FINAL TECHNICAL REPORT

CALIFORNIA BAY-DELTA AUTHORITY

FISH MERCURY PROJECT

YEAR 1 ANNUAL REPORT

SPORT FISH SAMPLING AND ANALYSIS

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EXECUTIVE SUMMARY

The Fish Mercury Project is a multifaceted three-year project that is examining mercury in fish in the Bay-Delta watershed and increasing public awareness of fish contamination issues, with the overall goal of reducing mercury exposure in humans and wildlife. Sport fish data are being collected by the Project to meet the goals of 1) characterizing mercury concentrations in fish to support development of new consumption advisories and risk communication, and 2) assessing spatial and temporal trends in mercury concentrations in the Bay-Delta watershed relative to habitat restoration and remediation projects.

In 2005, over 2000 fish from 22 species were collected from 69 popular sport fishing locations in the Bay-Delta watershed.

To achieve the first goal, mercury concentrations were measured in fish from many locations across the region. To achieve the second goal, statistical analysis of spatial patterns in mercury concentrations in largemouth bass, channel catfish, Sacramento sucker, and Sacramento pikeminnow were performed following an ANCOVA method that accounts for site-specific differences in the length:mercury relationship. Results were presented on maps whenever possible to make the information accessible to fishers and other stakeholders.

Mercury concentrations were elevated across the Delta watershed and varied by species and location. Largemouth bass were the most contaminated species, exceeding 0.23 ppm in 154 of 240 samples (62%), followed by Sacramento pikeminnow (31 of 33, 94%), common carp (39 of 76, 51%), Sacramento sucker (36 of 99, 36%), channel catfish (19 of 55, 35%), black crappie (6 of 16, 38%), white catfish (23 of 102, 23%), bluegill (13 of 120, 11%), and redear sunfish (7 of 148, 5%), in decreasing order of average concentrations. In terms of mercury concentration, redear sunfish are a good alternative to larger species higher in mercury. However, these rankings are based only on mercury, as organic contaminants were not included in this study.

Clear regional patterns in sport fish mercury concentrations were apparent, but no evidence of consistent long-term temporal trends across multiple sites was discovered. Mercury concentrations were higher in the Sacramento and San Joaquin Rivers and their tributaries and were lower in the Delta. For example, concentrations for largemouth bass along the Sacramento and San Joaquin Rivers were typically above 0.4 ppm and 0.3 ppm, respectively, with a few locations exceeding 0.6 ppm. In the Delta, however, the majority of locations were below 0.25 ppm. The reasons for this pattern are not well understood, but hypotheses are presented in this report. Sampling locations in areas with large wetlands had mid-level mercury concentrations and did not stand out from other sites in the watershed. Some data indicated significant inter-annual variation, with lower mercury concentrations in 2005 than in 2000, but change was not apparent on the scale of decades.

A linkage between sport fish and biosentinel small fish mercury concentrations was observed with adult and juvenile largemouth bass. Similar spatial and temporal scales of

mercury exposure for these different age classes of the same species may explain the close relationship.

The data collected in 2005 addressed the two Project goals well, given that it was the first year of the Project. Future analyses, when repeated measures of intensive and index sites are complete in 2007, will allow the Project goals to be more fully addressed.

INTRODUCTION

Mercury is a heavy metal that is highly toxic in the organic form methylmercury, which is known to accumulate to concentrations of concern in food webs of the San Francisco Estuary, the Sacramento-San Joaquin Delta, and their watersheds. The most significant source by mass of total mercury in the region is attributable to mining activity during the 1800s. Mercury was extensively mined in the Coast Range and transported to the Sierra Nevada for use in extracting gold from ore and placer deposits. Historical releases of mercury from gold mining areas were substantial (1.4 – 3.6 million kg; USGS 2000) and in many cases mercury continues to wash downstream from these areas today. Given the extent of the contamination and the long residence time of mercury in the aquatic environment, the mercury problem will likely affect California for decades, even if remediation actions are taken (Davis *et al.* 2003).

The Fish Mercury Project (FMP) is a multifaceted three-year project that will examine mercury in fish in the Bay-Delta watershed and increase public awareness of fish contamination issues, with the overall goal of reducing mercury exposure to humans and wildlife. The Project closely follows the recommendations of the California Bay Delta Authority (CBDA) "Mercury Strategy" (Wiener *et al.* 2003) relating to monitoring mercury in the watershed in support of adaptive management. The Project goals and objectives that relate to sport fish are:

1) Characterize mercury concentrations in fish to assess the health risks of consuming contaminated fish and communicate these risks to appropriate target audiences based on environmental justice principles (Project Goal 1, Objective 3; see Table 1); and
2) Characterize spatial and temporal trends in mercury in fishery resources to determine how habitat restoration and mercury clean-up actions affect methylmercury accumulation in the food web (Project Goal 2, Objective 1).

To better achieve these goals, the Project established a Steering Committee and Local Stakeholder Advisory Group to facilitate:

1) Stakeholder input into the monitoring and risk communication activities based on environmental justice principles, and
2) Coordination with other major science, management, and outreach and communication efforts.

Recent studies in the Bay–Delta watershed have found mercury and other contaminants at concentrations of concern for human health in striped bass, largemouth bass, white catfish, and other popular sport fish species. Extensive sampling was conducted in San Francisco Bay in 1994, 1997, 2000, and 2003 (Fairey *et al.* 1997, Davis *et al.* 2002, Greenfield *et al.* 2003, Davis *et al.* 2006b) and in the Sacramento-San Joaquin Delta in 1998, 1999, and 2000 (Davis *et al.* 2000, Davis *et al.* 2003). In response to the 1994 results, an interim fish consumption advisory was issued for the Bay–Delta, due to concern over human exposure to methylmercury, PCBs, organochlorine pesticides, and dioxins (OEHHA 1994). This advisory remains in effect. The Office of Environmental Health Hazard Assessment (OEHHA) has also issued draft advisories for the lower Cosumnes River, lower Mokelumne River, and Putah Creek, and final advisories for

Cache Creek, Bear Creek, Lake Natoma, and the lower American River, due to harmful levels of chemical contaminants, including mercury. Additional advisories will be developed from information gathered by the Project for the Sacramento River and North Delta, the San Joaquin River and South Delta, and other tributaries when separate consumption advice is required.

In addition to developing consumption advisories, information from the Project and previous studies will be used to assess spatial and temporal trends in mercury concentrations in the Bay-Delta watershed. Mercury concentrations in fish vary regionally throughout the Bay-Delta, with elevated concentrations in some Delta tributaries, including the Feather, Sacramento, American, and San Joaquin Rivers, and lower concentrations in the central Delta (Davis *et al.* 2000, Davis *et al.* 2003). With the addition of the 2005 monitoring, there should be enough data to investigate temporal variation in mercury concentrations in some species.

In 2005, over 2000 (n = 2097) fish from 22 species (Tables 2 and 3) were collected from 69 popular sport fishing locations in the Bay-Delta watershed (Table 3, Map 1). This report is a compilation of data from the Project and coordinated studies by the Central Valley Regional Water Quality Control Board (CVRWQCB) and the Sacramento River Watershed Program (SRWP). Collaboration with these projects allowed for a greater geographic scope in sampling and coordination ensured no duplication of effort.

METHODS

Sampling Design

The sampling plan was designed to address the main goals and objectives of the sport fish component of the Project (see Introduction and Table 1). Six types of sites were sampled in 2005 (Table 3). Advisory sites comprised the bulk of the sampling. Data from these sites and all other site types, including those of the CVRWQCB and SRWP, will be used to develop consumption advisories and communicate risk to stakeholders. Advisory sites included popular fishing areas as well as hatcheries for salmon and trout. Index and intensive sites, in addition to providing data for advisory development, were sampled to (1) indicate temporal and regional trends in sport fish mercury contamination to assess the effects of restoration and remediation actions and (2) to link sport fish mercury to biosentinel species data. Restoration sites also were sampled to assess the effects of restoration. See the Year 1 Work Plan (Davis *et al.* 2005) for more information on sampling design.

Fish species were targeted for capture and analysis for a variety of reasons, depending on the type of site. In general, primary target species were selected either because they were popular for human consumption (white catfish) or they were effective at documenting spatial and temporal trends in mercury (largemouth bass). Secondary target species were mainly chosen as species low in mercury that are potentially good alternatives for sport fishing (*e.g.*, redear sunfish and bluegill). Largemouth bass, channel catfish, Sacramento

sucker, and Sacramento pikeminnow were sampled at a wide range of lengths so that an analysis-of-covariance (ANCOVA) approach could be used to assess differences in the length:mercury relationship by site (Tremblay *et al.* 1995, Tremblay *et al.* 1998). See the Year 1 Work Plan (Davis *et al.* 2005) for detailed information on target species.

Field Collection and Laboratory Analyses

Sport fish were collected from locations in the Delta and Central Valley from late July to mid-December 2005 (Map 1). Additional fish were collected in January, April, and May 2006 from sites that were inaccessible in 2005. These data are reported separately, since they were collected so much later than the majority of samples in this report. Fish were collected by Moss Landing Marine Laboratories (MLML) staff with an electrofisher boat and fyke nets. Each location was sampled for as long as it took to obtain the desired number of the primary target species, and the secondary target species caught during this time were also kept. Total length (longest length from tip of tail fin to tip of nose/mouth), fork length (longest length from fork to tip of nose/mouth), and weight (for larger fish) were measured in the field. Information on by-catch, including species and approximate numbers, was recorded. Fish were wrapped in chemically cleaned Teflon sheeting and frozen on dry ice for transportation to the laboratory. Age of largemouth bass was also determined through analysis of otoliths.

Fish were kept frozen wrapped in Teflon in their original bags until the time of dissection. Dissection and compositing of muscle tissue samples were performed following USEPA guidance (USEPA 2000). At the time of dissection, fish were placed in a clean lab in their original bags to thaw. After thawing, fish were cleaned by rinsing with de-ionized (DI) and ASTM Type II water, and were handled only by personnel wearing polyethylene or powder-free latex gloves (glove type is analyte dependent). Weights for individual fish, when not measured previously, were taken prior to dissection. All dissection materials were cleaned by scrubbing with Micro® detergent, rinsing with tap water, DI water, and finally ASTM Type II water. All fish were dissected skin off, and only the fillet muscle tissue was used for analysis.

Total mercury in muscle tissue was measured by MLML. The lab chose to analyze all fish as individuals, so, contrary to the Sampling Plan, no composite data from 2005 sampling are in this report. Tissue samples were analyzed according to EPA 7473, "Mercury in Solids and Solutions by Thermal Decomposition, Amalgamation, and Atomic Absorption Spectrophotometry" using a Milestone Direct Mercury Analyzer (Model DMA-80). Samples, blanks, and standards were prepared using clean techniques. ASTM Type II water and analytical grade chemicals were used for all standard preparations. A continuing calibration verification (CCV) was performed after every 10 samples and samples run between CCVs that drifted greater than 10% were rerun. Three blanks, a standard reference material (DORM-2), as well as a method duplicate and a matrix spike pair were run with each set of samples.

The 2005 mercury samples were digested and analyzed in multiple batches per species depending on the sample size. Batches consisted of 20 samples per batch. Standard

Reference Material (NRC-DORM-2: dogfish muscle) recoveries, for the samples analyzed to date, were within the acceptable range of 75% – 125% recovery (range for all species 87.6% – 109.4%) established by the CalFed QAPP (Puckett and van Buuren 2000). The mercury matrix spike recoveries were all within the acceptable range of 75% – 125% (range for all species 92.1% – 121%) and all matrix spikes and matrix spike RPDs were within the acceptable range of less than 25% (range for all species 0.04% – 16.71%). All of the mercury lab duplicate RPDs were also in the acceptable range below 25% (range for all species 0.05% – 20.8%) and all method blanks were below the detection limit.

MLML participated in an inter-comparison (IC) study implemented for all CalFed mercury projects (van Buuren 2006). The IC study utilized a reference material, IAEA-407 (fish tissue). MLML analyzed three separate digestions of each reference sample. In addition, a matrix spike, matrix spike duplicate, certified reference material, and three method blanks were prepared and analyzed with each study sample. MLML's results were in good agreement with the referee lab (Brooks Rand, LLC) and no corrective actions were required.

Data Analysis

Guidance Tissue Levels

Mercury concentrations are presented in four categories. The lowest concentrations (less than 0.12 ppm) are in a range where consumption is strongly encouraged by OEHHA (Klasing and Brodberg 2006). OEHHA is the agency responsible for managing health risks due to contaminated sport fish in California. Locations with concentrations in this category are colored green. The highest concentrations (above 0.93 ppm) are in a range where OEHHA discourages consumption for women of childbearing age and children 17 and younger (Klasing and Brodberg 2006). Locations with concentrations in this category are colored red. Locations with concentrations between these endpoints are colored either yellow (between 0.12 and 0.23 ppm) or orange (between 0.23 and 0.93 ppm).

Controlling for the Relationships between Length and Mercury

Several methods were used to control within species for the relationship of fish length to mercury concentration. An ANCOVA method was used when data were sufficient (see below). Size limits (Table 4) were applied following USEPA guidance to all other recent data when comparing sites. USEPA guidance (USEPA 2000) specifies that the smallest fish in a composite should be no less than 75% the length of the largest. For historical mercury data used in time-trend analysis, mercury concentration was first regressed on fish length, and then the residuals were analyzed as a time series of length-adjusted mercury data. For the two sites with sufficient years in the time series, the residual mercury concentrations were regressed on year.

Statistical analysis of spatial patterns in mercury concentrations in largemouth bass, channel catfish, Sacramento sucker, and Sacramento pikeminnow were performed

following the method of Tremblay et al. (1995, 1998). Given the strong influence of fish length or age on mercury concentration in many species (Huckabee *et al.* 1979, Wiener *et al.* 2003), analysis of covariance (ANCOVA) is an appropriate tool for detecting significant differences among locations (*e.g.*, Watras *et al.* 1998). The Tremblay method performs a type of ANCOVA that tests for whether the slopes of different locations are significantly different from each other. This model also allows for curvilinear relationships between length and mercury by including a polynomial term in the regression analysis. The method employs dummy variables and backward, stepwise elimination regression to determine differences in means, slopes, and curve shapes among locations. Sites with at least 8 samples and a 130 mm range in lengths were included in the analysis.

Feedback from the Peer Review Panel (PRP) on a draft of this report recommended examining standardized fish concentrations based on linear ANCOVA, and then comparing these results to the Tremblay method. The PRP was concerned that the Tremblay model assumes curvilinear relationships when they could be inappropriate, and that this assumption may increase the probability of committing Type I and II errors. A summary of the requested comparison is presented in Appendix 2. The predicted mercury concentrations at a standard length, in addition to the slope and intercept parameters, were compared for each of the four species. The model equations were also examined on a scatter plot of the original data to evaluate model fit.

Results indicated that the Tremblay method performed well when sample sizes were large (in this case, largemouth bass and Sacramento sucker). However, for channel catfish and Sacramento pikeminnow, the data appeared too sparse to support the complexity of the Tremblay model (*i.e.*, too many parameters), and thus the linear ANCOVA was more appropriate. The parameter estimates using the Tremblay model were often exactly the same at different sites for the catfish and pikeminnow analyses, even though the data did not appear to fit that identical equation at some sites. This finding suggests a higher probability of Type II error in the species with lower sample sizes. If true, this implication must be confirmed by future power analyses. The robustness of the Tremblay model to Type I error could not be evaluated directly by the analysis described here. Such a model evaluation technique (*e.g.*, Monte Carlo simulation) was beyond the scope of the Project, and should be considered for future analyses if this is deemed a high priority. However, we do propose that an evaluation of models be performed with next year's dataset using maximum likelihood methods.

The steps listed below were taken to apply the Tremblay model to the largemouth bass and Sacramento sucker data, and to apply the linear ANCOVA to the channel catfish and Sacramento pikeminnow data. The only difference in the parameterization of these two models is that the linear model does not include the polynomial slope term. The computations were performed in SAS 9.1 (SAS Institute 2003).

1) The length data were "centered" by subtracting the mean length from each individual length measurement.
2) A backward elimination regression analysis with dummy variables for intercept, slope, and a polynomial term (in Tremblay model) for each location was run on

the untransformed mercury data along with a Box-Cox analysis of the optimal transformation for achieving normality and minimizing variance in the residuals of the regression. For these data, a log base-10 transformation was optimal.

3) The backward elimination regression was then run again with the optimally transformed (log) mercury data.
4) Coefficients with $p < 0.05$ were retained in the model.
5) The resulting regression equation was used to calculate predicted mercury concentrations (mean and 95% confidence interval) for each location at a standard length (350 mm for largemouth bass, 425 mm for channel catfish, 420 mm for Sacramento sucker, and 350 mm for Sacramento pikeminnow).

White catfish, a primary target species slated for ANCOVA, were not as abundant as expected at the sampling locations, so the dataset was too sparse for the ANCOVA analysis. Of five sites with sufficient data, four showed no length:mercury relationship (slope = 0), while the fifth had an unusual upward U-shaped regression curve that was heavily influenced by two large fish. Therefore, we concluded that the data were not suited to apply the Tremblay method and instead compared sites using length limits.

Redear sunfish, bluegill, common carp, and black crappie were originally planned to be analyzed as composites. Given that the lab chose to analyze them as individuals, we evaluated the data for the possibility of ANCOVA analysis. Four redear sunfish and four bluegill sites met the minimum sample size requirement (n = 8), but the length ranges were less than 90 mm. One common carp and none of the black crappie sites met the minimum sample size. An examination of length:mercury relationships was therefore not possible for these species, and instead we compared sites that represented five or more samples and applied size limits.

<u>Correlations between Sport Fish and Biosentinel Small Fish</u>

The sport fish dataset was also suitable for exploring correlations with biosentinel data to gain a more detailed understanding of spatial and temporal trends, as well as food web relationships. With this intent, the Sampling Plan indicated 14 sites where both sport fish and biosentinels would be collected (Map 2). We examined the linkage between the two groups of fish using two techniques. First, we calculated the Pearson's correlation of mean mercury concentration (standardized for length when possible) between biosentinel and sport fish species. Second, we related the relative difference in mercury concentration between the selected species to distance between sampling locations using linear regression. Largemouth bass were chosen as the sport fish species for this analysis, since they had the most extensive relevant data set (collected at 12 of the 14 overlap sites). Two biosentinel species were selected; the inland silverside, since it was the most widespread, and juvenile largemouth bass, for comparison to adults of the same species.

By comparing mercury in juveniles and adults of the same species, we aimed to reduce the variability in mercury bioaccumulation that might be due to differences in home range size, physiology, and trophic guild. Our assumption was that the similarity of such

factors within the same species would lead to a clearer linkage between biosentinel and sport fish mercury concentrations.

The (log-transformed) mean mercury concentrations used to compare biosentinel and sport fish were derived using two methods.

1. In the silverside to bass comparison, at each of the overlapping sites (n = 7), the mean silverside concentration was correlated to the 350 mm largemouth bass concentration derived from ANCOVA. The silverside data were not spread across a sufficient range in lengths to be suitable for ANCOVA. For the intra-species comparison of largemouth bass, the standard length concentration of 85 mm juveniles was related to the 350 mm adult concentration at each of the overlapping sites (n = 8). The criteria for applying ANCOVA to sport fish data are described above. The criteria for biosentinels were a minimum of 8 samples per site, and a range in lengths of 65 mm or more.
2. The difference in mercury concentration between biosentinel and sport fish was scaled to the midpoint between the respective concentrations at each site. This analysis method is known as the "scaled relative difference (SRD)".

   SRD = [sport fish – biosentinel] / [biosentinel + 0.5*(sport fish – biosentinel)]

   The differences were scaled in this way, because the expected difference in mercury concentrations between species lower in the food web (biosentinel fish) and higher in the food web (adult largemouth bass) is proportional to the overall mercury in the food web at that particular site. We used the mid-point of the difference between sport fish and biosentinel as a measure of overall mercury in the food web at each site. In this way, the SRD at a site with high mercury concentrations (*e.g,* Cosumnes River) may be similar to that of a low mercury site (*e.g,* Franks Tract). For example, the difference in mercury between adult largemouth bass and silverside at Cosumnes River was 0.45 µg/g, compared to 0.11 µg/g at Franks Tract. However, when scaled to the overall mercury in the food web (midpoint between biosentinel and sport fish at each site; Cosumnes River = 0.39 µg/g, Franks Tract = 0.10 µg/g), the SRD is relatively equal (1.1 µg/g for both sites). These scaled differences were then regressed against distance between sampling locations. The goal was to explore the influence that distance between where sport fish were sampled and where biosentinel fish were sampled may have had on the correlation between their mercury concentrations. The geographic coordinates are accurate within about a 0.5 km radius. However, some of the distances between the sport fish and biosentinel fish overlap sites were > 1 km, so we felt this analysis was worth exploring.

Mapping and GIS Methods

The map figures were designed using ESRI ArcInfo 9.0 software. All maps are in a California Teale Albers NAD 83 Projection. A connection to the GIS from a Microsoft Access 2003 database was established in order to display the results of queries that

calculated mean concentrations and for relative ease of updating the map figures as necessary.

RESULTS AND DISCUSSION

Over 2000 fish from 22 species (Tables 2 and 3) were collected from 69 locations in the Bay-Delta watershed (Map 1). This report provides a complete summary of these data (Table 5, Appendix 1), and the fish that were primary and secondary target species constitute the majority of the analyses. These species were largemouth bass, white catfish, channel catfish, redear sunfish, bluegill, Sacramento sucker, Sacramento pikeminnow, common carp, and black crappie. The sampling locations spanned a wide geographic range, including the main tributaries to the Delta, with more detailed sampling in the Delta areas where restoration actions are planned. Sample sizes for primary target species largemouth bass were excellent, and often met the target of 12 individuals per site. However, white catfish were less abundant and did not meet primary target sample size goals at most sites (Table 3). Channel catfish and Sacramento pikeminnow were less widely distributed but were abundant enough at some sites for ANCOVA analysis. Redear sunfish, bluegill, Sacramento sucker, and common carp, though secondary target species, were widely distributed and sample sizes met goals at many sites. Black crappie was the least sampled of the secondary targets, and sample size goals were met at very few sites.

Length:Mercury Relationships

Length:mercury relationships in target species varied greatly (Figures 1 – 9). Examining the relationship broadly within a species without regard to site showed that largemouth bass appeared to have a strong relationship (Figure 1). Mercury in Sacramento sucker and Sacramento pikeminnow were also strongly related to length (Figures 2 and 3). The two catfish species showed no obvious correlation (Figures 4 and 5), nor was there a strong overall length:mercury relationship for redear sunfish, bluegill, common carp, or black crappie (Figures 6 - 9). If anything, the white catfish data suggested a decline between 200 and 400 mm (Figure 4), and black crappie declined between 150 and 300 mm (Figure 9). Most of the other species showed little to no length:mercury relationship (Figures 11A, 12, 13, 14A, 14C, and 14D), except spotted bass, striped bass, hardhead, and smallmouth bass (Figures 10, 11B, and 14B). Clearer length:mercury relationships for these bass species and hardhead may have been hindered by the small sample size of these species. Striped bass was not a primary target species for this year of the Project but will be sampled heavily in future years. For the target species, results were as expected for largemouth bass and redear sunfish. Largemouth bass are known to accumulate mercury in a strong relationship to fish length in this watershed (Davis *et al.* 2003). Redear sunfish are small fish (< 250 mm) with a relatively small range of sizes collected (~ 150 mm) over which changes in mercury related to length may not be apparent. Mercury may also vary with fish age, and this relationship will be assessed in largemouth bass from 2005, 2006, and possibly the final sampling year. Unfortunately, the 2005 age data were not available for inclusion in this report. More detailed length:mercury

relationships by site for each species are discussed below in the section on spatial patterns.

Results for white catfish were more surprising, although Davis et al. (2003) also were not able to find positive length:mercury relationships in this watershed. Lack of an adequate size range and sample size of fish per site made it difficult to investigate length:mercury relationships in both this study and the previous one. However, four of five 2005 sites with sufficient data for ANCOVA analysis showed no relationship of length to mercury, although data for larger fish were sparse. Changes in diet between fish of different ages/lengths, changes in the food web over time, and a variety of other factors (Huckabee *et al.* 1979) may be related to the patterns observed. These results indicate that white catfish may be too difficult to capture across a wide enough range of sizes for ANCOVA analysis and may show little relationship between length and mercury. In either case, findings from the 2005 sampling season suggest that continuing to use white catfish as a primary target species with a target of 12 individuals sampled per site to facilitate ANCOVA analysis would not be an optimum allocation of resources.

Characterizing Mercury Concentrations (Project Goal 1)

A key purpose of sport fish sampling was to characterize mercury concentrations in fish to provide information needed to assess the health risks of consuming contaminated fish (Project Goal 1, Objective 3; see Table 1). The data discussed in this report will be used by OEHHA in development of consumption advisories, and the risk of consuming contaminated fish will be communicated by the Department of Health Services-Environmental Health Investigations Branch (DHS-EHIB) to appropriate target audiences based on environmental justice principles. Here we take the first step by summarizing fish mercury concentrations relative to draft GTLs developed by OEHHA (Klasing and Brodberg 2006) for use in establishing consumption advisories. All 2005 data from all site types (Table 3, Map 1) were included in addressing this objective, including data from sites funded by collaborating studies.

<u>Overall Impairment</u>

Overall impairment of sport fish consumption was assessed by determining the species with the highest and lowest mean mercury concentration at each of 68 sites (Table 4, Maps 3 and 4). Note that size limits were applied to the data in Maps 3 and 4; thus, not all sites with data available were included. On a site-by-site basis (Map 3), maximum concentrations were most often (n = 38 sites, 56%) in the orange 0.23 – 0.93 μg/g (or ppm) category. These sites were distributed throughout the study area. About one-quarter of the sites (n = 18, 27%) fell in the slightly lower yellow 0.12 – 0.23 μg/g category. These locations were concentrated in the central Delta; spatial patterns will be discussed in more detail in a separate section below. Nine sites (13%) were in the green < 0.12 μg/g category, and three sites (4%) were in the red > 0.93 μg/g category.

The species most often exhibiting the highest average concentration at each site was largemouth bass (n = 35 sites, 52%), and next most frequent was Sacramento

pikeminnow (n = 9, 13%). Chinook salmon had the highest average concentration at five sites (7%). Sacramento sucker, rainbow trout, and common carp each exhibited the highest average at four sites (6%), followed by black crappie at three sites (4%). Smallmouth bass, spotted bass, white catfish, and channel catfish were each the maximum at a single site. Thirty-three sites had maximum concentrations from species other than largemouth bass, but only eight of these sites had data for more than five bass within the applied size limits, and 21 sites lacked bass data completely. Sacramento pikeminnow were the second-most-contaminated fish, including two red sites (American River at Goethe Park and Sacramento River at Woodson Bridge). However, Sacramento pikeminnow had the highest average concentration at locations where few, if any, largemouth bass were caught. Furthermore, of the nine green sites, only one was represented by largemouth bass, with the remainder located in the Sierra Nevada foothills, where none of the target or highly sampled species were collected, but Chinook salmon and rainbow trout were common. Thus, across the majority of sites, largemouth bass was the most contaminated of the species analyzed in 2005.

The lowest concentrations on a site-by-site basis (Map 4) were most often (n = 51 sites, 75%) in the green 0 – 0.12 µg/g category. These locations were distributed widely throughout the study area. The rest of the sites (n = 17, 25%) were in the yellow 0.12 – 0.23 µg/g category, and mostly located east and north of the Sacramento-San Joaquin Delta. The species that most frequently had the lowest average concentration was redear sunfish (n = 22, 32%). Bluegill was second most common as the lowest species, with nine sites (13%). Sacramento sucker and rainbow trout had the lowest concentration at eight sites (12 %) each, as did Chinook salmon and brown bullhead at six sites (9%) each. The remaining nine sites were represented by common carp (n = 3 sites, 4%), hitch (n = 2 sites, 3%), and one site each for flathead catfish, pumpkinseed, channel catfish, and steelhead trout. Of the 46 sites with a minimum concentration from a species other than redear sunfish, only 10 sites had more than three redear within the applied size limits, and 33 had no redear data at all. Bluegill and rainbow trout were the next least contaminated species, but were only the lowest species in the Sierra Nevada foothills, and locations near the Cosumnes Reservoir and San Joaquin tributaries, where no redear were caught. Thus, redear sunfish were the least contaminated of the species analyzed in 2005, with particularly low mercury in the Delta.

Four species that represent varying degrees of mercury contamination are compared in Map 5. Largemouth bass and redear sunfish were mapped since they were previously shown to be the most and least impaired species, respectively (Maps 3 and 4). Sacramento sucker and channel catfish were additionally selected for comparison due to their wide distribution in the study area, and being characterized by intermediate mercury concentrations. When average concentrations for these four species were displayed simultaneously (Map 5), the variation in contamination by species could be distinguished at each site. The species that were and were not collected at each site was also made apparent. Largemouth bass was generally one contamination level higher than the catfish or sucker. Redear sunfish were usually two levels lower than bass, but occasionally only one level lower in the Sacramento River watershed. Bass and sunfish were only at equivalent levels at Lost Slough (downstream of the Cosumnes River) and San Joaquin

River at Hwy 99. All four species were collected at nine sites (13%), with the majority (n = 5) occurring along the San Joaquin River. At locations where all four species could be compared, redear sunfish and channel catfish were generally one or two contamination levels lower than Sacramento sucker and largemouth bass.

Spatial patterns in concentrations were clearly indicated in Map 5. The least contaminated sites across all four species (yellow and green in the map) were mainly in the central and southern Delta and secondarily in the extreme southern reaches of the San Joaquin. The most contaminated sites were along the mainstream and tributaries of the Sacramento and San Joaquin River within about 100 km of the Delta, as well as the Cosumnes River. This region corresponds to the area where intensive gold mining occurred in the Sierra Nevada.

Mercury Concentrations by Species

Contamination was significant in many of the target species. Largemouth bass and pikeminnow were highly contaminated, but sunfish and bluegill less so (Table 4). Non-target species were low in mercury (*e.g.*, rainbow trout and Chinook salmon) with two exceptions: hardhead and striped bass. Largemouth bass was the best sampled species (n = 240), but only 2% of samples corresponded to the red > 0.93 µg/g category (note that size limits were applied to the data in Table 4). Most bass samples (62%) fell in the orange 0.23 – 0.93 µg/g category, and an additional 30% were in the yellow 0.12 – 0.23 µg/g category. Redear sunfish and bluegill were mainly in the green category (82% and 61%, respectively), with 13% in the yellow category for redear, and 28% for bluegill. White and channel catfish samples tended to fall in the yellow category (42 and 45%, respectively). For white catfish, the next highest percentage (35%) was in the green < 0.12 µg/g category, yet the next highest percentage for channel catfish (35%) was in the orange category. Thus, channel catfish were more contaminated than white catfish. Sacramento sucker samples were equally distributed among the yellow and orange categories (35% each), with slightly fewer samples in the green category (28%). The majority of common carp samples corresponded to the orange (51%) and yellow (36%) categories. The only species with a relatively high percentage of samples in the red category was Sacramento pikeminnow (21%), but these were only seven samples. Most of the pikeminnow samples fell in the orange category (73%). Black crappie was a secondary target species; however only 16 samples were within the size limits. This small sample size may explain the bimodal distribution of mercury concentrations (as due to chance), with most falling in the green and orange categories (38% each), and the remainder in the yellow category (25%) between green and orange. The only non-target species with sufficient sample size (> 30) to make inferences regarding contamination, were rainbow trout, brown bullhead, and Chinook salmon. All of these were mostly (> 80%) in the green category. In summary, largemouth bass and pikeminnow were the most contaminated of the target species, followed in decreasing order by carp, sucker, channel catfish, black crappie, white catfish, bluegill, and redear sunfish.

The same overall ranking holds when size limits were not imposed (Figures 1 – 9). Figures 1 and 3 indicate that many largemouth bass and pikeminnow samples exceeded

0.93 µg/g wet weight, while sucker, catfish, and carp each had two or fewer samples in the red category (Figures 2, 4, 5, and 8). Furthermore, only three channel catfish, one carp, and no white catfish samples exceeded 0.6 µg/g, even though some of these fish were quite large (> 500 mm; *e.g.*, Figure 8). No bluegill samples were in the red category, but two exceeded 0.6 µg/g (Figure 7). Finally, no sunfish were in the red category, and only 10 fell into the orange category (Figure 6).

Examination of mercury concentrations by site yielded similar conclusions for relative contamination of the target species (Maps 6 – 14). The largemouth bass concentration map (Map 6) had two-thirds (30 of 47, 64 %) orange sites, many with mean concentrations greater than 0.5 µg/g. The remaining sites were 32% yellow (n =15), and 4% (n = 2) green. Half of the Sacramento sucker sites (15 of 30) were in the yellow category, with mean concentrations less than 0.2 µg/g (Map 7). Thirty-seven percent of sites (n = 11) fell in the orange category, and 13% (n = 4) were green. The Sacramento pikeminnow concentration map represents some of the highest concentrations found among the target species (Map 8). Although the number of sites were limited (n = 13), it remains compelling that 85% (n = 11) were orange, and 15% (n = 2) in the very high red category, with a few sites having mean concentrations greater than 1.0 µg/g. Twenty-six percent (5 of 19) of channel catfish sites (Map 10) and 23% (6 of 26) of white catfish sites (Map 9) were in the orange category, and the bar heights were under 0.5 µg/g. The yellow category included 53% (n = 10) and 46% (n =12) of channel and white catfish sites, respectively. Twenty-one percent (n = 4) and 31% (n = 8) of channel and white catfish sites, respectively, fell in the green category. The overwhelming majority of redear sunfish sites (30 of 35, 86%) were green (Map 11). Four sites (11%) fell into the yellow category, and only one site (3%) was orange. Forty-five percent of bluegill sites (13 of 29) were in each of the green and yellow categories, mostly under 0.2 µg/g (Map 12). The remaining 5% (n = 3) fell in the orange category. The majority of common carp sites were high, with 55% (12 of 22) in the orange category (Map 13). Thirty-six percent (n = 8) were in the yellow category, and a single site (5%) was green. Finally, black crappie sites were evenly distributed (3 of 9, 33%) in each of the green, yellow, and orange categories (Map 14), with all but one site having concentrations less than 0.5 µg/g.

The relative degree of mercury contamination of species sampled in 2005 was as expected based on their trophic ecology. Largemouth bass are large sport fish (up to 600 mm in the samples collected) and are the top piscivorous predator in the Bay-Delta watershed. Adults are known to consume all varieties of fish and large invertebrates in their habitat (Moyle 2002). A high exposure to mercury was expected in this species, given its size and position in the food web. Carp, sucker, and catfish also grow rather large (commonly > 500 mm in this study), but their diets do not primarily consist of fish (rather, detritus and benthic invertebrates). Redear sunfish are relatively small and occupy a lower position in the food web (Moyle 2002), feeding primarily offshore on shelled invertebrates (particularly clams). The lower concentrations in sunfish may, therefore, be due to a different age/size and exposure mechanism compared to other species sampled in the Project.

The original hypothesis from the Sampling Plan that redear sunfish may be a good alternative, as a species lower in mercury than other popular sport fish, is supported by these data. It is important to remember, however, that this conclusion is preliminary, given that organics analyses have not been performed on these samples. Redear sunfish at a variety of sizes were clearly lower in mercury than any of the other target species, particularly the largemouth bass, pikeminnow, carp, sucker, and catfish.

Mercury in Fish Collected in 2006

The fish that had to be collected in 2006 due to logistical problems the previous year were from 6 sites (Figure 15). Because these data are so few, we chose to use them to pilot a new type of display: mean-length:mean-mercury plots by site (Figure 15). These figures allow for detailed examination of differences between species at the same location. These graphics were created to facilitate examination of which species were higher and lower in mercury at the same site, and, therefore, convey to fishers and other stakeholders how the selection of surrogate species could lead to reduced mercury exposure. For example, the average sized largemouth bass (380 mm) at American River at Nimbus Dam was in the orange 0.23 – 0.93 µg/g category, while Sacramento sucker of similar size (360 mm) were well into the yellow 0.12 – 0.23 µg/g category. These data will be included in the full analysis of other fish collected in 2006 in the 2007 Annual Report.

Characterizing Spatial and Temporal Trends (Project Goal 2)

The second main purpose of sport fish sampling was to characterize spatial and temporal trends in mercury in fishery resources to determine how habitat restoration and mercury clean-up actions affect methylmercury accumulation in the food web (Project Goal 2, Objective 1).

Regional Spatial Patterns

After just the first year of sampling, it is very early in the Project to characterize trends in mercury relative to habitat restoration projects and clean-up actions. None of the restoration actions targeted for study with sport fish samples are underway, so the information gathered to date comprises baseline data only. Furthermore, with only one sampling round complete at index and intensive sites, their information content is similar to that of advisory sites, which have also been sampled once. Currently, the patterns that can be assessed with the data in hand are general spatial and temporal trends across all sites, without reference to specific restoration projects or types of sites. All site types contributed to the spatial patterns documented below.

Spatial and temporal mercury bioaccumulation patterns as they relate to wetland restoration and mercury sources can be examined on local and regional scales. Biosentinel species are better suited than sport fish to local patterns, because many species of sport fish have large home ranges that are on a regional scale, rather than being highly localized. Local patterns of mercury bioaccumulation are discussed in detail in the

companion report by Slotton and co-workers on biosentinel sampling and analysis. Regional patterns of mercury bioaccumulation can be assessed with sport fish data.

A discussion of regional spatial patterns of fish mercury in the Delta watershed and their relationship to areas with large amounts of wetland (as a surrogate for wetland restoration actions) follows. The limited data available for inter-annual and long-term temporal trends in mercury bioaccumulation were also analyzed, as well as relationships between sport fish mercury and mercury in biosentinel fish and water. Finally, a review of previous regional mercury and organics studies are presented for comparison.

Spatial Patterns Based on ANCOVA Results

Mercury concentrations were higher in the Sacramento and San Joaquin Rivers and their tributaries, and lower in the Delta. This pattern was apparent throughout the maps and spatial figures in this report (Figures 16 – 27; Maps 3 – 14) and was also observed by Davis et al. (2003) in this region. The map illustrating maximum average concentrations (Map 3) and map of concentrations comparing four representative species (Map 5) both indicate areas of lesser impact (green and yellow categories) in the central and southern regions of the Delta. Generally, each of the mercury concentration maps by species (Maps 6 – 14) repeats this pattern. Sacramento sucker (Map 7) and redear sunfish (Map 11) were the exceptions. Sucker had concentrations in the Delta and San Joaquin River that were as high or higher than in the Sacramento River, while redear sunfish were low in the Delta but low almost everywhere else as well.

The length:mercury relationship varied by site for all four species analyzed by ANCOVA (Figures 16 – 19). The regressions varied significantly by site in intercept, slope, and shape of the fit (presence or absence of polynomial component), which was indicated by the regression equation for each site. For largemouth bass, the more northern sites were plotted near the top of Figure 16, and Delta sites began near the bottom of the first page. Sites north of the Delta had higher intercepts, steeper slopes, and polynomial components, while those in the Delta had lower intercepts, more shallow slopes, and were closer to linear. Sites south of the Delta (on the lower half of the second page of Figure 16) had slightly higher intercepts and steeper slopes than those in the Delta, with polynomial slope components again being significant at three locations. Differences in slope of the length:mercury relationship could be caused by biological factors such as differences in growth rate (a slow-growing population would have a higher slope) or consumption rate (which might vary due to factors such as the nutritional quality of prey).

The channel catfish showed a similar pattern to largemouth bass, with variation by site in the length:mercury regression equations (Figure 17). The two sites along the Sacramento River had very steep slopes and high intercepts. Delta sites had few data for this species, yet showed concentrations that were quite low relative to fish of the same length at more northern sites. One Delta site had a shallower positive slope compared to the northern sites, and the other two were negative, but close to horizontal. Similarly, along the San Joaquin River, the one site included in the ANCOVA had a low intercept and slightly negative slope, indicating no strong size relationship. This pattern of lower mercury in

the San Joaquin River relative to the Sacramento River for channel catfish was also apparent in Map 10, where the latter sites were orange and the former yellow.

The Sacramento sucker ANCOVA results (Figure 18) did not exhibit the same pattern of reduced concentrations in the Delta as shown for the other species. All of the sites included in the ANCOVA had polynomial components to the regression equation, and a few of the sites along the Sacramento, American, and Feather Rivers did have steeper slopes and high intercepts. However, in general, sites in this northern region showed concentrations that were lower than fish of the same length at southern sites. Although few data were collected from Delta sites (none were sufficient for the ANCOVA), plots at the top of the second page of Figure 18 indicate that concentrations were similar to the San Joaquin River. This pattern was also evident in Map 7, where the central and southern Delta sites were orange like the San Joaquin River, and bar heights were mostly higher than sites to the south.

The ANCOVA results for Sacramento pikeminnow reveal a similar pattern to largemouth bass and channel catfish at some sites (Figure 19). Due to the limited distribution of pikeminnow caught in 2005, the pattern of reduced concentrations in the Delta was not made clear, and no samples of this species were collected from the San Joaquin River. Sites north of the Delta however, do indicate higher concentrations with steep slopes and high intercepts. The high slopes support the pattern in Map 8 of elevated concentrations (orange and red sites) throughout the Sacramento River watershed.

Spatial Patterns Based on Estimates of Mercury at a Standard Length

Calculating mean mercury ± confidence intervals at a standard length (Figures 20 – 23) was the best way to assess spatial differences, because the mercury values were normalized for length. For species that were not analyzed by ANCOVA, length and sample size limits were applied instead. In Figures 20 – 23 confidence intervals that did not overlap between sites indicated significantly different estimates of the mean mercury concentration at those sites.

For largemouth bass, the regional pattern of mercury concentration was the same as previously described: higher to the north and south and lower in the Delta (Figure 20). Concentrations in the Feather River were variable depending on location (around 0.2 – 0.6 µg/g), while those in the American, Sacramento, and Cosumnes/Mokelumne Rivers were often higher (0.6 µg/g). Most values in the Delta were significantly lower (around 0.2 µg/g), although more northern Delta sites tended to be slightly higher. Mercury concentrations jumped back up at the northern end of the San Joaquin River watershed and then declined to low levels again at the southern end.

The Delta was not well represented in the sites with sufficient samples for ANCOVA of the channel catfish, sucker, or pikeminnow data. With only six sites for comparison of channel catfish by standard length (Figure 21), the Sacramento River had high mercury concentrations (around 0.35 µg/g) relative to the Delta and San Joaquin River (around 0.2 µg/g). Sacramento sucker had variable mercury concentrations within each of the watersheds (Figure 22). Two Feather and Sacramento River sites, as well as one in the

American and San Joaquin Rivers were relatively high (around 0.25 µg/g) compared to the majority of other locations (around 0.1 µg/g). Sacramento pikeminnow were well represented in the Sacramento River, but not other regions (Figure 23). Concentrations were similar (0.2 – 0.4 ug/g) throughout the Sacramento, Feather and American Rivers, with the highest sites located on the Sacramento.

In contrast to channel catfish, white catfish of the appropriate size range were collected from many Delta sites (Figure 24). Mean mercury was higher at the northern locations (around 0.3 µg/g), lowest in the central Delta (around 0.1 µg/g), and rose again slightly at the San Joaquin.

The redear sunfish mean mercury concentrations (Figure 25) followed the same spatial pattern, although the differences were more subtle, which made sense given that sunfish were generally lower in mercury relative to the other species. Feather, Sacramento, and Cosumnes River sunfish values were high (around 0.2 µg/g) and variable within sites. Central Delta values were the lowest with the smallest confidence intervals (around 0.06 µg/g), and one of the San Joaquin River values was slightly higher (0.1 µg/g).

Bluegill of the appropriate size range were mostly collected from sites in the Delta and San Joaquin River (Figure 26). New Hogan Reservoir (Cosumnes/Mokelumne Rivers) was higher (around 0.2 µg/g) than the majority of the Delta sites (around 0.1 µg/g). The mercury concentrations at San Joaquin River sites rose again to intermediate levels (around 0.15 µg/g), relative to northern locations.

Common carp and black crappie were the most limited datasets for spatial comparison of mean mercury ± confidence interval. No data for crappie were collected within the appropriate size range. Four sites for carp were comparable, though the geographic scope was limited to north and south of the Delta (Figure 27). All four of these locations indicated similar mean mercury concentrations around 0.3 µg/g.

Temporal Trends

Another goal of sampling index and intensive sites, in addition to characterizing spatial patterns, was to identify trends over time. Eight sampling locations, five of which were index or intensive sites, had data sufficient to compare 350 mm standard-length largemouth bass from two time periods (2000 vs. 2005; Figure 28). These standard-length calculations used results from the Tremblay ANCOVA from this study (2005 data) and that by Davis et al. (2003; 2000 data). The overall regional pattern in mercury concentrations described in detail above was apparent in both time periods.

No consistent pattern of inter-annual time trends across sites was apparent. One site, Stanislaus River at Caswell State Park, had higher mercury in 2005, four others (Feather River at Nicolaus, Cosumnes River, Franks Tract, and Big Break) were not significantly different between years, and the remaining three locations were lower in 2005. Therefore, no systematic variation across the Delta watershed was observed during this time period, although the weight of evidence suggested slightly lower concentrations in 2005.

Two sites had sufficient data from the same species available over a longer time period (on the order of 10 – 20 years) to assess long-term time trends (Figure 29). Note that Figure 29 includes a mix of largemouth bass analyzed as individuals and composites; years with few observations indicate samples run as composites. Length:mercury relationships were highly significant at both sites ($p << 0.05$; Figure 29-A1 and 29-B1), but the trend in residual mercury concentrations over time (after removing the effect of length) was not significant in either case ($p > 0.05$; Figure 29-A2 and 29-B2). While this analysis showed no evidence of long-term time trends at these sites, the recent (1998 – 2005) data from Sacramento River at River Mile 44 suggested considerable inter-annual variation over the past 5 or 6 years. When the analysis for this site was repeated with the two 1980s data points removed, a significant decrease over time became apparent ($p = 0.001$). This inter-annual trend explained only one quarter of the variation in mercury residuals ($r^2 = 0.26$).

These results indicate that mercury bioaccumulation does not appear to be changing significantly over the long run, despite inter-annual variation at some sites, although we must remember how sparse the data are for this analysis. This finding is in keeping with the hypothesis that mercury has a long residence time in the Bay-Delta watershed, and concentrations are likely to stay elevated for decades in the absence of significant management actions. The ability to detect decreases in response to management actions would require long-term datasets from the same sites. The data evaluation performed here found a lack of such datasets in the watershed. We propose that funding agencies prioritize filling this data gap in the future.

This analysis also calls in to question how changes in mercury over time will be interpreted at restoration sites, given that we have observed short-term (5-year) variation in mercury at sites in this region in the absence of restoration. One primary line of evidence for effects of restoration projects will be based on overall direction of change in fish mercury at all sites with restoration versus at all sites without. Biosentinel data will provide important paired comparisons upstream and downstream of restoration projects. Ultimately, several long-term-time-trend data sets at both restoration sites and reference areas without restoration will be needed to provide a conclusive answer to how wetland restoration affects mercury in fish.

Linkage between Sport Fish and Biosentinel Small Fish Mercury Concentrations

Project Goal 2 to characterize trends applies particularly to index, intensive, and restoration sites. At these sites (Map 2), sport fish data can be correlated to biosentinel data to gain an understanding of food-web relationships. With only a single year of data, however, we expected a limited ability to detect these linkages, with better relationships to come in future years as data accumulate (*e.g.*, when silverside data can be averaged across many seasons to reflect the same timescale of exposure as adult bass.)

The relationship of mercury in biosentinels to adult largemouth bass varied depending on the biosentinel species (Figure 30). Inland silverside mercury did not correlate well with

that of adult largemouth bass (Figure 30A), but juvenile bass mercury did (Figure 30B). The Pearson statistic for the inland silverside comparison was 0.51, and was strongly influenced by a single data point. Juvenile largemouth bass concentrations were higher than silversides, and correlated well to adult bass (Pearson = 0.81). This strong relationship between juvenile and adult bass mercury is the first indication from this dataset that a relationship exists between biosentinel and adult sport fish contamination.

This result probably reflects a difference in scale of mercury exposure over time between biosentinel species. Juvenile bass mercury likely reflected accumulation over the past 6 months to 1 year, while silversides only reflected the previous few months (D. Slotton pers. comm.). Thus, the timescale of mercury accumulation in juvenile bass was more similar to that of adult bass. Home-range sizes of these two biosentinels are not well quantified in the literature.

Distance between sampling locations was significantly related to the correlation between biosentinel and sport fish mercury for inland silverside but not for juvenile bass (Figure 31). When sampling sites were closer together, the mercury in silversides was more closely related to that of adult bass than when sampling sites were far (> 2 km) apart (r^2 = 0.77, p = 0.01; Figure 31A). Yet, there was no such relationship between distance and mercury in juvenile and adult bass (r^2 = 0.06, p > 0.05; Figure 31B). This result probably reflects the difference in timescale of exposure between the biosentinel species as described above, and the fact that somewhat distant sampling locations may have had different mercury exposure environments as described below.

For the sampling sites that were rather far apart (*i.e.*, > 2 km), the sport fish and biosentinel fish may have experienced different mercury exposure regimes. For example, biosentinel fish may have been captured where tributary waters were mixing with main-stem waters, while sport fish were caught upstream of the confluence in solely main-stem waters. Consideration will be given by the principal investigators this field season (year 2007), when biosentinel and sport fish sampling will again occur at the same sites, as to whether field collections should be done at sites that more closely overlap in space and mercury exposure regimen, or whether it is more important to sample exactly where fish were taken in 2005.

Linkage between Methylmercury Concentrations in Sport Fish and Water

The Central Valley Regional Water Quality Control Board (CVRWQCB) found good correlations between methylmercury in unfiltered water and in largemouth bass from the Delta (Wood *et al.* 2006). Their analysis used the average and median methylmercury in water and in standard length (350 mm) bass at five Delta sites in 2000. A power regression (regression model with an exponential curve) provided the best fit to the data, showing positive relationships in all scenarios evaluated. As a result, the CVRWQCB has been collecting monthly methylmercury water samples over the last few years from more than 10 sites around the Delta, many of which overlap with FMP sampling locations by design (C. Foe pers. comm.). Early indications are that the more recent data also show good correlations to sport fish data collected during the same period (M. Wood, pers.

comm.). SFEI plans to collaborate with the CVRWQCB staff next year to further develop this analysis of sport fish and water datasets.

Linkage Between Sport Fish Mercury and Effects on Piscivorous Wildlife

The degree to which the mercury contamination we found in sport fish of the Delta and its watershed may affect other wildlife populations has not been studied in any detail. Piscivorous wildlife from mink to bald eagles reside in the watershed and are exposed to mercury by consuming local fish. Many of these species would have diets mainly comprised of small fish rather than the sport fish we sampled. Links between biosentinel fish mercury and wildlife effects are addressed in the biosentinel report.

The majority of sport fish collected had mercury concentrations much higher than the risk thresholds developed for avian piscivores (0.1 ug/g, Eisler 1987; 0.15 ug/g Barr 1986, Evers *et al.* 2004), but again larger fish would not commonly be consumed by most wildlife predators in the study area. Nevertheless, even the smallest fish species that were well sampled (redear sunfish and bluegill) had a large proportion of samples above the thresholds listed above (18% and 39% above 0.12 ug/g, respectively).

Thus, a detailed study of wildlife effects for avian and mammalian piscivores in the region is warranted, based on the sport fish and biosentinel fish data generated for this Project. Estimating or modeling effects on wildlife based on the concentrations in the sport fish we sampled is not the focus of this project, which is designed around human health concerns. However, a food-web bioaccumulation model will be developed in 2007 that may provide greater insight on this subject. The data presented here will be available to other scientists for use in their development of species-specific wildlife criterion values for this region.

Mercury Concentrations in Fish and Wetland Extent

The major wetlands present in the Project study area are concentrated in the northern Delta near Prospect Slough and Liberty Island, corresponding to the Prospect Slough (intensive) and Sacramento River at Rio Vista (index) sampling sites. The Yolo Bypass floodplain (a seasonal wetland) also inputs water to this area. These two sampling locations comprised some of the sites in the northern Delta with slightly higher mercury values than in the rest of the Delta (largemouth bass, Figure 20; white catfish, Figure 24; redear sunfish, Figure 25). However, mercury concentrations in this northern Delta area were generally lower than at sites in the Sacramento River drainage (Maps 6 – 14), so they did not stand out as the most impacted sites in the Delta watershed. A much more complete data set, including paired data before and after wetland restoration projects, is necessary to adequately address this question. The observations described here lack replication.

The relevance of wetland extent as an explanatory variable for fish mercury will be investigated in detail in a separate upcoming report for the FMP, as described in the next paragraph.

Explanatory Hypotheses for Spatial and Temporal Trends

The spatial pattern of lower mercury bioaccumulation in the central and lower Delta relative to its major river inputs is not well understood. One plausible hypothesis suggests that photodegradation of methylmercury in the water column may occur more readily in the Delta where water velocity is low and water clarity and residence time are high (Byington *et al.* 2005). Table 6 briefly summarizes this and other hypotheses that relate to spatial trends in sport fish mercury in the Bay-Delta watershed. A number of projects are underway that may contribute to refining or rejecting these ideas. In a forthcoming review of mercury in Delta and Central Valley sport fish (also funded by the FMP), concentrations will be related to sources of mercury to the watershed. This study will apply GIS methods to data collected in the Bay-Delta and will address the hypotheses of elevated mercury in close proximity to historical mining and wetlands (see Table 6). Other CALFED-funded projects that address plant-mercury interactions (Windham *et al.* 2006) and mercury-methylation processes (Marvin-DiPasquale *et al.* 2006) will help answer questions related to spatial mercury trends as well.

The multi-year sport fish mercury dataset generated by this Project will also provide an opportunity to evaluate inter-annual trends, especially at sites that have been monitored historically by other projects (*e.g.*, SRWP). For example, trends in sport fish mercury will be examined at sites where restoration projects have been initiated versus those without, providing needed information on the impact of such remediation actions to the food web (Project Goal 2). Furthermore, many of the sport fish sites are paired with biosentinel sampling, thereby increasing our knowledge of food web interactions in regions of restoration (Project Objective 2). Process-driven hypotheses can be explored more fully in the future, when three years of FMP data are available and through collaborative efforts (*e.g.*, USGS, SRWP and CVRWQCB). This exploration will contribute to achieving Project Goal 4 and may provide directions for future CALFED studies.

Linkage of Project Results to Other Bay-Delta Studies

The largest regional dataset to characterize mercury in the Delta watershed prior to the current Project was a previous CALFED-funded study (1999 – 2000) summarized by Davis *et al.* (2003). Several of the species with high mercury in this study also were elevated in that earlier data set (*e.g.*, largemouth bass, Sacramento pikeminnow, channel catfish, and white catfish). Bluegill and redear sunfish were also identified in the previous work as species lower in mercury that might be good alternatives for human consumption. The most relevant finding in comparison to the current Project was the relatively low mercury concentrations in the central Delta across several species, as described earlier in the Regional Trends section of this report. This spatial pattern does not seem to have altered significantly in the past five years.

The Sacramento River Watershed Program (SRWP) produced another large dataset (1997 – 2002) of sport fish mercury concentrations from 30 locations along the Sacramento River from above Lake Shasta to Cache Slough in the Delta (Larry Walker Associates

2004). The SRWP also monitored many of the major tributaries of the Sacramento River (*e.g.,* Feather and American Rivers) sampled in this study. The SRWP findings highlighted differences in mercury concentration based on trophic level and geography. Trophic level 3 species (*e.g.*, rainbow trout) had consistently lower mercury in agricultural drains, major tributaries, and at the two Delta locations, than trophic level 4 species from the same areas. Trophic level 4 species (*e.g.,* largemouth bass) were significantly lower in the southern Sacramento River main-stem and smaller tributaries, compared to the American and Feather Rivers. Overall, largemouth bass and white catfish samples were noted to be higher relative to other species. The one shortcoming of this dataset is the lack of samples in the Delta, which would have enabled a broader spatial comparison.

The FMP continues and extends the monitoring these two regional projects began. The study conducted by Davis *et al.* (2003) sampled many of the same locations as SRWP and filled in some regional data gaps in the San Joaquin River and Delta. The FMP includes locations sampled by both previous projects. This considerable overlap is designed to detect temporal variation in subsequent years.

Summary of Organics Studies in the Bay-Delta

A recent report written for the State Water Resources Control Board's Surface Water Ambient Monitoring Program (SWAMP) provided a review of the state-wide bioaccumulation monitoring data generated by major monitoring efforts since 1970 (Davis *et al.* 2006a). This report is of particular relevance because it summarized present and historic impacts of bioaccumulation on sport fish due to mercury, PCBs, and legacy pesticides. In the draft SWAMP report, contaminant concentrations were presented in three categories that related to draft guidance tissue levels (draft GTLs) developed by OEHHA (Klasing and Brodberg 2006), similar to the format presented for mercury in this report. Sport fish have been monitored for organic contaminants (PCBs and legacy pesticides) at more than 250 locations across the state since 1998. In the 1998 – 2003 state-wide data set, one-third of PCB monitoring locations exceeded 30 μg/kg for sport fish, a threshold of concern for sport fish consumption. However, only a small proportion (14 of 45) of locations in the Bay-Delta were in the 30 – 270 μg/kg or > 270 μg/kg categories. The remainder of sites in this region were less than 30 μg/kg and, thus, were considered to have no significant impact from PCBs. Data from the previous time intervals (1978 – 1987 and 1988 – 1997) suggested that concentrations were much higher in the past. Several locations in the Bay-Delta were significantly impacted prior to 1998, with concentrations falling in the highest impairment category (> 270 ug/kg). The SWAMP review underlined the fact that few locations have been monitored consistently over the long-term. Only one site in the Bay-Delta watershed (Sacramento River at RM44) had a reasonable time series that could be analyzed. That data set showed no clear time trend and considerable inter-annual variability. The limited evidence for evaluating long-term trends suggests that PCBs will persist in the aquatic environment. However, on the scale of the entire state, PCBs are declining gradually.

Legacy pesticides (DDTs, dieldrin, and chlordanes) do not appear to be as persistent as PCBs. Ninety-eight percent of more than 200 sport fish monitoring locations for DDTs (1998 – 2003) were considered not significantly impacted. Of the small proportion of elevated concentrations (> 830 µg/kg), none were located in the Bay-Delta. This result was similar to the pattern observed for dieldrin and chlordanes, which had very few locations at high concentrations and none within the regional scope of this project. Ninety eight percent of state-wide locations monitored for dieldrin had concentrations less than 24 µg/kg, and 100% were less than 300 µg/kg for chlordanes. These thresholds represent the lowest impairment levels for these contaminants, suggesting that fish consumption would not be significantly impacted. Legacy pesticides have not been monitored at many sites in a consistent manner over time. Sacramento River at RM44 is the exception for the Bay-Delta, showing significant declines in both DDTs and chlordanes in the last 20 years. In general, organics analyses at selected sites are needed to fill important data gaps for time trend analysis. The SWAMP review of sport fish organics data indicated that future evaluations of contaminants of concern for fishing beneficial uses (*e.g.,* human consumption) should consider PCBs, but legacy pesticides may not be as important.

CONCLUSIONS

- Mercury contamination of sport fish was significant across the Delta watershed and varied by species and over space. On a site-by-site basis (Map 3), maximum concentrations were most often (n = 38 sites, 56%) in the orange 0.23 – 0.93 µg/g category. About one-quarter of the sites (n = 18, 27%) fell in the slightly lower yellow 0.12 – 0.23 µg/g category. Nine sites (13%) were in the green < 0.12 µg/g category, and 3 sites (4%) were in the red > 0.93 µg/g category.

- Largemouth bass were the most contaminated species, followed by pikeminnow, carp, sucker, channel catfish, black crappie, white catfish, bluegill, and redear sunfish in decreasing order of concentration. In terms of mercury concentration, redear sunfish are a good alternative to larger species higher in mercury. However, organic contaminants were not included in this study.

- Continuing to use white catfish as a primary target species with 12 individuals sampled per site to facilitate ANCOVA analysis would not be an optimum allocation of resources. Obtaining the necessary samples for ANCOVA was difficult for this species, and length:mercury relationships were not always clear.

- Mercury concentrations were higher in the Sacramento and San Joaquin Rivers and their tributaries and were lower in the Delta. The reasons for this pattern are not well understood.

- Sampling locations in areas with large wetlands had mid-level mercury concentrations and did not stand out from other sites in the watershed.

- Linkage between sport fish and biosentinel mercury concentrations were found between adult and juvenile largemouth bass from the same locations.

- No evidence of long-term temporal trends was discovered. Some data indicated significant inter-annual variation, with lower mercury concentrations in 2005 than in 2000, but change was not apparent on the order of decades.

LITERATURE CITED

Barr, J. F. 1996. Aspects of common loon (*Gavia immer*) feeding biology on its breeding ground. Hydrobiologia 321:119-144.

Byington, A., K. Coale, G. Gill, and K. Choe. 2005. Photo-degradation of methyl mercury in the Sacramento-San Joaquin Delta (poster). *in* CBDA Annual Mercury Review Workshop, Sacramento, CA.

Davis, J. A., B. K. Greenfield, G. Ichikawa, and M. Stephenson. 2003. Mercury in sport fish from the Delta region (Task 2A). An assessment of the ecological and human health impacts of mercury in the Bay-Delta watershed. CALFED Bay-Delta Mercury Project, Sacramento, CA.

Davis, J. A., J. L. Grenier, A. R. Melwani, S. Bezalel, E. Letteney, and E. Zhang. 2006a. The Impact of pollutant bioaccumulation on the fishing and aquatic life support beneficial uses of California water bodies: A review of historic and recent data, Draft Report. San Francisco Estuary Institute.

Davis, J. A., J. A. Hunt, B. K. Greenfield, R. Fairey, M. Sigala, D. B. Crane, K. Regalado, and A. Bonnema. 2006b. Contaminant concentrations in fish from San Francisco Bay, 2003. San Francisco Estuary Institute, Oakland CA.

Davis, J. A., J. A. Hunt, D. G. Slotton, S. Ayers, R. Brodberg, M. Gassel, M. Stephenson, G. Ichikawa, A. Ujihara, and J. Kaslow. 2005. Final workplan for year 1 of the California Bay-Delta Authority Fish Mercury Project: Fish sampling and analysis. San Francisco Estuary Institute, Oakland CA.

Davis, J. A., M. D. May, B. K. Greenfield, R. Fairey, C. Roberts, G. Ichikawa, M. S. Stoelting, J. S. Becker, and R. S. Tjeerdema. 2002. Contaminant concentrations in sport fish from San Francisco Bay, 1997. Marine Pollution Bulletin 44:1117-1129.

Davis, J. A., M. D. May, G. Ichikawa, and D. Crane. 2000. Contaminant concentrations in fish from the Sacramento-San Joaquin Delta and Lower San Joaquin River, 1998. San Francisco Estuary Institute, Richmond, CA.

Fairey, R., K. Taberski, S. Lamerdin, E. Johnson, R. P. Clark, J. W. Downing, J. Newman, and M. Petreas. 1997. Organochlorines and other environmental contaminants in muscle tissues of sport fish collected from San Francisco Bay. Marine Pollution Bulletin 34:1058-1071.

Greenfield, B. K., J. A. Davis, R. Fairey, C. Roberts, D. B. Crane, G. Ichikawa, and M. Petreas. 2003. Contaminant concentrations in fish from San Francisco Bay, 2000. San Francisco Estuary Institute, Oakland, CA.

Huckabee, J. W., J. W. Elwood, and S. G. Hildebrand. 1979. Accumulation of mercury in freshwater biota. Pages 277-302 *in* J. O. Nriagu, editor. The biogeochemistry of mercury in the environment. Elsevier/North-Holland Biomedical Press, New York, NY.

Klasing, S., and R. Brodberg. 2006. DRAFT Report: Development of guidance tissue levels and screening values for common contaminants in California sport fish: chlordane, DDTs, dieldrin, methylmercury, PCBs, selenium, and toxaphene. California Office of Environmental Health Hazard Assessment, Sacramento, CA.

Larry Walker Associates. 2004. Sacramento River Watershed Program Annual Monitoring Report: 2002-2003. Final Draft Larry Walker Associates (LWA).

Report prepared for the Sacramento River Watershed Program.
Marvin-DiPasquale, M. C., J.L. Agee, L. Nicolas, L. Windham, S.L. Wren, D. Yee, A. Heyes, S.D. Olund, D.P. Krabbenhof, and R. Mason. 2006. Controls on mercury-methylation in sediments from freshwater, Delta, and salt-marsh regions of the San Francisco Bay watershed. *in* 4th Biennial CALFED Science Conference 2006, Sacramento, CA.
Moyle, P. B. 2002. Inland Fishes of California. University of California Press, Berkeley.
OEHHA. 1994. Health advisory on catching and eating fish: Interim sport fish advisory for San Francisco Bay. Office of Environmental Health Hazard Assessment, California Environmental Protection Agency, Sacramento, CA.
Puckett, H. M., and B. H. van Buuren. 2000. Quality assurance project plan for the CALFED Project: An assessment of ecological and human health impacts of mercury in the Bay-Delta watershed. California Deptment of Fish and Game, Monterey, CA.
Tremblay, G., J. Doyon, and R. Schetagne. 1995. Environmental monitoring network of the La Grande Complex. Monitoring of mercury levels in fish: approach and methods. Direction Principale Communications et Environnement Groupe-conseil Genivar Inc.
Tremblay, G., P. Legendre, J. Doyon, R. Verdon, and R. Schetagne. 1998. The use of polynomial regression analysis with indicator variables for interpretation of mercury in fish data. Biogeochemistry 40:189-201.
USEPA. 2000. Guidance for assessing chemical contaminant data for use in fish advisories: Volume 1, fish sampling and analysis. Third edition. EPA 823-R-93-002B-00-007. U.S. Environmental Protection Agency, Office of Water, Washington, D.C.
USGS. 2000. Mercury contamination from historic gold mining in California. Fact Sheet FS-061-00. USGS, Sacramento, CA.
van Buuren, B. H. 2006. The California Bay-Delta Authority mercury studies quality assurance program intercomparison study 2, November 2005. van Buuren Consulting, LLC, Seattle, WA.
Watras, C. J., R. C. Back, S. Halvorsen, R. J. M. Hudson, K. A. Morrison, and S. P. Wente. 1998. Bioaccumulation of mercury in pelagic freshwater food webs. Science of the Total Environment 219:183-208.
Wiener, J. G., C. C. Gilmour, and D. P. Krabbenhoft. 2003. Mercury strategy for the Bay-Delta ecosystem: unifying framework for science, adaptive management, and ecological restoration. CALFED Bay-Delta Mercury Project, Sacramento, CA.
Windham, L., A. Jew, S.L. Wren, and M. C. Marvin-DiPasquale. 2006. Plant-mercury interactions: Role of submerged and emergent macrophytes in mercury (Hg) cycling of San Francisco Bay and Delta wetlands. *in* 4th Biennial CALFED Science Conference 2006, Sacramento, CA.
Wood, M. L., C. Foe, and J. Cooke. 2006. Sacramento – San Joaquin Delta Estuary TMDL for Methylmercury Staff Report. Draft Report for Scientific Peer Review. Central Valley Regional Water Quality Control Board, Sacramento, CA.

Table 1. Fish Mercury Project goals and objectives.

Project Goals

1) Protect human health in the short term by characterizing mercury concentrations in fish, developing safe consumption guidelines, and reducing exposure through risk communication based on environmental justice principles.
2) Through food web monitoring, determine how habitat restoration and mercury clean-up actions affect methylmercury accumulation in the food web.
3) Establish an organizational and technical foundation for cost-effective and scientifically defensible fish mercury monitoring that meets the identified needs of end users.
4) Coordinate with the major ongoing science, management, and risk communication efforts to achieve efficiencies of scale and scope.

Project Objectives

1) Characterize spatial and temporal trends in mercury in fishery resources.
2) Demonstrate the use of biosentinel species to link ecosystem restoration, contaminant clean-up, and other landscape changes with spatial and temporal patterns in food web mercury.
3) Assess health risks of consuming contaminated fish and communicate these risks to appropriate target audiences based on environmental justice principles.
4) Establish a Steering Committee and stakeholder advisory groups to facilitate:
a) stakeholder input into the monitoring and risk communication activities based on environmental justice principles, and
b) coordination with other major science, management, and outreach/communication efforts.

