Temporal Assessment of Chemistry, Toxicity and Benthic Communities in Sediments at the Mouths of Chollas Creek and Paleta Creek, San Diego Bay

Draft Report

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ABSTRACT

This report describes the temporal variability of sediment conditions near the mouths of Chollas and Paleta Creeks, where they enter San Diego Bay, and also at reference stations. This investigation is an extension of the spatially-intensive study that was conducted at these sites in July and August 2001. Sediment samples were collected from two reference stations (CP2243 and CP2433), two Chollas Creek stations (C10 and C14), and two Paleta Creek stations (P11 and P17) over four additional sampling events between November 2001 and October 2002. The samples were analyzed for sediment chemistry (metals, PAHs, PCBs, DDTs, chlordanes), benthic community parameters (e.g., abundance, taxa, diversity, embayment Benthic Response Index) and toxicity measurements (amphipod survival test with whole sediments, sea urchin embryo development test with sediment-water interface, and sea urchin fertilization test with pore water). A 95% prediction limit based on a pool of stations representing ambient conditions in San Diego Bay (Baseline pool) was used to help evaluate impact. The prediction limit for metals data was based on a regression with % fines.

This study found that most sediment parameters were consistent over the five sampling periods at most stations. Much of the high variability was associated with 4,4'-DDT and chlordane measurements. There were a few instances where concentrations of As, Cd, Hg, Pb, PPPAHs, and PCBs had high variability. While there was high variability in a few instances, the variability was not consistently associated with any particular station or sampling event. The differences also did not appear to be related to season or rainfall.

Some indicators were found to be consistently above or below the 95% prediction limit for all five sampling events. Total PCBs, PPPAHs and total chlordanes were consistently above the prediction limit at all Chollas and Paleta Creek stations, while Cu and Zn were consistently above or below the prediction limit on a station-by-station basis. The fact that most metals were not consistently above or below the prediction limit appears to be more of a result of where the prediction limit was in relation to the range of measured values, rather than the amount of variability in the measurements.

A weight of evidence approach was used to classify the potential for impairment at the stations. Consistent classifications over the time period were found at both reference sites and the two stations closest to the creek inlets (C14 and P17). Greater variability in the impairment classification was found at the other two stations; the classification for these stations varied from unlikely to likely over time as a result of variations in the measures of biological impact (toxicity or benthic community composition).

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INTRODUCTION

The investigation of sediments near Chollas and Paleta Creeks was prompted by the designation of these two sites as being contaminated and having aquatic life impacts. Previous investigations in San Diego Bay suggest the levels of some constituents may vary throughout the year. For example, stormwater monitoring conducted near the mouth of Chollas Creek has found varying levels of sediment toxicity in samples collected during wet and dry seasons. Therefore whether an area is designated as being impacted or not may depend on when the samples were collected. Consequently to get a more accurate depiction of sediment impairment, it is valuable to know the variability associated with key indicators of sediment quality and whether this variability is related to seasonal factors.

There are three main sources of variability in sediment quality measurements. The first type is seasonal variability that is due to changes in stressors or natural cycles over time. For example, seasonal stormwater inputs may increase the load of contaminants to the sediment during the rainy season, with corresponding changes in sediment chemistry or toxicity. Another type of seasonal variability is associated with natural cycles in biology or geochemistry. For example, changes in water temperature can affect microbiological activity in the sediments, which can in turn affect the bioavailability of some contaminants. A second type of variability is related to heterogeneity in the environment. Small-scale variations in contaminants or biological communities can exist within a study site due to factors such as localized discharges, boat traffic, and predator activity. The third type of variability is associated with the analytical measurements. Laboratory procedures such as toxicity tests and chemical extractions introduce variation in the results. While QAQC procedures have been established to reduce and document this variability, some aspects of laboratory variability are undocumented and thus their contribution to the overall result is uncertain.

This report describes the temporal variability of sediment conditions near the mouths of Chollas and Paleta Creeks, where they enter San Diego Bay. This investigation is an extension of the spatially intensive study that was conducted at these sites in July and August 2001. The temporal study had two objectives. The first objective was to describe the temporal variability in indicators of sediment quality at selected reference and potentially impaired sites. This information is valuable in selecting specific indicators for use in future studies to monitor the effectiveness of management activities to improve sediement quality. The second objective of the study was confirm the aquatic life assessment results from the July & August 2001 sampling. Knowledge of the temporal variability associated with this assessment provides a valuable measure of the uncertainty associated with the sediment assessment process.

