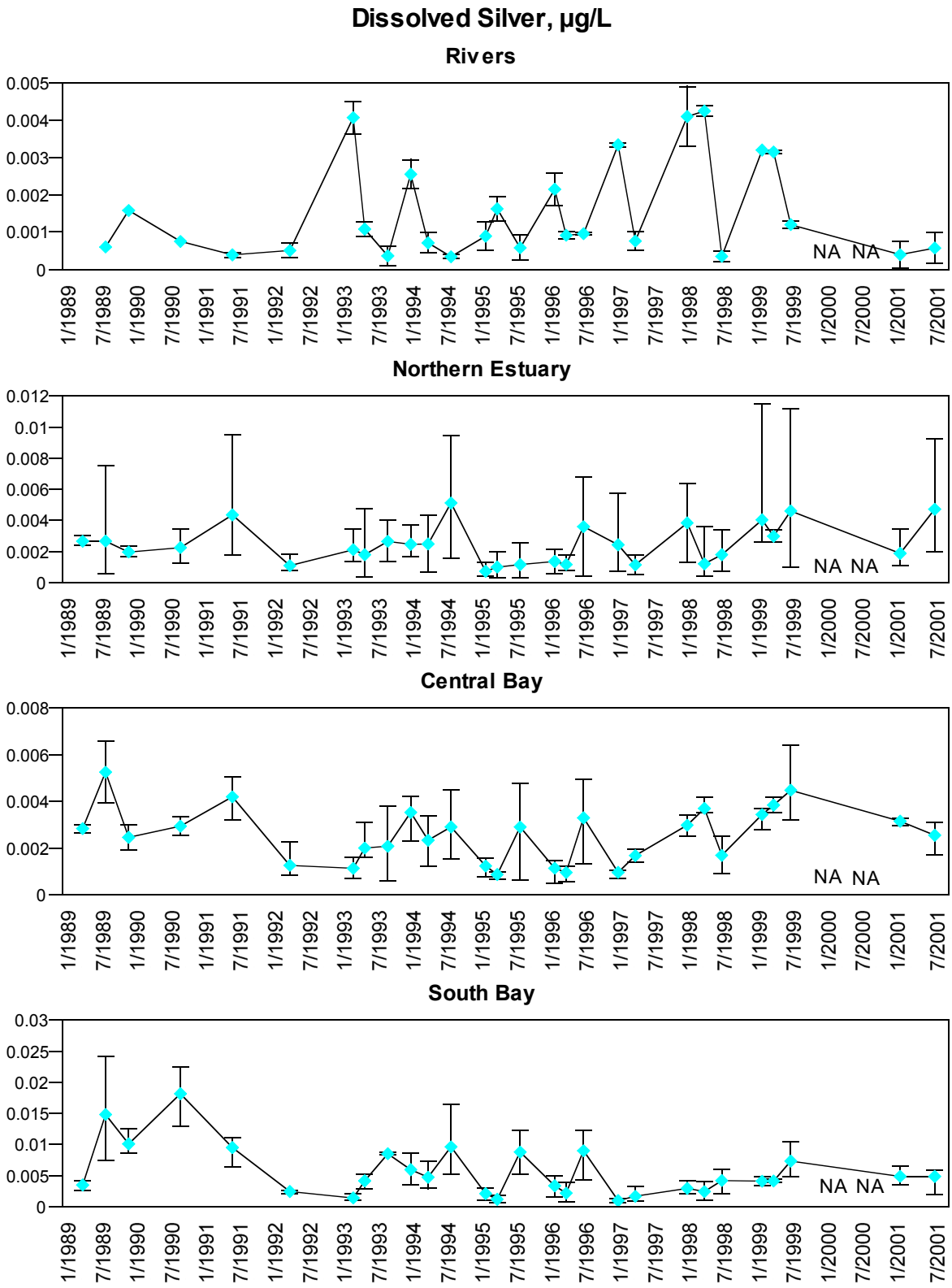

Figure 2.34a. Average dissolved silver concentrations in water (µg/L) in each Estuary reach from 1989–2001. Note different y-axis logarithmic scales. NA = data for 2000 were not available at the time of report production due to instrumentation problems in the laboratory. The vertical bars represent range of values.

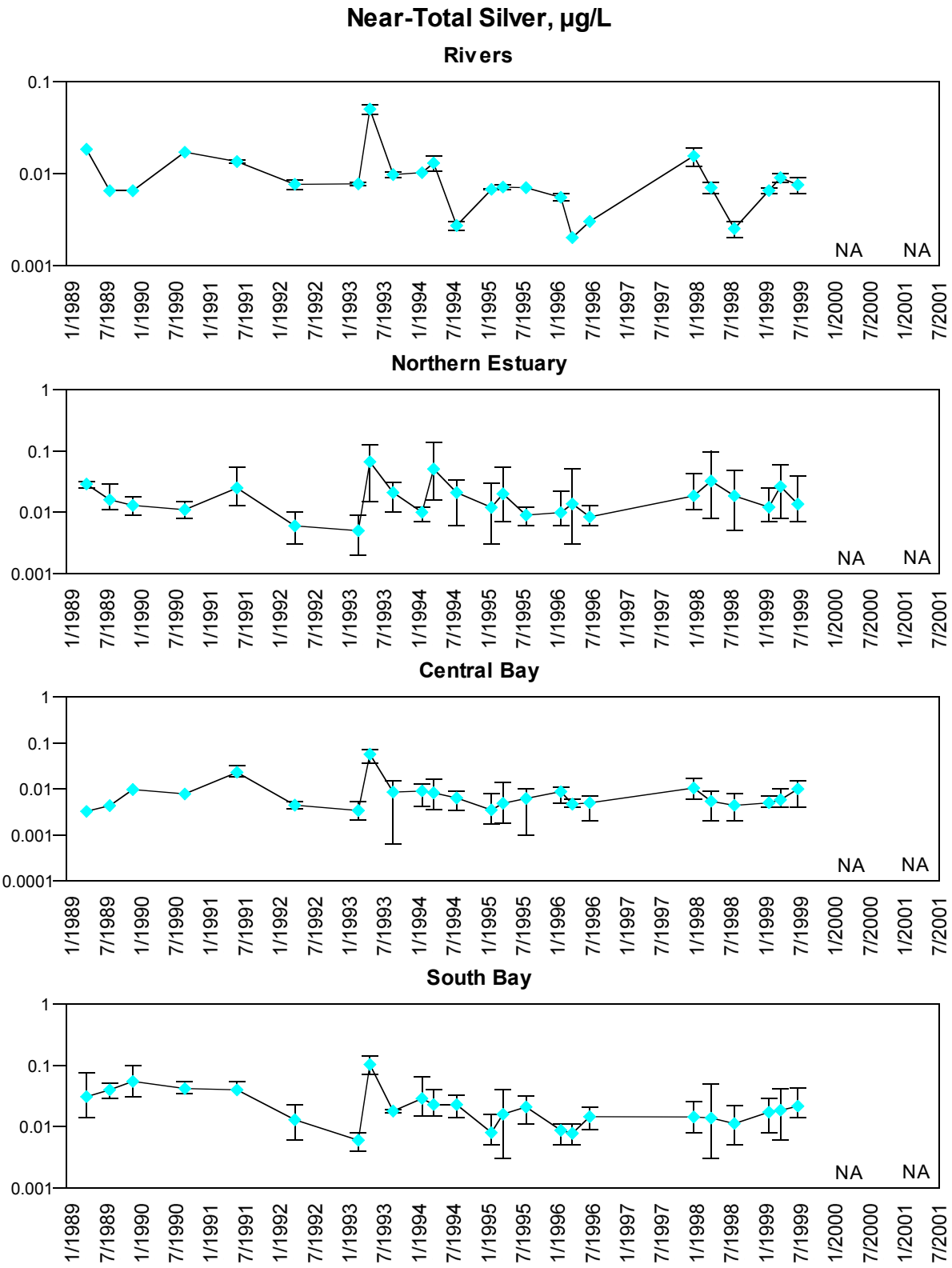

Figure 2.34b. Average near-total silver concentrations in water (µg/L) in each Estuary reach from 1989–2001. Note different y-axis logarithmic scales. The vertical bars represent range of values. All 1997 samples were lost due to methodological problems. NA = data for 2000 and 2001 were not available at the time of report production.

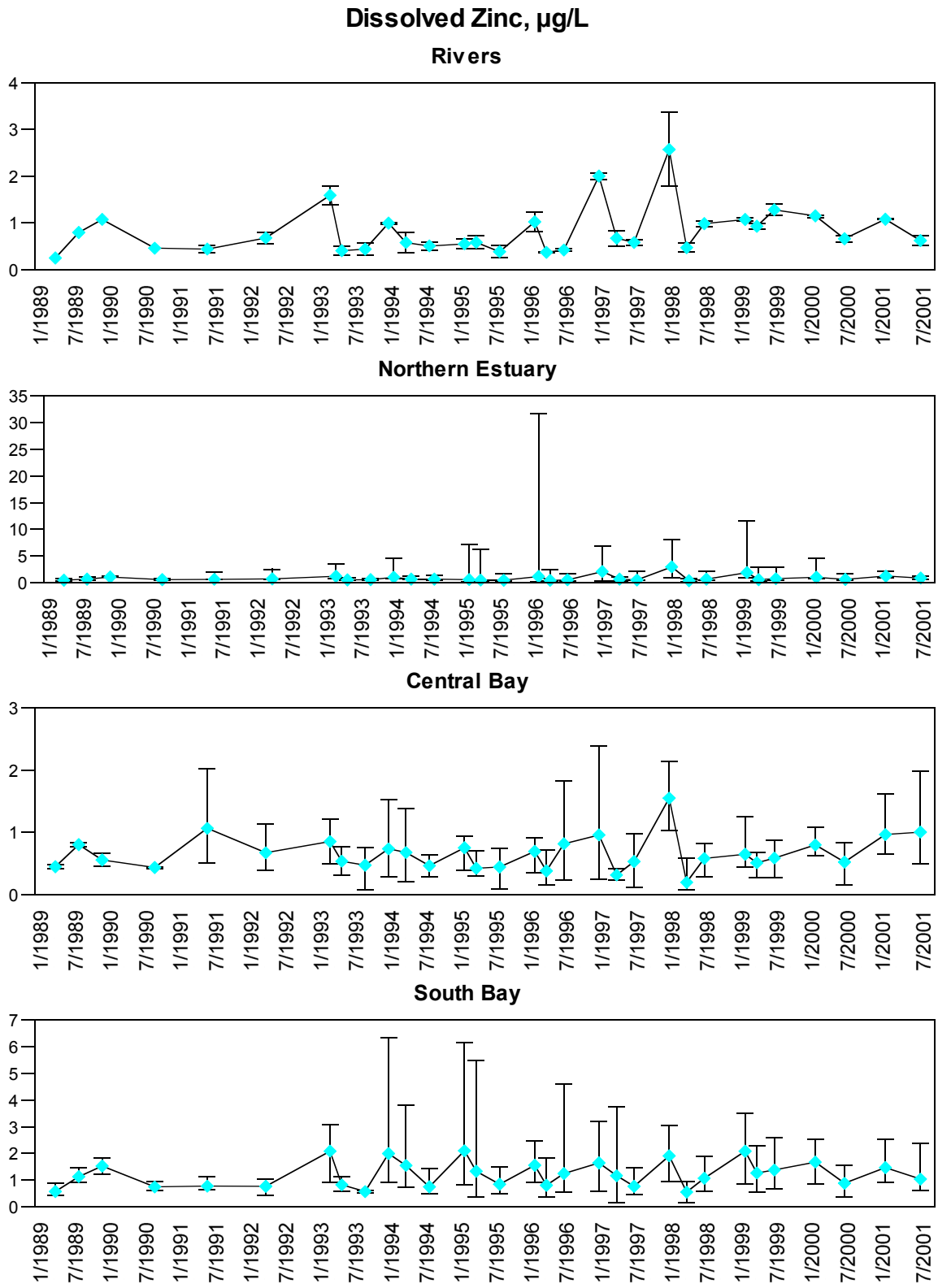

Figure 2.35a. Average dissolved zinc concentrations in water (µg/L) in each Estuary reach from 1989–2001. Note different y-axis scales. The vertical bars represent range of values.

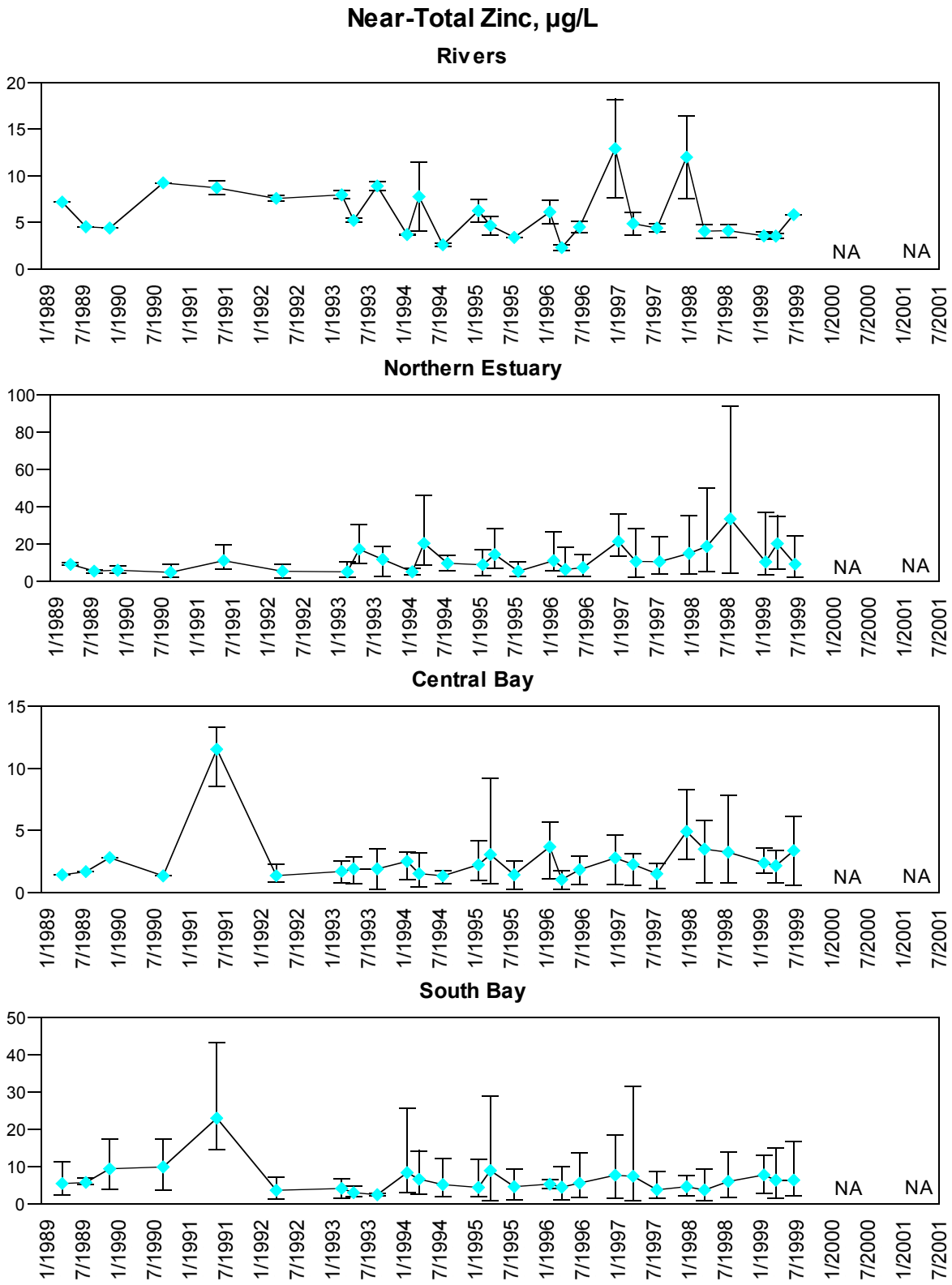

Figure 2.35b. Average near-total zinc concentrations in water (µg/L) in each Estuary reach from 1989–2001. Note different y-axis scales. The vertical bars represent range of values. NA = data for 2000 and 2001 were not available at the time of report production.

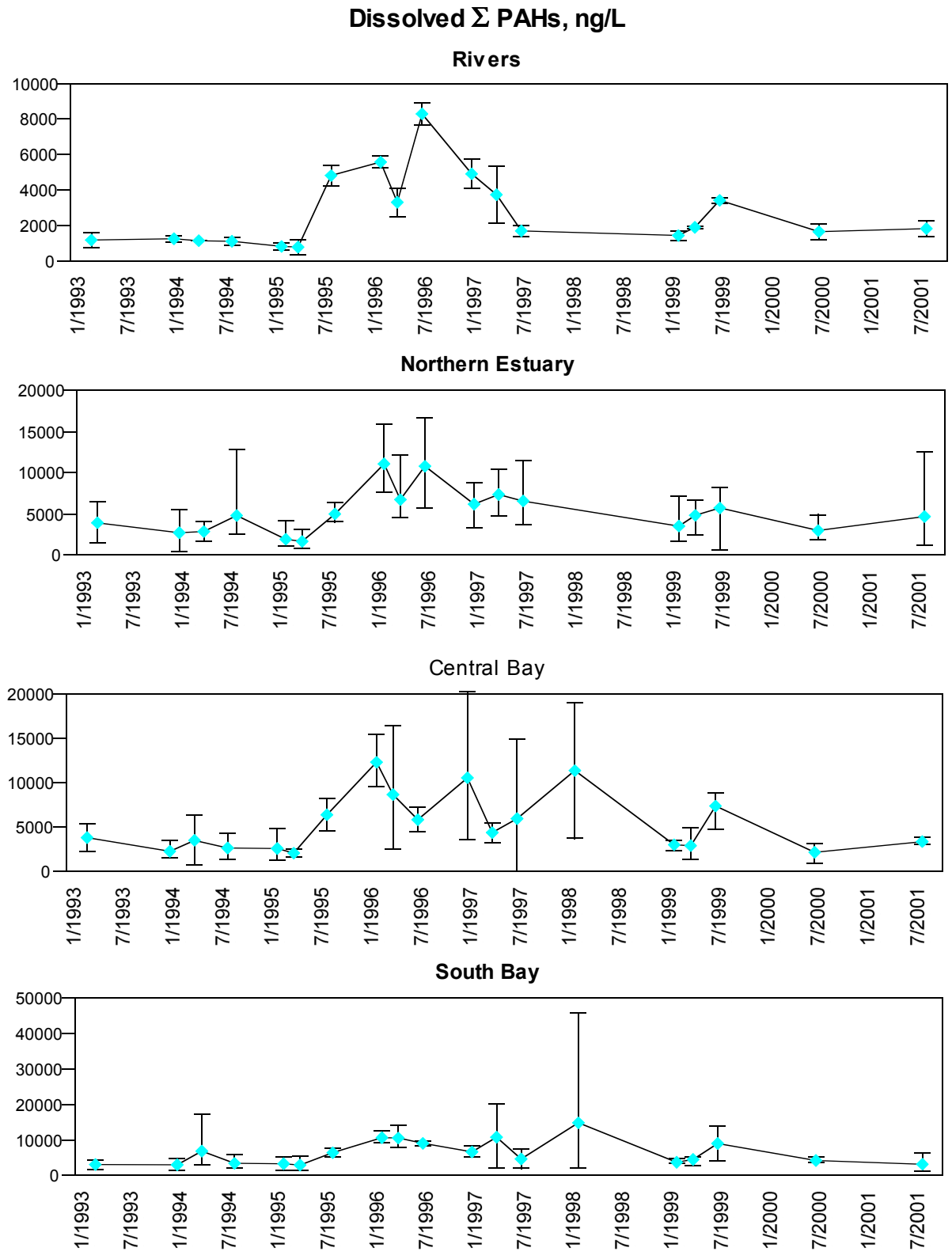

Figure 2.36a. Average dissolved PAH concentrations (ng/L) in water for each Estuary reach from 1993–2001. Note different y-axis logarithmic scales. The vertical bars represent the range of values. Sample size varies between reaches and seasons.