Table 2. Scientific and common names of fish species collected.

Common Name	*Genus*	*Species*
Bluegill	*Lepomis*	*macrochirus*
Brown Bullhead	*Ameiurus*	*nebulosus*
Brown Trout	*Salmo*	*trutta*
Carp	*Cyprinus*	*carpio*
Channel Catfish	*Ictalurus*	*punctatus*
Chinook Salmon	*Oncorhynchus*	*tshawytscha*
Crappie	*Pomoxis*	sp.
Flathead Catfish	*Pylodictis*	*olivaris*
Goldfish	*Carassius*	*auratus*
Hardhead	*Mylopharodon*	*conocephalus*
Hitch	*Lavinia*	*exilicauda*
Kokanee	*Oncorhynchus*	*nerka*
Largemouth Bass	*Micropterus*	*salmoides*
Pumpkinseed	*Lepomis*	*gibbosus*
Rainbow Trout	*Oncorhynchus*	*mykiss*
Redear Sunfish	*Lepomis*	*microlophus*
Sacramento Pikeminnow	*Ptychocheilus*	*grandis*
Sacramento Sucker	*Catostomus*	*occidentalis*
Smallmouth Bass	*Micropterus*	*dolomieu*
Spotted Bass	*Micropterus*	*punctulatus*
Steelhead	*Oncorhynchus*	*mykiss*
Striped Bass	*Morone*	*saxatilis*
Tule Perch	*Archoplites*	*interruptus*
White Catfish	*Ameiurus*	*catus*

Table 3. Number of fish collected at sampling locations in the Sacramento-San Joaquin watershed and Delta. Sites are ordered alphabetically. Advisory, Index, Intensive, and Restoration sites were funded by CalFed through the Fish Mercury Project to facilitate the development of consumption advisories and to understand the effects of wetland restoration; CVRWQCB sites were funded by the Central Valley Regional Water Quality Control Board; and SRWP were sites funded by the Sacramento River Watershed Project. All fish were analyzed as individuals.

Site Code	Site Name	Map Cell ID	Site Type	Bluegill	Brown Bullhead	Brown Trout	Carp	Channel Catfish	Chinook Salmon	Crappie	Flathead Catfish	Goldfish	Hardhead	Hitch	Kokanee	Largemouth Bass	Pumpkinseed	Rainbow Trout	Redear Sunfish	Tule Perch	Sacramento Pikeminnow	Sacramento Sucker	Smallmouth Bass	Spotted Bass	Steelhead	Striped Bass	White Catfish
ARDP	American River at Discovery Park	B3	SRWP													22					16	14					4
ARGP	American River at Goethe Park	B3	CVRWQCB													0		0			2	10				4	
ARNIM	American River at Nimbus Dam	B3	CVRWQCB	3												9			3		0	10					
AMHY	American River Hatchery	B3	Advisory															11									
BRRO	Bear River at Rio Oso	B3	CVRWQCB													0			10		4	4		3			
BVSL	Beaver Slough	In inset map	Advisory	5				3								9			5								9
BIGB	Big Break	In inset map	Index				3			5				5		10			5		1	4				5	4
CARV	Calaveras River	In inset map	Advisory	5			5	0								11			5								9
CMRES	Camanche Reservoir	C4	Advisory	10			5	2							0	12											0
CCMOU	Clear Creek	A1	Restoration										5					10			2	8					
COLHY	Coleman Hatchery	A2	Advisory						5																		
CBD99	Colusa Basin Drain at Road 99E	B3	CVRWQCB	1			4									0					0	0					13
COS	Cosumnes River	In inset map	Intensive	5			5	5		5				5		9			5		0	10					
DAHY	Darrah Springs Hatchery	B1	Advisory						0									10									
DBAY	Discovery Bay	In inset map	Advisory	5				4		5						9			5								5
FRGR	Feather River at Gridley	B3	CVRWQCB													10		0			10	10					
FRNI	Feather River at Nicolaus	B3	SRWP	5			5			5						13			10		5	10					
FRHY	Feather River Hatchery	B2	Advisory						5																6		
FRTR	Franks Tract	In inset map	Intensive	5	5					2						8			5	4	0	0					11
HCUT	Honker Cut	In inset map	Advisory	5				0								13			5								0
ITSL	Italian Slough	In inset map	Advisory	5	10		3	0		5						9			5								6
JKLK	Jenkinson Lake	C3	Advisory					0							0	4	4		1								0
LOSL	Lost Slough	In inset map	Advisory	5	7			0								9			5			5					0
MMSL	Mendota Pool/Mendota Slough	C5	Advisory	3	4		7	8				5				9			6								0
MRHY	Merced Hatchery	C5	Advisory						5																		
MER3HSP	Merced River at Hatfield State Park	C5	Restoration	4			5	5	1							12			5		0	10					
MRIND	Middle River at Bullfrog	In inset map	Index	10	10			4				4				22			5		0	0					8
MRHW4	Middle River at Hwy 4	In inset map	Advisory	5				0								9			5								1
MRMIS	Middle River at Mildred Island	In inset map	Advisory	4				1								5			6								2
MILK	Millerton Lake	D5	Advisory	12				1				10							0					13			
MCHY	Moccasin Hatchery	C4	Advisory															10									
MKHY	Mokelumne Hatchery	B4	Advisory						5																6		
MRLL	Mokelumne River at Lodi Lake	In inset map	Advisory			0										12		9			0	9					
MSHY	Mount Shasta Hatchery	A1	Advisory															10									
NHRES	New Hogan Reservoir	C4	Advisory	10				0								12							0				
NIMHY	Nimbus Hatchery	B3	Advisory						5																12		
ORTB	Old River at Tracy Blvd.	In inset map	Advisory	5				3								9			5								9
PCUT	Paradise Cut	In inset map	Advisory	1			5	0		3						13			5							1	9
PARES	Pardee Reservoir	C4	Advisory				5	10								12			10								0
NDPRSL	Prospect Slough	In inset map	Intensive				5	2		4				2		8			2	6	7	7				5	13
SRBND	Sacramento River at Bend Bridge	A2	CVRWQCB		0								5			0		12			10	10					
SRBUT	Sacramento River at Butte City	B3	CVRWQCB													10		0			0	10					
SRCOL	Sacramento River at Colusa	B3	CVRWQCB					10								10			7		10	10					
SRGR	Sacramento River at Grimes	B3	CVRWQCB					6								0		0	6		10	10			1		
SACHC	Sacramento River at Hamilton City	B2	Restoration		0								5			0		2			9	10			1		
SRORD	Sacramento River at Ord Bend	B2	CVRWQCB													0		0			10	10					
SACRIO	Sacramento River at Rio Vista	In inset map	Index	7			6	1		1				5		17			10		10	5	1				13
SRM44	Sacramento River at RM44	B4	Index						7							7			5		7	10	4	12	2	4	
SRVB	Sacramento River at Veterans Bridge	B3	SRWP				4	9								10		0	5		11	8					
SRWB	Sacramento River at Woodson Bridge	A2	CVRWQCB													0		0			10	10					
SSLK	Sacramento Slough at Karnak	B3	CVRWQCB				0	10								10		0			0	0					
SALTSL	Salt Slough at Hwy 165	C5	CVRWQCB	4			6	9		2						10		0	3		0	1				1	
SJHY	San Joaquin Hatchery	D5	Advisory															10									

Site Code	Site Name	Map Cell ID	Site Type	Bluegill	Brown Bullhead	Brown Trout	Carp	Channel Catfish	Chinook Salmon	Crappie	Flathead Catfish	Goldfish	Hardhead	Hitch	Kokanee	Largemouth Bass	Pumpkinseed	Rainbow Trout	Redear Sunfish	Tule Perch	Sacramento Pikeminnow	Sacramento Sucker	Smallmouth Bass	Spotted Bass	Steelhead	Striped Bass	White Catfish
SJCL	San Joaquin River at Crows Landing	B5	CVRWQCB	6			6	4								16		0	6		0	5					6
SJFF	San Joaquin River at Fremont Ford	C5	CVRWQCB	6			6	4								9		0			0	1					9
SJH99	San Joaquin River at Hwy 99	D5	Advisory		9		5	0								9			5					0			2
SJLPK	San Joaquin River at Laird Park	B5	Advisory	5			5	9											5								8
SJMO	San Joaquin River at Mossdale	In inset map	Advisory	5			5	0								9			5								9
SJPAT	San Joaquin River at Patterson	B5	CVRWQCB	5			8									10		0	5			1					3
POTSL	Potato Slough	In inset map	Index	5	4		1	2								12			5		1	4					1
SJVER	San Joaquin River at Vernalis	B4	Index	5			5	5								12			5		0	6				1	11
SMSL	Sand Mound Slough	In inset map	Advisory	5				0								9			5								9
SMCNL	Smith Canal	In inset map	Advisory				6	0								10			5								9
SRCSP	Stanislaus River at Caswell State Park	B4	CVRWQCB					4								10			5		2	10					2
TYSL	Taylor Slough	In inset map	Advisory	5												13			5			3					0
TUO3SHI	Tuolumne River at Shiloh Rd.	B5	Restoration	5			5	5			2					12					0	10					
WDCUT	Werner Dredger Cut	In inset map	Advisory	5	2			0		3						9			5					0			7
WHSL	Whiskey Slough	In inset map	Advisory	6	3			0								9			4								9
YRVMY	Yuba River at Marysville	B3	CVRWQCB															3			5	10					
			Total Collected	**187**	**54**	**0**	**125**	**126**	**33**	**40**	**2**	**19**	**15**	**17**	**0**	**503**	**4**	**87**	**219**	**10**	**142**	**255**	**5**	**28**	**4**	**21**	**201**

Table 4. Percent of samples in each of four draft guidance tissue levels. Sample sizes and size limits are also given.

Species	Number of Samples	Length Size Limits (mm)	0 – 0.12 ppm %	> 0.12 – 0.23 ppm %	> 0.23 – 0.93 ppm %	> 0.93 ppm %
Largemouth Bass	240	292 – 389	6	30	62	2
Redear Sunfish	148	154 – 206	82	13	5	0
Blue Gill	120	127 – 170	61	28	11	0
White Catfish	102	243 – 324	35	42	23	0
Sacramento Sucker	99	355 – 470	28	35	36	0
Carp	76	442 – 589	13	36	51	0
Channel Catfish	55	338 – 450	20	45	35	0
Rainbow Trout	53	262 – 349	100	0	0	0
Brown Bullhead	40	247 – 330	90	8	3	0
Sacramento Pikeminnow	33	355 – 470	0	6	73	21
Chinook Salmon	31	695 – 926	84	16	0	0
Crappie	16	198 – 264	38	25	38	0
Spotted Bass	14	279 – 372	0	36	64	0
Hardhead	10	336 – 448	0	20	80	0
Tule Perch	8	129 – 172	25	63	13	0
Striped Bass	5	324 – 433	0	20	80	0
Pumpkinseed	4	132 – 176	100	0	0	0
Steelhead Trout	3	517 – 690	100	0	0	0
Flathead Catfish	2	192 – 257	100	0	0	0
Hitch	2	200 – 267	100	0	0	0
Smallmouth Bass	1	313 – 418	0	0	0	100

Table 5. The mean, upper & lower confidence intervals, and standard deviation for mercury and total length for 2005 (and early 2006) samples. Note that samples collected during 2006 were for the 2005 monitoring effort but, due to logistical problems, were collected during 2006. Size limits were applied (Table 4).

Year	Species	Site Code	Site Name	Sample Size	Mean Total Length (mm)	Hg Lower Bound CI (95%)	Mean Hg (ppm)	Hg Upper Bound CI (95%)	Hg Std Dev
2005	Blue Gill	BVSL	Beaver Slough	5	150	0.045	0.095	0.146	0.057
2005	Blue Gill	CARV	Calaveras River	3	158	0.021	0.040	0.059	0.017
2005	Blue Gill	CMRES	Camanche Reservoir	4	145	0.095	0.149	0.203	0.055
2005	Blue Gill	COS	Cosumnes River	4	145	0.303	0.480	0.656	0.180
2005	Blue Gill	DBAY	Discovery Bay	5	138	0.038	0.050	0.062	0.013
2005	Blue Gill	FRNI	Feather River at Nicolaus	4	153	0.116	0.255	0.393	0.142
2005	Blue Gill	FRTR	Franks Tract	5	157	0.049	0.066	0.082	0.019
2005	Blue Gill	HCUT	Honker Cut	5	155	0.039	0.045	0.050	0.006
2005	Blue Gill	ITSL	Italian Slough	5	154	0.041	0.054	0.068	0.015
2005	Blue Gill	LOSL	Lost Slough	4	148	-0.013	0.291	0.595	0.310
2005	Blue Gill	MER3HSP	Merced River at Hatfield State Park	2	133	0.067	0.166	0.264	0.071
2005	Blue Gill	MILK	Millerton Lake	7	139	0.065	0.086	0.106	0.028
2005	Blue Gill	MRHW4	Middle River at Hwy 4	3	163	0.065	0.101	0.137	0.032
2005	Blue Gill	MRIND	Middle River at Bullfrog	10	151	0.061	0.123	0.186	0.100
2005	Blue Gill	MRMIS	Middle River at Mildred Island	4	146	0.076	0.142	0.207	0.067
2005	Blue Gill	NHRES	New Hogan Reservoir	5	164	0.132	0.222	0.313	0.103
2005	Blue Gill	POTSL	Potato Slough	4	158	0.063	0.074	0.085	0.011
2005	Blue Gill	SACRIO	Sacramento River at Rio Vista	2	151	0.094	0.127	0.160	0.024
2005	Blue Gill	SJCL	San Joaquin River at Crows Landing	5	150	0.119	0.138	0.156	0.021
2005	Blue Gill	SJFF	San Joaquin River at Fremont Ford	5	147	0.150	0.188	0.226	0.043
2005	Blue Gill	SJLPK	San Joaquin River at Laird Park	3	149	0.102	0.173	0.244	0.063
2005	Blue Gill	SJPAT	San Joaquin River at Patterson	3	154	0.117	0.143	0.169	0.023
2005	Blue Gill	SJVER	San Joaquin River at Vernalis	5	148	0.123	0.139	0.156	0.019
2005	Blue Gill	SMSL	Sand Mound Slough	3	155	0.050	0.061	0.071	0.009
2005	Blue Gill	SS165	Salt Slough at Hwy 165	3	145	0.112	0.171	0.230	0.053
2005	Blue Gill	TUO3SHI	Tuolumne River at Shiloh Rd.	3	142	0.105	0.123	0.140	0.016
2005	Blue Gill	TYSL	Taylor Slough	4	136	0.046	0.050	0.053	0.004
2005	Blue Gill	WDCUT	Werner Dredger Cut	4	144	0.048	0.061	0.073	0.013
2005	Blue Gill	WHSL	Whiskey Slough	1	136		0.031		
2005	Brown Bullhead	FRTR	Franks Tract	5	303	0.052	0.057	0.063	0.006
2005	Brown Bullhead	ITSL	Italian Slough	7	306	0.044	0.055	0.067	0.015
2005	Brown Bullhead	LOSL	Lost Slough	4	263	0.110	0.189	0.267	0.080
2005	Brown Bullhead	MMSL	Mendota Pool/Mendota Slough	4	275	0.029	0.038	0.046	0.008
2005	Brown Bullhead	MRIND	Middle River at Bullfrog	7	291	0.055	0.074	0.093	0.026
2005	Brown Bullhead	POTSL	Potato Slough	2	288	0.029	0.090	0.151	0.044
2005	Brown Bullhead	SJH99	San Joaquin River at Hwy 99	6	272	0.022	0.038	0.053	0.019
2005	Brown Bullhead	WDCUT	Werner Dredger Cut	2	288	0.020	0.031	0.041	0.008
2005	Brown Bullhead	WHSL	Whiskey Slough	3	305	0.029	0.044	0.060	0.014
2005	Carp	BIGB	Big Break	3	576	0.034	0.145	0.257	0.098
2005	Carp	CARV	Calaveras River	2	574	0.123	0.135	0.147	0.008
2005	Carp	CBD99	Colusa Basin Drain at Road 99E	2	472	0.091	0.136	0.181	0.033
2005	Carp	CMRES	Camanche Reservoir	2	475	-0.019	0.453	0.925	0.341
2005	Carp	COS	Cosumnes River	5	524	0.168	0.339	0.510	0.195
2005	Carp	FRNI	Feather River at Nicolaus	4	523	0.137	0.322	0.506	0.188
2005	Carp	MER3HSP	Merced River at Hatfield State Park	5	504	0.221	0.284	0.348	0.073
2005	Carp	MMSL	Mendota Pool/Mendota Slough	4	552	0.099	0.149	0.198	0.050
2005	Carp	NDPRSL	Prospect Slough	4	537	0.195	0.349	0.503	0.157
2005	Carp	PARES	Pardee Reservoir	4	485	0.030	0.053	0.075	0.023
2005	Carp	PCUT	Paradise Cut	3	578	0.135	0.168	0.201	0.029

Year	Species	Site Code	Site Name	Sample Size	Mean Total Length (mm)	Hg Lower Bound CI (95%)	Mean Hg (ppm)	Hg Upper Bound CI (95%)	Hg Std Dev
2005	Carp	SACRIO	Sacramento River at Rio Vista	3	556	0.303	0.330	0.356	0.024
2005	Carp	SJCL	San Joaquin River at Crows Landing	5	475	0.188	0.228	0.269	0.046
2005	Carp	SJFF	San Joaquin River at Fremont Ford	4	486	0.142	0.242	0.341	0.101
2005	Carp	SJLPK	San Joaquin River at Laird Park	4	473	0.307	0.359	0.410	0.052
2005	Carp	SJMO	San Joaquin River at Mossdale	2	510	0.117	0.166	0.215	0.035
2005	Carp	SJPAT	San Joaquin River at Patterson	4	497	0.193	0.256	0.318	0.064
2005	Carp	SJVER	San Joaquin River at Vernalis	5	499	0.210	0.261	0.311	0.057
2005	Carp	SMCNL	Smith Canal	1	536		0.115		
2005	Carp	SRVB	Sacramento River at Veterans Bridge	3	510	0.196	0.376	0.555	0.159
2005	Carp	SS165	Salt Slough at Hwy 165	3	470	0.135	0.191	0.247	0.049
2005	Carp	TUO3SHI	Tuolumne River at Shiloh Rd.	4	531	0.206	0.361	0.515	0.158
2006	Carp	MILK	Millerton Lake	4	530	0.145	0.250	0.354	0.107
2005	Channel Catfish	BVSL	Beaver Slough	2	412	0.039	0.137	0.234	0.070
2005	Channel Catfish	COS	Cosumnes River	3	420	0.237	0.281	0.325	0.039
2005	Channel Catfish	DBAY	Discovery Bay	1	396		0.072		
2005	Channel Catfish	MER3HSP	Merced River at Hatfield State Park	4	393	0.137	0.181	0.224	0.044
2005	Channel Catfish	MMSL	Mendota Pool/Mendota Slough	4	401	0.055	0.074	0.093	0.020
2005	Channel Catfish	MRIND	Middle River at Bullfrog	2	363	0.063	0.119	0.174	0.040
2005	Channel Catfish	NDPRSL	Prospect Slough	1	437		0.295		
2005	Channel Catfish	ORTB	Old River at Tracy Blvd.	2	411	0.009	0.185	0.360	0.127
2005	Channel Catfish	SACRIO	Sacramento River at Rio Vista	1	403		0.112		
2005	Channel Catfish	SJCL	San Joaquin River at Crows Landing	2	344	0.140	0.179	0.218	0.028
2005	Channel Catfish	SJFF	San Joaquin River at Fremont Ford	1	371		0.199		
2005	Channel Catfish	SJLPK	San Joaquin River at Laird Park	7	393	0.193	0.241	0.290	0.065
2005	Channel Catfish	SJVER	San Joaquin River at Vernalis	3	349	0.147	0.195	0.244	0.043
2005	Channel Catfish	SRCOL	Sacramento River at Colusa	5	385	0.225	0.292	0.358	0.076
2005	Channel Catfish	SRCSP	Stanislaus River at Caswell State Park	3	395	0.093	0.126	0.159	0.029
2005	Channel Catfish	SRVB	Sacramento River at Veterans Bridge	5	392	0.220	0.304	0.389	0.096
2005	Channel Catfish	SS165	Salt Slough at Hwy 165	1	449		0.125		
2005	Channel Catfish	SSLK	Sacramento Slough at Karnak	4	359	0.176	0.209	0.241	0.034
2005	Channel Catfish	TUO3SHI	Tuolumne River at Shiloh Rd.	4	402	0.125	0.155	0.185	0.030
2006	Channel Catfish	NHRES	New Hogan Reservoir	1	434		0.310		
2005	Chinook Salmon	COLHY	Coleman Hatchery	5	898	0.068	0.073	0.078	0.006
2005	Chinook Salmon	FRHY	Feather River Hatchery	5	849	0.106	0.120	0.133	0.015
2005	Chinook Salmon	MER3HSP	Merced River at Hatfield State Park	1	796		0.084		
2005	Chinook Salmon	MKHY	Mokelumne Hatchery	5	797	0.110	0.124	0.139	0.017
2005	Chinook Salmon	MRHY	Merced Hatchery	5	803	0.078	0.086	0.094	0.009
2005	Chinook Salmon	NIMHY	Nimbus Hatchery	5	850	0.063	0.092	0.122	0.034
2005	Chinook Salmon	SRM44	Sacramento River at RM44	5	828	0.064	0.068	0.072	0.005
2005	Crappie	BIGB	Big Break	1	250		0.160		
2005	Crappie	COS	Cosumnes River	2	211	0.433	0.644	0.854	0.152
2005	Crappie	DBAY	Discovery Bay	4	242	0.044	0.068	0.092	0.025
2005	Crappie	FRTR	Franks Tract	1	208		0.066		
2005	Crappie	ITSL	Italian Slough	3	257	0.170	0.269	0.368	0.088
2005	Crappie	NDPRSL	Prospect Slough	2	258	0.083	0.214	0.344	0.094
2005	Crappie	SACRIO	Sacramento River at Rio Vista	1	231		0.138		
2005	Crappie	SS165	Salt Slough at Hwy 165	1	222		0.310		
2005	Crappie	WDCUT	Werner Dredger Cut	1	210		0.084		
2005	Flathead Catfish	SRCSP	Stanislaus River at Caswell State Park	2	228	0.069	0.075	0.081	0.004
2005	Hardhead	CCMOU	Clear Creek	2	431	0.278	0.415	0.552	0.099
2005	Hardhead	SACHC	Sacramento River at Hamilton City	4	364	0.057	0.356	0.655	0.305
2005	Hardhead	SRBND	Sacramento River at Bend Bridge	4	396	0.245	0.365	0.484	0.122

Year	Species	Site Code	Site Name	Sample Size	Mean Total Length (mm)	Hg Lower Bound CI (95%)	Mean Hg (ppm)	Hg Upper Bound CI (95%)	Hg Std Dev
2006	Hardhead	CMRES	Camanche Reservoir	2	435	0.325	0.417	0.508	0.066
2005	hitch	BIGB	Big Break	1	204		0.039		
2005	hitch	NDPRSL	Prospect Slough	1	260		0.113		
2006	Kokanee	PARES	Pardee Reservoir	13	205	0.102	0.107	0.112	0.009
2005	Largemouth Bass	ARDP	American River at Discovery Park	5	340	0.326	0.602	0.878	0.315
2005	Largemouth Bass	ARNIM	American River at Nimbus Dam	4	337	0.255	0.521	0.788	0.272
2005	Largemouth Bass	BIGB	Big Break	5	321	0.169	0.266	0.363	0.111
2005	Largemouth Bass	BVSL	Beaver Slough	6	338	0.173	0.226	0.279	0.066
2005	Largemouth Bass	CARV	Calaveras River	4	341	0.067	0.211	0.355	0.147
2005	Largemouth Bass	CMRES	Camanche Reservoir	5	349	0.292	0.337	0.382	0.051
2005	Largemouth Bass	COS	Cosumnes River	6	346	0.542	0.611	0.680	0.086
2005	Largemouth Bass	DBAY	Discovery Bay	5	339	0.132	0.178	0.224	0.052
2005	Largemouth Bass	FRGR	Feather River at Gridley	6	323	0.152	0.204	0.256	0.065
2005	Largemouth Bass	FRNI	Feather River at Nicolaus	6	333	0.208	0.600	0.992	0.490
2005	Largemouth Bass	FRTR	Franks Tract	4	358	0.149	0.157	0.166	0.009
2005	Largemouth Bass	HCUT	Honker Cut	6	355	0.131	0.188	0.245	0.071
2005	Largemouth Bass	ITSL	Italian Slough	5	319	0.183	0.247	0.311	0.073
2005	Largemouth Bass	JKLK	Jenkinson Lake	2	364	0.105	0.141	0.176	0.026
2005	Largemouth Bass	LOSL	Lost Slough	7	320	0.334	0.419	0.505	0.115
2005	Largemouth Bass	MER3HSP	Merced River at Hatfield State Park	4	351	0.177	0.245	0.312	0.069
2005	Largemouth Bass	MMSL	Mendota Pool/Mendota Slough	4	347	0.101	0.229	0.357	0.131
2005	Largemouth Bass	MRHW4	Middle River at Hwy 4	3	341	0.191	0.236	0.281	0.040
2005	Largemouth Bass	MRIND	Middle River at Bullfrog	9	328	0.231	0.274	0.318	0.066
2005	Largemouth Bass	MRLL	Mokelumne River at Lodi Lake	1	334		0.093		
2005	Largemouth Bass	MRMIS	Middle River at Mildred Island	4	347	0.185	0.231	0.278	0.047
2005	Largemouth Bass	NDPRSL	Prospect Slough	7	330	0.256	0.307	0.358	0.069
2005	Largemouth Bass	NHRES	New Hogan Reservoir	5	364	0.361	0.409	0.458	0.055
2005	Largemouth Bass	ORTB	Old River at Tracy Blvd.	7	343	0.120	0.155	0.191	0.048
2005	Largemouth Bass	PARES	Pardee Reservoir	8	360	0.227	0.281	0.335	0.078
2005	Largemouth Bass	PCUT	Paradise Cut	8	354	0.147	0.172	0.198	0.037
2005	Largemouth Bass	POTSL	Potato Slough	4	355	0.295	0.371	0.447	0.078
2005	Largemouth Bass	SACRIO	Sacramento River at Rio Vista	7	332	0.268	0.366	0.465	0.133
2005	Largemouth Bass	SJCL	San Joaquin River at Crows Landing	9	333	0.270	0.315	0.359	0.068
2005	Largemouth Bass	SJFF	San Joaquin River at Fremont Ford	5	353	0.295	0.425	0.555	0.148
2005	Largemouth Bass	SJH99	San Joaquin River at Hwy 99	5	340	0.080	0.095	0.109	0.016
2005	Largemouth Bass	SJMO	San Joaquin River at Mossdale	5	345	0.205	0.264	0.324	0.068
2005	Largemouth Bass	SJPAT	San Joaquin River at Patterson	3	326	0.256	0.338	0.420	0.072
2005	Largemouth Bass	SJVER	San Joaquin River at Vernalis	5	345	0.334	0.416	0.498	0.093
2005	Largemouth Bass	SMCNL	Smith Canal	2	358	0.058	0.178	0.298	0.087
2005	Largemouth Bass	SMSL	Sand Mound Slough	5	347	0.146	0.193	0.241	0.054
2005	Largemouth Bass	SRBUT	Sacramento River at Butte City	6	349	0.444	0.588	0.732	0.180
2005	Largemouth Bass	SRCOL	Sacramento River at Colusa	5	353	0.459	0.548	0.637	0.102
2005	Largemouth Bass	SRCSP	Stanislaus River at Caswell State Park	3	331	0.120	0.447	0.774	0.289
2005	Largemouth Bass	SRM44	Sacramento River at RM44	4	300	0.201	0.301	0.400	0.102
2005	Largemouth Bass	SRVB	Sacramento River at Veterans Bridge	6	351	0.382	0.751	1.119	0.460
2005	Largemouth Bass	SS165	Salt Slough at Hwy 165	8	342	0.219	0.245	0.270	0.037
2005	Largemouth Bass	SSLK	Sacramento Slough at Karnak	4	348	0.264	0.320	0.377	0.058
2005	Largemouth Bass	TUO3SHI	Tuolumne River at Shiloh Rd.	5	340	0.236	0.512	0.788	0.315
2005	Largemouth Bass	TYSL	Taylor Slough	5	334	0.103	0.200	0.298	0.111
2005	Largemouth Bass	WDCUT	Werner Dredger Cut	3	325	0.130	0.160	0.189	0.026
2005	Largemouth Bass	WHSL	Whiskey Slough	5	321	0.099	0.128	0.156	0.032
2006	Largemouth Bass	JKLK	Jenkinson Lake	2	364	0.105	0.141	0.176	0.026

Year	Species	Site Code	Site Name	Sample Size	Mean Total Length (mm)	Hg Lower Bound CI (95%)	Mean Hg (ppm)	Hg Upper Bound CI (95%)	Hg Std Dev
2005	Pumpkinseed	JKLK	Jenkinson Lake	4	157	0.057	0.060	0.063	0.003
2005	Rainbow Trout	AMHY	American Hatchery	11	291	0.020	0.021	0.022	0.002
2005	Rainbow Trout	CCMOU	Clear Creek	2	310	0.015	0.030	0.044	0.011
2005	Rainbow Trout	DAHY	Darrah Springs Hatchery	9	312	0.007	0.011	0.016	0.007
2005	Rainbow Trout	MCHY	Moccasin Hatchery	9	292	0.021	0.023	0.025	0.003
2005	Rainbow Trout	MRLL	Mokelumne River at Lodi Lake	9	317	0.036	0.039	0.042	0.005
2005	Rainbow Trout	SJHY	San Joaquin Hatchery	9	283	0.020	0.022	0.024	0.002
2005	Rainbow Trout	SRBND	Sacramento River at Bend Bridge	2	318	0.023	0.026	0.028	0.002
2005	Rainbow Trout	YRVMY	Yuba River at Marysville	2	301	0.078	0.094	0.110	0.011
2006	Rainbow Trout	JKLK	Jenkinson Lake	9	304	0.033	0.035	0.037	0.003
2005	Redear Sunfish	ARNIM	American River at Nimbus Dam	3	160	0.041	0.071	0.100	0.026
2005	Redear Sunfish	BIGB	Big Break	3	192	0.052	0.066	0.080	0.013
2005	Redear Sunfish	BRRO	Bear River at Rio Oso	10	179	0.074	0.139	0.205	0.106
2005	Redear Sunfish	BVSL	Beaver Slough	5	177	0.041	0.090	0.138	0.056
2005	Redear Sunfish	CARV	Calaveras River	5	191	0.033	0.055	0.077	0.025
2005	Redear Sunfish	COS	Cosumnes River	5	170	0.071	0.204	0.338	0.152
2005	Redear Sunfish	FRNI	Feather River at Nicolaus	8	181	0.123	0.168	0.212	0.064
2005	Redear Sunfish	FRTR	Franks Tract	5	174	0.030	0.061	0.091	0.035
2005	Redear Sunfish	HCUT	Honker Cut	1	169		0.053		
2005	Redear Sunfish	ITSL	Italian Slough	4	189	0.055	0.076	0.097	0.021
2005	Redear Sunfish	LOSL	Lost Slough	5	180	0.135	0.264	0.393	0.147
2005	Redear Sunfish	MER3HSP	Merced River at Hatfield State Park	3	166	0.055	0.086	0.117	0.027
2005	Redear Sunfish	MMSL	Mendota Pool/Mendota Slough	4	193	0.036	0.066	0.096	0.030
2005	Redear Sunfish	MRHW4	Middle River at Hwy 4	3	189	0.059	0.077	0.094	0.015
2005	Redear Sunfish	MRMIS	Middle River at Mildred Island	5	184	0.041	0.061	0.081	0.023
2005	Redear Sunfish	ORTB	Old River at Tracy Blvd.	5	187	0.035	0.039	0.043	0.005
2005	Redear Sunfish	PCUT	Paradise Cut	1	202		0.046		
2005	Redear Sunfish	POTSL	Potato Slough	5	167	0.034	0.041	0.048	0.008
2005	Redear Sunfish	SACRIO	Sacramento River at Rio Vista	6	181	0.073	0.089	0.104	0.019
2005	Redear Sunfish	SJCL	San Joaquin River at Crows Landing	5	182	0.058	0.098	0.139	0.046
2005	Redear Sunfish	SJH99	San Joaquin River at Hwy 99	2	160	0.037	0.042	0.046	0.004
2005	Redear Sunfish	SJLPK	San Joaquin River at Laird Park	4	189	0.050	0.082	0.113	0.032
2005	Redear Sunfish	SJPAT	San Joaquin River at Patterson	4	177	0.064	0.071	0.079	0.007
2005	Redear Sunfish	SJVER	San Joaquin River at Vernalis	4	186	0.067	0.114	0.162	0.048
2005	Redear Sunfish	SMCNL	Smith Canal	5	188	0.037	0.049	0.061	0.014
2005	Redear Sunfish	SMSL	Sand Mound Slough	5	175	0.037	0.047	0.056	0.011
2005	Redear Sunfish	SRCOL	Sacramento River at Colusa	6	184	0.106	0.151	0.195	0.056
2005	Redear Sunfish	SRCSP	Stanislaus River at Caswell State Park	2	186	0.020	0.102	0.183	0.059
2005	Redear Sunfish	SRGR	Sacramento River at Grimes	4	171	0.044	0.071	0.097	0.027
2005	Redear Sunfish	SRM44	Sacramento River at RM44	4	182	0.050	0.072	0.094	0.022
2005	Redear Sunfish	SRVB	Sacramento River at Veterans Bridge	4	175	0.040	0.059	0.077	0.019
2005	Redear Sunfish	SS165	Salt Slough at Hwy 165	2	171	0.076	0.101	0.125	0.018
2005	Redear Sunfish	TYSL	Taylor Slough	5	180	0.028	0.035	0.043	0.009
2005	Redear Sunfish	WDCUT	Werner Dredger Cut	5	192	0.055	0.080	0.105	0.028
2005	Redear Sunfish	WHSL	Whiskey Slough	1	193		0.027		
2005	Sacramento Pikeminnow	ARDP	American River at Discovery Park	4	386	0.021	0.424	0.827	0.411
2005	Sacramento Pikeminnow	ARGP	American River at Goethe Park	1	459		1.260		
2005	Sacramento Pikeminnow	BRRO	Bear River at Rio Oso	1	468		0.507		
2005	Sacramento Pikeminnow	CCMOU	Clear Creek	1	458		0.593		
2005	Sacramento Pikeminnow	FRGR	Feather River at Gridley	3	389	0.013	0.527	1.042	0.455
2005	Sacramento Pikeminnow	SACHC	Sacramento River at Hamilton City	3	384	0.090	0.617	1.143	0.465
2005	Sacramento Pikeminnow	SRBND	Sacramento River at Bend Bridge	5	397	0.199	0.444	0.688	0.279

Year	Species	Site Code	Site Name	Sample Size	Mean Total Length (mm)	Hg Lower Bound CI (95%)	Mean Hg (ppm)	Hg Upper Bound CI (95%)	Hg Std Dev
2005	Sacramento Pikeminnow	SRCOL	Sacramento River at Colusa	1	406		0.272		
2005	Sacramento Pikeminnow	SRM44	Sacramento River at RM44	4	412	0.319	0.425	0.531	0.108
2005	Sacramento Pikeminnow	SRORD	Sacramento River at Ord Bend	3	397	0.172	0.355	0.537	0.161
2005	Sacramento Pikeminnow	SRVB	Sacramento River at Veterans Bridge	2	411	0.229	0.246	0.262	0.012
2005	Sacramento Pikeminnow	SRWB	Sacramento River at Woodson Bridge	4	438	0.813	1.011	1.208	0.201
2005	Sacramento Pikeminnow	YRVMY	Yuba River at Marysville	1	470		0.910		
2005	Sacramento Sucker	ARDP	American River at Discovery Park	6	429	0.086	0.143	0.199	0.071
2005	Sacramento Sucker	ARGP	American River at Goethe Park	1	439		0.128		
2005	Sacramento Sucker	ARNIM	American River at Nimbus Dam	2	405	-0.098	0.250	0.597	0.251
2005	Sacramento Sucker	BIGB	Big Break	3	443	0.207	0.267	0.328	0.054
2005	Sacramento Sucker	BRRO	Bear River at Rio Oso	2	453	0.084	0.196	0.308	0.081
2005	Sacramento Sucker	CCMOU	Clear Creek	5	447	0.079	0.150	0.222	0.081
2005	Sacramento Sucker	COS	Cosumnes River	5	404	0.140	0.207	0.274	0.076
2005	Sacramento Sucker	FRGR	Feather River at Gridley	3	450	0.055	0.119	0.184	0.057
2005	Sacramento Sucker	FRNI	Feather River at Nicolaus	4	393	0.104	0.173	0.243	0.071
2005	Sacramento Sucker	LOSL	Lost Slough	3	429	0.230	0.391	0.552	0.142
2005	Sacramento Sucker	MER3HSP	Merced River at Hatfield State Park	3	397	0.090	0.237	0.385	0.131
2005	Sacramento Sucker	MRLL	Mokelumne River at Lodi Lake	6	436	0.176	0.263	0.349	0.109
2005	Sacramento Sucker	NDPRSL	Prospect Slough	5	434	0.173	0.307	0.441	0.153
2005	Sacramento Sucker	POTSL	Potato Slough	1	458		0.325		
2005	Sacramento Sucker	SACHC	Sacramento River at Hamilton City	2	409	0.064	0.070	0.076	0.004
2005	Sacramento Sucker	SACRIO	Sacramento River at Rio Vista	1	414		0.151		
2005	Sacramento Sucker	SJCL	San Joaquin River at Crows Landing	1	383		0.149		
2005	Sacramento Sucker	SJVER	San Joaquin River at Vernalis	2	420	0.117	0.240	0.362	0.088
2005	Sacramento Sucker	SRBND	Sacramento River at Bend Bridge	5	421	0.044	0.068	0.091	0.027
2005	Sacramento Sucker	SRBUT	Sacramento River at Butte City	2	441	0.213	0.225	0.237	0.008
2005	Sacramento Sucker	SRCOL	Sacramento River at Colusa	5	403	0.044	0.093	0.141	0.055
2005	Sacramento Sucker	SRCSP	Stanislaus River at Caswell State Park	3	460	0.293	0.341	0.388	0.042
2005	Sacramento Sucker	SRGR	Sacramento River at Grimes	5	403	0.074	0.167	0.259	0.105
2005	Sacramento Sucker	SRM44	Sacramento River at RM44	5	433	0.106	0.159	0.213	0.061
2005	Sacramento Sucker	SRORD	Sacramento River at Ord Bend	2	462	0.085	0.134	0.182	0.035
2005	Sacramento Sucker	SRVB	Sacramento River at Veterans Bridge	6	405	0.135	0.193	0.252	0.073
2005	Sacramento Sucker	SRWB	Sacramento River at Woodson Bridge	3	436	-0.095	0.210	0.514	0.269
2005	Sacramento Sucker	SS165	Salt Slough at Hwy 165	1	429		0.281		
2005	Sacramento Sucker	TUO3SHI	Tuolumne River at Shiloh Rd.	4	429	0.102	0.181	0.260	0.081
2005	Sacramento Sucker	YRVMY	Yuba River at Marysville	3	420	0.072	0.325	0.579	0.224
2006	Sacramento Sucker	ARNIM	American River at Nimbus Dam	3	405	-0.034	0.250	0.534	0.251
2005	Smallmouth Bass	SRM44	Sacramento River at RM44	1	407		1.408		
2006	Smallmouth Bass	NHRES	New Hogan Reservoir	8	353	0.563	0.643	0.724	0.116
2005	Spotted Bass	MILK	Millerton Lake	6	330	0.183	0.212	0.240	0.035
2005	Spotted Bass	SRM44	Sacramento River at RM44	8	334	0.396	0.477	0.558	0.117
2005	Steelhead Trout	SACHC	Sacramento River at Hamilton City	1	630		0.097		
2005	Steelhead Trout	SRGR	Sacramento River at Grimes	1	602		0.075		
2005	Steelhead Trout	SRM44	Sacramento River at RM44	1	584		0.049		
2006	Steelhead Trout	FRHY	Feather River Hatchery	3	606	0.057	0.114	0.172	0.051
2006	Steelhead Trout	MKHY	Mokelumne Hatchery	5	600	0.093	0.108	0.123	0.017
2006	Steelhead Trout	NIMHY	Nimbus Hatchery	4	608	0.041	0.053	0.065	0.012
2005	Striped Bass	ARGP	American River at Goethe Park	2	401	0.379	0.557	0.735	0.129
2005	Striped Bass	NDPRSL	Prospect Slough	1	376		0.300		
2005	Striped Bass	PCUT	Paradise Cut	1	426		0.153		
2005	Striped Bass	SRM44	Sacramento River at RM44	1	401		0.600		
2005	Tule Perch	FRTR	Franks Tract	2	168	0.068	0.085	0.101	0.012

Year	Species	Site Code	Site Name	Sample Size	Mean Total Length (mm)	Hg Lower Bound CI (95%)	Mean Hg (ppm)	Hg Upper Bound CI (95%)	Hg Std Dev
2005	Tule Perch	NDPRSL	Prospect Slough	6	140	0.179	0.215	0.252	0.046
2005	White Catfish	ARDP	American River at Discovery Park	3	283	0.175	0.346	0.516	0.151
2005	White Catfish	BIGB	Big Break	3	293	0.148	0.170	0.192	0.019
2005	White Catfish	BVSL	Beaver Slough	4	276	0.091	0.118	0.145	0.027
2005	White Catfish	CARV	Calaveras River	7	268	0.066	0.097	0.127	0.041
2005	White Catfish	CBD99	Colusa Basin Drain at Road 99E	1	260		0.197		
2005	White Catfish	DBAY	Discovery Bay	2	282	0.015	0.077	0.138	0.045
2005	White Catfish	FRTR	Franks Tract	5	299	0.102	0.136	0.169	0.038
2005	White Catfish	ITSL	Italian Slough	3	257	0.062	0.145	0.228	0.073
2005	White Catfish	MRHW4	Middle River at Hwy 4	1	274		0.163		
2005	White Catfish	MRIND	Middle River at Bullfrog	5	283	0.098	0.132	0.167	0.039
2005	White Catfish	MRMIS	Middle River at Mildred Island	1	251		0.145		
2005	White Catfish	NDPRSL	Prospect Slough	6	293	0.264	0.331	0.398	0.084
2005	White Catfish	ORTB	Old River at Tracy Blvd.	8	295	0.088	0.105	0.121	0.023
2005	White Catfish	PCUT	Paradise Cut	7	277	0.085	0.127	0.168	0.057
2005	White Catfish	SACRIO	Sacramento River at Rio Vista	10	291	0.198	0.267	0.337	0.112
2005	White Catfish	SJCL	San Joaquin River at Crows Landing	1	249		0.190		
2005	White Catfish	SJFF	San Joaquin River at Fremont Ford	3	259	0.240	0.297	0.354	0.050
2005	White Catfish	SJH99	San Joaquin River at Hwy 99	2	303	0.045	0.082	0.118	0.026
2005	White Catfish	SJLPK	San Joaquin River at Laird Park	2	245	0.251	0.290	0.328	0.028
2005	White Catfish	SJMO	San Joaquin River at Mossdale	8	264	0.130	0.204	0.279	0.108
2005	White Catfish	SJPAT	San Joaquin River at Patterson	1	261		0.323		
2005	White Catfish	SJVER	San Joaquin River at Vernalis	4	262	0.114	0.185	0.256	0.072
2005	White Catfish	SMCNL	Smith Canal	7	265	0.071	0.088	0.104	0.022
2005	White Catfish	SMSL	Sand Mound Slough	3	256	0.060	0.154	0.247	0.083
2005	White Catfish	WDCUT	Werner Dredger Cut	2	256	0.079	0.120	0.160	0.029
2005	White Catfish	WHSL	Whiskey Slough	3	298	0.048	0.080	0.112	0.028

Table 6. Explanatory hypotheses for trends in fish mercury.

Mechanism	Hypothesis	Reference
Biogeochemical mechanisms in the central Delta	High primary producer biomass in the central Delta and the associated reducing conditions limit the pool of microbially available reactive-mercury and, thus, methylmercury production.	Windham, L., A. Jew, S.L. Wren, and M.C. Marvin-DiPasquale, Plant-mercury interactions: Role of submerged and emergent macrophytes in mercury (Hg) cycling of San Francisco Bay and Delta wetlands, 4th Biennial CALFED Science Conference 2006 DiPasquale, M.C., R. Stewart, N.S. Fisher, P. Pickhardt, R.P. Mason, A. Heyes, and L. Windham-Meyer . Evaluation of Mercury Transformations and Trophic Transfer in the San Francisco Bay/Delta: Identifying Critical Processes for the Ecosystem Restoration Program. 2005 Annual Report of Progress for Project #ERP-02-P40 To The California Bay-Delta Authority (CBDA) Sacramento, CA. Marvin-DiPasquale, M.C. and J.L. Agee. 2003. Microbial mercury cycling in sediments of the San Francisco Bay-Delta. Estuaries 26(6): 1517-1528.
Photo-demethylation	Longer exposure of methylmercury to light results in higher demethylation rates.	Byington, A., K. Coale, G. Gill, and K. Choe. 2005. Photo-degradation of methyl mercury in the Sacramento-San Joaquin Delta (poster). *in* CBDA Annual Mercury Review Workshop, Sacramento, CA.
Microbial methylation	Emergent vegetation and reactive-mercury-methylating bacteria result in higher methylmercury concentrations and production rates.	Marvin-DiPasquale, M.C., J.L. Agee, L. Nicolas, L. Windham, S.L. Wren, D. Yee, A. Heyes, S.D. Olund, D.P. Krabbenhof, and R. Mason, Controls on mercury-methylation in sediments from freshwater, Delta, and salt-marsh regions of the San Francisco Bay watershed, 4th Biennial CALFED Science Conference 2006
Import/export from wetlands	Depending on the dynamics of the wetland system, methylmercury can be either imported or exported by wetlands.	Stephenson, M.D., K. Coale, G. Gill, C.S. Enright, and J.R. Burau, Methyl mercury import/exports in wetlands in the San Francisco Delta and Tributaries – A mass balance approach, 4th Biennial CALFED Science Conference 2006
Bio-dilution in high productivity waters	High primary producer biomass reduces the amount of methylmercury in the system by uptake and sorption. This phenomenon results in lower concentrations per unit of biomass that is transferred up the food chain.	Stober, J. , D. Scheidt, R. Jones, K. Thornton, L. Gandy, D. Stevens, J. Trexler, S. Rathbun, 1998, South Florida Ecosystem Assessment Monitoring For Adaptive Management: Implications For Ecosytem Restoration, Final Technical Report - Phase I. United States Environmental Protection Agency Report 904-R-98-002. http://www.epa.gov/region4/sesd/reports/epa904r98002.html

Table 6 (cont'd.)

Mechanism	Hypothesis	Reference
Proximity and intensity of mining sources	Closer proximity and greater intensity of mining in the watershed increases the amount of total mercury that may potentially be accumulated in the food web.	Alpers, C.N., M.P. Hunerlach, J.T. May, R.L. Hothem, H.E. Taylor, R.C. Antweiler, J.F. De Wild, and D.A. Lawler, 2005, Geochemical characterization of water, sediment, and biota affected by mercury contamination and acidic drainage from historical gold mining, Greenhorn Creek, Nevada County, California, 1999–2001: U.S. Geological Survey Scientific Investigations Report 2004-5251, 278 p. Available at http://pubs.usgs.gov/sir/2004/5251/ May, J.T., R.L. Hothem, C.N. Alpers, and M.A. Law, 2000, Mercury bioaccumulation in fish in a region affected by historic gold mining: The South Yuba River, Deer Creek, and Bear River watersheds, California, 1999: U.S. Geological Survey Open-File Report 00-367, 30 p. http://ca.water.usgs.gov/archive/reports/ofr00367/ Allen-Gil, S.M., D.J. Gilroy and L.R. Curtis. An ecoregion approach to mercury bioaccumulation by fish in reservoirs. 1995. Archives of Environmental Contamination and Toxicology. Volume 28, Number 1 Suchanek, T.H., D.G. Slotton, D. C. Nelson, S.M. Ayers, C. Asher, R. Weyand, A. Liston, and C. Eagles-Smith. Mercury loading and source bioavailability from the Upper Cache Creek mining districts, CALFED – Cache Creek Study (Task 5A: Final Report), January 2000 to July 2002. May, J.T., R.L. Hothem, C.N. Alpers, and M.A. Law. 1999. Mercury Bioaccumulation in Fish in a Region Affected by Historic Gold Mining: The South Yuba River, Deer Creek, and Bear River Watersheds, California, 1999. USGS open file report 00-367
Clean-up actions	Clean-up actions will decrease the concentration of mercury more rapidly than natural processes as mercury-laden sediment is removed from the system.	Churchill, R. and J. Clinkenbeard, 2003. Assessment of the feasibility of remediation of mercury mine sources in the Cache Creek watershed. Final Report to the California Bay Delta Authority. 59 pp. (http://loer.tamug.tamu.edu/calfed/FinalReports.htm). Rytuba, J.J. 2000. Mercury mine drainage and processes that control its environmental impact. Science of the Total Environment 260: 57-71. Wiener, J.G., C.C. Gilmour, and D.P. Krabbenhoft. 2003. Mercury Strategy for the Bay-Delta Ecosystem: A Unifying Framework for Science, Adaptive Management, and Ecological Restoration. Final Report to the California Bay Delta Authority.

Figure 1. Length versus mercury concentrations in largemouth bass (n = 503), 2005. Horizontal colored lines represent draft GTL ranges (Klasing and Brodberg, 2006).

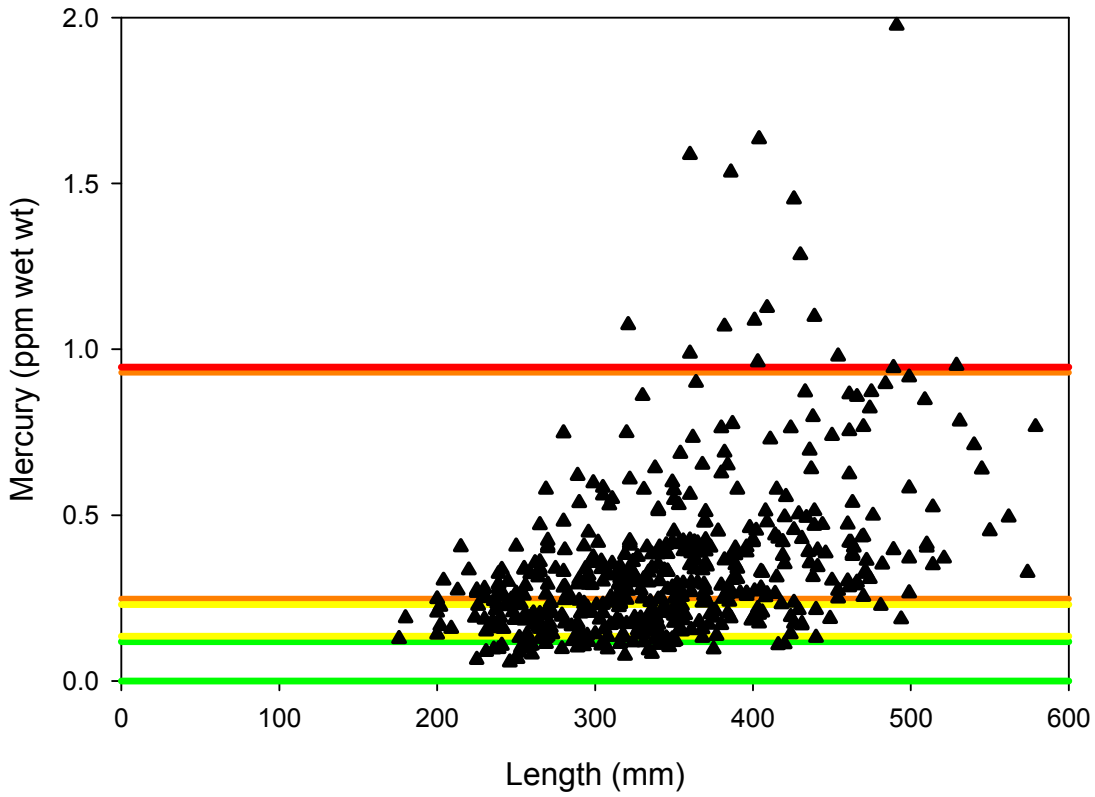


Figure 2. Length versus mercury concentrations in Sacramento sucker (n = 255), 2005. Horizontal colored lines represent draft GTL ranges (Klasing and Brodberg, 2006).

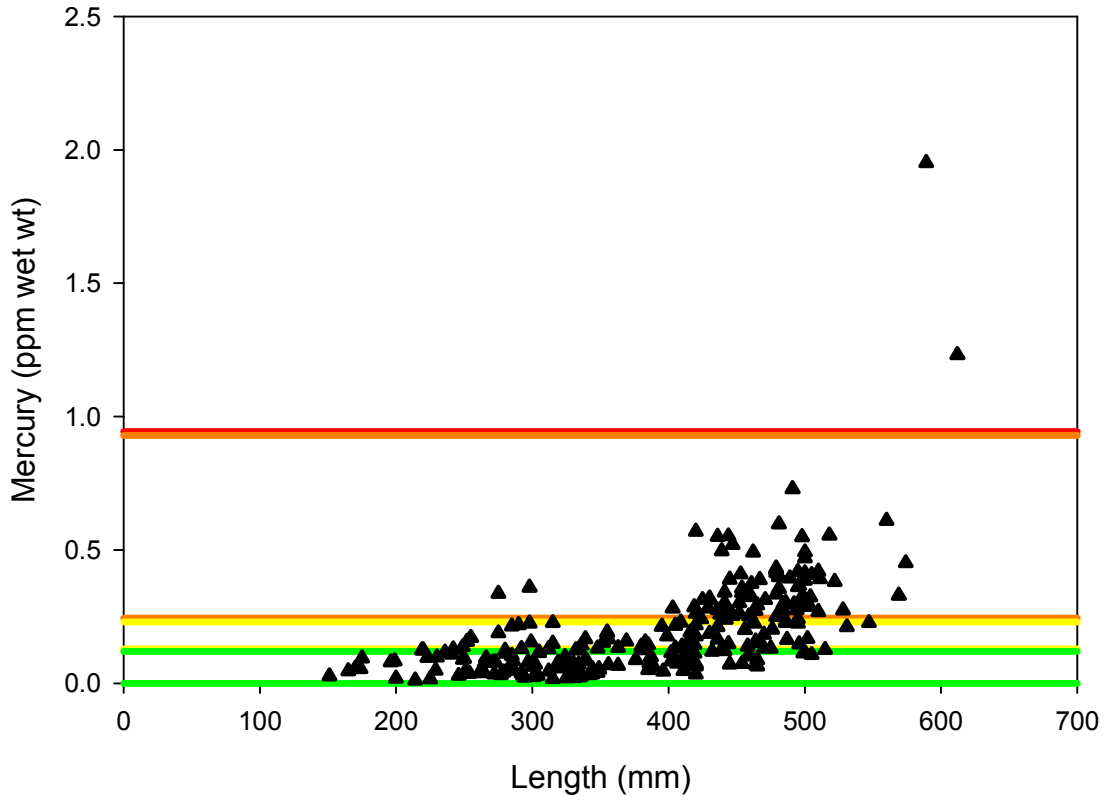


Figure 3. Length versus mercury concentrations in Sacramento pikeminnow (n = 142), 2005. Horizontal colored lines represent draft GTL ranges (Klasing and Brodberg, 2006).

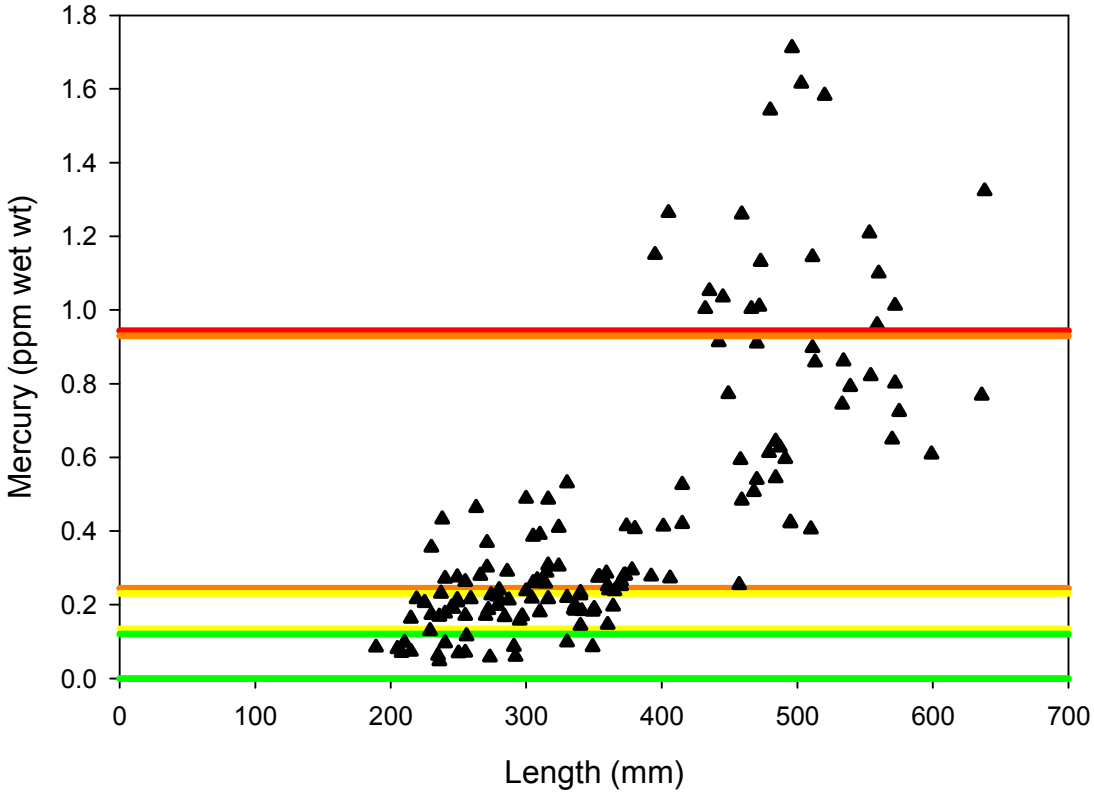


Figure 4. Length versus mercury concentrations in white catfish (n = 201), 2005. Horizontal colored lines represent draft GTL ranges (Klasing and Brodberg, 2006).

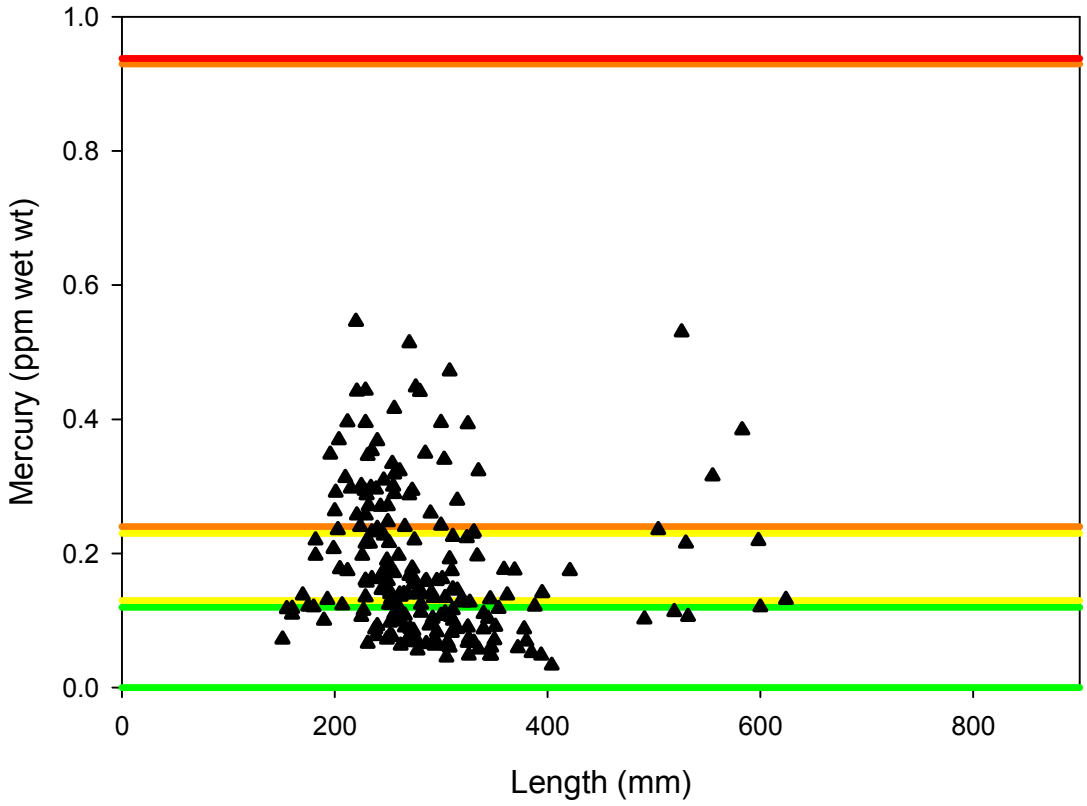


Figure 5. Length versus mercury concentrations in channel catfish (n = 126), 2005. Horizontal colored lines represent draft GTL ranges (Klasing and Brodberg, 2006).

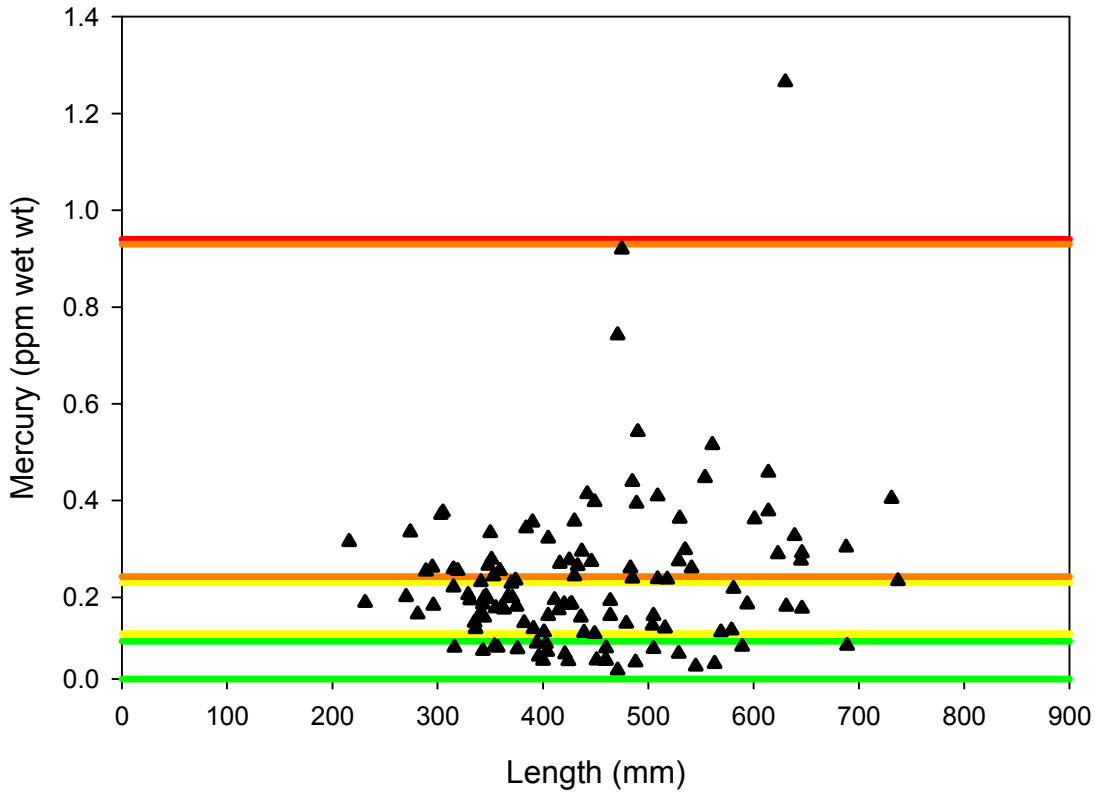


Figure 6. Length versus mercury concentrations in redear sunfish (n = 219), 2005. Horizontal colored lines represent draft GTL ranges (Klasing and Brodberg, 2006).

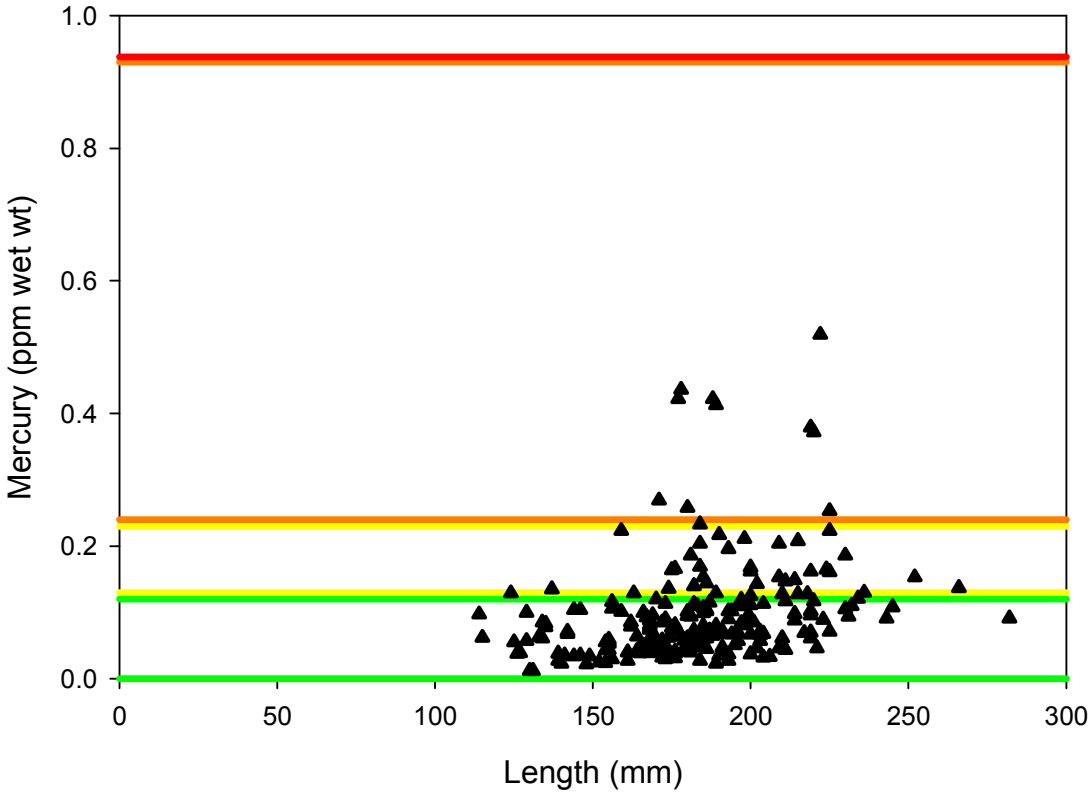


Figure 7. Length versus mercury concentrations in bluegill (n = 187), 2005. Horizontal colored lines represent draft GTL ranges (Klasing and Brodberg, 2006).