METHODS

STUDY DESIGN

A subset of stations from the spatial studyconducted in July and August 2001 were monitored over four additional sampling events between November 2001 and October 2002. Sediment samples were collected on a quarterly basis from two reference stations (CP2243 and CP2433), two Chollas Creek stations (C10 and C14), and two Paleta Creek stations (P11 and P17) (Figure 1). Reference station CP2243 was located in the lower portion of San Diego Bay, while CP2433 was in the upper portion the Bay. These reference stations were selected for continued investigation in the quarterly study because they were not toxic in July 2001, and they contained relatively low levels of sediment contaminants. Station C10 was located in the Outer Channel area of the Chollas Creek study site, while Station C14 was in the Inner Channel area. Stations P11 and P17 were both considered Inner Channel stations.

Most of the constituents that were measured in the spatial component from July/August 2001 were also measured during the temporal sampling component. This included analysis of sediment chemistry, grain size, toxicity, and benthic community parameters.

Three types of toxicity tests were conducted. The toxicity of the bulk sediment was measured using a 10-day amphipod survival test (USEPA 1994). This test measures the survival of the amphipod crustacean, *Eohaustorius estuarius*, after 10 days of exposure to whole sediment. The 10-day amphipod survival test is a benchmark indicator used to describe sediment toxicity in regional monitoring studies and dredge material investigations throughout the state of California and the nation. The second toxicity test measured the potential of the sediments to impact overlying water quality. In this test, known as the sediment-water interface (SWI) test, the toxicity of water in contact with the sediment surface is measured. This test determines whether sediment-associated toxicants are able to transfer into the water column in harmful quantities. The third test measured the toxicity of the sediment pore water. This test measured the fertilization success of sea urchin gametes exposed to the sediment pore water.

The benthic community parameters and indicator species were also measured. The benthic community parameters included the number of taxa present, organism abundance, species diversity, and the Benthic Response Index developed for harbors and embayments (Ranasinghe et al. 2003). The indicator species measured included *Capitella capitata*, *Streblospio benedicti*, *Euphilomedes carcharodonta*, and amphiurids.

FIELD METHODS

Sediment samples were collected from reference stations CP2243 and CP2433, from Chollas Creek Stations C10 and C14, and Paleta Creek Stations P11 and P17 over five sampling events. For the summer 2001 sampling event, samples were collected from the reference sites and the Chollas Creek sites on July 18, and from the Paleta Creek sites on

August 28. For the remaining four collection events, the samples were collected from all six sites the same day. These sampling events were conducted on November 6, 2001, February 11, June 10 and October 9, 2002. Bulk sediment was collected at all stations using a 0.1 m^2 Van Veen grab sampler with a closed top. The top two centimeters of sediment in a grab was removed using a plastic scoop. Multiple grabs were collected at each site to supply enough sediment for all analyses planned for the particular site. Sediment from the multiple grabs was composited and homogenized by placing it in a large plastic bowl and manually stirring with a plastic spoon. Large shells, rocks, plastic, or other large debris were manually excluded from the samples. All samples were immediately placed on ice and kept cold until arrival at the analytical laboratory.

An Ocean Instruments Inc. multicorer was used to collect sediment cores at all sites for use in the sediment-water interface toxicity test. This corer was used because its design produces intact cores with little or no disturbance to the very top surface layer of sediment. The multicorer takes four simultaneous cores up to 30 cm in length. The cores are taken approximately at the corners of a square pattern that is about 25 cm on a side. The corer was set to collect cores with a nominal length of ~20 cm so that about 10 cm of overlying water would still be present. Though most cores collected were about 20 cm, core lengths varied from 6 to 29 cm. Once the multicorer was recovered, the four cores were removed, their outsides rinsed with site water and the ends sealed with plastic endcaps. The end caps were secured with black tape. The cores were placed into coolers with specially built holders to maintain them in an upright position and kept cool until arrival at the toxicology laboratory for analysis.

Benthic organisms were collected using a 0.1 m^2 Van Veen grab sampler with a closed top. All sediment from a single grab was placed into a 1.0 mm screened box and the sediment washed out using site water. All organisms remaining within the screen were manually removed, placed into 1-L plastic jars containing a $MgSO_4$ relaxant solution, and preserved using 10% sodium borate buffered formalin.