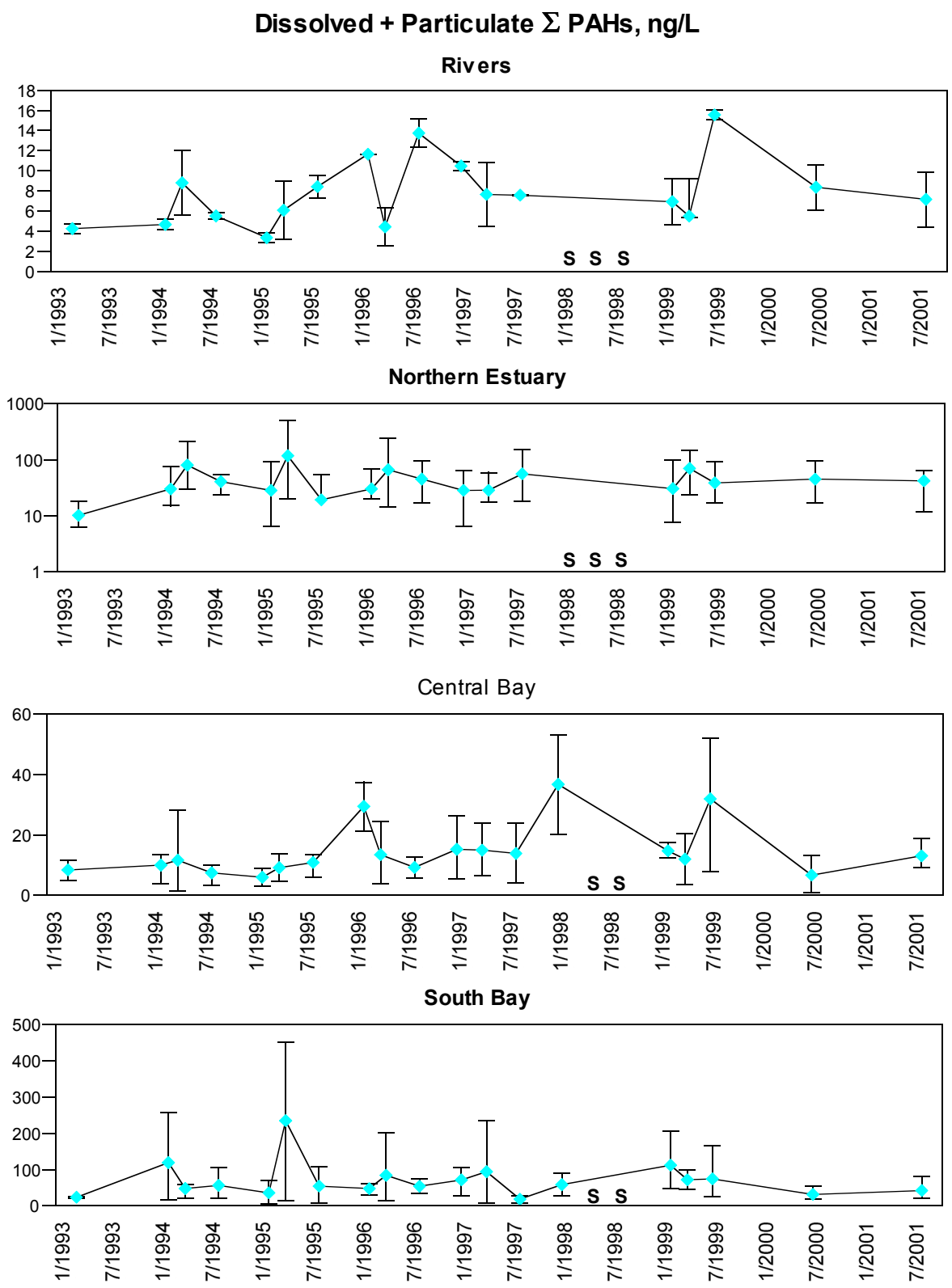

Figure 2.36b. Average total (dissolved + particulate) PAH concentrations (ng/L) in water for each Estuary reach from 1993–2001. Note different y-axis logarithmic scales. The vertical bars represent the range of values. Sample size varies between reaches and seasons. S = qualified values represent significant portion of the sum.

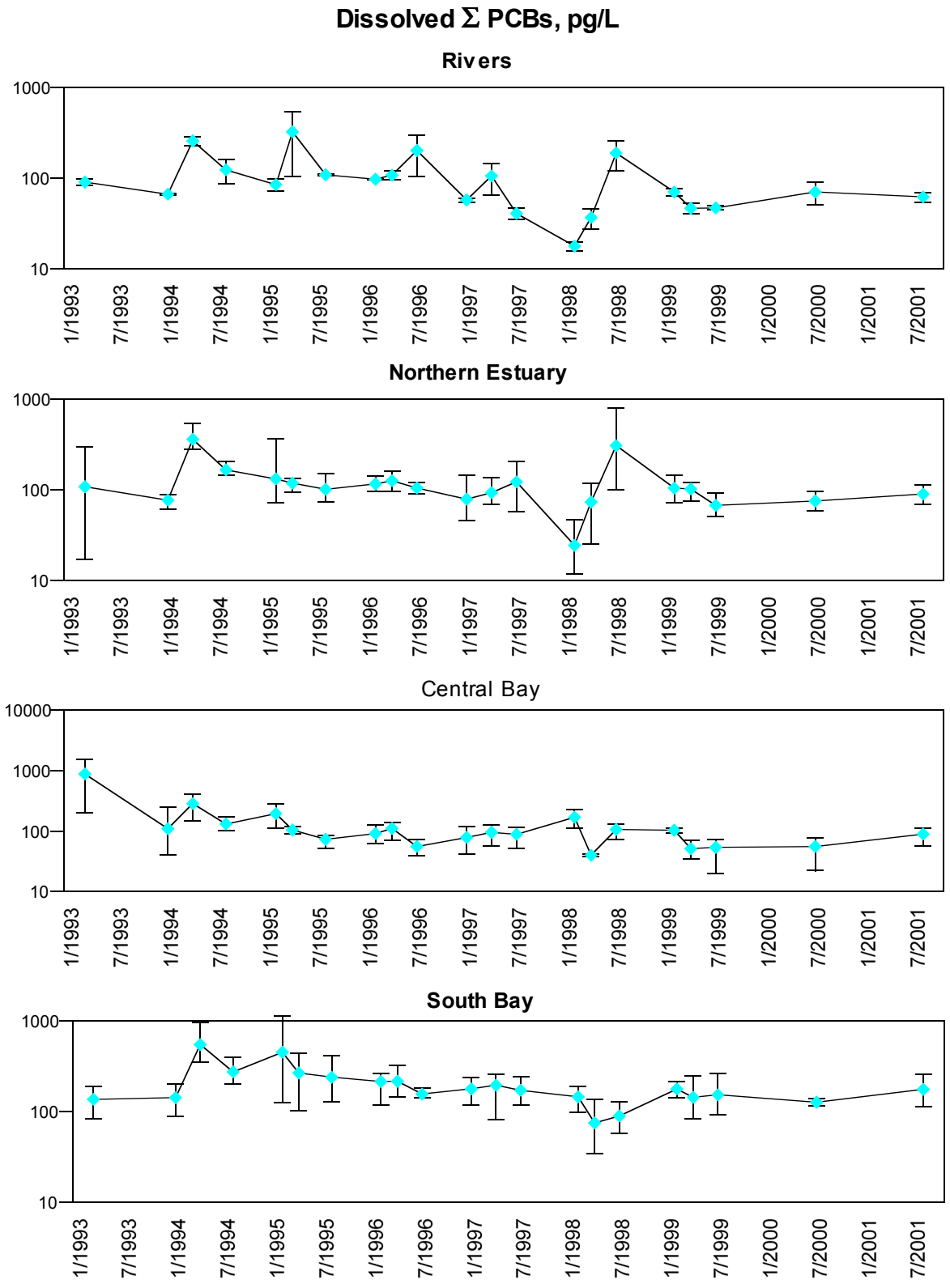

Figure 2.37a. Average dissolved PCB concentrations (pg/L) in water for each Estuary reach from 1993–2001. Note different y-axis logarithmic scales. The vertical bars represent the range of values. Sample size varies between reaches and seasons.

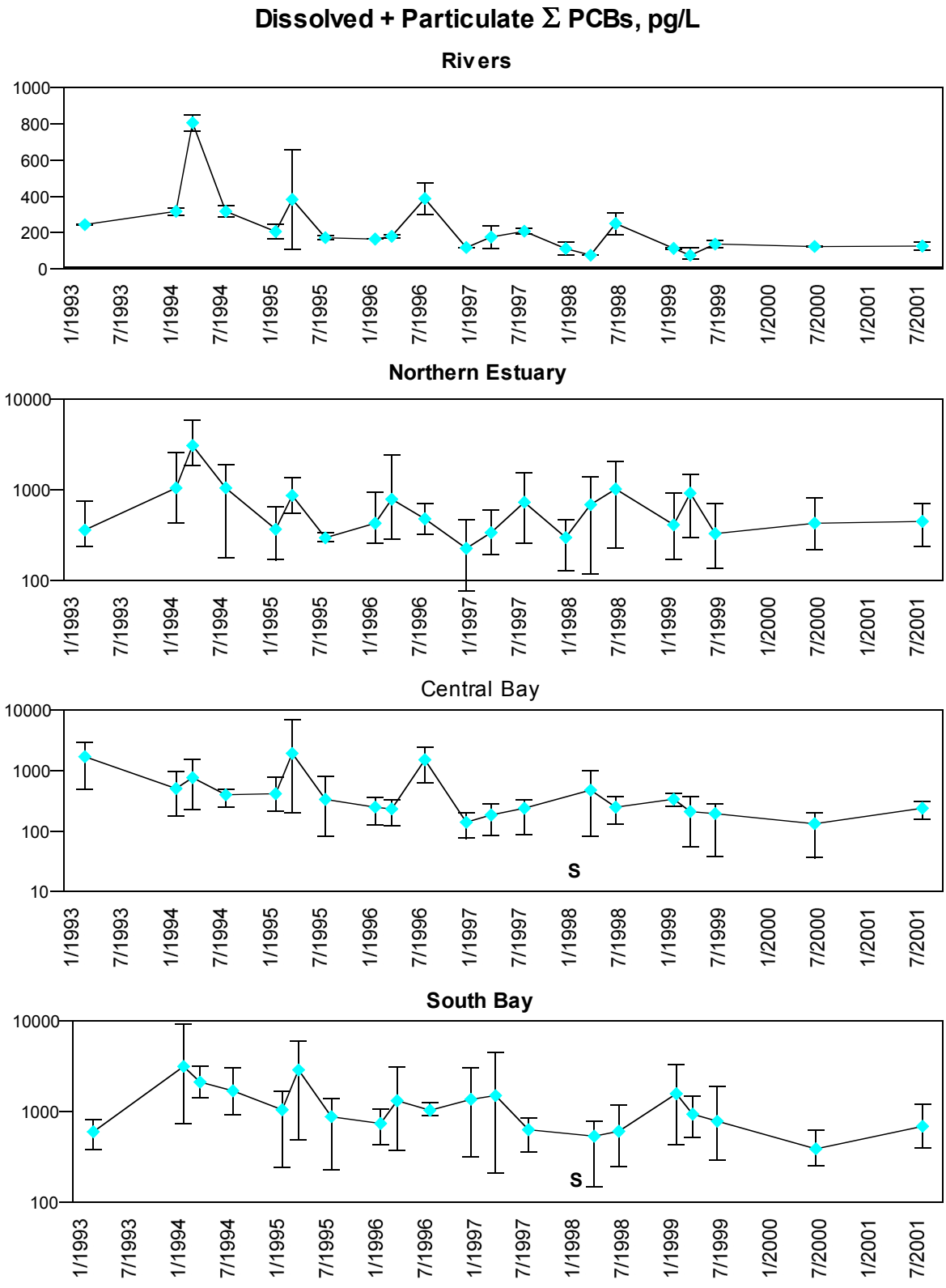

Figure 2.37b. Average total (dissolved + particulate) PCB concentrations (pg/L) in water for each Estuary reach from 1993–2001. Note different y-axis logarithmic scales. The vertical bars represent the range of values. Sample size varies between reaches and seasons. S = qualified values represent significant portion of the sum.

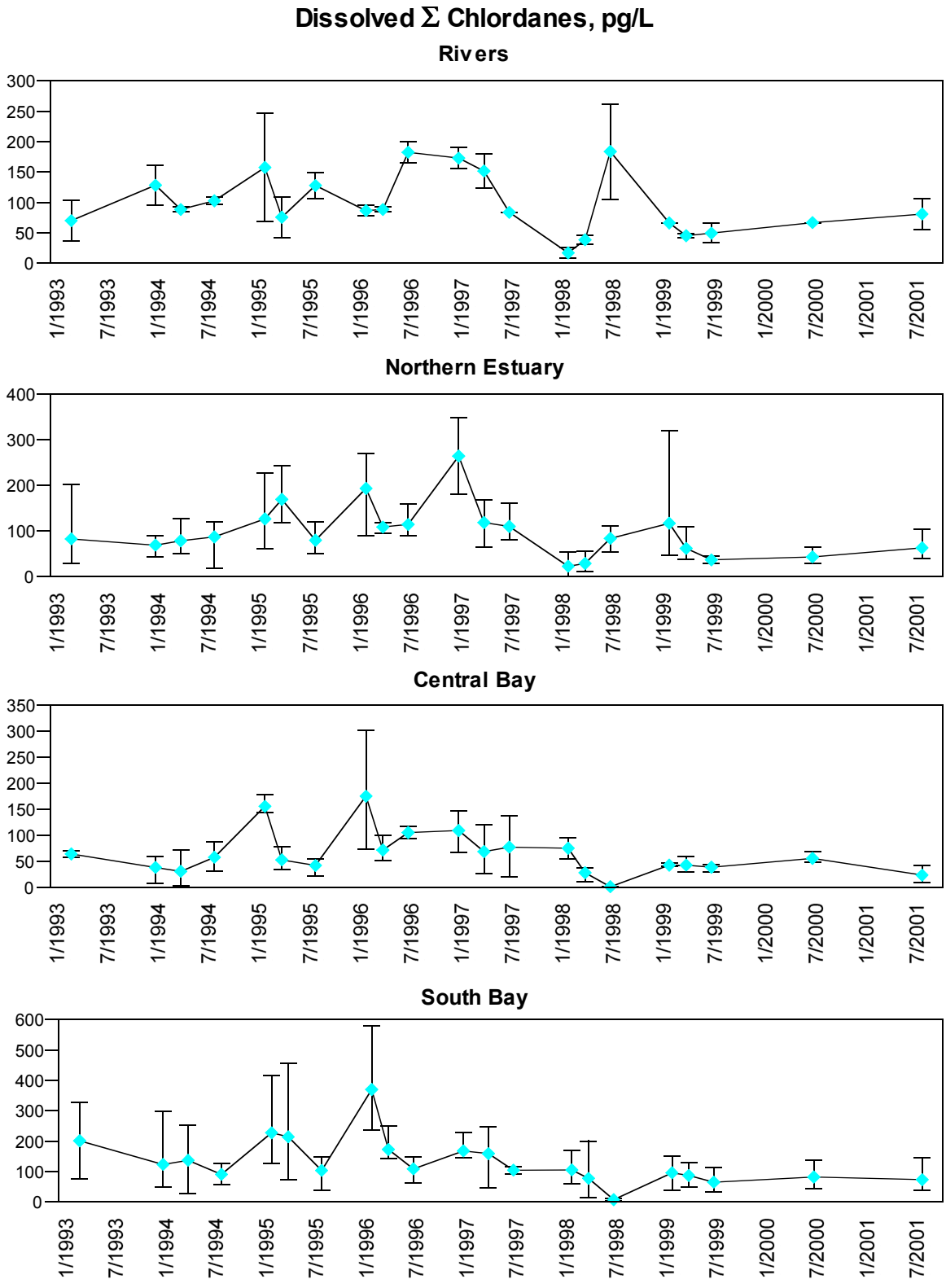

Figure 2.38a. Averagedissolved Chlordane concentrations (pg/L) in water for each Estuary reach from 1993–2001. Note different y-axis scales. The vertical bars represent the range of values. Sample size varies between reaches and seasons.

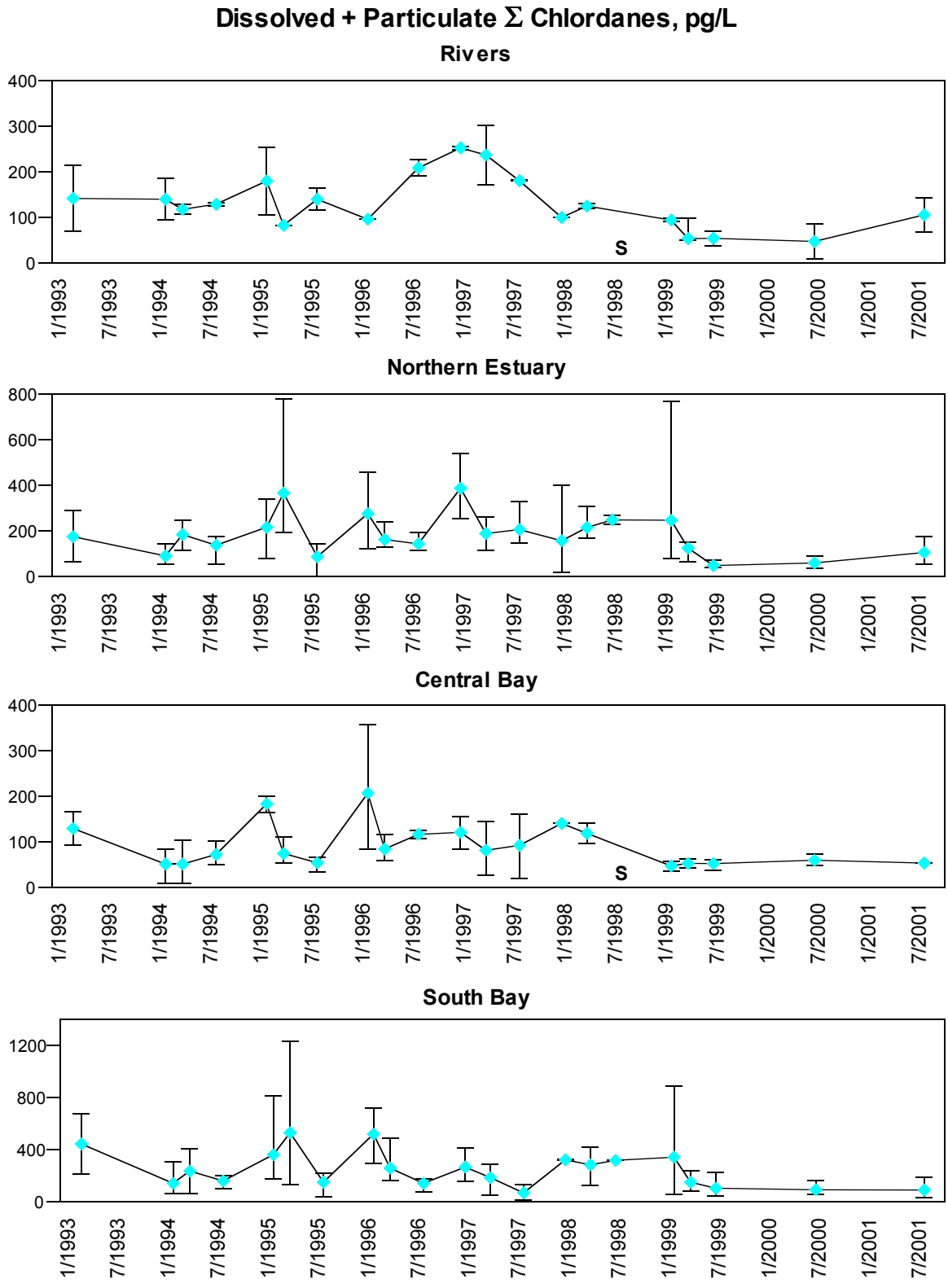

Figure 2.38b. Average total (dissolved + particulate) Chlordane concentrations (pg/L) in water for each Estuary reach from 1993–2001. Note different y-axis scales. The vertical bars represent the range of values. Sample size varies between reaches and seasons. S = qualified values represent significant portion of the sum.

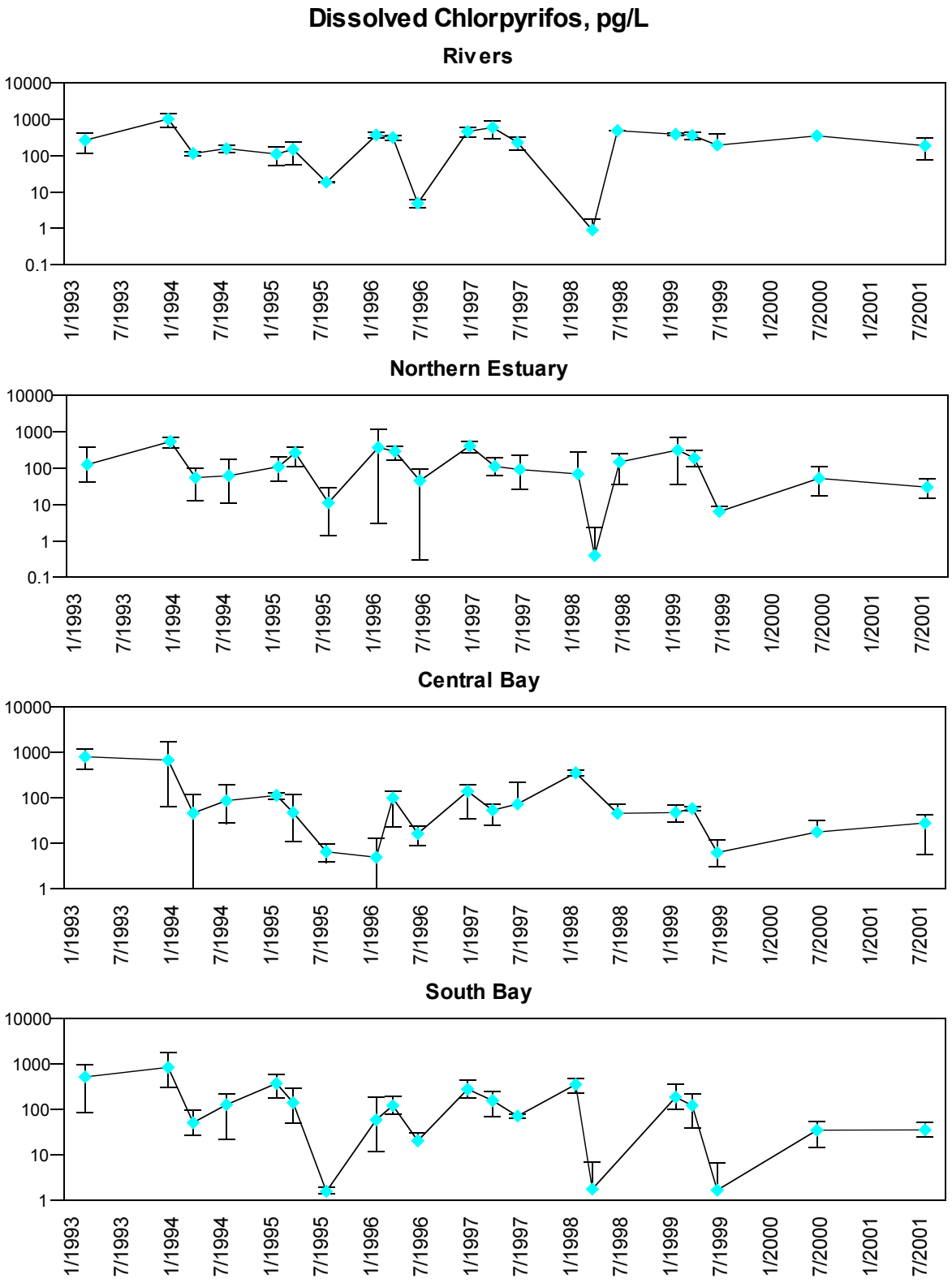

Figure 2.39a. Average dissolved Chlorpyrifos concentrations (pg/L) in water for each Estuary reach from 1993–2001. Note different y-axis logarithmic scales. The vertical bars represent the range of values. Sample size varies between reaches and seasons.