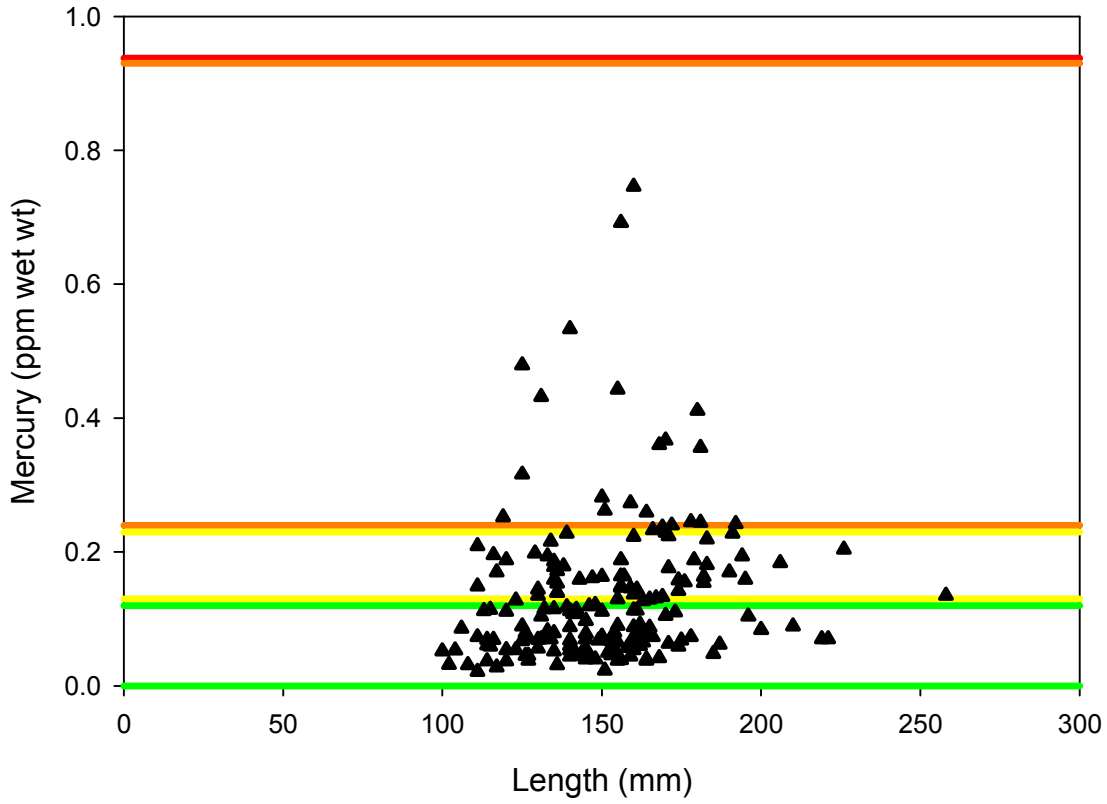


Figure 8. Length versus mercury concentrations in common carp (n = 125), 2005. Horizontal colored lines represent draft GTL ranges (Klasing and Brodberg, 2006)

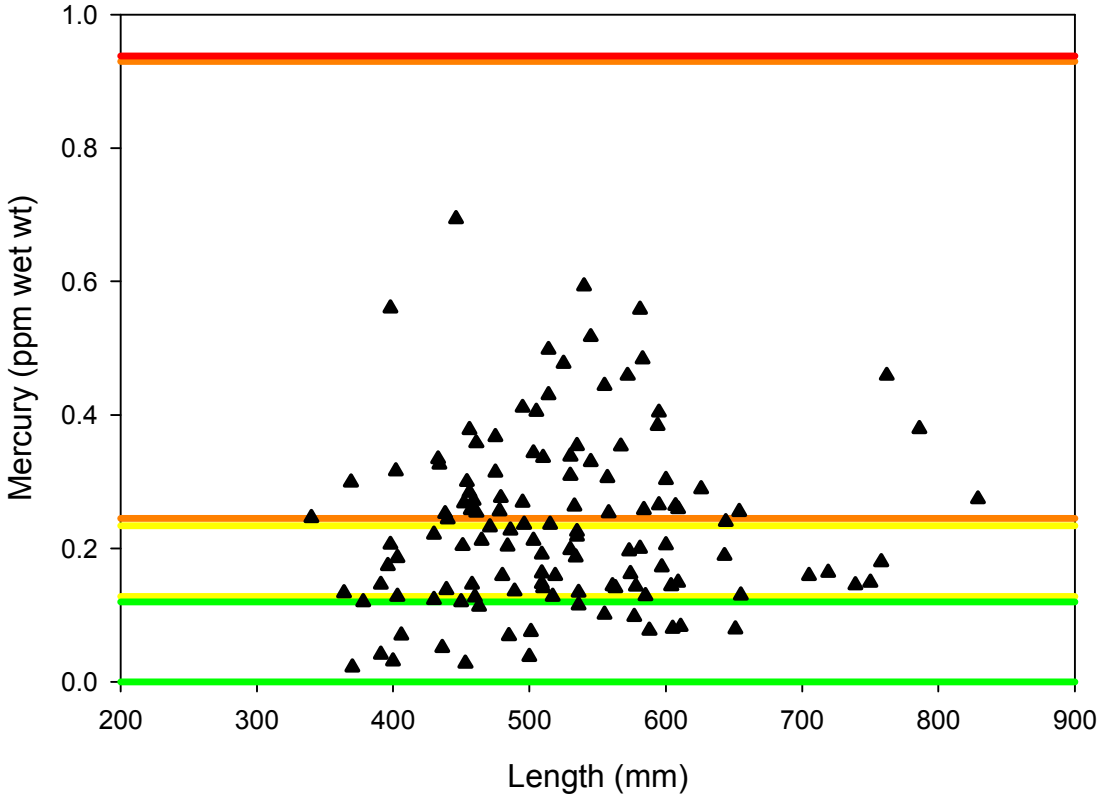


Figure 9. Length versus mercury concentrations in black crappie (n = 40), 2005. Horizontal colored lines represent draft GTL ranges (Klasing and Brodberg, 2006).

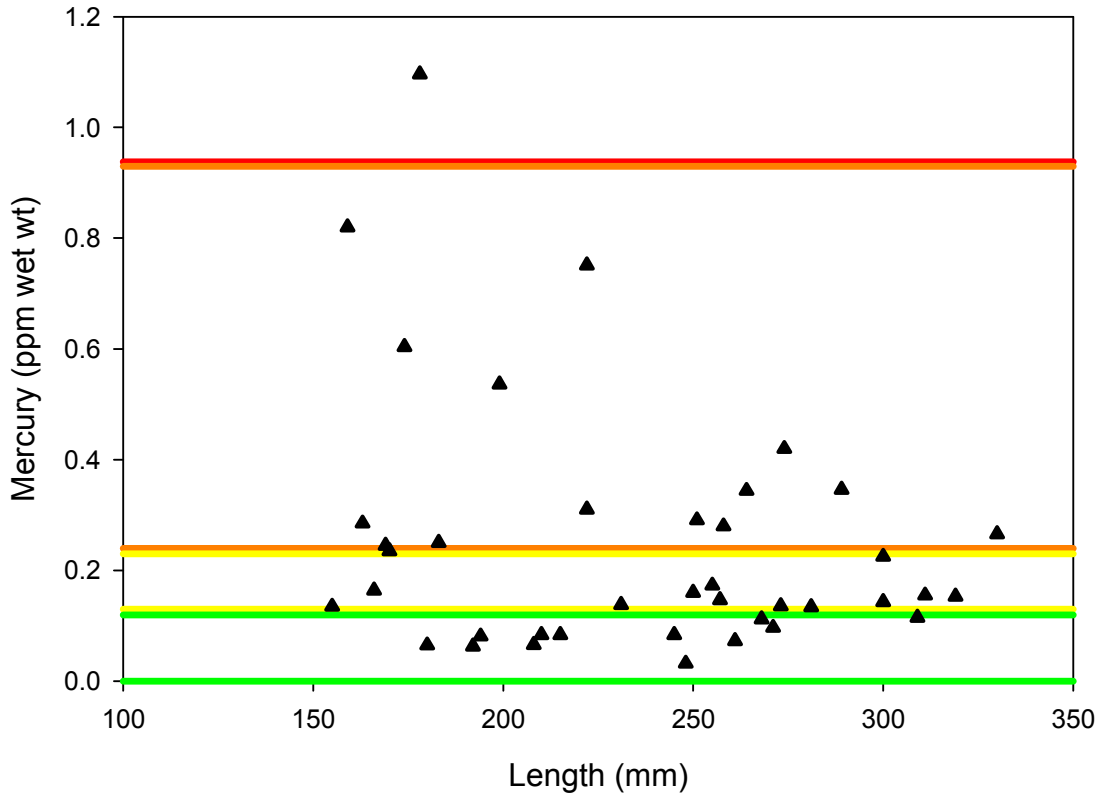


Figure 10. Length versus mercury concentrations in (A) spotted (n = 28) and (B) striped bass (n = 21), 2005. Horizontal colored lines represent draft GTL ranges (Klasing and Brodberg, 2006).

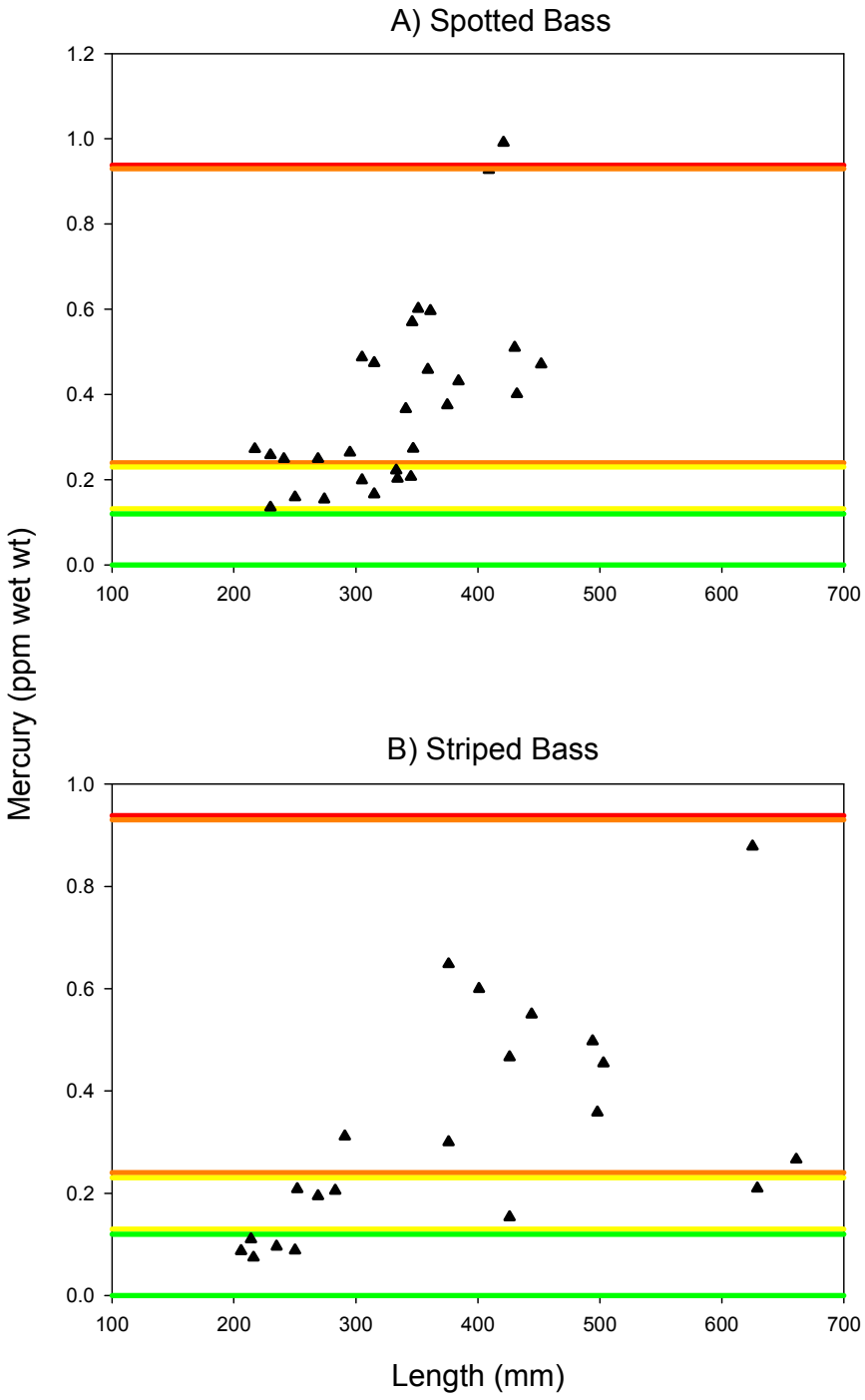


Figure 11. Length versus mercury concentrations in (A) brown bullhead (n = 54) and (B) hardhead (n = 15), 2005. Horizontal colored lines represent draft GTL ranges (Klasing and Brodberg, 2006).

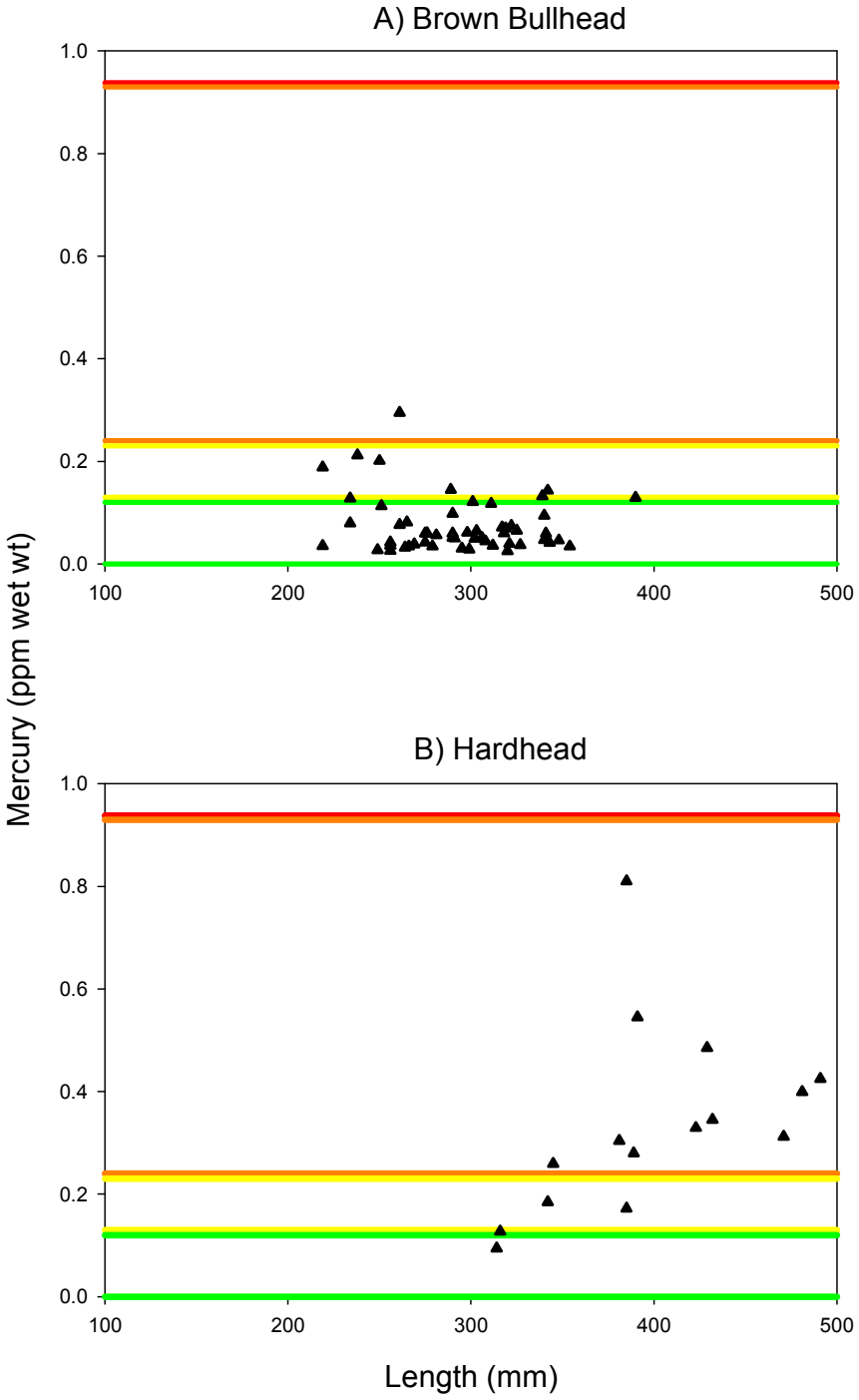


Figure 12. Length versus mercury concentrations in (A) rainbow trout (n = 87) and (B) steelhead trout (n = 28), 2005. Horizontal colored lines represent draft GTL ranges (Klasing and Brodberg, 2006).

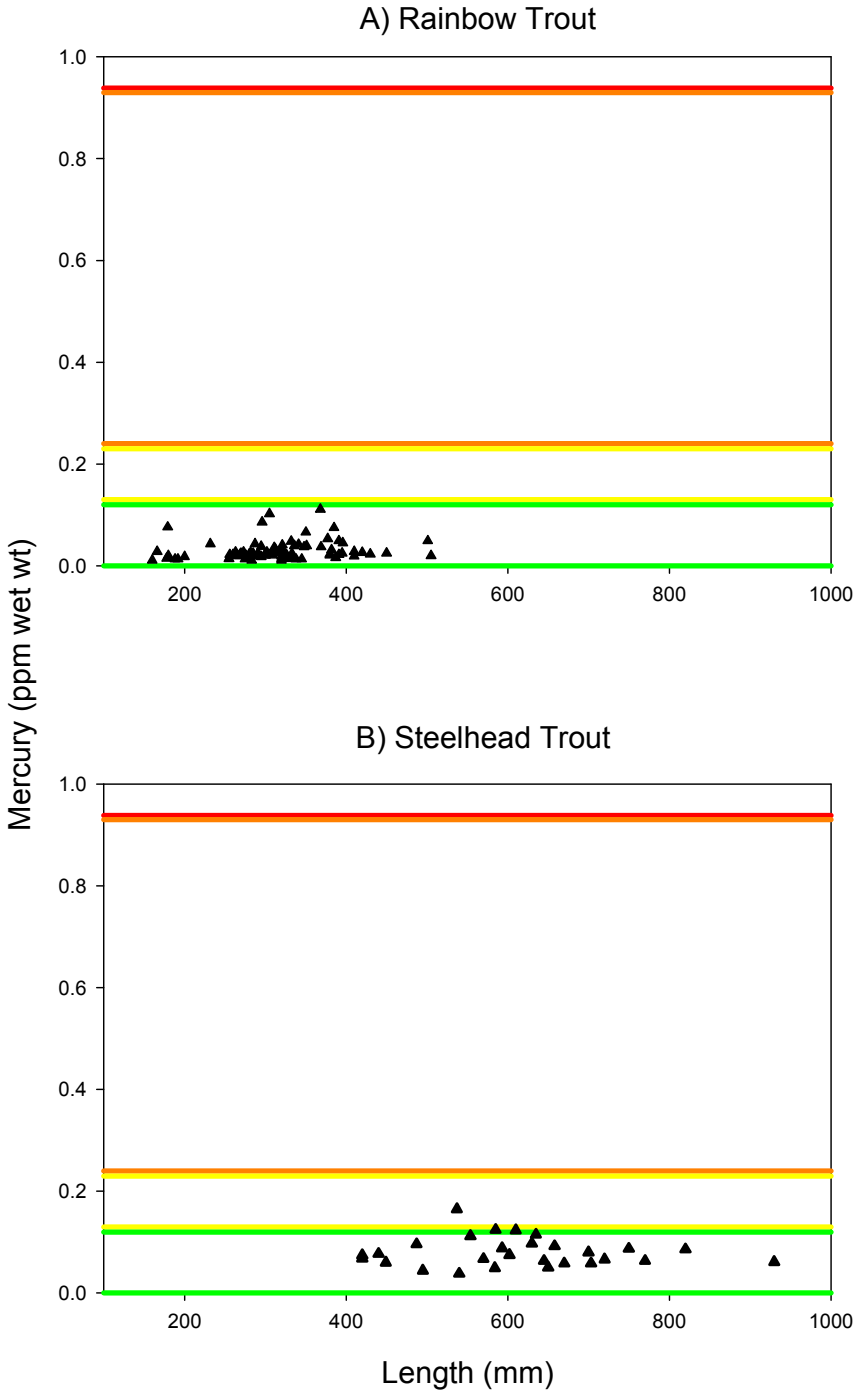


Figure 13. Length versus mercury concentrations in (A) chinook salmon (n = 33) and (B) hitch (n = 17), 2005. Horizontal colored lines represent draft GTL ranges (Klasing and Brodberg, 2006).

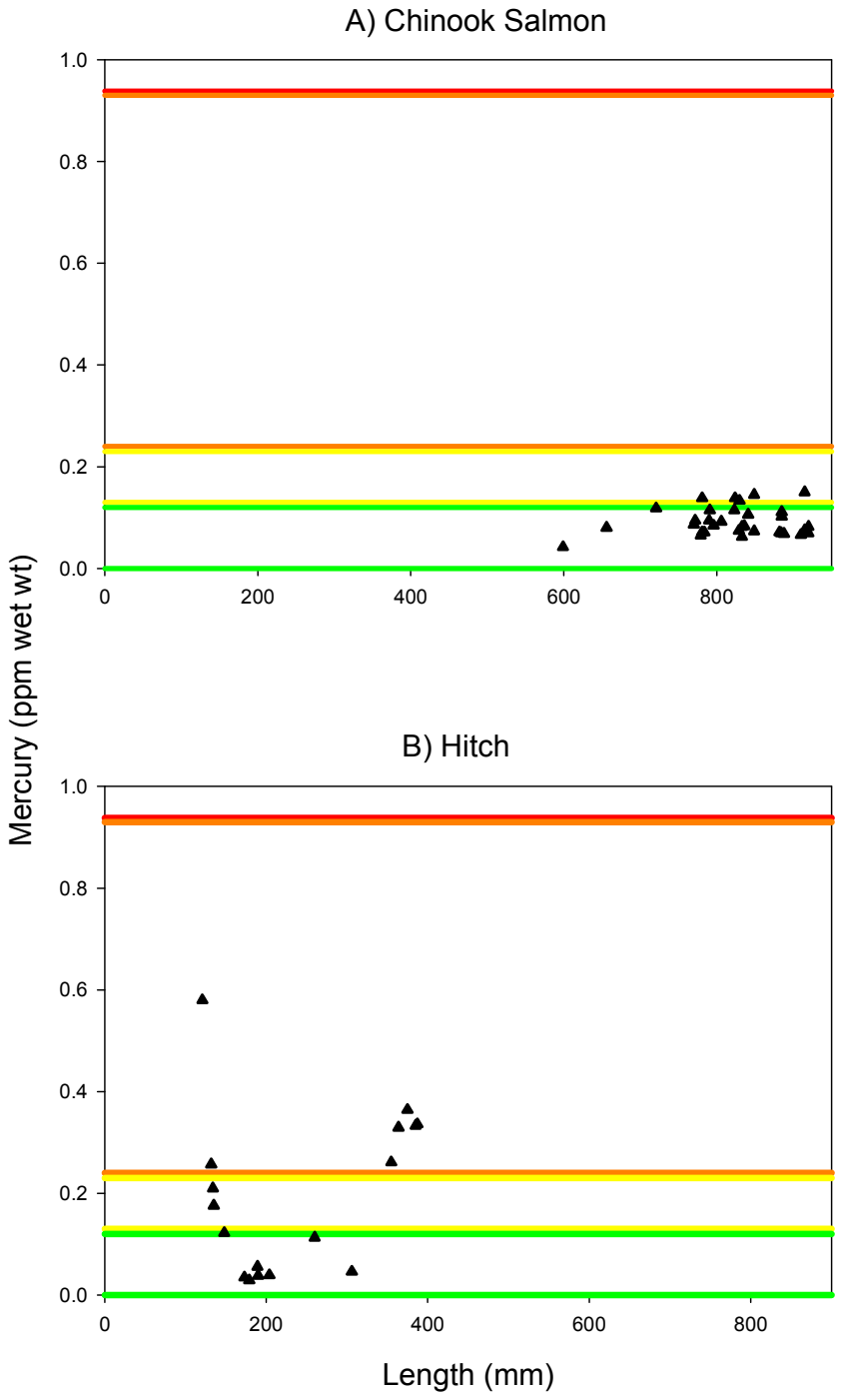


Figure 14. Length versus mercury concentrations in (A) tule perch (n = 10), (B) smallmouth bass (n = 5), (C) pumpkinseed (n = 4), and (D) flathead catfish (n = 2), 2005. Horizontal colored lines represent draft GTL ranges (Klasing and Brodberg, 2006).

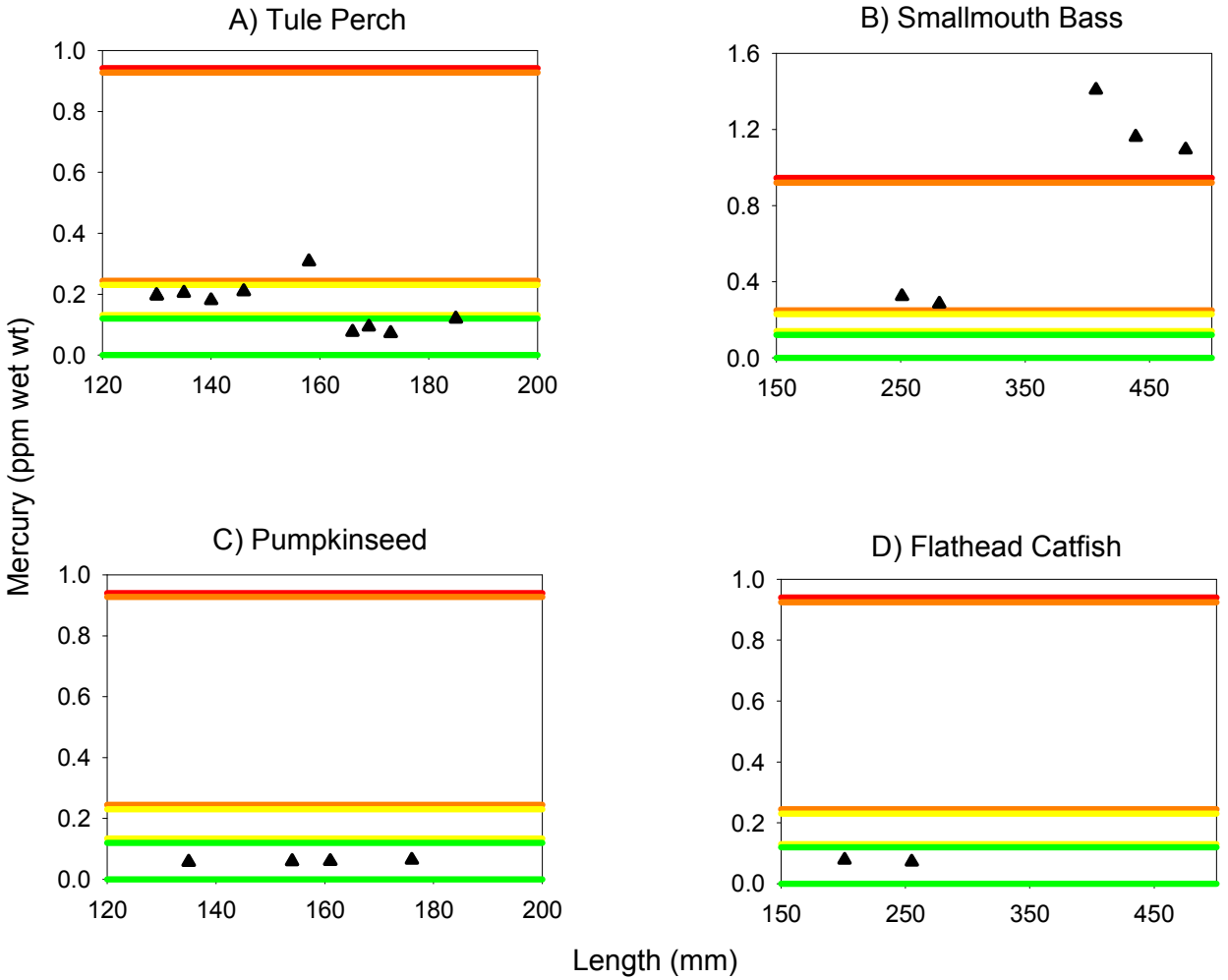


Figure 15. Length versus mercury relationships (mean +/- 95% CI) in species collected at each sampling location, 2006. Symbols represent different species, and colors represent the draft GTLs (Table 4; Klasing and Brodberg, 2006).

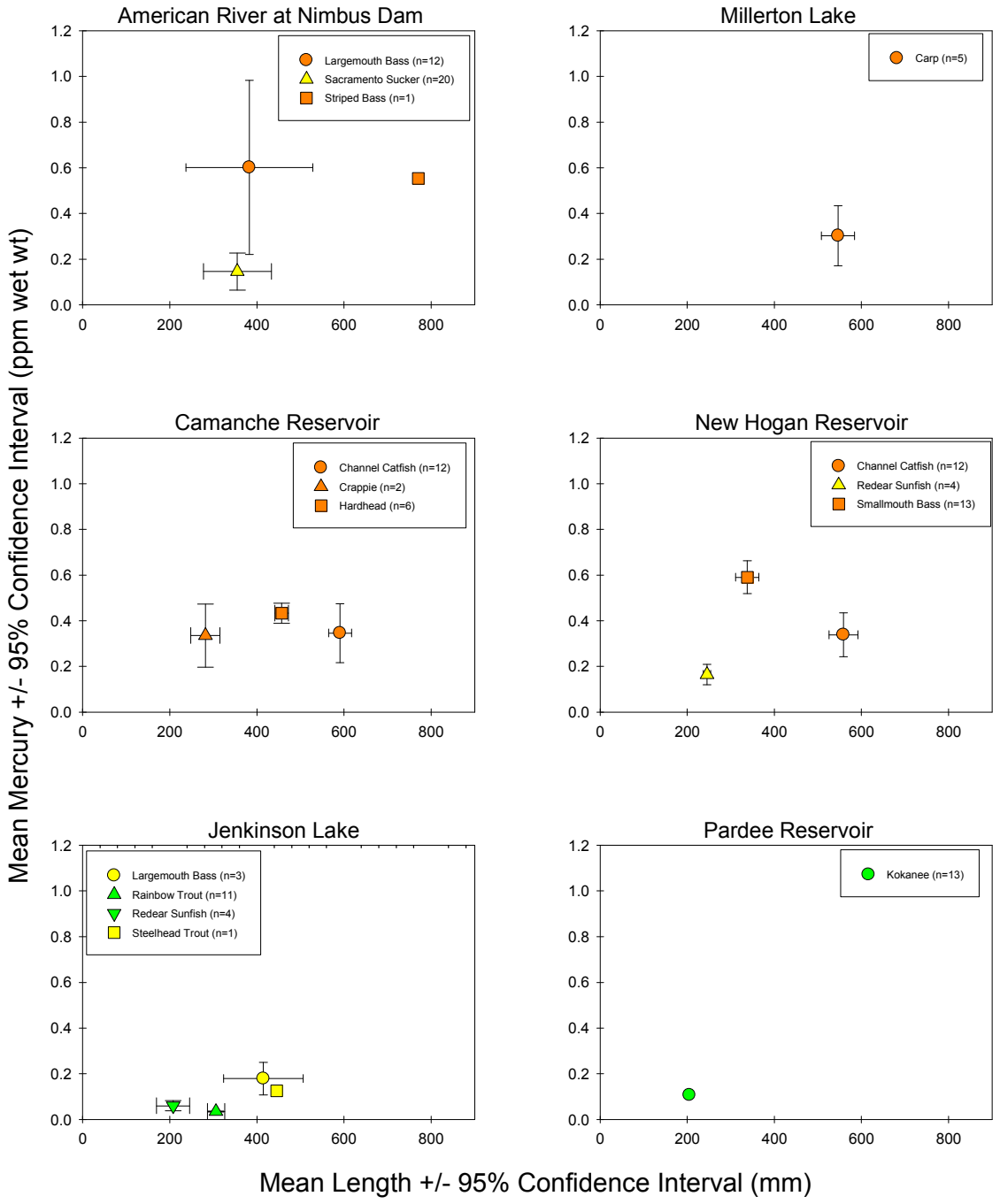


Figure 16. Length vs. mercury relationships in largemouth bass at each sampling location, 2005. Regression lines and equations at each site resulted from ANCOVA. CL = centered length. Regression lines not shown for sites excluded from analysis due to insufficient data.

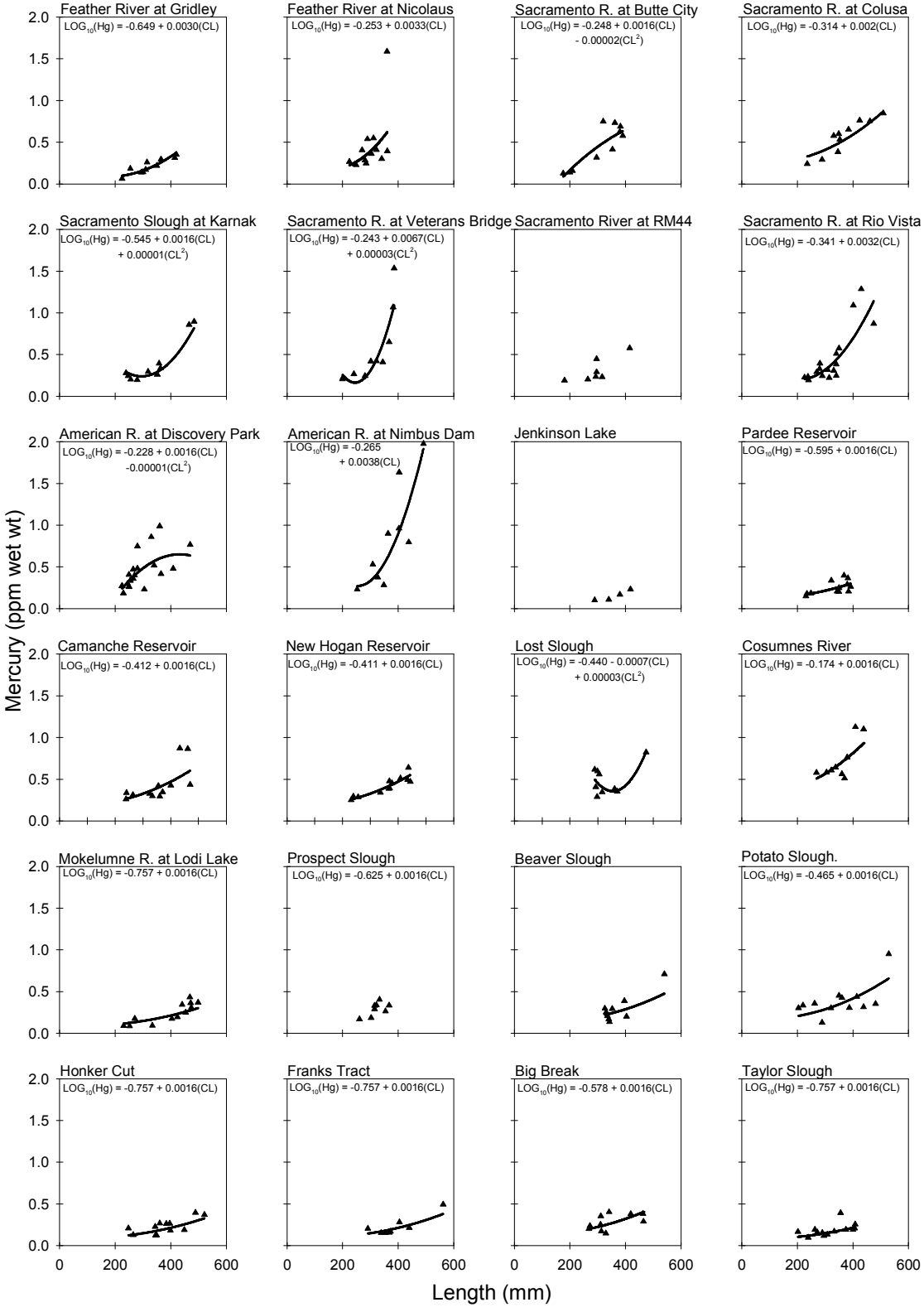


Figure 16 (cont'd).

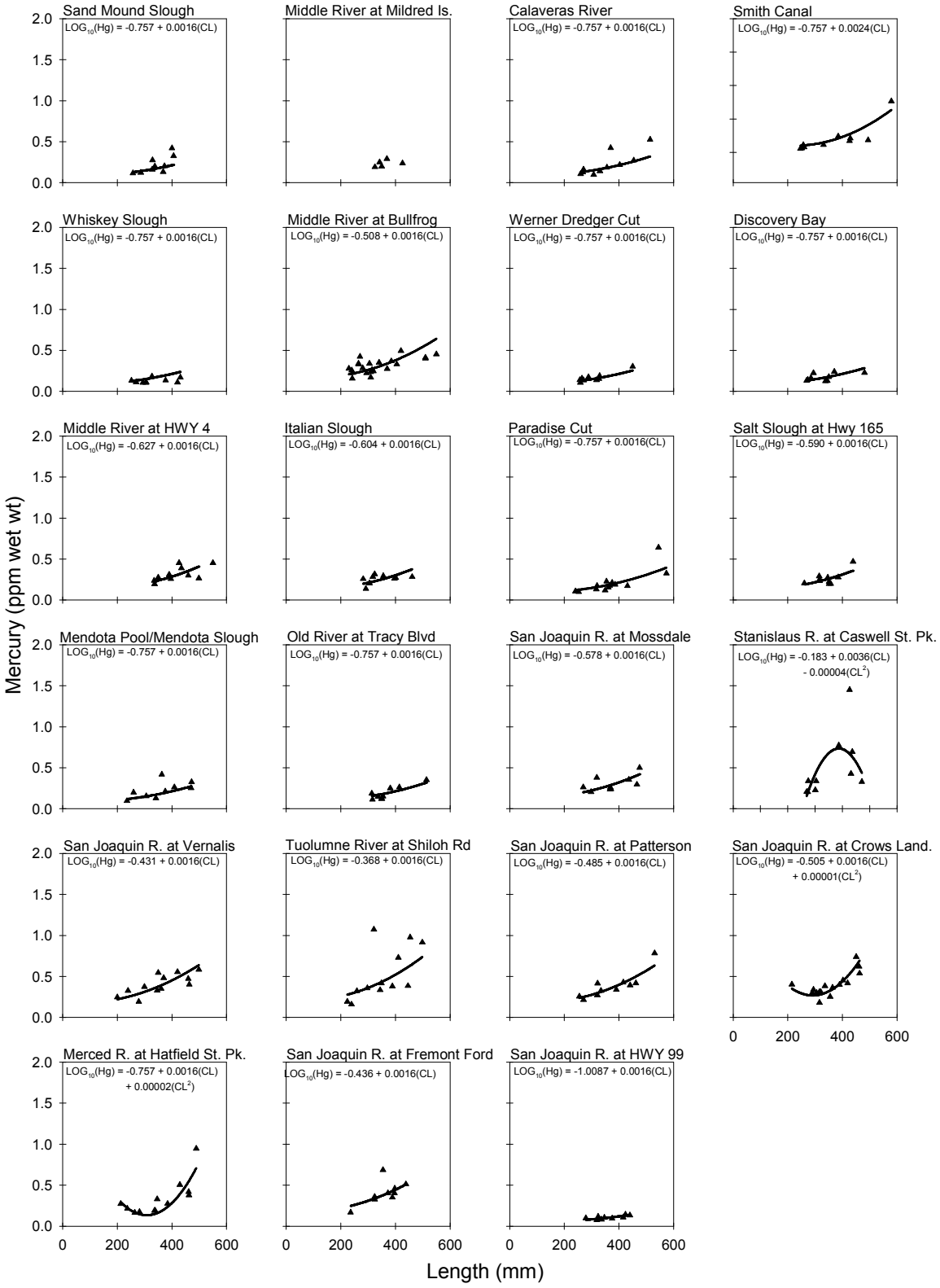


Figure 17. Length vs. mercury relationships in channel catfish at each sampling location, 2005. Regression lines and equations at each site resulted from ANCOVA. CL = centered length. Regression lines not shown for sites excluded from analysis due to insufficient data.

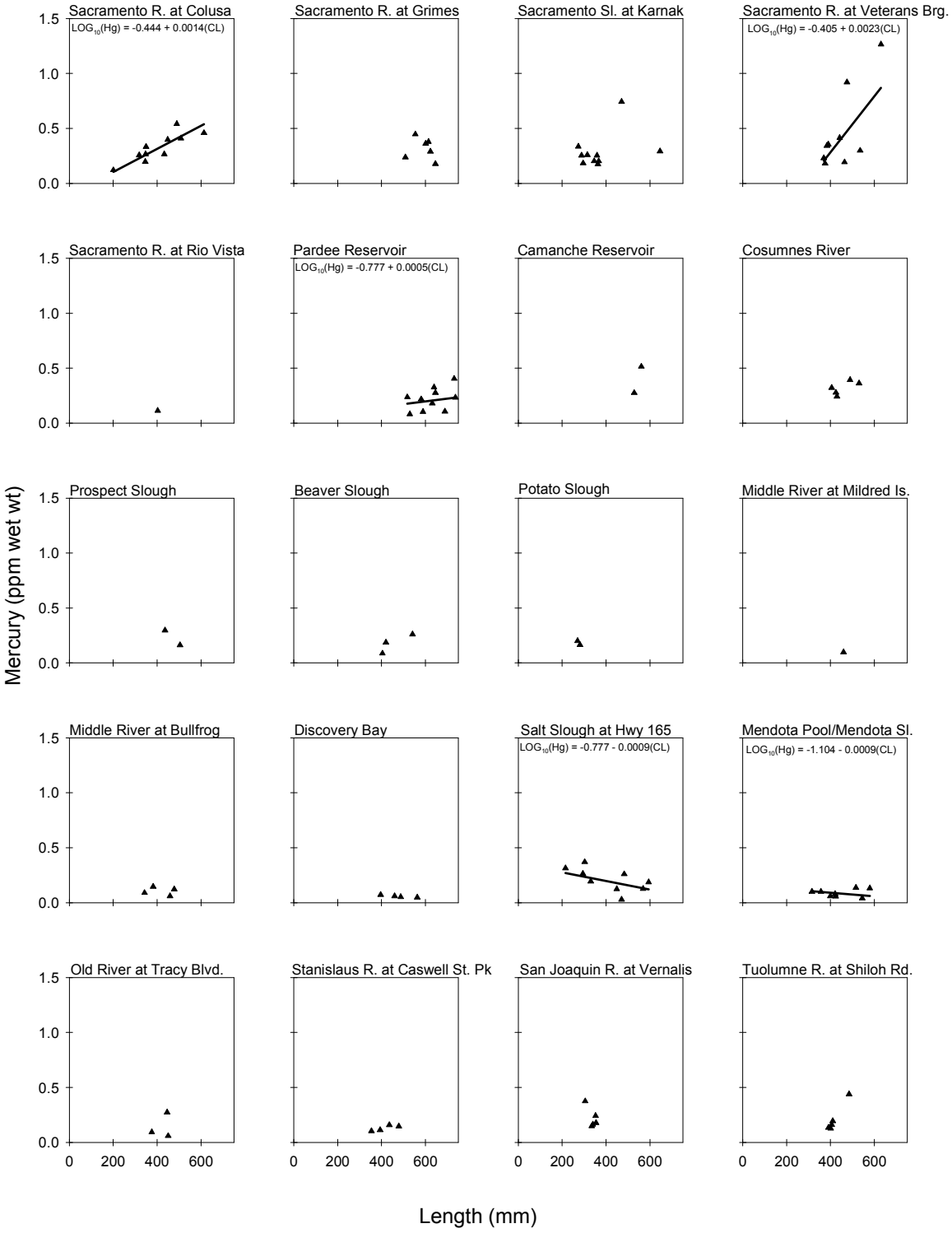


Figure 17 (cont'd).

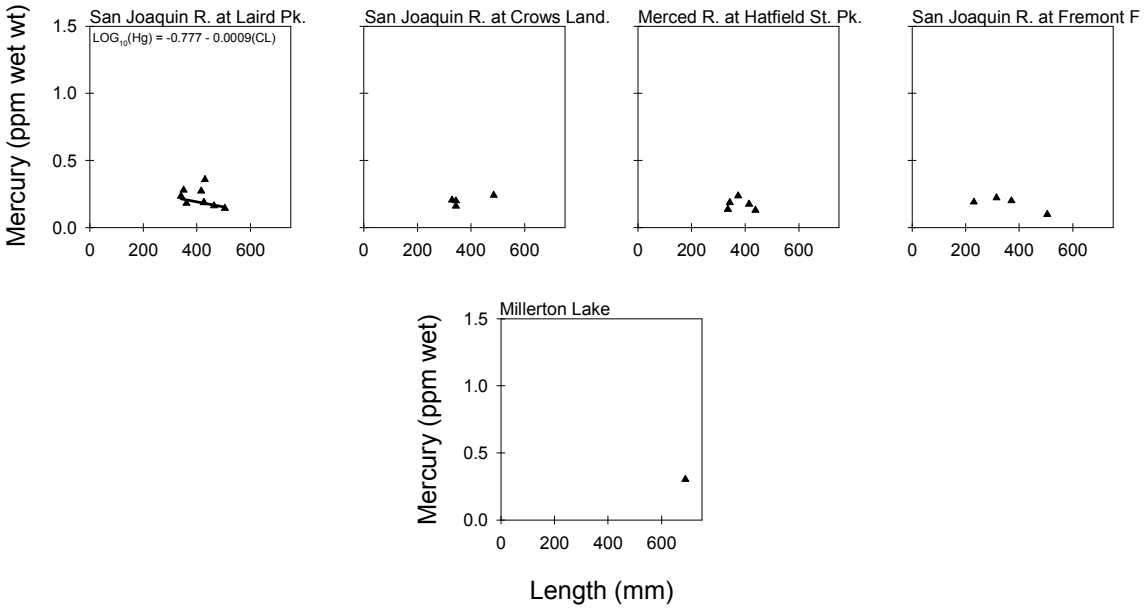


Figure 18. Length vs. mercury relationships in Sacramento sucker at each sampling location, 2005. Regression lines and equations at each site resulted from ANCOVA. CL = centered length. Regression lines not shown for sites excluded from analysis due to insufficient data.

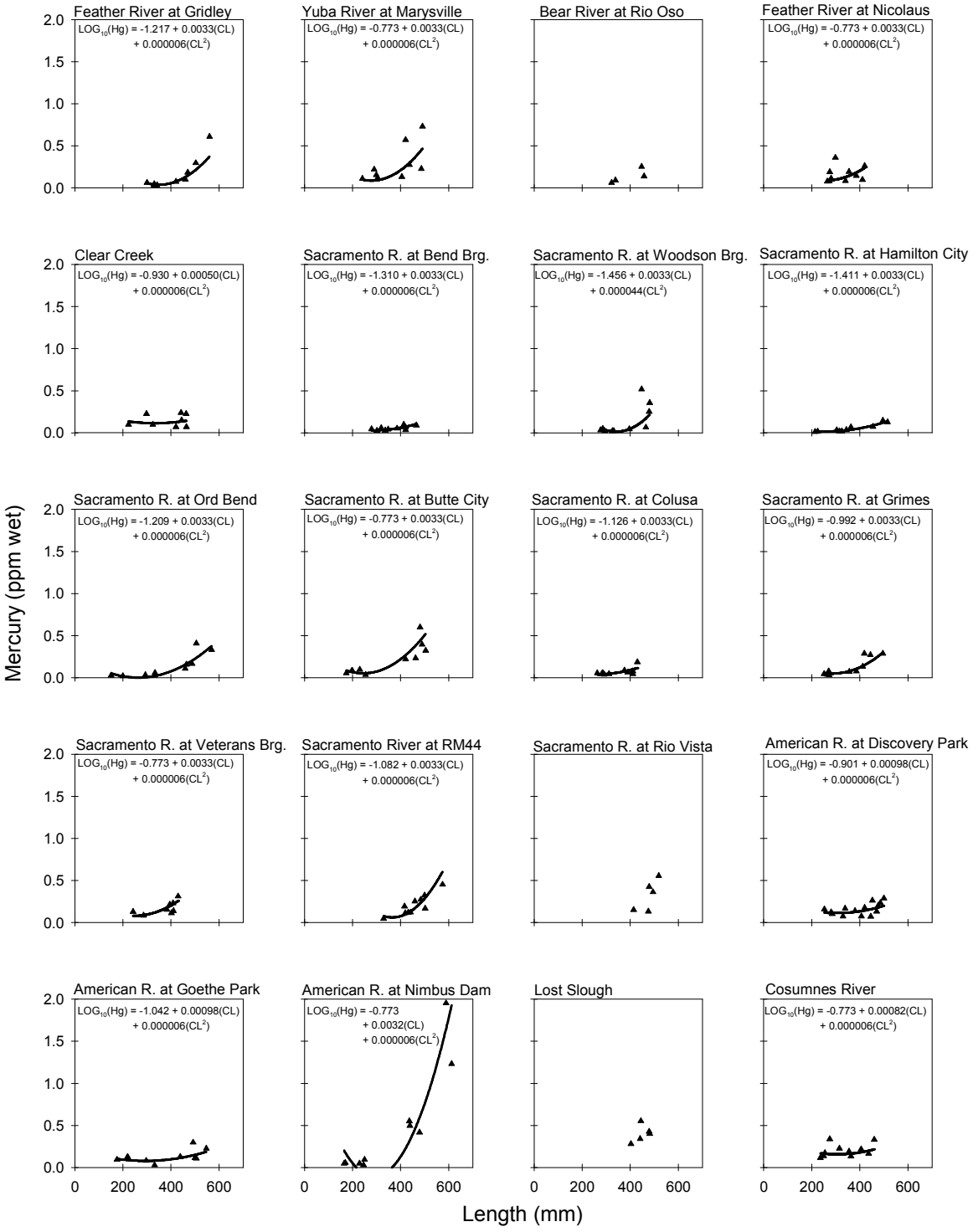


Figure 18 (cont'd).

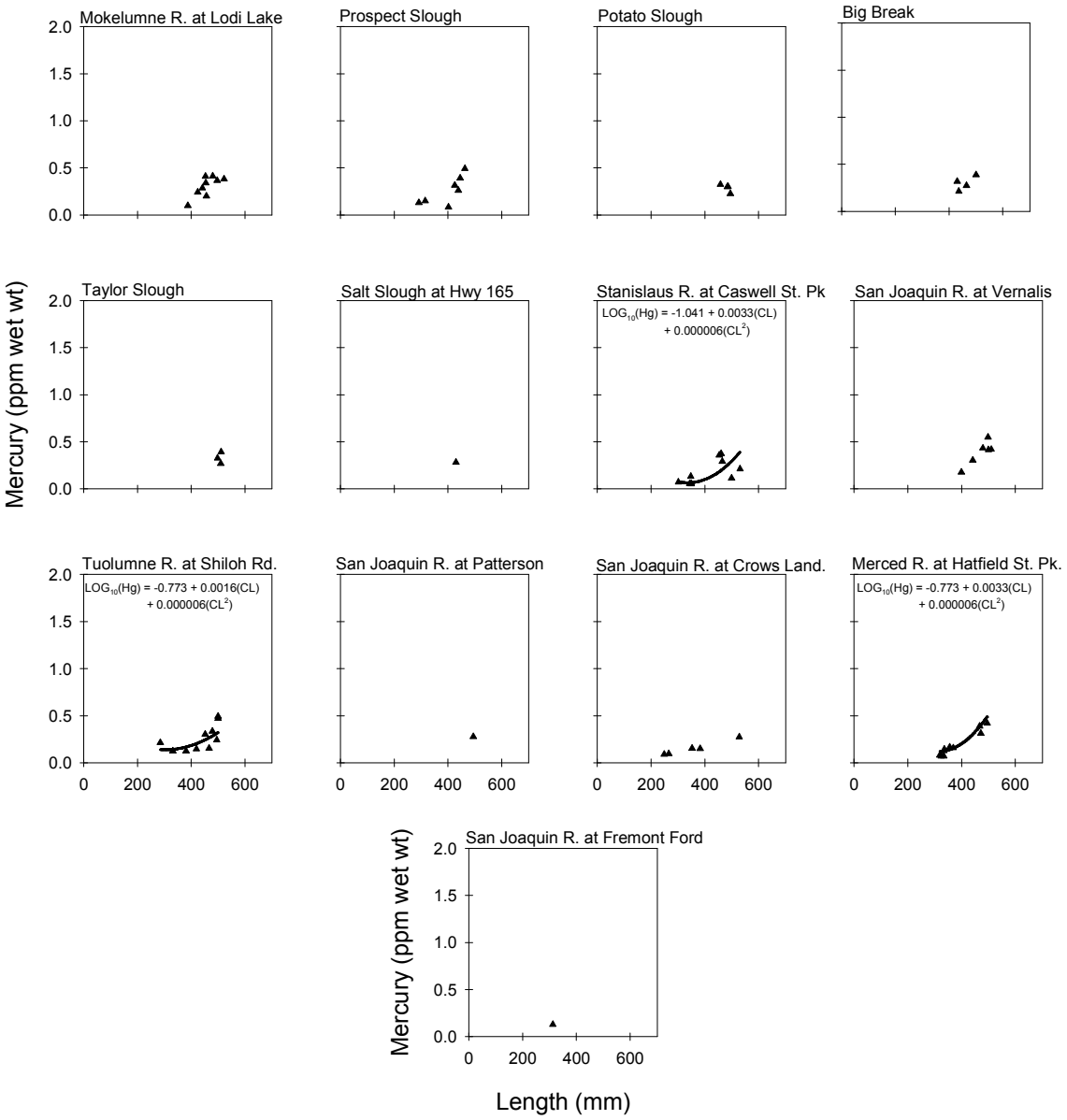


Figure 19. Length vs. mercury relationships in Sacramento pikeminnow at each sampling location, 2005. Regression lines and equations at each site resulted from ANCOVA. CL = centered length. Regression lines not shown for sites excluded from analysis due to insufficient data.

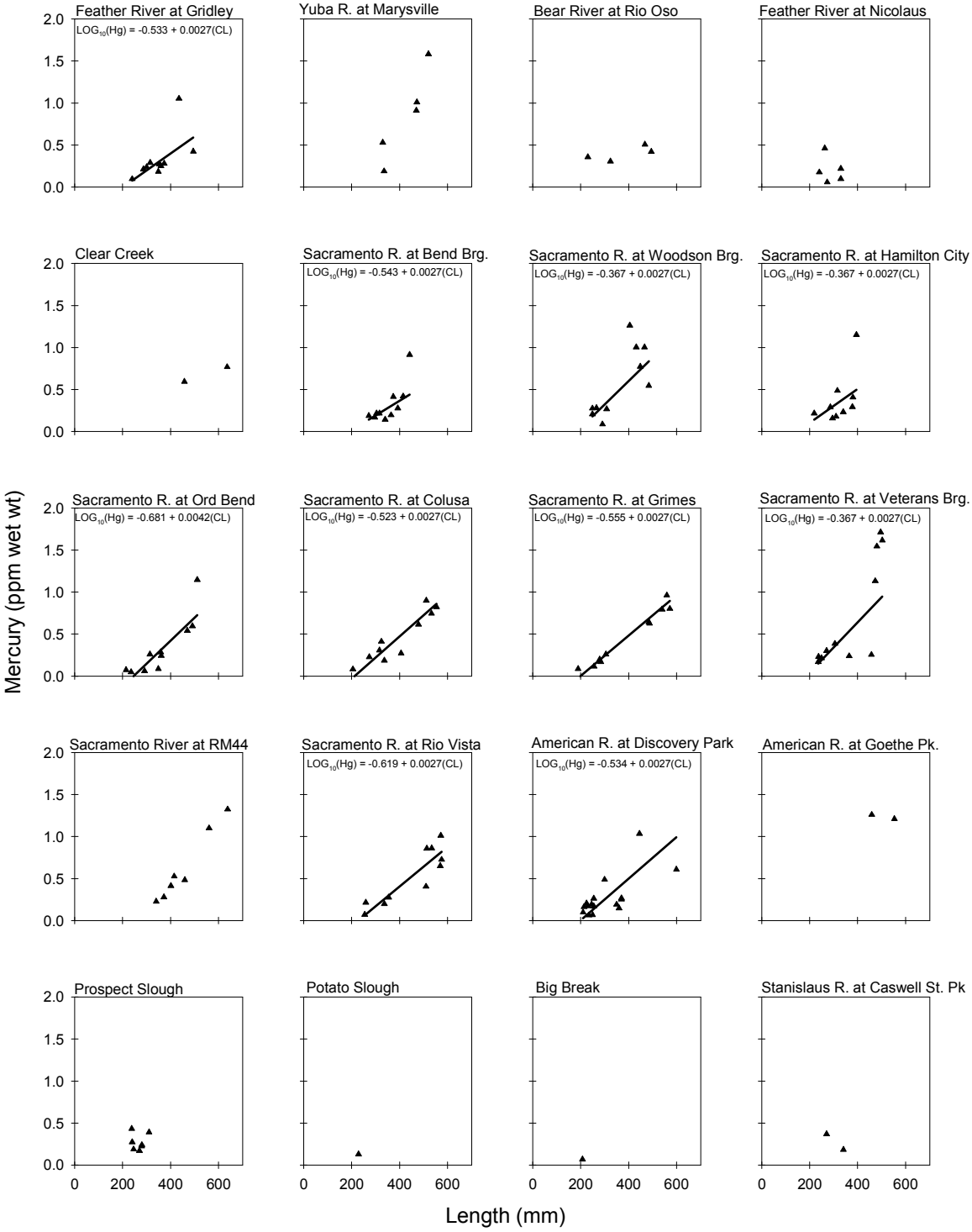


Figure 20. Spatial comparison of largemouth bass mercury concentrations estimated at a standard length of 350 mm (mean and 95% confidence interval). Locations are grouped by watershed sub-areas from north (top) to south (bottom).

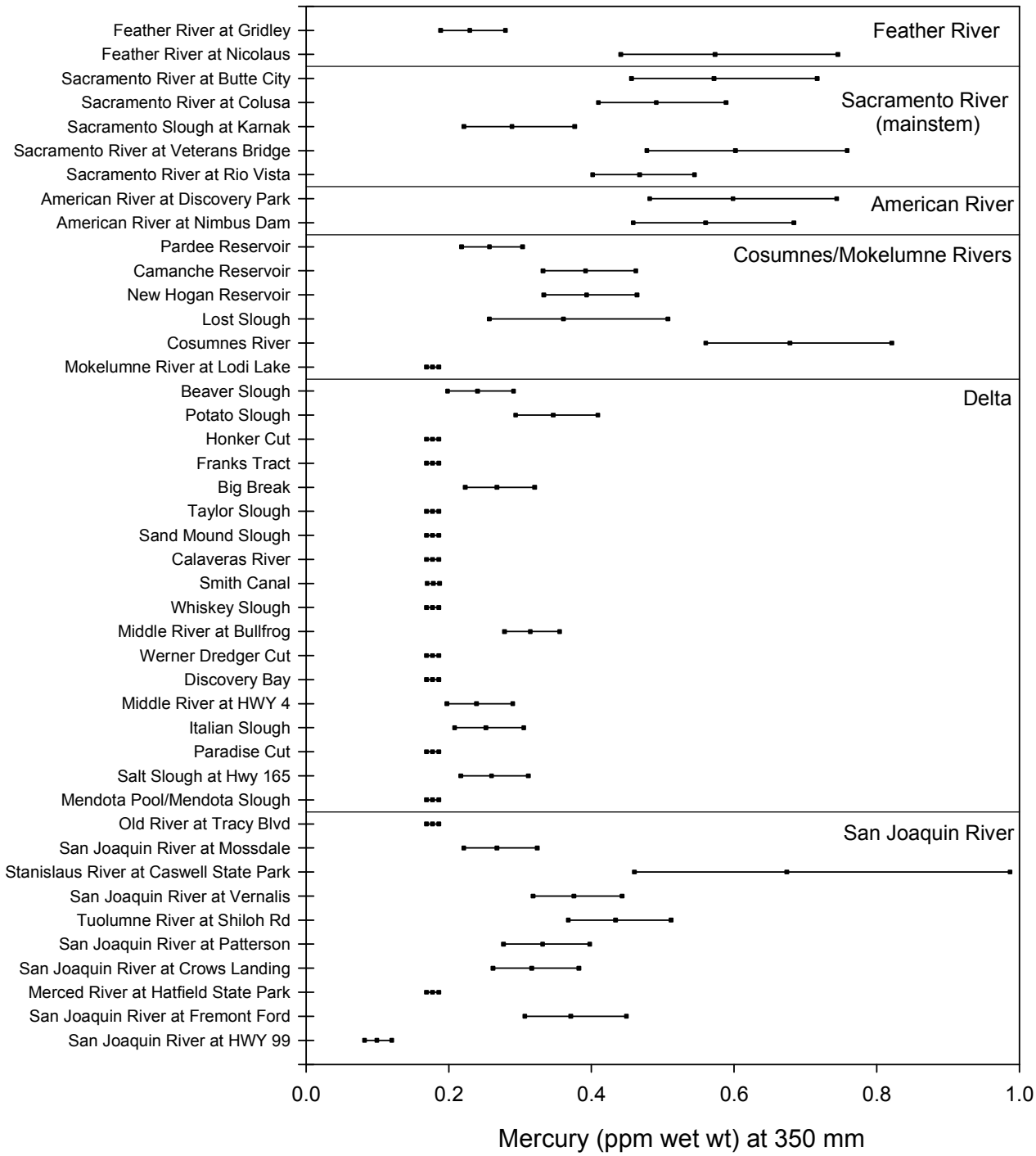


Figure 21. Spatial comparison of channel catfish mercury concentrations estimated at a standard length of 425 mm (mean and 95% confidence interval). Locations are grouped by watershed sub-areas from north (top) to south (bottom).

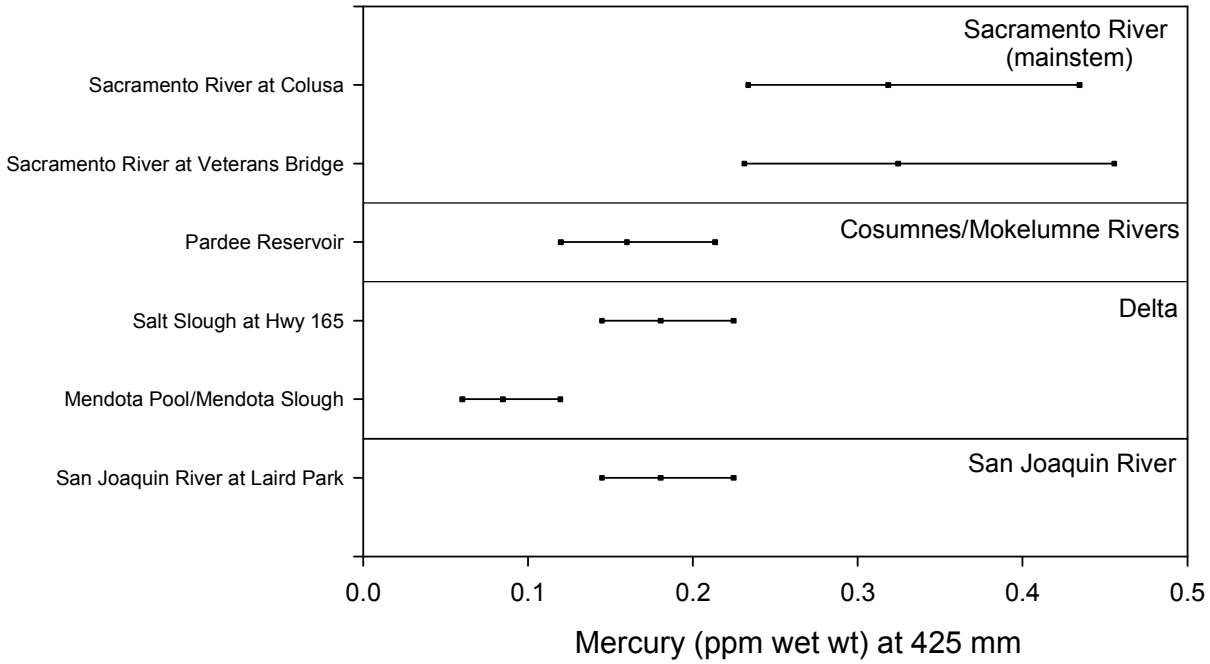


Figure 22. Spatial comparison of Sacramento sucker mercury concentrations estimated at a standard length of 420 mm (mean and 95% confidence interval). Locations are grouped by watershed sub-areas from north (top) to south (bottom).

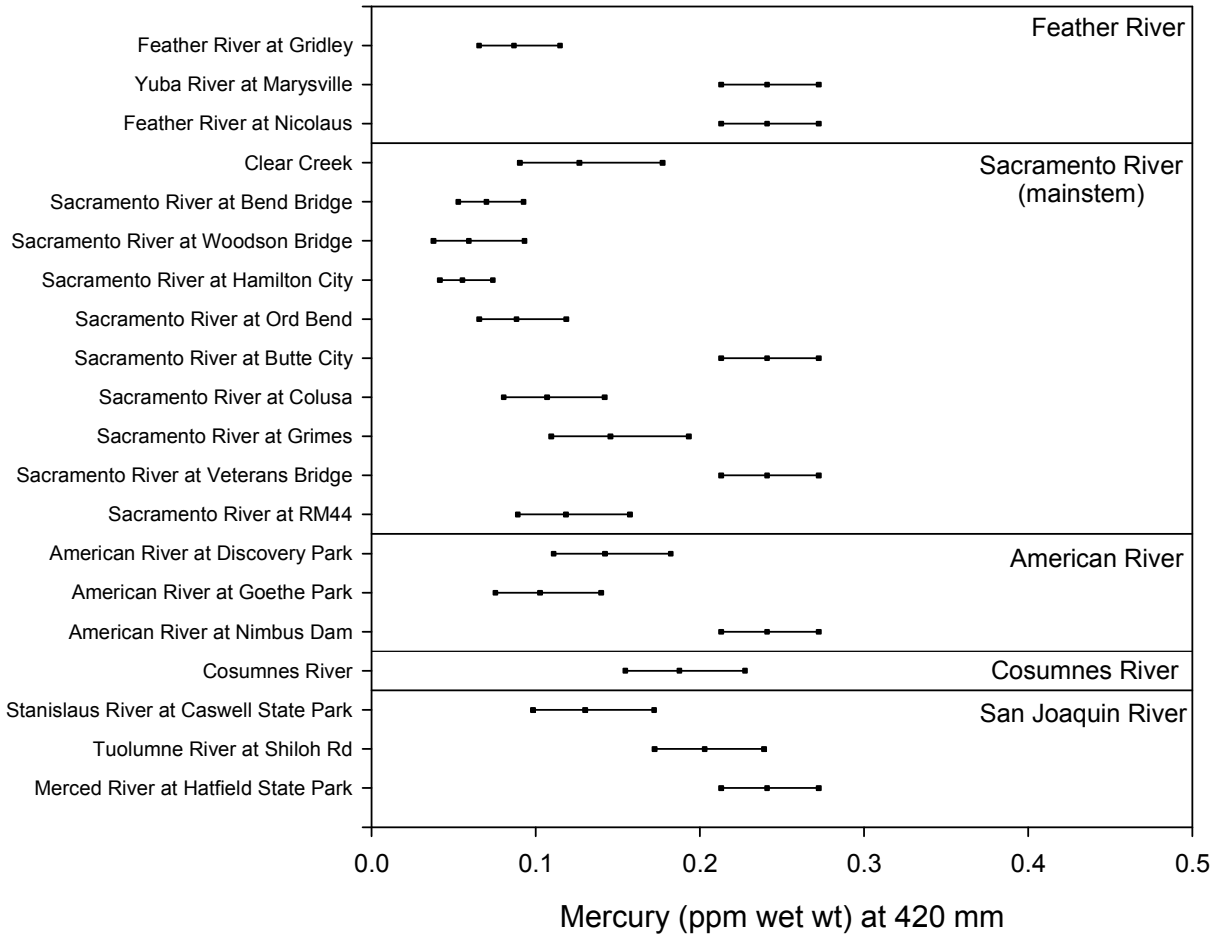


Figure 23. Spatial comparison of Sacramento pikeminnow mercury concentrations estimated at a standard length of 350 mm (mean and 95% confidence interval). Locations are grouped by watershed sub-areas from north (top) to south (bottom).