Because stormwater runoff is a potential contributor to the variability of the chemistry and toxicity measurements at these sites, the number of antecedent days following a storm and the seasonal rainfall totals were noted for the present study. The amount of daily rainfall was obtained from measurements at nearby Lindbergh Field in San Diego. The season totals were measured as the cumulative rainfall from the beginning of July to the end of June the following year. The July 2001 sample was collected 51 days after a 0.02 inch rain event. No rain fell between the July and August 2001 sampling events. The November 2001 sample was collected two days after a 0.28 inch rain event, which was the first measurable rain event of the 2001-2002 season (Figure 2). The February 2002 sample was collected 14 days after a 0.18 inch rain event, which brought the season total to 1.76 inches. The June 2002 sample was collected 45 days after a 0.25 inch rain event, which brought the season total to 3.06 inches. The 2001-2002 season was the driest on record, with only 28% of the normal total rainfall. The October 2002 sample was collected eight days after a 0.01 inch rain event, which brought the 2002-2003 season total to 0.32 inches.

CHEMICAL ANALYSIS

Sediment Metals

Metals. Sediment samples from the July and August 2001 sampling events were analyzed for metals at Battelle (Sequim, WA). The samples for the remaining sampling events were analyzed by Columbia Analytical (Kelso, WA). Samples were digested using a strong acid (total metals) digestion technique (NOAA 1998). All metals, except Hg and Ag were analyzed by either inductively coupled plasma mass spectrometry following EPA Method 200.8 or inductively coupled plasma atomic emission spectroscopy Method 200.7. Silver was analyzed by graphite furnace atomic absorption Method 200.9. Mercury was analyzed by cold vapor atomic absorption following modified EPA Method 245.5. Selenium was analyzed by hydride atomic absorption using flow injection. Manganese and tin were added to the suite of metals analyzed for the quarterly sampling component. The data quality objectives for the metals analyses are shown in Table 2.

Sediment Organics

Sediment samples from the July and August 2001 sampling events were analyzed for trace organics by Arthur D. Little Inc. (ADL, Cambridge, MA). The samples for the remaining sampling events were analyzed by Columbia Analytical (Kelso, WA). The data quality objectives for the organics analyses are shown in Table 3.

PAHs. The extraction procedure allowed for the simultaneous extraction of PAHs, PCBs, and chlorinated pesticides. After homogenization, a 30 to 50 g aliquot of each sample was transferred into a Teflon® jar along with ~60 g of sodium sulfate, 100 mL of 50:50 dichloromethane/acetone, and then spiked with surrogate compounds. After a three minute sonication the sample was centrifuged and the organic solvent layer was decanted into a flask. This extraction procedure was repeated 2 more times with fresh aliquots of solvent. After the third sonication, the sample jar was placed on an orbital shaker for 1 hour prior to the final centrifuge.

The three solvent extracts were combined and water was removed by adding approximately 75 g of sodium sulfate. Copper, alumina column, and high-pressure liquid chromatography (HPLC) cleanups were performed on the sample extracts to remove potential contamination that would interfere with sample analysis. All extracts were concentrated to approximately 1 mL using kuderna-danish concentrators and nitrogen evaporation. Extracts were split into archive and working volumes. The working extract volume was further split: one-half was designated for PAH analysis and one-half was exchanged into hexane for PCB/Pesticide analyses (see below).

The sample extracts were analyzed for PAHs using a modified version of EPA's SW-846 Method 8270. The gas chromatograph/mass spectrometer (GC/MS) was operated in selected ion monitoring (SIM) mode to obtain the desired sensitivity that is comparable to that of a GC equipped with an electron capture detector. The GC/MS was tuned with perfluorotributylamine to verify accurate mass assignment and to maximize the

sensitivity of the instrument in the mass range of interest (100 to 300 atomic mass units). Average response factors for each target compound and surrogate were calculated from initial calibration standards relative to internal standard compounds added to the sample extracts just prior to instrumental analysis (internal standardization). Calibration standards were analyzed on regular intervals to monitor sensitivity and linearity of the GC/MS. The average response factors generated from the calibrations were used to calculate the concentrations of target compounds and surrogates. The recoveries of the surrogate compounds spiked into the sample prior to extraction were used to assess sample-specific extraction efficiency. Target compound concentrations were surrogate corrected based on sample-specific surrogate recoveries to correct for differences in extraction efficiency.