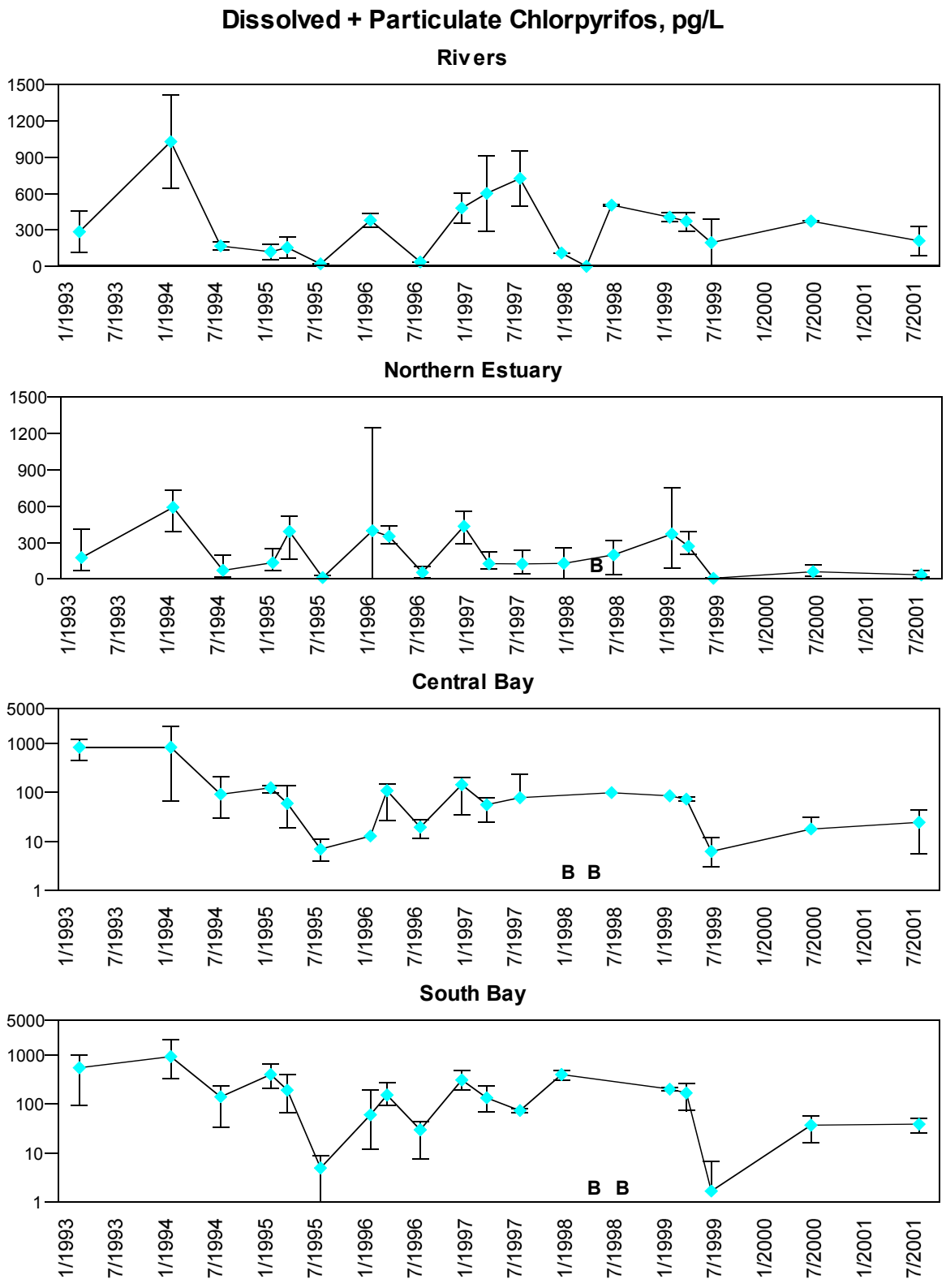

Figure 2.39b. Average total (dissolved + particulate) Chlorpyrifos concentrations (pg/L) in water for each Estuary reach from 1993–2001. Note different y-axis logarithmic scales. The vertical bars represent the range of values. Sample size varies between reaches and seasons. B = significant portion of the samples suffered from blank contamination.

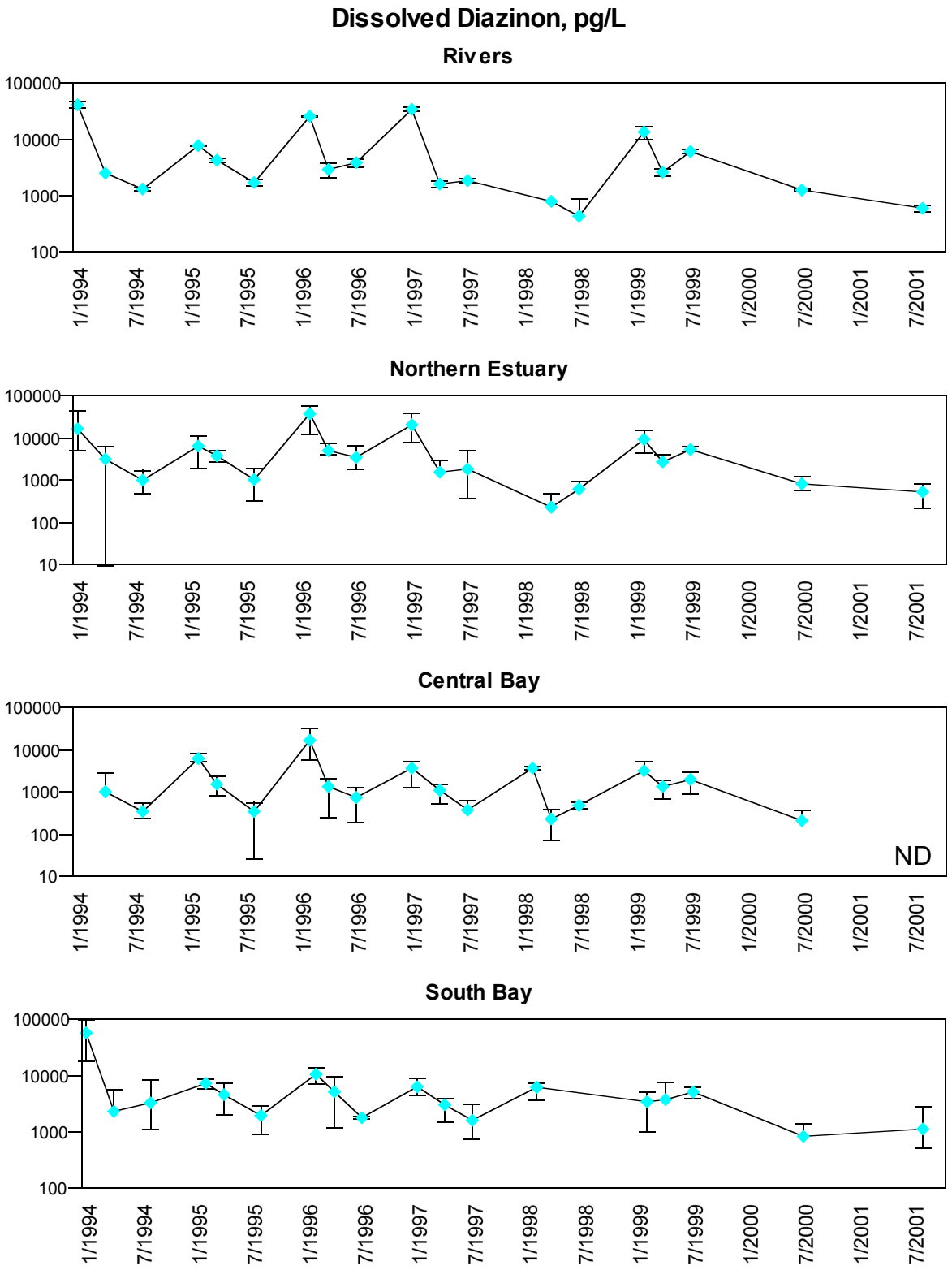

Figure 2.40a. Average dissolved Diazinon concentrations (parts per quadrillion, ppq) in water for each Estuary reach from 1994–2001. Note logarithmic scale. Sample size varies between reaches and seasons. The vertical bars represent the range of values. ND = not detected.

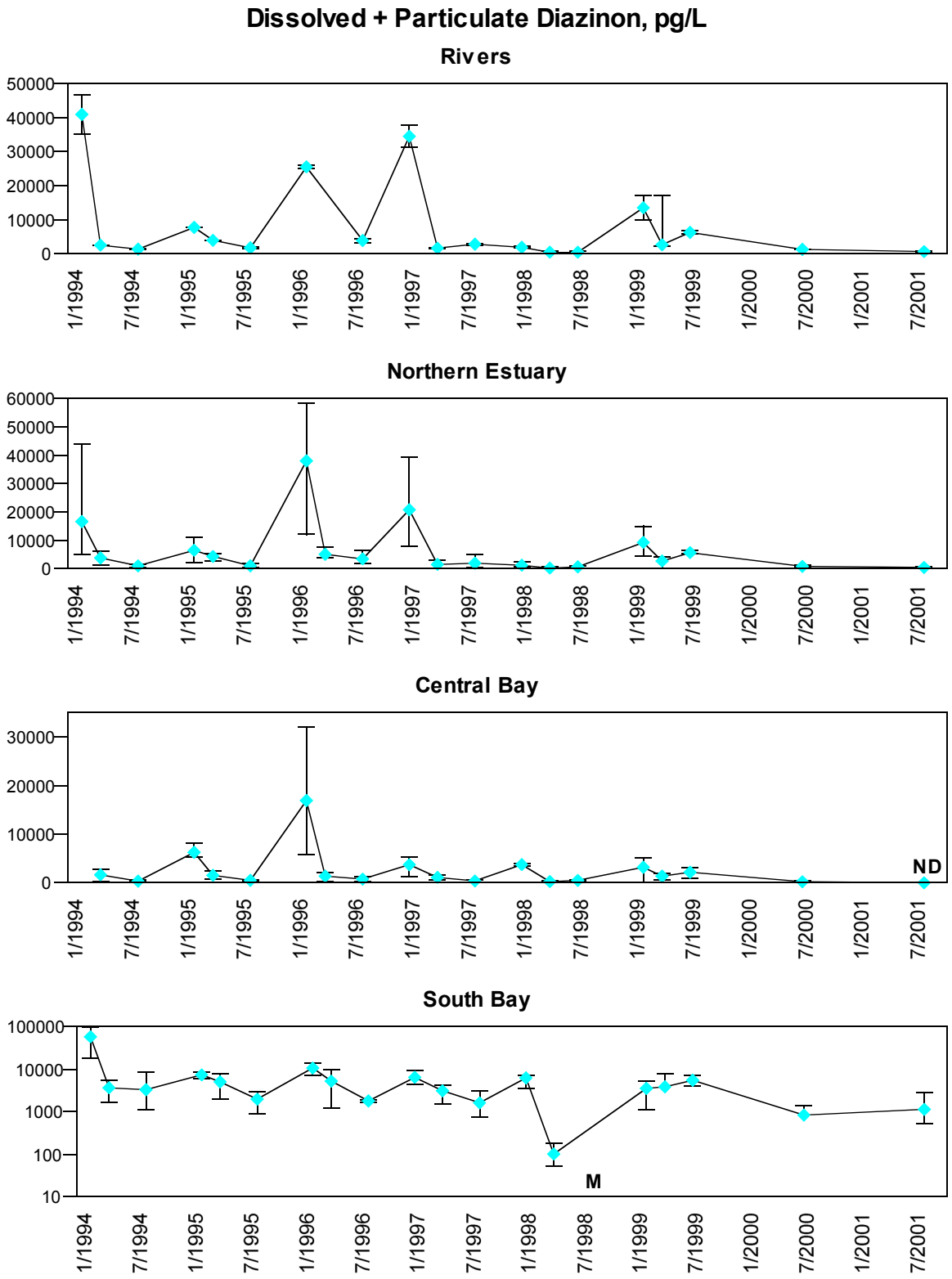

Figure 2.40b. Average total (dissolved + particulate) Diazinon concentrations (parts per quadrillion, ppq) in water for each Estuary reach from 1994–2001. Note logarithmic scale. Sample size varies between reaches and seasons. The vertical bars represent the range of values. M = matrix interference. ND = not detected.

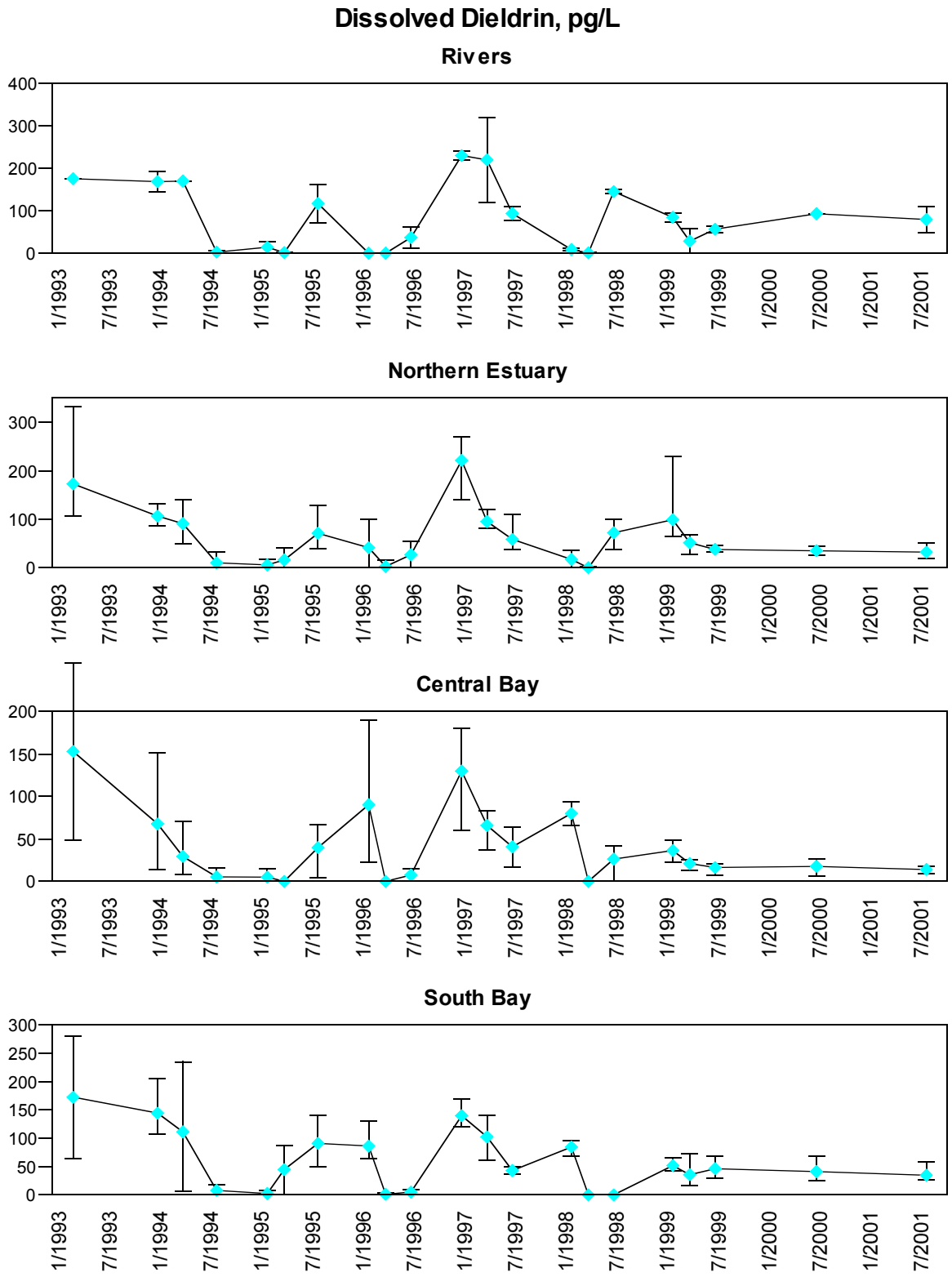

Figure 2.41a. Average dissolved Dieldrin concentrations (pg/L) in water for each Estuary reach from 1993–2001. Note different y-axis scales. The vertical bars represent the range of values. Sample size varies between reaches and seasons.

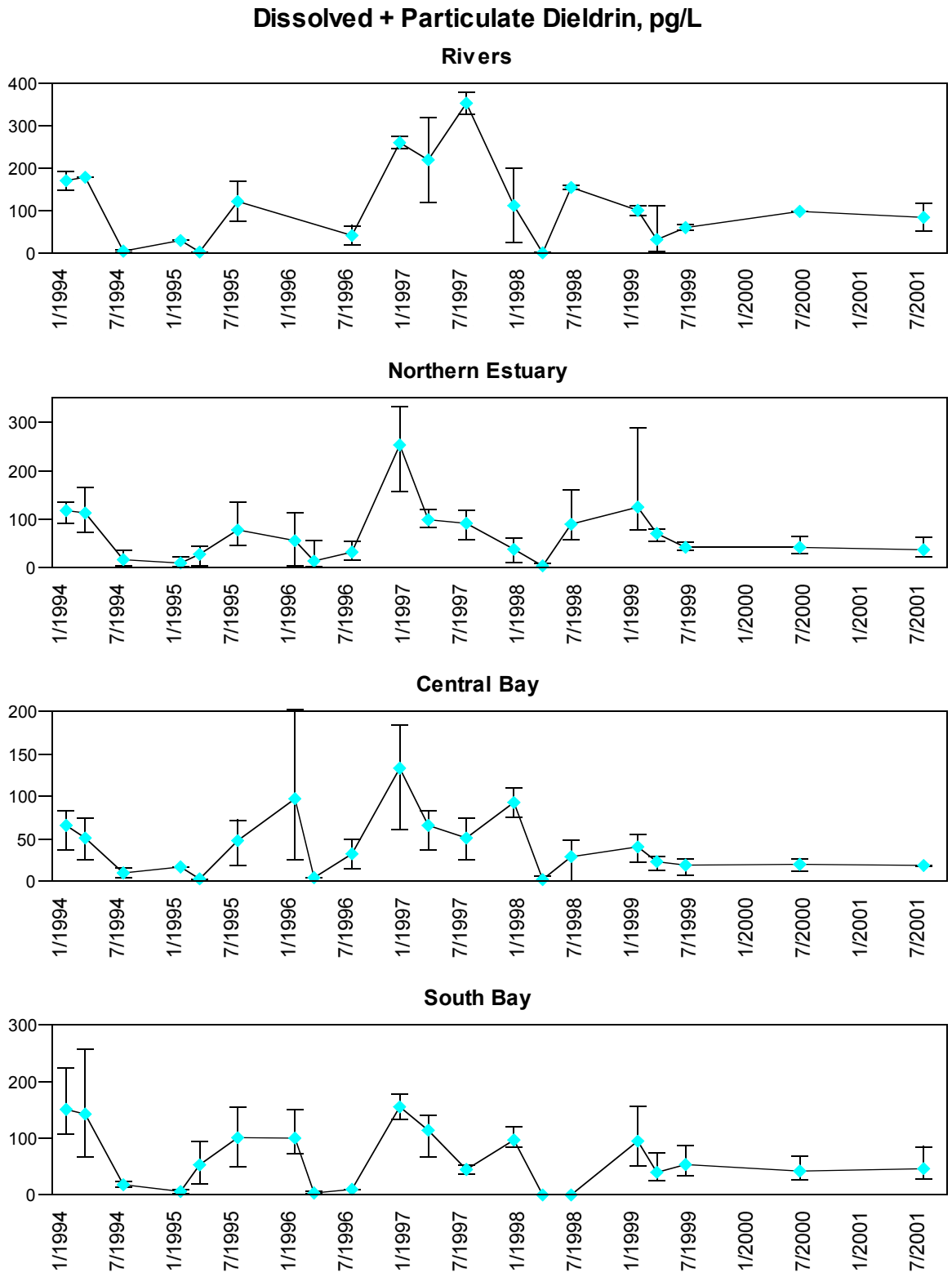

Figure 2.41b. Average total (dissolved + particulate) Dieldrin concentrations (pg/L) in water for each Estuary reach from 1994–2001. Note different y-axis scales. The vertical bars represent the range of values. Sample size varies between reaches and seasons.