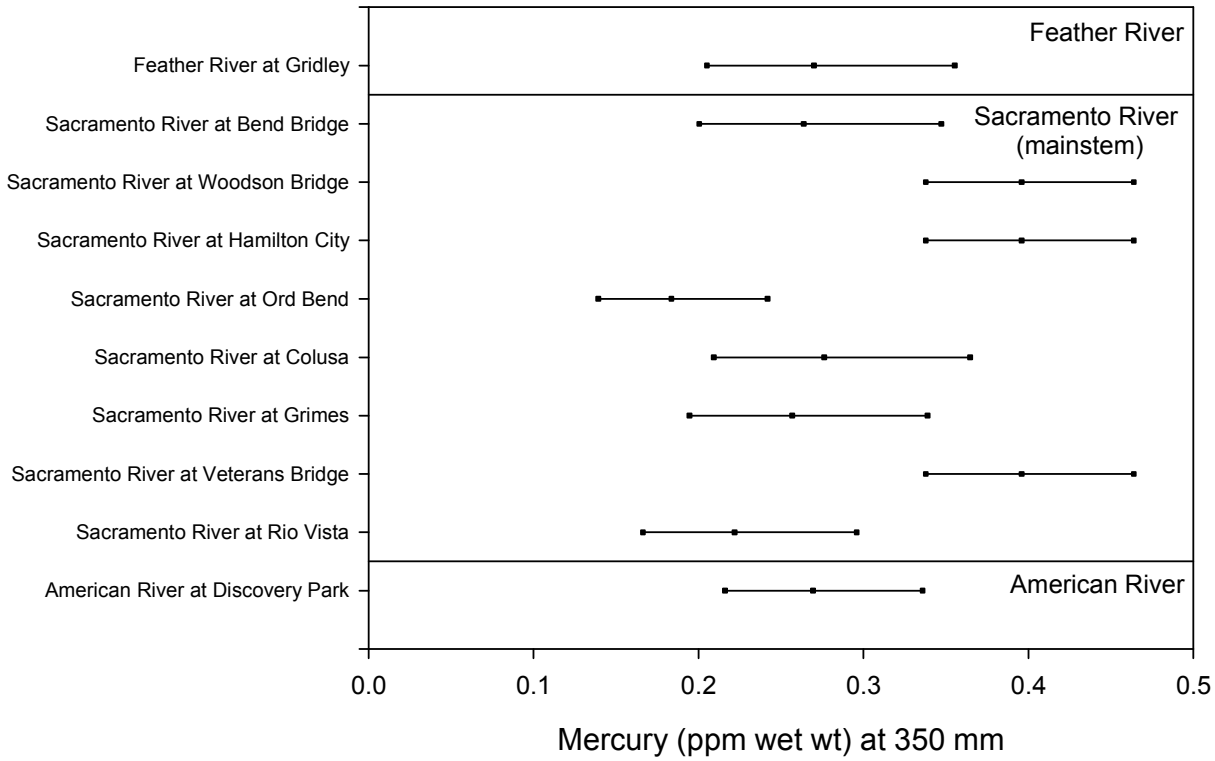


Figure 24. Spatial comparison of white catfish mercury concentrations. Data represent mean and 95% confidence interval of mercury concentration. Locations are grouped by watershed sub-areas from north (top) to south (bottom). Size limits were applied (see Table 4). Sites shown have samples sizes of five or more fish.

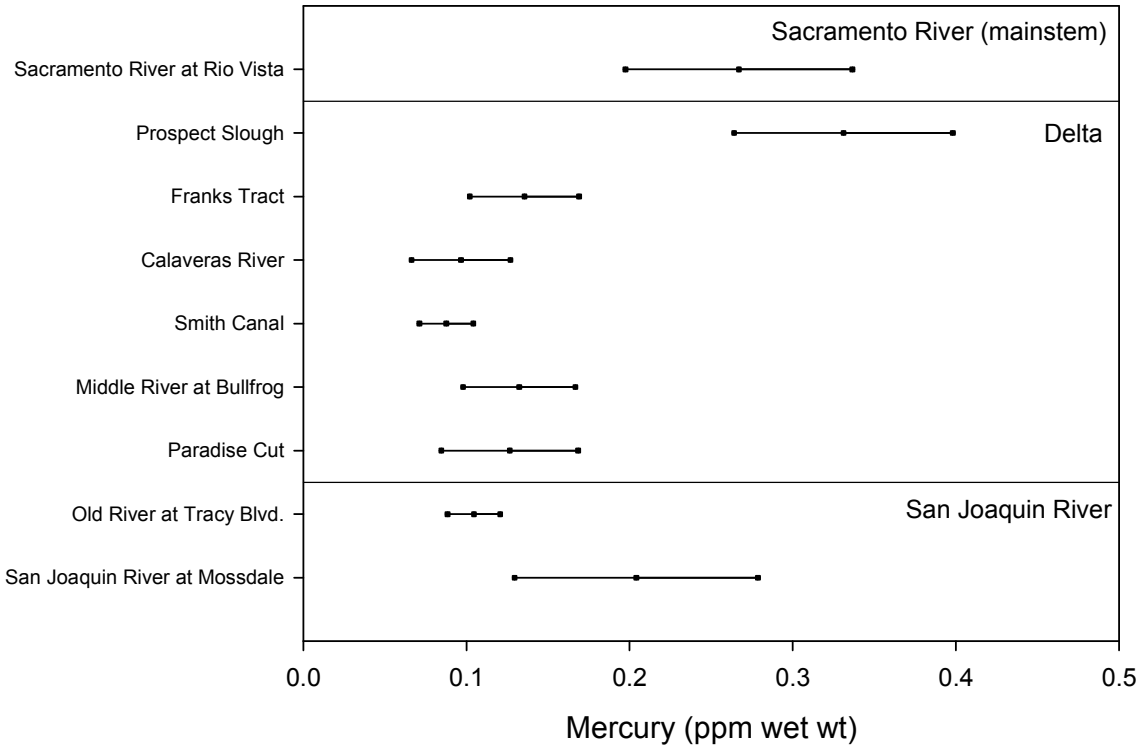


Figure 25. Spatial comparison of redear sunfish mercury concentrations. Data represent mean and 95% confidence interval of mercury concentration. Locations are grouped by watershed sub-areas from north (top) to south (bottom). Size limits were applied (see Table 4). Sites shown have samples sizes of five or more fish.

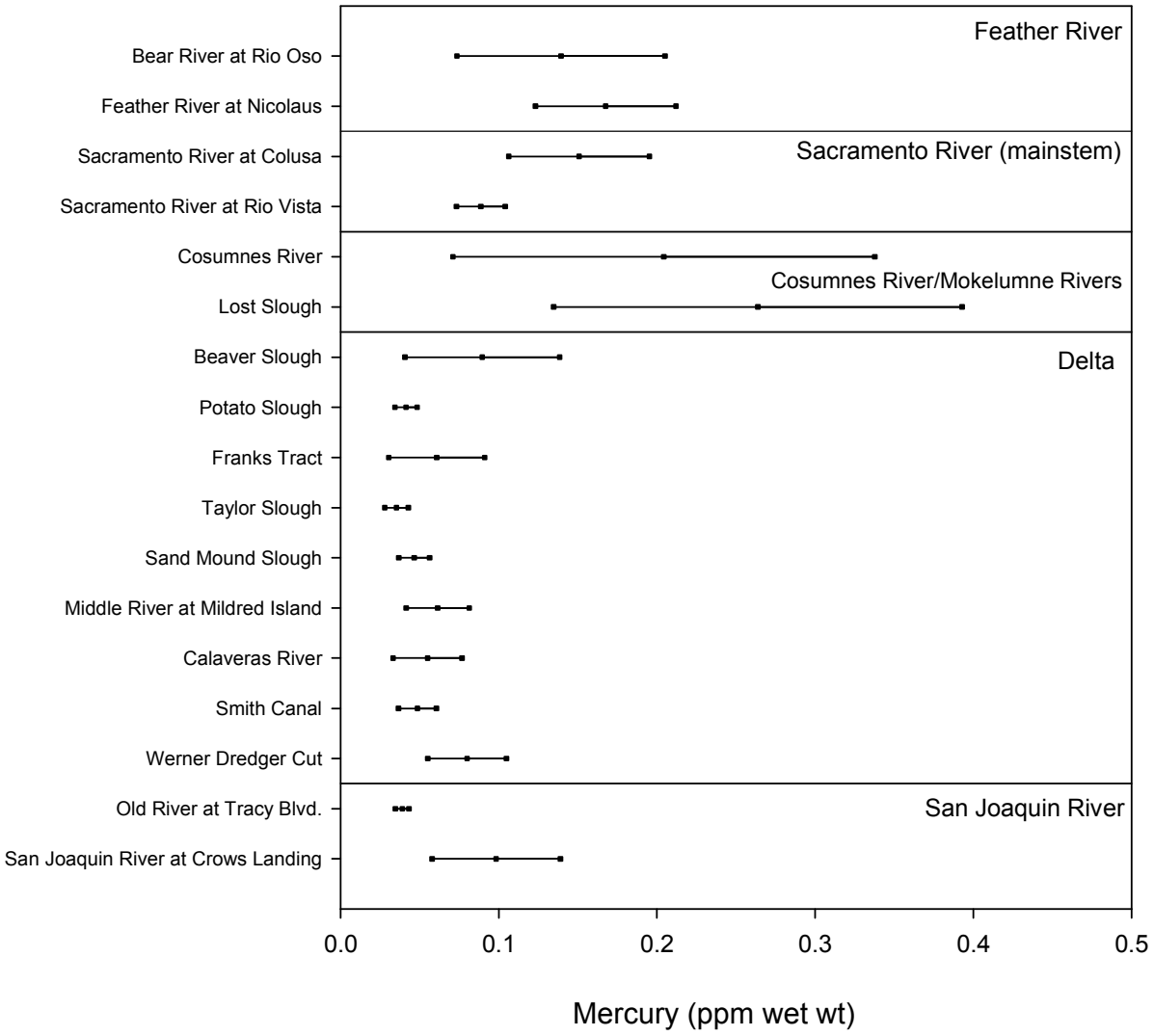


Figure 26. Spatial comparison of bluegill mercury concentrations. Data represent mean and 95% confidence interval of mercury concentration. Locations are grouped by watershed sub-areas from north (top) to south (bottom). Size limits were applied (see Table 4). Sites shown have samples sizes of five or more fish.

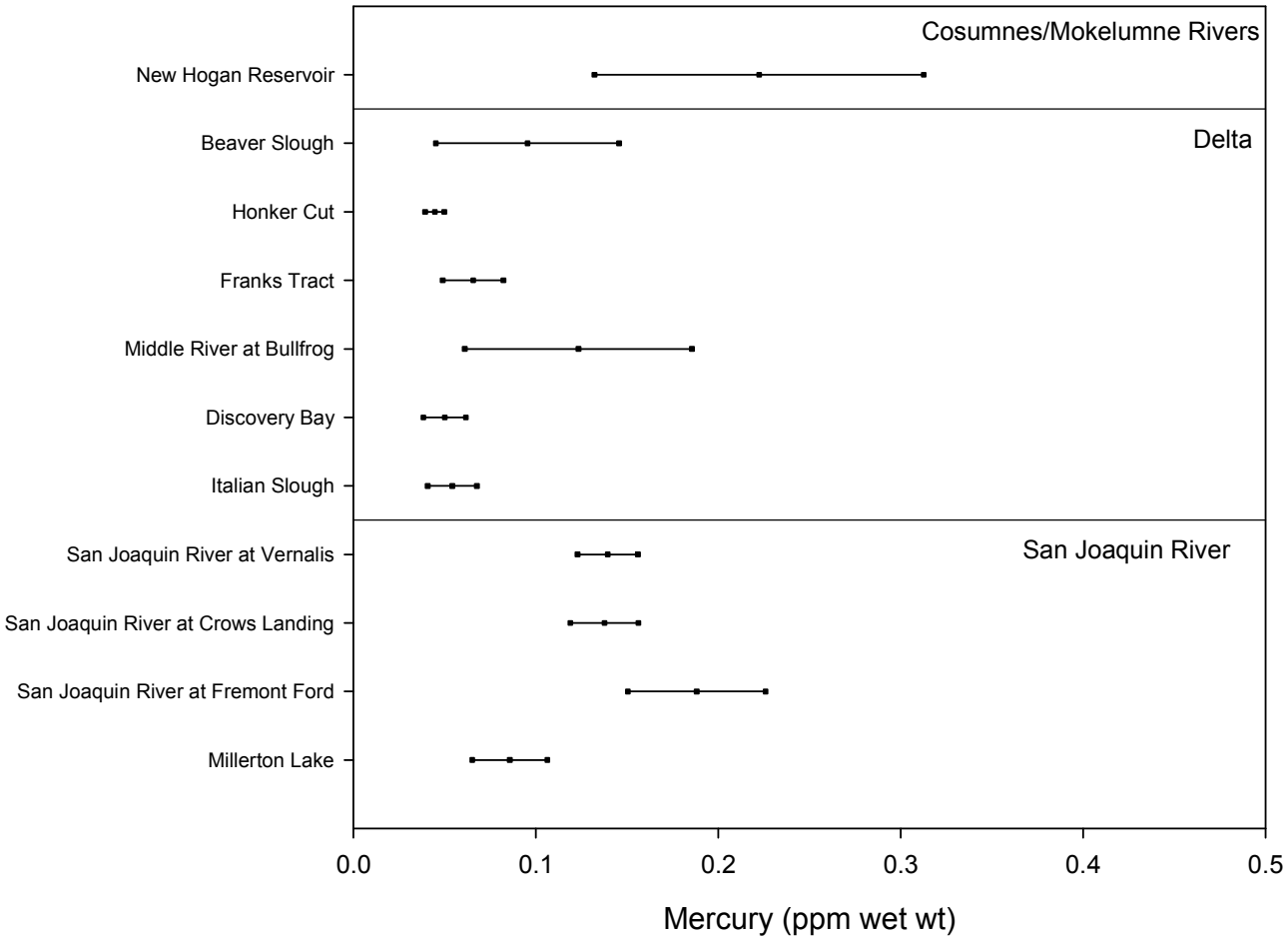


Figure 27. Spatial comparison of common carp mercury concentrations. Data represent mean and 95% confidence interval of mercury concentration. Locations are grouped by watershed sub-areas from north (top) to south (bottom). Size limits were applied (see Table 4). Sites shown have samples sizes of five or more fish.

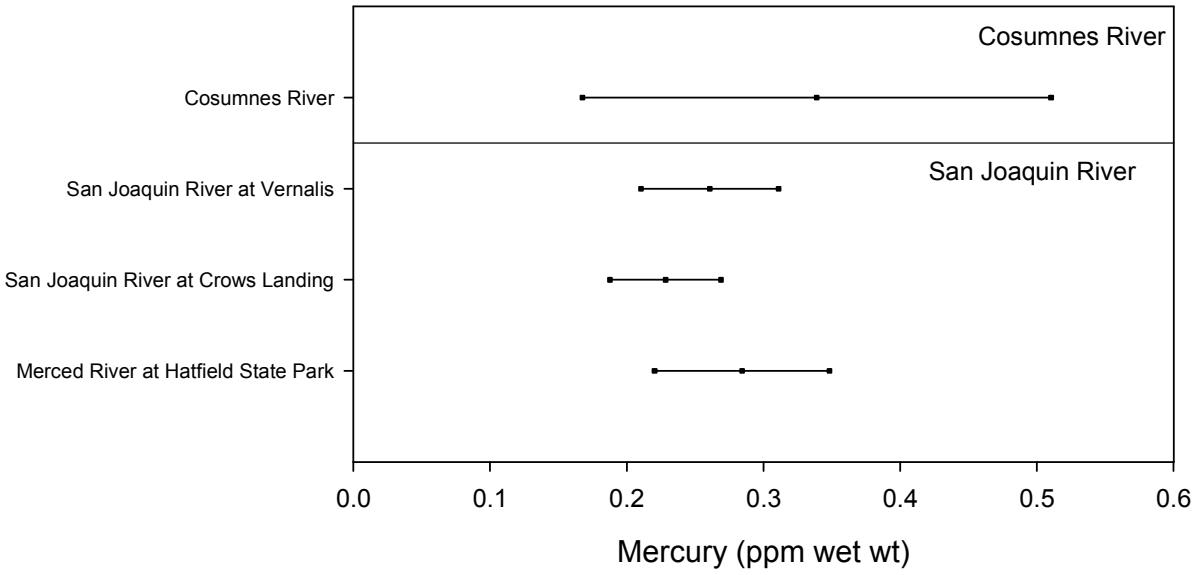


Figure 28. Spatial comparison of largemouth bass mercury concentrations estimated at a standard length of 350 mm (mean and 95% confidence interval) in A) 2000 and B) 2005. Locations sampled in both years are listed from north (top) to south (bottom).

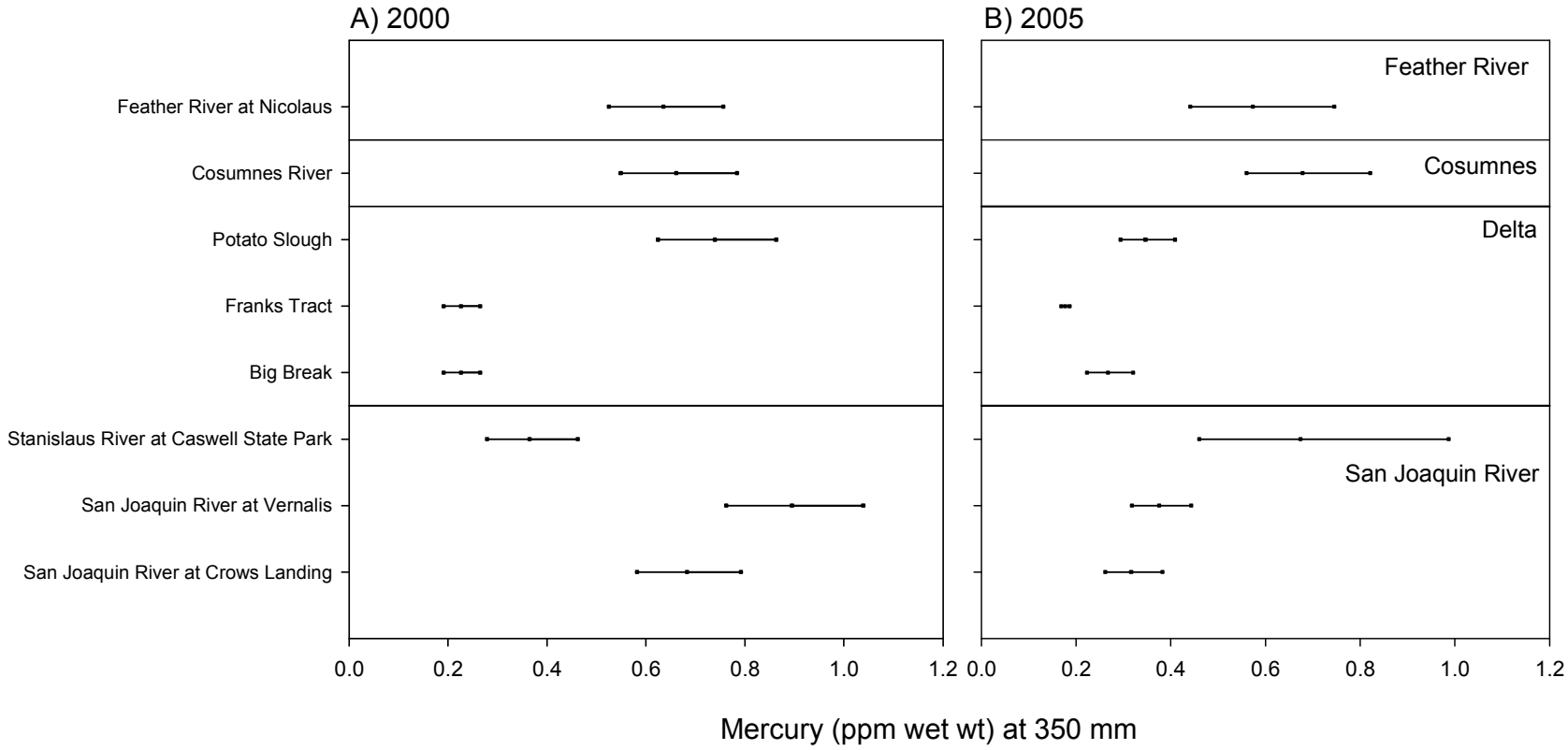
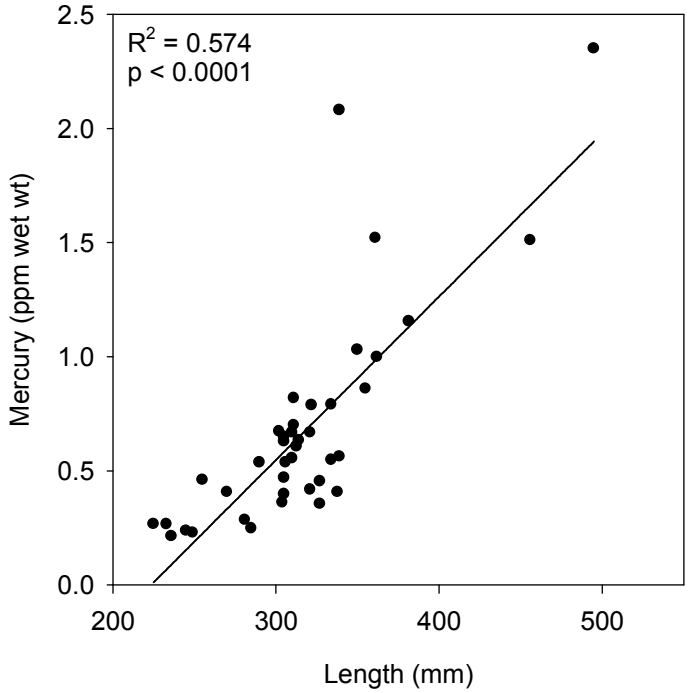


Figure 29. Long-term trend of mercury concentration in largemouth bass at A) Feather River at Nicolaus and B) Sacramento River at RM44. Regressions show 1) length vs. mercury concentration to assess the effect of fish size on mercury, and 2) year vs. residuals (of length vs. mercury) to assess the long-term time trend.

A1)



A2)

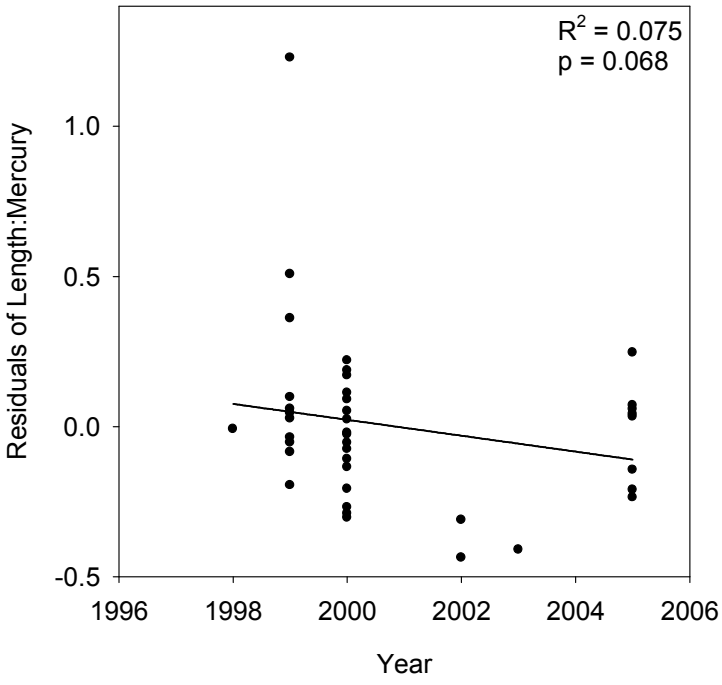
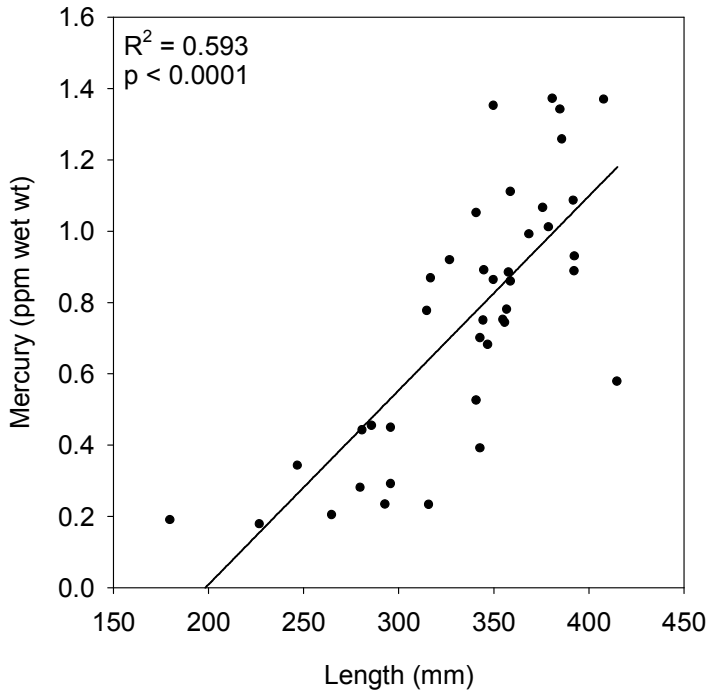


Figure 29 (cont'd).

B1)



B2)

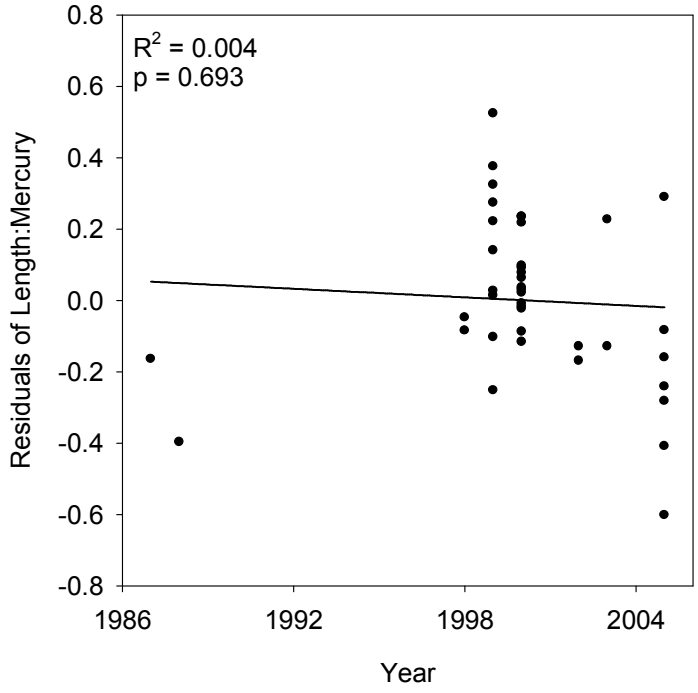
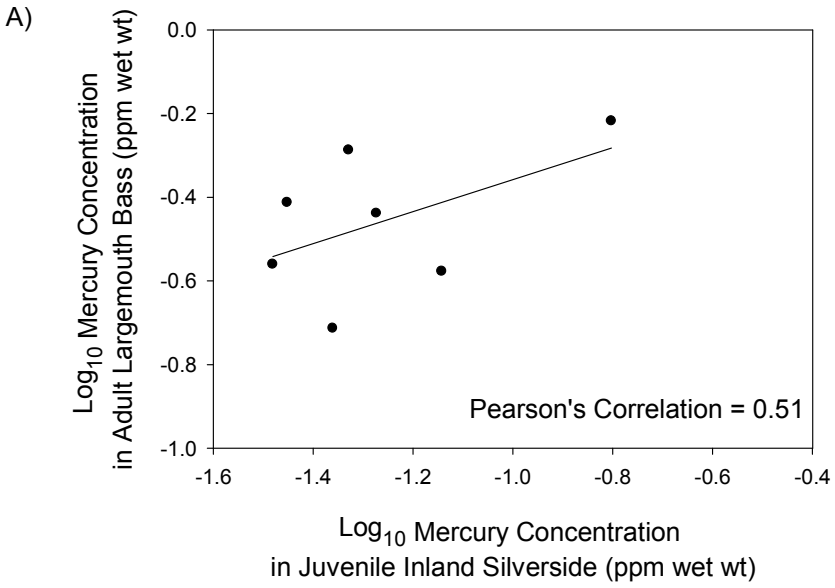


Figure 30. Comparison of average mercury concentration between A) inland silversides and adult largemouth bass, and B) juvenile and adult largemouth bass at overlapping sites. Mercury concentrations were standardized to 85 mm for juvenile and 350 mm for adult largemouth bass using Tremblay ANCOVA. Inland silverside data were not appropriate for the ANCOVA, so arithmetic means were used.



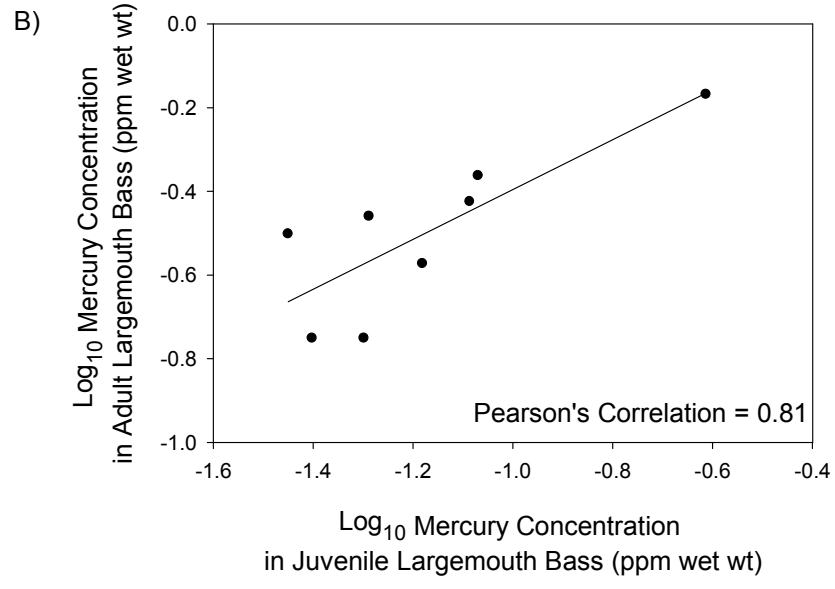
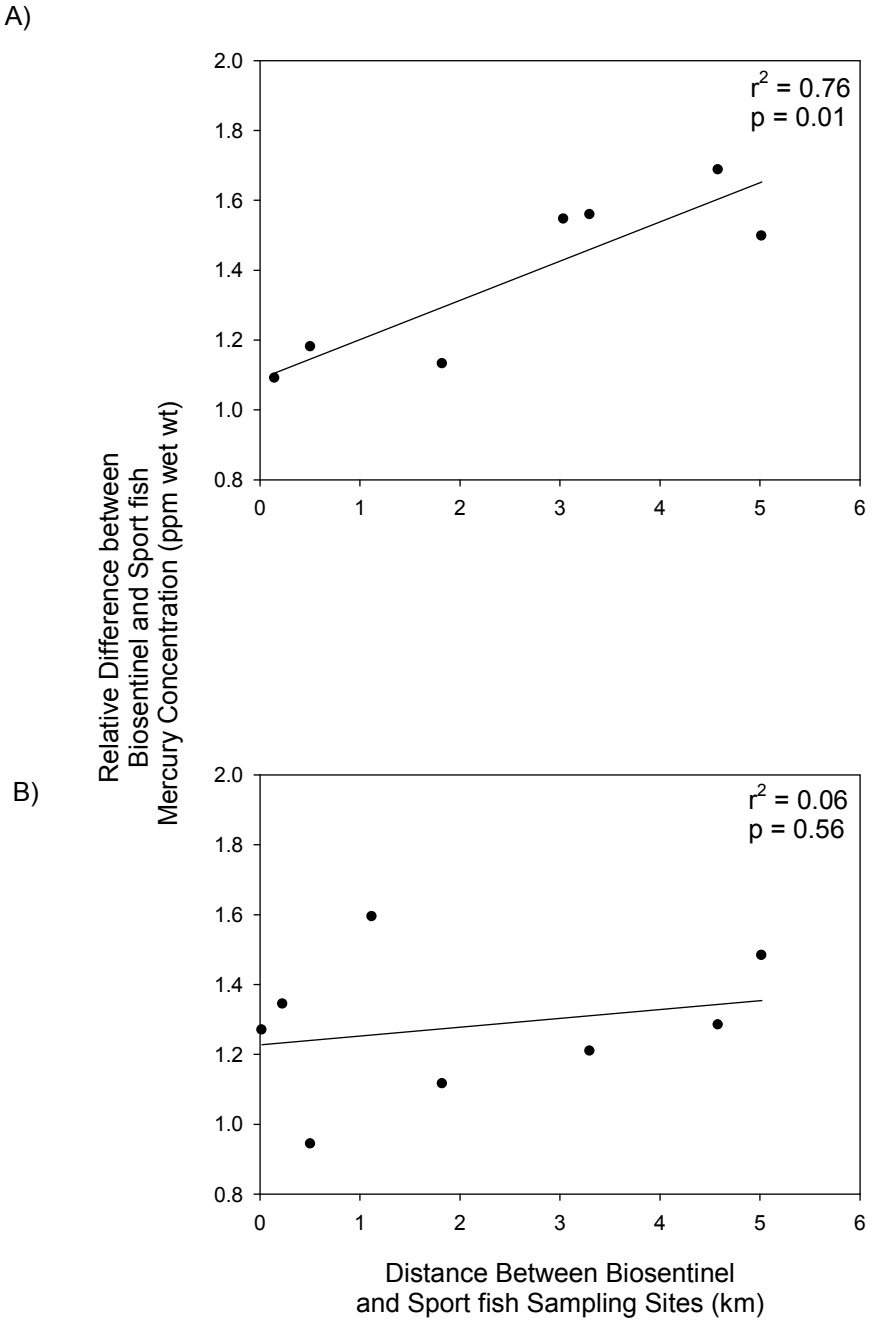
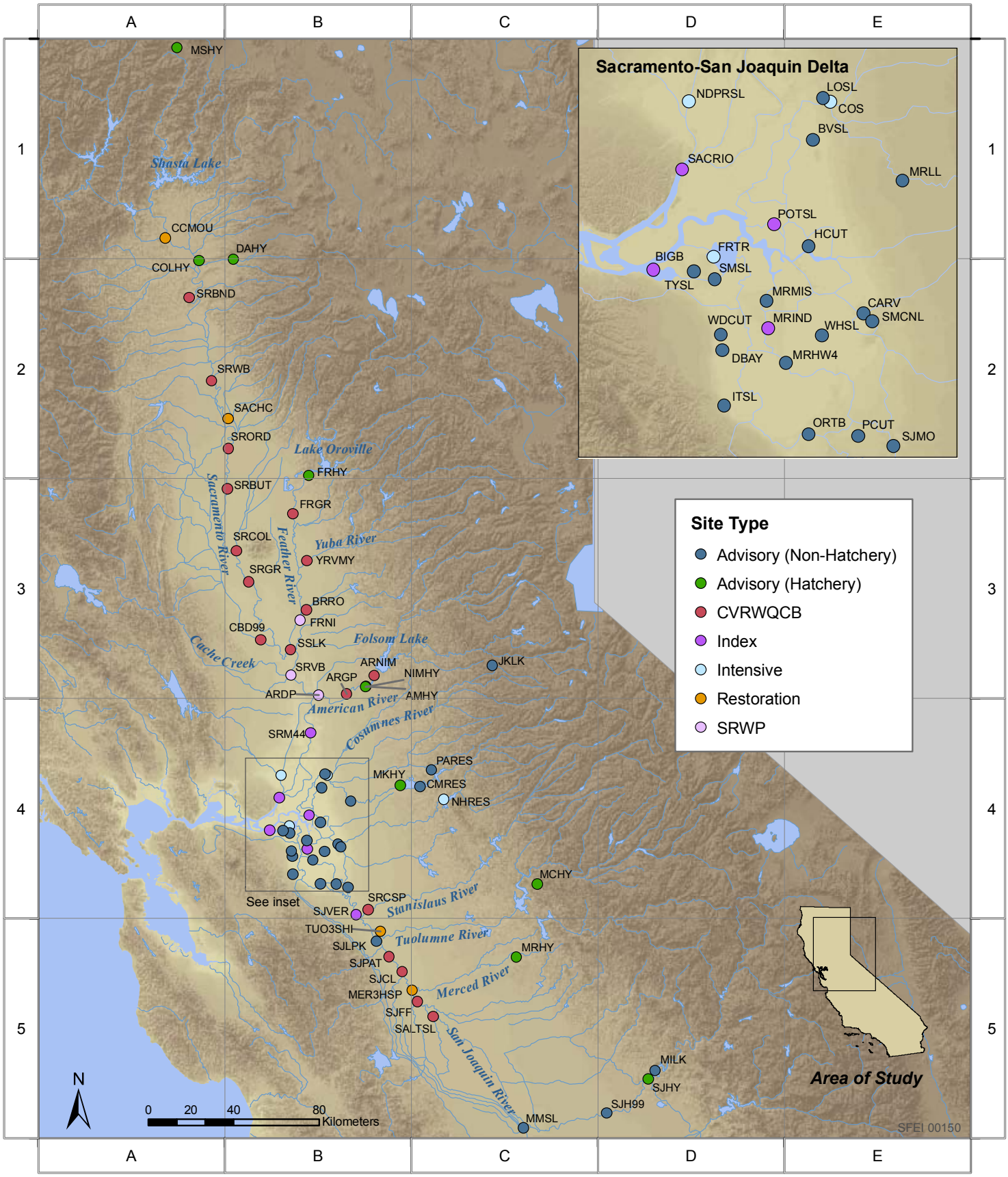
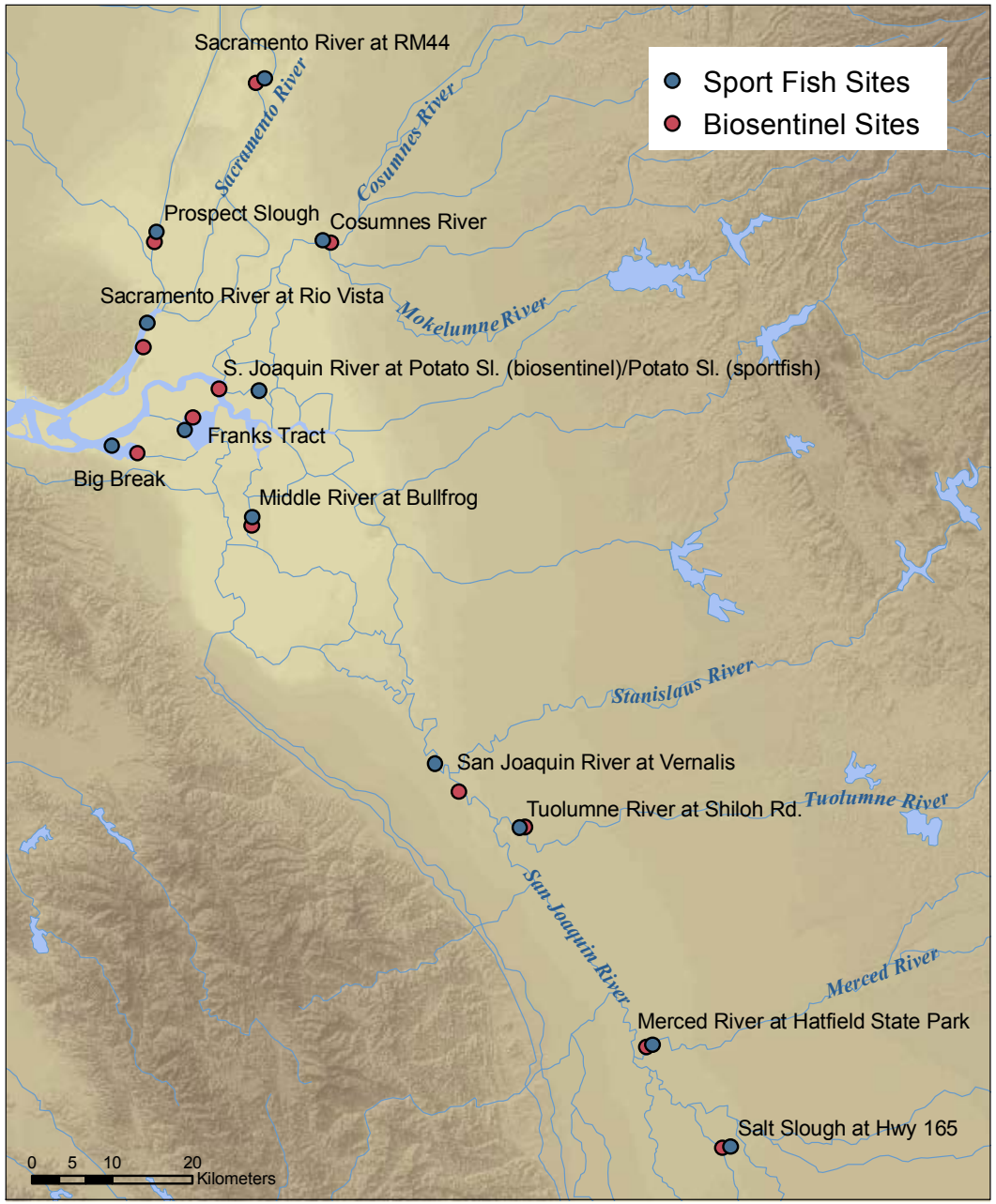


Figure 31. Relative difference between A) inland silverside and adult largemouth bass, and B) juvenile and adult largemouth bass, mercury concentrations plotted against distance between sampling sites. Relative difference is the difference in mercury concentration at each site divided by 50% of the adult concentration.

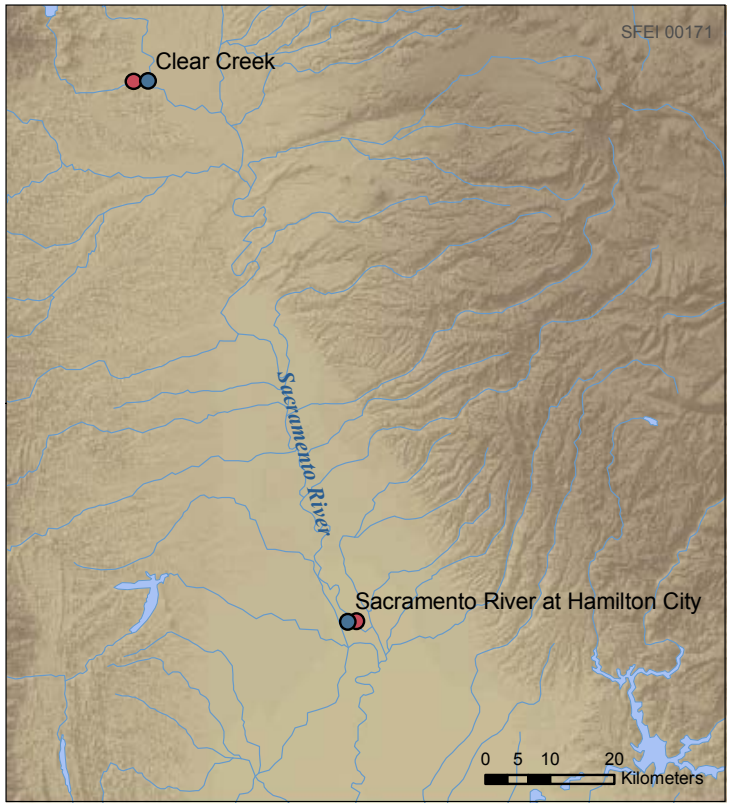




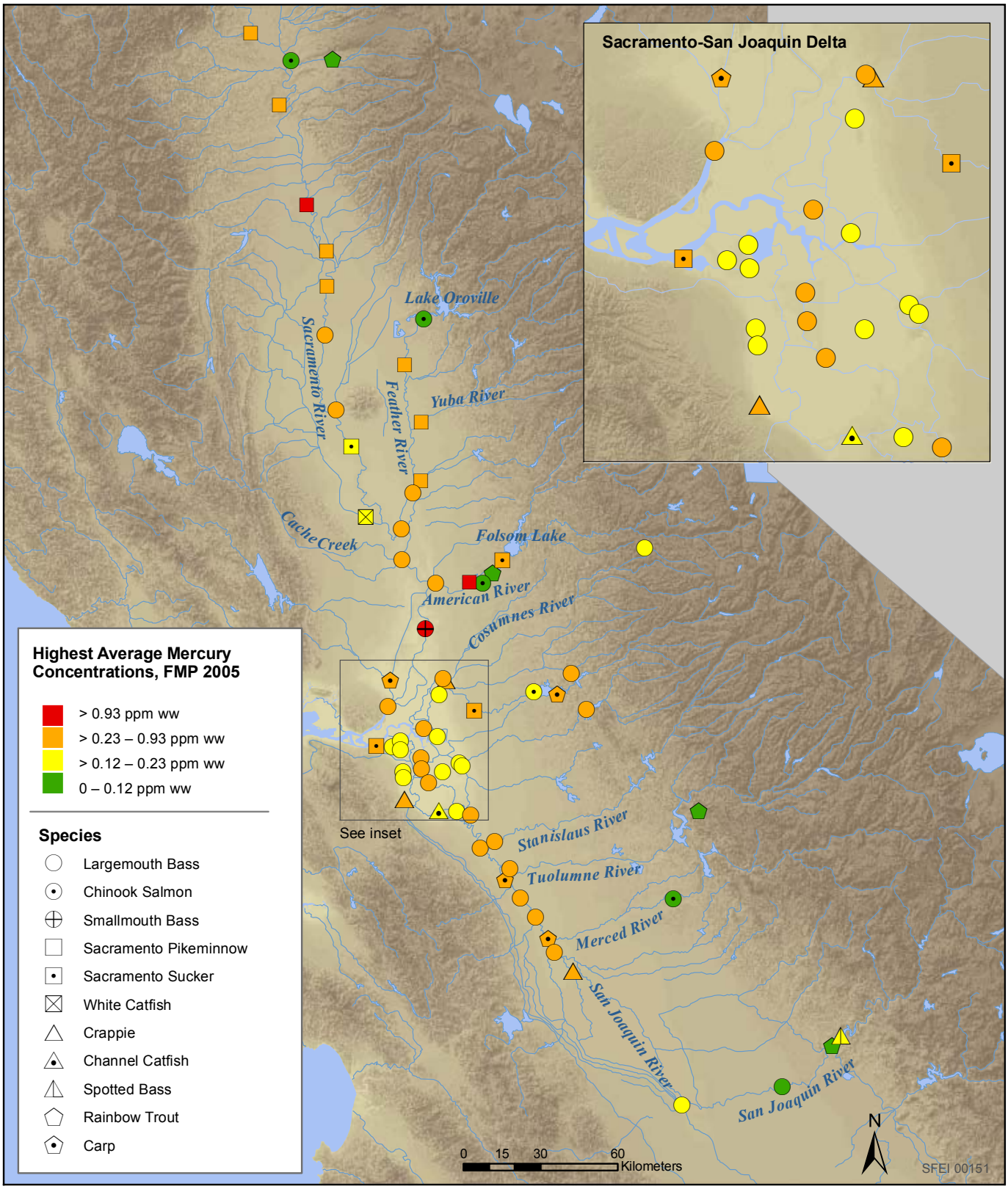
Map 1. Sport fish sampling locations for FMP 2005. See Table 3 for site names corresponding to site codes above.



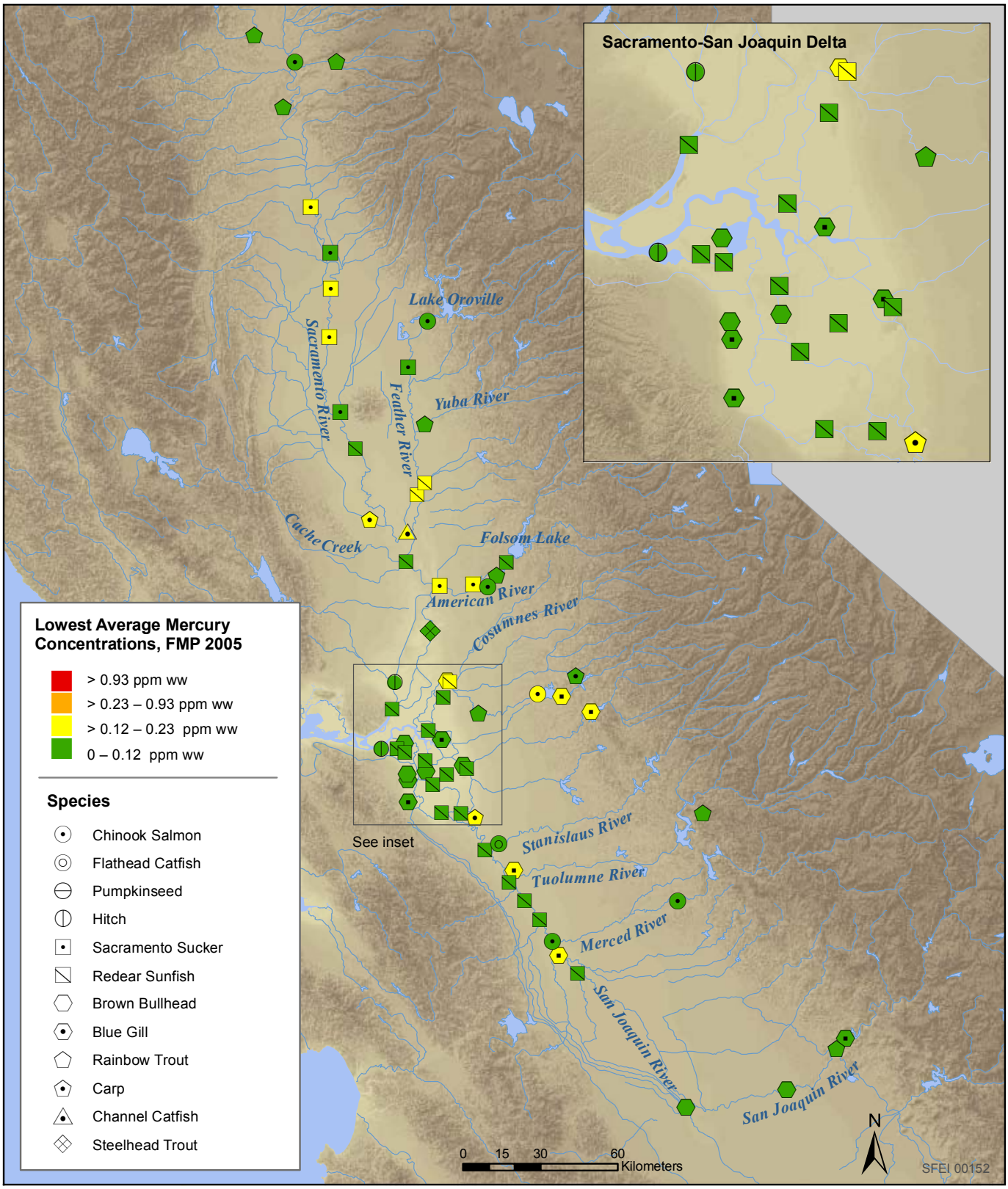
Site Name	Distance (km)
Big Break	3.32
Clear Creek	2.26
Cosumnes River	0.51
Franks Tract	1.82
Merced River at Hatfield State Park	0.02
Middle River at Bullfrog	1.12
Prospect Slough	0.26
Sacramento River at Hamilton City	0.25
Sacramento River at Rio Vista	3.04
Sacramento River at RM44	1.14
Salt Slough at Hwy 165	0.15
San Joaquin River at Potato Slough/Potato Sl.	5.02
San Joaquin River at Vernalis	4.58
Tuolumne River at Shiloh Road	0.23



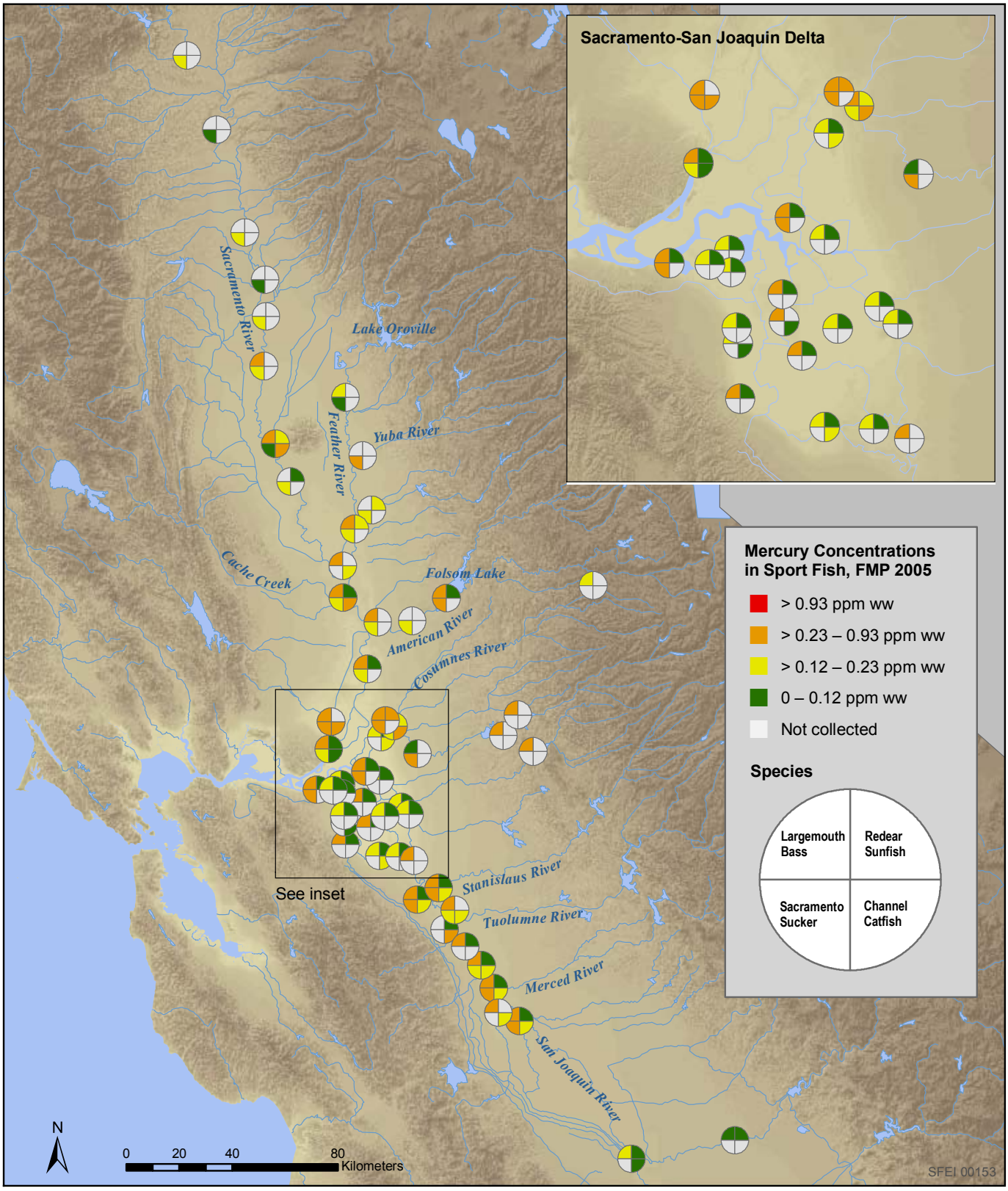
Map 2. Sites where both sport fish (blue dots) and biosentinels (red dots) were sampled for FMP 2005. Table specifies distance in kilometers between biosentinel and sport fish sampling locations. Note: Some dots were moved slightly to enhance visibility when the distance between sites was less than 0.5 kilometer.



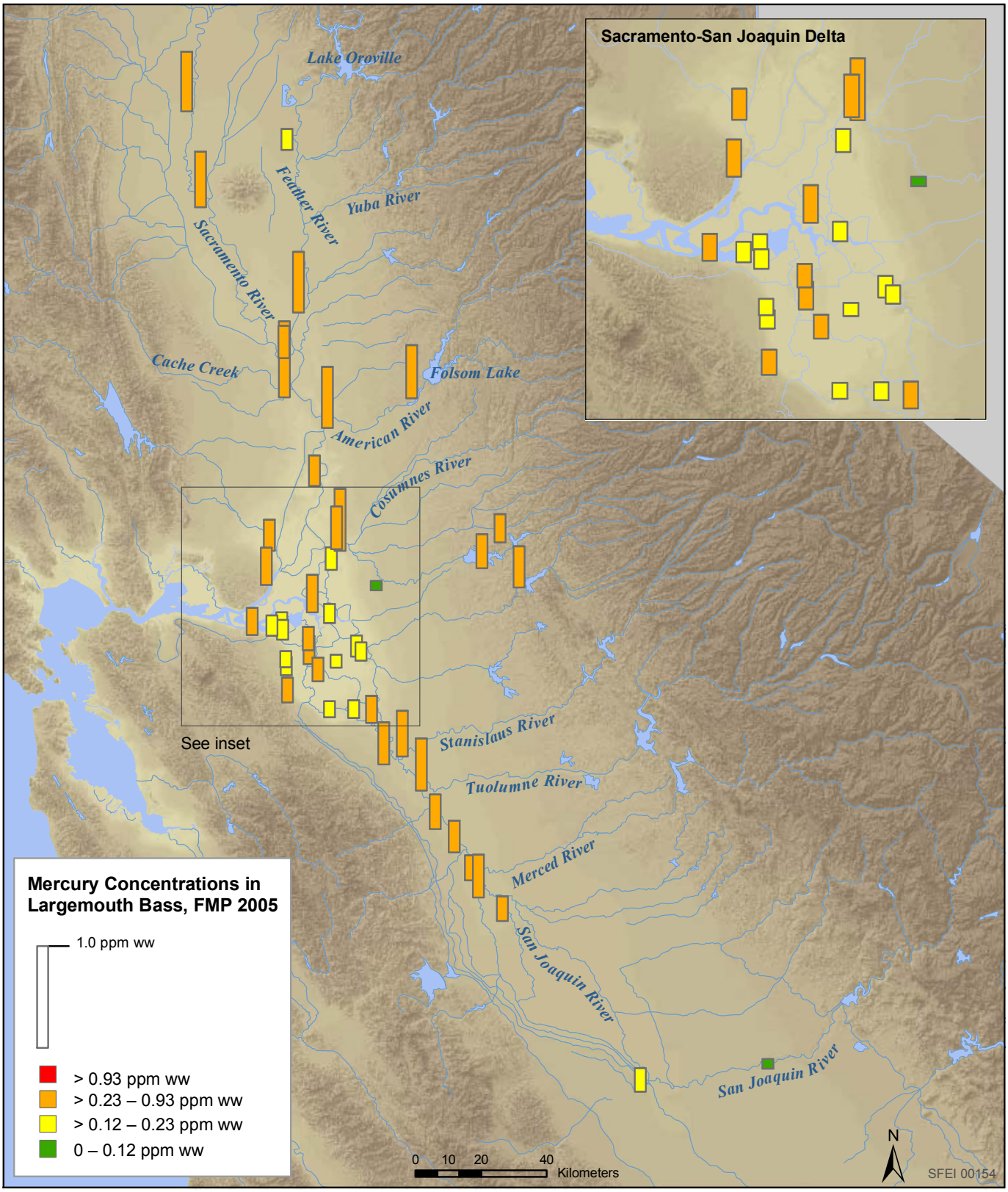
Map 3. The species at each sampling site with the highest average mercury concentration (ppm wet weight) in 2005 is shown. Symbol types represent species, and colors represent average mercury concentration (see legend). Size limits were applied (Table 4).



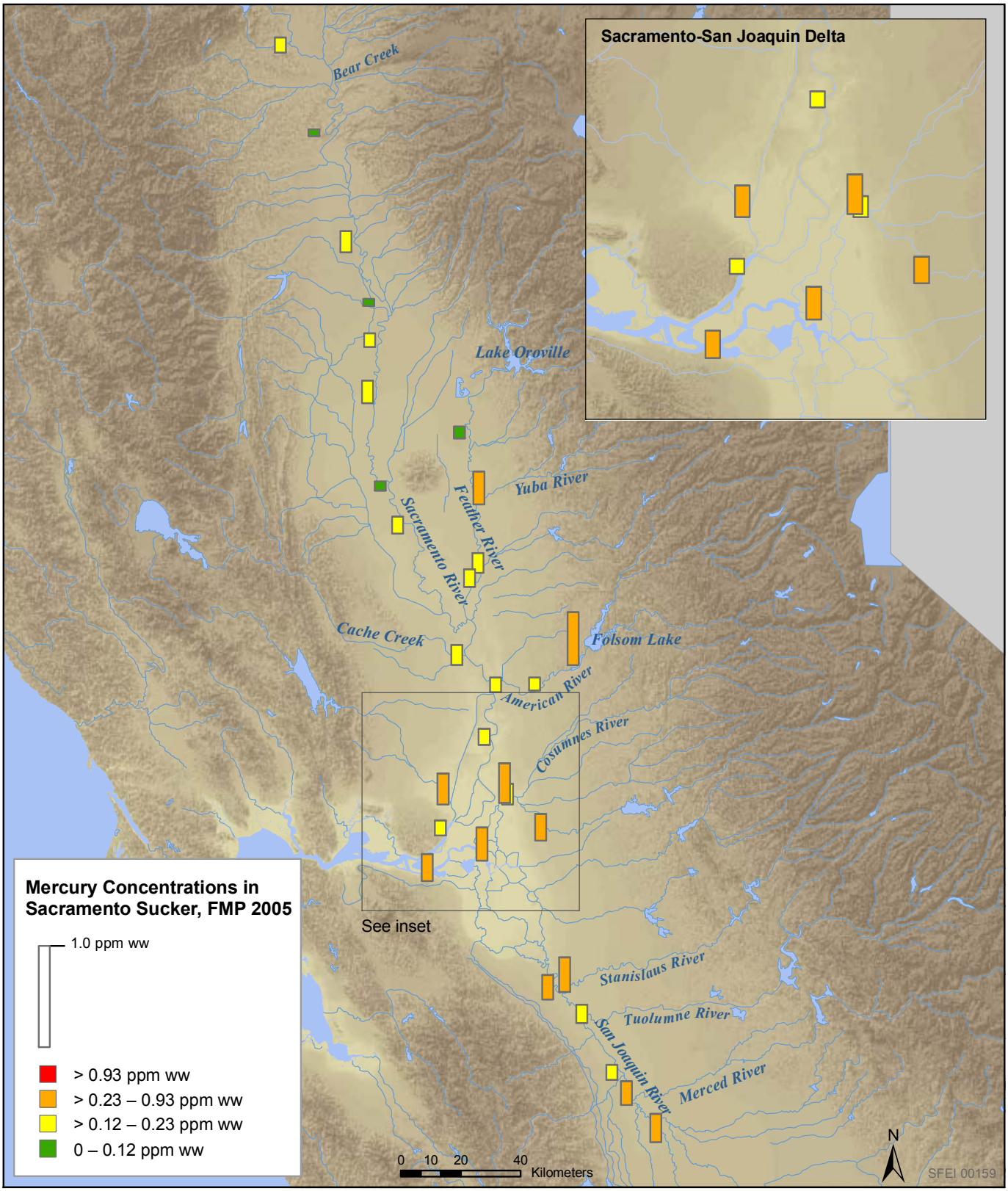
Map 4. The species at each sampling site with the lowest average mercury concentration (ppm wet weight) in 2005 is shown. Symbol types represent species, and colors represent average mercury concentration (see legend). Size limits were applied (Table 4).



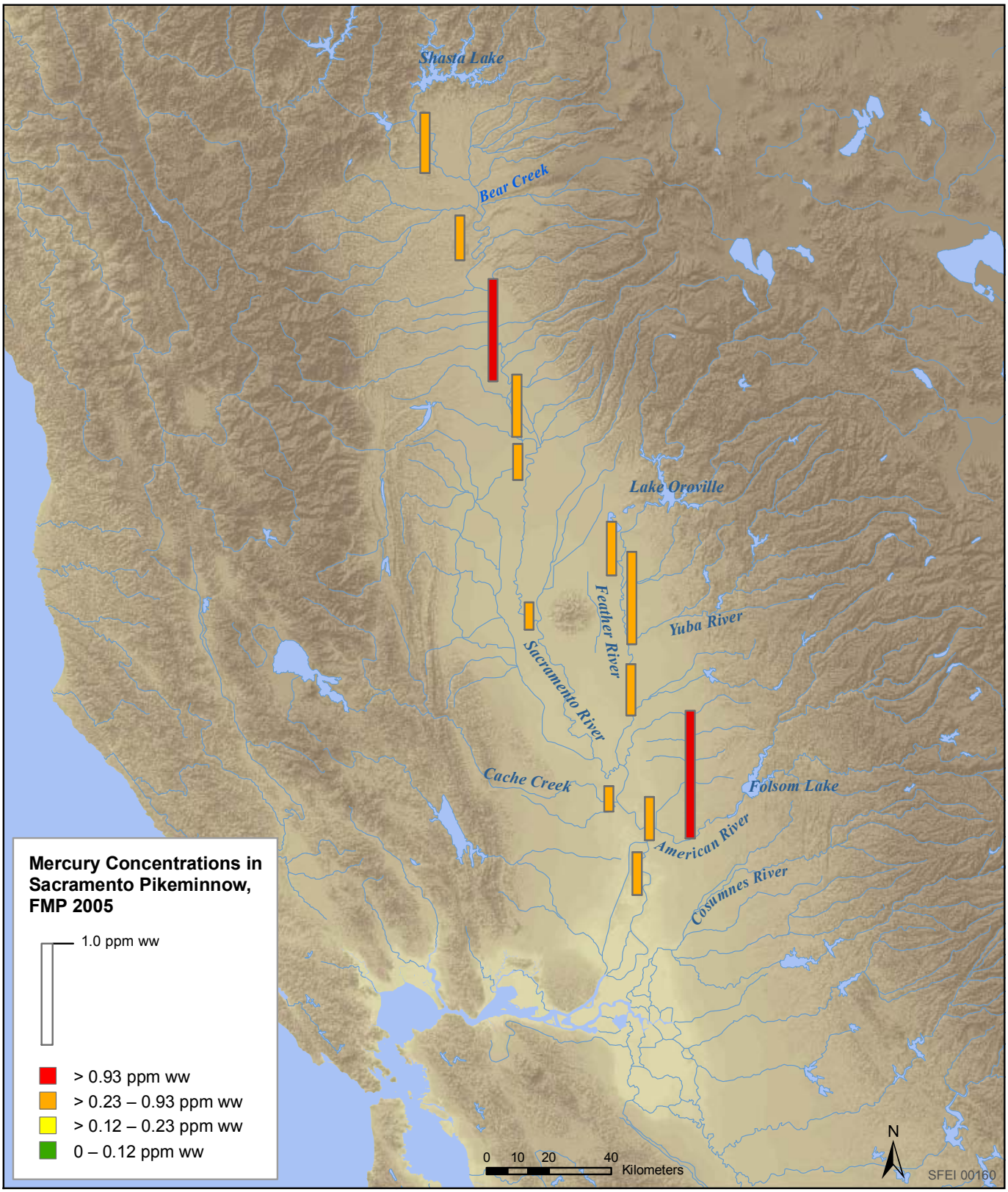
Map 5. Mercury concentrations (ppm wet weight) in sport fish at FMP sampling locations. Quadrants indicate species, and colors represent mercury concentration ranges (see legend). Size limits were applied (Table 4).