A full suite of quality control samples were prepared for every analysis batch including a procedural blank, blank spike, blank spike duplicate, matrix spike, matrix spike duplicate, duplicates, and standard reference material.

The PAH compounds used for comparing among stations and sampling events in this study was a subset of the total PAHs measured. Sixteen priority pollutant PAH compounds (PPPAHs) were used, including: acenaphthylene, acenaphthene, anthracene, benz(a)anthracene, benzo(a)pyrene, benz0(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-c,d)pyrene, naphthalene, phenanthrene, and pyrene.

PCBs. Sediment samples were extracted and measured using a modified version of EPA's SW-846 Method 8081 using dual, dissimilar columns and dual detectors. A Restek RTX-5 column (or equivalent) was used as the primary column and a DB-17 column (or equivalent) was used as the confirmation column. Average calibration factors for each target compound and surrogate were calculated from initial calibration standards (external standardization). Calibration standards were analyzed on regular intervals to monitor sensitivity, retention time stability, and linearity of the GC/ECD. Average calibration factors generated from the calibrations were used to calculate target compound concentrations. When co-elution occurred between one or more target compounds or when interference occurred on the primary column, the results were reported from the confirmation column for the affected compounds. Compound identification was based on 1) detecting a peak within the established retention time window for a specific compound on both the primary and confirmation columns, and 2) the analyst's judgment. The recoveries of the surrogate compounds spiked into the sample prior to extraction were used to assess sample-specific extraction efficiency. Target compound concentrations were surrogate corrected based on sample-specific surrogate recoveries to correct for differences in extraction efficiency.

A full suite of quality control samples were prepared for every analysis batch including a procedural blank, blank spike, blank spike duplicate, matrix spike, matrix spike duplicate, duplicates, and standard reference material.

Chlorinated Pesticides. Sediment samples were extracted for chlorinated pesticides (DDTs, chlordanes) simultaneously with PAH and PCB as described above. The analytical method is described above.

Sediment Grain Size

Sediment samples were analyzed for grain size by Battelle's Sequim, WA laboratory. Samples were analyzed for grain size according to the methods of Plumb (1981). Samples were wet sieved through a No. 230 (0.0625 mm) U.S. Standard Sieve. The fine fraction (silt and clay) was collected in a 1-Liter graduated cylinder. Sediment retained on the No. 230 sieve was washed with distilled water into labeled, pre-weighed beakers and oven-dried for 24 hours at 105^{o}C. After drying, the soil was sieved using a No. 10 (2.00 mm) sieve to determine the percent gravel, and a No. 230 (0.0625 mm) sieve to determine percent sand by weighing. Sediment passing the No. 230 sieve was added to the fine fraction in a graduated cylinder. The fine fraction was stirred and aliquots taken to determine the percent silt (0.0625 mm to 0.0039 mm) and clay (<0.005 mm) using hydrometers.

TOXICITY TESTING

Bulk Sediment Toxicity

The 10-day amphipod survival test (U.S. EPA 1994) was used to evaluate toxicity of the whole sediment samples. The amphipods, *Eohaustorius estuarius*, were collected from Yaquina Bay near Newport, Oregon. The animals were held in the laboratory on their native (home) sediment for four days before testing began. Amphipod home sediment was tested as a negative control. The tests were conducted in 1 L glass jars containing 2 cm of sediment (approximately 150 ml) and 800 ml of water. Five replicates were used for each sample and the control. The overlying water was adjusted to a salinity of 20 g/kg, and the exposures conducted at 15°C. The sediment was added to the five replicate jars and overlying water added with aeration one day before the animals were added, in order to provide a 24 hr equilibration period. After equilibration, 20 amphipods were added to each beaker to start the test. The beakers were monitored daily for visible changes to the sediment or death of the animals. At the end of the exposure period, the sediment from the beakers was passed through a sieve to recover the animals, and the number of surviving animals counted. Water quality parameters (temperature, pH, dissolved oxygen, ammonia, and salinity) were measured on the pore water and overlying water of surrogate water quality beakers at both the beginning and end of the exposure period. Data quality objectives for the amphipod test are shown in Table 4.