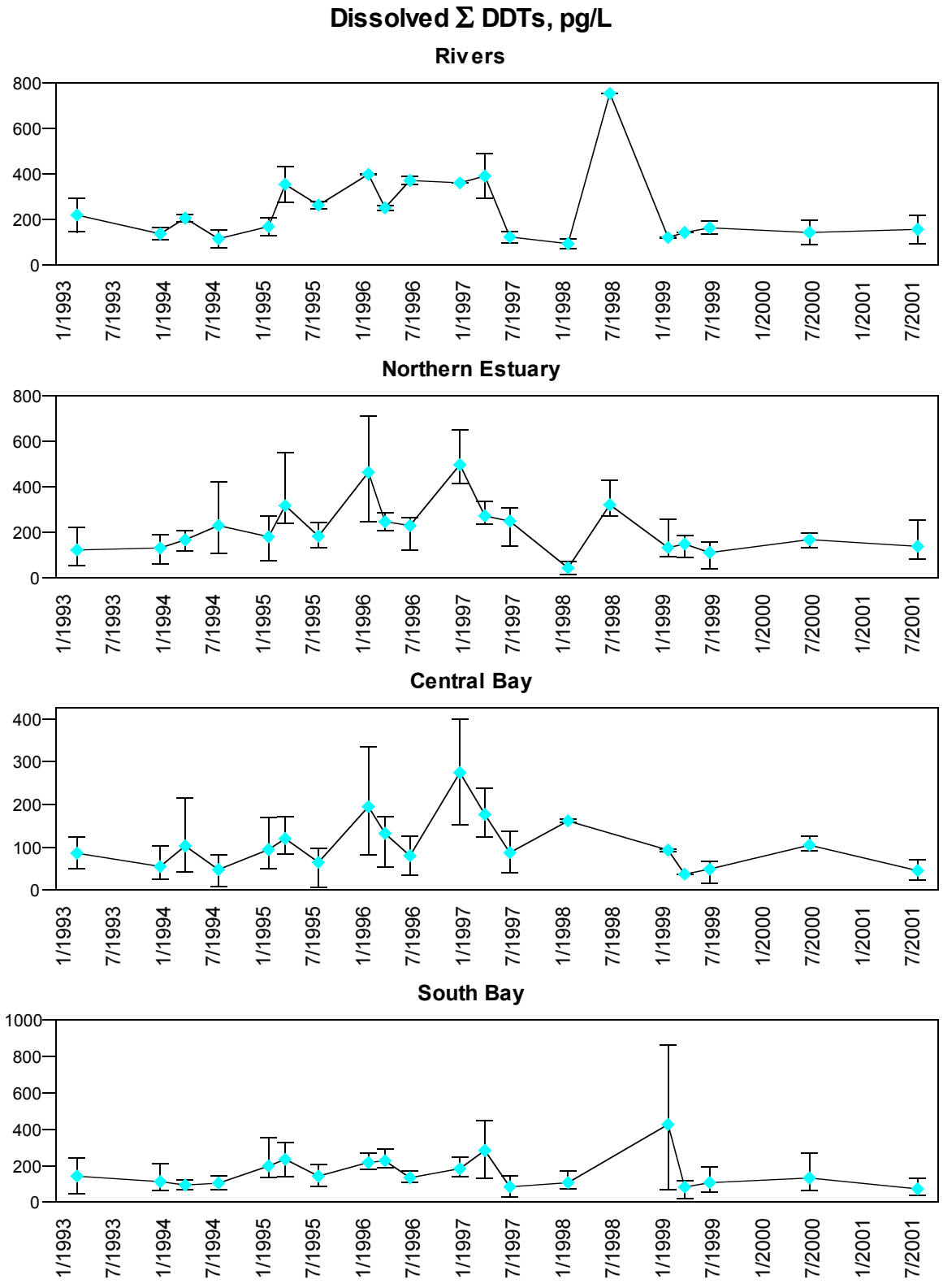

Figure 2.42a. Average dissolved DDT concentrations (pg/L) in water for each Estuary reach from 1993–2001. Note different y-axis logarithmic scales. The vertical bars represent the range of values. Sample size varies between reaches and seasons.

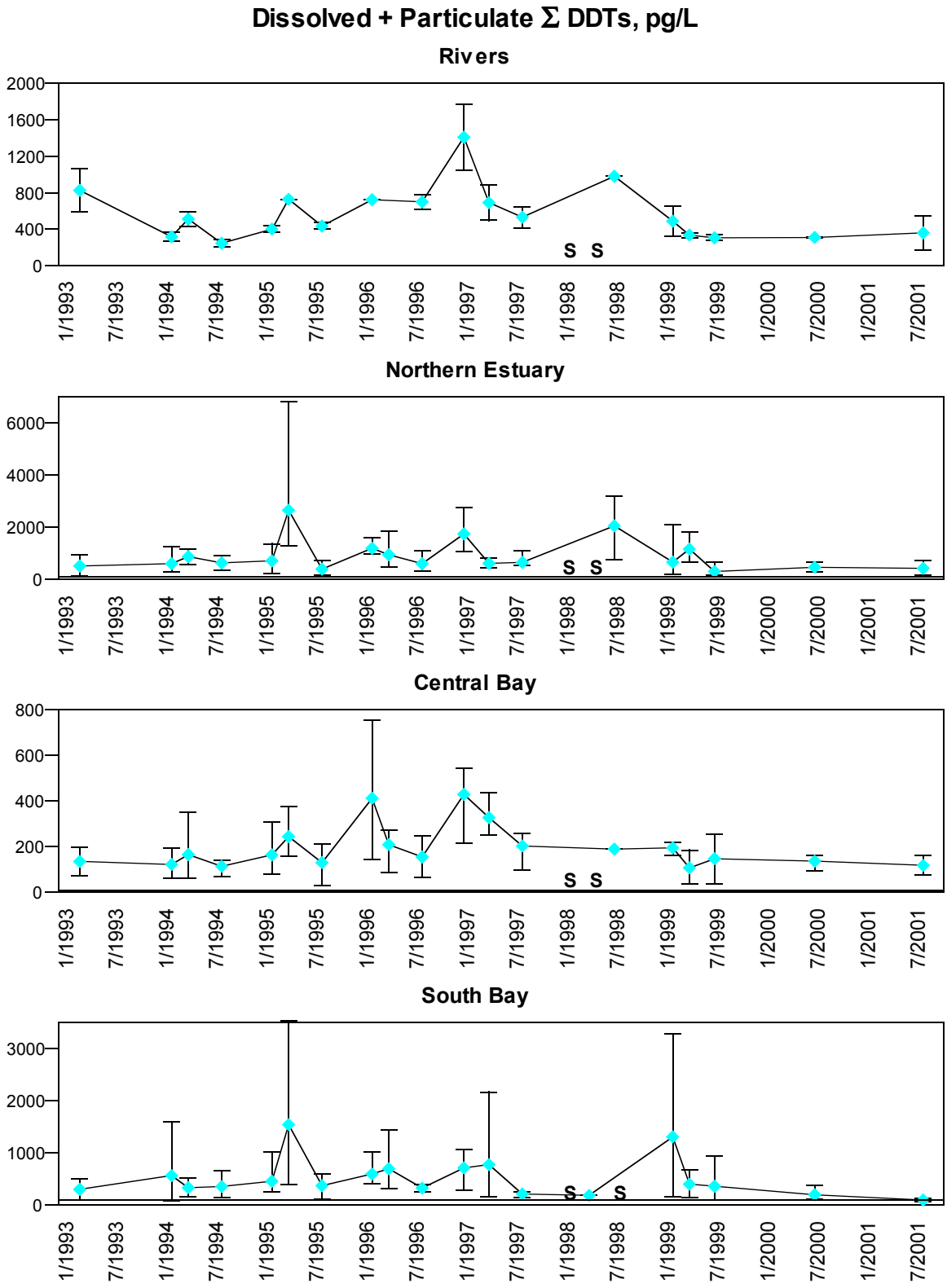

Figure 2.42b. Average total (dissolved + particulate) DDT concentrations (pg/L) in water for each Estuary reach from 1993–2001. Note different y-axis logarithmic scales. The vertical bars represent the range of values. Sample size varies between reaches and seasons. S = qualified values represent significant portion of the sum.

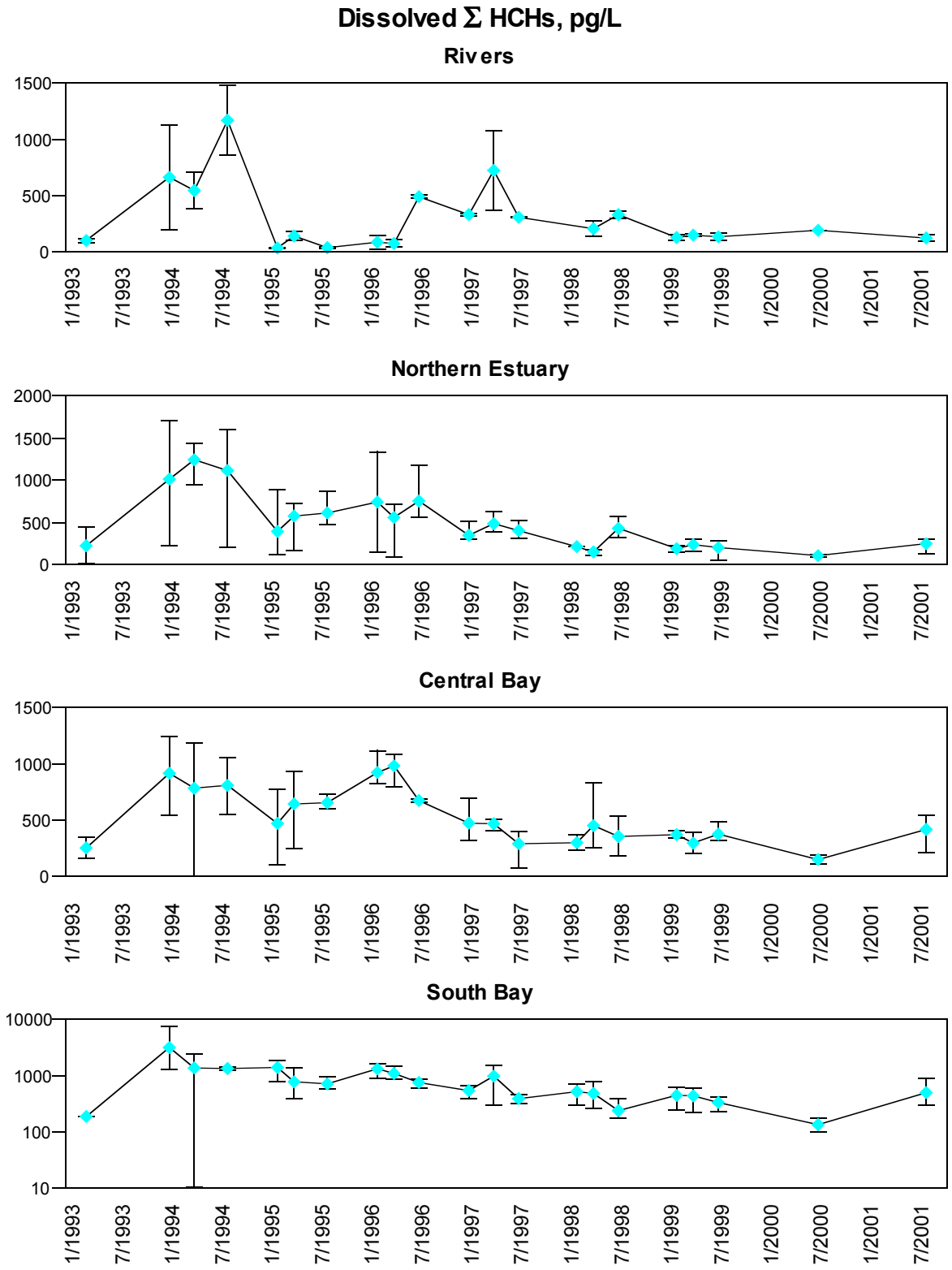

Figure 2.43a. Average dissolved HCH concentrations (pg/L) in water for each Estuary reach from 1994–2001. Note different y-axis scales and logarithmic scale for concentrations in the South Bay. The vertical bars represent the range of values. Sample size varies between reaches and seasons.

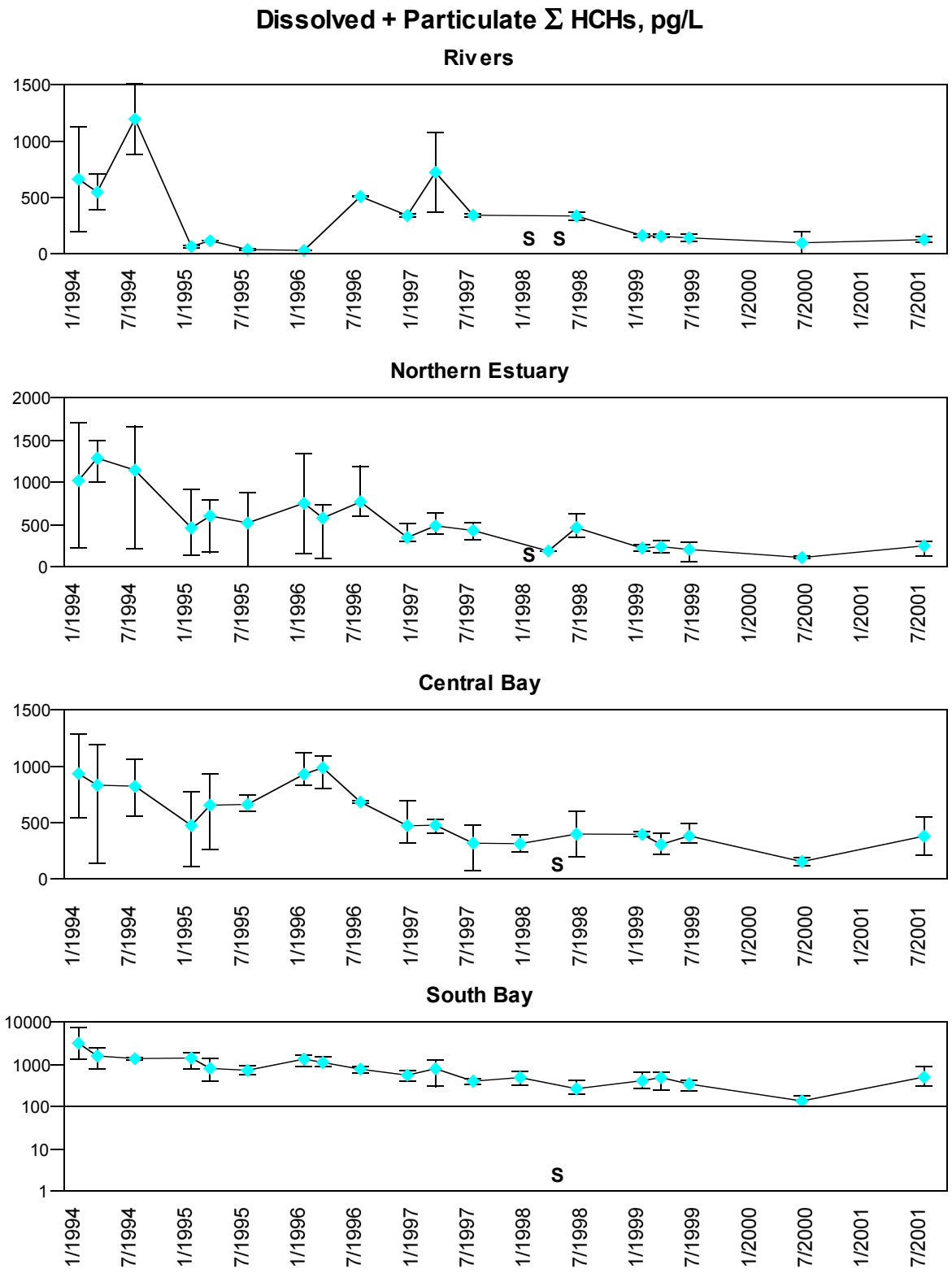

Figure 2.43b. Average total (dissolved + particulate) HCH concentrations (pg/L) in water for each Estuary reach from 1994–2001. Note different y-axis scales and logarithmic scale for concentrations in the South Bay. The vertical bars represent the range of values. Sample size varies between reaches and seasons. S = qualified values represent significant portion of the sum.

2001 Regional Monitoring Program

Water Data Tables

Table 1. Conventional water quality parameters, 2001.

b = blank contamination <30% of measured concentration, E = estimated value unreliable due to meter/probe problems, NA = not available, NC = not calculated, ND = not detected, NS = not sampled.
Nitrate is derived from the difference between concentrations of NOx and Nitrite.