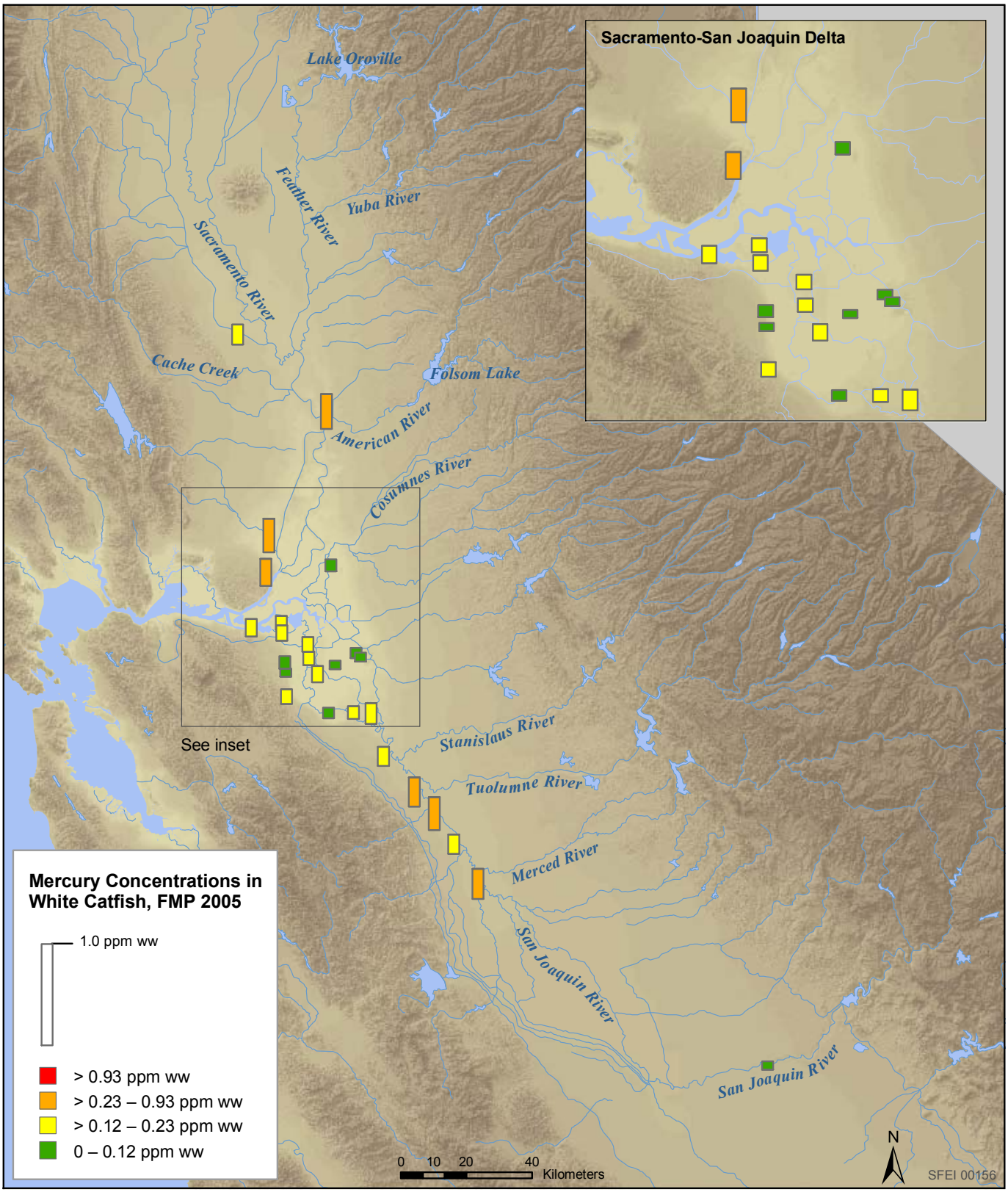
Map 6. Average mercury concentrations in largemouth bass at 2005 FMP sampling sites. Colors represent mercury concentration categories (see legend). Size limits were applied (292 – 389 mm).



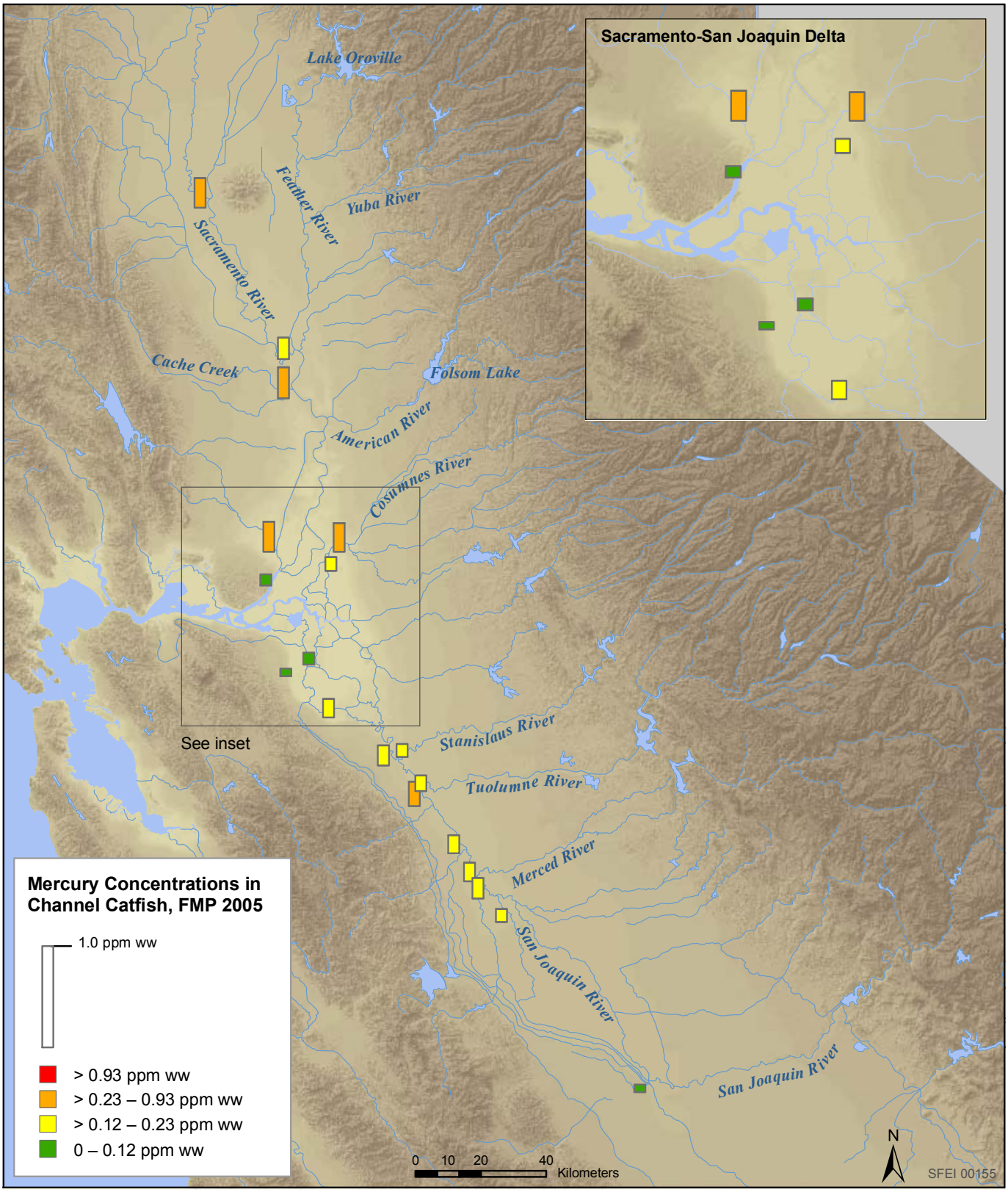
Map 7. Average mercury concentrations in Sacramento sucker at 2005 FMP sampling sites. Colors represent mercury concentration categories (see legend). Size limits were applied (355 – 470 mm).



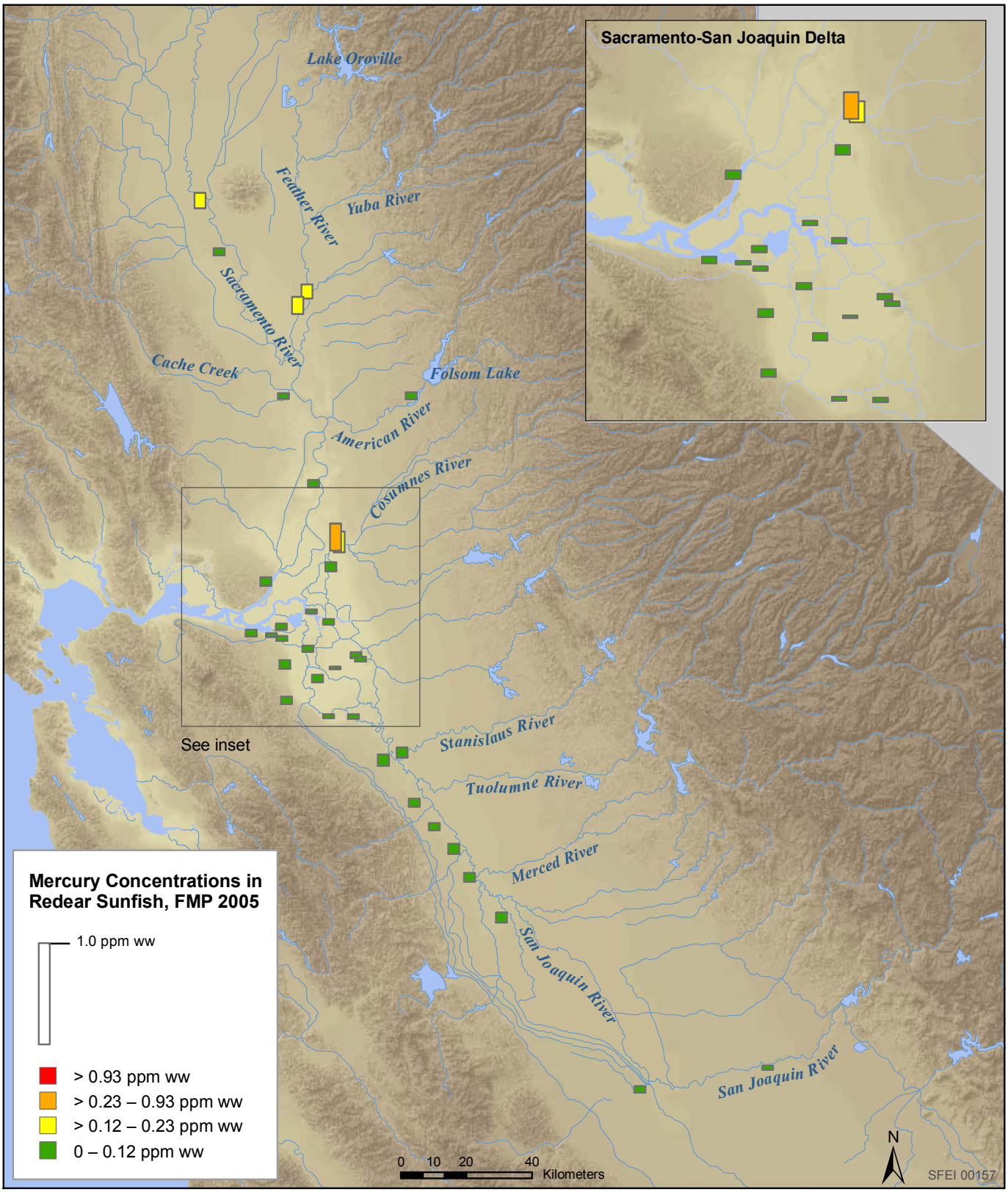
Map 8. Average mercury concentrations in Sacramento pikeminnow at 2005 FMP sampling sites. Colors represent mercury concentration categories (see legend). Size limits were applied (355 – 470 mm).



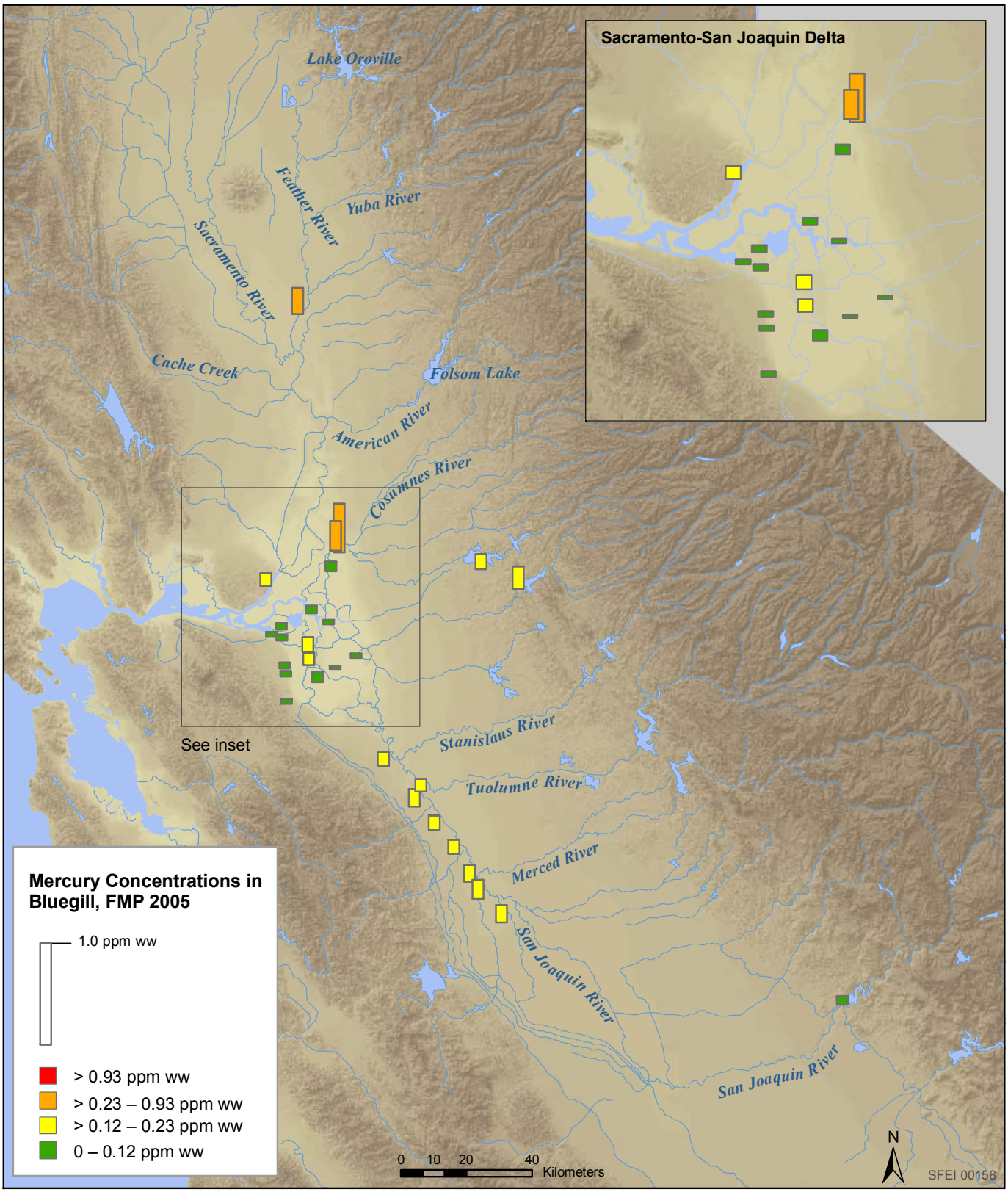
Map 9. Average mercury concentrations in white catfish at 2005 FMP sampling sites. Colors represent mercury concentration categories (see legend). Size limits were applied (243 – 324 mm).



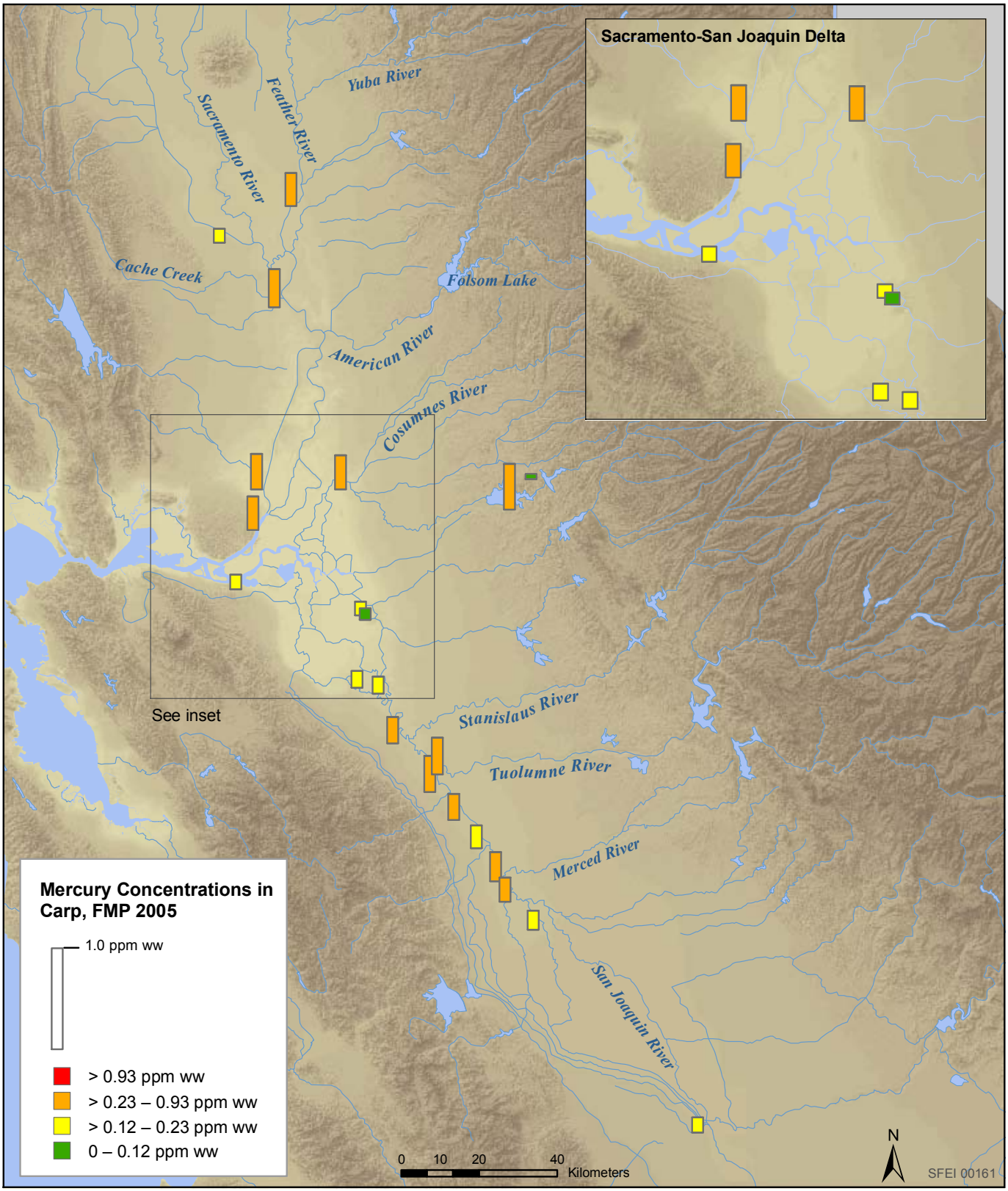
Map 10. Average mercury concentrations in channel catfish at 2005 FMP sampling sites. Colors represent mercury concentration categories (see legend). Size limits were applied (338 – 450 mm).



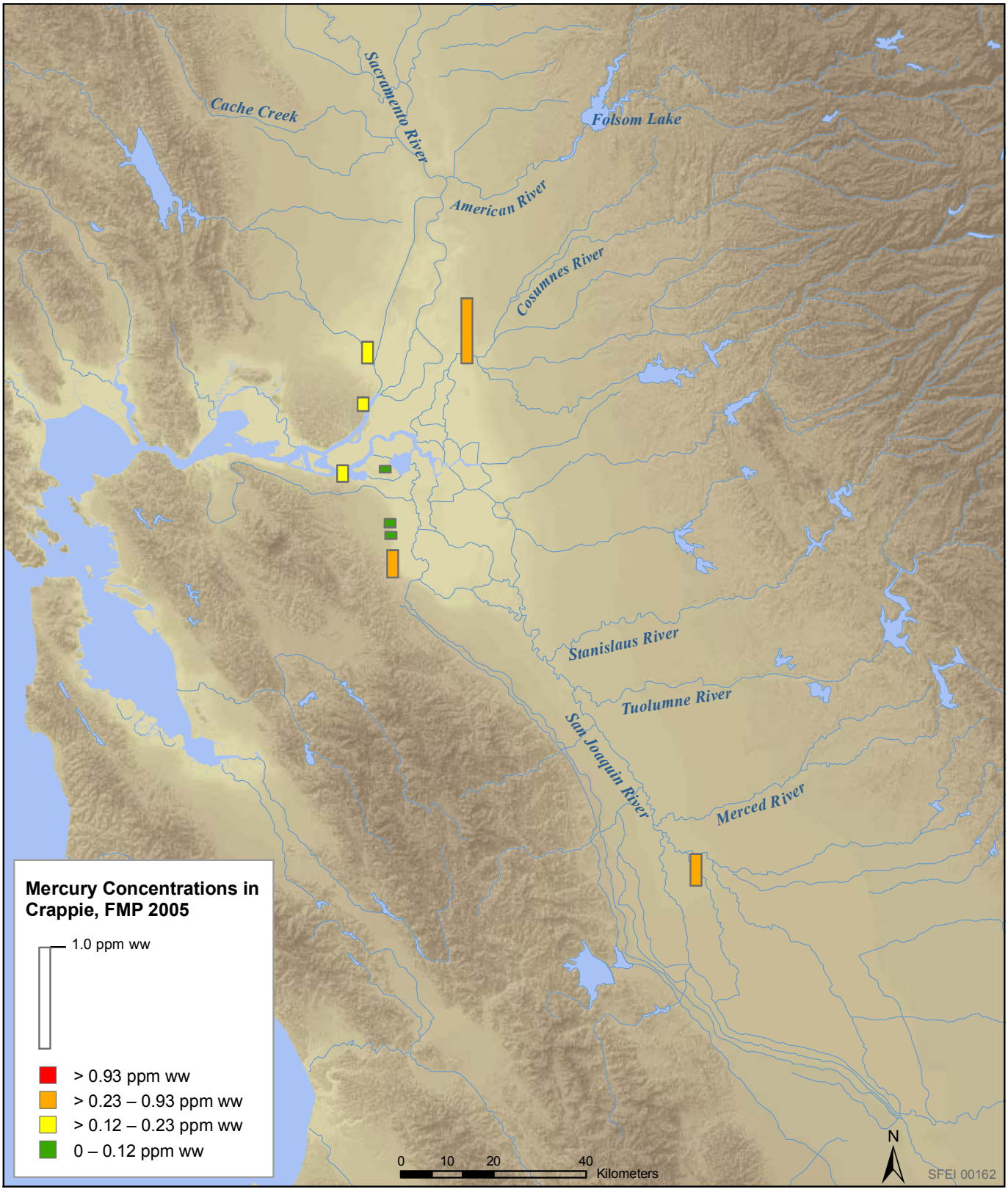
Map 11. Average mercury concentrations in redear sunfish at 2005 FMP sampling sites. Colors represent mercury concentration categories (see legend). Size limits were applied (154 – 206 mm).



Map 12. Average mercury concentrations in bluegill at 2005 FMP sampling sites. Colors represent mercury concentration categories (see legend). Size limits were applied (127 – 170 mm).



Map 13. Average mercury concentrations in carp at 2005 FMP sampling sites. Colors represent mercury concentration categories (see legend). Size limits were applied (442 – 589 mm).



Map 14. Average mercury concentrations in crappie at 2005 FMP sampling sites. Colors represent mercury concentration categories (see legend). Size limits were applied (198 – 264 mm).

Appendix 1 - All individual data from fish collected during 2005. Note that samples collected during 2006 were for the 2005 monitoring effort but due to logistical problems were collected during 2006.