Sediment-Water Interface Toxicity

The preparation of the sediment-water interface (SWI) test samples was conducted according to the procedures described by Anderson *et al*. (1996). The toxicity of the SWI samples was tested using the purple sea urchin development test (U.S. EPA 1995). This test measures the ability of the sea urchin larvae to develop normally from a fertilized egg in test media. The purple sea urchins (*Strongylocentrotus purpuratus*) used in the tests were collected from the intertidal zone in northern Santa Monica Bay.

To test a SWI sample, the overlying water in each of the four core tube replicates was first replaced with clean seawater. Aeration was then applied to the core tubes. Four replicate cores were used for each sediment type. After equilibration for 24 h, a polycarbonate cylinder with a fine mesh screen bottom (screen tube) was placed on the sediment inside the core tube. Two controls were included in the test: a screen tube blank (screen tube placed in a beaker of seawater) and a core tube blank (core containing only seawater). Four replicates of each control were tested. Fertilized sea urchin eggs were then added to the screen tube and given 72 hr to develop at 15°C. After the exposure period, the screen tubes were removed from the core tube and the outside rinsed to remove any adhering sediment. The embryos were then rinsed into glass shell vials and preserved in formalin. Each sample was examined using a microscope to determine the percentage of normally developed embryos. Water quality parameters (temperature, pH, dissolved oxygen, ammonia, and salinity) were measured on the overlying water at both the beginning and end of the exposure period. Data quality objectives for the sediment-water interface test are shown in Table 4.

Sediment Porewater Toxicity

The purple sea urchin fertilization test was used to evaluate pore water toxicity (EPA 1995). This test measures toxic effects on sea urchin sperm, as a reduction in their ability to fertilize eggs. The pore water was extracted by centrifuging the sediment at 3000 *g* for 30 min. The purple sea urchins (*Strongylocentrotus purpuratus*) used in the tests were collected from the intertidal zone in northern Santa Monica Bay. The test consisted of a 20 minute exposure of sperm to samples of 25, 50, or 100% pore water diluted with seawater. Eggs were then added and given 20 minutes for fertilization to occur. The eggs were then preserved and examined later with a microscope to assess the percentage of successful fertilization. Toxic effects were expressed as a reduction in fertilization percentage. The tests were conducted in glass shell vials containing 10 mL of solution at a temperature of 15°C. Four replicates were tested for each sample. A seawater blank was included as negative control. Data quality objectives for the pore water test are shown in Table 4.

BENTHIC COMMUNITY ANALYSIS

In the benthic laboratory, the samples were rinsed and transferred from formalin to 70% ethanol. Samples were then sorted into six major taxonomic categories (annelids, arthropods, molluscs, ophiuroids, other echinoderms, and other phyla). Specimens were then identified to the lowest practicable taxon and enumerated. Laboratory quality control procedures included resorting 10% of the samples, with at least 1 sample resorted per sorter.

DATA ANALYSIS

Mean SQGQ1. The chemistry data were compared to sediment quality guidelines. The overall level of chemical contamination at each station was compared using the mean

Sediment Quality Guideline Quotient (SQGQ1, Fairey et al. 2001), which was calculated as follows:

$$\text{SQGQ1} = \frac{1}{N}\sum_{x=1}^{N}\left(\frac{Cx}{SQGx}\right)$$

Where Cx and SQGx are the sediment concentration and sediment quality guideline (Table 1) for contaminant x, respectively, and N is the total number of chemical parameters.

The parameters used for calculating the SQGQ1 include five metals (Cd, Cu, Pb, Ag, Zn), total PCBs (the sum of congeners 8, 18, 28, 44, 52, 66, 101, 105, 118, 128, 138, 153, 170, 180, 187, 195, 206, 209) multiplied by 2, total chlordanes, and organic carbon-normalized total PAHs (the sum of acenaphthene, acenaphthylene, anthracene, fluorene, naphthalene, phenanthrene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, fluoranthene, pyrene). PCB congeners 8, 195, and 209 were not analyzed in this study, but it was determined from a previous NAVSTA study in San Diego Bay that these congeners account for approximately 8.7% of the PCBs in suite of 18 congeners in the SQGQ1, and 9.53% of the 15 congeners that were measured. Therefore the missing values for the SQGQ1 calculations were replaced with 9.53% of the remaining 15 PCB congeners. For the Baseline Pool, congeners 8, 101, 195, and 209 were missing from the Shipyard Study I data set. These congeners represented approximately 17.5% of the 18 congeners measured in the NAVSTA study, and 21.2% of the 14 congeners that were measured. Therefore the missing values were replaced with 21.2% of the remaining 14 PCB congeners. Nondetects for organic contaminants were treated as equal to half the detection limit. Nondetects for metals and metalloids were treated as equal to half the reporting level.