Station Code	Station	Date	Cruise	Ammonia	Chlorophyll-a	Conductivity	DO	DOC	Hardness	Nitrate	Nitrite	pH	Phaeophytin	Phosphate	Salinity (by salinometer)	Salinity (by SCT)	Silicates	Temperature	TSS
				mg/L	mg/m^3	µmho	mg/L	ug/L	mg/L	mg/L	mg/L	pH	mg/m^3	mg/L	psu	°/oo	mg/L	°C	mg/L
BG20	Sacramento River	2/14/01	2001-02	b 0.2	1.4	1986	10.7	3021	185	0.43	0.018	7.6	1.5	0.07	ND	1	7.3	9.5	43.4
BG30	San Joaquin River	2/14/01	2001-02	b 0.21	1.2	1290	10.5	3195	168	0.45	0.018	7.6	1.5	0.07	ND	0.6	7	9.5	46.5
BF40	Honker Bay	2/13/01	2001-02	b 0.2	0.9	8190	10.4	3051	865	0.50	0.026	7.8	3.9	0.07	4.5	4.6	5.8	9	126.7
BF20	Grizzly Bay	2/13/01	2001-02	0.18	1	10390	10.9	2534	1120	0.24	0.021	7.8	2.2	0.04	5.8	5.9	3.4	9.3	65.9
BF10	Pacheco Creek	2/13/01	2001-02	0.2	1.2	12750	11.1	3099	1490	0.51	0.02	7.9	3	0.07	7.9	7.7	4.7	9.6	103.7
BD50	Napa River	2/12/01	2001-02	0.19	1.6	22920	9.3	2240	2540	0.54	0.018	7.9	2.2	0.08	13.6	13.8	5.1	10	64.5
BD40	Davis Point	2/12/01	2001-02	0.15	1.8	27600	10	1976	3550	0.24	0.013	8	2.1	0.04	19.3	E	1.9	9.6	57.9
BD30	Pinole Point	2/12/01	2001-02	0.13	2.6	36310	9.4	NA	4320	0.36	0.005	8	1.1	0.06	23.4	22.8	2.6	9.8	30.3
BD20	San Pablo Bay	2/12/01	2001-02	0.15	3.4	30770	9.9	1970	3620	0.43	0.005	8	5.6	0.07	19	19	3.9	9.3	168.4
BD15	Petaluma River	2/12/01	2001-02	0.3	6.1	22740	8.6	5081	2660	0.96	0.073	7.7	7.9	0.13	13.6	13.7	3.8	8.7	275.6
BC60	Red Rock	2/8/01	2001-02	0.1	2.5	46090	8.7	1099	NA	0.26	0.003	7.9	2.1	0.05	29.9	29.9	1.5	10.9	28.1
BC41	Point Isabel	2/8/01	2001-02	0.11	2.5	43260	8.6	1171	NA	0.29	0.011	8.1	1.4	0.05	27.5	27.7	1.9	10	22.8
BC30	Richardson Bay	2/8/01	2001-02	0.1	2.3	46140	8.6	2612	NA	0.15	0.007	8.1	1.1	0.03	30	29.9	0.8	11.1	9.8
BC20	Golden Gate	3/3/33	2001-02	NS	NS	NS	NS	NS	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
BC10	Yerba Buena Island	2/8/01	2001-02	0.15	3.1	43870	9.2	2048	NA	0.29	0.009	8.1	2.7	0.06	28.2	28.2	1.7	10.8	36
BB70	Alameda	2/8/01	2001-02	0.14	3.4	43920	9.2	2648	NA	0.29	0.011	8.2	1.1	0.06	28.5	28.2	1.7	11.5	18.1
BB30	Oyster Point	2/6/01	2001-02	0.16	5.6	43050	8.7	2312	NA	0.32	0.013	7.9	3.1	0.07	27.9	27.6	1.8	10.8	39.4
BB15	San Bruno Shoal	2/6/01	2001-02	0.11	4.8	43980	9.3	1658	NA	0.28	0.012	8	1.5	0.08	28.6	28.3	1.2	10.7	5.7
BA40	Redwood Creek	2/6/01	2001-02	b 0.04	16	43990	8.6	4877	NA	0.03	ND	8.2	17.5	0.07	28.5	28.3	0.5	12	198.2
BA30	Dumbarton Bridge	2/7/01	2001-02	0.12	7.3	42080	8.1	4048	NA	0.63	0.015	7.8	9.6	0.18	26.9	26.9	1.7	10.9	181.9
BA20	South Bay	2/7/01	2001-02	0.13	8.6	42030	8.7	1634	NA	0.59	0.019	7.9	7.5	0.17	26.9	26.9	1.7	10.6	119.5
BA10	Coyote Creek	2/7/01	2001-02	0.12	7.7	46140	8.6	2552	NA	0.76	0.019	8.1	4.1	0.20	26	29.9	1.8	11.1	64.5
C-3-0	San Jose	2/7/01	2001-02	0.23	5.4	24210	8.4	5069	2500	5.04	0.169	7.8	4.5	0.91	13.2	E	5.3	11	97.9
C-1-3	Sunnyvale	2/7/01	2001-02	0.32	0.9	26800	8.7	3537	3160	3.16	0.168	7.9	1.4	0.60	17.9	16.5	3.7	9.9	442.2
BW10	Standish Dam	2/5/01	2001-02	0.24	5.8	5990	5.5	4804	780	6.24	0.372	7.7	2.2	1.35	3.3	3.3	8.4	15.1	26.8
BW15	Guadalupe River	2/5/01	2001-02	0.05	2.9	2268	7	1700	459	4.10	0.018	8	2.9	0.04	ND	1.2	8.3	18.9	71.2
BG20	Sacramento River	8/7/01	2001-08	0.06	3.6	485	9.3	1507	97	0.18	0.036	7.5	1.9	0.07	ND	ND	15.9	22	b 34.7
BG30	San Joaquin River	8/7/01	2001-08	0.04	3.6	2092	9	1790	246	0.26	0.011	7.7	0.9	0.08	ND	1.1	14.5	23.7	b 15.1
BF40	Honker Bay	8/8/01	2001-08	0.07	1.5	11380	9.2	1814	1230	0.33	0.016	8	1.4	0.09	6.5	6.5	13.1	21.2	b 74.7
BF20	Grizzly Bay	8/8/01	2001-08	0.08	1.6	15990	9	1892	1740	0.49	0.022	8	1.8	0.12	9.4	9.4	11.6	21.4	b 92.1
BF10	Pacheco Creek	8/8/01	2001-08	0.11	2	17640	8.8	1742	1920	0.48	0.025	8	0.9	0.12	10.4	10.4	11.5	21.5	b 45.5
BD50	Napa River	8/7/01	2001-08	0.13	1.7	30620	8	2162	3540	0.41	0.02	8	1.8	0.12	19.3	19.1	8.3	20.3	b 62.6
BD40	Davis Point	8/6/01	2001-08	0.11	2	36520	7	1616	4200	0.41	0.02	8	1.2	0.12	22.2	23.1	7	20.3	b 48.1
BD30	Pinole Point	8/6/01	2001-08	0.11	2.2	38150	7.9	1477	4490	0.36	0.019	8	0.7	0.12	25	24.3	6	20.2	b 17.5
BD20	San Pablo Bay	8/6/01	2001-08	0.11	1.8	39430	8.2	1465	4650	0.36	0.019	8	1	0.12	25.6	25.2	5.8	20.4	b 35.1
BD15	Petaluma River	8/6/01	2001-08	0.04	16.2	40100	8	2811	4760	0.29	0.014	8.1	2.6	0.20	25.7	25.7	9	23.7	b 105.9
BC60	Red Rock	8/2/01	2001-08	0.12	2.5	48080	7.5	1117	NA	0.19	0.014	8.1	1.1	0.07	31.6	31.4	2.8	17.2	b 8.5
BC41	Point Isabel	8/2/01	2001-08	0.08	3.4	47680	7.8	1063	NA	0.22	0.01	8.2	1	0.08	31.3	31.1	3.2	17.8	b 9.9
BC30	Richardson Bay	8/2/01	2001-08	0.11	2.2	48000	6.9	1003	NA	0.19	0.01	8	0.8	0.07	31.4	31.4	2.9	17.4	b 5.2
BC20	Golden Gate	8/2/01	2001-08	0.11	3.7	49330	7.6	1057	NA	0.10	0.008	8.1	2.5	0.08	32.4	32.3	0.9	15.7	b 5.4
BC10	Yerba Buena Island	8/3/01	2001-08	0.14	2.6	47030	7.4	1267	NA	0.21	0.014	8.1	1	0.08	29.4	30.7	3.3	17.5	b 9.0
BB70	Alameda	8/3/01	2001-08	0.11	5.2	47330	7.2	1700	NA	0.23	0.021	8	2.1	0.17	31.1	30.8	5.6	20	b 13.6
BB30	Oyster Point	7/31/01	2001-08	0.16	4.4	47080	6.8	1573	NA	0.14	0.022	7.8	0.6	0.07	31	30.7	2.7	18.9	b 10.7
BB15	San Bruno Shoal	7/31/01	2001-08	0.11	3.9	46210	6.9	2216	NA	0.1	0.017	7.9	1.2	0.17	30.4	30	4.1	20.7	b 7.2
BA40	Redwood Creek	7/31/01	2001-08	0.06	5.2	45860	7	2534	NA	0.12	0.01	8	1.5	0.34	30.1	29.8	7.8	21.8	b 11.3
BA30	Dumbarton Bridge	8/1/01	2001-08	0.04	8.5	45580	9.1	3069	NA	0.11	0.011	8.2	0.5	0.34	30	29.6	7.4	22.2	b 11.3
BA20	South Bay	7/31/01	2001-08	0.09	6.9	43060	6.9	3561	5190	0.39	0.034	8	0.6	0.44	28.1	27.7	9.6	23	b 14.3
BA10	Coyote Creek	7/31/01	2001-08	0.13	10.6	37760	6.6	4324	NA	0.62	0.078	7.9	0.5	0.35	24.8	24.9	5.8	23.4	b 29.1
C-3-0	San Jose	8/1/01	2001-08	0.18	74.6	8700	4.8	5741	1310	4.40	0.41	7.5	11	0.32	5.2	4.9	14.5	22.9	b 328.3
C-1-3	Sunnyvale	8/1/01	2001-08	0.22	17.8	16530	5.4	5855	1840	1.35	0.081	7.7	22.2	0.88	10	9.8	11.7	23	b 178.0
BW10	Standish Dam	7/30/01	2001-08	0.17	56.4	3917	5.2	4792	832	2.07	0.203	8	9	0.24	3.4	2.1	15.7	21	b 127.2
BW15	Guadalupe River	7/30/01	2001-08	0.08	42.1	1644	6.6	1658	580	3.62	0.027	8	11.3	0.12	ND	ND	18.5	21.6	b 263.9
Quality Assurance Tables																			
Average Of Blanks Per Cruise			2001-02	0.008															0.11
Standard Deviation of Blanks			2001-02	0.002															0.023
Average Method Detection Limit			2001-02	0.009	0.18	140	0.3	87	0.7	0.0016	0.0016	0.050	0.3	0.0023	2	0.1	0.013	0.10	0.16
Number of replicates			2001-02	41	25	0	0	22	10	0	37	0	25	42	25	0	43	0	6
Standard Deviation of Replicates			2001-02	0.005	0.20	NA	NA	120	5	NC	0.00091	NA	0.1	0.0010	0.002	NA	0.087	NA	1.5
Precision (RSD%)			2001-02	4	5	NA	NA	5	0.3	ND	4	NA	5	1	0.01	NA	2	NA	2
Accuracy (%error)			2001-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Average Of Blanks Per Cruise			2001-08																0.1
Standard Deviation of Blanks			2001-08																0.02
Average Method Detection Limit			2001-08	0.01	0.5	160	0.3	90	0.7	0.0006	0.0006	0.05	0.8	0.0023	2	1	0.010	0.1	0.07
Number of replicates			2001-08	28	26	0	0	26	15	1	28	0	26	48	26	0	48	0	7
Standard Deviation of Replicates			2001-08	0.002	0.6	NA	NA	60	4	0.0004	0.0009	NA	0.2	0.0037	0.0007	NA	0.26	NA	2
Precision (RSD%)			2001-08	2	5	NA	NA	3	0.2	0.4	3	NA	10	3	0.004	NA	2	NA	7
Accuracy (%error)			2001-08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 2. Dissolved concentrations of trace elements in water, 2001.

B = blank contamination >30% of measured concentration, b = blank contamination <30% of measured concentration, e = estimated value

NA = not available, ND = not detected, NS = not sampled, Q = outside QA limits. Chromium was not analyzed in 2001 water samples.

Station Code	Station	Date	Cruise	Ag	As	Cd	Co	Cu	Fe	Hg	MeHg	Mn	Ni	Pb	Se	Zn
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	ng/L	µg/L	µg/L	µg/L	µg/L	µg/L
BG20	Sacramento River	2/14/01	2001-02	0.000037	1.75	0.016	0.112	1.92	160	B	B	3.72	1.59	0.091	0.13	1.07
BG30	San Joaquin River	2/14/01	2001-02	0.00075	1.77	0.015	0.084	1.89	95.9	B	B	4.15	1.47	0.064	0.11	1.08
BF40	Honker Bay	2/13/01	2001-02	0.0011	b 1.6	0.028	0.069	1.97	32.4	b 0.0007	B	5.32	1.58	0.021	0.12	0.89
BF20	Grizzly Bay	2/13/01	2001-02	0.0014	b 1.43	0.031	0.136	2.07	59.9	b 0.0004	B	14.0	1.98	0.0425	0.15	0.82
BF10	Pacheco Creek	2/13/01	2001-02	0.0012	b 1.7	0.035	0.111	2.04	42.3	b 0.0004	B	8.68	1.96	0.028	0.14	1.14
BD50	Napa River	2/12/01	2001-02	0.0014	1.73	0.047	0.099	1.69	28.8	b 0.0015	B	7.03	1.77	0.031	ND	1.39
BD40	Davis Point	2/12/01	2001-02	0.0019	b 1.74	0.057	0.067	1.29	12.9	B	B	2.84	1.53	0.016	0.14	1.10
BD30	Pinole Point	2/12/01	2001-02	0.0028	1.55	0.058	0.066	1.16	17.1	b 0.0006	B	2.17	1.33	0.019	0.11	1.08
BD20	San Pablo Bay	2/12/01	2001-02	0.0035	1.55	0.061	0.042	1.45	20.7	B	B	0.59	1.52	0.022	e 0.09	1.11
BD15	Petaluma River	2/12/01	2001-02	0.0016	1.76	0.109	0.891	3.04	18.8	b 0.0004	B	91.9	12.91	0.031	0.15	2.08
BC60	Red Rock	2/8/01	2001-02	0.0031	1.54	0.048	0.062	0.58	ND	b 0.0005	B	2.9	0.72	0.012	ND	0.65
BC41	Point Isabel	2/8/01	2001-02	0.0030	1.45	0.049	0.082	0.85	4.25	B	B	4.55	1.00	0.012	e 0.07	0.69
BC30	Richardson Bay	2/8/01	2001-02	0.0032	1.48	0.052	0.081	0.80	2.88	B	B	3.90	0.87	0.0125	e 0.04	0.90
BC20	Golden Gate	-	2001-02	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
BC10	Yerba Buena Island	2/8/01	2001-02	0.0033	1.63	0.059	0.101	1.03	2.59	B	B	6.86	1.05	0.017	e 0.09	1.63
BB70	Alameda	2/8/01	2001-02	0.0048	1.71	0.057	0.098	0.98	9.23	B	B	2.675	1.09	0.023	e 0.82	0.91
BB30	Oyster Point	2/6/01	2001-02	0.0049	b 1.4	0.063	0.117	1.20	12.51	b 0.0003	B	4.35	1.35	0.025	0.28	0.99
BB15	San Bruno Shoal	2/6/01	2001-02	0.0036	1.61	0.078	0.174	1.62	4.09	B	B	10.5	1.68	0.024	e 0.06	0.95
BA40	Redwood Creek	2/6/01	2001-02	0.0044	1.57	0.069	0.252	2.15	6.81	b 0.0005	NA	11.9	2.31	0.033	e 0.08	1.44
BA30	Dumbarton Bridge	2/7/01	2001-02	0.0063	b 1.99	0.081	0.165	2.37	9.11	b 0.0014	B	0.8	2.56	0.041	ND	1.83
BA20	South Bay	2/7/01	2001-02	0.0065	b 1.96	0.079	0.157	2.42	3.88	b 0.0006	B	0.35	2.62	0.037	e 0.03	1.63
BA10	Coyote Creek	2/7/01	2001-02	0.0035	b 2.04	0.082	0.232	2.53	16.8	b 0.0003	B	2.11	2.83	0.054	ND	2.52
C-3-0	San Jose	2/7/01	2001-02	0.0024	b 2.26	0.069	0.782	2.22	65.5	B	B	196	4.74	0.275	1.11	13.6
C-1-3	Sunnyvale	2/7/01	2001-02	0.0015	b 2.6	0.076	0.637	2.34	8.8	b 0.0014	B	71.5	4.05	0.139	0.77	8.33
BW10	Standish Dam	2/5/01	2001-02	0.00013	1.63	0.023	0.524	1.91	24.7	B	B	140	4.87	0.258	1.26	20.1
BW15	Guadalupe River	2/5/01	2001-02	0.0001	1.1	0.018	0.243	0.93	6.88	b 0.0004	B	121	3.45	0.043	4.72	2.60
BG20	Sacramento River	8/7/01	2001-08	0.00099	1.85	0.01	0.077	1.50	70.2	b 0.0011	B	1.41	1.06	0.0385	e 0.06	0.73
BG30	San Joaquin River	8/7/01	2001-08	0.00016	2.31	0.011	0.048	1.84	24.8	b 0.0011	B	1.82	0.98	0.018	e 0.08	0.51
BF40	Honker Bay	8/8/01	2001-08	0.0020	2.58	0.039	0.07	2.29	19.8	b 0.0010	B	5.32	1.50	0.013	0.11	0.73
BF20	Grizzly Bay	8/8/01	2001-08	0.0027	2.49	0.054	0.084	2.31	29.7	B	B	11.9	1.76	0.0175	e 0.07	0.75
BF10	Pacheco Creek	8/8/01	2001-08	0.0026	2.74	0.056	0.058	2.30	ND	B	B	4.61	1.75	ND	0.15	0.66
BD50	Napa River	8/7/01	2001-08	0.0031	2.66	0.087	0.139	2.54	1.79	B	B	26.2	2.50	ND	0.14	1.19
BD40	Davis Point	8/6/01	2001-08	0.0046	2.75	0.087	0.063	1.92	11.4	B	B	3.72	1.82	0.013	0.18	0.84
BD30	Pinole Point	8/6/01	2001-08	0.0065	2.48	0.093	0.088	2.01	29.2	b 0.0045	B	6.47	1.83	0.025	0.12	1.23
BD20	San Pablo Bay	8/6/01	2001-08	0.0093	2.54	0.095	0.063	1.91	11.18	b 0.0011	B	4.63	1.71	0.012	0.14	0.77
BD15	Petaluma River	8/6/01	2001-08	0.0070	3.81	0.117	0.109	3.35	14.8	b 0.0015	B	13.16	2.84	0.014	ND	0.60
BC60	Red Rock	8/2/01	2001-08	0.0024	b 1.85	0.072	0.104	0.88	3.02	B	B	5.61	0.96	0.01	e 0.09	0.50
BC41	Point Isabel	8/2/01	2001-08	0.0031	b 1.92	0.077	0.115	1.12	12.6	B	B	6.98	1.14	0.016	e 0.08	1.20
BC30	Richardson Bay	8/2/01	2001-08	0.0026	b 2.01	0.074	0.113	1.03	3.16	B	B	7.78	1.24	0.0115	e 0.06	1.98
BC20	Golden Gate	8/2/01	2001-08	0.0017	b 1.77	0.06	0.075	0.62	2.47	B	B	1.53	0.70	ND	e 0.04	0.56
BC10	Yerba Buena Island	8/3/01	2001-08	0.0029	b 1.95	0.075	0.119	1.15	2.84	B	B	7.72	1.13	0.011	e 0.08	0.80
BB70	Alameda	8/3/01	2001-08	0.0046	b 2.68	0.09	0.193	1.73	2.47	B	B	12.4	1.78	0.023	e 0.08	0.85
BB30	Oyster Point	7/31/01	2001-08	0.0056	b 2.31	0.079	0.177	1.55	6.61	b 0.0011	B	15.4	1.56	0.014	ND	0.82
BB15	San Bruno Shoal	7/31/01	2001-08	0.0049	b 3.65	0.08	0.251	2.40	2.51	B	B	46.1	2.20	0.013	e 0.12	0.66
BA40	Redwood Creek	7/31/01	2001-08	0.0052	b 4.15	0.082	0.268	2.62	4.42	b 0.0026	B	67.7	2.53	0.025	ND	0.61
BA30	Dumbarton Bridge	8/1/01	2001-08	0.0058	b 4.59	0.089	0.291	2.96	5.97	b 0.0017	B	74.4	2.70	0.029	e 0.13	0.66
BA20	South Bay	7/31/01	2001-08	0.0059	b 4.5	0.097	0.433	3.52	4.35	b 0.0012	B	124	3.66	0.061	ND	1.24
BA10	Coyote Creek	7/31/01	2001-08	0.0020	b 4.13	0.08	0.655	3.60	2.35	b 0.0022	B	135	4.72	0.102	e 0.39	2.38
C-3-0	San Jose	8/1/01	2001-08	0.0024	b 2.84	0.035	1.01	2.24	12.0	Q	b 0.228	159	6.32	0.184	e 0.56	10.9
C-1-3	Sunnyvale	8/1/01	2001-08	0.00096	b 4.36	0.034	0.947	2.52	5.67	b 0.0013	B	127	5.02	0.17	e 0.90	3.93
BW10	Standish Dam	7/30/01	2001-08	0.0014	e 3.52	0.013	0.82	1.55	6.89	b 0.0012	B	265	5.25	0.126	1.31	4.87
BW15	Guadalupe River	7/30/01	2001-08	0.00012	e 1.78	0.006	0.275	0.79	ND	B	B	275	2.40	0.034	5.01	1.00
Quality Assurance Tables																
Average Of Blanks Per Cruise			2001-02		0.04					0.00006	0.01					
Standard Deviation of Blanks			2001-02							0.00003	0.01					
Average Method Detection Limit			2001-02	0.000018	0.04	0.002	0.001	0.021	1.6	0.00001	0.005	0.07	0.06	0.009	0.03	0.08
Number of replicates			2001-02	3	3	4	4	4	4	2	4	4	4	4	1	4
Standard Deviation of Replicates			2001-02	0.00016	0.2	0.0007	0.005	0.058	4.9	0.00004	0.004	0.2	0.07	0.004	0.02	0.07
Precision (RSD%)			2001-02	12	10	2	5	7	8	8	20	4	6	8	2	8
Accuracy (%error)			2001-02	NA	3	5	10	10	NA	e 20	e 20	NA	10	NA	6	10
Average Of Blanks Per Cruise			2001-08		0.1					0.00034	0.074					
Standard Deviation of Blanks			2001-08													
Average Method Detection Limit			2001-08	0.000018	0.04	0.002	0.001	0.021	1.6	0.000015	0.02	0.07	0.06	0.009	0.03	0.08
Number of replicates			2001-08	4	4	4	4	4.00	4	4	14	4	4.00	4	1	4.00
Standard Deviation of Replicates			2001-08	0.00012	0.1	0.001	0.002	0.061	3.8	0.0014	0.02	0.2	0.08	0.002	0.09	0.3
Precision (RSD%)			2001-08	9	6	2	2	4	12	< 39 >	20	10	6	10	NA	20
Accuracy (%error)			2001-08	NA	5	6	10	10	NA	e 20	20	NA	10	NA	6	10

Table 3. Total or near-total ▲ concentrations of trace elements in water, 2001.

B = blank contamination >30% of measured concentration, b = blank contamination <30% of measured concentration, e = estimated value,
NA = not available, ND = not detected, NR = not reported due to pending QA review, NS= not sampled, p = low precision (<30% of field value), Q = outside QA limits.