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Blue Gill	ARNIM	American River at Nimbus Dam	100	0.052	
2005	Blue Gill	ARNIM	American River at Nimbus Dam	125	0.067	
2005	Blue Gill	ARNIM	American River at Nimbus Dam	106	0.086	
2005	Blue Gill	BVSL	Beaver Slough	144	0.051	
2005	Blue Gill	BVSL	Beaver Slough	154	0.055	
2005	Blue Gill	BVSL	Beaver Slough	134	0.070	
2005	Blue Gill	BVSL	Beaver Slough	160	0.113	
2005	Blue Gill	BVSL	Beaver Slough	156	0.188	
2005	Blue Gill	CARV	Calaveras River	151	0.023	
2005	Blue Gill	CARV	Calaveras River	164	0.040	
2005	Blue Gill	CARV	Calaveras River	185	0.048	
2005	Blue Gill	CARV	Calaveras River	158	0.057	
2005	Blue Gill	CARV	Calaveras River	187	0.062	
2005	Blue Gill	CMRES	Camanche Reservoir	145	0.078	
2005	Blue Gill	CMRES	Camanche Reservoir	200	0.084	
2005	Blue Gill	CMRES	Camanche Reservoir	123	0.128	
2005	Blue Gill	CMRES	Camanche Reservoir	169	0.133	
2005	Blue Gill	CMRES	Camanche Reservoir	117	0.170	
2005	Blue Gill	CMRES	Camanche Reservoir	183	0.181	
2005	Blue Gill	CMRES	Camanche Reservoir	135	0.186	
2005	Blue Gill	CMRES	Camanche Reservoir	129	0.198	
2005	Blue Gill	CMRES	Camanche Reservoir	183	0.219	
2005	Blue Gill	CMRES	Camanche Reservoir	180	0.411	
2005	Blue Gill	CBD99	Colusa Basin Drain at Road 99E	111	0.209	
2005	Blue Gill	COS	Cosumnes River	151	0.262	
2005	Blue Gill	COS	Cosumnes River	125	0.316	
2005	Blue Gill	COS	Cosumnes River	131	0.432	
2005	Blue Gill	COS	Cosumnes River	140	0.533	
2005	Blue Gill	COS	Cosumnes River	156	0.692	
2005	Blue Gill	DBAY	Discovery Bay	127	0.038	
2005	Blue Gill	DBAY	Discovery Bay	145	0.040	
2005	Blue Gill	DBAY	Discovery Bay	140	0.044	
2005	Blue Gill	DBAY	Discovery Bay	140	0.060	
2005	Blue Gill	DBAY	Discovery Bay	140	0.068	
2005	Blue Gill	FRNI	Feather River at Nicolaus	155	0.130	
2005	Blue Gill	FRNI	Feather River at Nicolaus	150	0.163	
2005	Blue Gill	FRNI	Feather River at Nicolaus	172	0.240	
2005	Blue Gill	FRNI	Feather River at Nicolaus	150	0.282	
2005	Blue Gill	FRNI	Feather River at Nicolaus	155	0.443	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Blue Gill	FRTR	Franks Tract	168	0.042	
2005	Blue Gill	FRTR	Franks Tract	141	0.055	
2005	Blue Gill	FRTR	Franks Tract	163	0.065	
2005	Blue Gill	FRTR	Franks Tract	150	0.074	
2005	Blue Gill	FRTR	Franks Tract	162	0.092	
2005	Blue Gill	HCUT	Honker Cut	156	0.039	
2005	Blue Gill	HCUT	Honker Cut	148	0.040	
2005	Blue Gill	HCUT	Honker Cut	159	0.044	
2005	Blue Gill	HCUT	Honker Cut	153	0.046	
2005	Blue Gill	HCUT	Honker Cut	160	0.054	
2005	Blue Gill	ITSL	Italian Slough	164	0.038	
2005	Blue Gill	ITSL	Italian Slough	144	0.045	
2005	Blue Gill	ITSL	Italian Slough	145	0.047	
2005	Blue Gill	ITSL	Italian Slough	149	0.068	
2005	Blue Gill	ITSL	Italian Slough	166	0.073	
2005	Blue Gill	LOSL	Lost Slough	162	0.085	
2005	Blue Gill	LOSL	Lost Slough	131	0.104	
2005	Blue Gill	LOSL	Lost Slough	139	0.228	
2005	Blue Gill	LOSL	Lost Slough	125	0.479	
2005	Blue Gill	LOSL	Lost Slough	160	0.746	
2005	Blue Gill	MMSL	Mendota Pool/Mendota Slough	120	0.037	
2005	Blue Gill	MMSL	Mendota Pool/Mendota Slough	219	0.070	
2005	Blue Gill	MMSL	Mendota Pool/Mendota Slough	226	0.204	
2005	Blue Gill	P	Merced River at Hatfield State Park	132	0.115	
2005	Blue Gill	P	Merced River at Hatfield State Park	111	0.149	
2005	Blue Gill	P	Merced River at Hatfield State Park	134	0.216	
2005	Blue Gill	P	Merced River at Hatfield State Park	119	0.252	
2005	Blue Gill	MRIND	Middle River at Bullfrog	155	0.038	
2005	Blue Gill	MRIND	Middle River at Bullfrog	130	0.056	
2005	Blue Gill	MRIND	Middle River at Bullfrog	145	0.070	
2005	Blue Gill	MRIND	Middle River at Bullfrog	150	0.073	
2005	Blue Gill	MRIND	Middle River at Bullfrog	140	0.088	
2005	Blue Gill	MRIND	Middle River at Bullfrog	160	0.088	
2005	Blue Gill	MRIND	Middle River at Bullfrog	150	0.111	
2005	Blue Gill	MRIND	Middle River at Bullfrog	140	0.112	
2005	Blue Gill	MRIND	Middle River at Bullfrog	170	0.230	
2005	Blue Gill	MRIND	Middle River at Bullfrog	170	0.367	
2005	Blue Gill	MRHW4	Middle River at Hwy 4	163	0.078	
2005	Blue Gill	MRHW4	Middle River at Hwy 4	165	0.087	
2005	Blue Gill	MRHW4	Middle River at Hwy 4	173	0.110	
2005	Blue Gill	MRHW4	Middle River at Hwy 4	160	0.137	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Blue Gill	MRHW4	Middle River at Hwy 4	191	0.228	
2005	Blue Gill	MRMIS	Middle River at Mildred Island	133	0.082	
2005	Blue Gill	MRMIS	Middle River at Mildred Island	145	0.097	
2005	Blue Gill	MRMIS	Middle River at Mildred Island	135	0.159	
2005	Blue Gill	MRMIS	Middle River at Mildred Island	170	0.229	
2005	Blue Gill	MILK	Millerton Lake	115	0.059	
2005	Blue Gill	MILK	Millerton Lake	162	0.060	
2005	Blue Gill	MILK	Millerton Lake	116	0.069	
2005	Blue Gill	MILK	Millerton Lake	114	0.069	
2005	Blue Gill	MILK	Millerton Lake	130	0.069	
2005	Blue Gill	MILK	Millerton Lake	131	0.070	
2005	Blue Gill	MILK	Millerton Lake	127	0.072	
2005	Blue Gill	MILK	Millerton Lake	126	0.079	
2005	Blue Gill	MILK	Millerton Lake	154	0.080	
2005	Blue Gill	MILK	Millerton Lake	125	0.089	
2005	Blue Gill	MILK	Millerton Lake	142	0.114	
2005	Blue Gill	MILK	Millerton Lake	130	0.135	
2005	Blue Gill	NHRES	New Hogan Reservoir	161	0.113	
2005	Blue Gill	NHRES	New Hogan Reservoir	165	0.129	
2005	Blue Gill	NHRES	New Hogan Reservoir	174	0.142	
2005	Blue Gill	NHRES	New Hogan Reservoir	182	0.163	
2005	Blue Gill	NHRES	New Hogan Reservoir	171	0.176	
2005	Blue Gill	NHRES	New Hogan Reservoir	169	0.237	
2005	Blue Gill	NHRES	New Hogan Reservoir	178	0.245	
2005	Blue Gill	NHRES	New Hogan Reservoir	159	0.273	
2005	Blue Gill	NHRES	New Hogan Reservoir	181	0.356	
2005	Blue Gill	NHRES	New Hogan Reservoir	168	0.360	
2005	Blue Gill	ORTB	Old River at Tracy Blvd.	114	0.037	
2005	Blue Gill	ORTB	Old River at Tracy Blvd.	104	0.053	
2005	Blue Gill	ORTB	Old River at Tracy Blvd.	123	0.054	
2005	Blue Gill	ORTB	Old River at Tracy Blvd.	114	0.061	
2005	Blue Gill	ORTB	Old River at Tracy Blvd.	111	0.073	
2005	Blue Gill	PCUT	Paradise Cut	258	0.135	
2005	Blue Gill	POTSL	Potato Slough	171	0.063	
2005	Blue Gill	POTSL	Potato Slough	155	0.065	
2005	Blue Gill	POTSL	Potato Slough	160	0.069	
2005	Blue Gill	POTSL	Potato Slough	160	0.073	
2005	Blue Gill	POTSL	Potato Slough	155	0.090	
2005	Blue Gill	SACRIO	Sacramento River at Rio Vista	175	0.068	
2005	Blue Gill	SACRIO	Sacramento River at Rio Vista	141	0.110	
2005	Blue Gill	SACRIO	Sacramento River at Rio Vista	120	0.111	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Blue Gill	SACRIO	Sacramento River at Rio Vista	115	0.114	
2005	Blue Gill	SACRIO	Sacramento River at Rio Vista	161	0.144	
2005	Blue Gill	SACRIO	Sacramento River at Rio Vista	206	0.184	
2005	Blue Gill	SACRIO	Sacramento River at Rio Vista	192	0.242	
2005	Blue Gill	SS165	Salt Slough at Hwy 165	139	0.118	
2005	Blue Gill	SS165	Salt Slough at Hwy 165	136	0.172	
2005	Blue Gill	SS165	Salt Slough at Hwy 165	120	0.188	
2005	Blue Gill	SS165	Salt Slough at Hwy 165	160	0.223	
2005	Blue Gill	SJCL	San Joaquin River at Crows Landing	170	0.105	
2005	Blue Gill	SJCL	San Joaquin River at Crows Landing	167	0.131	
2005	Blue Gill	SJCL	San Joaquin River at Crows Landing	136	0.140	
2005	Blue Gill	SJCL	San Joaquin River at Crows Landing	136	0.153	
2005	Blue Gill	SJCL	San Joaquin River at Crows Landing	143	0.159	
2005	Blue Gill	SJCL	San Joaquin River at Crows Landing	171	0.224	
2005	Blue Gill	SJFF	San Joaquin River at Fremont Ford	156	0.149	
2005	Blue Gill	SJFF	San Joaquin River at Fremont Ford	147	0.161	
2005	Blue Gill	SJFF	San Joaquin River at Fremont Ford	135	0.178	
2005	Blue Gill	SJFF	San Joaquin River at Fremont Ford	133	0.194	
2005	Blue Gill	SJFF	San Joaquin River at Fremont Ford	181	0.244	
2005	Blue Gill	SJFF	San Joaquin River at Fremont Ford	164	0.259	
2005	Blue Gill	SJLPK	San Joaquin River at Laird Park	142	0.108	
2005	Blue Gill	SJLPK	San Joaquin River at Laird Park	174	0.158	
2005	Blue Gill	SJLPK	San Joaquin River at Laird Park	190	0.170	
2005	Blue Gill	SJLPK	San Joaquin River at Laird Park	138	0.179	
2005	Blue Gill	SJLPK	San Joaquin River at Laird Park	166	0.233	
2005	Blue Gill	SJMO	San Joaquin River at Mossdale	221	0.070	
2005	Blue Gill	SJMO	San Joaquin River at Mossdale	196	0.104	
2005	Blue Gill	SJMO	San Joaquin River at Mossdale	195	0.159	
2005	Blue Gill	SJMO	San Joaquin River at Mossdale	179	0.188	
2005	Blue Gill	SJMO	San Joaquin River at Mossdale	194	0.194	
2005	Blue Gill	SJPAT	San Joaquin River at Patterson	146	0.119	
2005	Blue Gill	SJPAT	San Joaquin River at Patterson	159	0.146	
2005	Blue Gill	SJPAT	San Joaquin River at Patterson	182	0.154	
2005	Blue Gill	SJPAT	San Joaquin River at Patterson	176	0.155	
2005	Blue Gill	SJPAT	San Joaquin River at Patterson	156	0.164	
2005	Blue Gill	SJVER	San Joaquin River at Vernalis	135	0.115	
2005	Blue Gill	SJVER	San Joaquin River at Vernalis	163	0.127	
2005	Blue Gill	SJVER	San Joaquin River at Vernalis	130	0.144	
2005	Blue Gill	SJVER	San Joaquin River at Vernalis	156	0.147	
2005	Blue Gill	SJVER	San Joaquin River at Vernalis	157	0.164	
2005	Blue Gill	SMSL	Sand Mound Slough	152	0.050	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Blue Gill	SMSL	Sand Mound Slough	174	0.059	
2005	Blue Gill	SMSL	Sand Mound Slough	160	0.065	
2005	Blue Gill	SMSL	Sand Mound Slough	153	0.067	
2005	Blue Gill	SMSL	Sand Mound Slough	210	0.089	
2005	Blue Gill	TYSL	Taylor Slough	127	0.045	
2005	Blue Gill	TYSL	Taylor Slough	141	0.048	
2005	Blue Gill	TYSL	Taylor Slough	135	0.052	
2005	Blue Gill	TYSL	Taylor Slough	140	0.053	
2005	Blue Gill	TYSL	Taylor Slough	120	0.054	
2005	Blue Gill	TUO3SHI	Tuolumne River at Shiloh Rd.	141	0.108	
2005	Blue Gill	TUO3SHI	Tuolumne River at Shiloh Rd.	113	0.112	
2005	Blue Gill	TUO3SHI	Tuolumne River at Shiloh Rd.	148	0.121	
2005	Blue Gill	TUO3SHI	Tuolumne River at Shiloh Rd.	136	0.139	
2005	Blue Gill	TUO3SHI	Tuolumne River at Shiloh Rd.	116	0.196	
2005	Blue Gill	WDCUT	Werner Dredger Cut	126	0.045	
2005	Blue Gill	WDCUT	Werner Dredger Cut	144	0.051	
2005	Blue Gill	WDCUT	Werner Dredger Cut	145	0.055	
2005	Blue Gill	WDCUT	Werner Dredger Cut	153	0.057	
2005	Blue Gill	WDCUT	Werner Dredger Cut	135	0.079	
2005	Blue Gill	WHSL	Whiskey Slough	111	0.021	
2005	Blue Gill	WHSL	Whiskey Slough	117	0.028	
2005	Blue Gill	WHSL	Whiskey Slough	136	0.031	
2005	Blue Gill	WHSL	Whiskey Slough	108	0.031	
2005	Blue Gill	WHSL	Whiskey Slough	102	0.032	
2005	Blue Gill	WHSL	Whiskey Slough	178	0.073	
2005	Brown Bullhead	FRTR	Franks Tract	290	0.051	
2005	Brown Bullhead	FRTR	Franks Tract	306	0.051	
2005	Brown Bullhead	FRTR	Franks Tract	318	0.060	
2005	Brown Bullhead	FRTR	Franks Tract	298	0.061	
2005	Brown Bullhead	FRTR	Franks Tract	303	0.064	
2005	Brown Bullhead	ITSL	Italian Slough	354	0.034	
2005	Brown Bullhead	ITSL	Italian Slough	321	0.039	
2005	Brown Bullhead	ITSL	Italian Slough	256	0.042	
2005	Brown Bullhead	ITSL	Italian Slough	308	0.044	
2005	Brown Bullhead	ITSL	Italian Slough	348	0.046	
2005	Brown Bullhead	ITSL	Italian Slough	340	0.047	
2005	Brown Bullhead	ITSL	Italian Slough	302	0.049	
2005	Brown Bullhead	ITSL	Italian Slough	319	0.069	
2005	Brown Bullhead	ITSL	Italian Slough	317	0.071	
2005	Brown Bullhead	ITSL	Italian Slough	322	0.074	
2005	Brown Bullhead	LOSL	Lost Slough	251	0.113	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Brown Bullhead	LOSL	Lost Slough	234	0.128	
2005	Brown Bullhead	LOSL	Lost Slough	289	0.145	
2005	Brown Bullhead	LOSL	Lost Slough	219	0.188	
2005	Brown Bullhead	LOSL	Lost Slough	250	0.201	
2005	Brown Bullhead	LOSL	Lost Slough	238	0.212	
2005	Brown Bullhead	LOSL	Lost Slough	261	0.295	
2005	Brown Bullhead	MMSL	Mendota Pool/Mendota Slough	264	0.032	
2005	Brown Bullhead	MMSL	Mendota Pool/Mendota Slough	266	0.034	
2005	Brown Bullhead	MMSL	Mendota Pool/Mendota Slough	279	0.034	
2005	Brown Bullhead	MMSL	Mendota Pool/Mendota Slough	291	0.050	
2005	Brown Bullhead	MRIND	Middle River at Bullfrog	275	0.042	
2005	Brown Bullhead	MRIND	Middle River at Bullfrog	281	0.056	
2005	Brown Bullhead	MRIND	Middle River at Bullfrog	290	0.059	
2005	Brown Bullhead	MRIND	Middle River at Bullfrog	341	0.059	
2005	Brown Bullhead	MRIND	Middle River at Bullfrog	325	0.065	
2005	Brown Bullhead	MRIND	Middle River at Bullfrog	265	0.081	
2005	Brown Bullhead	MRIND	Middle River at Bullfrog	340	0.094	
2005	Brown Bullhead	MRIND	Middle River at Bullfrog	290	0.098	
2005	Brown Bullhead	MRIND	Middle River at Bullfrog	311	0.117	
2005	Brown Bullhead	MRIND	Middle River at Bullfrog	390	0.129	
2005	Brown Bullhead	POTSL	Potato Slough	275	0.059	
2005	Brown Bullhead	POTSL	Potato Slough	301	0.121	
2005	Brown Bullhead	POTSL	Potato Slough	339	0.132	
2005	Brown Bullhead	POTSL	Potato Slough	342	0.143	
2005	Brown Bullhead	SJH99	San Joaquin River at Hwy 99	256	0.026	
2005	Brown Bullhead	SJH99	San Joaquin River at Hwy 99	249	0.027	
2005	Brown Bullhead	SJH99	San Joaquin River at Hwy 99	299	0.028	
2005	Brown Bullhead	SJH99	San Joaquin River at Hwy 99	295	0.030	
2005	Brown Bullhead	SJH99	San Joaquin River at Hwy 99	219	0.035	
2005	Brown Bullhead	SJH99	San Joaquin River at Hwy 99	269	0.038	
2005	Brown Bullhead	SJH99	San Joaquin River at Hwy 99	343	0.041	
2005	Brown Bullhead	SJH99	San Joaquin River at Hwy 99	261	0.076	
2005	Brown Bullhead	SJH99	San Joaquin River at Hwy 99	234	0.079	
2005	Brown Bullhead	WDCUT	Werner Dredger Cut	320	0.025	
2005	Brown Bullhead	WDCUT	Werner Dredger Cut	256	0.036	
2005	Brown Bullhead	WHSL	Whiskey Slough	312	0.036	
2005	Brown Bullhead	WHSL	Whiskey Slough	327	0.037	
2005	Brown Bullhead	WHSL	Whiskey Slough	276	0.060	
2005	Carp	BIGB	Big Break	588	0.077	
2005	Carp	BIGB	Big Break	555	0.101	
2005	Carp	BIGB	Big Break	584	0.258	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Carp	CARV	Calaveras River	585	0.129	
2005	Carp	CARV	Calaveras River	563	0.141	
2005	Carp	CARV	Calaveras River	609	0.149	
2005	Carp	CARV	Calaveras River	597	0.172	
2005	Carp	CARV	Calaveras River	643	0.189	
2005	Carp	CMRES	Camanche Reservoir	398	0.206	
2005	Carp	CMRES	Camanche Reservoir	503	0.212	
2005	Carp	CMRES	Camanche Reservoir	433	0.334	
2005	Carp	CMRES	Camanche Reservoir	398	0.560	
2005	Carp	CMRES	Camanche Reservoir	446	0.694	
2005	Carp	CBD99	Colusa Basin Drain at Road 99E	463	0.113	
2005	Carp	CBD99	Colusa Basin Drain at Road 99E	480	0.159	
2005	Carp	CBD99	Colusa Basin Drain at Road 99E	403	0.186	
2005	Carp	CBD99	Colusa Basin Drain at Road 99E	340	0.246	
2005	Carp	COS	Cosumnes River	450	0.120	
2005	Carp	COS	Cosumnes River	573	0.196	
2005	Carp	COS	Cosumnes River	530	0.309	
2005	Carp	COS	Cosumnes River	525	0.477	
2005	Carp	COS	Cosumnes River	540	0.593	
2005	Carp	FRNI	Feather River at Nicolaus	430	0.123	
2005	Carp	FRNI	Feather River at Nicolaus	460	0.127	
2005	Carp	FRNI	Feather River at Nicolaus	530	0.198	
2005	Carp	FRNI	Feather River at Nicolaus	555	0.444	
2005	Carp	FRNI	Feather River at Nicolaus	545	0.517	
2005	Carp	ITSL	Italian Slough	750	0.149	
2005	Carp	ITSL	Italian Slough	786	0.379	
2005	Carp	ITSL	Italian Slough	762	0.459	
2005	Carp	MMSL	Mendota Pool/Mendota Slough	370	0.022	
2005	Carp	MMSL	Mendota Pool/Mendota Slough	400	0.031	
2005	Carp	MMSL	Mendota Pool/Mendota Slough	391	0.041	
2005	Carp	MMSL	Mendota Pool/Mendota Slough	577	0.098	
2005	Carp	MMSL	Mendota Pool/Mendota Slough	536	0.134	
2005	Carp	MMSL	Mendota Pool/Mendota Slough	561	0.144	
2005	Carp	MMSL	Mendota Pool/Mendota Slough	535	0.218	
2005	Carp	P	Merced River at Hatfield State Park	515	0.236	
2005	Carp	P	Merced River at Hatfield State Park	496	0.236	
2005	Carp	P	Merced River at Hatfield State Park	533	0.263	
2005	Carp	P	Merced River at Hatfield State Park	479	0.276	
2005	Carp	P	Merced River at Hatfield State Park	495	0.411	
2006	Carp	MILK	Millerton Lake	492	0.113	
2006	Carp	MILK	Millerton Lake	526	0.241	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2006	Carp	MILK	Millerton Lake	553	0.274	
2006	Carp	MILK	Millerton Lake	550	0.371	
2006	Carp	MILK	Millerton Lake	610	0.513	
2005	Carp	PCUT	Paradise Cut	578	0.143	
2005	Carp	PCUT	Paradise Cut	574	0.162	
2005	Carp	PCUT	Paradise Cut	581	0.200	
2005	Carp	PCUT	Paradise Cut	609	0.259	
2005	Carp	PCUT	Paradise Cut	594	0.384	
2005	Carp	PARES	Pardee Reservoir	453	0.028	
2005	Carp	PARES	Pardee Reservoir	500	0.038	
2005	Carp	PARES	Pardee Reservoir	436	0.051	
2005	Carp	PARES	Pardee Reservoir	485	0.069	
2005	Carp	PARES	Pardee Reservoir	501	0.075	
2005	Carp	POTSL	Potato Slough	595	0.404	
2005	Carp	NDPRSL	Prospect Slough	517	0.128	
2005	Carp	NDPRSL	Prospect Slough	438	0.252	
2005	Carp	NDPRSL	Prospect Slough	535	0.354	
2005	Carp	NDPRSL	Prospect Slough	514	0.430	
2005	Carp	NDPRSL	Prospect Slough	583	0.484	
2005	Carp	SACRIO	Sacramento River at Rio Vista	607	0.264	
2005	Carp	SACRIO	Sacramento River at Rio Vista	595	0.265	
2005	Carp	SACRIO	Sacramento River at Rio Vista	600	0.303	
2005	Carp	SACRIO	Sacramento River at Rio Vista	557	0.306	
2005	Carp	SACRIO	Sacramento River at Rio Vista	545	0.330	
2005	Carp	SACRIO	Sacramento River at Rio Vista	567	0.353	
2005	Carp	SRVB	Sacramento River at Veterans Bridge	406	0.070	
2005	Carp	SRVB	Sacramento River at Veterans Bridge	495	0.269	
2005	Carp	SRVB	Sacramento River at Veterans Bridge	454	0.300	
2005	Carp	SRVB	Sacramento River at Veterans Bridge	581	0.558	
2005	Carp	SS165	Salt Slough at Hwy 165	489	0.136	
2005	Carp	SS165	Salt Slough at Hwy 165	391	0.146	
2005	Carp	SS165	Salt Slough at Hwy 165	451	0.204	
2005	Carp	SS165	Salt Slough at Hwy 165	430	0.221	
2005	Carp	SS165	Salt Slough at Hwy 165	471	0.232	
2005	Carp	SS165	Salt Slough at Hwy 165	369	0.299	
2005	Carp	SJCL	San Joaquin River at Crows Landing	519	0.159	
2005	Carp	SJCL	San Joaquin River at Crows Landing	484	0.203	
2005	Carp	SJCL	San Joaquin River at Crows Landing	440	0.244	
2005	Carp	SJCL	San Joaquin River at Crows Landing	461	0.254	
2005	Carp	SJCL	San Joaquin River at Crows Landing	457	0.258	
2005	Carp	SJCL	San Joaquin River at Crows Landing	452	0.268	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Carp	SJFF	San Joaquin River at Fremont Ford	378	0.120	
2005	Carp	SJFF	San Joaquin River at Fremont Ford	458	0.146	
2005	Carp	SJFF	San Joaquin River at Fremont Ford	509	0.163	
2005	Carp	SJFF	San Joaquin River at Fremont Ford	396	0.174	
2005	Carp	SJFF	San Joaquin River at Fremont Ford	475	0.314	
2005	Carp	SJFF	San Joaquin River at Fremont Ford	503	0.343	
2005	Carp	SJH99	San Joaquin River at Hwy 99	651	0.079	
2005	Carp	SJH99	San Joaquin River at Hwy 99	655	0.130	
2005	Carp	SJH99	San Joaquin River at Hwy 99	739	0.145	
2005	Carp	SJH99	San Joaquin River at Hwy 99	705	0.159	
2005	Carp	SJH99	San Joaquin River at Hwy 99	758	0.180	
2005	Carp	SJLPK	San Joaquin River at Laird Park	439	0.138	
2005	Carp	SJLPK	San Joaquin River at Laird Park	456	0.284	
2005	Carp	SJLPK	San Joaquin River at Laird Park	475	0.367	
2005	Carp	SJLPK	San Joaquin River at Laird Park	456	0.378	
2005	Carp	SJLPK	San Joaquin River at Laird Park	505	0.405	
2005	Carp	SJMO	San Joaquin River at Mossdale	510	0.141	
2005	Carp	SJMO	San Joaquin River at Mossdale	719	0.164	
2005	Carp	SJMO	San Joaquin River at Mossdale	509	0.191	
2005	Carp	SJMO	San Joaquin River at Mossdale	654	0.255	
2005	Carp	SJMO	San Joaquin River at Mossdale	626	0.289	
2005	Carp	SJPAT	San Joaquin River at Patterson	403	0.128	
2005	Carp	SJPAT	San Joaquin River at Patterson	364	0.133	
2005	Carp	SJPAT	San Joaquin River at Patterson	534	0.187	
2005	Carp	SJPAT	San Joaquin River at Patterson	486	0.227	
2005	Carp	SJPAT	San Joaquin River at Patterson	459	0.272	
2005	Carp	SJPAT	San Joaquin River at Patterson	402	0.316	
2005	Carp	SJPAT	San Joaquin River at Patterson	434	0.326	
2005	Carp	SJPAT	San Joaquin River at Patterson	510	0.336	
2005	Carp	SJVER	San Joaquin River at Vernalis	465	0.212	
2005	Carp	SJVER	San Joaquin River at Vernalis	535	0.225	
2005	Carp	SJVER	San Joaquin River at Vernalis	558	0.253	
2005	Carp	SJVER	San Joaquin River at Vernalis	478	0.256	
2005	Carp	SJVER	San Joaquin River at Vernalis	461	0.358	
2005	Carp	SMCNL	Smith Canal	605	0.080	
2005	Carp	SMCNL	Smith Canal	611	0.083	
2005	Carp	SMCNL	Smith Canal	536	0.115	
2005	Carp	SMCNL	Smith Canal	604	0.144	
2005	Carp	SMCNL	Smith Canal	644	0.240	
2005	Carp	SMCNL	Smith Canal	829	0.274	
2005	Carp	TUO3SHI	Tuolumne River at Shiloh Rd.	509	0.147	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Carp	TUO3SHI	Tuolumne River at Shiloh Rd.	600	0.205	
2005	Carp	TUO3SHI	Tuolumne River at Shiloh Rd.	530	0.338	
2005	Carp	TUO3SHI	Tuolumne River at Shiloh Rd.	572	0.459	
2005	Carp	TUO3SHI	Tuolumne River at Shiloh Rd.	514	0.498	
2005	Channel Catfish	BVSL	Beaver Slough	404	0.087	
2005	Channel Catfish	BVSL	Beaver Slough	420	0.186	
2005	Channel Catfish	BVSL	Beaver Slough	541	0.260	
2006	Channel Catfish	CMRES	Camanche Reservoir	649	0.125	
2006	Channel Catfish	CMRES	Camanche Reservoir	606	0.149	
2006	Channel Catfish	CMRES	Camanche Reservoir	609	0.153	
2006	Channel Catfish	CMRES	Camanche Reservoir	615	0.166	
2005	Channel Catfish	CMRES	Camanche Reservoir	529	0.275	
2006	Channel Catfish	CMRES	Camanche Reservoir	490	0.317	
2006	Channel Catfish	CMRES	Camanche Reservoir	600	0.364	
2006	Channel Catfish	CMRES	Camanche Reservoir	590	0.410	
2006	Channel Catfish	CMRES	Camanche Reservoir	556	0.419	
2005	Channel Catfish	CMRES	Camanche Reservoir	561	0.515	
2006	Channel Catfish	CMRES	Camanche Reservoir	600	0.645	
2006	Channel Catfish	CMRES	Camanche Reservoir	595	0.711	
2005	Channel Catfish	COS	Cosumnes River	430	0.244	
2005	Channel Catfish	COS	Cosumnes River	425	0.277	
2005	Channel Catfish	COS	Cosumnes River	405	0.322	
2005	Channel Catfish	COS	Cosumnes River	530	0.363	
2005	Channel Catfish	COS	Cosumnes River	489	0.394	
2005	Channel Catfish	DBAY	Discovery Bay	563	0.049	
2005	Channel Catfish	DBAY	Discovery Bay	488	0.053	
2005	Channel Catfish	DBAY	Discovery Bay	460	0.060	
2005	Channel Catfish	DBAY	Discovery Bay	396	0.072	
2005	Channel Catfish	MMSL	Mendota Pool/Mendota Slough	545	0.040	
2005	Channel Catfish	MMSL	Mendota Pool/Mendota Slough	424	0.058	
2005	Channel Catfish	MMSL	Mendota Pool/Mendota Slough	400	0.059	
2005	Channel Catfish	MMSL	Mendota Pool/Mendota Slough	421	0.079	
2005	Channel Catfish	MMSL	Mendota Pool/Mendota Slough	316	0.100	
2005	Channel Catfish	MMSL	Mendota Pool/Mendota Slough	357	0.100	
2005	Channel Catfish	MMSL	Mendota Pool/Mendota Slough	579	0.132	
2005	Channel Catfish	MMSL	Mendota Pool/Mendota Slough	516	0.136	
2005	Channel Catfish	P	Merced River at Hatfield State Park	439	0.127	
2005	Channel Catfish	P	Merced River at Hatfield State Park	336	0.135	
2005	Channel Catfish	P	Merced River at Hatfield State Park	415	0.174	
2005	Channel Catfish	P	Merced River at Hatfield State Park	343	0.186	
2005	Channel Catfish	P	Merced River at Hatfield State Park	374	0.235	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Channel Catfish	MRIND	Middle River at Bullfrog	459	0.059	
2005	Channel Catfish	MRIND	Middle River at Bullfrog	343	0.090	
2005	Channel Catfish	MRIND	Middle River at Bullfrog	478	0.122	
2005	Channel Catfish	MRIND	Middle River at Bullfrog	382	0.147	
2005	Channel Catfish	MRMIS	Middle River at Mildred Island	460	0.098	
2005	Channel Catfish	MILK	Millerton Lake	688	0.303	
2006	Channel Catfish	NHRES	New Hogan Reservoir	601	0.108	
2006	Channel Catfish	NHRES	New Hogan Reservoir	621	0.117	
2006	Channel Catfish	NHRES	New Hogan Reservoir	571	0.173	
2006	Channel Catfish	NHRES	New Hogan Reservoir	536	0.197	
2006	Channel Catfish	NHRES	New Hogan Reservoir	434	0.310	
2006	Channel Catfish	NHRES	New Hogan Reservoir	504	0.345	
2006	Channel Catfish	NHRES	New Hogan Reservoir	499	0.372	
2006	Channel Catfish	NHRES	New Hogan Reservoir	614	0.379	
2006	Channel Catfish	NHRES	New Hogan Reservoir	604	0.421	
2006	Channel Catfish	NHRES	New Hogan Reservoir	554	0.431	
2006	Channel Catfish	NHRES	New Hogan Reservoir	619	0.558	
2006	Channel Catfish	NHRES	New Hogan Reservoir	545	0.651	
2005	Channel Catfish	ORTB	Old River at Tracy Blvd.	451	0.060	
2005	Channel Catfish	ORTB	Old River at Tracy Blvd.	376	0.095	
2005	Channel Catfish	ORTB	Old River at Tracy Blvd.	446	0.274	
2005	Channel Catfish	PARES	Pardee Reservoir	529	0.081	
2005	Channel Catfish	PARES	Pardee Reservoir	589	0.103	
2005	Channel Catfish	PARES	Pardee Reservoir	689	0.106	
2005	Channel Catfish	PARES	Pardee Reservoir	631	0.181	
2005	Channel Catfish	PARES	Pardee Reservoir	581	0.218	
2005	Channel Catfish	PARES	Pardee Reservoir	737	0.234	
2005	Channel Catfish	PARES	Pardee Reservoir	518	0.237	
2005	Channel Catfish	PARES	Pardee Reservoir	645	0.276	
2005	Channel Catfish	PARES	Pardee Reservoir	639	0.327	
2005	Channel Catfish	PARES	Pardee Reservoir	731	0.404	
2005	Channel Catfish	POTSL	Potato Slough	281	0.165	
2005	Channel Catfish	POTSL	Potato Slough	270	0.201	
2005	Channel Catfish	NDPRSL	Prospect Slough	505	0.162	
2005	Channel Catfish	NDPRSL	Prospect Slough	437	0.295	
2005	Channel Catfish	SRCOL	Sacramento River at Colusa	201	0.121	
2005	Channel Catfish	SRCOL	Sacramento River at Colusa	347	0.197	
2005	Channel Catfish	SRCOL	Sacramento River at Colusa	319	0.255	
2005	Channel Catfish	SRCOL	Sacramento River at Colusa	433	0.265	
2005	Channel Catfish	SRCOL	Sacramento River at Colusa	348	0.266	
2005	Channel Catfish	SRCOL	Sacramento River at Colusa	350	0.333	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Channel Catfish	SRCOL	Sacramento River at Colusa	449	0.397	
2005	Channel Catfish	SRCOL	Sacramento River at Colusa	509	0.409	
2005	Channel Catfish	SRCOL	Sacramento River at Colusa	614	0.458	
2005	Channel Catfish	SRCOL	Sacramento River at Colusa	490	0.542	
2005	Channel Catfish	SRGR	Sacramento River at Grimes	646	0.177	
2005	Channel Catfish	SRGR	Sacramento River at Grimes	509	0.238	
2005	Channel Catfish	SRGR	Sacramento River at Grimes	623	0.290	
2005	Channel Catfish	SRGR	Sacramento River at Grimes	601	0.362	
2005	Channel Catfish	SRGR	Sacramento River at Grimes	614	0.378	
2005	Channel Catfish	SRGR	Sacramento River at Grimes	554	0.447	
2005	Channel Catfish	SACRIO	Sacramento River at Rio Vista	403	0.112	
2005	Channel Catfish	SRVB	Sacramento River at Veterans Bridge	375	0.181	
2005	Channel Catfish	SRVB	Sacramento River at Veterans Bridge	464	0.193	
2005	Channel Catfish	SRVB	Sacramento River at Veterans Bridge	370	0.229	
2005	Channel Catfish	SRVB	Sacramento River at Veterans Bridge	535	0.298	
2005	Channel Catfish	SRVB	Sacramento River at Veterans Bridge	384	0.343	
2005	Channel Catfish	SRVB	Sacramento River at Veterans Bridge	390	0.355	
2005	Channel Catfish	SRVB	Sacramento River at Veterans Bridge	442	0.414	
2005	Channel Catfish	SRVB	Sacramento River at Veterans Bridge	475	0.919	
2005	Channel Catfish	SRVB	Sacramento River at Veterans Bridge	630	1.265	
2005	Channel Catfish	SSLK	Sacramento Slough at Karnak	363	0.175	
2005	Channel Catfish	SSLK	Sacramento Slough at Karnak	296	0.183	
2005	Channel Catfish	SSLK	Sacramento Slough at Karnak	367	0.202	
2005	Channel Catfish	SSLK	Sacramento Slough at Karnak	346	0.202	
2005	Channel Catfish	SSLK	Sacramento Slough at Karnak	289	0.254	
2005	Channel Catfish	SSLK	Sacramento Slough at Karnak	359	0.255	
2005	Channel Catfish	SSLK	Sacramento Slough at Karnak	315	0.258	
2005	Channel Catfish	SSLK	Sacramento Slough at Karnak	646	0.292	
2005	Channel Catfish	SSLK	Sacramento Slough at Karnak	274	0.335	
2005	Channel Catfish	SSLK	Sacramento Slough at Karnak	471	0.742	
2005	Channel Catfish	SS165	Salt Slough at Hwy 165	471	0.028	
2005	Channel Catfish	SS165	Salt Slough at Hwy 165	449	0.125	
2005	Channel Catfish	SS165	Salt Slough at Hwy 165	569	0.128	
2005	Channel Catfish	SS165	Salt Slough at Hwy 165	594	0.186	
2005	Channel Catfish	SS165	Salt Slough at Hwy 165	331	0.194	
2005	Channel Catfish	SS165	Salt Slough at Hwy 165	483	0.260	
2005	Channel Catfish	SS165	Salt Slough at Hwy 165	295	0.262	
2005	Channel Catfish	SS165	Salt Slough at Hwy 165	216	0.315	
2005	Channel Catfish	SS165	Salt Slough at Hwy 165	303	0.371	
2005	Channel Catfish	SJCL	San Joaquin River at Crows Landing	344	0.159	
2005	Channel Catfish	SJCL	San Joaquin River at Crows Landing	344	0.199	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Channel Catfish	SJCL	San Joaquin River at Crows Landing	329	0.205	
2005	Channel Catfish	SJCL	San Joaquin River at Crows Landing	485	0.239	
2005	Channel Catfish	SJFF	San Joaquin River at Fremont Ford	505	0.096	
2005	Channel Catfish	SJFF	San Joaquin River at Fremont Ford	231	0.189	
2005	Channel Catfish	SJFF	San Joaquin River at Fremont Ford	371	0.199	
2005	Channel Catfish	SJFF	San Joaquin River at Fremont Ford	315	0.221	
2005	Channel Catfish	SJLPK	San Joaquin River at Laird Park	504	0.142	
2005	Channel Catfish	SJLPK	San Joaquin River at Laird Park	464	0.162	
2005	Channel Catfish	SJLPK	San Joaquin River at Laird Park	361	0.180	
2005	Channel Catfish	SJLPK	San Joaquin River at Laird Park	426	0.185	
2005	Channel Catfish	SJLPK	San Joaquin River at Laird Park	427	0.187	
2005	Channel Catfish	SJLPK	San Joaquin River at Laird Park	341	0.232	
2005	Channel Catfish	SJLPK	San Joaquin River at Laird Park	416	0.270	
2005	Channel Catfish	SJLPK	San Joaquin River at Laird Park	351	0.278	
2005	Channel Catfish	SJLPK	San Joaquin River at Laird Park	430	0.357	
2005	Channel Catfish	SJVER	San Joaquin River at Vernalis	335	0.148	
2005	Channel Catfish	SJVER	San Joaquin River at Vernalis	340	0.164	
2005	Channel Catfish	SJVER	San Joaquin River at Vernalis	355	0.178	
2005	Channel Catfish	SJVER	San Joaquin River at Vernalis	353	0.244	
2005	Channel Catfish	SJVER	San Joaquin River at Vernalis	305	0.376	
2005	Channel Catfish	SRCSP	Stanislaus River at Caswell State Park	354	0.105	
2005	Channel Catfish	SRCSP	Stanislaus River at Caswell State Park	394	0.114	
2005	Channel Catfish	SRCSP	Stanislaus River at Caswell State Park	479	0.146	
2005	Channel Catfish	SRCSP	Stanislaus River at Caswell State Park	436	0.159	
2005	Channel Catfish	TUO3SHI	Tuolumne River at Shiloh Rd.	401	0.128	
2005	Channel Catfish	TUO3SHI	Tuolumne River at Shiloh Rd.	391	0.135	
2005	Channel Catfish	TUO3SHI	Tuolumne River at Shiloh Rd.	405	0.162	
2005	Channel Catfish	TUO3SHI	Tuolumne River at Shiloh Rd.	411	0.195	
2005	Channel Catfish	TUO3SHI	Tuolumne River at Shiloh Rd.	485	0.439	
2005	Chinook Salmon	COLHY	Coleman Hatchery	888	0.068	
2005	Chinook Salmon	COLHY	Coleman Hatchery	884	0.069	
2005	Chinook Salmon	COLHY	Coleman Hatchery	882	0.071	
2005	Chinook Salmon	COLHY	Coleman Hatchery	915	0.075	
2005	Chinook Salmon	COLHY	Coleman Hatchery	920	0.082	
2005	Chinook Salmon	FRHY	Feather River Hatchery	885	0.102	
2005	Chinook Salmon	FRHY	Feather River Hatchery	885	0.111	
2005	Chinook Salmon	FRHY	Feather River Hatchery	823	0.114	
2005	Chinook Salmon	FRHY	Feather River Hatchery	830	0.133	
2005	Chinook Salmon	FRHY	Feather River Hatchery	824	0.138	
2005	Chinook Salmon	MRHY	Merced Hatchery	849	0.073	
2005	Chinook Salmon	MRHY	Merced Hatchery	833	0.082	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Chinook Salmon	MRHY	Merced Hatchery	770	0.086	
2005	Chinook Salmon	MRHY	Merced Hatchery	790	0.094	
2005	Chinook Salmon	MRHY	Merced Hatchery	772	0.094	
2005	Chinook Salmon	P	Merced River at Hatfield State Park	796	0.084	
2005	Chinook Salmon	MKHY	Mokelumne Hatchery	841	0.106	
2005	Chinook Salmon	MKHY	Mokelumne Hatchery	791	0.114	
2005	Chinook Salmon	MKHY	Mokelumne Hatchery	721	0.118	
2005	Chinook Salmon	MKHY	Mokelumne Hatchery	781	0.138	
2005	Chinook Salmon	MKHY	Mokelumne Hatchery	849	0.145	
2005	Chinook Salmon	NIMHY	Nimbus Hatchery	910	0.066	
2005	Chinook Salmon	NIMHY	Nimbus Hatchery	784	0.071	
2005	Chinook Salmon	NIMHY	Nimbus Hatchery	836	0.083	
2005	Chinook Salmon	NIMHY	Nimbus Hatchery	806	0.092	
2005	Chinook Salmon	NIMHY	Nimbus Hatchery	915	0.150	
2005	Chinook Salmon	SRM44	Sacramento River at RM44	599	0.042	
2005	Chinook Salmon	SRM44	Sacramento River at RM44	833	0.062	
2005	Chinook Salmon	SRM44	Sacramento River at RM44	779	0.065	
2005	Chinook Salmon	SRM44	Sacramento River at RM44	920	0.069	
2005	Chinook Salmon	SRM44	Sacramento River at RM44	781	0.071	
2005	Chinook Salmon	SRM44	Sacramento River at RM44	829	0.074	
2005	Chinook Salmon	SRM44	Sacramento River at RM44	656	0.080	
2005	Crappie	BIGB	Big Break	271	0.097	
2005	Crappie	BIGB	Big Break	300	0.143	
2005	Crappie	BIGB	Big Break	250	0.160	
2005	Crappie	BIGB	Big Break	300	0.225	
2005	Crappie	BIGB	Big Break	330	0.266	
2006	Crappie	CMRES	Camanche Reservoir	265	0.265	
2006	Crappie	CMRES	Camanche Reservoir	299	0.406	
2005	Crappie	COS	Cosumnes River	199	0.536	
2005	Crappie	COS	Cosumnes River	174	0.604	
2005	Crappie	COS	Cosumnes River	222	0.751	
2005	Crappie	COS	Cosumnes River	159	0.820	
2005	Crappie	COS	Cosumnes River	178	1.096	
2005	Crappie	DBAY	Discovery Bay	248	0.032	
2005	Crappie	DBAY	Discovery Bay	192	0.063	
2005	Crappie	DBAY	Discovery Bay	261	0.073	
2005	Crappie	DBAY	Discovery Bay	215	0.084	
2005	Crappie	DBAY	Discovery Bay	245	0.084	
2005	Crappie	FRNI	Feather River at Nicolaus	155	0.135	
2005	Crappie	FRNI	Feather River at Nicolaus	166	0.164	
2005	Crappie	FRNI	Feather River at Nicolaus	170	0.235	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Crappie	FRNI	Feather River at Nicolaus	169	0.245	
2005	Crappie	FRNI	Feather River at Nicolaus	163	0.285	
2005	Crappie	FRTR	Franks Tract	208	0.066	
2005	Crappie	FRTR	Franks Tract	268	0.112	
2005	Crappie	ITSL	Italian Slough	273	0.136	
2005	Crappie	ITSL	Italian Slough	255	0.173	
2005	Crappie	ITSL	Italian Slough	251	0.291	
2005	Crappie	ITSL	Italian Slough	264	0.344	
2005	Crappie	ITSL	Italian Slough	274	0.420	
2005	Crappie	PCUT	Paradise Cut	309	0.115	
2005	Crappie	PCUT	Paradise Cut	319	0.153	
2005	Crappie	PCUT	Paradise Cut	311	0.155	
2005	Crappie	NDPRSL	Prospect Slough	281	0.134	
2005	Crappie	NDPRSL	Prospect Slough	257	0.147	
2005	Crappie	NDPRSL	Prospect Slough	258	0.280	
2005	Crappie	NDPRSL	Prospect Slough	289	0.346	
2005	Crappie	SACRIO	Sacramento River at Rio Vista	231	0.138	
2005	Crappie	SS165	Salt Slough at Hwy 165	183	0.250	
2005	Crappie	SS165	Salt Slough at Hwy 165	222	0.310	
2005	Crappie	WDCUT	Werner Dredger Cut	180	0.065	
2005	Crappie	WDCUT	Werner Dredger Cut	194	0.081	
2005	Crappie	WDCUT	Werner Dredger Cut	210	0.084	
2005	Flathead Catfish	SRCSP	Stanislaus River at Caswell State Park	255	0.072	
2005	Flathead Catfish	SRCSP	Stanislaus River at Caswell State Park	201	0.078	
2006	Hardhead	CMRES	Camanche Reservoir	440	0.370	
2006	Hardhead	CMRES	Camanche Reservoir	461	0.404	
2006	Hardhead	CMRES	Camanche Reservoir	468	0.406	
2006	Hardhead	CMRES	Camanche Reservoir	458	0.431	
2006	Hardhead	CMRES	Camanche Reservoir	430	0.463	
2006	Hardhead	CMRES	Camanche Reservoir	485	0.525	
2005	Hardhead	CCMOU	Clear Creek	471	0.312	
2005	Hardhead	CCMOU	Clear Creek	432	0.345	
2005	Hardhead	CCMOU	Clear Creek	481	0.399	
2005	Hardhead	CCMOU	Clear Creek	491	0.425	
2005	Hardhead	CCMOU	Clear Creek	429	0.485	
2005	Hardhead	SRBND	Sacramento River at Bend Bridge	316	0.127	
2005	Hardhead	SRBND	Sacramento River at Bend Bridge	389	0.280	
2005	Hardhead	SRBND	Sacramento River at Bend Bridge	381	0.304	
2005	Hardhead	SRBND	Sacramento River at Bend Bridge	423	0.329	
2005	Hardhead	SRBND	Sacramento River at Bend Bridge	391	0.545	
2005	Hardhead	SACHC	Sacramento River at Hamilton City	314	0.094	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Hardhead	SACHC	Sacramento River at Hamilton City	385	0.172	
2005	Hardhead	SACHC	Sacramento River at Hamilton City	342	0.184	
2005	Hardhead	SACHC	Sacramento River at Hamilton City	345	0.259	
2005	Hardhead	SACHC	Sacramento River at Hamilton City	385	0.810	
2005	Hitch	BIGB	Big Break	179	0.029	
2005	Hitch	BIGB	Big Break	173	0.035	
2005	Hitch	BIGB	Big Break	190	0.038	
2005	Hitch	BIGB	Big Break	204	0.039	
2005	Hitch	BIGB	Big Break	189	0.056	
2005	Hitch	COS	Cosumnes River	148	0.122	
2005	Hitch	COS	Cosumnes River	135	0.176	
2005	Hitch	COS	Cosumnes River	134	0.210	
2005	Hitch	COS	Cosumnes River	132	0.257	
2005	Hitch	COS	Cosumnes River	121	0.580	
2005	Hitch	NDPRSL	Prospect Slough	306	0.046	
2005	Hitch	NDPRSL	Prospect Slough	260	0.113	
2005	Hitch	SACRIO	Sacramento River at Rio Vista	355	0.261	
2005	Hitch	SACRIO	Sacramento River at Rio Vista	364	0.329	
2005	Hitch	SACRIO	Sacramento River at Rio Vista	385	0.333	
2005	Hitch	SACRIO	Sacramento River at Rio Vista	387	0.336	
2005	Hitch	SACRIO	Sacramento River at Rio Vista	375	0.364	
2006	Kokanee	PARES	Pardee Reservoir	203	0.091	
2006	Kokanee	PARES	Pardee Reservoir	209	0.099	
2006	Kokanee	PARES	Pardee Reservoir	203	0.099	
2006	Kokanee	PARES	Pardee Reservoir	207	0.103	
2006	Kokanee	PARES	Pardee Reservoir	206	0.103	
2006	Kokanee	PARES	Pardee Reservoir	207	0.105	
2006	Kokanee	PARES	Pardee Reservoir	194	0.105	
2006	Kokanee	PARES	Pardee Reservoir	198	0.105	
2006	Kokanee	PARES	Pardee Reservoir	211	0.108	
2006	Kokanee	PARES	Pardee Reservoir	212	0.115	
2006	Kokanee	PARES	Pardee Reservoir	216	0.116	
2006	Kokanee	PARES	Pardee Reservoir	199	0.119	
2006	Kokanee	PARES	Pardee Reservoir	202	0.121	
2005	Largemouth Bass	ARDP	American River at Discovery Park	230	0.185	
2005	Largemouth Bass	ARDP	American River at Discovery Park	305	0.230	
2005	Largemouth Bass	ARDP	American River at Discovery Park	250	0.261	
2005	Largemouth Bass	ARDP	American River at Discovery Park	250	0.264	
2005	Largemouth Bass	ARDP	American River at Discovery Park	225	0.267	
2005	Largemouth Bass	ARDP	American River at Discovery Park	225	0.268	
2005	Largemouth Bass	ARDP	American River at Discovery Park	225	0.274	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Largemouth Bass	ARDP	American River at Discovery Park	245	0.299	
2005	Largemouth Bass	ARDP	American River at Discovery Park	255	0.336	
2005	Largemouth Bass	ARDP	American River at Discovery Park	255	0.338	
2005	Largemouth Bass	ARDP	American River at Discovery Park	265	0.359	
2005	Largemouth Bass	ARDP	American River at Discovery Park	270	0.400	
2005	Largemouth Bass	ARDP	American River at Discovery Park	250	0.405	
2005	Largemouth Bass	ARDP	American River at Discovery Park	365	0.416	
2005	Largemouth Bass	ARDP	American River at Discovery Park	265	0.470	
2005	Largemouth Bass	ARDP	American River at Discovery Park	409	0.479	
2005	Largemouth Bass	ARDP	American River at Discovery Park	280	0.481	
2005	Largemouth Bass	ARDP	American River at Discovery Park	340	0.517	
2005	Largemouth Bass	ARDP	American River at Discovery Park	280	0.747	
2005	Largemouth Bass	ARDP	American River at Discovery Park	470	0.766	
2005	Largemouth Bass	ARDP	American River at Discovery Park	330	0.860	
2005	Largemouth Bass	ARDP	American River at Discovery Park	360	0.988	
2005	Largemouth Bass	ARNIM	American River at Nimbus Dam	253	0.231	
2006	Largemouth Bass	ARNIM	American River at Nimbus Dam	240	0.255	
2005	Largemouth Bass	ARNIM	American River at Nimbus Dam	349	0.282	
2005	Largemouth Bass	ARNIM	American River at Nimbus Dam	327	0.374	
2005	Largemouth Bass	ARNIM	American River at Nimbus Dam	309	0.530	
2006	Largemouth Bass	ARNIM	American River at Nimbus Dam	420	0.622	
2005	Largemouth Bass	ARNIM	American River at Nimbus Dam	438	0.796	
2005	Largemouth Bass	ARNIM	American River at Nimbus Dam	364	0.899	
2006	Largemouth Bass	ARNIM	American River at Nimbus Dam	489	0.927	
2005	Largemouth Bass	ARNIM	American River at Nimbus Dam	403	0.961	
2005	Largemouth Bass	ARNIM	American River at Nimbus Dam	404	1.634	
2005	Largemouth Bass	ARNIM	American River at Nimbus Dam	491	1.976	
2005	Largemouth Bass	BVSL	Beaver Slough	342	0.137	
2005	Largemouth Bass	BVSL	Beaver Slough	340	0.170	
2005	Largemouth Bass	BVSL	Beaver Slough	404	0.200	
2005	Largemouth Bass	BVSL	Beaver Slough	335	0.207	
2005	Largemouth Bass	BVSL	Beaver Slough	330	0.250	
2005	Largemouth Bass	BVSL	Beaver Slough	352	0.293	
2005	Largemouth Bass	BVSL	Beaver Slough	326	0.299	
2005	Largemouth Bass	BVSL	Beaver Slough	396	0.388	
2005	Largemouth Bass	BVSL	Beaver Slough	540	0.711	
2005	Largemouth Bass	BIGB	Big Break	329	0.149	
2005	Largemouth Bass	BIGB	Big Break	313	0.173	
2005	Largemouth Bass	BIGB	Big Break	268	0.199	
2005	Largemouth Bass	BIGB	Big Break	272	0.235	
2005	Largemouth Bass	BIGB	Big Break	310	0.252	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Largemouth Bass	BIGB	Big Break	465	0.289	
2005	Largemouth Bass	BIGB	Big Break	311	0.354	
2005	Largemouth Bass	BIGB	Big Break	419	0.378	
2005	Largemouth Bass	BIGB	Big Break	463	0.382	
2005	Largemouth Bass	BIGB	Big Break	341	0.403	
2005	Largemouth Bass	CARV	Calaveras River	308	0.095	
2005	Largemouth Bass	CARV	Calaveras River	260	0.107	
2005	Largemouth Bass	CARV	Calaveras River	268	0.128	
2005	Largemouth Bass	CARV	Calaveras River	330	0.140	
2005	Largemouth Bass	CARV	Calaveras River	270	0.150	
2005	Largemouth Bass	CARV	Calaveras River	270	0.161	
2005	Largemouth Bass	CARV	Calaveras River	356	0.184	
2005	Largemouth Bass	CARV	Calaveras River	403	0.218	
2005	Largemouth Bass	CARV	Calaveras River	454	0.273	
2005	Largemouth Bass	CARV	Calaveras River	370	0.425	
2005	Largemouth Bass	CARV	Calaveras River	514	0.523	
2005	Largemouth Bass	CMRES	Camanche Reservoir	239	0.261	
2005	Largemouth Bass	CMRES	Camanche Reservoir	361	0.296	
2005	Largemouth Bass	CMRES	Camanche Reservoir	334	0.297	
2005	Largemouth Bass	CMRES	Camanche Reservoir	264	0.313	
2005	Largemouth Bass	CMRES	Camanche Reservoir	324	0.327	
2005	Largemouth Bass	CMRES	Camanche Reservoir	241	0.335	
2005	Largemouth Bass	CMRES	Camanche Reservoir	371	0.346	
2005	Largemouth Bass	CMRES	Camanche Reservoir	356	0.421	
2005	Largemouth Bass	CMRES	Camanche Reservoir	400	0.425	
2005	Largemouth Bass	CMRES	Camanche Reservoir	470	0.436	
2005	Largemouth Bass	CMRES	Camanche Reservoir	461	0.864	
2005	Largemouth Bass	CMRES	Camanche Reservoir	433	0.870	
2005	Largemouth Bass	COS	Cosumnes River	370	0.510	
2005	Largemouth Bass	COS	Cosumnes River	360	0.562	
2005	Largemouth Bass	COS	Cosumnes River	269	0.577	
2005	Largemouth Bass	COS	Cosumnes River	305	0.583	
2005	Largemouth Bass	COS	Cosumnes River	322	0.607	
2005	Largemouth Bass	COS	Cosumnes River	338	0.641	
2005	Largemouth Bass	COS	Cosumnes River	380	0.762	
2005	Largemouth Bass	COS	Cosumnes River	439	1.099	
2005	Largemouth Bass	COS	Cosumnes River	409	1.125	
2005	Largemouth Bass	DBAY	Discovery Bay	338	0.126	
2005	Largemouth Bass	DBAY	Discovery Bay	345	0.129	
2005	Largemouth Bass	DBAY	Discovery Bay	269	0.130	
2005	Largemouth Bass	DBAY	Discovery Bay	273	0.141	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Largemouth Bass	DBAY	Discovery Bay	285	0.165	
2005	Largemouth Bass	DBAY	Discovery Bay	350	0.175	
2005	Largemouth Bass	DBAY	Discovery Bay	294	0.222	
2005	Largemouth Bass	DBAY	Discovery Bay	481	0.227	
2005	Largemouth Bass	DBAY	Discovery Bay	370	0.239	
2005	Largemouth Bass	FRGR	Feather River at Gridley	225	0.064	
2005	Largemouth Bass	FRGR	Feather River at Gridley	295	0.137	
2005	Largemouth Bass	FRGR	Feather River at Gridley	300	0.141	
2005	Largemouth Bass	FRGR	Feather River at Gridley	310	0.170	
2005	Largemouth Bass	FRGR	Feather River at Gridley	255	0.183	
2005	Largemouth Bass	FRGR	Feather River at Gridley	350	0.220	
2005	Largemouth Bass	FRGR	Feather River at Gridley	315	0.259	
2005	Largemouth Bass	FRGR	Feather River at Gridley	365	0.296	
2005	Largemouth Bass	FRGR	Feather River at Gridley	415	0.312	
2005	Largemouth Bass	FRGR	Feather River at Gridley	420	0.352	
2005	Largemouth Bass	FRNI	Feather River at Nicolaus	249	0.229	
2005	Largemouth Bass	FRNI	Feather River at Nicolaus	245	0.237	
2005	Largemouth Bass	FRNI	Feather River at Nicolaus	285	0.247	
2005	Largemouth Bass	FRNI	Feather River at Nicolaus	225	0.266	
2005	Largemouth Bass	FRNI	Feather River at Nicolaus	281	0.284	
2005	Largemouth Bass	FRNI	Feather River at Nicolaus	341	0.302	
2005	Largemouth Bass	FRNI	Feather River at Nicolaus	304	0.361	
2005	Largemouth Bass	FRNI	Feather River at Nicolaus	361	0.395	
2005	Largemouth Bass	FRNI	Feather River at Nicolaus	270	0.406	
2005	Largemouth Bass	FRNI	Feather River at Nicolaus	322	0.409	
2005	Largemouth Bass	FRNI	Feather River at Nicolaus	290	0.537	
2005	Largemouth Bass	FRNI	Feather River at Nicolaus	311	0.549	
2005	Largemouth Bass	FRNI	Feather River at Nicolaus	360	1.587	
2005	Largemouth Bass	FRTR	Franks Tract	339	0.151	
2005	Largemouth Bass	FRTR	Franks Tract	353	0.152	
2005	Largemouth Bass	FRTR	Franks Tract	368	0.156	
2005	Largemouth Bass	FRTR	Franks Tract	372	0.170	
2005	Largemouth Bass	FRTR	Franks Tract	291	0.203	
2005	Largemouth Bass	FRTR	Franks Tract	440	0.214	
2005	Largemouth Bass	FRTR	Franks Tract	405	0.279	
2005	Largemouth Bass	FRTR	Franks Tract	562	0.494	
2005	Largemouth Bass	HCUT	Honker Cut	346	0.123	
2005	Largemouth Bass	HCUT	Honker Cut	346	0.124	
2005	Largemouth Bass	HCUT	Honker Cut	349	0.125	
2005	Largemouth Bass	HCUT	Honker Cut	265	0.127	
2005	Largemouth Bass	HCUT	Honker Cut	399	0.182	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Largemouth Bass	HCUT	Honker Cut	449	0.187	
2005	Largemouth Bass	HCUT	Honker Cut	248	0.207	
2005	Largemouth Bass	HCUT	Honker Cut	344	0.227	
2005	Largemouth Bass	HCUT	Honker Cut	384	0.261	
2005	Largemouth Bass	HCUT	Honker Cut	396	0.264	
2005	Largemouth Bass	HCUT	Honker Cut	361	0.268	
2005	Largemouth Bass	HCUT	Honker Cut	521	0.370	
2005	Largemouth Bass	HCUT	Honker Cut	489	0.395	
2005	Largemouth Bass	ITSL	Italian Slough	292	0.139	
2005	Largemouth Bass	ITSL	Italian Slough	305	0.205	
2005	Largemouth Bass	ITSL	Italian Slough	282	0.258	
2005	Largemouth Bass	ITSL	Italian Slough	396	0.263	
2005	Largemouth Bass	ITSL	Italian Slough	401	0.271	
2005	Largemouth Bass	ITSL	Italian Slough	461	0.283	
2005	Largemouth Bass	ITSL	Italian Slough	317	0.283	
2005	Largemouth Bass	ITSL	Italian Slough	356	0.294	
2005	Largemouth Bass	ITSL	Italian Slough	324	0.314	
2005	Largemouth Bass	JKLK	Jenkinson Lake	289	0.101	
2005	Largemouth Bass	JKLK	Jenkinson Lake	340	0.109	
2006	Largemouth Bass	JKLK	Jenkinson Lake	373	0.134	
2006	Largemouth Bass	JKLK	Jenkinson Lake	364	0.151	
2005	Largemouth Bass	JKLK	Jenkinson Lake	380	0.169	
2005	Largemouth Bass	JKLK	Jenkinson Lake	418	0.231	
2006	Largemouth Bass	JKLK	Jenkinson Lake	508	0.251	
2005	Largemouth Bass	LOSL	Lost Slough	298	0.290	
2005	Largemouth Bass	LOSL	Lost Slough	316	0.345	
2005	Largemouth Bass	LOSL	Lost Slough	370	0.354	
2005	Largemouth Bass	LOSL	Lost Slough	361	0.385	
2005	Largemouth Bass	LOSL	Lost Slough	293	0.406	
2005	Largemouth Bass	LOSL	Lost Slough	305	0.560	
2005	Largemouth Bass	LOSL	Lost Slough	299	0.597	
2005	Largemouth Bass	LOSL	Lost Slough	289	0.619	
2005	Largemouth Bass	LOSL	Lost Slough	474	0.822	
2005	Largemouth Bass	MMSL	Mendota Pool/Mendota Slough	236	0.095	
2005	Largemouth Bass	MMSL	Mendota Pool/Mendota Slough	341	0.130	
2005	Largemouth Bass	MMSL	Mendota Pool/Mendota Slough	306	0.156	
2005	Largemouth Bass	MMSL	Mendota Pool/Mendota Slough	260	0.197	
2005	Largemouth Bass	MMSL	Mendota Pool/Mendota Slough	376	0.212	
2005	Largemouth Bass	MMSL	Mendota Pool/Mendota Slough	470	0.254	
2005	Largemouth Bass	MMSL	Mendota Pool/Mendota Slough	409	0.262	
2005	Largemouth Bass	MMSL	Mendota Pool/Mendota Slough	472	0.324	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Largemouth Bass	MMSL	Mendota Pool/Mendota Slough	363	0.418	
2005	Largemouth Bass	P	Merced River at Hatfield State Park	264	0.163	
2005	Largemouth Bass	P	Merced River at Hatfield State Park	281	0.174	
2005	Largemouth Bass	P	Merced River at Hatfield State Park	339	0.188	
2005	Largemouth Bass	P	Merced River at Hatfield State Park	336	0.189	
2005	Largemouth Bass	P	Merced River at Hatfield State Park	237	0.214	
2005	Largemouth Bass	P	Merced River at Hatfield State Park	213	0.273	
2005	Largemouth Bass	P	Merced River at Hatfield State Park	384	0.273	
2005	Largemouth Bass	P	Merced River at Hatfield State Park	346	0.329	
2005	Largemouth Bass	P	Merced River at Hatfield State Park	463	0.377	
2005	Largemouth Bass	P	Merced River at Hatfield State Park	461	0.418	
2005	Largemouth Bass	P	Merced River at Hatfield State Park	429	0.503	
2005	Largemouth Bass	P	Merced River at Hatfield State Park	489	0.944	
2005	Largemouth Bass	MRIND	Middle River at Bullfrog	242	0.157	
2005	Largemouth Bass	MRIND	Middle River at Bullfrog	310	0.169	
2005	Largemouth Bass	MRIND	Middle River at Bullfrog	295	0.222	
2005	Largemouth Bass	MRIND	Middle River at Bullfrog	243	0.225	
2005	Largemouth Bass	MRIND	Middle River at Bullfrog	310	0.236	
2005	Largemouth Bass	MRIND	Middle River at Bullfrog	320	0.246	
2005	Largemouth Bass	MRIND	Middle River at Bullfrog	240	0.256	
2005	Largemouth Bass	MRIND	Middle River at Bullfrog	315	0.261	
2005	Largemouth Bass	MRIND	Middle River at Bullfrog	370	0.275	
2005	Largemouth Bass	MRIND	Middle River at Bullfrog	230	0.278	
2005	Largemouth Bass	MRIND	Middle River at Bullfrog	280	0.282	
2005	Largemouth Bass	MRIND	Middle River at Bullfrog	405	0.329	
2005	Largemouth Bass	MRIND	Middle River at Bullfrog	265	0.330	
2005	Largemouth Bass	MRIND	Middle River at Bullfrog	265	0.338	
2005	Largemouth Bass	MRIND	Middle River at Bullfrog	305	0.339	
2005	Largemouth Bass	MRIND	Middle River at Bullfrog	340	0.351	
2005	Largemouth Bass	MRIND	Middle River at Bullfrog	385	0.368	
2005	Largemouth Bass	MRIND	Middle River at Bullfrog	510	0.402	
2005	Largemouth Bass	MRIND	Middle River at Bullfrog	510	0.412	
2005	Largemouth Bass	MRIND	Middle River at Bullfrog	270	0.423	
2005	Largemouth Bass	MRIND	Middle River at Bullfrog	550	0.452	
2005	Largemouth Bass	MRIND	Middle River at Bullfrog	420	0.494	
2005	Largemouth Bass	MRHW4	Middle River at Hwy 4	337	0.195	
2005	Largemouth Bass	MRHW4	Middle River at Hwy 4	335	0.238	
2005	Largemouth Bass	MRHW4	Middle River at Hwy 4	396	0.257	
2005	Largemouth Bass	MRHW4	Middle River at Hwy 4	499	0.265	
2005	Largemouth Bass	MRHW4	Middle River at Hwy 4	350	0.275	
2005	Largemouth Bass	MRHW4	Middle River at Hwy 4	460	0.301	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Largemouth Bass	MRHW4	Middle River at Hwy 4	390	0.308	
2005	Largemouth Bass	MRHW4	Middle River at Hwy 4	435	0.389	
2005	Largemouth Bass	MRHW4	Middle River at Hwy 4	426	0.455	
2005	Largemouth Bass	MRMIS	Middle River at Mildred Island	325	0.191	
2005	Largemouth Bass	MRMIS	Middle River at Mildred Island	350	0.197	
2005	Largemouth Bass	MRMIS	Middle River at Mildred Island	426	0.236	
2005	Largemouth Bass	MRMIS	Middle River at Mildred Island	342	0.248	
2005	Largemouth Bass	MRMIS	Middle River at Mildred Island	369	0.291	
2005	Largemouth Bass	MRLL	Mokelumne River at Lodi Lake	252	0.086	
2005	Largemouth Bass	MRLL	Mokelumne River at Lodi Lake	231	0.088	
2005	Largemouth Bass	MRLL	Mokelumne River at Lodi Lake	334	0.093	
2005	Largemouth Bass	MRLL	Mokelumne River at Lodi Lake	404	0.173	
2005	Largemouth Bass	MRLL	Mokelumne River at Lodi Lake	271	0.175	
2005	Largemouth Bass	MRLL	Mokelumne River at Lodi Lake	424	0.193	
2005	Largemouth Bass	MRLL	Mokelumne River at Lodi Lake	454	0.249	
2005	Largemouth Bass	MRLL	Mokelumne River at Lodi Lake	474	0.308	
2005	Largemouth Bass	MRLL	Mokelumne River at Lodi Lake	441	0.344	
2005	Largemouth Bass	MRLL	Mokelumne River at Lodi Lake	472	0.363	
2005	Largemouth Bass	MRLL	Mokelumne River at Lodi Lake	499	0.370	
2005	Largemouth Bass	MRLL	Mokelumne River at Lodi Lake	469	0.433	
2005	Largemouth Bass	NHRES	New Hogan Reservoir	231	0.250	
2005	Largemouth Bass	NHRES	New Hogan Reservoir	256	0.286	
2005	Largemouth Bass	NHRES	New Hogan Reservoir	239	0.292	
2005	Largemouth Bass	NHRES	New Hogan Reservoir	336	0.340	
2005	Largemouth Bass	NHRES	New Hogan Reservoir	366	0.387	
2005	Largemouth Bass	NHRES	New Hogan Reservoir	370	0.391	
2005	Largemouth Bass	NHRES	New Hogan Reservoir	378	0.451	
2005	Largemouth Bass	NHRES	New Hogan Reservoir	444	0.471	
2005	Largemouth Bass	NHRES	New Hogan Reservoir	369	0.478	
2005	Largemouth Bass	NHRES	New Hogan Reservoir	434	0.492	
2005	Largemouth Bass	NHRES	New Hogan Reservoir	408	0.511	
2005	Largemouth Bass	NHRES	New Hogan Reservoir	437	0.639	
2005	Largemouth Bass	ORTB	Old River at Tracy Blvd.	316	0.112	
2005	Largemouth Bass	ORTB	Old River at Tracy Blvd.	351	0.120	
2005	Largemouth Bass	ORTB	Old River at Tracy Blvd.	349	0.123	
2005	Largemouth Bass	ORTB	Old River at Tracy Blvd.	336	0.149	
2005	Largemouth Bass	ORTB	Old River at Tracy Blvd.	355	0.150	
2005	Largemouth Bass	ORTB	Old River at Tracy Blvd.	314	0.186	
2005	Largemouth Bass	ORTB	Old River at Tracy Blvd.	381	0.248	
2005	Largemouth Bass	ORTB	Old River at Tracy Blvd.	414	0.263	
2005	Largemouth Bass	ORTB	Old River at Tracy Blvd.	514	0.350	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Largemouth Bass	PCUT	Paradise Cut	253	0.099	
2005	Largemouth Bass	PCUT	Paradise Cut	241	0.107	
2005	Largemouth Bass	PCUT	Paradise Cut	350	0.118	
2005	Largemouth Bass	PCUT	Paradise Cut	317	0.132	
2005	Largemouth Bass	PCUT	Paradise Cut	361	0.154	
2005	Largemouth Bass	PCUT	Paradise Cut	320	0.171	
2005	Largemouth Bass	PCUT	Paradise Cut	431	0.172	
2005	Largemouth Bass	PCUT	Paradise Cut	366	0.178	
2005	Largemouth Bass	PCUT	Paradise Cut	386	0.190	
2005	Largemouth Bass	PCUT	Paradise Cut	375	0.210	
2005	Largemouth Bass	PCUT	Paradise Cut	355	0.227	
2005	Largemouth Bass	PCUT	Paradise Cut	574	0.326	
2005	Largemouth Bass	PCUT	Paradise Cut	545	0.638	
2005	Largemouth Bass	PARES	Pardee Reservoir	231	0.149	
2005	Largemouth Bass	PARES	Pardee Reservoir	235	0.179	
2005	Largemouth Bass	PARES	Pardee Reservoir	249	0.184	
2005	Largemouth Bass	PARES	Pardee Reservoir	349	0.203	
2005	Largemouth Bass	PARES	Pardee Reservoir	384	0.204	
2005	Largemouth Bass	PARES	Pardee Reservoir	343	0.205	
2005	Largemouth Bass	PARES	Pardee Reservoir	350	0.248	
2005	Largemouth Bass	PARES	Pardee Reservoir	392	0.265	
2005	Largemouth Bass	PARES	Pardee Reservoir	380	0.288	
2005	Largemouth Bass	PARES	Pardee Reservoir	322	0.336	
2005	Largemouth Bass	PARES	Pardee Reservoir	382	0.364	
2005	Largemouth Bass	PARES	Pardee Reservoir	368	0.399	
2005	Largemouth Bass	POTSL	Potato Slough	289	0.126	
2005	Largemouth Bass	POTSL	Potato Slough	204	0.303	
2005	Largemouth Bass	POTSL	Potato Slough	321	0.303	
2005	Largemouth Bass	POTSL	Potato Slough	387	0.305	
2005	Largemouth Bass	POTSL	Potato Slough	438	0.314	
2005	Largemouth Bass	POTSL	Potato Slough	220	0.334	
2005	Largemouth Bass	POTSL	Potato Slough	482	0.352	
2005	Largemouth Bass	POTSL	Potato Slough	262	0.355	
2005	Largemouth Bass	POTSL	Potato Slough	360	0.424	
2005	Largemouth Bass	POTSL	Potato Slough	414	0.439	
2005	Largemouth Bass	POTSL	Potato Slough	350	0.451	
2005	Largemouth Bass	POTSL	Potato Slough	529	0.951	
2005	Largemouth Bass	NDPRSL	Prospect Slough	261	0.170	
2005	Largemouth Bass	NDPRSL	Prospect Slough	303	0.185	
2005	Largemouth Bass	NDPRSL	Prospect Slough	355	0.265	
2005	Largemouth Bass	NDPRSL	Prospect Slough	315	0.291	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Largemouth Bass	NDPRSL	Prospect Slough	315	0.332	
2005	Largemouth Bass	NDPRSL	Prospect Slough	368	0.334	
2005	Largemouth Bass	NDPRSL	Prospect Slough	322	0.337	
2005	Largemouth Bass	NDPRSL	Prospect Slough	333	0.403	
2005	Largemouth Bass	SRBUT	Sacramento River at Butte City	176	0.127	
2005	Largemouth Bass	SRBUT	Sacramento River at Butte City	200	0.140	
2005	Largemouth Bass	SRBUT	Sacramento River at Butte City	209	0.158	
2005	Largemouth Bass	SRBUT	Sacramento River at Butte City	296	0.318	
2005	Largemouth Bass	SRBUT	Sacramento River at Butte City	353	0.413	
2005	Largemouth Bass	SRBUT	Sacramento River at Butte City	390	0.577	
2005	Largemouth Bass	SRBUT	Sacramento River at Butte City	380	0.626	
2005	Largemouth Bass	SRBUT	Sacramento River at Butte City	382	0.689	
2005	Largemouth Bass	SRBUT	Sacramento River at Butte City	362	0.733	
2005	Largemouth Bass	SRBUT	Sacramento River at Butte City	320	0.747	
2005	Largemouth Bass	SRCOL	Sacramento River at Colusa	236	0.241	
2005	Largemouth Bass	SRCOL	Sacramento River at Colusa	289	0.292	
2005	Largemouth Bass	SRCOL	Sacramento River at Colusa	346	0.383	
2005	Largemouth Bass	SRCOL	Sacramento River at Colusa	353	0.531	
2005	Largemouth Bass	SRCOL	Sacramento River at Colusa	331	0.577	
2005	Largemouth Bass	SRCOL	Sacramento River at Colusa	349	0.599	
2005	Largemouth Bass	SRCOL	Sacramento River at Colusa	384	0.651	
2005	Largemouth Bass	SRCOL	Sacramento River at Colusa	461	0.754	
2005	Largemouth Bass	SRCOL	Sacramento River at Colusa	424	0.762	
2005	Largemouth Bass	SRCOL	Sacramento River at Colusa	509	0.847	
2005	Largemouth Bass	SACRIO	Sacramento River at Rio Vista	240	0.191	
2005	Largemouth Bass	SACRIO	Sacramento River at Rio Vista	315	0.222	
2005	Largemouth Bass	SACRIO	Sacramento River at Rio Vista	226	0.226	
2005	Largemouth Bass	SACRIO	Sacramento River at Rio Vista	238	0.233	
2005	Largemouth Bass	SACRIO	Sacramento River at Rio Vista	290	0.242	
2005	Largemouth Bass	SACRIO	Sacramento River at Rio Vista	340	0.246	
2005	Largemouth Bass	SACRIO	Sacramento River at Rio Vista	270	0.290	
2005	Largemouth Bass	SACRIO	Sacramento River at Rio Vista	331	0.307	
2005	Largemouth Bass	SACRIO	Sacramento River at Rio Vista	309	0.319	
2005	Largemouth Bass	SACRIO	Sacramento River at Rio Vista	280	0.329	
2005	Largemouth Bass	SACRIO	Sacramento River at Rio Vista	340	0.382	
2005	Largemouth Bass	SACRIO	Sacramento River at Rio Vista	281	0.395	
2005	Largemouth Bass	SACRIO	Sacramento River at Rio Vista	340	0.512	
2005	Largemouth Bass	SACRIO	Sacramento River at Rio Vista	350	0.575	
2005	Largemouth Bass	SACRIO	Sacramento River at Rio Vista	475	0.871	
2005	Largemouth Bass	SACRIO	Sacramento River at Rio Vista	401	1.087	
2005	Largemouth Bass	SACRIO	Sacramento River at Rio Vista	430	1.285	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Largemouth Bass	SRM44	Sacramento River at RM44	180	0.189	
2005	Largemouth Bass	SRM44	Sacramento River at RM44	265	0.203	
2005	Largemouth Bass	SRM44	Sacramento River at RM44	316	0.232	
2005	Largemouth Bass	SRM44	Sacramento River at RM44	293	0.233	
2005	Largemouth Bass	SRM44	Sacramento River at RM44	296	0.290	
2005	Largemouth Bass	SRM44	Sacramento River at RM44	296	0.448	
2005	Largemouth Bass	SRM44	Sacramento River at RM44	415	0.577	
2005	Largemouth Bass	SRVB	Sacramento River at Veterans Bridge	200	0.207	
2005	Largemouth Bass	SRVB	Sacramento River at Veterans Bridge	202	0.224	
2005	Largemouth Bass	SRVB	Sacramento River at Veterans Bridge	281	0.244	
2005	Largemouth Bass	SRVB	Sacramento River at Veterans Bridge	241	0.267	
2005	Largemouth Bass	SRVB	Sacramento River at Veterans Bridge	345	0.410	
2005	Largemouth Bass	SRVB	Sacramento River at Veterans Bridge	302	0.417	
2005	Largemouth Bass	SRVB	Sacramento River at Veterans Bridge	322	0.423	
2005	Largemouth Bass	SRVB	Sacramento River at Veterans Bridge	368	0.652	
2005	Largemouth Bass	SRVB	Sacramento River at Veterans Bridge	382	1.069	
2005	Largemouth Bass	SRVB	Sacramento River at Veterans Bridge	386	1.534	
2005	Largemouth Bass	SSLK	Sacramento Slough at Karnak	279	0.198	
2005	Largemouth Bass	SSLK	Sacramento Slough at Karnak	256	0.201	
2005	Largemouth Bass	SSLK	Sacramento Slough at Karnak	247	0.245	
2005	Largemouth Bass	SSLK	Sacramento Slough at Karnak	352	0.259	
2005	Largemouth Bass	SSLK	Sacramento Slough at Karnak	239	0.279	
2005	Largemouth Bass	SSLK	Sacramento Slough at Karnak	319	0.293	
2005	Largemouth Bass	SSLK	Sacramento Slough at Karnak	363	0.337	
2005	Largemouth Bass	SSLK	Sacramento Slough at Karnak	358	0.392	
2005	Largemouth Bass	SSLK	Sacramento Slough at Karnak	466	0.857	
2005	Largemouth Bass	SSLK	Sacramento Slough at Karnak	484	0.895	
2005	Largemouth Bass	SS165	Salt Slough at Hwy 165	351	0.199	
2005	Largemouth Bass	SS165	Salt Slough at Hwy 165	357	0.199	
2005	Largemouth Bass	SS165	Salt Slough at Hwy 165	261	0.204	
2005	Largemouth Bass	SS165	Salt Slough at Hwy 165	351	0.222	
2005	Largemouth Bass	SS165	Salt Slough at Hwy 165	316	0.235	
2005	Largemouth Bass	SS165	Salt Slough at Hwy 165	317	0.254	
2005	Largemouth Bass	SS165	Salt Slough at Hwy 165	346	0.276	
2005	Largemouth Bass	SS165	Salt Slough at Hwy 165	385	0.280	
2005	Largemouth Bass	SS165	Salt Slough at Hwy 165	315	0.293	
2005	Largemouth Bass	SS165	Salt Slough at Hwy 165	439	0.468	
2005	Largemouth Bass	SJCL	San Joaquin River at Crows Landing	316	0.179	
2005	Largemouth Bass	SJCL	San Joaquin River at Crows Landing	355	0.254	
2005	Largemouth Bass	SJCL	San Joaquin River at Crows Landing	305	0.300	
2005	Largemouth Bass	SJCL	San Joaquin River at Crows Landing	290	0.305	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Largemouth Bass	SJCL	San Joaquin River at Crows Landing	321	0.309	
2005	Largemouth Bass	SJCL	San Joaquin River at Crows Landing	316	0.309	
2005	Largemouth Bass	SJCL	San Joaquin River at Crows Landing	294	0.338	
2005	Largemouth Bass	SJCL	San Joaquin River at Crows Landing	364	0.364	
2005	Largemouth Bass	SJCL	San Joaquin River at Crows Landing	336	0.382	
2005	Largemouth Bass	SJCL	San Joaquin River at Crows Landing	389	0.400	
2005	Largemouth Bass	SJCL	San Joaquin River at Crows Landing	215	0.404	
2005	Largemouth Bass	SJCL	San Joaquin River at Crows Landing	419	0.419	
2005	Largemouth Bass	SJCL	San Joaquin River at Crows Landing	402	0.454	
2005	Largemouth Bass	SJCL	San Joaquin River at Crows Landing	463	0.537	
2005	Largemouth Bass	SJCL	San Joaquin River at Crows Landing	461	0.623	
2005	Largemouth Bass	SJCL	San Joaquin River at Crows Landing	450	0.740	
2005	Largemouth Bass	SJFF	San Joaquin River at Fremont Ford	236	0.167	
2005	Largemouth Bass	SJFF	San Joaquin River at Fremont Ford	324	0.327	
2005	Largemouth Bass	SJFF	San Joaquin River at Fremont Ford	389	0.349	
2005	Largemouth Bass	SJFF	San Joaquin River at Fremont Ford	324	0.359	
2005	Largemouth Bass	SJFF	San Joaquin River at Fremont Ford	373	0.403	
2005	Largemouth Bass	SJFF	San Joaquin River at Fremont Ford	396	0.403	
2005	Largemouth Bass	SJFF	San Joaquin River at Fremont Ford	398	0.462	
2005	Largemouth Bass	SJFF	San Joaquin River at Fremont Ford	439	0.512	
2005	Largemouth Bass	SJFF	San Joaquin River at Fremont Ford	354	0.685	
2005	Largemouth Bass	SJH99	San Joaquin River at Hwy 99	319	0.076	
2005	Largemouth Bass	SJH99	San Joaquin River at Hwy 99	336	0.082	
2005	Largemouth Bass	SJH99	San Joaquin River at Hwy 99	375	0.095	
2005	Largemouth Bass	SJH99	San Joaquin River at Hwy 99	279	0.097	
2005	Largemouth Bass	SJH99	San Joaquin River at Hwy 99	347	0.103	
2005	Largemouth Bass	SJH99	San Joaquin River at Hwy 99	416	0.108	
2005	Largemouth Bass	SJH99	San Joaquin River at Hwy 99	324	0.117	
2005	Largemouth Bass	SJH99	San Joaquin River at Hwy 99	440	0.131	
2005	Largemouth Bass	SJH99	San Joaquin River at Hwy 99	424	0.141	
2005	Largemouth Bass	SJMO	San Joaquin River at Mossdale	298	0.206	
2005	Largemouth Bass	SJMO	San Joaquin River at Mossdale	368	0.237	
2005	Largemouth Bass	SJMO	San Joaquin River at Mossdale	371	0.240	
2005	Largemouth Bass	SJMO	San Joaquin River at Mossdale	369	0.258	
2005	Largemouth Bass	SJMO	San Joaquin River at Mossdale	269	0.261	
2005	Largemouth Bass	SJMO	San Joaquin River at Mossdale	466	0.296	
2005	Largemouth Bass	SJMO	San Joaquin River at Mossdale	436	0.355	
2005	Largemouth Bass	SJMO	San Joaquin River at Mossdale	319	0.381	
2005	Largemouth Bass	SJMO	San Joaquin River at Mossdale	476	0.498	
2005	Largemouth Bass	SJPAT	San Joaquin River at Patterson	271	0.216	
2005	Largemouth Bass	SJPAT	San Joaquin River at Patterson	255	0.258	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Largemouth Bass	SJPAT	San Joaquin River at Patterson	321	0.272	
2005	Largemouth Bass	SJPAT	San Joaquin River at Patterson	334	0.327	
2005	Largemouth Bass	SJPAT	San Joaquin River at Patterson	390	0.339	
2005	Largemouth Bass	SJPAT	San Joaquin River at Patterson	441	0.394	
2005	Largemouth Bass	SJPAT	San Joaquin River at Patterson	322	0.415	
2005	Largemouth Bass	SJPAT	San Joaquin River at Patterson	462	0.417	
2005	Largemouth Bass	SJPAT	San Joaquin River at Patterson	416	0.430	
2005	Largemouth Bass	SJPAT	San Joaquin River at Patterson	531	0.783	
2005	Largemouth Bass	SJVER	San Joaquin River at Vernalis	279	0.194	
2005	Largemouth Bass	SJVER	San Joaquin River at Vernalis	200	0.246	
2005	Largemouth Bass	SJVER	San Joaquin River at Vernalis	239	0.323	
2005	Largemouth Bass	SJVER	San Joaquin River at Vernalis	346	0.330	
2005	Largemouth Bass	SJVER	San Joaquin River at Vernalis	360	0.349	
2005	Largemouth Bass	SJVER	San Joaquin River at Vernalis	299	0.373	
2005	Largemouth Bass	SJVER	San Joaquin River at Vernalis	464	0.403	
2005	Largemouth Bass	SJVER	San Joaquin River at Vernalis	460	0.472	
2005	Largemouth Bass	SJVER	San Joaquin River at Vernalis	370	0.480	
2005	Largemouth Bass	SJVER	San Joaquin River at Vernalis	350	0.547	
2005	Largemouth Bass	SJVER	San Joaquin River at Vernalis	421	0.555	
2005	Largemouth Bass	SJVER	San Joaquin River at Vernalis	499	0.582	
2005	Largemouth Bass	SMSL	Sand Mound Slough	257	0.116	
2005	Largemouth Bass	SMSL	Sand Mound Slough	286	0.121	
2005	Largemouth Bass	SMSL	Sand Mound Slough	368	0.130	
2005	Largemouth Bass	SMSL	Sand Mound Slough	328	0.161	
2005	Largemouth Bass	SMSL	Sand Mound Slough	338	0.200	
2005	Largemouth Bass	SMSL	Sand Mound Slough	373	0.201	
2005	Largemouth Bass	SMSL	Sand Mound Slough	329	0.274	
2005	Largemouth Bass	SMSL	Sand Mound Slough	406	0.326	
2005	Largemouth Bass	SMSL	Sand Mound Slough	400	0.419	
2005	Largemouth Bass	SMCNL	Smith Canal	246	0.056	
2005	Largemouth Bass	SMCNL	Smith Canal	251	0.066	
2005	Largemouth Bass	SMCNL	Smith Canal	260	0.080	
2005	Largemouth Bass	SMCNL	Smith Canal	257	0.112	
2005	Largemouth Bass	SMCNL	Smith Canal	331	0.117	
2005	Largemouth Bass	SMCNL	Smith Canal	426	0.173	
2005	Largemouth Bass	SMCNL	Smith Canal	494	0.186	
2005	Largemouth Bass	SMCNL	Smith Canal	429	0.214	
2005	Largemouth Bass	SMCNL	Smith Canal	385	0.239	
2005	Largemouth Bass	SMCNL	Smith Canal	579	0.766	
2005	Largemouth Bass	SRCSP	Stanislaus River at Caswell State Park	273	0.205	
2005	Largemouth Bass	SRCSP	Stanislaus River at Caswell State Park	269	0.206	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Largemouth Bass	SRCSP	Stanislaus River at Caswell State Park	301	0.228	
2005	Largemouth Bass	SRCSP	Stanislaus River at Caswell State Park	471	0.328	
2005	Largemouth Bass	SRCSP	Stanislaus River at Caswell State Park	304	0.338	
2005	Largemouth Bass	SRCSP	Stanislaus River at Caswell State Park	275	0.339	
2005	Largemouth Bass	SRCSP	Stanislaus River at Caswell State Park	431	0.429	
2005	Largemouth Bass	SRCSP	Stanislaus River at Caswell State Park	436	0.695	
2005	Largemouth Bass	SRCSP	Stanislaus River at Caswell State Park	387	0.775	
2005	Largemouth Bass	SRCSP	Stanislaus River at Caswell State Park	426	1.453	
2005	Largemouth Bass	TYSL	Taylor Slough	239	0.096	
2005	Largemouth Bass	TYSL	Taylor Slough	296	0.118	
2005	Largemouth Bass	TYSL	Taylor Slough	308	0.133	
2005	Largemouth Bass	TYSL	Taylor Slough	290	0.154	
2005	Largemouth Bass	TYSL	Taylor Slough	272	0.160	
2005	Largemouth Bass	TYSL	Taylor Slough	202	0.166	
2005	Largemouth Bass	TYSL	Taylor Slough	333	0.168	
2005	Largemouth Bass	TYSL	Taylor Slough	263	0.189	
2005	Largemouth Bass	TYSL	Taylor Slough	400	0.189	
2005	Largemouth Bass	TYSL	Taylor Slough	375	0.191	
2005	Largemouth Bass	TYSL	Taylor Slough	406	0.207	
2005	Largemouth Bass	TYSL	Taylor Slough	408	0.253	
2005	Largemouth Bass	TYSL	Taylor Slough	356	0.392	
2005	Largemouth Bass	TUO3SHI	Tuolumne River at Shiloh Rd.	239	0.159	
2005	Largemouth Bass	TUO3SHI	Tuolumne River at Shiloh Rd.	224	0.191	
2005	Largemouth Bass	TUO3SHI	Tuolumne River at Shiloh Rd.	259	0.322	
2005	Largemouth Bass	TUO3SHI	Tuolumne River at Shiloh Rd.	344	0.333	
2005	Largemouth Bass	TUO3SHI	Tuolumne River at Shiloh Rd.	297	0.356	
2005	Largemouth Bass	TUO3SHI	Tuolumne River at Shiloh Rd.	389	0.380	
2005	Largemouth Bass	TUO3SHI	Tuolumne River at Shiloh Rd.	446	0.385	
2005	Largemouth Bass	TUO3SHI	Tuolumne River at Shiloh Rd.	349	0.418	
2005	Largemouth Bass	TUO3SHI	Tuolumne River at Shiloh Rd.	411	0.728	
2005	Largemouth Bass	TUO3SHI	Tuolumne River at Shiloh Rd.	499	0.916	
2005	Largemouth Bass	TUO3SHI	Tuolumne River at Shiloh Rd.	454	0.979	
2005	Largemouth Bass	TUO3SHI	Tuolumne River at Shiloh Rd.	321	1.073	
2005	Largemouth Bass	WDCUT	Werner Dredger Cut	259	0.107	
2005	Largemouth Bass	WDCUT	Werner Dredger Cut	270	0.134	
2005	Largemouth Bass	WDCUT	Werner Dredger Cut	318	0.137	
2005	Largemouth Bass	WDCUT	Werner Dredger Cut	257	0.140	
2005	Largemouth Bass	WDCUT	Werner Dredger Cut	327	0.153	
2005	Largemouth Bass	WDCUT	Werner Dredger Cut	265	0.157	
2005	Largemouth Bass	WDCUT	Werner Dredger Cut	289	0.172	
2005	Largemouth Bass	WDCUT	Werner Dredger Cut	329	0.188	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Largemouth Bass	WDCUT	Werner Dredger Cut	450	0.303	
2005	Largemouth Bass	WHSL	Whiskey Slough	293	0.105	
2005	Largemouth Bass	WHSL	Whiskey Slough	304	0.107	
2005	Largemouth Bass	WHSL	Whiskey Slough	306	0.109	
2005	Largemouth Bass	WHSL	Whiskey Slough	420	0.111	
2005	Largemouth Bass	WHSL	Whiskey Slough	269	0.112	
2005	Largemouth Bass	WHSL	Whiskey Slough	252	0.130	
2005	Largemouth Bass	WHSL	Whiskey Slough	377	0.136	
2005	Largemouth Bass	WHSL	Whiskey Slough	431	0.168	
2005	Largemouth Bass	WHSL	Whiskey Slough	327	0.181	
2005	Punkinseed	JKLK	Jenkinson Lake	135	0.057	
2005	Punkinseed	JKLK	Jenkinson Lake	154	0.059	
2005	Punkinseed	JKLK	Jenkinson Lake	161	0.060	
2005	Punkinseed	JKLK	Jenkinson Lake	176	0.064	
2005	Rainbow Trout	AMHY	American Hatchery	320	0.019	
2005	Rainbow Trout	AMHY	American Hatchery	285	0.019	
2005	Rainbow Trout	AMHY	American Hatchery	280	0.020	
2005	Rainbow Trout	AMHY	American Hatchery	290	0.021	
2005	Rainbow Trout	AMHY	American Hatchery	270	0.021	
2005	Rainbow Trout	AMHY	American Hatchery	309	0.021	
2005	Rainbow Trout	AMHY	American Hatchery	300	0.021	
2005	Rainbow Trout	AMHY	American Hatchery	300	0.021	
2005	Rainbow Trout	AMHY	American Hatchery	280	0.023	
2005	Rainbow Trout	AMHY	American Hatchery	300	0.023	
2005	Rainbow Trout	AMHY	American Hatchery	270	0.024	
2005	Rainbow Trout	CCMOU	Clear Creek	188	0.013	
2005	Rainbow Trout	CCMOU	Clear Creek	272	0.022	
2005	Rainbow Trout	CCMOU	Clear Creek	166	0.028	
2005	Rainbow Trout	CCMOU	Clear Creek	348	0.037	
2005	Rainbow Trout	CCMOU	Clear Creek	232	0.043	
2005	Rainbow Trout	CCMOU	Clear Creek	396	0.045	
2005	Rainbow Trout	CCMOU	Clear Creek	501	0.049	
2005	Rainbow Trout	CCMOU	Clear Creek	377	0.053	
2005	Rainbow Trout	CCMOU	Clear Creek	385	0.075	
2005	Rainbow Trout	CCMOU	Clear Creek	368	0.111	
2005	Rainbow Trout	DAHY	Darrah Springs Hatchery	283	0.000	Non-detect. Value converted to zero from negative MDL.
2005	Rainbow Trout	DAHY	Darrah Springs Hatchery	320	0.000	Non-detect. Value converted to zero from negative MDL.
2005	Rainbow Trout	DAHY	Darrah Springs Hatchery	275	0.013	
2005	Rainbow Trout	DAHY	Darrah Springs Hatchery	345	0.013	
2005	Rainbow Trout	DAHY	Darrah Springs Hatchery	338	0.013	
2005	Rainbow Trout	DAHY	Darrah Springs Hatchery	320	0.014	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Rainbow Trout	DAHY	Darrah Springs Hatchery	332	0.014	
2005	Rainbow Trout	DAHY	Darrah Springs Hatchery	330	0.015	
2005	Rainbow Trout	DAHY	Darrah Springs Hatchery	387	0.016	
2005	Rainbow Trout	DAHY	Darrah Springs Hatchery	268	0.020	
2006	Rainbow Trout	JKLK	Jenkinson Lake	316	0.031	
2006	Rainbow Trout	JKLK	Jenkinson Lake	326	0.032	
2006	Rainbow Trout	JKLK	Jenkinson Lake	299	0.032	
2006	Rainbow Trout	JKLK	Jenkinson Lake	329	0.033	
2006	Rainbow Trout	JKLK	Jenkinson Lake	376	0.034	
2006	Rainbow Trout	JKLK	Jenkinson Lake	261	0.034	
2006	Rainbow Trout	JKLK	Jenkinson Lake	274	0.036	
2006	Rainbow Trout	JKLK	Jenkinson Lake	283	0.036	
2006	Rainbow Trout	JKLK	Jenkinson Lake	307	0.037	
2006	Rainbow Trout	JKLK	Jenkinson Lake	329	0.037	
2006	Rainbow Trout	JKLK	Jenkinson Lake	269	0.040	
2005	Rainbow Trout	MCHY	Moccasin Hatchery	276	0.020	
2005	Rainbow Trout	MCHY	Moccasin Hatchery	292	0.021	
2005	Rainbow Trout	MCHY	Moccasin Hatchery	321	0.021	
2005	Rainbow Trout	MCHY	Moccasin Hatchery	292	0.021	
2005	Rainbow Trout	MCHY	Moccasin Hatchery	326	0.022	
2005	Rainbow Trout	MCHY	Moccasin Hatchery	256	0.022	
2005	Rainbow Trout	MCHY	Moccasin Hatchery	269	0.023	
2005	Rainbow Trout	MCHY	Moccasin Hatchery	314	0.026	
2005	Rainbow Trout	MCHY	Moccasin Hatchery	273	0.027	
2005	Rainbow Trout	MCHY	Moccasin Hatchery	263	0.027	
2005	Rainbow Trout	MRLL	Mokelumne River at Lodi Lake	321	0.033	
2005	Rainbow Trout	MRLL	Mokelumne River at Lodi Lake	312	0.033	
2005	Rainbow Trout	MRLL	Mokelumne River at Lodi Lake	311	0.036	
2005	Rainbow Trout	MRLL	Mokelumne River at Lodi Lake	295	0.038	
2005	Rainbow Trout	MRLL	Mokelumne River at Lodi Lake	336	0.039	
2005	Rainbow Trout	MRLL	Mokelumne River at Lodi Lake	321	0.041	
2005	Rainbow Trout	MRLL	Mokelumne River at Lodi Lake	341	0.042	
2005	Rainbow Trout	MRLL	Mokelumne River at Lodi Lake	287	0.043	
2005	Rainbow Trout	MRLL	Mokelumne River at Lodi Lake	332	0.048	
2005	Rainbow Trout	MSHY	Mount Shasta Hatchery	410	0.019	
2005	Rainbow Trout	MSHY	Mount Shasta Hatchery	505	0.020	
2005	Rainbow Trout	MSHY	Mount Shasta Hatchery	380	0.021	
2005	Rainbow Trout	MSHY	Mount Shasta Hatchery	391	0.022	
2005	Rainbow Trout	MSHY	Mount Shasta Hatchery	380	0.023	
2005	Rainbow Trout	MSHY	Mount Shasta Hatchery	430	0.023	
2005	Rainbow Trout	MSHY	Mount Shasta Hatchery	450	0.025	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Rainbow Trout	MSHY	Mount Shasta Hatchery	395	0.025	
2005	Rainbow Trout	MSHY	Mount Shasta Hatchery	420	0.026	
2005	Rainbow Trout	MSHY	Mount Shasta Hatchery	410	0.028	
2005	Rainbow Trout	SRBND	Sacramento River at Bend Bridge	160	0.011	
2005	Rainbow Trout	SRBND	Sacramento River at Bend Bridge	192	0.013	
2005	Rainbow Trout	SRBND	Sacramento River at Bend Bridge	255	0.014	
2005	Rainbow Trout	SRBND	Sacramento River at Bend Bridge	178	0.015	
2005	Rainbow Trout	SRBND	Sacramento River at Bend Bridge	200	0.018	
2005	Rainbow Trout	SRBND	Sacramento River at Bend Bridge	180	0.020	
2005	Rainbow Trout	SRBND	Sacramento River at Bend Bridge	333	0.024	
2005	Rainbow Trout	SRBND	Sacramento River at Bend Bridge	302	0.027	
2005	Rainbow Trout	SRBND	Sacramento River at Bend Bridge	382	0.031	
2005	Rainbow Trout	SRBND	Sacramento River at Bend Bridge	369	0.037	
2005	Rainbow Trout	SRBND	Sacramento River at Bend Bridge	391	0.049	
2005	Rainbow Trout	SRBND	Sacramento River at Bend Bridge	350	0.066	
2005	Rainbow Trout	SACHC	Sacramento River at Hamilton City	255	0.014	
2005	Rainbow Trout	SACHC	Sacramento River at Hamilton City	351	0.039	
2005	Rainbow Trout	SJHY	San Joaquin Hatchery	295	0.018	
2005	Rainbow Trout	SJHY	San Joaquin Hatchery	290	0.020	
2005	Rainbow Trout	SJHY	San Joaquin Hatchery	265	0.020	
2005	Rainbow Trout	SJHY	San Joaquin Hatchery	260	0.022	
2005	Rainbow Trout	SJHY	San Joaquin Hatchery	274	0.022	
2005	Rainbow Trout	SJHY	San Joaquin Hatchery	290	0.022	
2005	Rainbow Trout	SJHY	San Joaquin Hatchery	300	0.023	
2005	Rainbow Trout	SJHY	San Joaquin Hatchery	263	0.023	
2005	Rainbow Trout	SJHY	San Joaquin Hatchery	285	0.024	
2005	Rainbow Trout	SJHY	San Joaquin Hatchery	282	0.026	
2005	Rainbow Trout	YRVMY	Yuba River at Marysville	179	0.076	
2005	Rainbow Trout	YRVMY	Yuba River at Marysville	296	0.086	
2005	Rainbow Trout	YRVMY	Yuba River at Marysville	305	0.102	
2005	Redear Sunfish	ARNIM	American River at Nimbus Dam	154	0.055	
2005	Redear Sunfish	ARNIM	American River at Nimbus Dam	168	0.056	
2005	Redear Sunfish	ARNIM	American River at Nimbus Dam	159	0.101	
2005	Redear Sunfish	BROO	Bear River at Rio Oso	177	0.071	
2005	Redear Sunfish	BROO	Bear River at Rio Oso	168	0.074	
2005	Redear Sunfish	BROO	Bear River at Rio Oso	168	0.077	
2005	Redear Sunfish	BROO	Bear River at Rio Oso	167	0.093	
2005	Redear Sunfish	BROO	Bear River at Rio Oso	185	0.099	
2005	Redear Sunfish	BROO	Bear River at Rio Oso	180	0.101	
2005	Redear Sunfish	BROO	Bear River at Rio Oso	200	0.125	
2005	Redear Sunfish	BROO	Bear River at Rio Oso	174	0.136	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Redear Sunfish	BROO	Bear River at Rio Oso	193	0.196	
2005	Redear Sunfish	BROO	Bear River at Rio Oso	177	0.422	
2005	Redear Sunfish	BVSL	Beaver Slough	172	0.032	
2005	Redear Sunfish	BVSL	Beaver Slough	179	0.041	
2005	Redear Sunfish	BVSL	Beaver Slough	169	0.096	
2005	Redear Sunfish	BVSL	Beaver Slough	183	0.110	
2005	Redear Sunfish	BVSL	Beaver Slough	184	0.169	
2005	Redear Sunfish	BIGB	Big Break	203	0.057	
2005	Redear Sunfish	BIGB	Big Break	185	0.060	
2005	Redear Sunfish	BIGB	Big Break	225	0.071	
2005	Redear Sunfish	BIGB	Big Break	189	0.080	
2005	Redear Sunfish	BIGB	Big Break	223	0.089	
2005	Redear Sunfish	CARV	Calaveras River	206	0.033	
2005	Redear Sunfish	CARV	Calaveras River	175	0.036	
2005	Redear Sunfish	CARV	Calaveras River	173	0.047	
2005	Redear Sunfish	CARV	Calaveras River	203	0.066	
2005	Redear Sunfish	CARV	Calaveras River	199	0.093	
2005	Redear Sunfish	COS	Cosumnes River	155	0.059	
2005	Redear Sunfish	COS	Cosumnes River	168	0.060	
2005	Redear Sunfish	COS	Cosumnes River	159	0.223	
2005	Redear Sunfish	COS	Cosumnes River	180	0.258	
2005	Redear Sunfish	COS	Cosumnes River	188	0.422	
2005	Redear Sunfish	DBAY	Discovery Bay	217	0.069	
2005	Redear Sunfish	DBAY	Discovery Bay	219	0.070	
2005	Redear Sunfish	DBAY	Discovery Bay	243	0.091	
2005	Redear Sunfish	DBAY	Discovery Bay	245	0.108	
2005	Redear Sunfish	DBAY	Discovery Bay	219	0.162	
2005	Redear Sunfish	FRNI	Feather River at Nicolaus	173	0.090	
2005	Redear Sunfish	FRNI	Feather River at Nicolaus	187	0.115	
2005	Redear Sunfish	FRNI	Feather River at Nicolaus	170	0.120	
2005	Redear Sunfish	FRNI	Feather River at Nicolaus	218	0.128	
2005	Redear Sunfish	FRNI	Feather River at Nicolaus	186	0.144	
2005	Redear Sunfish	FRNI	Feather River at Nicolaus	185	0.153	
2005	Redear Sunfish	FRNI	Feather River at Nicolaus	190	0.217	
2005	Redear Sunfish	FRNI	Feather River at Nicolaus	184	0.233	
2005	Redear Sunfish	FRNI	Feather River at Nicolaus	171	0.269	
2005	Redear Sunfish	FRNI	Feather River at Nicolaus	222	0.519	
2005	Redear Sunfish	FRTR	Franks Tract	154	0.024	
2005	Redear Sunfish	FRTR	Franks Tract	164	0.042	
2005	Redear Sunfish	FRTR	Franks Tract	165	0.047	
2005	Redear Sunfish	FRTR	Franks Tract	185	0.080	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Redear Sunfish	FRTR	Franks Tract	200	0.111	
2005	Redear Sunfish	HCUT	Honker Cut	140	0.023	
2005	Redear Sunfish	HCUT	Honker Cut	139	0.027	
2005	Redear Sunfish	HCUT	Honker Cut	149	0.034	
2005	Redear Sunfish	HCUT	Honker Cut	146	0.035	
2005	Redear Sunfish	HCUT	Honker Cut	169	0.053	
2005	Redear Sunfish	ITSL	Italian Slough	186	0.061	
2005	Redear Sunfish	ITSL	Italian Slough	200	0.067	
2005	Redear Sunfish	ITSL	Italian Slough	186	0.069	
2005	Redear Sunfish	ITSL	Italian Slough	185	0.107	
2005	Redear Sunfish	ITSL	Italian Slough	219	0.379	
2006	Redear Sunfish	JKLK	Jenkinson Lake	151	0.043	
2006	Redear Sunfish	JKLK	Jenkinson Lake	215	0.044	
2006	Redear Sunfish	JKLK	Jenkinson Lake	229	0.059	
2005	Redear Sunfish	JKLK	Jenkinson Lake	282	0.091	
2006	Redear Sunfish	JKLK	Jenkinson Lake	236	0.092	
2005	Redear Sunfish	LOSL	Lost Slough	182	0.140	
2005	Redear Sunfish	LOSL	Lost Slough	175	0.164	
2005	Redear Sunfish	LOSL	Lost Slough	176	0.166	
2005	Redear Sunfish	LOSL	Lost Slough	189	0.413	
2005	Redear Sunfish	LOSL	Lost Slough	178	0.436	
2005	Redear Sunfish	MMSL	Mendota Pool/Mendota Slough	189	0.023	
2005	Redear Sunfish	MMSL	Mendota Pool/Mendota Slough	194	0.067	
2005	Redear Sunfish	MMSL	Mendota Pool/Mendota Slough	197	0.084	
2005	Redear Sunfish	MMSL	Mendota Pool/Mendota Slough	193	0.090	
2005	Redear Sunfish	MMSL	Mendota Pool/Mendota Slough	231	0.094	
2005	Redear Sunfish	MMSL	Mendota Pool/Mendota Slough	214	0.149	
2005	Redear Sunfish	P	Merced River at Hatfield State Park	174	0.062	
2005	Redear Sunfish	P	Merced River at Hatfield State Park	142	0.071	
2005	Redear Sunfish	P	Merced River at Hatfield State Park	168	0.081	
2005	Redear Sunfish	P	Merced River at Hatfield State Park	144	0.104	
2005	Redear Sunfish	P	Merced River at Hatfield State Park	156	0.116	
2005	Redear Sunfish	MRIND	Middle River at Bullfrog	219	0.102	
2005	Redear Sunfish	MRIND	Middle River at Bullfrog	230	0.105	
2005	Redear Sunfish	MRIND	Middle River at Bullfrog	220	0.117	
2005	Redear Sunfish	MRIND	Middle River at Bullfrog	225	0.161	
2005	Redear Sunfish	MRIND	Middle River at Bullfrog	230	0.186	
2005	Redear Sunfish	MRHW4	Middle River at Hwy 4	184	0.065	
2005	Redear Sunfish	MRHW4	Middle River at Hwy 4	203	0.071	
2005	Redear Sunfish	MRHW4	Middle River at Hwy 4	181	0.094	
2005	Redear Sunfish	MRHW4	Middle River at Hwy 4	215	0.128	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Redear Sunfish	MRHW4	Middle River at Hwy 4	209	0.153	
2005	Redear Sunfish	MRMIS	Middle River at Mildred Island	152	0.025	
2005	Redear Sunfish	MRMIS	Middle River at Mildred Island	156	0.030	
2005	Redear Sunfish	MRMIS	Middle River at Mildred Island	195	0.051	
2005	Redear Sunfish	MRMIS	Middle River at Mildred Island	178	0.064	
2005	Redear Sunfish	MRMIS	Middle River at Mildred Island	190	0.071	
2005	Redear Sunfish	MRMIS	Middle River at Mildred Island	200	0.091	
2006	Redear Sunfish	NHRES	New Hogan Reservoir	248	0.128	
2006	Redear Sunfish	NHRES	New Hogan Reservoir	256	0.138	
2006	Redear Sunfish	NHRES	New Hogan Reservoir	242	0.163	
2006	Redear Sunfish	NHRES	New Hogan Reservoir	236	0.230	
2005	Redear Sunfish	ORTB	Old River at Tracy Blvd.	204	0.032	
2005	Redear Sunfish	ORTB	Old River at Tracy Blvd.	193	0.037	
2005	Redear Sunfish	ORTB	Old River at Tracy Blvd.	181	0.040	
2005	Redear Sunfish	ORTB	Old River at Tracy Blvd.	176	0.041	
2005	Redear Sunfish	ORTB	Old River at Tracy Blvd.	179	0.045	
2005	Redear Sunfish	PCUT	Paradise Cut	211	0.044	
2005	Redear Sunfish	PCUT	Paradise Cut	221	0.046	
2005	Redear Sunfish	PCUT	Paradise Cut	209	0.046	
2005	Redear Sunfish	PCUT	Paradise Cut	202	0.046	
2005	Redear Sunfish	PCUT	Paradise Cut	266	0.137	
2005	Redear Sunfish	PARES	Pardee Reservoir	141	0.035	
2005	Redear Sunfish	PARES	Pardee Reservoir	139	0.038	
2005	Redear Sunfish	PARES	Pardee Reservoir	126	0.038	
2005	Redear Sunfish	PARES	Pardee Reservoir	125	0.055	
2005	Redear Sunfish	PARES	Pardee Reservoir	142	0.068	
2005	Redear Sunfish	PARES	Pardee Reservoir	135	0.078	
2005	Redear Sunfish	PARES	Pardee Reservoir	135	0.083	
2005	Redear Sunfish	PARES	Pardee Reservoir	134	0.085	
2005	Redear Sunfish	PARES	Pardee Reservoir	129	0.100	
2005	Redear Sunfish	PARES	Pardee Reservoir	137	0.135	
2005	Redear Sunfish	POTSL	Potato Slough	176	0.031	
2005	Redear Sunfish	POTSL	Potato Slough	176	0.038	
2005	Redear Sunfish	POTSL	Potato Slough	174	0.042	
2005	Redear Sunfish	POTSL	Potato Slough	154	0.043	
2005	Redear Sunfish	POTSL	Potato Slough	155	0.053	
2005	Redear Sunfish	NDPRSL	Prospect Slough	215	0.208	
2005	Redear Sunfish	NDPRSL	Prospect Slough	225	0.253	
2005	Redear Sunfish	SRCOL	Sacramento River at Colusa	201	0.085	
2005	Redear Sunfish	SRCOL	Sacramento River at Colusa	146	0.104	
2005	Redear Sunfish	SRCOL	Sacramento River at Colusa	156	0.106	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Redear Sunfish	SRCOL	Sacramento River at Colusa	182	0.113	
2005	Redear Sunfish	SRCOL	Sacramento River at Colusa	181	0.186	
2005	Redear Sunfish	SRCOL	Sacramento River at Colusa	184	0.204	
2005	Redear Sunfish	SRCOL	Sacramento River at Colusa	198	0.211	
2005	Redear Sunfish	SRGR	Sacramento River at Grimes	161	0.040	
2005	Redear Sunfish	SRGR	Sacramento River at Grimes	196	0.057	
2005	Redear Sunfish	SRGR	Sacramento River at Grimes	162	0.085	
2005	Redear Sunfish	SRGR	Sacramento River at Grimes	166	0.100	
2005	Redear Sunfish	SRGR	Sacramento River at Grimes	209	0.204	
2005	Redear Sunfish	SRGR	Sacramento River at Grimes	225	0.223	
2005	Redear Sunfish	SACRIO	Sacramento River at Rio Vista	172	0.058	
2005	Redear Sunfish	SACRIO	Sacramento River at Rio Vista	162	0.079	
2005	Redear Sunfish	SACRIO	Sacramento River at Rio Vista	172	0.085	
2005	Redear Sunfish	SACRIO	Sacramento River at Rio Vista	214	0.088	
2005	Redear Sunfish	SACRIO	Sacramento River at Rio Vista	180	0.095	
2005	Redear Sunfish	SACRIO	Sacramento River at Rio Vista	214	0.098	
2005	Redear Sunfish	SACRIO	Sacramento River at Rio Vista	194	0.102	
2005	Redear Sunfish	SACRIO	Sacramento River at Rio Vista	204	0.113	
2005	Redear Sunfish	SACRIO	Sacramento River at Rio Vista	252	0.153	
2005	Redear Sunfish	SACRIO	Sacramento River at Rio Vista	220	0.372	
2005	Redear Sunfish	SRM44	Sacramento River at RM44	172	0.055	
2005	Redear Sunfish	SRM44	Sacramento River at RM44	179	0.058	
2005	Redear Sunfish	SRM44	Sacramento River at RM44	191	0.072	
2005	Redear Sunfish	SRM44	Sacramento River at RM44	186	0.104	
2005	Redear Sunfish	SRM44	Sacramento River at RM44	210	0.128	
2005	Redear Sunfish	SRVB	Sacramento River at Veterans Bridge	171	0.042	
2005	Redear Sunfish	SRVB	Sacramento River at Veterans Bridge	167	0.042	
2005	Redear Sunfish	SRVB	Sacramento River at Veterans Bridge	210	0.061	
2005	Redear Sunfish	SRVB	Sacramento River at Veterans Bridge	187	0.073	
2005	Redear Sunfish	SRVB	Sacramento River at Veterans Bridge	175	0.077	
2005	Redear Sunfish	SS165	Salt Slough at Hwy 165	133	0.063	
2005	Redear Sunfish	SS165	Salt Slough at Hwy 165	168	0.088	
2005	Redear Sunfish	SS165	Salt Slough at Hwy 165	173	0.113	
2005	Redear Sunfish	SJCL	San Joaquin River at Crows Landing	172	0.056	
2005	Redear Sunfish	SJCL	San Joaquin River at Crows Landing	155	0.056	
2005	Redear Sunfish	SJCL	San Joaquin River at Crows Landing	115	0.062	
2005	Redear Sunfish	SJCL	San Joaquin River at Crows Landing	186	0.102	
2005	Redear Sunfish	SJCL	San Joaquin River at Crows Landing	196	0.110	
2005	Redear Sunfish	SJCL	San Joaquin River at Crows Landing	200	0.168	
2005	Redear Sunfish	SJH99	San Joaquin River at Hwy 99	144	0.034	
2005	Redear Sunfish	SJH99	San Joaquin River at Hwy 99	165	0.039	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Redear Sunfish	SJH99	San Joaquin River at Hwy 99	127	0.039	
2005	Redear Sunfish	SJH99	San Joaquin River at Hwy 99	155	0.044	
2005	Redear Sunfish	SJH99	San Joaquin River at Hwy 99	129	0.057	
2005	Redear Sunfish	SJLPK	San Joaquin River at Laird Park	182	0.063	
2005	Redear Sunfish	SJLPK	San Joaquin River at Laird Park	188	0.065	
2005	Redear Sunfish	SJLPK	San Joaquin River at Laird Park	196	0.069	
2005	Redear Sunfish	SJLPK	San Joaquin River at Laird Park	211	0.117	
2005	Redear Sunfish	SJLPK	San Joaquin River at Laird Park	189	0.129	
2005	Redear Sunfish	SJMO	San Joaquin River at Mossdale	219	0.061	
2005	Redear Sunfish	SJMO	San Joaquin River at Mossdale	232	0.110	
2005	Redear Sunfish	SJMO	San Joaquin River at Mossdale	234	0.121	
2005	Redear Sunfish	SJMO	San Joaquin River at Mossdale	236	0.130	
2005	Redear Sunfish	SJMO	San Joaquin River at Mossdale	224	0.165	
2005	Redear Sunfish	SJPAT	San Joaquin River at Patterson	164	0.064	
2005	Redear Sunfish	SJPAT	San Joaquin River at Patterson	184	0.067	
2005	Redear Sunfish	SJPAT	San Joaquin River at Patterson	182	0.073	
2005	Redear Sunfish	SJPAT	San Joaquin River at Patterson	176	0.081	
2005	Redear Sunfish	SJPAT	San Joaquin River at Patterson	219	0.096	
2005	Redear Sunfish	SJVER	San Joaquin River at Vernalis	182	0.047	
2005	Redear Sunfish	SJVER	San Joaquin River at Vernalis	197	0.119	
2005	Redear Sunfish	SJVER	San Joaquin River at Vernalis	163	0.129	
2005	Redear Sunfish	SJVER	San Joaquin River at Vernalis	211	0.147	
2005	Redear Sunfish	SJVER	San Joaquin River at Vernalis	200	0.162	
2005	Redear Sunfish	SMSL	Sand Mound Slough	173	0.030	
2005	Redear Sunfish	SMSL	Sand Mound Slough	186	0.045	
2005	Redear Sunfish	SMSL	Sand Mound Slough	170	0.048	
2005	Redear Sunfish	SMSL	Sand Mound Slough	166	0.049	
2005	Redear Sunfish	SMSL	Sand Mound Slough	180	0.061	
2005	Redear Sunfish	SMCNL	Smith Canal	190	0.035	
2005	Redear Sunfish	SMCNL	Smith Canal	192	0.036	
2005	Redear Sunfish	SMCNL	Smith Canal	182	0.051	
2005	Redear Sunfish	SMCNL	Smith Canal	185	0.053	
2005	Redear Sunfish	SMCNL	Smith Canal	191	0.068	
2005	Redear Sunfish	SRCSP	Stanislaus River at Caswell State Park	170	0.060	
2005	Redear Sunfish	SRCSP	Stanislaus River at Caswell State Park	134	0.061	
2005	Redear Sunfish	SRCSP	Stanislaus River at Caswell State Park	114	0.097	
2005	Redear Sunfish	SRCSP	Stanislaus River at Caswell State Park	124	0.129	
2005	Redear Sunfish	SRCSP	Stanislaus River at Caswell State Park	202	0.143	
2005	Redear Sunfish	TYSL	Taylor Slough	161	0.027	
2005	Redear Sunfish	TYSL	Taylor Slough	184	0.027	
2005	Redear Sunfish	TYSL	Taylor Slough	200	0.037	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Redear Sunfish	TYSL	Taylor Slough	165	0.039	
2005	Redear Sunfish	TYSL	Taylor Slough	191	0.047	
2005	Redear Sunfish	WDCUT	Werner Dredger Cut	168	0.039	
2005	Redear Sunfish	WDCUT	Werner Dredger Cut	204	0.068	
2005	Redear Sunfish	WDCUT	Werner Dredger Cut	198	0.081	
2005	Redear Sunfish	WDCUT	Werner Dredger Cut	193	0.102	
2005	Redear Sunfish	WDCUT	Werner Dredger Cut	197	0.110	
2005	Redear Sunfish	WHSL	Whiskey Slough	130	0.000	Non-detect. Value converted to zero from negative MDL.
2005	Redear Sunfish	WHSL	Whiskey Slough	131	0.000	Non-detect. Value converted to zero from negative MDL.
2005	Redear Sunfish	WHSL	Whiskey Slough	148	0.022	
2005	Redear Sunfish	WHSL	Whiskey Slough	193	0.027	
2005	Tule Perch	FRTR	Franks Tract	173	0.072	
2005	Tule Perch	FRTR	Franks Tract	166	0.076	
2005	Tule Perch	FRTR	Franks Tract	169	0.093	
2005	Tule Perch	FRTR	Franks Tract	185	0.119	
2005	Tule Perch	NDPRSL	Prospect Slough	140	0.180	
2005	Tule Perch	NDPRSL	Prospect Slough	130	0.196	
2005	Tule Perch	NDPRSL	Prospect Slough	130	0.196	
2005	Tule Perch	NDPRSL	Prospect Slough	135	0.204	
2005	Tule Perch	NDPRSL	Prospect Slough	146	0.209	
2005	Tule Perch	NDPRSL	Prospect Slough	158	0.307	
2005	Sacramento Pikeminnow	ARDP	American River at Discovery Park	235	0.062	
2005	Sacramento Pikeminnow	ARDP	American River at Discovery Park	250	0.068	
2005	Sacramento Pikeminnow	ARDP	American River at Discovery Park	210	0.097	
2005	Sacramento Pikeminnow	ARDP	American River at Discovery Park	360	0.146	
2005	Sacramento Pikeminnow	ARDP	American River at Discovery Park	215	0.163	
2005	Sacramento Pikeminnow	ARDP	American River at Discovery Park	255	0.170	
2005	Sacramento Pikeminnow	ARDP	American River at Discovery Park	230	0.173	
2005	Sacramento Pikeminnow	ARDP	American River at Discovery Park	350	0.189	
2005	Sacramento Pikeminnow	ARDP	American River at Discovery Park	245	0.193	
2005	Sacramento Pikeminnow	ARDP	American River at Discovery Park	225	0.205	
2005	Sacramento Pikeminnow	ARDP	American River at Discovery Park	370	0.251	
2005	Sacramento Pikeminnow	ARDP	American River at Discovery Park	255	0.262	
2005	Sacramento Pikeminnow	ARDP	American River at Discovery Park	370	0.264	
2005	Sacramento Pikeminnow	ARDP	American River at Discovery Park	300	0.488	
2005	Sacramento Pikeminnow	ARDP	American River at Discovery Park	599	0.608	
2005	Sacramento Pikeminnow	ARDP	American River at Discovery Park	445	1.035	
2005	Sacramento Pikeminnow	ARGP	American River at Goethe Park	553	1.209	
2005	Sacramento Pikeminnow	ARGP	American River at Goethe Park	459	1.260	
2005	Sacramento Pikeminnow	BROO	Bear River at Rio Oso	324	0.304	
2005	Sacramento Pikeminnow	BROO	Bear River at Rio Oso	230	0.355	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Sacramento Pikeminnow	BROO	Bear River at Rio Oso	495	0.421	
2005	Sacramento Pikeminnow	BROO	Bear River at Rio Oso	468	0.507	
2005	Sacramento Pikeminnow	BIGB	Big Break	208	0.069	
2005	Sacramento Pikeminnow	CCMOU	Clear Creek	458	0.593	
2005	Sacramento Pikeminnow	CCMOU	Clear Creek	636	0.768	
2005	Sacramento Pikeminnow	FRGR	Feather River at Gridley	240	0.096	
2005	Sacramento Pikeminnow	FRGR	Feather River at Gridley	349	0.182	
2005	Sacramento Pikeminnow	FRGR	Feather River at Gridley	287	0.212	
2005	Sacramento Pikeminnow	FRGR	Feather River at Gridley	300	0.237	
2005	Sacramento Pikeminnow	FRGR	Feather River at Gridley	360	0.250	
2005	Sacramento Pikeminnow	FRGR	Feather River at Gridley	353	0.274	
2005	Sacramento Pikeminnow	FRGR	Feather River at Gridley	373	0.280	
2005	Sacramento Pikeminnow	FRGR	Feather River at Gridley	315	0.287	
2005	Sacramento Pikeminnow	FRGR	Feather River at Gridley	495	0.423	
2005	Sacramento Pikeminnow	FRGR	Feather River at Gridley	435	1.052	
2005	Sacramento Pikeminnow	FRNI	Feather River at Nicolaus	273	0.057	
2005	Sacramento Pikeminnow	FRNI	Feather River at Nicolaus	330	0.098	
2005	Sacramento Pikeminnow	FRNI	Feather River at Nicolaus	240	0.176	
2005	Sacramento Pikeminnow	FRNI	Feather River at Nicolaus	330	0.219	
2005	Sacramento Pikeminnow	FRNI	Feather River at Nicolaus	263	0.463	
2005	Sacramento Pikeminnow	POTSL	Potato Slough	229	0.129	
2005	Sacramento Pikeminnow	NDPRSL	Prospect Slough	270	0.170	
2005	Sacramento Pikeminnow	NDPRSL	Prospect Slough	246	0.189	
2005	Sacramento Pikeminnow	NDPRSL	Prospect Slough	279	0.222	
2005	Sacramento Pikeminnow	NDPRSL	Prospect Slough	280	0.240	
2005	Sacramento Pikeminnow	NDPRSL	Prospect Slough	240	0.271	
2005	Sacramento Pikeminnow	NDPRSL	Prospect Slough	310	0.390	
2005	Sacramento Pikeminnow	NDPRSL	Prospect Slough	238	0.432	
2005	Sacramento Pikeminnow	SRBND	Sacramento River at Bend Bridge	340	0.143	
2005	Sacramento Pikeminnow	SRBND	Sacramento River at Bend Bridge	297	0.169	
2005	Sacramento Pikeminnow	SRBND	Sacramento River at Bend Bridge	272	0.186	
2005	Sacramento Pikeminnow	SRBND	Sacramento River at Bend Bridge	364	0.195	
2005	Sacramento Pikeminnow	SRBND	Sacramento River at Bend Bridge	316	0.216	
2005	Sacramento Pikeminnow	SRBND	Sacramento River at Bend Bridge	304	0.217	
2005	Sacramento Pikeminnow	SRBND	Sacramento River at Bend Bridge	392	0.277	
2005	Sacramento Pikeminnow	SRBND	Sacramento River at Bend Bridge	374	0.413	
2005	Sacramento Pikeminnow	SRBND	Sacramento River at Bend Bridge	415	0.420	
2005	Sacramento Pikeminnow	SRBND	Sacramento River at Bend Bridge	442	0.913	
2005	Sacramento Pikeminnow	SRCOL	Sacramento River at Colusa	205	0.080	
2005	Sacramento Pikeminnow	SRCOL	Sacramento River at Colusa	336	0.184	
2005	Sacramento Pikeminnow	SRCOL	Sacramento River at Colusa	274	0.226	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Sacramento Pikeminnow	SRCOL	Sacramento River at Colusa	406	0.272	
2005	Sacramento Pikeminnow	SRCOL	Sacramento River at Colusa	316	0.307	
2005	Sacramento Pikeminnow	SRCOL	Sacramento River at Colusa	324	0.409	
2005	Sacramento Pikeminnow	SRCOL	Sacramento River at Colusa	479	0.613	
2005	Sacramento Pikeminnow	SRCOL	Sacramento River at Colusa	533	0.744	
2005	Sacramento Pikeminnow	SRCOL	Sacramento River at Colusa	554	0.821	
2005	Sacramento Pikeminnow	SRCOL	Sacramento River at Colusa	511	0.897	
2005	Sacramento Pikeminnow	SRGR	Sacramento River at Grimes	189	0.084	
2005	Sacramento Pikeminnow	SRGR	Sacramento River at Grimes	256	0.115	
2005	Sacramento Pikeminnow	SRGR	Sacramento River at Grimes	284	0.167	
2005	Sacramento Pikeminnow	SRGR	Sacramento River at Grimes	279	0.197	
2005	Sacramento Pikeminnow	SRGR	Sacramento River at Grimes	305	0.259	
2005	Sacramento Pikeminnow	SRGR	Sacramento River at Grimes	487	0.627	
2005	Sacramento Pikeminnow	SRGR	Sacramento River at Grimes	484	0.643	
2005	Sacramento Pikeminnow	SRGR	Sacramento River at Grimes	539	0.792	
2005	Sacramento Pikeminnow	SRGR	Sacramento River at Grimes	572	0.801	
2005	Sacramento Pikeminnow	SRGR	Sacramento River at Grimes	559	0.960	
2005	Sacramento Pikeminnow	SACHC	Sacramento River at Hamilton City	295	0.157	
2005	Sacramento Pikeminnow	SACHC	Sacramento River at Hamilton City	310	0.180	
2005	Sacramento Pikeminnow	SACHC	Sacramento River at Hamilton City	219	0.215	
2005	Sacramento Pikeminnow	SACHC	Sacramento River at Hamilton City	340	0.232	
2005	Sacramento Pikeminnow	SACHC	Sacramento River at Hamilton City	286	0.290	
2005	Sacramento Pikeminnow	SACHC	Sacramento River at Hamilton City	378	0.294	
2005	Sacramento Pikeminnow	SACHC	Sacramento River at Hamilton City	380	0.406	
2005	Sacramento Pikeminnow	SACHC	Sacramento River at Hamilton City	316	0.486	
2005	Sacramento Pikeminnow	SACHC	Sacramento River at Hamilton City	395	1.150	
2005	Sacramento Pikeminnow	SRORD	Sacramento River at Ord Bend	236	0.047	
2005	Sacramento Pikeminnow	SRORD	Sacramento River at Ord Bend	292	0.059	
2005	Sacramento Pikeminnow	SRORD	Sacramento River at Ord Bend	215	0.073	
2005	Sacramento Pikeminnow	SRORD	Sacramento River at Ord Bend	349	0.085	
2005	Sacramento Pikeminnow	SRORD	Sacramento River at Ord Bend	361	0.240	
2005	Sacramento Pikeminnow	SRORD	Sacramento River at Ord Bend	314	0.258	
2005	Sacramento Pikeminnow	SRORD	Sacramento River at Ord Bend	359	0.285	
2005	Sacramento Pikeminnow	SRORD	Sacramento River at Ord Bend	470	0.539	
2005	Sacramento Pikeminnow	SRORD	Sacramento River at Ord Bend	491	0.596	
2005	Sacramento Pikeminnow	SRORD	Sacramento River at Ord Bend	511	1.144	
2005	Sacramento Pikeminnow	SACRIO	Sacramento River at Rio Vista	255	0.070	
2005	Sacramento Pikeminnow	SACRIO	Sacramento River at Rio Vista	336	0.198	
2005	Sacramento Pikeminnow	SACRIO	Sacramento River at Rio Vista	259	0.216	
2005	Sacramento Pikeminnow	SACRIO	Sacramento River at Rio Vista	354	0.276	
2005	Sacramento Pikeminnow	SACRIO	Sacramento River at Rio Vista	510	0.405	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Sacramento Pikeminnow	SACRIO	Sacramento River at Rio Vista	570	0.649	
2005	Sacramento Pikeminnow	SACRIO	Sacramento River at Rio Vista	575	0.724	
2005	Sacramento Pikeminnow	SACRIO	Sacramento River at Rio Vista	513	0.858	
2005	Sacramento Pikeminnow	SACRIO	Sacramento River at Rio Vista	534	0.861	
2005	Sacramento Pikeminnow	SACRIO	Sacramento River at Rio Vista	572	1.012	
2005	Sacramento Pikeminnow	SRM44	Sacramento River at RM44	340	0.226	
2005	Sacramento Pikeminnow	SRM44	Sacramento River at RM44	372	0.279	
2005	Sacramento Pikeminnow	SRM44	Sacramento River at RM44	401	0.412	
2005	Sacramento Pikeminnow	SRM44	Sacramento River at RM44	459	0.483	
2005	Sacramento Pikeminnow	SRM44	Sacramento River at RM44	415	0.526	
2005	Sacramento Pikeminnow	SRM44	Sacramento River at RM44	560	1.100	
2005	Sacramento Pikeminnow	SRM44	Sacramento River at RM44	638	1.323	
2005	Sacramento Pikeminnow	SRVB	Sacramento River at Veterans Bridge	236	0.168	
2005	Sacramento Pikeminnow	SRVB	Sacramento River at Veterans Bridge	249	0.213	
2005	Sacramento Pikeminnow	SRVB	Sacramento River at Veterans Bridge	237	0.230	
2005	Sacramento Pikeminnow	SRVB	Sacramento River at Veterans Bridge	365	0.237	
2005	Sacramento Pikeminnow	SRVB	Sacramento River at Veterans Bridge	457	0.254	
2005	Sacramento Pikeminnow	SRVB	Sacramento River at Veterans Bridge	271	0.301	
2005	Sacramento Pikeminnow	SRVB	Sacramento River at Veterans Bridge	305	0.385	
2005	Sacramento Pikeminnow	SRVB	Sacramento River at Veterans Bridge	473	1.131	
2005	Sacramento Pikeminnow	SRVB	Sacramento River at Veterans Bridge	480	1.542	
2005	Sacramento Pikeminnow	SRVB	Sacramento River at Veterans Bridge	503	1.615	
2005	Sacramento Pikeminnow	SRVB	Sacramento River at Veterans Bridge	496	1.712	
2005	Sacramento Pikeminnow	SRWB	Sacramento River at Woodson Bridge	291	0.086	
2005	Sacramento Pikeminnow	SRWB	Sacramento River at Woodson Bridge	249	0.207	
2005	Sacramento Pikeminnow	SRWB	Sacramento River at Woodson Bridge	308	0.267	
2005	Sacramento Pikeminnow	SRWB	Sacramento River at Woodson Bridge	249	0.275	
2005	Sacramento Pikeminnow	SRWB	Sacramento River at Woodson Bridge	266	0.279	
2005	Sacramento Pikeminnow	SRWB	Sacramento River at Woodson Bridge	484	0.544	
2005	Sacramento Pikeminnow	SRWB	Sacramento River at Woodson Bridge	449	0.772	
2005	Sacramento Pikeminnow	SRWB	Sacramento River at Woodson Bridge	432	1.003	
2005	Sacramento Pikeminnow	SRWB	Sacramento River at Woodson Bridge	466	1.003	
2005	Sacramento Pikeminnow	SRWB	Sacramento River at Woodson Bridge	405	1.264	
2005	Sacramento Pikeminnow	SRCSP	Stanislaus River at Caswell State Park	341	0.183	
2005	Sacramento Pikeminnow	SRCSP	Stanislaus River at Caswell State Park	271	0.368	
2005	Sacramento Pikeminnow	YRVMY	Yuba River at Marysville	335	0.188	
2005	Sacramento Pikeminnow	YRVMY	Yuba River at Marysville	330	0.530	
2005	Sacramento Pikeminnow	YRVMY	Yuba River at Marysville	470	0.910	
2005	Sacramento Pikeminnow	YRVMY	Yuba River at Marysville	472	1.010	
2005	Sacramento Pikeminnow	YRVMY	Yuba River at Marysville	520	1.582	
2005	Sacramento Sucker	ARDP	American River at Discovery Park	445	0.072	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Sacramento Sucker	ARDP	American River at Discovery Park	406	0.075	
2005	Sacramento Sucker	ARDP	American River at Discovery Park	330	0.075	
2005	Sacramento Sucker	ARDP	American River at Discovery Park	285	0.104	
2005	Sacramento Sucker	ARDP	American River at Discovery Park	280	0.123	
2005	Sacramento Sucker	ARDP	American River at Discovery Park	470	0.132	
2005	Sacramento Sucker	ARDP	American River at Discovery Park	380	0.138	
2005	Sacramento Sucker	ARDP	American River at Discovery Park	252	0.157	
2005	Sacramento Sucker	ARDP	American River at Discovery Park	339	0.166	
2005	Sacramento Sucker	ARDP	American River at Discovery Park	420	0.177	
2005	Sacramento Sucker	ARDP	American River at Discovery Park	476	0.202	
2005	Sacramento Sucker	ARDP	American River at Discovery Park	486	0.233	
2005	Sacramento Sucker	ARDP	American River at Discovery Park	452	0.262	
2005	Sacramento Sucker	ARDP	American River at Discovery Park	500	0.287	
2005	Sacramento Sucker	ARGP	American River at Goethe Park	332	0.029	
2005	Sacramento Sucker	ARGP	American River at Goethe Park	297	0.080	
2005	Sacramento Sucker	ARGP	American River at Goethe Park	175	0.094	
2005	Sacramento Sucker	ARGP	American River at Goethe Park	505	0.107	
2005	Sacramento Sucker	ARGP	American River at Goethe Park	500	0.115	
2005	Sacramento Sucker	ARGP	American River at Goethe Park	219	0.124	
2005	Sacramento Sucker	ARGP	American River at Goethe Park	220	0.124	
2005	Sacramento Sucker	ARGP	American River at Goethe Park	439	0.128	
2005	Sacramento Sucker	ARGP	American River at Goethe Park	547	0.227	
2005	Sacramento Sucker	ARGP	American River at Goethe Park	492	0.297	
2005	Sacramento Sucker	ARNIM	American River at Nimbus Dam	246	0.029	
2005	Sacramento Sucker	ARNIM	American River at Nimbus Dam	165	0.046	
2005	Sacramento Sucker	ARNIM	American River at Nimbus Dam	229	0.048	
2006	Sacramento Sucker	ARNIM	American River at Nimbus Dam	371	0.053	
2006	Sacramento Sucker	ARNIM	American River at Nimbus Dam	357	0.054	
2005	Sacramento Sucker	ARNIM	American River at Nimbus Dam	170	0.056	
2006	Sacramento Sucker	ARNIM	American River at Nimbus Dam	235	0.061	
2006	Sacramento Sucker	ARNIM	American River at Nimbus Dam	248	0.068	
2006	Sacramento Sucker	ARNIM	American River at Nimbus Dam	211	0.092	
2005	Sacramento Sucker	ARNIM	American River at Nimbus Dam	250	0.093	
2006	Sacramento Sucker	ARNIM	American River at Nimbus Dam	420	0.096	
2006	Sacramento Sucker	ARNIM	American River at Nimbus Dam	496	0.137	
2006	Sacramento Sucker	ARNIM	American River at Nimbus Dam	198	0.163	
2006	Sacramento Sucker	ARNIM	American River at Nimbus Dam	506	0.267	
2005	Sacramento Sucker	ARNIM	American River at Nimbus Dam	479	0.416	
2006	Sacramento Sucker	ARNIM	American River at Nimbus Dam	511	0.470	
2005	Sacramento Sucker	ARNIM	American River at Nimbus Dam	439	0.496	
2005	Sacramento Sucker	ARNIM	American River at Nimbus Dam	436	0.550	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Sacramento Sucker	ARNIM	American River at Nimbus Dam	612	1.232	
2005	Sacramento Sucker	ARNIM	American River at Nimbus Dam	589	1.951	
2005	Sacramento Sucker	BROO	Bear River at Rio Oso	322	0.061	
2005	Sacramento Sucker	BROO	Bear River at Rio Oso	339	0.090	
2005	Sacramento Sucker	BROO	Bear River at Rio Oso	458	0.139	
2005	Sacramento Sucker	BROO	Bear River at Rio Oso	447	0.253	
2005	Sacramento Sucker	BIGB	Big Break	436	0.211	
2005	Sacramento Sucker	BIGB	Big Break	464	0.273	
2005	Sacramento Sucker	BIGB	Big Break	430	0.318	
2005	Sacramento Sucker	BIGB	Big Break	500	0.386	
2005	Sacramento Sucker	CCMOU	Clear Creek	420	0.069	
2005	Sacramento Sucker	CCMOU	Clear Creek	464	0.070	
2005	Sacramento Sucker	CCMOU	Clear Creek	223	0.097	
2005	Sacramento Sucker	CCMOU	Clear Creek	324	0.100	
2005	Sacramento Sucker	CCMOU	Clear Creek	444	0.148	
2005	Sacramento Sucker	CCMOU	Clear Creek	463	0.225	
2005	Sacramento Sucker	CCMOU	Clear Creek	298	0.225	
2005	Sacramento Sucker	CCMOU	Clear Creek	442	0.239	
2005	Sacramento Sucker	COS	Cosumnes River	236	0.116	
2005	Sacramento Sucker	COS	Cosumnes River	363	0.133	
2005	Sacramento Sucker	COS	Cosumnes River	249	0.137	
2005	Sacramento Sucker	COS	Cosumnes River	436	0.165	
2005	Sacramento Sucker	COS	Cosumnes River	255	0.171	
2005	Sacramento Sucker	COS	Cosumnes River	355	0.189	
2005	Sacramento Sucker	COS	Cosumnes River	405	0.217	
2005	Sacramento Sucker	COS	Cosumnes River	315	0.227	
2005	Sacramento Sucker	COS	Cosumnes River	460	0.331	
2005	Sacramento Sucker	COS	Cosumnes River	275	0.336	
2005	Sacramento Sucker	FRGR	Feather River at Gridley	335	0.023	
2005	Sacramento Sucker	FRGR	Feather River at Gridley	342	0.031	
2005	Sacramento Sucker	FRGR	Feather River at Gridley	329	0.034	
2005	Sacramento Sucker	FRGR	Feather River at Gridley	330	0.046	
2005	Sacramento Sucker	FRGR	Feather River at Gridley	300	0.063	
2005	Sacramento Sucker	FRGR	Feather River at Gridley	420	0.073	
2005	Sacramento Sucker	FRGR	Feather River at Gridley	460	0.102	
2005	Sacramento Sucker	FRGR	Feather River at Gridley	470	0.183	
2005	Sacramento Sucker	FRGR	Feather River at Gridley	503	0.295	
2005	Sacramento Sucker	FRGR	Feather River at Gridley	560	0.610	
2005	Sacramento Sucker	FRNI	Feather River at Nicolaus	265	0.077	
2005	Sacramento Sucker	FRNI	Feather River at Nicolaus	273	0.080	
2005	Sacramento Sucker	FRNI	Feather River at Nicolaus	340	0.084	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Sacramento Sucker	FRNI	Feather River at Nicolaus	411	0.096	
2005	Sacramento Sucker	FRNI	Feather River at Nicolaus	281	0.112	
2005	Sacramento Sucker	FRNI	Feather River at Nicolaus	385	0.144	
2005	Sacramento Sucker	FRNI	Feather River at Nicolaus	275	0.188	
2005	Sacramento Sucker	FRNI	Feather River at Nicolaus	355	0.191	
2005	Sacramento Sucker	FRNI	Feather River at Nicolaus	420	0.262	
2005	Sacramento Sucker	FRNI	Feather River at Nicolaus	298	0.359	
2005	Sacramento Sucker	LOSL	Lost Slough	403	0.281	
2005	Sacramento Sucker	LOSL	Lost Slough	441	0.341	
2005	Sacramento Sucker	LOSL	Lost Slough	481	0.399	
2005	Sacramento Sucker	LOSL	Lost Slough	479	0.427	
2005	Sacramento Sucker	LOSL	Lost Slough	444	0.552	
2005	Sacramento Sucker	P	Merced River at Hatfield State Park	324	0.070	
2005	Sacramento Sucker	P	Merced River at Hatfield State Park	334	0.071	
2005	Sacramento Sucker	P	Merced River at Hatfield State Park	319	0.079	
2005	Sacramento Sucker	P	Merced River at Hatfield State Park	334	0.128	
2005	Sacramento Sucker	P	Merced River at Hatfield State Park	336	0.143	
2005	Sacramento Sucker	P	Merced River at Hatfield State Park	369	0.158	
2005	Sacramento Sucker	P	Merced River at Hatfield State Park	356	0.166	
2005	Sacramento Sucker	P	Merced River at Hatfield State Park	471	0.313	
2005	Sacramento Sucker	P	Merced River at Hatfield State Park	467	0.388	
2005	Sacramento Sucker	P	Merced River at Hatfield State Park	495	0.418	
2005	Sacramento Sucker	MRLL	Mokelumne River at Lodi Lake	387	0.099	
2005	Sacramento Sucker	MRLL	Mokelumne River at Lodi Lake	456	0.201	
2005	Sacramento Sucker	MRLL	Mokelumne River at Lodi Lake	424	0.241	
2005	Sacramento Sucker	MRLL	Mokelumne River at Lodi Lake	441	0.285	
2005	Sacramento Sucker	MRLL	Mokelumne River at Lodi Lake	454	0.340	
2005	Sacramento Sucker	MRLL	Mokelumne River at Lodi Lake	496	0.366	
2005	Sacramento Sucker	MRLL	Mokelumne River at Lodi Lake	522	0.381	
2005	Sacramento Sucker	MRLL	Mokelumne River at Lodi Lake	453	0.409	
2005	Sacramento Sucker	MRLL	Mokelumne River at Lodi Lake	480	0.412	
2005	Sacramento Sucker	POTSL	Potato Slough	495	0.225	
2005	Sacramento Sucker	POTSL	Potato Slough	484	0.297	
2005	Sacramento Sucker	POTSL	Potato Slough	486	0.302	
2005	Sacramento Sucker	POTSL	Potato Slough	458	0.325	
2005	Sacramento Sucker	NDPRSL	Prospect Slough	402	0.083	
2005	Sacramento Sucker	NDPRSL	Prospect Slough	292	0.130	
2005	Sacramento Sucker	NDPRSL	Prospect Slough	315	0.150	
2005	Sacramento Sucker	NDPRSL	Prospect Slough	438	0.259	
2005	Sacramento Sucker	NDPRSL	Prospect Slough	425	0.313	
2005	Sacramento Sucker	NDPRSL	Prospect Slough	445	0.390	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Sacramento Sucker	NDPRSL	Prospect Slough	462	0.491	
2005	Sacramento Sucker	SRBND	Sacramento River at Bend Bridge	301	0.025	
2005	Sacramento Sucker	SRBND	Sacramento River at Bend Bridge	336	0.028	
2005	Sacramento Sucker	SRBND	Sacramento River at Bend Bridge	420	0.035	
2005	Sacramento Sucker	SRBND	Sacramento River at Bend Bridge	348	0.040	
2005	Sacramento Sucker	SRBND	Sacramento River at Bend Bridge	279	0.042	
2005	Sacramento Sucker	SRBND	Sacramento River at Bend Bridge	385	0.051	
2005	Sacramento Sucker	SRBND	Sacramento River at Bend Bridge	319	0.057	
2005	Sacramento Sucker	SRBND	Sacramento River at Bend Bridge	420	0.064	
2005	Sacramento Sucker	SRBND	Sacramento River at Bend Bridge	465	0.088	
2005	Sacramento Sucker	SRBND	Sacramento River at Bend Bridge	413	0.100	
2005	Sacramento Sucker	SRBUT	Sacramento River at Butte City	254	0.036	
2005	Sacramento Sucker	SRBUT	Sacramento River at Butte City	174	0.055	
2005	Sacramento Sucker	SRBUT	Sacramento River at Butte City	196	0.080	
2005	Sacramento Sucker	SRBUT	Sacramento River at Butte City	199	0.083	
2005	Sacramento Sucker	SRBUT	Sacramento River at Butte City	230	0.098	
2005	Sacramento Sucker	SRBUT	Sacramento River at Butte City	420	0.219	
2005	Sacramento Sucker	SRBUT	Sacramento River at Butte City	462	0.231	
2005	Sacramento Sucker	SRBUT	Sacramento River at Butte City	504	0.323	
2005	Sacramento Sucker	SRBUT	Sacramento River at Butte City	489	0.394	
2005	Sacramento Sucker	SRBUT	Sacramento River at Butte City	481	0.597	
2005	Sacramento Sucker	SRCOL	Sacramento River at Colusa	292	0.039	
2005	Sacramento Sucker	SRCOL	Sacramento River at Colusa	312	0.045	
2005	Sacramento Sucker	SRCOL	Sacramento River at Colusa	411	0.047	
2005	Sacramento Sucker	SRCOL	Sacramento River at Colusa	282	0.050	
2005	Sacramento Sucker	SRCOL	Sacramento River at Colusa	263	0.053	
2005	Sacramento Sucker	SRCOL	Sacramento River at Colusa	286	0.053	
2005	Sacramento Sucker	SRCOL	Sacramento River at Colusa	389	0.063	
2005	Sacramento Sucker	SRCOL	Sacramento River at Colusa	411	0.078	
2005	Sacramento Sucker	SRCOL	Sacramento River at Colusa	376	0.088	
2005	Sacramento Sucker	SRCOL	Sacramento River at Colusa	430	0.187	
2005	Sacramento Sucker	SRGR	Sacramento River at Grimes	272	0.034	
2005	Sacramento Sucker	SRGR	Sacramento River at Grimes	264	0.039	
2005	Sacramento Sucker	SRGR	Sacramento River at Grimes	251	0.045	
2005	Sacramento Sucker	SRGR	Sacramento River at Grimes	356	0.069	
2005	Sacramento Sucker	SRGR	Sacramento River at Grimes	386	0.075	
2005	Sacramento Sucker	SRGR	Sacramento River at Grimes	271	0.078	
2005	Sacramento Sucker	SRGR	Sacramento River at Grimes	412	0.132	
2005	Sacramento Sucker	SRGR	Sacramento River at Grimes	444	0.272	
2005	Sacramento Sucker	SRGR	Sacramento River at Grimes	419	0.286	
2005	Sacramento Sucker	SRGR	Sacramento River at Grimes	496	0.288	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Sacramento Sucker	SACHC	Sacramento River at Hamilton City	214	0.012	
2005	Sacramento Sucker	SACHC	Sacramento River at Hamilton City	225	0.016	
2005	Sacramento Sucker	SACHC	Sacramento River at Hamilton City	315	0.017	
2005	Sacramento Sucker	SACHC	Sacramento River at Hamilton City	325	0.020	
2005	Sacramento Sucker	SACHC	Sacramento River at Hamilton City	304	0.030	
2005	Sacramento Sucker	SACHC	Sacramento River at Hamilton City	344	0.034	
2005	Sacramento Sucker	SACHC	Sacramento River at Hamilton City	363	0.067	
2005	Sacramento Sucker	SACHC	Sacramento River at Hamilton City	454	0.073	
2005	Sacramento Sucker	SACHC	Sacramento River at Hamilton City	515	0.126	
2005	Sacramento Sucker	SACHC	Sacramento River at Hamilton City	496	0.147	
2005	Sacramento Sucker	SRORD	Sacramento River at Ord Bend	200	0.019	
2005	Sacramento Sucker	SRORD	Sacramento River at Ord Bend	331	0.027	
2005	Sacramento Sucker	SRORD	Sacramento River at Ord Bend	151	0.027	
2005	Sacramento Sucker	SRORD	Sacramento River at Ord Bend	293	0.032	
2005	Sacramento Sucker	SRORD	Sacramento River at Ord Bend	333	0.058	
2005	Sacramento Sucker	SRORD	Sacramento River at Ord Bend	459	0.109	
2005	Sacramento Sucker	SRORD	Sacramento River at Ord Bend	464	0.158	
2005	Sacramento Sucker	SRORD	Sacramento River at Ord Bend	487	0.164	
2005	Sacramento Sucker	SRORD	Sacramento River at Ord Bend	569	0.330	
2005	Sacramento Sucker	SRORD	Sacramento River at Ord Bend	505	0.407	
2005	Sacramento Sucker	SACRIO	Sacramento River at Rio Vista	475	0.131	
2005	Sacramento Sucker	SACRIO	Sacramento River at Rio Vista	414	0.151	
2005	Sacramento Sucker	SACRIO	Sacramento River at Rio Vista	495	0.362	
2005	Sacramento Sucker	SACRIO	Sacramento River at Rio Vista	479	0.425	
2005	Sacramento Sucker	SACRIO	Sacramento River at Rio Vista	518	0.555	
2005	Sacramento Sucker	SRM44	Sacramento River at RM44	329	0.046	
2005	Sacramento Sucker	SRM44	Sacramento River at RM44	419	0.112	
2005	Sacramento Sucker	SRM44	Sacramento River at RM44	432	0.120	
2005	Sacramento Sucker	SRM44	Sacramento River at RM44	441	0.122	
2005	Sacramento Sucker	SRM44	Sacramento River at RM44	502	0.167	
2005	Sacramento Sucker	SRM44	Sacramento River at RM44	416	0.191	
2005	Sacramento Sucker	SRM44	Sacramento River at RM44	459	0.252	
2005	Sacramento Sucker	SRM44	Sacramento River at RM44	484	0.274	
2005	Sacramento Sucker	SRM44	Sacramento River at RM44	499	0.323	
2005	Sacramento Sucker	SRM44	Sacramento River at RM44	574	0.451	
2005	Sacramento Sucker	SRVB	Sacramento River at Veterans Bridge	286	0.085	
2005	Sacramento Sucker	SRVB	Sacramento River at Veterans Bridge	402	0.114	
2005	Sacramento Sucker	SRVB	Sacramento River at Veterans Bridge	242	0.128	
2005	Sacramento Sucker	SRVB	Sacramento River at Veterans Bridge	410	0.138	
2005	Sacramento Sucker	SRVB	Sacramento River at Veterans Bridge	383	0.154	
2005	Sacramento Sucker	SRVB	Sacramento River at Veterans Bridge	395	0.213	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Sacramento Sucker	SRVB	Sacramento River at Veterans Bridge	409	0.229	
2005	Sacramento Sucker	SRVB	Sacramento River at Veterans Bridge	430	0.312	
2005	Sacramento Sucker	SRWB	Sacramento River at Woodson Bridge	331	0.021	
2005	Sacramento Sucker	SRWB	Sacramento River at Woodson Bridge	294	0.022	
2005	Sacramento Sucker	SRWB	Sacramento River at Woodson Bridge	326	0.023	
2005	Sacramento Sucker	SRWB	Sacramento River at Woodson Bridge	277	0.032	
2005	Sacramento Sucker	SRWB	Sacramento River at Woodson Bridge	396	0.045	
2005	Sacramento Sucker	SRWB	Sacramento River at Woodson Bridge	286	0.048	
2005	Sacramento Sucker	SRWB	Sacramento River at Woodson Bridge	465	0.064	
2005	Sacramento Sucker	SRWB	Sacramento River at Woodson Bridge	479	0.250	
2005	Sacramento Sucker	SRWB	Sacramento River at Woodson Bridge	481	0.355	
2005	Sacramento Sucker	SRWB	Sacramento River at Woodson Bridge	447	0.520	
2005	Sacramento Sucker	SS165	Salt Slough at Hwy 165	429	0.281	
2005	Sacramento Sucker	SJCL	San Joaquin River at Crows Landing	249	0.089	
2005	Sacramento Sucker	SJCL	San Joaquin River at Crows Landing	266	0.095	
2005	Sacramento Sucker	SJCL	San Joaquin River at Crows Landing	383	0.149	
2005	Sacramento Sucker	SJCL	San Joaquin River at Crows Landing	352	0.153	
2005	Sacramento Sucker	SJCL	San Joaquin River at Crows Landing	528	0.274	
2005	Sacramento Sucker	SJFF	San Joaquin River at Fremont Ford	312	0.129	
2005	Sacramento Sucker	SJPAT	San Joaquin River at Patterson	494	0.275	
2005	Sacramento Sucker	SJVER	San Joaquin River at Vernalis	399	0.177	
2005	Sacramento Sucker	SJVER	San Joaquin River at Vernalis	441	0.302	
2005	Sacramento Sucker	SJVER	San Joaquin River at Vernalis	500	0.413	
2005	Sacramento Sucker	SJVER	San Joaquin River at Vernalis	510	0.419	
2005	Sacramento Sucker	SJVER	San Joaquin River at Vernalis	479	0.431	
2005	Sacramento Sucker	SJVER	San Joaquin River at Vernalis	498	0.549	
2005	Sacramento Sucker	SRCSP	Stanislaus River at Caswell State Park	349	0.052	
2005	Sacramento Sucker	SRCSP	Stanislaus River at Caswell State Park	344	0.053	
2005	Sacramento Sucker	SRCSP	Stanislaus River at Caswell State Park	349	0.054	
2005	Sacramento Sucker	SRCSP	Stanislaus River at Caswell State Park	302	0.071	
2005	Sacramento Sucker	SRCSP	Stanislaus River at Caswell State Park	499	0.113	
2005	Sacramento Sucker	SRCSP	Stanislaus River at Caswell State Park	348	0.131	
2005	Sacramento Sucker	SRCSP	Stanislaus River at Caswell State Park	531	0.211	
2005	Sacramento Sucker	SRCSP	Stanislaus River at Caswell State Park	465	0.293	
2005	Sacramento Sucker	SRCSP	Stanislaus River at Caswell State Park	454	0.356	
2005	Sacramento Sucker	SRCSP	Stanislaus River at Caswell State Park	461	0.373	
2005	Sacramento Sucker	TYSL	Taylor Slough	510	0.268	
2005	Sacramento Sucker	TYSL	Taylor Slough	498	0.325	
2005	Sacramento Sucker	TYSL	Taylor Slough	511	0.392	
2005	Sacramento Sucker	TUO3SHI	Tuolumne River at Shiloh Rd.	332	0.124	
2005	Sacramento Sucker	TUO3SHI	Tuolumne River at Shiloh Rd.	380	0.125	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Sacramento Sucker	TUO3SHI	Tuolumne River at Shiloh Rd.	419	0.146	
2005	Sacramento Sucker	TUO3SHI	Tuolumne River at Shiloh Rd.	466	0.152	
2005	Sacramento Sucker	TUO3SHI	Tuolumne River at Shiloh Rd.	285	0.214	
2005	Sacramento Sucker	TUO3SHI	Tuolumne River at Shiloh Rd.	495	0.241	
2005	Sacramento Sucker	TUO3SHI	Tuolumne River at Shiloh Rd.	452	0.301	
2005	Sacramento Sucker	TUO3SHI	Tuolumne River at Shiloh Rd.	479	0.334	
2005	Sacramento Sucker	TUO3SHI	Tuolumne River at Shiloh Rd.	500	0.469	
2005	Sacramento Sucker	TUO3SHI	Tuolumne River at Shiloh Rd.	500	0.492	
2005	Sacramento Sucker	YRVMY	Yuba River at Marysville	241	0.109	
2005	Sacramento Sucker	YRVMY	Yuba River at Marysville	305	0.115	
2005	Sacramento Sucker	YRVMY	Yuba River at Marysville	305	0.116	
2005	Sacramento Sucker	YRVMY	Yuba River at Marysville	405	0.131	
2005	Sacramento Sucker	YRVMY	Yuba River at Marysville	299	0.154	
2005	Sacramento Sucker	YRVMY	Yuba River at Marysville	290	0.219	
2005	Sacramento Sucker	YRVMY	Yuba River at Marysville	486	0.227	
2005	Sacramento Sucker	YRVMY	Yuba River at Marysville	436	0.275	
2005	Sacramento Sucker	YRVMY	Yuba River at Marysville	420	0.570	
2005	Sacramento Sucker	YRVMY	Yuba River at Marysville	491	0.729	
2006	Smallmouth Bass	NHRES	New Hogan Reservoir	269	0.366	
2006	Smallmouth Bass	NHRES	New Hogan Reservoir	281	0.442	
2006	Smallmouth Bass	NHRES	New Hogan Reservoir	326	0.448	
2006	Smallmouth Bass	NHRES	New Hogan Reservoir	310	0.507	
2006	Smallmouth Bass	NHRES	New Hogan Reservoir	314	0.518	
2006	Smallmouth Bass	NHRES	New Hogan Reservoir	283	0.530	
2006	Smallmouth Bass	NHRES	New Hogan Reservoir	326	0.600	
2006	Smallmouth Bass	NHRES	New Hogan Reservoir	373	0.659	
2006	Smallmouth Bass	NHRES	New Hogan Reservoir	339	0.660	
2006	Smallmouth Bass	NHRES	New Hogan Reservoir	421	0.683	
2006	Smallmouth Bass	NHRES	New Hogan Reservoir	357	0.724	
2006	Smallmouth Bass	NHRES	New Hogan Reservoir	416	0.759	
2006	Smallmouth Bass	NHRES	New Hogan Reservoir	376	0.779	
2005	Smallmouth Bass	SACRIO	Sacramento River at Rio Vista	281	0.284	
2005	Smallmouth Bass	SRM44	Sacramento River at RM44	251	0.323	
2005	Smallmouth Bass	SRM44	Sacramento River at RM44	479	1.093	
2005	Smallmouth Bass	SRM44	Sacramento River at RM44	439	1.161	
2005	Smallmouth Bass	SRM44	Sacramento River at RM44	407	1.408	
2005	Spotted Bass	BROO	Bear River at Rio Oso	241	0.249	
2005	Spotted Bass	BROO	Bear River at Rio Oso	230	0.258	
2005	Spotted Bass	BROO	Bear River at Rio Oso	217	0.272	
2005	Spotted Bass	MILK	Millerton Lake	230	0.135	
2005	Spotted Bass	MILK	Millerton Lake	274	0.154	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	Spotted Bass	MILK	Millerton Lake	250	0.159	
2005	Spotted Bass	MILK	Millerton Lake	315	0.166	
2005	Spotted Bass	MILK	Millerton Lake	305	0.199	
2005	Spotted Bass	MILK	Millerton Lake	334	0.203	
2005	Spotted Bass	MILK	Millerton Lake	345	0.207	
2005	Spotted Bass	MILK	Millerton Lake	333	0.222	
2005	Spotted Bass	MILK	Millerton Lake	347	0.273	
2005	Spotted Bass	MILK	Millerton Lake	375	0.375	
2005	Spotted Bass	MILK	Millerton Lake	432	0.401	
2005	Spotted Bass	MILK	Millerton Lake	452	0.471	
2005	Spotted Bass	MILK	Millerton Lake	430	0.510	
2005	Spotted Bass	SRM44	Sacramento River at RM44	269	0.249	
2005	Spotted Bass	SRM44	Sacramento River at RM44	295	0.264	
2005	Spotted Bass	SRM44	Sacramento River at RM44	341	0.366	
2005	Spotted Bass	SRM44	Sacramento River at RM44	384	0.431	
2005	Spotted Bass	SRM44	Sacramento River at RM44	359	0.458	
2005	Spotted Bass	SRM44	Sacramento River at RM44	315	0.474	
2005	Spotted Bass	SRM44	Sacramento River at RM44	305	0.487	
2005	Spotted Bass	SRM44	Sacramento River at RM44	346	0.570	
2005	Spotted Bass	SRM44	Sacramento River at RM44	361	0.596	
2005	Spotted Bass	SRM44	Sacramento River at RM44	351	0.601	
2005	Spotted Bass	SRM44	Sacramento River at RM44	409	0.927	
2005	Spotted Bass	SRM44	Sacramento River at RM44	421	0.991	
2006	Steelhead Trout	FRHY	Feather River Hatchery	495	0.044	
2006	Steelhead Trout	FRHY	Feather River Hatchery	645	0.063	
2006	Steelhead Trout	FRHY	Feather River Hatchery	700	0.080	
2006	Steelhead Trout	FRHY	Feather River Hatchery	487	0.096	
2006	Steelhead Trout	FRHY	Feather River Hatchery	635	0.115	
2006	Steelhead Trout	FRHY	Feather River Hatchery	537	0.165	
2006	Steelhead Trout	JKLK	Jenkinson Lake	446	0.125	
2006	Steelhead Trout	MKHY	Mokelumne Hatchery	420	0.068	
2006	Steelhead Trout	MKHY	Mokelumne Hatchery	593	0.088	
2006	Steelhead Trout	MKHY	Mokelumne Hatchery	658	0.092	
2006	Steelhead Trout	MKHY	Mokelumne Hatchery	554	0.112	
2006	Steelhead Trout	MKHY	Mokelumne Hatchery	610	0.123	
2006	Steelhead Trout	MKHY	Mokelumne Hatchery	585	0.124	
2006	Steelhead Trout	NIMHY	Nimbus Hatchery	540	0.038	
2006	Steelhead Trout	NIMHY	Nimbus Hatchery	650	0.050	
2006	Steelhead Trout	NIMHY	Nimbus Hatchery	703	0.058	
2006	Steelhead Trout	NIMHY	Nimbus Hatchery	670	0.058	
2006	Steelhead Trout	NIMHY	Nimbus Hatchery	930	0.061	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2006	Steelhead Trout	NIMHY	Nimbus Hatchery	770	0.063	
2006	Steelhead Trout	NIMHY	Nimbus Hatchery	720	0.066	
2006	Steelhead Trout	NIMHY	Nimbus Hatchery	570	0.067	
2006	Steelhead Trout	NIMHY	Nimbus Hatchery	420	0.074	
2006	Steelhead Trout	NIMHY	Nimbus Hatchery	440	0.077	
2006	Steelhead Trout	NIMHY	Nimbus Hatchery	820	0.086	
2006	Steelhead Trout	NIMHY	Nimbus Hatchery	750	0.087	
2005	Steelhead Trout	SRGR	Sacramento River at Grimes	602	0.075	
2005	Steelhead Trout	SACHC	Sacramento River at Hamilton City	630	0.097	
2005	Steelhead Trout	SRM44	Sacramento River at RM44	584	0.049	
2005	Steelhead Trout	SRM44	Sacramento River at RM44	449	0.060	
2005	Striped Bass	ARGP	American River at Goethe Park	498	0.358	
2005	Striped Bass	ARGP	American River at Goethe Park	426	0.466	
2005	Striped Bass	ARGP	American River at Goethe Park	444	0.550	
2005	Striped Bass	ARGP	American River at Goethe Park	376	0.648	
2006	Striped Bass	ARNIM	American River at Nimbus Dam	771	0.554	
2005	Striped Bass	BIGB	Big Break	216	0.074	
2005	Striped Bass	BIGB	Big Break	206	0.087	
2005	Striped Bass	BIGB	Big Break	250	0.088	
2005	Striped Bass	BIGB	Big Break	235	0.096	
2005	Striped Bass	BIGB	Big Break	214	0.110	
2005	Striped Bass	PCUT	Paradise Cut	426	0.153	
2005	Striped Bass	NDPRSL	Prospect Slough	283	0.205	
2005	Striped Bass	NDPRSL	Prospect Slough	252	0.208	
2005	Striped Bass	NDPRSL	Prospect Slough	376	0.300	
2005	Striped Bass	NDPRSL	Prospect Slough	291	0.311	
2005	Striped Bass	NDPRSL	Prospect Slough	494	0.497	
2005	Striped Bass	SRM44	Sacramento River at RM44	269	0.194	
2005	Striped Bass	SRM44	Sacramento River at RM44	661	0.266	
2005	Striped Bass	SRM44	Sacramento River at RM44	503	0.454	
2005	Striped Bass	SRM44	Sacramento River at RM44	401	0.600	
2005	Striped Bass	SS165	Salt Slough at Hwy 165	629	0.209	
2005	Striped Bass	SJVER	San Joaquin River at Vernalis	625	0.878	
2005	White Catfish	ARDP	American River at Discovery Park	324	0.223	
2005	White Catfish	ARDP	American River at Discovery Park	230	0.287	
2005	White Catfish	ARDP	American River at Discovery Park	255	0.300	
2005	White Catfish	ARDP	American River at Discovery Park	270	0.514	
2005	White Catfish	BVSL	Beaver Slough	296	0.083	
2005	White Catfish	BVSL	Beaver Slough	344	0.103	
2005	White Catfish	BVSL	Beaver Slough	256	0.110	
2005	White Catfish	BVSL	Beaver Slough	227	0.115	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	White Catfish	BVSL	Beaver Slough	261	0.139	
2005	White Catfish	BVSL	Beaver Slough	291	0.141	
2005	White Catfish	BVSL	Beaver Slough	421	0.174	
2005	White Catfish	BVSL	Beaver Slough	369	0.175	
2005	White Catfish	BVSL	Beaver Slough	359	0.176	
2005	White Catfish	BIGB	Big Break	340	0.110	
2005	White Catfish	BIGB	Big Break	285	0.158	
2005	White Catfish	BIGB	Big Break	286	0.159	
2005	White Catfish	BIGB	Big Break	308	0.192	
2005	White Catfish	CARV	Calaveras River	278	0.056	
2005	White Catfish	CARV	Calaveras River	231	0.066	
2005	White Catfish	CARV	Calaveras River	278	0.068	
2005	White Catfish	CARV	Calaveras River	267	0.068	
2005	White Catfish	CARV	Calaveras River	271	0.074	
2005	White Catfish	CARV	Calaveras River	239	0.077	
2005	White Catfish	CARV	Calaveras River	261	0.117	
2005	White Catfish	CARV	Calaveras River	253	0.127	
2005	White Catfish	CARV	Calaveras River	270	0.167	
2005	White Catfish	CBD99	Colusa Basin Drain at Road 99E	190	0.100	
2005	White Catfish	CBD99	Colusa Basin Drain at Road 99E	160	0.109	
2005	White Catfish	CBD99	Colusa Basin Drain at Road 99E	155	0.117	
2005	White Catfish	CBD99	Colusa Basin Drain at Road 99E	160	0.118	
2005	White Catfish	CBD99	Colusa Basin Drain at Road 99E	180	0.120	
2005	White Catfish	CBD99	Colusa Basin Drain at Road 99E	175	0.121	
2005	White Catfish	CBD99	Colusa Basin Drain at Road 99E	193	0.131	
2005	White Catfish	CBD99	Colusa Basin Drain at Road 99E	170	0.138	
2005	White Catfish	CBD99	Colusa Basin Drain at Road 99E	230	0.157	
2005	White Catfish	CBD99	Colusa Basin Drain at Road 99E	229	0.160	
2005	White Catfish	CBD99	Colusa Basin Drain at Road 99E	212	0.174	
2005	White Catfish	CBD99	Colusa Basin Drain at Road 99E	260	0.197	
2005	White Catfish	CBD99	Colusa Basin Drain at Road 99E	182	0.197	
2005	White Catfish	DBAY	Discovery Bay	305	0.045	
2005	White Catfish	DBAY	Discovery Bay	326	0.048	
2005	White Catfish	DBAY	Discovery Bay	394	0.048	
2005	White Catfish	DBAY	Discovery Bay	151	0.072	
2005	White Catfish	DBAY	Discovery Bay	259	0.108	
2005	White Catfish	FRTR	Franks Tract	404	0.033	
2005	White Catfish	FRTR	Franks Tract	346	0.048	
2005	White Catfish	FRTR	Franks Tract	372	0.059	
2005	White Catfish	FRTR	Franks Tract	315	0.088	
2005	White Catfish	FRTR	Franks Tract	351	0.091	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	White Catfish	FRTR	Franks Tract	491	0.102	
2005	White Catfish	FRTR	Franks Tract	304	0.111	
2005	White Catfish	FRTR	Franks Tract	319	0.131	
2005	White Catfish	FRTR	Franks Tract	310	0.174	
2005	White Catfish	FRTR	Franks Tract	246	0.174	
2005	White Catfish	FRTR	Franks Tract	530	0.215	
2005	White Catfish	ITSL	Italian Slough	385	0.052	
2005	White Catfish	ITSL	Italian Slough	331	0.067	
2005	White Catfish	ITSL	Italian Slough	274	0.085	
2005	White Catfish	ITSL	Italian Slough	238	0.087	
2005	White Catfish	ITSL	Italian Slough	252	0.124	
2005	White Catfish	ITSL	Italian Slough	246	0.227	
2005	White Catfish	MRIND	Middle River at Bullfrog	310	0.082	
2005	White Catfish	MRIND	Middle River at Bullfrog	300	0.107	
2005	White Catfish	MRIND	Middle River at Bullfrog	304	0.134	
2005	White Catfish	MRIND	Middle River at Bullfrog	250	0.159	
2005	White Catfish	MRIND	Middle River at Bullfrog	250	0.180	
2005	White Catfish	MRIND	Middle River at Bullfrog	229	0.215	
2005	White Catfish	MRIND	Middle River at Bullfrog	235	0.232	
2005	White Catfish	MRIND	Middle River at Bullfrog	228	0.294	
2005	White Catfish	MRHW4	Middle River at Hwy 4	274	0.163	
2005	White Catfish	MRMIS	Middle River at Mildred Island	251	0.145	
2005	White Catfish	MRMIS	Middle River at Mildred Island	204	0.369	
2005	White Catfish	ORTB	Old River at Tracy Blvd.	286	0.065	
2005	White Catfish	ORTB	Old River at Tracy Blvd.	271	0.088	
2005	White Catfish	ORTB	Old River at Tracy Blvd.	289	0.093	
2005	White Catfish	ORTB	Old River at Tracy Blvd.	292	0.103	
2005	White Catfish	ORTB	Old River at Tracy Blvd.	309	0.106	
2005	White Catfish	ORTB	Old River at Tracy Blvd.	311	0.116	
2005	White Catfish	ORTB	Old River at Tracy Blvd.	322	0.127	
2005	White Catfish	ORTB	Old River at Tracy Blvd.	346	0.132	
2005	White Catfish	ORTB	Old River at Tracy Blvd.	280	0.139	
2005	White Catfish	PCUT	Paradise Cut	305	0.063	
2005	White Catfish	PCUT	Paradise Cut	270	0.076	
2005	White Catfish	PCUT	Paradise Cut	254	0.076	
2005	White Catfish	PCUT	Paradise Cut	519	0.113	
2005	White Catfish	PCUT	Paradise Cut	600	0.120	
2005	White Catfish	PCUT	Paradise Cut	244	0.146	
2005	White Catfish	PCUT	Paradise Cut	311	0.147	
2005	White Catfish	PCUT	Paradise Cut	301	0.162	
2005	White Catfish	PCUT	Paradise Cut	251	0.216	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	White Catfish	POTSL	Potato Slough	327	0.127	
2005	White Catfish	NDPRSL	Prospect Slough	334	0.196	
2005	White Catfish	NDPRSL	Prospect Slough	199	0.207	
2005	White Catfish	NDPRSL	Prospect Slough	330	0.230	
2005	White Catfish	NDPRSL	Prospect Slough	290	0.260	
2005	White Catfish	NDPRSL	Prospect Slough	315	0.279	
2005	White Catfish	NDPRSL	Prospect Slough	270	0.287	
2005	White Catfish	NDPRSL	Prospect Slough	273	0.294	
2005	White Catfish	NDPRSL	Prospect Slough	215	0.297	
2005	White Catfish	NDPRSL	Prospect Slough	325	0.393	
2005	White Catfish	NDPRSL	Prospect Slough	300	0.395	
2005	White Catfish	NDPRSL	Prospect Slough	212	0.396	
2005	White Catfish	NDPRSL	Prospect Slough	308	0.472	
2005	White Catfish	NDPRSL	Prospect Slough	220	0.546	
2005	White Catfish	SACRIO	Sacramento River at Rio Vista	293	0.134	
2005	White Catfish	SACRIO	Sacramento River at Rio Vista	395	0.141	
2005	White Catfish	SACRIO	Sacramento River at Rio Vista	315	0.145	
2005	White Catfish	SACRIO	Sacramento River at Rio Vista	296	0.159	
2005	White Catfish	SACRIO	Sacramento River at Rio Vista	275	0.220	
2005	White Catfish	SACRIO	Sacramento River at Rio Vista	311	0.225	
2005	White Catfish	SACRIO	Sacramento River at Rio Vista	331	0.232	
2005	White Catfish	SACRIO	Sacramento River at Rio Vista	300	0.242	
2005	White Catfish	SACRIO	Sacramento River at Rio Vista	335	0.323	
2005	White Catfish	SACRIO	Sacramento River at Rio Vista	303	0.340	
2005	White Catfish	SACRIO	Sacramento River at Rio Vista	285	0.349	
2005	White Catfish	SACRIO	Sacramento River at Rio Vista	256	0.416	
2005	White Catfish	SACRIO	Sacramento River at Rio Vista	280	0.441	
2005	White Catfish	SJCL	San Joaquin River at Crows Landing	249	0.190	
2005	White Catfish	SJCL	San Joaquin River at Crows Landing	233	0.215	
2005	White Catfish	SJCL	San Joaquin River at Crows Landing	239	0.296	
2005	White Catfish	SJCL	San Joaquin River at Crows Landing	225	0.301	
2005	White Catfish	SJCL	San Joaquin River at Crows Landing	583	0.384	
2005	White Catfish	SJCL	San Joaquin River at Crows Landing	526	0.530	
2005	White Catfish	SJFF	San Joaquin River at Fremont Ford	224	0.240	
2005	White Catfish	SJFF	San Joaquin River at Fremont Ford	266	0.240	
2005	White Catfish	SJFF	San Joaquin River at Fremont Ford	229	0.257	
2005	White Catfish	SJFF	San Joaquin River at Fremont Ford	200	0.263	
2005	White Catfish	SJFF	San Joaquin River at Fremont Ford	201	0.291	
2005	White Catfish	SJFF	San Joaquin River at Fremont Ford	210	0.313	
2005	White Catfish	SJFF	San Joaquin River at Fremont Ford	256	0.318	
2005	White Catfish	SJFF	San Joaquin River at Fremont Ford	254	0.334	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	White Catfish	SJFF	San Joaquin River at Fremont Ford	196	0.348	
2005	White Catfish	SJH99	San Joaquin River at Hwy 99	294	0.063	
2005	White Catfish	SJH99	San Joaquin River at Hwy 99	311	0.100	
2005	White Catfish	SJLPK	San Joaquin River at Laird Park	624	0.131	
2005	White Catfish	SJLPK	San Joaquin River at Laird Park	226	0.197	
2005	White Catfish	SJLPK	San Joaquin River at Laird Park	243	0.270	
2005	White Catfish	SJLPK	San Joaquin River at Laird Park	234	0.298	
2005	White Catfish	SJLPK	San Joaquin River at Laird Park	246	0.309	
2005	White Catfish	SJLPK	San Joaquin River at Laird Park	231	0.346	
2005	White Catfish	SJLPK	San Joaquin River at Laird Park	229	0.395	
2005	White Catfish	SJLPK	San Joaquin River at Laird Park	229	0.443	
2005	White Catfish	SJMO	San Joaquin River at Mossdale	262	0.136	
2005	White Catfish	SJMO	San Joaquin River at Mossdale	269	0.139	
2005	White Catfish	SJMO	San Joaquin River at Mossdale	279	0.148	
2005	White Catfish	SJMO	San Joaquin River at Mossdale	274	0.155	
2005	White Catfish	SJMO	San Joaquin River at Mossdale	243	0.165	
2005	White Catfish	SJMO	San Joaquin River at Mossdale	256	0.171	
2005	White Catfish	SJMO	San Joaquin River at Mossdale	221	0.257	
2005	White Catfish	SJMO	San Joaquin River at Mossdale	250	0.271	
2005	White Catfish	SJMO	San Joaquin River at Mossdale	276	0.448	
2005	White Catfish	SJPAT	San Joaquin River at Patterson	203	0.235	
2005	White Catfish	SJPAT	San Joaquin River at Patterson	261	0.323	
2005	White Catfish	SJPAT	San Joaquin River at Patterson	221	0.442	
2005	White Catfish	SJVER	San Joaquin River at Vernalis	253	0.132	
2005	White Catfish	SJVER	San Joaquin River at Vernalis	265	0.140	
2005	White Catfish	SJVER	San Joaquin River at Vernalis	205	0.177	
2005	White Catfish	SJVER	San Joaquin River at Vernalis	273	0.178	
2005	White Catfish	SJVER	San Joaquin River at Vernalis	598	0.219	
2005	White Catfish	SJVER	San Joaquin River at Vernalis	504	0.235	
2005	White Catfish	SJVER	San Joaquin River at Vernalis	240	0.237	
2005	White Catfish	SJVER	San Joaquin River at Vernalis	256	0.289	
2005	White Catfish	SJVER	San Joaquin River at Vernalis	555	0.315	
2005	White Catfish	SJVER	San Joaquin River at Vernalis	235	0.353	
2005	White Catfish	SJVER	San Joaquin River at Vernalis	240	0.368	
2005	White Catfish	SMSL	Sand Mound Slough	347	0.048	
2005	White Catfish	SMSL	Sand Mound Slough	378	0.087	
2005	White Catfish	SMSL	Sand Mound Slough	266	0.090	
2005	White Catfish	SMSL	Sand Mound Slough	388	0.121	
2005	White Catfish	SMSL	Sand Mound Slough	207	0.123	
2005	White Catfish	SMSL	Sand Mound Slough	251	0.124	
2005	White Catfish	SMSL	Sand Mound Slough	235	0.162	