Two thresholds were used to evaluate the mean SQGQ1 data: a lower effects threshold equal to 0.25, and an upper effects threshold equal to 1.0. Mean SQGQ1 values below the lower effects threshold are unlikely to cause amphipod mortality, while values above the upper threshold are likely to affect amphipod survival.

Toxicity Data. Data from the amphipod survival, sea urchin development, and sea urchin fertilization tests were tested for significant reductions in survival or percentage normal development using multiple t-tests, assuming unequal variances. Comparisons were made against the home sediment control for the amphipod test, the screen tube blank for the sea urchin development test, and a sea water control for the sea urchin fertilization test. A sample was considered marginally toxic to amphipods if survival was significantly different, but $\geq$75% of control. Samples that were significantly different and <75% of the control amphipod survival were considered toxic. The toxic thresholds for the sea urchin development and sea urchin fertilization tests were 59% and 88% of control, respectively. Samples with test results below these thresholds, and significantly

different from control, were considered toxic. Significantly different from control, but greater than these thresholds were considered marginally toxic.

Comparisons among sampling events for each toxicity test were made using analysis of variance in SAS version 9.0. When there were an unequal number of replicates, the nonparametric Kruskal-Wallis test was used. An ANOVA on ranks was used when assumptions of normality were not met.

The Spearman rank correlation test was used to describe the relationships among toxicity, sediment chemistry and benthic community parameters (SAS version 9.0).

Benthic Community Data. Analysis of the benthic community data fell into two broad categories: community measures, and indicator species. Community measures included abundance, number of taxa, Shannon-Wiener Diversity, embayment Benthic Response Index (Ranasinghe 2002), and evenness. The indicator species that were enumerated included *Capitella capitata*, *Streblospio benedicti*, *Euphilomedes carcharodonta*, and amphiurids. Five thresholds were applied to the BRI values (Ranasinghe et al. 2003). The threshold categories, arranged in increasing order of disturbance, are:

Reference	BRI <31		
Response Level 1	BRI 31-41	=	Marginal category, 5-25% loss of biodiversity
Response Level 2	BRI 42-52	=	25-50% loss of biodiversity
Response Level 3	BRI 53-72	=	50-80% loss of biodiversity
Response Level 4	BRI >72	=	>80% loss of biodiversity

Metals Threshold. Metal enrichment was evaluated using thresholds derived from metals:%fines regression analyses of the Baseline Pool. The thresholds were calculated as the 95% prediction limit based on a predicted value, estimated from regression analysis of each metal and %fines in the Baseline Pool. Normality of the regression residuals was assessed with the Kolmogorov-Smirnov test. If the residuals were not normally distributed, sites with residuals > 2 standard deviations were eliminated, and the regression was recalculated. The process of testing for normality and removal of data based on standard deviations was iterated until a normal distribution was achieved. The predicted metals value was derived from the final regression line using the equation for a straight line:

(Eqn 1) $y = mx + b$, or predicted metal concentration = slope x %fines + y-intercept.

The 95% prediction limit of the predicted value was derived as:

(Eqn 2) 95% prediction limit $= SE\sqrt{1+\frac{1}{n}+\frac{(X-\overline{X})^2}{(n-1)(SD^2)}} * (t-statistic)$

The t-statistic for a one-tailed test, n-2, $\alpha = 0.05$ was used.

Finally, the threshold was derived as: Predicted concentration + 95% prediction limit, or Eqn 1 + Eqn 2. Because the % fines was variable, the calculated threshold also varied by station and sampling event.

Thresholds for Other Constituents. For all other constituents (organic contaminants, toxicity, benthic macrofauna parameters), the threshold used for evaluation was the 95% prediction limit, $\alpha = 0.05$, based on the Baseline Pool. These prediction limits were not based on a % fines regression analysis.