Station Code	Station	Date	Cruise	Ag ▲	As	Cd ▲	Co	Cu ▲	Fe	Hg	MeHg	Mn ▲	Ni ▲	Pb ▲	Se	Zn ▲
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	ng/L	µg/L	µg/L	µg/L	µg/L	µg/L
BG20	Sacramento River	2/14/01	2001-02	NA	2.06	NA	NA	NA	NA	NR	B	NA	NA	NA	ND	NA
BG30	San Joaquin River	2/14/01	2001-02	NA	2.09	NA	NA	NA	NA	NR	B	NA	NA	NA	0.14	NA
BF40	Honker Bay	2/13/01	2001-02	NA	b 3.26	NA	NA	NA	NA	NR	b 0.121	NA	NA	NA	0.16	NA
BF20	Grizzly Bay	2/13/01	2001-02	NA	b 2.29	NA	NA	NA	NA	NR	b 0.062	NA	NA	NA	0.15	NA
BF10	Pacheco Creek	2/13/01	2001-02	NA	b 2.91	NA	NA	NA	NA	NR	B	NA	NA	NA	0.21	NA
BD50	Napa River	2/12/01	2001-02	NA	2.38	NA	NA	NA	NA	NR	B	NA	NA	NA	0.18	NA
BD40	Davis Point	2/12/01	2001-02	NA	b 2.17	NA	NA	NA	NA	NR	b 0.112	NA	NA	NA	0.16	NA
BD30	Pinole Point	2/12/01	2001-02	NA	2.18	NA	NA	NA	NA	NR	B	NA	NA	NA	0.13	NA
BD20	San Pablo Bay	2/12/01	2001-02	NA	4.6	NA	NA	NA	NA	NR	B	NA	NA	NA	0.17	NA
BD15	Petaluma River	2/12/01	2001-02	NA	5.19	NA	NA	NA	NA	NR	b 0.06	NA	NA	NA	0.27	NA
BC60	Red Rock	2/8/01	2001-02	NA	1.96	NA	NA	NA	NA	NR	b 0.231	NA	NA	NA	0.12	NA
BC41	Point Isabel	2/8/01	2001-02	NA	1.94	NA	NA	NA	NA	NR	B	NA	NA	NA	e 0.06	NA
BC30	Richardson Bay	2/8/01	2001-02	NA	1.5	NA	NA	NA	NA	NR	B	NA	NA	NA	e 0.06	NA
BC20	Golden Gate	-	2001-02	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
BC10	Yerba Buena Island	2/8/01	2001-02	NA	2.16	NA	NA	NA	NA	NR	B	NA	NA	NA	e 0.08	NA
BB70	Alameda	2/8/01	2001-02	NA	1.81	NA	NA	NA	NA	NR	B	NA	NA	NA	e 0.8	NA
BB30	Oyster Point	2/6/01	2001-02	NA	b 2.21	NA	NA	NA	NA	NR	B	NA	NA	NA	e 0.06	NA
BB15	San Bruno Shoal	2/6/01	2001-02	NA	2.51	NA	NA	NA	NA	NR	B	NA	NA	NA	ND	NA
BA40	Redwood Creek	2/6/01	2001-02	NA	3.27	NA	NA	NA	NA	NR	b 0.215	NA	NA	NA	e 0.06	NA
BA30	Dumbarton Bridge	2/7/01	2001-02	NA	b 3.83	NA	NA	NA	NA	NR	b 0.084	NA	NA	NA	e 0.05	NA
BA20	South Bay	2/7/01	2001-02	NA	b 3.12	NA	NA	NA	NA	NR	b 0.084	NA	NA	NA	e 0.05	NA
BA10	Coyote Creek	2/7/01	2001-02	NA	b 2.5	NA	NA	NA	NA	NR	b 0.069	NA	NA	NA	e 0.08	NA
C-3-0	San Jose	2/7/01	2001-02	NA	b 2.94	NA	NA	NA	NA	NR	b 0.138	NA	NA	NA	1.18	NA
C-1-3	Sunnyvale	2/7/01	2001-02	NA	b 4.75	NA	NA	NA	NA	NR	b 0.365	NA	NA	NA	1.15	NA
BW10	Standish Dam	2/5/01	2001-02	NA	2.13	NA	NA	NA	NA	NR	b 0.119	NA	NA	NA	1.22	NA
BW15	Guadalupe River	2/5/01	2001-02	NA	1.41	NA	NA	NA	NA	NR	b 0.169	NA	NA	NA	5.34	NA
BG20	Sacramento River	8/7/01	2001-08	NA	2.31	NA	NA	NA	NA	0.0108	0.332	NA	NA	NA	0.11	NA
BG30	San Joaquin River	8/7/01	2001-08	NA	2.39	NA	NA	NA	NA	0.0050	0.185	NA	NA	NA	e 0.10	NA
BF40	Honker Bay	8/8/01	2001-08	NA	3.63	NA	NA	NA	NA	0.0246	0.182	NA	NA	NA	0.19	NA
BF20	Grizzly Bay	8/8/01	2001-08	NA	3.68	NA	NA	NA	NA	0.0352	0.119	NA	NA	NA	0.17	NA
BF10	Pacheco Creek	8/8/01	2001-08	NA	3.04	NA	NA	NA	NA	0.0167	0.159	NA	NA	NA	0.19	NA
BD50	Napa River	8/7/01	2001-08	NA	3.35	NA	NA	NA	NA	0.0093	0.394	NA	NA	NA	0.21	NA
BD40	Davis Point	8/6/01	2001-08	NA	3.14	NA	NA	NA	NA	0.0125	0.241	NA	NA	NA	0.22	NA
BD30	Pinole Point	8/6/01	2001-08	NA	2.63	NA	NA	NA	NA	0.0094	0.076	NA	NA	NA	e,p 0.18	NA
BD20	San Pablo Bay	8/6/01	2001-08	NA	2.82	NA	NA	NA	NA	0.0176	0.208	NA	NA	NA	0.16	NA
BD15	Petaluma River	8/6/01	2001-08	NA	4.78	NA	NA	NA	NA	0.0258	0.157	NA	NA	NA	0.26	NA
BC60	Red Rock	8/2/01	2001-08	NA	b 2.04	NA	NA	NA	NA	0.0039	0.109	NA	NA	NA	e 0.10	NA
BC41	Point Isabel	8/2/01	2001-08	NA	b 2.04	NA	NA	NA	NA	0.0044	0.02	NA	NA	NA	0.1	NA
BC30	Richardson Bay	8/2/01	2001-08	NA	b 2.11	NA	NA	NA	NA	0.0032	0.102	NA	NA	NA	e 0.06	NA
BC20	Golden Gate	8/2/01	2001-08	NA	b 1.89	NA	NA	NA	NA	0.0204	0.167	NA	NA	NA	ND	NA
BC10	Yerba Buena Island	8/3/01	2001-08	NA	b 2.08	NA	NA	NA	NA	0.0086	0.197	NA	NA	NA	e 0.08	NA
BB70	Alameda	8/3/01	2001-08	NA	b 2.9	NA	NA	NA	NA	0.0160	0.216	NA	NA	NA	0.12	NA
BB30	Oyster Point	7/31/01	2001-08	NA	b 2.46	NA	NA	NA	NA	0.0053	0.082	NA	NA	NA	ND	NA
BB15	San Bruno Shoal	7/31/01	2001-08	NA	b 3.45	NA	NA	NA	NA	0.0057	0.061	NA	NA	NA	ND	NA
BA40	Redwood Creek	7/31/01	2001-08	NA	b 4.44	NA	NA	NA	NA	0.0207	0.179	NA	NA	NA	ND	NA
BA30	Dumbarton Bridge	8/1/01	2001-08	NA	b 4.93	NA	NA	NA	NA	0.0091	0.171	NA	NA	NA	e 0.18	NA
BA20	South Bay	7/31/01	2001-08	NA	b 4.32	NA	NA	NA	NA	0.0197	0.274	NA	NA	NA	e 0.29	NA
BA10	Coyote Creek	7/31/01	2001-08	NA	b 4.46	NA	NA	NA	NA	0.0164	0.287	NA	NA	NA	ND	NA
C-3-0	San Jose	8/1/01	2001-08	NA	b 4.8	NA	NA	NA	NA	Q	0.677	NA	NA	NA	e 0.75	NA
C-1-3	Sunnyvale	8/1/01	2001-08	NA	b 6.3	NA	NA	NA	NA	0.0612	0.694	NA	NA	NA	e 1.09	NA
BW10	Standish Dam	7/30/01	2001-08	NA	e 4.03	NA	NA	NA	NA	0.0870	0.742	NA	NA	NA	1.94	NA
BW15	Guadalupe River	7/30/01	2001-08	NA	e 3.42	NA	NA	NA	NA	0.1492	0.183	NA	NA	NA	6.06	NA

Quality Assurance Tables

Average Of Blanks Per Cruise	2001-02	0.04				NA	0.01		
Standard Deviation of Blanks	2001-02					NA	0.03		
Average Method Detection Limit	2001-02	0.04				NA	0.005		0.03
Number of replicates	2001-02	1				NA	2		5
Standard Deviation of Replicates	2001-02	0.06				NA	0.01		0.07
Precision (RSD%)	2001-02	3				NA	4		4
Accuracy (%error)	2001-02	5				NA	e 20		13
Average Of Blanks Per Cruise	2001-08	0.04							
Standard Deviation of Blanks	2001-08								
Average Method Detection Limit	2001-08	0.04				0.000015	0.02		0.03
Number of replicates	2001-08	2				0	9		5
Standard Deviation of Replicates	2001-08	0.05				na	0.1		0.07
Precision (RSD%)	2001-08	2				na	30		NA
Accuracy (%error)	2001-08	5				e 20	e 20		6

Table 4. Dissolved PAH concentrations in water samples, 2001.
ND = not detected, Q = outside QA limits, NA = not available. LPAH = low molecular-weight PAH.

Station Code	Station	Date	Cruise	Sum of PAHs (SFEI)	Sum of LPAHs (SFEI)	Biphenyl	Naphthalene	1-Methylnaphthalene	2-Methylnaphthalene	2,6-Dimethylnaphthalene	2,3,5-Trimethylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Dibenzothiophene	Fluorene	Phenanthrene	1-Methylphenanthrene
				ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L
BG20	Sacramento River	8/7/01	2001-08	2.2	0.93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.30	0.63	ND
BG30	San Joaquin River	8/7/01	2001-08	1.4	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.5	ND
BF20	Grizzly Bay	8/8/01	2001-08	5.0	2.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.72	1.4	ND
BD50	Napa River	8/7/01	2001-08	13	5.9	0.5	ND	ND	ND	ND	ND	Q	ND	ND	ND	1.7	3.7	ND
BD40	Davis Point	8/6/01	2001-08	4.5	2.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.66	1.5	ND
BD30	Pinole Point	8/6/01	2001-08	1.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	Q	ND
BD20	San Pablo Bay	8/6/01	2001-08	2.7	1.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.39	0.9	ND
BD15	Petaluma River	8/6/01	2001-08	2.2	0.63	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.63	ND
BC60	Red Rock	8/2/01	2001-08	3.2	1.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.61	1.3	ND
BC20	Golden Gate	8/2/01	2001-08	3.1	1.9	ND	ND	ND	ND	ND	ND	Q	ND	ND	ND	0.57	1.3	ND
BC10	Yerba Buena Island	8/3/01	2001-08	3.9	1.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.62	1.3	ND
BB70	Alameda	8/3/01	2001-08	6.4	2.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.48	2.0	Q
BA40	Redwood Creek	7/31/01	2001-08	1.2	0.58	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.58	ND
BA30	Dumbarton Bridge	8/1/01	2001-08	1.7	0.87	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.87	ND
BA10	Coyote Creek	7/31/01	2001-08	3.5	1.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.41	0.8	ND
C-3-0	San Jose	8/1/01	2001-08	9.7	3.3	ND	ND	ND	ND	ND	ND	Q	ND	ND	0.27	1.0	1.8	0.27
BW10	Standish Dam	7/30/01	2001-08	5.2	1.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.57	0.89	ND
BW15	Guadalupe River	7/30/01	2001-08	8.2	2.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.71	1.5	ND
Quality Assurance Tables																		
Average Of Blanks Per Cruise			2001-08															
Standard Deviation of Blanks			2001-08															
Average Method Detection Limit			2001-08			0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Number of replicates			2001-08			4	4	4	4	4	4	4	4	4	4	4	4	4
Standard Deviation of Replicates			2001-08			0	0	0	0	0	0	2.4	0	0	0	36	38	0
Precision (RSD%)			2001-08			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5	3	NA
Accuracy (%error)			2001-08			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4 (continued). Dissolved PAH concentrations in water samples, 2001.
ND = not detected, Q = outside QA limits, NA = not available. HPAH = high molecular-weight PAH.

Station Code	Station	Date	Cruise	Sum of PAHs (SFEI)	Sum of HPAHs (SFEI)	Benz(a)anthracene	Chrysene	Pyrene	Benzo(a)pyrene	Benzo(e)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Dibenz(a,h)anthracene	Perylene	Benzo(ghi)perylene	Fluoranthene	Indeno(1,2,3-cd)pyrene
				ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L
BG20	Sacramento River	8/7/01	2001-08	2.2	1.3	ND	ND	0.4	ND	ND	ND	ND	ND	ND	ND	0.91	ND
BG30	San Joaquin River	8/7/01	2001-08	1.4	0.88	ND	ND	0.35	ND	ND	ND	ND	ND	ND	ND	0.53	ND
BF20	Grizzly Bay	8/8/01	2001-08	5.0	2.9	ND	ND	0.96	ND	ND	ND	ND	ND	ND	ND	1.9	ND
BD50	Napa River	8/7/01	2001-08	13	6.6	0.52	ND	2.1	ND	ND	ND	ND	ND	ND	ND	4.0	ND
BD40	Davis Point	8/6/01	2001-08	4.5	2.3	ND	ND	0.73	ND	ND	ND	ND	ND	ND	ND	1.6	ND
BD30	Pinole Point	8/6/01	2001-08	1.2	1.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.2	ND
BD20	San Pablo Bay	8/6/01	2001-08	2.7	1.4	ND	ND	0.43	ND	ND	ND	ND	ND	ND	ND	1.0	ND
BD15	Petaluma River	8/6/01	2001-08	2.2	1.6	ND	ND	0.58	ND	ND	ND	ND	ND	ND	ND	0.98	ND
BC60	Red Rock	8/2/01	2001-08	3.2	1.3	ND	ND	Q	ND	ND	ND	ND	ND	ND	ND	1.3	ND
BC20	Golden Gate	8/2/01	2001-08	3.1	1.2	ND	ND	Q	ND	ND	ND	ND	ND	ND	ND	1.2	ND
BC10	Yerba Buena Island	8/3/01	2001-08	3.9	2.0	ND	ND	0.59	ND	ND	ND	ND	ND	ND	ND	1.4	ND
BB70	Alameda	8/3/01	2001-08	6.4	3.9	0.98	0.54	Q	ND	ND	ND	ND	ND	ND	ND	2.4	ND
BA40	Redwood Creek	7/31/01	2001-08	1.2	0.57	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.57	ND
BA30	Dumbarton Bridge	8/1/01	2001-08	1.7	0.87	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.87	ND
BA10	Coyote Creek	7/31/01	2001-08	3.5	2.3	0.37	ND	0.51	ND	ND	ND	ND	ND	ND	ND	1.4	ND
C-3-0	San Jose	8/1/01	2001-08	9.7	6.4	0.94	ND	2.1	ND	0.33	0.42	ND	ND	ND	ND	2.3	0.27
BW10	Standish Dam	7/30/01	2001-08	5.2	3.7	0.94	ND	1.3	ND	ND	ND	ND	ND	ND	ND	1.5	ND
BW15	Guadalupe River	7/30/01	2001-08	8.2	6.0	0.96	ND	2.1	ND	ND	0.56	ND	ND	ND	ND	2.4	ND
Quality Assurance Tables																	
Average Of Blanks Per Cruise			2001-08														
Standard Deviation of Blanks			2001-08														
Average Method Detection Limit			2001-08			0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Number of replicates			2001-08			4	4	3	4	4	4	4	4	4	4	4	4
Standard Deviation of Replicates			2001-08			0	0	38	0	0	0	0	0	0	0	19	0
Precision (RSD%)			2001-08			NA	NA	4	NA	NA	NA	NA	NA	NA	NA	1	NA
Accuracy (%error)			2001-08			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 5. Total (dissolved + particulate) PAH concentrations in water samples, 2001.
ND = not detected, NA = not available, NC = not calculated, Q = outside QA limits. LPAH = low molecular-weight PAH. QA results are for particulate PAHs.

Station Code	Station	Date	Cruise	Sum of PAHs (SFEI)	Sum of LPAHs (SFEI)	Biphenyl	Naphthalene	1-Methylnaphthalene	2-Methylnaphthalene	2,6-Dimethylnaphthalene	2,3,5-Trimethylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Dibenzothiophene	Fluorene	Phenanthrene	1-Methylphenanthrene
				ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L
BG20	Sacramento River	8/7/01	2001-08	9.9	1.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.30	1.3	ND
BG30	San Joaquin River	8/7/01	2001-08	4.4	0.82	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.82	ND
BF20	Grizzly Bay	8/8/01	2001-08	42	5.5	ND	ND	ND	ND	ND	ND	ND	ND	0.37	ND	1.1	3.6	0.44
BD50	Napa River	8/7/01	2001-08	55	10	0.5	ND	ND	ND	ND	ND	Q	ND	0.65	ND	2.2	6.3	0.45
BD40	Davis Point	8/6/01	2001-08	36	5.2	ND	ND	ND	ND	ND	ND	ND	ND	0.39	ND	1.03	3.4	0.34
BD30	Pinole Point	8/6/01	2001-08	12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	Q	ND
BD20	San Pablo Bay	8/6/01	2001-08	45	5.0	0.36	ND	ND	ND	ND	ND	ND	ND	0.47	ND	0.76	3.0	0.36
BD15	Petaluma River	8/6/01	2001-08	64	5.1	ND	ND	ND	ND	ND	ND	ND	ND	0.7	ND	0.57	3.8	ND
BC60	Red Rock	8/2/01	2001-08	11	2.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.61	2.0	ND
BC20	Golden Gate	8/2/01	2001-08	9.1	2.3	ND	ND	ND	ND	ND	ND	Q	ND	ND	ND	0.57	1.8	ND
BC10	Yerba Buena Island	8/3/01	2001-08	19	4.4	1.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.62	2.6	ND
BB70	Alameda	8/3/01	2001-08	28	3.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.48	3.4	Q
BA40	Redwood Creek	7/31/01	2001-08	21	1.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.4	ND
BA30	Dumbarton Bridge	8/1/01	2001-08	40	2.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.6	ND
BA10	Coyote Creek	7/31/01	2001-08	81	8.9	ND	ND	ND	ND	ND	ND	ND	ND	0.57	ND	0.79	4.0	3.5
C-3-0	San Jose	8/1/01	2001-08	122	10	ND	ND	ND	ND	ND	ND	Q	0.31	1.3	0.27	1.7	6.4	0.27
BW10	Standish Dam	7/30/01	2001-08	107	5.9	ND	ND	ND	ND	ND	ND	ND	ND	0.92	ND	0.91	4.1	ND
BW15	Guadalupe River	7/30/01	2001-08	465	27	0.81	ND	ND	ND	0.64	1.8	0.39	1.4	5.6	0.94	3.1	12	0.76
Quality Assurance Tables																		
Average Of Blanks Per Cruise			2001-08															
Standard Deviation of Blanks			2001-08															
Average Method Detection Limit			2001-08			0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Number of replicates			2001-08			2	2	2	2	2	2	2	2	2	2	2	2	2
Standard Deviation of Replicates			2001-08			NC	NC	NC	NC	NC	NC	NC	NC	3.5	NC	25	74	3.5
Precision (RSD%)			2001-08			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4	NA
Accuracy (%error)			2001-08			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 5 (continued). Total (dissolved + particulate) PAH concentrations in water samples, 2001.

ND = not detected, NA = not available, NC = not calculated, Q = outside QA limits. HPAH = high molecular-weight PAH. QA results are for particulate PAHs.

Station Code	Station	Date	Cruise	Sum of PAHs (SFEI)	Sum of HPAHs (SFEI)	Benz(a)anthracene	Chrysene	Pyrene	Benzo(a)pyrene	Benzo(e)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Dibenz(a,h)anthracene	Perylene	Benzo(ghi)perylene	Fluoranthene	Indeno(1,2,3-cd)pyrene
				ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L
BG20	Sacramento River	8/7/01	2001-08	9.9	8.3	1.0	0.62	2.0	ND	0.7	1.0	ND	ND	ND	ND	2.5	0.49
BG30	San Joaquin River	8/7/01	2001-08	4.4	3.6	0.44	0.29	0.9	ND	0.33	0.49	ND	ND	ND	ND	1.1	ND
BF20	Grizzly Bay	8/8/01	2001-08	42	37	4.8	2.4	7.3	ND	3.4	5.1	1.35	0.37	ND	1.5	7.7	2.7
BD50	Napa River	8/7/01	2001-08	55	45	5.9	2.8	9.4	ND	3.5	5.2	1.5	0.39	ND	2.9	11	2.9
BD40	Davis Point	8/6/01	2001-08	36	31	3.9	1.8	5.9	ND	2.9	4.4	1.2	0.33	ND	2.0	5.9	2.7
BD30	Pinole Point	8/6/01	2001-08	12	12	1.6	0.73	2	ND	1.2	1.8	0.55	ND	ND	ND	3.0	1.1
BD20	San Pablo Bay	8/6/01	2001-08	45	40	4.7	1.9	7.3	ND	3.9	5.9	1.6	0.45	ND	3.8	6.1	4.0
BD15	Petaluma River	8/6/01	2001-08	64	59	7.1	3.0	11	0.3	6.0	8.7	2.6	0.7	ND	6.3	8.0	6.0
BC60	Red Rock	8/2/01	2001-08	11	8.8	1.3	0.6	Q	ND	1.0	1.6	0.47	ND	ND	ND	2.8	1.0
BC20	Golden Gate	8/2/01	2001-08	9.1	6.8	1.0	0.48	Q	ND	0.76	1.2	0.34	ND	ND	ND	2.3	0.72
BC10	Yerba Buena Island	8/3/01	2001-08	19	14	1.8	0.81	2.9	ND	1.3	2.1	0.62	ND	ND	ND	3.5	1.4
BB70	Alameda	8/3/01	2001-08	28	24	4.3	1.9	Q	ND	2.6	4.4	1.3	0.34	ND	0.54	5.8	3.2
BA40	Redwood Creek	7/31/01	2001-08	21	20	2.5	1.2	3.3	ND	2.3	3.7	1.1	ND	ND	ND	3.1	2.8
BA30	Dumbarton Bridge	8/1/01	2001-08	40	37	4.5	1.9	6.2	ND	3.9	5.9	1.8	0.45	ND	3.1	4.9	4.6
BA10	Coyote Creek	7/31/01	2001-08	81	72	8.6	3.8	14	2.5	6.7	10	2.9	0.79	ND	7.6	8.2	7.4
C-3-0	San Jose	8/1/01	2001-08	122	112	14	5.2	14	11	10	17	4.8	1.3	0.43	11	11	11
BW10	Standish Dam	7/30/01	2001-08	107	101	12	5.6	7.2	10	9.8	15	4.5	1.3	4.8	11	9.8	10
BW15	Guadalupe River	7/30/01	2001-08	465	438	61	25	50	41	37	67	18	3.0	27	29	52	28
Quality Assurance Tables																	
Average Of Blanks Per Cruise			2001-08														
Standard Deviation of Blanks			2001-08														
Average Method Detection Limit			2001-08			0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Number of replicates			2001-08			2	2	2	2	2	2	2	2	2	2	2	2
Standard Deviation of Replicates			2001-08			35	74	110	NC	35	71	35	14	NC	71	110	140
Precision (RSD%)			2001-08			1	4	2	NA	1	1	5	NA	NA	9	2	10
Accuracy (%error)			2001-08			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 6. Dissolved PCB concentrations in water samples, 2001.

B = blank contamination >30% of measured concentration, b = blank contamination < 30% of measured concentration, CXXX = coelution,
where XXX is the lowest number of the coeluting congeners where the values are stored, ND = not detected, NA = not available, NC = not calculated, Q = outside QA limits.