Year	Species	Site Code	Site Name	Total Length (mm)	Hg Concentration (ppm)	Comment
2005	White Catfish	SMSL	Sand Mound Slough	250	0.247	
2005	White Catfish	SMSL	Sand Mound Slough	232	0.271	
2005	White Catfish	SMCNL	Smith Canal	262	0.063	
2005	White Catfish	SMCNL	Smith Canal	249	0.072	
2005	White Catfish	SMCNL	Smith Canal	294	0.072	
2005	White Catfish	SMCNL	Smith Canal	252	0.078	
2005	White Catfish	SMCNL	Smith Canal	240	0.092	
2005	White Catfish	SMCNL	Smith Canal	252	0.097	
2005	White Catfish	SMCNL	Smith Canal	225	0.106	
2005	White Catfish	SMCNL	Smith Canal	266	0.108	
2005	White Catfish	SMCNL	Smith Canal	281	0.124	
2005	White Catfish	SRCSP	Stanislaus River at Caswell State Park	229	0.135	
2005	White Catfish	SRCSP	Stanislaus River at Caswell State Park	182	0.220	
2005	White Catfish	WDCUT	Werner Dredger Cut	347	0.060	
2005	White Catfish	WDCUT	Werner Dredger Cut	325	0.067	
2005	White Catfish	WDCUT	Werner Dredger Cut	380	0.069	
2005	White Catfish	WDCUT	Werner Dredger Cut	326	0.073	
2005	White Catfish	WDCUT	Werner Dredger Cut	325	0.090	
2005	White Catfish	WDCUT	Werner Dredger Cut	260	0.099	
2005	White Catfish	WDCUT	Werner Dredger Cut	252	0.140	
2005	White Catfish	WHSL	Whiskey Slough	335	0.057	
2005	White Catfish	WHSL	Whiskey Slough	308	0.060	
2005	White Catfish	WHSL	Whiskey Slough	306	0.067	
2005	White Catfish	WHSL	Whiskey Slough	350	0.071	
2005	White Catfish	WHSL	Whiskey Slough	340	0.087	
2005	White Catfish	WHSL	Whiskey Slough	532	0.106	
2005	White Catfish	WHSL	Whiskey Slough	281	0.112	
2005	White Catfish	WHSL	Whiskey Slough	354	0.118	
2005	White Catfish	WHSL	Whiskey Slough	362	0.138	

APPENDIX 2

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MEMORANDUM

To: Tom Grieb, Tetratech

From: Aroon Melwani, SFEI

CC: Letitia Grenier, Jay Davis, Jennifer Hunt (SFEI)

Date: 5/29/2007

Re: Comparison of linear and polynomial ANCOVA models for analysis of 2005 FMP sport fish data

Attachments:
Appendix 2 Figures A and B; Table A and B

At the FMP Annual Meeting in June 2006, the FMP Peer Review Panel and Technical Review Committee recommended examining standardized fish concentrations based on linear ANCOVA and confidence intervals, and comparing these results to the Tremblay (polynomial) analysis. This memo summarizes our findings for this comparison.