RESULTS

CHEMISTRY

Metals. Concentrations of most metals were within a factor of two over the five sampling events at each reference station (Figure 3-Figure 8, Table 5). For example, concentrations of Cr ranged from 26.3 – 40.2 mg/kg at Station CP2243, and from 23.2 – 42.2 mg/kg at Station CP2433. Silver was below the reporting level for the majority of sampling events (at least three out of the five samples) at all six stations. Therefore variability among sampling events could not be assessed for Ag. Concentrations of Cd varied by a factor of three at Station CP2433 (0.29 – 0.9 mg/kg).

For As, Cr, Hg, and Ni, the highest concentrations were often measured in the July sample. The lowest concentrations were not related to any particular sampling event.

The average concentration of each metal from all five sampling events was consistent between the two reference stations; there was less than a factor of two difference for the average concentrations of each metal. For example, the average concentration of Cr was 29.4 mg/kg at Station CP2243 and 28.9 mg/kg at Station CP2433. Consistency between reference stations was found even for those metals that had high variability among the quarterly sampling events. For example, while Cd varied by a factor of four among sampling events at Station CP2243, and by a factor of three at Station CP2433, the average Cd concentrations between these stations were similar (Station CP2243 = 0.41 mg/kg, CP2433 = 0.58 mg/kg).

Cadmium was the only metal at the reference stations that exceeded the Baseline Pool 95% prediction limit. The June and October samples from both reference stations exceeded this threshold by up to almost a factor of three (Figure 3).

At the Chollas Creek stations, the concentrations of all metals were consistent over the sampling events at each station (within a factor of two, Figures 3-8, Table 5). For example, the concentration of Cr ranged from 36.0 – 55.0 mg/kg at Station C10, and from 33.4 – 51.6 mg/kg at Station C14.

Concentrations of Cd, Cu, Pb, and Zn in some samples from Station C10 exceeded the metals:%fines regression threshold (based on the Baseline Pool). Both the July 2001 and October 2002 samples exceeded the threshold for Cd (Figure 3). For the November, February, and June samples, Cd concentrations were below the reporting levels, however the reporting levels for these sampling events were relatively high (more than twice the threshold value). The concentrations of Cu at Station C10 exceeded the threshold value for all five sampling events, with the July sample exceeding by more than a factor of two (Figure 5). The samples from all five quarterly events exceeded the Baseline Pool thresholds for Pb and Zn, all by less than a factor of two (Figure 6 and Figure 8).

At Station C14, concentrations of Cd, Pb, and Zn from all five samples exceeded the threshold values. The Cd thresholds were exceeded by up to a factor of four, while

concentrations of Zn exceeded the thresholds by up to a factor of two. The July sample exceeded the Ni threshold by less than a factor of two.

The concentrations of most metals at the Paleta Creek stations were within a factor of two during the study (Table 5). Concentrations of Hg (0.39 – 1.08 mg/kg) and Pb (46.8 – 129.0 mg/kg) at Station P11, and As at Station P17 (6.2 – 19.8 mg/kg), however, varied by a factor of three. There were no consistent trends among the concentrations of metals from the Paleta Creek sites.

Concentrations of Cd, Cr, Cu, Pb, Ni and Zn in some of the samples from Station P11 exceeded the Baseline Pool threshold values. All samples exceeded the Cd threshold by up to a factor of seven, although Cd concentrations for the November and February samples were below the reporting level. The August and June samples exceeded the Cr threshold at Station P11. All five samples exceeded the Cu threshold, all by less than a factor of two. Concentrations of Pb from the August, February, June and October samples from Station P11 exceeded the thresholds by up to a factor of two. Only the August sample exceeded the Ni threshold. This exceedance was by less than a factor of two. The samples from all five quarterly events exceeded the threshold for Zn, by less than a factor of two.

The concentrations of Cd, Cu, Pb and Zn from all five sampling events from Station P17 exceeded the 95% prediction limit. Copper concentrations exceeded the threshold by less than a factor of two, Zn and Pb exceeded the thresholds by up to a factor of two, and concentrations of Cd exceeded the threshold by more than a factor of four. The concentration of Ni in the August sample was slightly greater than the threshold.

The average concentration of some metals at the Chollas and Paleta Creek sites were comparable to the average concentrations at the reference sites. The average concentrations of Ag, As, and Cr from each of the Chollas and Paleta Creek stations were within a factor of two of the average concentration from the reference sites (Table 5). However, average concentrations of Cu, Hg, Pb, and Zn at Station P11 were approximately three times the average concentration at the reference sites, while the average concentrations of Cu and Pb at Station C10 were approximately four times the average at the reference sites, and Pb from Stations C14 and P17 was five times the average reference site concentration.