Station Code	Station	Date	Cruise	Sum of PCBs (SFEI)	PCB 005/8	PCB 008	PCB 018	PCB 028	PCB 031	PCB 044	PCB 049	PCB 052	PCB 060	PCB 066	PCB 070	PCB 074	PCB 087	PCB 095
				pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l
BG20	Sacramento River	8/7/01	2001-08	70	ND	*C005*	6.3	B	1.8	3.5	3.8	6.7	1.6	1.5	2.8	ND	1.5	6.2
BG30	San Joaquin River	8/7/01	2001-08	55	ND	*C005*	3.9	B	2.0	3.1	3.0	5.0	2.6	1.8	2.3	ND	1.2	4.6
BF20	Grizzly Bay	8/8/01	2001-08	96	8.1	*C005*	5.4	B	2.8	3.5	3.1	5.4	2.3	2.3	2.9	ND	1.9	10
BD50	Napa River	8/7/01	2001-08	114	Q	*C005*	5.1	B	4.0	5.0	6.9	9.9	1.9	2.9	3.6	ND	2.1	11
BD40	Davis Point	8/6/01	2001-08	77	Q	*C005*	5.0	B	3.8	3.1	4.4	5.9	1.6	2.1	1.9	ND	1.4	6.9
BD30	Pinole Point	8/6/01	2001-08	77	ND	*C005*	5.9	B	3.2	3.0	4.4	6.3	ND	1.8	2.2	ND	1.7	6.8
BD20	San Pablo Bay	8/6/01	2001-08	69	Q	*C005*	4.8	B	2.1	2.4	2.9	4.3	1.7	1.9	1.8	ND	1.2	6.9
BD15	Petaluma River	8/6/01	2001-08	103	ND	*C005*	5.1	B	3.4	3.3	4.6	5.9	2.1	2.6	3.0	ND	2.2	8.6
BC60	Red Rock	8/2/01	2001-08	108	3.7	*C005*	10	B	2.4	4.1	5.0	8.5	2.6	2.7	3.6	ND	2.9	10
BC20	Golden Gate	8/2/01	2001-08	58	ND	*C005*	Q	B	1.9	2.4	3.5	5.2	1.6	1.5	1.8	ND	1.5	5.6
BC10	Yerba Buena Island	8/3/01	2001-08	100	ND	*C005*	8.9	B	2.4	3.7	5.0	7.7	3.0	2.9	2.6	ND	2.1	8.4
BB70	Alameda	8/3/01	2001-08	209	Q	*C005*	13	B	3.7	8.2	9.1	14	6.6	5.7	5.8	ND	4.6	16
BA40	Redwood Creek	7/31/01	2001-08	112	2.4	*C005*	11	B	3.2	3.2	4.3	6.1	3.8	3.1	2.7	ND	2.0	9.2
BA30	Dumbarton Bridge	8/1/01	2001-08	122	2.1	*C005*	3.7	B	3.5	4.2	4.7	7.9	8.6	3.9	3.6	ND	2.4	9.0
BA10	Coyote Creek	7/31/01	2001-08	257	3.2	*C005*	12	b 8.6	8.6	11	11	19	15	7.7	8.0	2.4	4.7	30
C-3-0	San Jose	8/1/01	2001-08	866	54	*C005*	69	b 47	46	50	42	72	14	32	31	12	15	61
BW10	Standish Dam	7/30/01	2001-08	705	Q	*C005*	42	b 34	26	37	27	50	46	21	22	11	11	91
BW15	Guadalupe River	7/30/01	2001-08	628	33	*C005*	24	b 22	21	27	24	44	25	19	22	9.4	11	70
Quality Assurance Tables																		
Average Of Blanks Per Cruise			2001-08					2.3										
Standard Deviation of Blanks			2001-08					1.5										
Average Method Detection Limit			2001-08		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Number of replicates			2001-08		4	0	4	4	4	4	4	4	4	4	4	4	4	4
Standard Deviation of Replicates			2001-08		0.67	NA	0.25	0.14	0.14	0.11	0.035	0.19	0.28	0.12	0.088	NC	0.071	0.72
Precision (RSD%)			2001-08		17	NA	3	8	6	3	1	3	16	5	4	NA	3	7
Accuracy (%error)			2001-08		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 6 (continued). Dissolved PCB concentrations in water samples, 2001.
ND = not detected, NA = not available, NC = not calculated.

Station Code	Station	Date	Cruise	Sum of PCBs (SFEI)	PCB 097	PCB 099	PCB 101	PCB 105	PCB 110	PCB 118	PCB 128	PCB 132	PCB 138	PCB 141	PCB 149	PCB 151	PCB 153
				pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l
BG20	Sacramento River	8/7/01	2001-08	70	1.4	2.3	5.8	1.3	5.5	2.8	ND	1.4	2.6	ND	4.0	1.8	3.8
BG30	San Joaquin River	8/7/01	2001-08	55	1.0	1.5	3.9	0.91	4.2	2.3	ND	1.1	2.1	ND	3.1	1.3	2.9
BF20	Grizzly Bay	8/8/01	2001-08	96	2.3	3.3	6.3	1.6	10.0	4.0	ND	2.7	5.2	ND	6.9	2.8	6.8
BD50	Napa River	8/7/01	2001-08	114	2.6	4.9	10	ND	9.8	4.2	ND	2.6	4.7	ND	8.1	3.2	7.3
BD40	Davis Point	8/6/01	2001-08	77	2.0	3.2	6.1	ND	6.3	2.9	ND	1.9	3.2	ND	4.7	2.2	5.0
BD30	Pinole Point	8/6/01	2001-08	77	1.6	3.3	6.6	ND	6.0	3.0	ND	1.7	3.1	ND	5.1	2.3	5.1
BD20	San Pablo Bay	8/6/01	2001-08	69	1.8	2.9	6.0	ND	6.0	2.6	ND	1.9	3.3	ND	4.9	2.2	5.0
BD15	Petaluma River	8/6/01	2001-08	103	2.7	4.8	9.0	1.4	8.3	4.5	ND	2.6	4.9	ND	7.8	3.6	7.9
BC60	Red Rock	8/2/01	2001-08	108	2.8	4.4	10	ND	8.7	4.4	ND	2.0	3.7	ND	6.3	2.9	5.9
BC20	Golden Gate	8/2/01	2001-08	58	1.5	2.6	5.9	ND	4.8	2.6	ND	1.2	2.5	ND	3.9	1.7	4.0
BC10	Yerba Buena Island	8/3/01	2001-08	100	2.4	4.0	9.1	1.3	7.1	3.8	ND	2.0	3.7	ND	6.7	2.9	6.3
BB70	Alameda	8/3/01	2001-08	209	5.7	8.8	18	2.0	16	8.4	ND	4.5	7.6	2.6	13	6.2	14
BA40	Redwood Creek	7/31/01	2001-08	112	2.3	5.0	8.8	1.7	7.5	5.2	ND	2.1	5.0	1.3	6.7	3.0	8.8
BA30	Dumbarton Bridge	8/1/01	2001-08	122	3.0	5.7	9.6	1.9	9.0	5.9	ND	2.7	5.8	ND	7.8	3.5	9.4
BA10	Coyote Creek	7/31/01	2001-08	257	4.9	8.5	16	2.6	19	8.8	1.7	4.4	8.5	1.5	12	6.0	13
C-3-0	San Jose	8/1/01	2001-08	866	18	24	49	8.3	48	27	5.1	14	27	5.5	36	18	36
BW10	Standish Dam	7/30/01	2001-08	705	12	17	34	6.6	52	19	3.9	9.7	21	4.9	25	13	25
BW15	Guadalupe River	7/30/01	2001-08	628	12	17	38	4.6	46	20	4.4	11	23	5.8	31	15	30
Quality Assurance Tables																	
Average Of Blanks Per Cruise			2001-08														
Standard Deviation of Blanks			2001-08														
Average Method Detection Limit			2001-08		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Number of replicates			2001-08		4	4	4	4	4	4	4	4	4	4	4	4	4
Standard Deviation of Replicates			2001-08		0.14	0.14	0.18	0.34	0.80	0.18	NC	0.34	0.28	0.018	0.18	0.16	0.28
Precision (RSD%)			2001-08		7	4	3	NA	8	4	NA	8	6	NA	3	7	4
Accuracy (%error)			2001-08		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 6 (continued). Dissolved PCB concentrations in water samples, 2001.
ND = not detected, NA = not available, NC = not calculated.

Station Code	Station	Date	Cruise	Sum of PCBs (SFEI)	PCB 156	PCB 158	PCB 170	PCB 174	PCB 177	PCB 180	PCB 183	PCB 187	PCB 194	PCB 195	PCB 201	PCB 203
				pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l
BG20	Sacramento River	8/7/01	2001-08	70	ND	ND	ND	ND	ND	ND	ND	1.2	ND	ND	ND	ND
BG30	San Joaquin River	8/7/01	2001-08	55	ND	ND	ND	ND	ND	ND	ND	1.0	ND	ND	ND	ND
BF20	Grizzly Bay	8/8/01	2001-08	96	ND	ND	ND	ND	ND	1.8	ND	2.5	ND	ND	ND	ND
BD50	Napa River	8/7/01	2001-08	114	ND	ND	ND	ND	ND	1.8	ND	2.6	ND	ND	ND	ND
BD40	Davis Point	8/6/01	2001-08	77	ND	ND	ND	ND	ND	1.2	ND	1.7	ND	ND	ND	ND
BD30	Pinole Point	8/6/01	2001-08	77	ND	ND	ND	ND	ND	ND	ND	1.7	ND	ND	1.7	ND
BD20	San Pablo Bay	8/6/01	2001-08	69	ND	ND	ND	ND	ND	1.1	ND	1.7	ND	ND	ND	ND
BD15	Petaluma River	8/6/01	2001-08	103	ND	ND	ND	ND	ND	1.9	ND	2.9	ND	ND	ND	ND
BC60	Red Rock	8/2/01	2001-08	108	ND	ND	ND	ND	ND	1.6	ND	1.8	ND	ND	1.6	ND
BC20	Golden Gate	8/2/01	2001-08	58	ND	ND	ND	ND	ND	ND	ND	1.3	ND	ND	1.3	ND
BC10	Yerba Buena Island	8/3/01	2001-08	100	ND	ND	ND	ND	ND	1.5	ND	2.0	ND	ND	1.4	ND
BB70	Alameda	8/3/01	2001-08	209	ND	ND	1.7	2.4	1.6	3.8	1.5	4.8	ND	ND	ND	ND
BA40	Redwood Creek	7/31/01	2001-08	112	ND	ND	ND	ND	1.1	1.8	ND	3.0	ND	ND	1.15	ND
BA30	Dumbarton Bridge	8/1/01	2001-08	122	ND	ND	ND	ND	1.3	2.1	ND	3.2	ND	ND	ND	ND
BA10	Coyote Creek	7/31/01	2001-08	257	ND	ND	ND	1.5	1.7	2.7	1.8	4.3	ND	ND	ND	ND
C-3-0	San Jose	8/1/01	2001-08	866	1.9	2.9	6.5	6.8	5.9	14	5.0	13	2.1	ND	1.1	ND
BW10	Standish Dam	7/30/01	2001-08	705	ND	1.9	5.1	5.8	4.5	11	4.1	9.3	2.0	ND	ND	ND
BW15	Guadalupe River	7/30/01	2001-08	628	ND	2.5	5.7	6.8	5.0	13	4.6	12	2.1	ND	ND	ND
Quality Assurance Tables																
Average Of Blanks Per Cruise			2001-08													
Standard Deviation of Blanks			2001-08													
Average Method Detection Limit			2001-08		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Number of replicates			2001-08		4	4	4	4	4	4	4	4	4	4	4	4
Standard Deviation of Replicates			2001-08		NC	NC	NC	NC	NC	0.035	NC	0.088	NC	NC	0.035	NC
Precision (RSD%)			2001-08		NA	NA	NA	NA	NA	NA	NA	4	NA	NA	NA	NA
Accuracy (%error)			2001-08		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 7. Total (dissolved + particulate) PCB concentrations in water samples, 2001.

B = blank contamination >30% of measured concentration, CXXX = coelution, where XXX is the lowest number of the coeluting congeners where the values are stored, M = matrix interference, ND = not detected, NA = not available, Q = outside QA limits. QA results are for particulate PCBs.

Station Code	Station	Date	Cruise	Sum of PCBs (SFEI)	PCB 005/8	PCB 008	PCB 018	PCB 028	PCB 031	PCB 044	PCB 049	PCB 052	PCB 060	PCB 066	PCB 070	PCB 074	PCB 087	PCB 095
				pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l
BG20	Sacramento River	8/7/01	2001-08	147	1.4	*C005*	7.8	B	3.8	4.9	6.2	9.3	1.6	3.5	5.4	ND	2.8	9.6
BG30	San Joaquin River	8/7/01	2001-08	104	ND	*C005*	3.9	B	3.4	4.4	4.8	7.3	2.6	3.4	3.8	ND	1.2	6.8
BF20	Grizzly Bay	8/8/01	2001-08	489	16	*C005*	8.4	B	8.8	10	10	16	7.1	13	14	3.8	7.3	23
BD50	Napa River	8/7/01	2001-08	471	Q	*C005*	5.1	B	8.2	10	14	19	5.8	11	13	3.2	6.3	22
BD40	Davis Point	8/6/01	2001-08	377	Q	*C005*	5.0	B	7.6	7.6	10	13	4.8	10	11	3.4	5.5	17
BD30	Pinole Point	8/6/01	2001-08	242	4.0	*C005*	5.9	B	5.6	5.4	7.7	11	2.7	5.7	6.3	1.5	4.0	13
BD20	San Pablo Bay	8/6/01	2001-08	421	Q	*C005*	7.5	B	6.4	7.5	9.5	12	5.8	11	7.8	3.7	5.7	17
BD15	Petaluma River	8/6/01	2001-08	713	7.3	*C005*	9.0	B	11	11	14	20	11	18	18	5.6	11	27
BC60	Red Rock	8/2/01	2001-08	257	Q	*C005*	12	B	4.4	5.9	8.2	12	4.1	5.7	5.0	1.4	5.0	15
BC20	Golden Gate	8/2/01	2001-08	156	Q	*C005*	Q	B	4.1	4.0	6.1	7.4	1.6	3.7	1.8	ND	2.9	9.9
BC10	Yerba Buena Island	8/3/01	2001-08	311	9.8	*C005*	12	B	5.9	5.8	8.3	11	6.0	7.2	4.9	1.6	4.7	15
BB70	Alameda	8/3/01	2001-08	646	Q	*C005*	14	B	7.9	13	16	22	13	16	13	3.5	10	30
BA40	Redwood Creek	7/31/01	2001-08	402	6.6	*C005*	13	B	6.9	6.1	8.5	13	9.4	11	8.0	ND	5.6	19
BA30	Dumbarton Bridge	8/1/01	2001-08	516	7.1	*C005*	5.2	B	8.5	8.9	11	17	15	14	9.5	ND	8.3	21
BA10	Coyote Creek	7/31/01	2001-08	1217	8.6	*C005*	20	B	22	25	26	45	30	36	34	12	20	63
C-3-0	San Jose	8/1/01	2001-08	3993	75	*C005*	102	B	101	112	102	167	58	142	131	49	67	211
BW10	Standish Dam	7/30/01	2001-08	4191	Q	*C005*	54	B	88	102	80	119	176	121	122	54	60	371
BW15	Guadalupe River	7/30/01	2001-08	6475	193	*C005*	M	B	121	115	144	204	M	149	132	48	109	310
Quality Assurance Tables																		
Average Of Blanks Per Cruise			2001-08					1.4										
Standard Deviation of Blanks			2001-08					1.4										
Average Method Detection Limit			2001-08		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Number of replicates			2001-08		3	0	3	3	3	3	3	3	3	3	3	3	3	3
Standard Deviation of Replicates			2001-08		0.33	NA	0.16	0.14	0.024	0.14	0.047	0.49	0.28	0.24	0.24	0.024	0.57	0.59
Precision (RSD%)			2001-08		5	NA	6	2	0.4	2	1	4	7	2	1	1	5	6
Accuracy (%error)			2001-08		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 7 (continued). Total (dissolved + particulate) PCB concentrations in water samples, 2001.
ND = not detected, NA = not available, NC = not calculated. QA results are for particulate PCBs.

Station Code	Station	Date	Cruise	Sum of PCBs (SFEI)	PCB 097	PCB 099	PCB 101	PCB 105	PCB 110	PCB 118	PCB 128	PCB 132	PCB 138	PCB 141	PCB 149	PCB 151	PCB 153
				pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l
BG20	Sacramento River	8/7/01	2001-08	147	1.4	4.4	9.8	3.5	12	7.7	ND	3.4	8.2	1.2	8.6	3.9	11
BG30	San Joaquin River	8/7/01	2001-08	104	1.0	2.9	6.8	2.2	8.4	5.8	ND	2.5	6.0	ND	6.6	2.7	7.9
BF20	Grizzly Bay	8/8/01	2001-08	489	7.1	15	24	11	38	30	5.5	13	35	3.4	29	12	42
BD50	Napa River	8/7/01	2001-08	471	6.8	15	26	7.6	34	28	3.7	13	33	4.7	31	13	41
BD40	Davis Point	8/6/01	2001-08	377	5.9	13	21	6.7	27	23	2.7	9.7	25	3.4	22	9.4	33
BD30	Pinole Point	8/6/01	2001-08	242	4.1	7.6	15	4.0	18	14	2.3	5.7	16	2.0	16	6.9	22
BD20	San Pablo Bay	8/6/01	2001-08	421	6.3	14	23	7.2	29	26	3.6	10	29	3.8	25	11	40
BD15	Petaluma River	8/6/01	2001-08	713	11.9	24	39	15	47	46	10	16	51	5.6	45	20	68
BC60	Red Rock	8/2/01	2001-08	257	5.1	8.4	18	3.1	18	12	1.9	5.8	14	1.9	16	7.2	21
BC20	Golden Gate	8/2/01	2001-08	156	3.1	5.2	11	1.6	11	6.8	1.7	3.5	10	1.5	10	4.9	15
BC10	Yerba Buena Island	8/3/01	2001-08	311	5.3	8.7	19	5.4	19	15	2.8	6.3	19	3.0	21	8.8	27
BB70	Alameda	8/3/01	2001-08	646	12.1	21	40	10	41	33	6.1	15	40	7.7	41	18	57
BA40	Redwood Creek	7/31/01	2001-08	402	6.3	12	24	7.0	24	24	5.0	8.0	26	4.1	25	11	42
BA30	Dumbarton Bridge	8/1/01	2001-08	516	8.9	17	31	12	32	34	6.3	12	36	4.0	32	15	50
BA10	Coyote Creek	7/31/01	2001-08	1217	18	38	66	24	74	72	17	23	81	11	71	31	106
C-3-0	San Jose	8/1/01	2001-08	3993	62	119	229	70	208	207	49	74	237	24	246	98	316
BW10	Standish Dam	7/30/01	2001-08	4191	48	90	204	64	262	179	47	62	271	59	235	93	295
BW15	Guadalupe River	7/30/01	2001-08	6475	85	177	348	105	406	330	79	78	463	90	451	155	750
Quality Assurance Tables																	
Average Of Blanks Per Cruise			2001-08														
Standard Deviation of Blanks			2001-08														
Average Method Detection Limit			2001-08		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Number of replicates			2001-08		3	3	3	3	3	3	3	3	3	3	3	3	3
Standard Deviation of Replicates			2001-08		0.35	0.28	0.47	0.094	0.94	NC	0.42	0.26	0.94	0.16	0.24	0.19	0.47
Precision (RSD%)			2001-08		5	3	1	2	3	0	6	3	4	3	1	3	1
Accuracy (%error)			2001-08		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 7 (continued). Total (dissolved + particulate) PCB concentrations in water samples, 2001.
ND = not detected, NA = not available. QA results are for particulate PCBs.

Station Code	Station	Date	Cruise	Sum of PCBs (SFEI)	PCB 156	PCB 158	PCB 170	PCB 174	PCB 177	PCB 180	PCB 183	PCB 187	PCB 194	PCB 195	PCB 201	PCB 203
				pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l
BG20	Sacramento River	8/7/01	2001-08	147	ND	ND	2.7	1.7	1.8	5.4	1.4	4.7	ND	ND	ND	ND
BG30	San Joaquin River	8/7/01	2001-08	104	ND	ND	1.6	ND	1.3	3.1	ND	3.7	ND	ND	ND	ND
BF20	Grizzly Bay	8/8/01	2001-08	489	3.2	2.8	12	6.6	9.3	26	7.1	21	7.2	2.3	1.8	3.4
BD50	Napa River	8/7/01	2001-08	471	3.4	2.4	11	6.5	7.6	24	6.4	22	6.9	2.0	2.4	3.7
BD40	Davis Point	8/6/01	2001-08	377	2.6	2.1	10	5.6	6.9	20	5.8	16	5.4	1.9	1.4	2.3
BD30	Pinole Point	8/6/01	2001-08	242	ND	1.4	4.9	2.8	4.0	10	3.2	10	2.8	ND	1.7	ND
BD20	San Pablo Bay	8/6/01	2001-08	421	2.9	3.2	12	6.6	9.0	25	7.1	20	6.5	2.4	2.5	2.5
BD15	Petaluma River	8/6/01	2001-08	713	5.4	4.9	19	11	15	39	11	33	11	3.8	4.9	4.6
BC60	Red Rock	8/2/01	2001-08	257	ND	1.4	5.5	3.7	3.8	12	4.8	9.2	2.5	ND	3.2	ND
BC20	Golden Gate	8/2/01	2001-08	156	ND	ND	3.6	2.7	2.6	4.6	4.5	7.0	2.1	ND	1.3	ND
BC10	Yerba Buena Island	8/3/01	2001-08	311	1.3	2.1	7.8	5.5	5.6	16	6.3	13	4.0	1.4	3.4	1.4
BB70	Alameda	8/3/01	2001-08	646	3.5	4.1	18.7	13	13	36	11	28	9.4	3.2	3.6	3.1
BA40	Redwood Creek	7/31/01	2001-08	402	3.0	1.9	9.1	3.7	9.1	21	5.5	20	5.0	ND	3.6	2.2
BA30	Dumbarton Bridge	8/1/01	2001-08	516	3.2	3.4	13	6.0	11	25	9.8	24	6.3	2.3	3.4	2.2
BA10	Coyote Creek	7/31/01	2001-08	1217	7.4	6.2	31	21	24	58	18	51.3	18	6.2	7.7	6.4
C-3-0	San Jose	8/1/01	2001-08	3993	30	25	100	75	63	194	55	143	59	23	19	27
BW10	Standish Dam	7/30/01	2001-08	4191	31	36	125	90	64	231	59	149	70	26	16	39
BW15	Guadalupe River	7/30/01	2001-08	6475	56	51	206	157	115	423	104	292	69	44	37	73
Quality Assurance Tables																
Average Of Blanks Per Cruise			2001-08													
Standard Deviation of Blanks			2001-08													
Average Method Detection Limit			2001-08		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Number of replicates			2001-08		3	3	3	3	3	3	3	3	3	3	3	3
Standard Deviation of Replicates			2001-08		0.31	0.21	0.49	0.09	0.38	0.73	0.16	0.0	0.1	0.26	0.047	0.16
Precision (RSD%)			2001-08		8	7	3	1	3	3	3	0.3	2	12	0	5
Accuracy (%error)			2001-08		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 8. Dissolved pesticide concentrations in water samples, 2001.