Four species were found to be suitable for the ANCOVA analysis. The criteria were: 1) an overall relationship of length to mercury, 2) at least 8 samples at each site, and 3) a range in lengths of approximately 130 mm or more at each site. The species that met these criteria were largemouth bass (43 sites; n = 479), Sacramento sucker (20 sites; n = 200), Sacramento pikeminnow (10 sites; n = 106), and channel catfish (6 sites; n=55).

The comparison of linear and polynomial models is summarized in Table A.

Table A. Comparison of number and types of significant length-mercury relationships between the models.

Species	# Sites	Model Applied	Linear Relationship	Polynomial Relationship	No Relationship
Largemouth Bass	43	Polynomial	35	8	0
		Linear	43	-	0
Sacramento Sucker	20	Polynomial	2	18	0
		Linear	20	-	0
Sacramento Pikeminnow	10	Polynomial	9	1	0
		Linear	10	-	0
Channel Catfish	6	Polynomial	2	0	4
		Linear	2	-	4

Table 1 suggests that when species are represented by low sample sizes, the Tremblay method does not often detect a polynomial relationship of length: mercury. The higher parameterization of this model and lower degrees of freedom (due to a small sample size) may be reasons for this observation. However, with high sample sizes, polynomial relationships were shown. To further explore the differing response to the Tremblay model application, we evaluated the two models by comparing two of the species, shown in the attached table (Table B). Largemouth bass and Sacramento pikeminnow were selected for this evaluation because they have large and small sample sizes, respectively.

Table B shows the intercept and slope terms that resulted from the application of both the linear and polynomial models. In addition, the predicted mercury at 350 mm and confidence intervals (on raw units basis; ug/g wet wt) have been presented. To compare these model results, the final five columns present the difference in each parameter or concentration value (polynomial model minus the linear model). Since the length^2 parameter cannot be contrasted with a term in the linear model, the value "Yes" is shown in this column for reference, for sites that retained the polynomial term in the Tremblay analysis.

All largemouth bass sites had a linear length: mercury relationship in the Tremblay (polynomial) analysis (Table B). The majority (35 of 43) of sites did not have a polynomial term. Comparing the results for these sites to those from the linear model indicated a small average difference between intercepts (0.00012), and between slopes (-0.000045). The average differences in predicted mercury concentration at 350 mm (-0.000024 ug/g) and the width of confidence intervals (– 0.0056 ug/g) were also relatively small. This comparison indicates that the Tremblay model performs well at sites that do not have a polynomial relationship, giving results that closely match those from linear ANCOVA.

At the eight sites that exhibited a non-linear relationship of mercury to length in the Tremblay analysis, the intercept parameter differed by an average of -0.0304 between the polynomial and linear models. The linear slope term also varied, differing by an average of 0.00064 between models. A large difference was evident in the predicted mercury concentrations as well. The predicted mercury differed by an average of -0.026 ug/g. Similarly, the confidence interval widths differed by an average of 0.034 ug/g. These model differences, as well as comparison of best-fit curves (Figure 1) indicate that the polynomial curve appeared to better fit the data. Thus, a real non-linear length: mercury relationship may exist at these largemouth bass sites.

Modeling of the Sacramento pikeminnow data showed a differing effect from the Tremblay analysis. The Tremblay method indicated little difference in length: mercury between sites, with most (9 of 10) sites having identical parameter estimates. The linear method gave more variable intercept values, although most slope estimates were identical. At the 9 sites with no polynomial term from the Tremblay model, intercepts varied by an average of -0.0026 and the slopes by -0.00015 between the models. The predicted mercury concentration at 350mm for these sites differed by an average of -0.0055, and the confidence interval widths by -0.110. These average differences were an order of magnitude greater than between models for the largemouth bass data. Note that the difference between confidence interval widths is largely due to the pooling of sample size (resulting in small confidence intervals) in the Tremblay method, due to 9 of 10 sites having the same parameter estimates.

Only a single site showed a non-linear length: mercury relationship in the Tremblay analysis of pikeminnow (Figure 2). Although the polynomial curve appeared to be a better fit for that site (Figure 2), the estimates from the Tremblay method for the other sites indicate a less precise fit. In-fact, Figure 2 indicates that some of the sites should be polynomial, yet the Tremblay model resulted in linear relationships. The intercept at the single polynomial site was very different between models (-0.127), and the slope differed slightly (-0.000234). The average difference in predicted mercury concentration (-0.151) and width of confidence interval (-0.0756) was relatively large. This model comparison suggests that the parameter estimates resulting from the Tremblay analysis may be inappropriate, because they fail to reflect differences between sites that are evident in the linear ANCOVA. We propose that the simple linear analysis should therefore be employed.

Overall, we found that the Tremblay method performed well when samples sizes were large. When sample sizes were small, however, the data appeared to be too sparse to support the complexity of the Tremblay model (too many parameters, too few degrees of freedom). Future analyses should consider both options when sample sizes are intermediate. Examination of both model estimates on a scatter plot are the best evidence for model fit, although maximum likelihood methods may be employed in future years to evaluate different models.

In summary, the following models will be employed for final ANCOVA analyses of 2005 data:

Largemouth Bass – Tremblay (polynomial)
Sacramento Sucker – Tremblay (polynomial)
Sacramento Pike Minnow – Simple Linear
Channel Catfish – Simple Linear

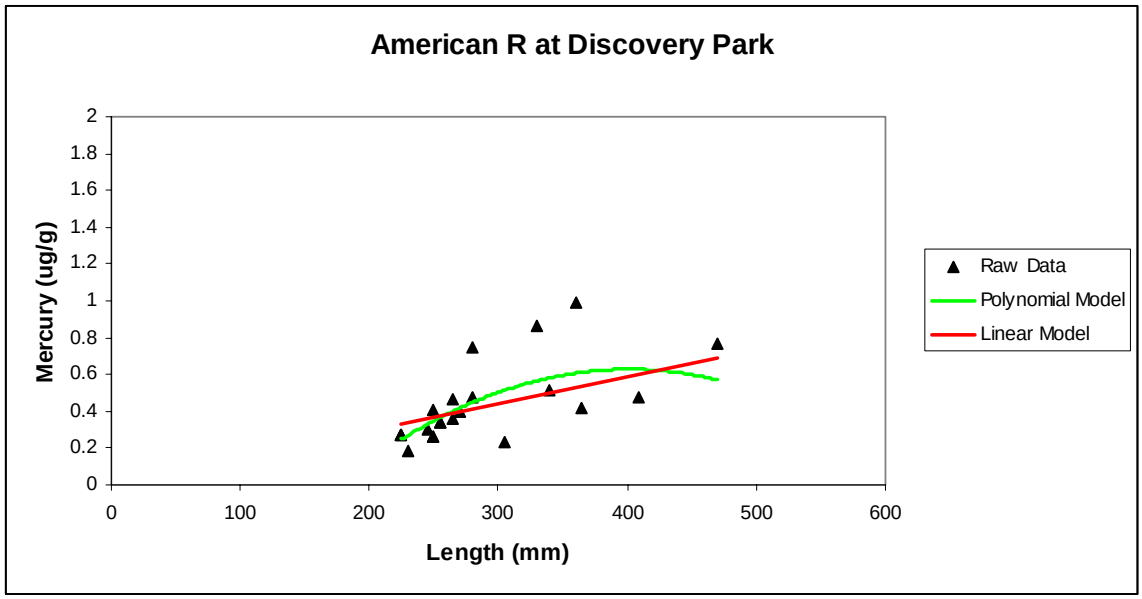
Thanks and kind regards,

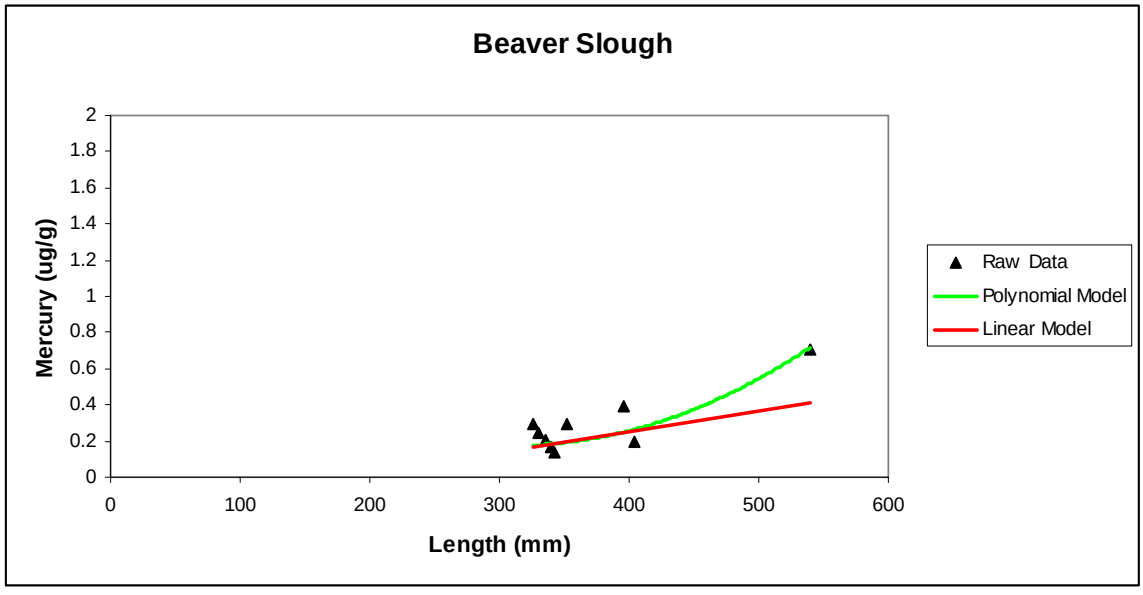
Aroon Melwani

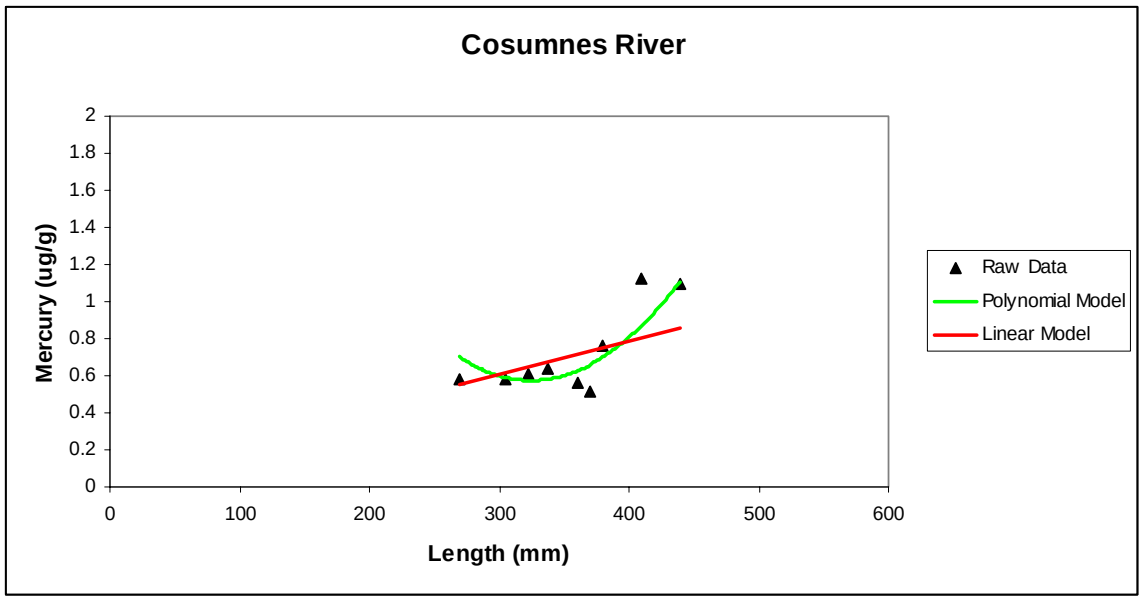
Appendix 2 (cont'd.) Supplemental Figure A

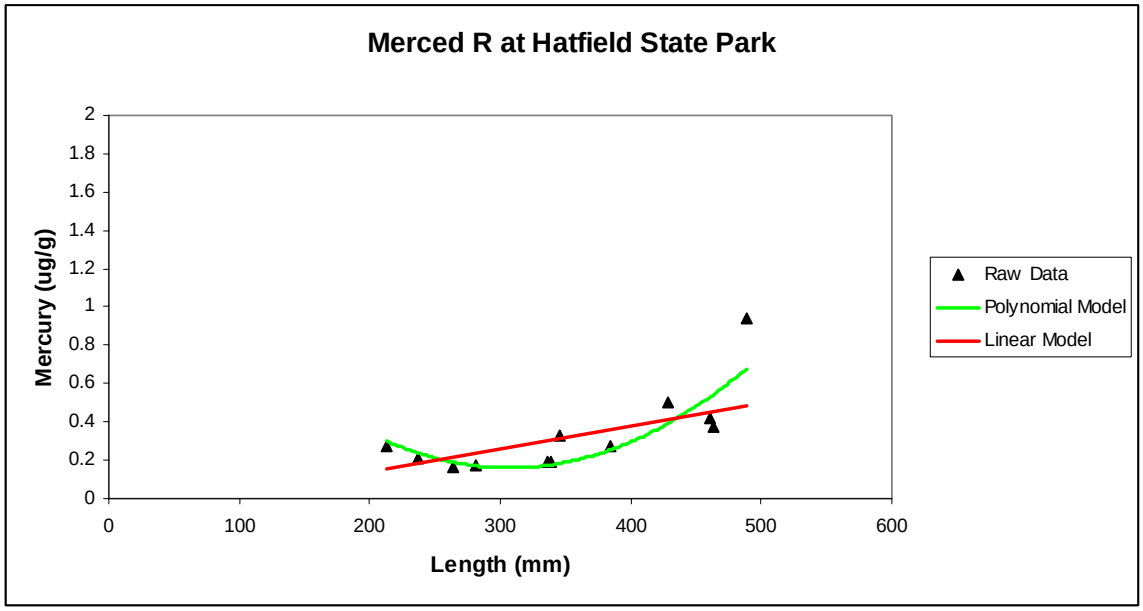
Largemouth Bass Sites Comparing Linear and Polynomial Curves

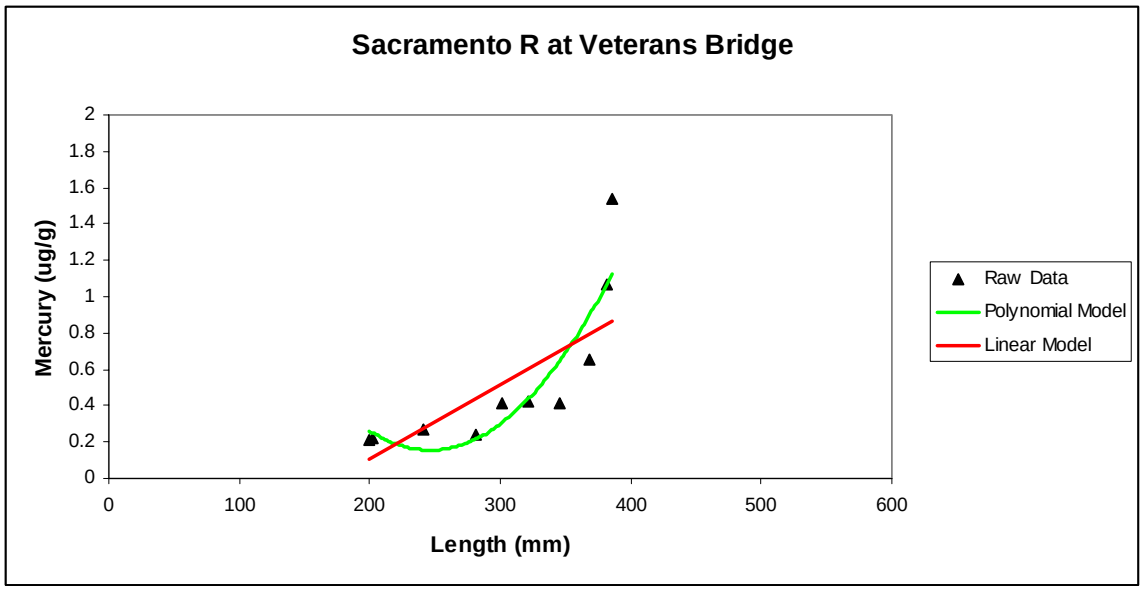
Shown below are the eight sites with a significant polynomial term in the Tremblay analysis. For comparison, I have also shown the linear model estimate. For the majority of these sites, the polynomial curve appeared to better fit the data.

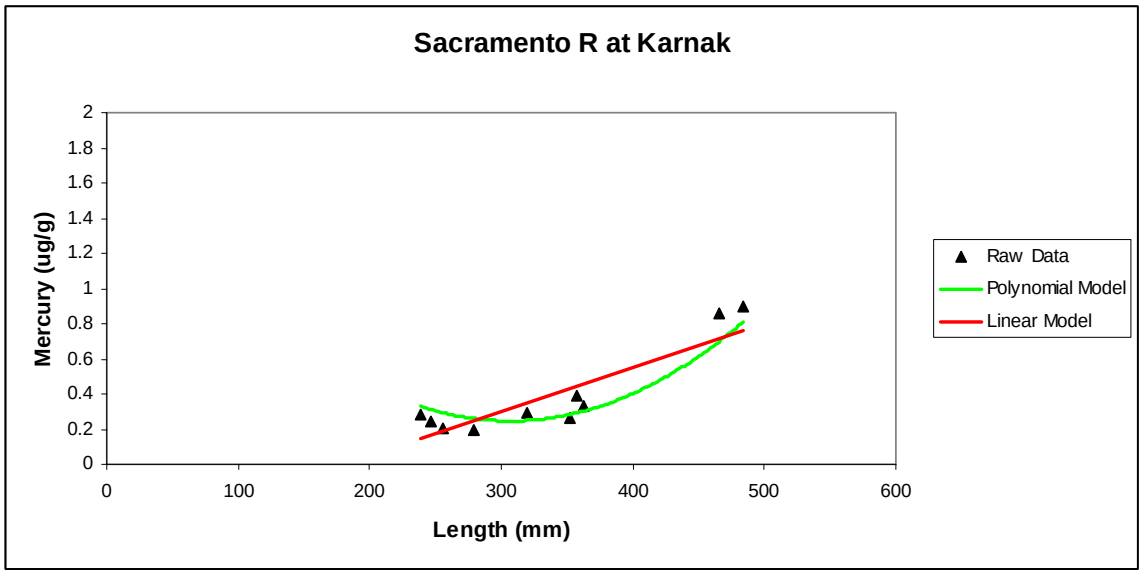


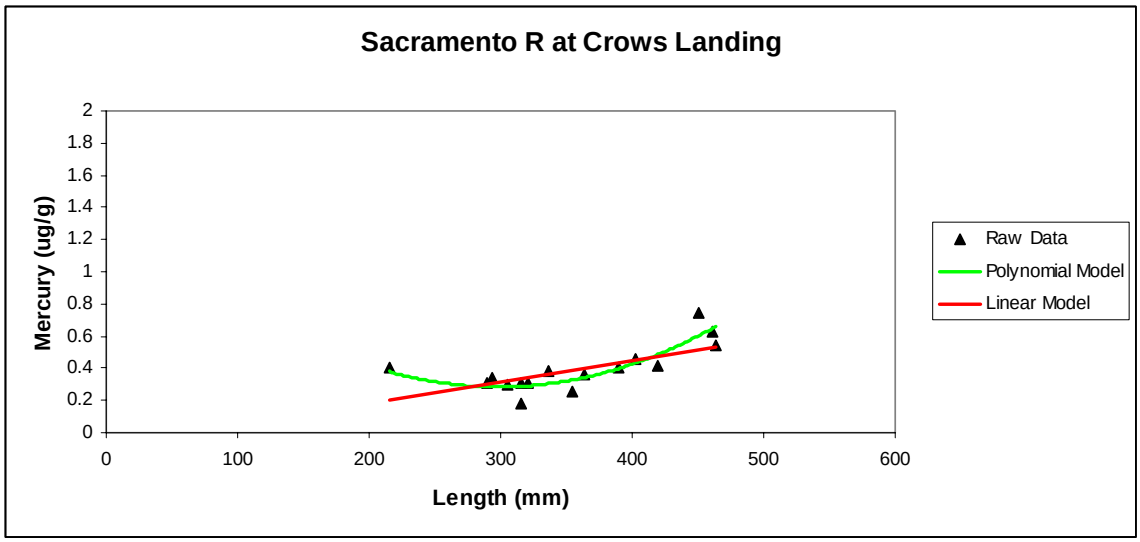


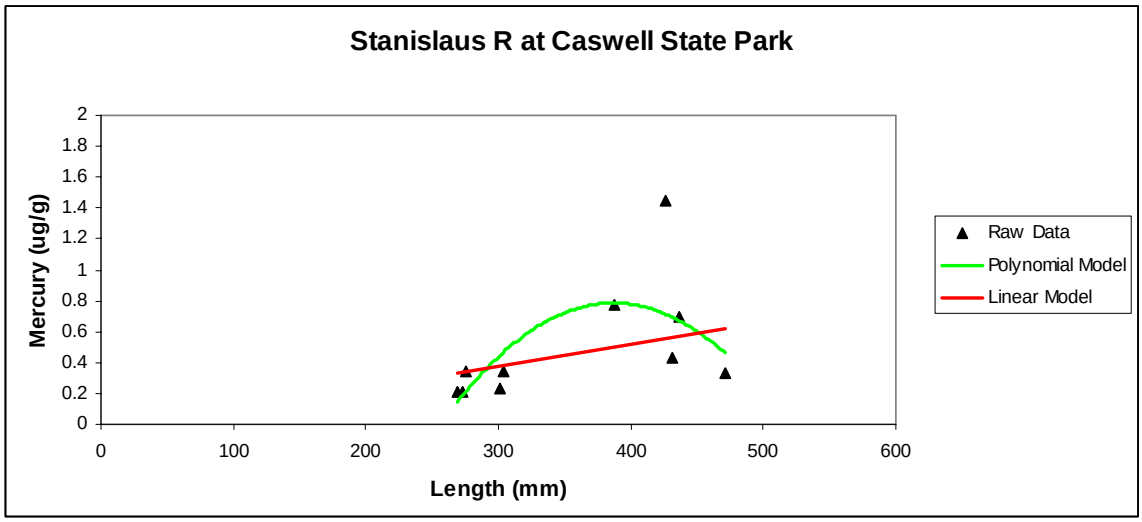

Cosumnes River
Mercury (ug/g)
Length (mm)
Raw Data
Polynomial Model
Linear Model


Merced R at Hatfield State Park
Mercury (ug/g)
Length (mm)
Raw Data
Polynomial Model
Linear Model


Sacramento R at Veterans Bridge
Mercury (ug/g)
Length (mm)
Raw Data
Polynomial Model
Linear Model


Sacramento R at Karnak
Mercury (ug/g)
Length (mm)
Raw Data
Polynomial Model
Linear Model

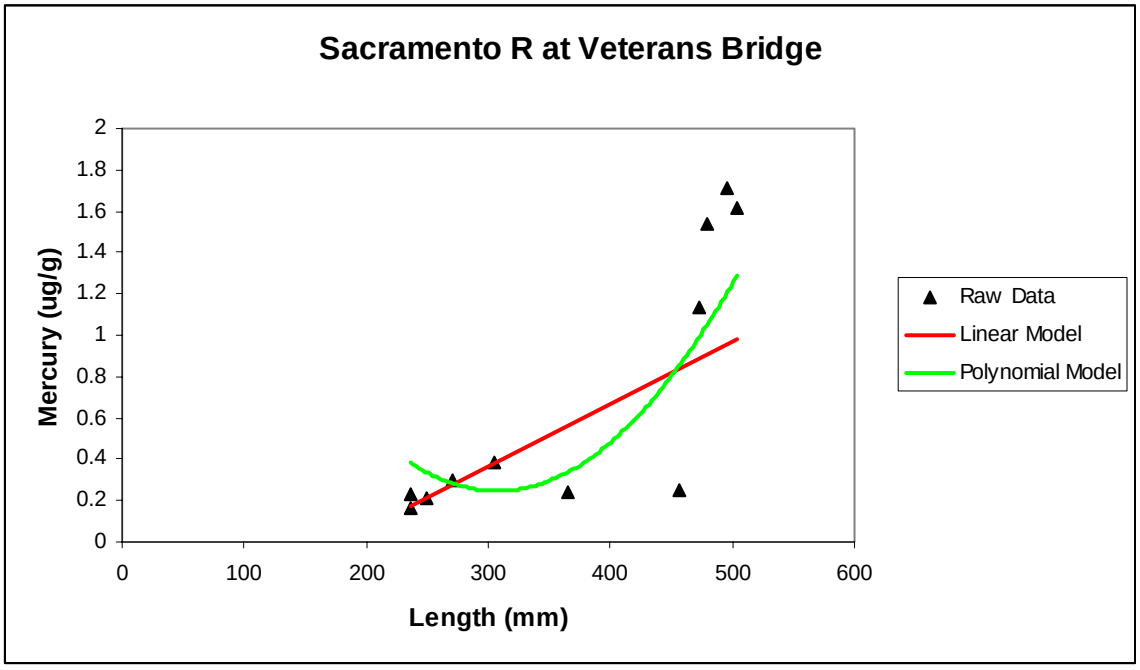

Sacramento R at Crows Landing
Mercury (ug/g)
Length (mm)
Raw Data
Polynomial Model
Linear Model


Stanislaus R at Caswell State Park
Mercury (ug/g)
Length (mm)
Raw Data
Polynomial Model
Linear Model

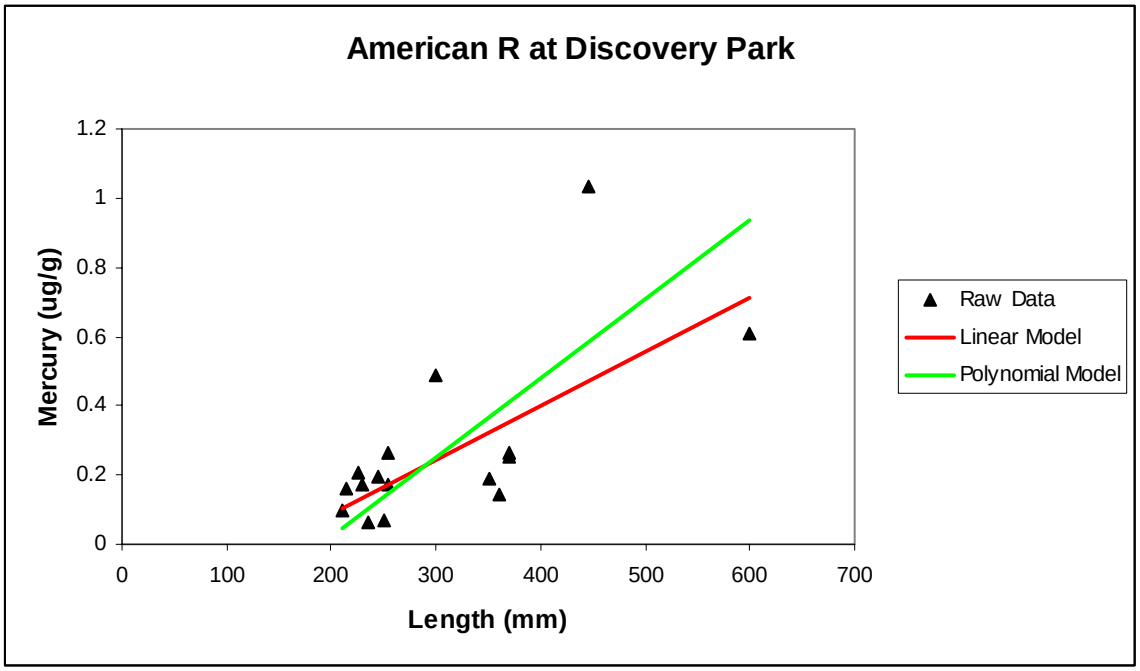
Appendix 2 (cont'd.) Supplemental Figure B

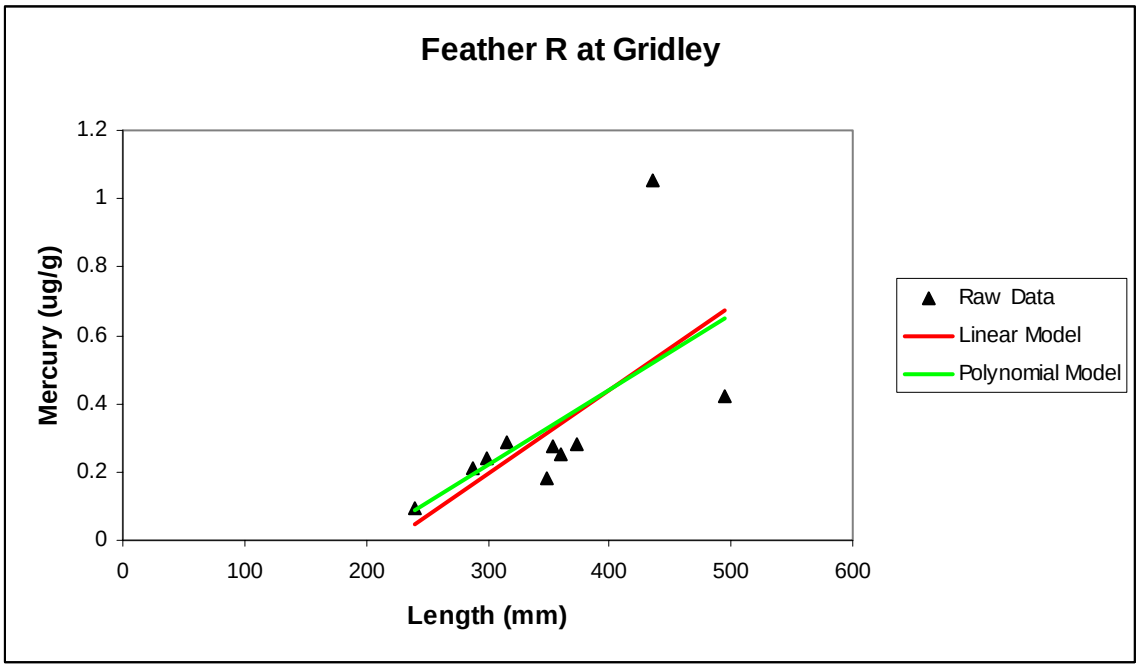
Sacramento Pikeminnow Sites Comparing Linear and Polynomial Curves

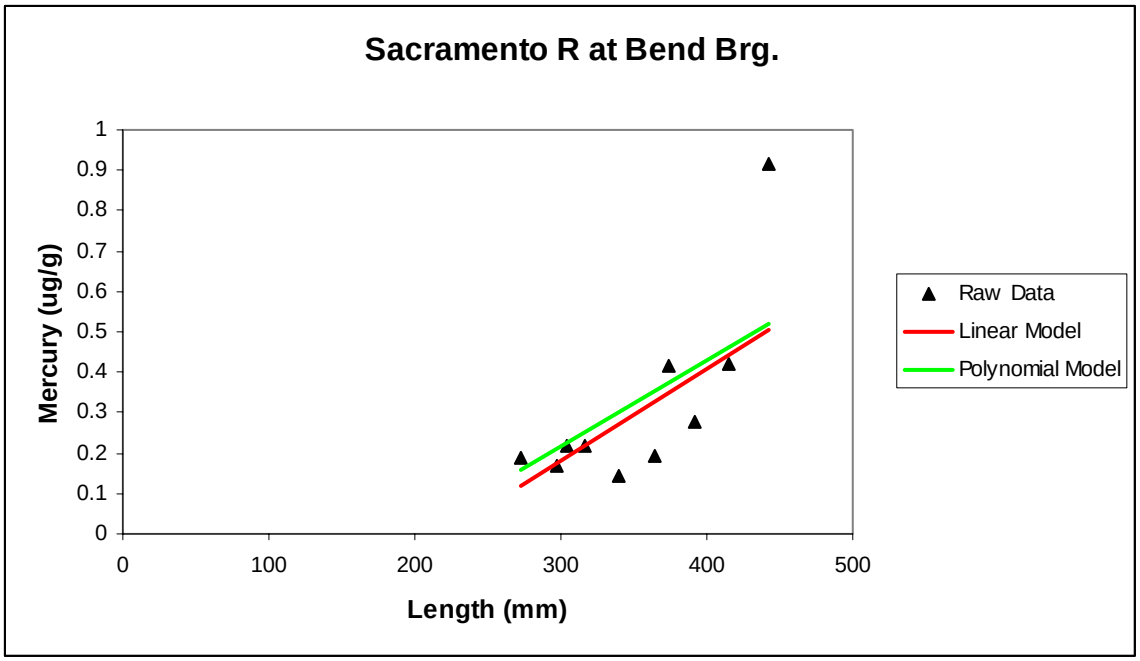
Shown below is the one site that retained the polynomial term in the Tremblay analysis. For comparison, I have also shown the linear model estimate.

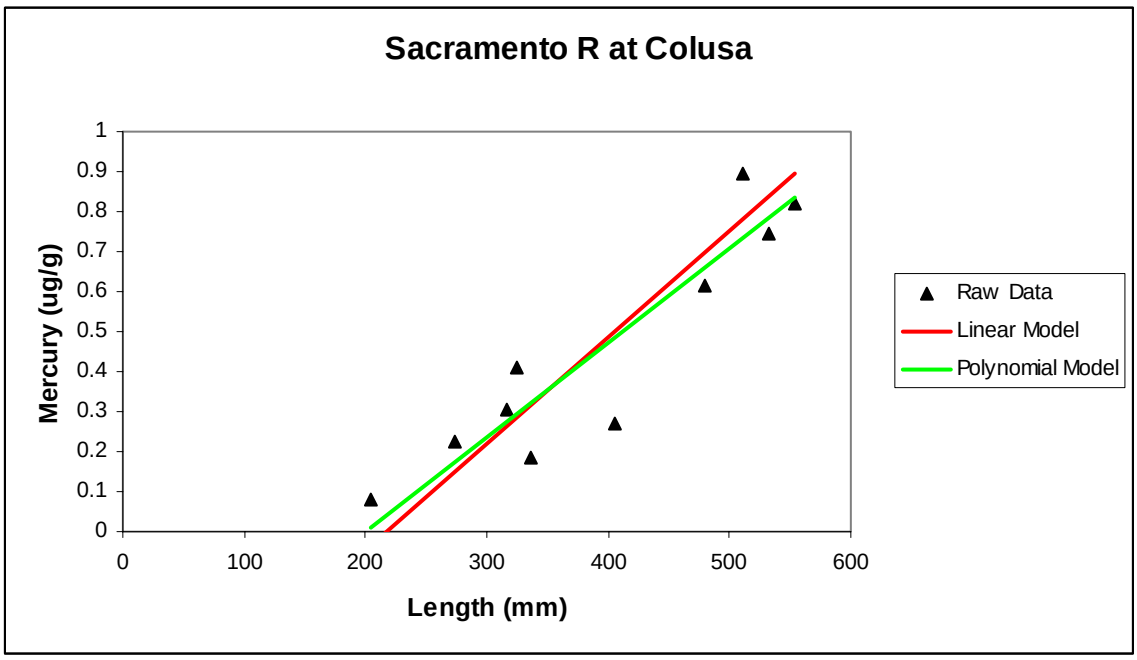


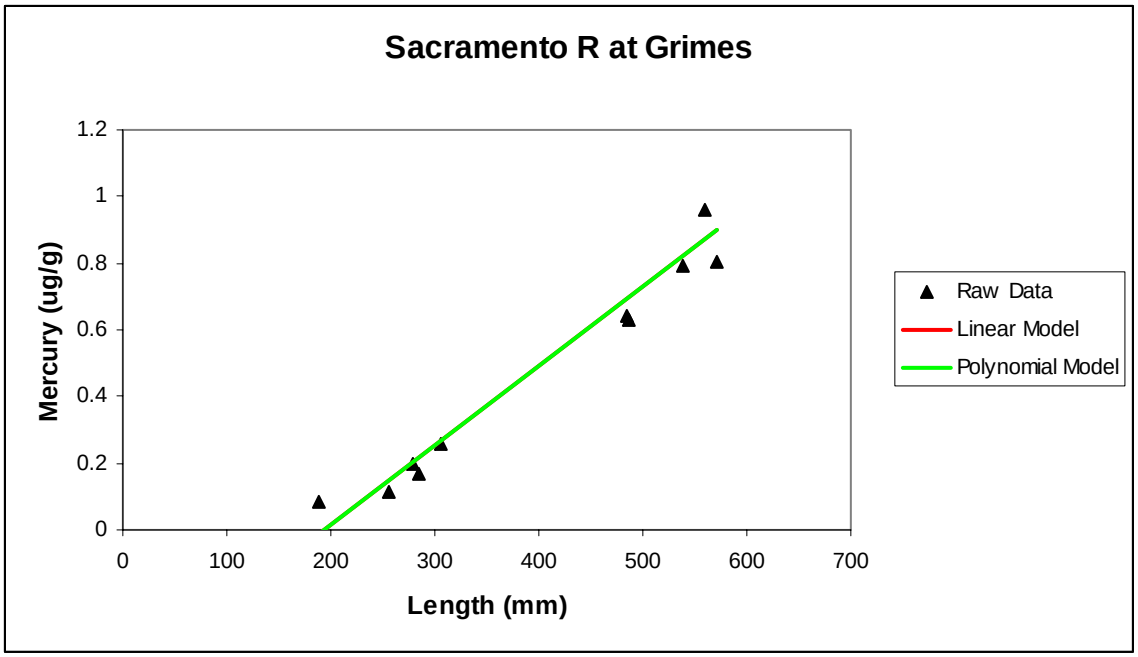
The remainder of the plots resulted in linear curves by both the Tremblay and Linear models, with the linear model providing a better fit in most cases. It appears that some of these sites should be polynomial regressions based on the shape of the scatter plots, but the data are too sparse to support second-order terms in the model.



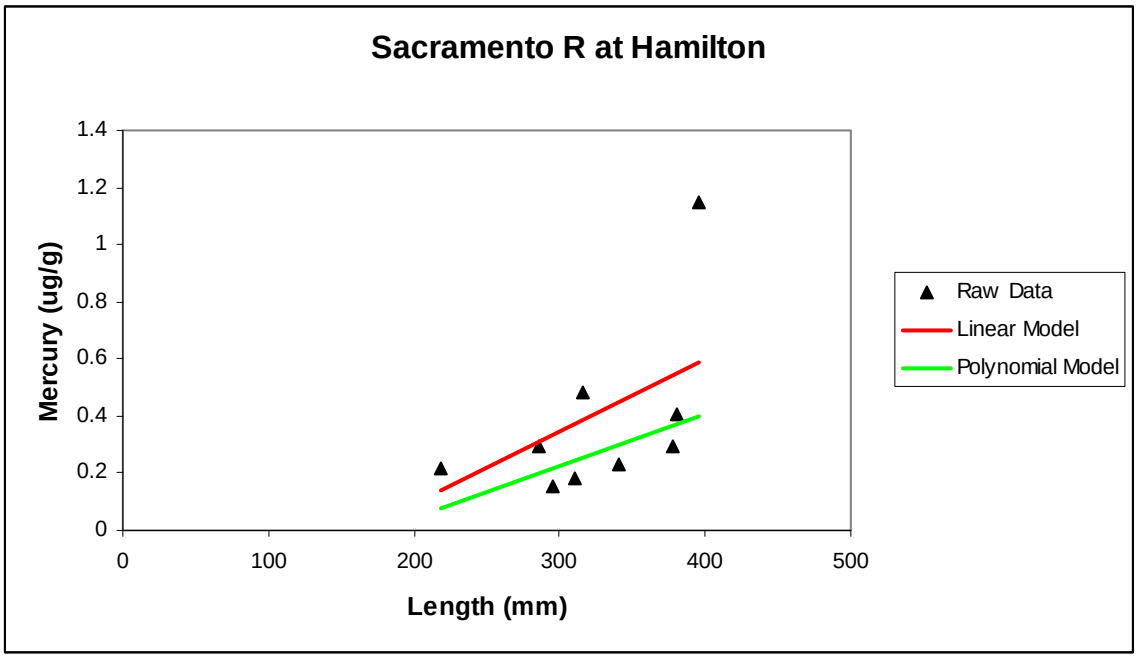


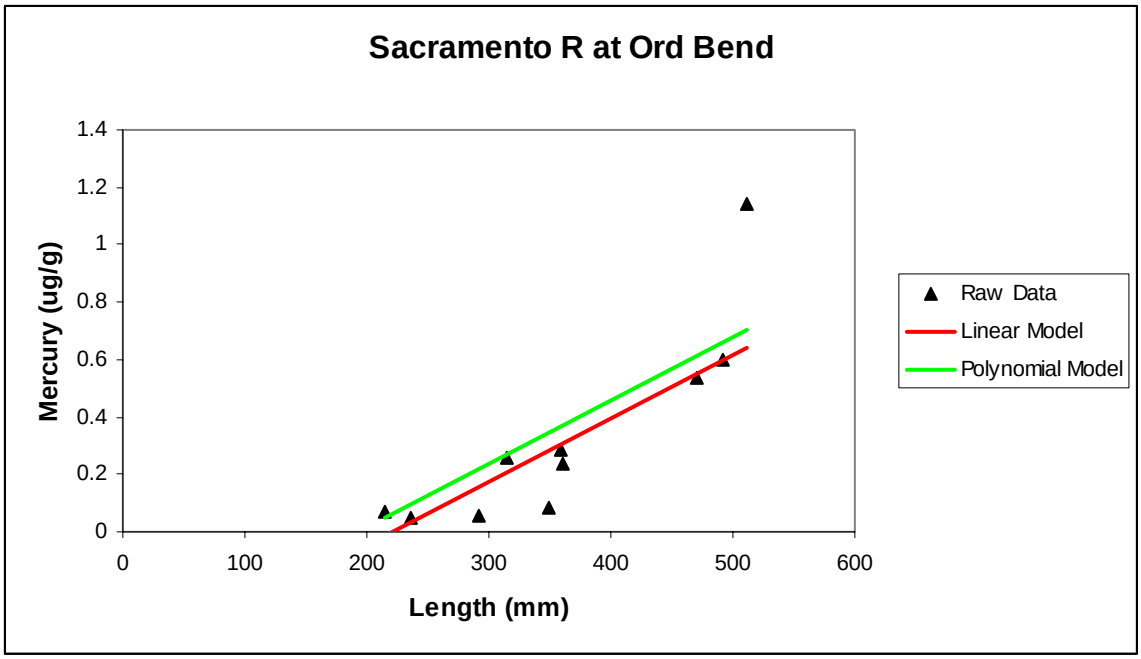

Sacramento R at Bend Brg.
Mercury (ug/g)
Length (mm)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
100
200
300
400
500
Raw Data
Linear Model
Polynomial Model

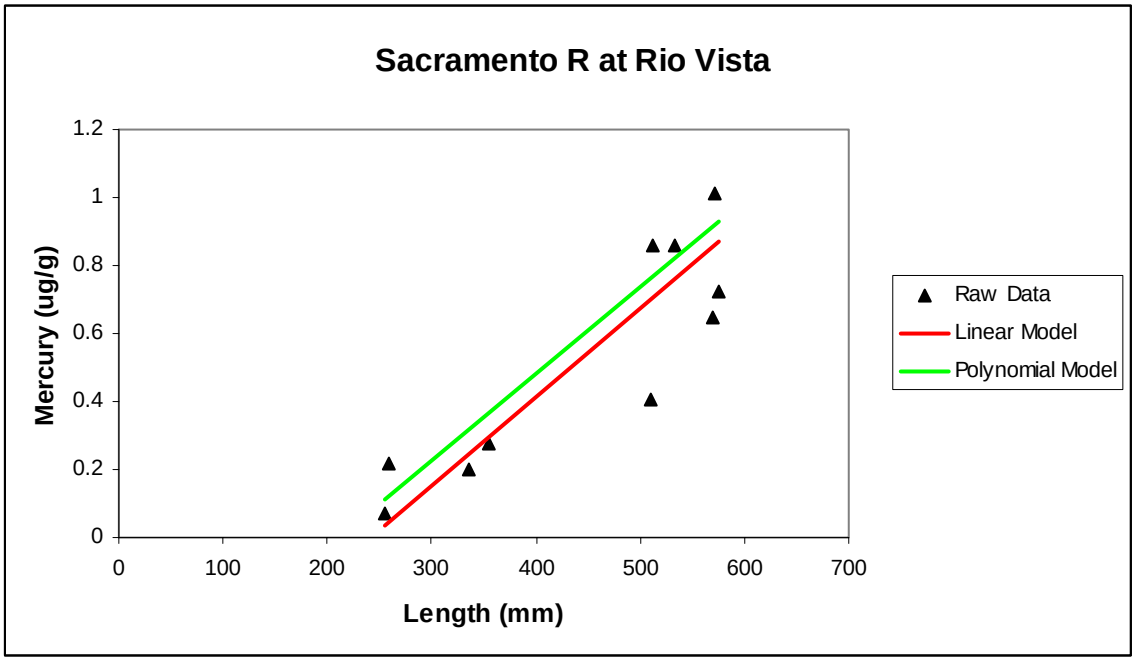

Sacramento R at Colusa
Mercury (ug/g)
Length (mm)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
100
200
300
400
500
600
Raw Data
Linear Model
Polynomial Model

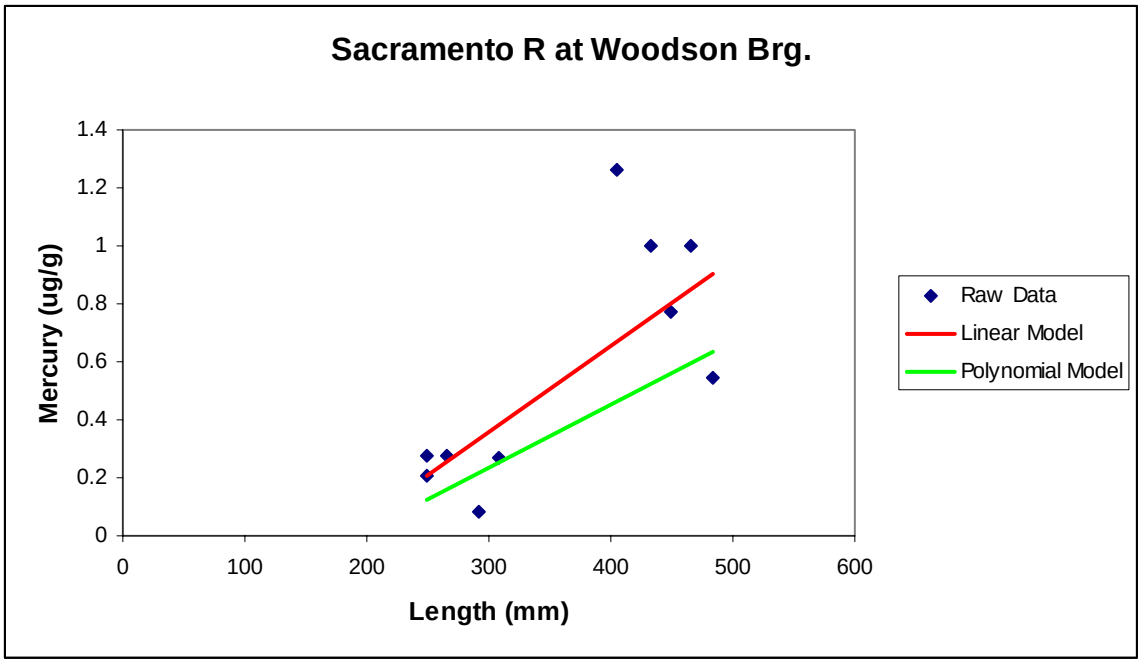


Note: The above plot has same linear and polynomial predicted values, *i.e.*, same regression.




Sacramento R at Ord Bend
Mercury (ug/g)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
100
200
300
400
500
600
Length (mm)
Raw Data
Linear Model
Polynomial Model


Sacramento R at Rio Vista
Mercury (ug/g)
1.2
1
0.8
0.6
0.4
0.2
0
0
100
200
300
400
500
600
700
Length (mm)
Raw Data
Linear Model
Polynomial Model


Sacramento R at Woodson Brg.
Mercury (ug/g)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
100
200
300
400
500
600
Length (mm)
Raw Data
Linear Model
Polynomial Model

Appendix 2 (cont'd) Table B. Comparison of parameters and predicted concentrations between Tremblay and Linear ANCOVA

		Tremblay Model							Linear ANCOVA Model						Difference Between Models (Polynomial Result - Linear Result)				
Species	Site	Intercept	Length	Length^2	Predict Hg	LCI 95%	UCI 95%	Width CI 95%	Intercept	Length	Predict Hg	LCI 95%	UCI 95%	Width CI 95%	Intercept	Length	Length^2	Predict Hg	Width CI 95%
Largemouth Bass	American R at Discovery Pk	0.77370	0.00099	-0.00001	0.60368	0.50352	0.71293	0.20941	0.70554	0.00107	0.50291	0.44642	0.56274	0.11632	0.06816	-0.00007	Yes	0.10077	0.09309
Largemouth Bass	American R at Nimbus Dam	0.78102	0.00378		0.63021	0.53559	0.73253	0.19694	0.78102	0.00378	0.63021	0.52987	0.73926	0.20939	0.00000	0.00000	No	0.00000	-0.01245
Largemouth Bass	Beaver Sl	0.43629	0.00099	0.00001	0.19337	0.18141	0.20572	0.02431	0.43627	0.00107	0.19350	0.18063	0.20682	0.02618	0.00002	-0.00007	Yes	-0.00013	-0.00187
Largemouth Bass	Big Break	0.52101	0.00099		0.27498	0.21918	0.33711	0.11792	0.52084	0.00107	0.27506	0.21593	0.34132	0.12540	0.00017	-0.00007	No	-0.00007	-0.00747
Largemouth Bass	Calaveras Sl	0.43629	0.00099		0.19331	0.18135	0.20566	0.02431	0.43627	0.00107	0.19350	0.18063	0.20682	0.02618	0.00002	-0.00007	No	-0.00019	-0.00187
Largemouth Bass	Camanche Res	0.63556	0.00099		0.40824	0.34530	0.47647	0.13118	0.63500	0.00107	0.40784	0.34111	0.48051	0.13940	0.00056	-0.00007	No	0.0004088	-0.0082226
Largemouth Bass	Cosumnes R	0.77409	0.00099	0.00002	0.60486	0.48786	0.73443	0.24657	0.83018	0.00107	0.69522	0.59412	0.80427	0.21015	-0.0560900	-0.0000724	Yes	-0.0903585	0.0364206
Largemouth Bass	Discovery Bay	0.43629	0.00099		0.19331	0.18135	0.20566	0.02431	0.43627	0.00107	0.19350	0.18063	0.20682	0.02618	0.0000200	-0.0000724	No	-0.0001935	-0.0018682
Largemouth Bass	Feather R at Gridley	0.43629	0.00099		0.19331	0.18135	0.20566	0.02431	0.43627	0.00107	0.19350	0.18063	0.20682	0.02618	0.0000200	-0.0000724	No	-0.0001935	-0.0018682
Largemouth Bass	Feather R at Nicolaus	0.78249	0.00283		0.62744	0.50511	0.76304	0.25793	0.78249	0.00283	0.62744	0.49781	0.77206	0.27425	0.0000000	0.0000000	No	0.0000000	-0.0163176
Largemouth Bass	Franks Tract	0.43629	0.00099		0.19331	0.18135	0.20566	0.02431	0.43627	0.00107	0.19350	0.18063	0.20682	0.02618	0.0000200	-0.0000724	No	-0.0001935	-0.0018682
Largemouth Bass	Honkers Cut	0.43629	0.00099		0.19331	0.18135	0.20566	0.02431	0.43627	0.00107	0.19350	0.18063	0.20682	0.02618	0.0000200	-0.0000724	No	-0.0001935	-0.0018682
Largemouth Bass	Italian Sl	0.50216	0.00099		0.25557	0.19917	0.31901	0.11984	0.50205	0.00107	0.25570	0.19596	0.32340	0.12744	0.0001110	-0.0000724	No	-0.0001315	-0.0075957
Largemouth Bass	Lost Sl	0.70052	0.00099		0.49548	0.41552	0.58246	0.16694	0.70145	0.00107	0.49712	0.41220	0.58999	0.17779	-0.0009300	-0.0000724	No	-0.0016485	-0.0108535
Largemouth Bass	Mendota Pool	0.43629	0.00099		0.19331	0.18135	0.20566	0.02431	0.43627	0.00107	0.19350	0.18063	0.20682	0.02618	0.0000200	-0.0000724	No	-0.0001935	-0.0018682
Largemouth Bass	Merced R at Hatfield St Pk	0.43629	0.00099	0.00001	0.19344	0.18148	0.20578	0.02430	0.55198	0.00107	0.30869	0.25103	0.37231	0.12128	-0.1156900	-0.0000724	Yes	-0.1152497	-0.0969807
Largemouth Bass	Middle R at Bullfrog	0.56326	0.00099		0.32108	0.27951	0.36552	0.08600	0.56407	0.00107	0.32227	0.27810	0.36970	0.09160	-0.0008100	-0.0000724	No	-0.0011910	-0.0055986
Largemouth Bass	Middle R at Hwy 4	0.43629	0.00099		0.19331	0.18135	0.20566	0.02431	0.43627	0.00107	0.19350	0.18063	0.20682	0.02618	0.0000200	-0.0000724	No	-0.0001935	-0.0018682
Largemouth Bass	Mokelumne R at Lodi Lake	0.43629	0.00099		0.19331	0.18135	0.20566	0.02431	0.43627	0.00107	0.19350	0.18063	0.20682	0.02618	0.0000200	-0.0000724	No	-0.0001935	-0.0018682
Largemouth Bass	New Hogan Res	0.63015	0.00099		0.40136	0.33897	0.46903	0.13006	0.62950	0.00107	0.40084	0.33472	0.47293	0.13821	0.0006500	-0.0000724	No	0.0005193	-0.0081465
Largemouth Bass	Old R at Tracy Blvd	0.43629	0.00099		0.19331	0.18135	0.20566	0.02431	0.43627	0.00107	0.19350	0.18063	0.20682	0.02618	0.0000200	-0.0000724	No	-0.0001935	-0.0018682
Largemouth Bass	Paradise Cut	0.43629	0.00099		0.19331	0.18135	0.20566	0.02431	0.43627	0.00107	0.19350	0.18063	0.20682	0.02618	0.0000200	-0.0000724	No	-0.0001935	-0.0018682
Largemouth Bass	Pardee Res	0.51093	0.00099		0.26451	0.21431	0.31998	0.10567	0.51198	0.00107	0.26584	0.21251	0.32514	0.11263	-0.0010570	-0.0000724	No	-0.0013286	-0.0069586
Largemouth Bass	Sacramento R at Butte City	0.73454	0.00229		0.55102	0.45985	0.65044	0.19060	0.73455	0.00229	0.55102	0.45437	0.65701	0.20264	-0.0000100	0.0000000	No	0.0000000	-0.0120416
Largemouth Bass	Sacramento R at Colusa	0.71673	0.00099		0.51856	0.44070	0.60275	0.16205	0.71517	0.00107	0.51666	0.43425	0.60623	0.17198	0.0015600	-0.0000724	No	0.0018993	-0.0099253
Largemouth Bass	Sacramento R at Rio Vista	0.70907	0.00261		0.51545	0.44999	0.58536	0.13538	0.70908	0.00261	0.51545	0.44600	0.58993	0.14393	-0.0000100	0.0000000	No	0.0000000	-0.0085580
Largemouth Bass	Sacramento R at Veterans Br	0.78290	0.00633	0.00003	0.64764	0.53732	0.76823	0.23092	0.83141	0.00311	0.70891	0.59110	0.83743	0.24633	-0.0485100	0.0032203	Yes	-0.0612748	-0.0154103
Largemouth Bass	Sacramento Sl at Karnak	0.52611	0.00099	0.00001	0.28052	0.19998	0.37465	0.17468	0.62448	0.00193	0.39821	0.32540	0.47837	0.15296	-0.0983720	-0.0009360	Yes	-0.1176930	0.0217112
Largemouth Bass	Salt Sl at Hwy 165	0.51108	0.00099		0.26467	0.20998	0.32569	0.11570	0.51129	0.00107	0.26513	0.20714	0.33027	0.12313	-0.0002090	-0.0000724	No	-0.0004632	-0.0074221
Largemouth Bass	San Joaquin R at Crows Land.	0.56199	0.00099	0.00001	0.31978	0.25685	0.38961	0.13277	0.60936	0.00107	0.37574	0.32004	0.43592	0.11588	-0.0473700	-0.0000724	Yes	-0.0559655	0.0168892
Largemouth Bass	San Joaquin R at Fremont Ford	0.61668	0.00099		0.38447	0.31449	0.46149	0.14700	0.61577	0.00107	0.38364	0.30955	0.46568	0.15614	0.0009100	-0.0000724	No	0.0008304	-0.0091320
Largemouth Bass	San Joaquin R at Hwy 99	0.30792	0.00099		0.09691	0.06351	0.13733	0.07382	0.30679	0.00107	0.09635	0.06120	0.13946	0.07826	0.0011300	-0.0000724	No	0.0005533	-0.0044402
Largemouth Bass	San Joaquin R at Mossdale	0.51788	0.00099		0.27171	0.21338	0.33710	0.12372	0.51586	0.00107	0.26986	0.20830	0.33938	0.13108	0.0020250	-0.0000724	No	0.0018525	-0.0073582
Largemouth Bass	San Joaquin R at Patterson	0.58317	0.00099		0.34404	0.28117	0.41324	0.13208	0.58117	0.00107	0.34198	0.27556	0.41556	0.14000	0.0020000	-0.0000724	No	0.0020616	-0.0079205
Largemouth Bass	San Joaquin R at Potato Sl	0.59998	0.00099		0.36404	0.30475	0.42862	0.12387	0.59940	0.00107	0.36363	0.30080	0.43242	0.13163	0.0005800	-0.0000724	No	0.0004102	-0.0077564
Largemouth Bass	San Joaquin R at Vernalis	0.61808	0.00099		0.38621	0.32505	0.45265	0.12760	0.61732	0.00107	0.38557	0.32076	0.45631	0.13555	0.0007600	-0.0000724	No	0.0006460	-0.0079519
Largemouth Bass	Sand Mound Sl	0.43629	0.00099		0.19331	0.18135	0.20566	0.02431	0.43627	0.00107	0.19350	0.18063	0.20682	0.02618	0.0000200	-0.0000724	No	-0.0001935	-0.0018682
Largemouth Bass	Smith Canal	0.43629	0.00099		0.19331	0.18135	0.20566	0.02431	0.43627	0.00107	0.19350	0.18063	0.20682	0.02618	0.0000200	-0.0000724	No	-0.0001935	-0.0018682
Largemouth Bass	Stanislaus R at Caswell St Pk	0.84156	0.00285	-0.00003	0.72395	0.53664	0.93923	0.40259	0.65810	0.00107	0.43787	0.36233	0.52056	0.15823	0.1834600	0.0017818	Yes	0.2860724	0.2443577
Largemouth Bass	Taylor Sl	0.43629	0.00099		0.19331	0.18135	0.20566	0.02431	0.43627	0.00107	0.19350	0.18063	0.20682	0.02618	0.0000200	-0.0000724	No	-0.0001935	-0.0018682
Largemouth Bass	Tuolumne R at Shiloh Rd	0.68149	0.00162		0.47198	0.40406	0.54516	0.14110	0.68487	0.00107	0.47402	0.40185	0.55214	0.15028	-0.0033800	0.0005564	No	-0.0020357	-0.0091865
Largemouth Bass	Werner Dredger Cut	0.43629	0.00099		0.19331	0.18135	0.20566	0.02431	0.43627	0.00107	0.19350	0.18063	0.20682	0.02618	0.0000200	-0.0000724	No	-0.0001935	-0.0018682
Largemouth Bass	Whiskey Sl	0.43629	0.00099		0.19331	0.18135	0.20566	0.02431	0.43627	0.00107	0.19350	0.18063	0.20682	0.02618	0.0000200	-0.0000724	No	-0.0001935	-0.0018682
Sac Pikeminnow	American R at Discovery Pk	0.58502	0.00186		0.31415	0.28277	0.34718	0.06441	0.56144	0.00134	0.29574	0.21901	0.38397	0.16495	0.0235800	0.0005228	No	0.0184088	-0.1005400
Sac Pikeminnow	Feather R at Gridley	0.58502	0.00186		0.31415	0.28277	0.34718	0.06441	0.57095	0.00209	0.29522	0.20699	0.39906	0.19207	0.0140700	-0.0002344	No	0.0189307	-0.1276574
Sac Pikeminnow	Sacramento R at Bend Bridge	0.58502	0.00186		0.31415	0.28277	0.34718	0.06441	0.56087	0.00209	0.28436	0.19792	0.38642	0.18851	0.0241500	-0.0002344	No	0.0297935	-0.1240941
Sac Pikeminnow	Sacramento R at Colusa	0.58502	0.00186		0.31415	0.28277	0.34718	0.06441	0.57616	0.00209	0.30091	0.21089	0.40687	0.19597	0.0088600	-0.0002344	No	0.0132419	-0.1315617
Sac Pikeminnow	Sacramento R at Grimes	0.58502	0.00186		0.31415	0.28277	0.34718	0.06441	0.56762	0.00209	0.29160	0.20306	0.39612	0.19306	0.0174000	-0.0002344	No	0.0225490	-0.1286493
Sac Pikeminnow	Sacramento R at Hamilton City	0.58502	0.00186		0.31415	0.28277	0.34718	0.06441	0.71164	0.00209	0.46788	0.40068	0.54030	0.13962	-0.1266200	-0.0002344	No	-0.1537343	-0.0752107
Sac Pikeminnow	Sacramento R at Ord Bend	0.58502	0.00186		0.31415	0.28277	0.34718	0.06441	0.52011	0.00209	0.24255	0.16327	0.33746	0.17418	0.0649100	-0.0002344	No	0.0716026	-0.1097724
Sac Pikeminnow	Sacramento R at Rio Vista	0.58502	0.00186		0.31415	0.28277	0.34718	0.06441	0.50827	0.00209	0.23102	0.15030	0.32904	0.17874	0.0767500	-0.0002344	No	0.0831246	-0.1143326
Sac Pikeminnow	Sacramento R at Veterans Br	0.58502	0.00186	0.00002	0.31725	0.28604	0.35007	0.06403	0.71164	0.00209	0.46788	0.40068	0.54030	0.13962	-0.1266200	-0.0002344	Yes	-0.1506328	-0.0755919
Sac Pikeminnow	Sacramento R at Woodson Br	0.58502	0.00186		0.31415	0.28277	0.34718	0.06441	0.71164	0.00209	0.46788	0.40068	0.54030	0.13962	-0.1266200	-0.0002344	No	-0.1537343	-0.0752107
Largemouth Bass	Avg of Parameters (ALL)	0.56611	0.00149	0.00000	0.34508	0.28656	0.40997	0.12341	0.56639	0.00130	0.34213	0.28776	0.40178	0.11401	-0.0002803	0.0001900	ALL	0.0029435	0.0093977
Largemouth Bass	Avg of Parameters (Linear Sites)	0.52884	0.00117		0.29809	0.25672	0.34317	0.08644	0.52873	0.00121	0.29812	0.25419	0.34623	0.09203	0.0001161	-0.0000451	NO	-0.0000237	-0.0055909
Largemouth Bass	Avg of Parameters (Poly Sites)	0.65382	0.00219	0.00001	0.46170	0.36669	0.56866	0.20197	0.68425	0.00155	0.48744	0.40734	0.57481	0.16747	-0.0304287	0.0006415	YES	-0.0257449	0.0344979
Sac Pikeminnow	Avg of Parameters (ALL)	0.58502	0.00186	0.00002	0.31446	0.28310	0.34747	0.06437	0.60003	0.00202	0.33450	0.25535	0.42598	0.17064	-0.0150140	-0.0001586	ALL	-0.0200450	-0.1062621
Sac Pikeminnow	Avg of Parameters (Linear Sites)	0.58502	0.00186		0.31415	0.28277	0.34718	0.06441	0.58763	0.00201	0.31968	0.23920	0.41328	0.17408	-0.0026133	-0.0001502	NO	-0.0055353	-0.1096699
Sac Pikeminnow	Avg of Parameters (Poly Sites)	0.58502	0.00186	0.00002	0.31725	0.28604	0.35007	0.06403	0.71164	0.00209	0.46788	0.40068	0.54030	0.13962	-0.1266200	-0.0002344	YES	-0.1506328	-0.0755919