B = blank contamination > 30% of measured concentration, b = blank contamination < 30% of measured concentration,
NA = not available, ND = not detected, NC = not calculated. Q = outside QA limits.

Station Code	Station	Date	Cruise	Chlorpyrifos	Dacthal	Diazinon	Endosulfan I	Endosulfan II	Endosulfan Sulfate	Oxadiazon	Sum DDTs (SFEI)	o,p^-DDD	o,p^-DDE	o,p^-DDT	p,p^-DDD	p,p^-DDE	p,p^-DDT
				pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l
BG20	Sacramento River	8/7/01	2001-08	300	51	520	NA	ND	110	130	264	Q	Q	b 18	100	120	b 26
BG30	San Joaquin River	8/7/01	2001-08	76	30	670	ND	2.5	70	180	107	Q	Q	B	44	49	b 14
BF20	Grizzly Bay	8/8/01	2001-08	49	46	797	ND	3.9	130	420	280	Q	Q	Q	115	140	b 25
BD50	Napa River	8/7/01	2001-08	42	28	520	ND	ND	57	680	215	Q	Q	B	110	73	b 32
BD40	Davis Point	8/6/01	2001-08	23	18	470	ND	ND	31	300	116	Q	Q	B	52	46	b 18
BD30	Pinole Point	8/6/01	2001-08	16	9.0	260	ND	ND	22	200	104	Q	Q	B	42	45	b 17
BD20	San Pablo Bay	8/6/01	2001-08	15	11	410	ND	ND	24	240	103	Q	Q	B	43	41	b 19
BD15	Petaluma River	8/6/01	2001-08	20	8.8	220	ND	ND	23	340	135	Q	Q	Q	74	61	ND
BC60	Red Rock	8/2/01	2001-08	5.7	2.4	ND	ND	ND	8.0	ND	42	Q	Q	Q	31	11	B
BC20	Golden Gate	8/2/01	2001-08	25	ND	ND	ND	ND	4.1	ND	24	Q	Q	Q	17	6.9	B
BC10	Yerba Buena Island	8/3/01	2001-08	44	8.6	ND	ND	ND	7.0	140	98	Q	Q	Q	35	37	b 26
BB70	Alameda	8/3/01	2001-08	52	14	620	ND	ND	2.9	290	65	Q	Q	Q	37	28	ND
BA40	Redwood Creek	7/31/01	2001-08	26	6.6	520	ND	ND	17	15	36	Q	Q	Q	17	19	B
BA30	Dumbarton Bridge	8/1/01	2001-08	29	10	610	ND	ND	23	18	61	Q	Q	Q	31	30	B
BA10	Coyote Creek	7/31/01	2001-08	49	14	2800	ND	2.6	100	85	131	Q	Q	Q	64	67	B
C-3-0	San Jose	8/1/01	2001-08	450	23	22000	ND	64	700	160	572	Q	Q	Q	250	310	b 12
BW10	Standish Dam	7/30/01	2001-08	120	24	6300	ND	18	220	1400	410	Q	Q	Q	200	210	B
BW15	Guadalupe River	7/30/01	2001-08	86	15	960	ND	ND	49	690	550	Q	Q	Q	330	220	B
Quality Assurance Tables																	
Average Of Blanks Per Cruise			2001-08											1.5			2.19
Standard Deviation of Blanks			2001-08											4.7			2.5
Average Method Detection Limit			2001-08	1.0	1.0	204	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Number of replicates			2001-08	4	4	4	4	4	4	4		1	4	4	4	4	4
Standard Deviation of Replicates			2001-08	1.4	0.80	3.85	NC	0.49	4.1	18		0.71	0.78	5.9	5.7	0.37	0.41
Precision (RSD%)			2001-08	4	4	1	NA	51	7	11		9	5	22	6	2	3
Accuracy (%error)			2001-08	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA

Table 8 (continued). Dissolved pesticide concentrations in water samples, 2001.
ND = not detected, NA = not available, NC = not calculated. Q = outside QA limits.

Station Code	Station	Date	Cruise	Sum Chlordanes (SFEI)	alpha-Chlordane	gamma-Chlordane	cis-Nonachlor	trans-Nonachlor	Heptachlor	Heptachlor Epoxide	Oxychlordane
				pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l
BG20	Sacramento River	8/7/01	2001-08	106	24	15	2.1	11	ND	24	30
BG30	San Joaquin River	8/7/01	2001-08	55	12	6.2	1.1	5.1	ND	15	16
BF20	Grizzly Bay	8/8/01	2001-08	104	11	10	2.9	8.2	ND	48	24
BD50	Napa River	8/7/01	2001-08	77	12	11	5.1	10	ND	33	5.8
BD40	Davis Point	8/6/01	2001-08	49	4.4	6.1	1.9	5.3	ND	20	11
BD30	Pinole Point	8/6/01	2001-08	40	7.8	6.1	ND	3.9	ND	13	10
BD20	San Pablo Bay	8/6/01	2001-08	47	4.7	5.6	2.4	4.9	ND	20	9.0
BD15	Petaluma River	8/6/01	2001-08	65	7.4	7.0	3.4	5.6	ND	24	18
BC60	Red Rock	8/2/01	2001-08	19	Q	5.0	Q	3.0	ND	ND	11
BC20	Golden Gate	8/2/01	2001-08	10	Q	3.2	Q	1.6	ND	ND	4.8
BC10	Yerba Buena Island	8/3/01	2001-08	41	2.6	3.4	2.4	3.8	ND	25	4.3
BB70	Alameda	8/3/01	2001-08	56	16	4.9	ND	3.9	ND	19	12
BA40	Redwood Creek	7/31/01	2001-08	38	5.6	6.9	3.9	6.9	ND	ND	15
BA30	Dumbarton Bridge	8/1/01	2001-08	56	11	8.6	5.1	11	ND	ND	20
BA10	Coyote Creek	7/31/01	2001-08	145	19	22	5.4	46	ND	12	41
C-3-0	San Jose	8/1/01	2001-08	256	94	44	10	68	ND	7.5	33
BW10	Standish Dam	7/30/01	2001-08	274	89	40	12	85	3.0	9.1	36
BW15	Guadalupe River	7/30/01	2001-08	265	69	62	14	63	ND	11	46
Quality Assurance Tables											
Average Of Blanks Per Cruise			2001-08								
Standard Deviation of Blanks			2001-08								
Average Method Detection Limit			2001-08		1.0	1.0	1.0	1.0	1.0	1.0	1.0
Number of replicates			2001-08		3	4	4	4	4	4	4
Standard Deviation of Replicates			2001-08		1.4	0.28	0.57	0.55	NC	0	0.34
Precision (RSD%)			2001-08		11	6	2	15	NA	0	4
Accuracy (%error)			2001-08		NA	NA	NA	NA	NA	NA	NA

Table 8 (continued). Dissolved pesticide concentrations in water samples, 2001.
b = blank contamination < 30% of measured concentration, NA = not available, ND = not detected, NC = not calculated.

Station Code	Station	Date	Cruise	Sum HCHs (SFEI)	alpha-HCH	beta-HCH	delta-HCH	gamma-HCH	Aldrin	Dieldrin	Endrin	Hexachlorobenzene	Mirex
				pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l
BG20	Sacramento River	8/7/01	2001-08	150	29	50	ND	71	NA	110	ND	b 13	ND
BG30	San Joaquin River	8/7/01	2001-08	97	22	34	ND	41	NA	49	ND	b 22	ND
BF20	Grizzly Bay	8/8/01	2001-08	295	57	145	ND	93	NA	51	ND	b 28	ND
BD50	Napa River	8/7/01	2001-08	248	130	37	ND	81	NA	35	15	b 34	ND
BD40	Davis Point	8/6/01	2001-08	244	72	120	ND	52	NA	24	ND	b 24	ND
BD30	Pinole Point	8/6/01	2001-08	134	15	100	ND	19	NA	20	ND	b 13	ND
BD20	San Pablo Bay	8/6/01	2001-08	269	80	140	ND	49	NA	23	ND	b 21	ND
BD15	Petaluma River	8/6/01	2001-08	303	88	180	ND	35	NA	22	ND	b 23	ND
BC60	Red Rock	8/2/01	2001-08	547	190	290	ND	67	NA	17	ND	b 16	ND
BC20	Golden Gate	8/2/01	2001-08	494	190	250	ND	54	NA	9.3	ND	b 15	ND
BC10	Yerba Buena Island	8/3/01	2001-08	215	145	16	ND	54	NA	18	ND	b 20	ND
BB70	Alameda	8/3/01	2001-08	480	130	200	ND	150	NA	26	ND	b 15	ND
BA40	Redwood Creek	7/31/01	2001-08	303	54	195	ND	54	NA	29	ND	b 19	ND
BA30	Dumbarton Bridge	8/1/01	2001-08	339	66	210	ND	63	NA	32	ND	b 16	ND
BA10	Coyote Creek	7/31/01	2001-08	891	91	340	ND	460	NA	58	ND	b 28	ND
C-3-0	San Jose	8/1/01	2001-08	3464	400	730	34	2300	NA	110	ND	b 120	ND
BW10	Standish Dam	7/30/01	2001-08	1347	130	230	6.8	980	NA	150	38	b 40	ND
BW15	Guadalupe River	7/30/01	2001-08	46	10	14	ND	22	NA	150	39	b 9	ND
Quality Assurance Tables													
Average Of Blanks Per Cruise			2001-08									3.8	
Standard Deviation of Blanks			2001-08									1.5	
Average Method Detection Limit			2001-08		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0
Number of replicates			2001-08		4	4	4	4		4	4	4	4
Standard Deviation of Replicates			2001-08		5.3	7.1	NC	0.35		0.55	NC	0.88	NC
Precision (RSD%)			2001-08		7	4	NA	1		2	NA	4	NA
Accuracy (%error)			2001-08		NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 9. Total (dissolved + particulate) pesticide concentrations in water samples, 2001.

B = blank contamination > 30% of measured concentration, b = blank contamination < 30% of measured concentration, M = matrix interference, ND = not detected,
NA = not available, NC = not calculated, Q = outside QA limits, S = compounds typically comprising > 30% of the sum were not quantifiable and the sum is not calculated.
T = either the dissolved or particulate fraction was not available preventing calculation of a total concentration. QA results are for particulate pesticides.

Station Code	Station	Date	Cruise	Chlorpyrifos	Dacthal	Diazinon	Endosulfan I	Endosulfan II	Endosulfan Sulfate	Oxadiazon	Sum DDTs (SFEI)	o,p^-DDD	o,p^-DDE	o,p^-DDT	p,p^-DDD	p,p^-DDE	p,p^-DDT
				pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l
BG20	Sacramento River	8/7/01	2001-08	332	51	520	T	ND	110	180	546	Q	Q	b 24	164	310	b 48
BG30	San Joaquin River	8/7/01	2001-08	90	30	670	ND	2.5	70	213	175	Q	Q	B	60	97	b 18
BF20	Grizzly Bay	8/8/01	2001-08	67	46	797	ND	3.9	130	735	736	Q	Q	Q	275	425	b 36
BD50	Napa River	8/7/01	2001-08	52	28	520	ND	ND	57	900	543	Q	Q	B	280	263	Q
BD40	Davis Point	8/6/01	2001-08	29	18	470	ND	ND	31	450	367	Q	Q	B	143	196	b 28
BD30	Pinole Point	8/6/01	2001-08	21	9.0	260	ND	ND	22	259	169	Q	Q	B	70	99	Q
BD20	San Pablo Bay	8/6/01	2001-08	22	11	410	ND	ND	24	370	328	Q	Q	B	127	171	b 30
BD15	Petaluma River	8/6/01	2001-08	20	8.8	220	ND	ND	23	510	455	Q	Q	Q	184	271	Q
BC60	Red Rock	8/2/01	2001-08	5.7	2.4	ND	ND	ND	8.0	22	76	Q	Q	Q	44	32	B
BC20	Golden Gate	8/2/01	2001-08	T	T	ND	T	T	T	T	S	T	Q	Q	T	19	T
BC10	Yerba Buena Island	8/3/01	2001-08	44	8.6	ND	ND	ND	7.0	196	161	Q	Q	Q	62	69	b 31
BB70	Alameda	8/3/01	2001-08	52	16	620	ND	ND	2.9	331	130	Q	Q	Q	64	65	1
BA40	Redwood Creek	7/31/01	2001-08	26	6.6	520	ND	ND	17	52	68	Q	Q	Q	17	51	B
BA30	Dumbarton Bridge	8/1/01	2001-08	29	10	610	ND	ND	23	68	109	Q	Q	Q	31	78	B
BA10	Coyote Creek	7/31/01	2001-08	49	14	2800	ND	2.6	100	111	S	Q	Q	Q	Q	287	B
C-3-0	San Jose	8/1/01	2001-08	504	35	22000	ND	64	700	238	1252	Q	Q	Q	250	990	b 12
BW10	Standish Dam	7/30/01	2001-08	120	24	6540	ND	18	220	1400	1610	Q	Q	Q	200	1410	B
BW15	Guadalupe River	7/30/01	2001-08	226	49	1210	ND	ND	49	690	2150	Q	M	Q	330	1820	B
Quality Assurance Tables																	
Average Of Blanks Per Cruise			2001-08														
Standard Deviation of Blanks			2001-08														
Average Method Detection Limit			2001-08	1.0	1.0	204	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Number of replicates			2001-08	3	3	NC	3	3	3	3		3	3	3	2	3	2
Standard Deviation of Replicates			2001-08	0.82	NC	NC	NC	NC	NC	2.6		1.0	0.94	0.28	0	7.3	1.4
Precision (RSD%)			2001-08	15	NA	NA	NA	NA	NA	1		12	2	3	0	3	25
Accuracy (%error)			2001-08	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA

Table 9 (continued). Total (dissolved + particulate) pesticide concentrations in water samples, 2001.

B = blank contamination > 30% of measured concentration, b = blank contamination < 30% of measured concentration, ND = not detected, NA = not available, NC = not calculated, Q = outside QA limits, S = compounds typically comprising > 30% of the sum were not quantifiable and the sum is not calculated. T = either the dissolved or particulate fraction was not available preventing calculation of a total concentration. QA results are for particulate pesticides.

Station Code	Station	Date	Cruise	Sum Chlordanes (SFEI)	alpha-Chlordane	gamma-Chlordane	cis-Nonachlor	trans-Nonachlor	Heptachlor	Heptachlor Epoxide	Oxychlordane
				pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l
BG20	Sacramento River	8/7/01	2001-08	143	27	18	2.1	13	ND	24	b 59
BG30	San Joaquin River	8/7/01	2001-08	69	14	6.2	1.1	6.7	ND	15	b 26
BF20	Grizzly Bay	8/8/01	2001-08	176	14	16	5.9	16	ND	48	b 76
BD50	Napa River	8/7/01	2001-08	131	16	18	8.5	15	ND	33	b 41
BD40	Davis Point	8/6/01	2001-08	89	6.5	11	4.4	8.9	ND	20	b 39
BD30	Pinole Point	8/6/01	2001-08	56	7.8	6.1	ND	6.1	ND	13	b 23
BD20	San Pablo Bay	8/6/01	2001-08	79	Q	9.4	4.9	7.4	ND	20	b 37
BD15	Petaluma River	8/6/01	2001-08	111	10	7.0	7.0	11	ND	24	b 52
BC60	Red Rock	8/2/01	2001-08	S	Q	5.0	Q	3.0	ND	ND	B
BC20	Golden Gate	8/2/01	2001-08	S	T	T	T	1.6	T	ND	T
BC10	Yerba Buena Island	8/3/01	2001-08	53	4.6	4.9	2.4	5.9	ND	25	b 10
BB70	Alameda	8/3/01	2001-08	69	17	6.1	ND	5.9	ND	19	b 21
BA40	Redwood Creek	7/31/01	2001-08	32	8.1	6.9	6.3	11	ND	ND	B
BA30	Dumbarton Bridge	8/1/01	2001-08	79	15	13	5.1	17	ND	1.2	b 28
BA10	Coyote Creek	7/31/01	2001-08	192	27	39	5.4	67	ND	12	41
C-3-0	San Jose	8/1/01	2001-08	458	141	96	Q	125	ND	7.5	b 88
BW10	Standish Dam	7/30/01	2001-08	587	125	121	Q	235	3.0	9.1	b 94
BW15	Guadalupe River	7/30/01	2001-08	1221	459	452	Q	253	ND	11	46
Quality Assurance Tables											
Average Of Blanks Per Cruise			2001-08								
Standard Deviation of Blanks			2001-08								
Average Method Detection Limit			2001-08		1.0	1.0	1.0	1.0	1.0	1.0	1.0
Number of replicates			2001-08		3	3	3	3	3	3	3
Standard Deviation of Replicates			2001-08		0.87	0.024	0.12	1.3	NC	NC	0.71
Precision (RSD%)			2001-08		35	1	12	13	NA	NA	2
Accuracy (%error)			2001-08		NA	NA	NA	NA	NA	NA	NA

Table 9 (continued). Total (dissolved + particulate) pesticide concentrations in water samples, 2001.

b = blank contamination < 30% of measured concentration, NA = not available, ND = not detected, NC = not calculated, T = either the dissolved or particulate fraction was not available preventing calculation of a total concentration. QA results are for particulate pe

Station Code	Station	Date	Cruise	Sum HCHs (SFEI)	alpha-HCH	beta-HCH	delta-HCH	gamma-HCH	Aldrin	Dieldrin	Endrin
				pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l	pg/l
BG20	Sacramento River	8/7/01	2001-08	152	29	50	ND	73	NA	117	ND
BG30	San Joaquin River	8/7/01	2001-08	99	22	34	ND	43	NA	52	ND
BF20	Grizzly Bay	8/8/01	2001-08	299	57	147	ND	95	NA	63	1.8
BD50	Napa River	8/7/01	2001-08	248	130	37	ND	81	NA	53	15
BD40	Davis Point	8/6/01	2001-08	247	75	120	ND	52	NA	31	ND
BD30	Pinole Point	8/6/01	2001-08	134	15	100	ND	19	NA	23	ND
BD20	San Pablo Bay	8/6/01	2001-08	271	80	140	ND	51	NA	31	ND
BD15	Petaluma River	8/6/01	2001-08	307	92	180	ND	35	NA	22	ND
BC60	Red Rock	8/2/01	2001-08	550	193	290	ND	67	NA	18	ND
BC20	Golden Gate	8/2/01	2001-08	NA	T	T	T	T	NA	T	T
BC10	Yerba Buena Island	8/3/01	2001-08	215	145	16	ND	54	NA	19	ND
BB70	Alameda	8/3/01	2001-08	482	130	200	ND	152	NA	29	ND
BA40	Redwood Creek	7/31/01	2001-08	303	54	195	ND	54	NA	35	ND
BA30	Dumbarton Bridge	8/1/01	2001-08	339	66	210	ND	63	NA	38	ND
BA10	Coyote Creek	7/31/01	2001-08	894	94	340	ND	460	NA	85	ND
C-3-0	San Jose	8/1/01	2001-08	3478	402	733	34	2309	NA	121	ND
BW10	Standish Dam	7/30/01	2001-08	1347	130	230	6.8	980	NA	150	38
BW15	Guadalupe River	7/30/01	2001-08	46	10	14	ND	22	NA	150	39
Quality Assurance Tables											
Average Of Blanks Per Cruise			2001-08								
Standard Deviation of Blanks			2001-08								
Average Method Detection Limit			2001-08		1.0	1.0	1.0	1.0		1.0	1.0
Number of replicates			2001-08		3	3	3	3		3	3
Standard Deviation of Replicates			2001-08		0.024	0.47	NC	0.38		0.54	0.42
Precision (RSD%)			2001-08		3	NA	NA	NA		4	NA
Accuracy (%error)			2001-08		NA	NA	NA	NA		NA	NA

Table 10. Aquatic bioassay results, 2001. * = significantly less than in the control. *Americamysis bahia* was formerly *Mysidopsis bahia*.

Station Code	Station	Date	Cruise	Mean % Survival	Mean % Survival (Control)
				Americamysis bahia	
BF20	Grizzly Bay	2/13/01	2001-02	88	95
BD30	Pinole Point	2/12/01	2001-02	88	83
BA30	Dumbarton Bridge	2/7/01	2001-02	88	83
C-3-0	San Jose	2/7/01	2001-02	77.5 *	95
C-1-3	Sunnyvale	2/7/01	2001-02	77.5 *	95
BG30	San Joaquin River	8/7/01	2001-08	90	81
BF20	Grizzly Bay	8/8/01	2001-08	95	93
BD30	Pinole Point	8/6/01	2001-08	93	83
BA30	Dumbarton Bridge	8/1/01	2001-08	90	88
C-3-0	San Jose	8/1/01	2001-08	86 *	100
C-1-3	Sunnyvale	8/1/01	2001-08	89	100