PPPAHs. The concentration of priority pollutant PAHs was consistent among sampling events at the reference sites (within a factor of two, Figure 9, Table 6). For Station CP2243, concentrations ranged from 184 – 267 ng/g, and for Station CP2433 the concentrations ranged from 338 – 780 ng/g. When PPPAH values are arranged from lowest to highest, the sampling event order was the same for both stations (i.e., June 2002, February 2002, November 2001, October 2002, and July 2001). The average concentration of PPPAHs for each reference sites varied by a factor of two (CP2243 = 218 ng/g, CP2433 = 503 ng/g).

The concentrations of PPPAHs were consistent (within a factor of two) among sampling events at the Chollas Creek site (Figure 9, Table 6). For Station C10, concentrations ranged from 2,993 ng/g in June to 5,565 ng/g in October, and for Station C14, the concentrations ranged from 6,526 ng/g in November to 10,104 ng/g in October. The average concentration of PPPAHs from the quarterly events for Station C10 was 4,419 ng/g, while the average value for Station C14 was 7,495 ng/g.

For Paleta Creek Station P11, PPPAH concentrations varied by less than a factor of two among sampling events, ranging from 6,317 ng/g in June to 8,936 ng/g in October. For P17, PPPAH concentrations varied by more than a factor of three, ranging from 7,078 ng/g in February to 27,804 ng/g in June. There were no trends in sampling order between stations associated with PPPAH concentration. The average concentration of PPPAHs from the quarterly events at Station P11 was 7,821 ng/g, while the average value for Station P17 was 12,252 ng/g.

The average PPPAH concentration of the reference stations was relatively low compared to the concentrations at the Chollas Creek or Paleta Creek stations (Figure 9). The average concentration at Station C10 was 12 times the average concentration at the reference sites, while the average values at Stations C14 and P11 were 21 times the average reference site concentration, and Station P17 was 32 times the concentration.

Acenaphthene was the only PPPAH compound that was below the method detection limit (MDL). This compound was below the MDL in the samples from November, February, June and October from Station CP2243. As described earlier, when organic compounds are not detected, half the MDL is substituted for the value. The substituted value for acenaphthene accounted for less than 1% of the total PPPAH value in these samples.

PCBs. The concentration of total PCBs was consistent among sampling events at the reference sites (within a factor of two, Figure 10, Table 6). For Station CP2243, concentrations ranged from 14 – 21 ng/g, and for Station CP2433 the concentrations ranged from 14 – 27 ng/g. The lowest concentration for both sites was from the October 2002 sample, while the highest concentration for both sites was from July 2001. The average concentrations of total PCBs for each reference site varied by less than a factor of two (CP2243 = 17 ng/g, CP2433 = 18 ng/g).

None of the samples from the reference sites exceeded the 95% prediction limit for total PCBs (Figure 10). The concentrations of total PCBs from each sampling event were less than half of the prediction limit.

The concentrations of total PCBs were consistent among sampling events at Station C10 (Figure 10, Table 6). Concentrations for this station ranged from 109 ng/g in June 2002 to 202 ng/g in July 2001. For Station C14, concentrations varied by a factor of three, ranging from 77 ng/g in October to 212 ng/g in July. The average concentration of total PCBs from the quarterly events for Station C10 was 138 ng/g, while the average value for Station C14 was 136 ng/g.

All of the quarterly samples from Stations C10 and C14 exceeded the 95% prediction limit for total PCBs. Total PCB concentrations exceeded the threshold by up to a factor of three at Stations C10 and C14.

For Paleta Creek Station P11, total PCB concentrations varied by a factor of three among sampling events, ranging from 135 ng/g in October to 402 ng/g in June. For P17, total PAH concentrations varied by less than a factor of two, ranging from 189 ng/g in August to 265 ng/g in February. There were no trends in sampling order between stations associated with total PCB concentration. The average concentration of total PCBs from the quarterly events for Station P11 was 258 ng/g, while the average value for Station P17 was 223 ng/g.

All of the quarterly samples from the Paleta Creek stations had concentrations of total PCBs that exceeded the 95% prediction limit. Total PCB concentrations exceeded the threshold by up to a factor of six at Stations P11 and up to a factor of four at Station P17.

The average total PCB concentration of the reference stations was relatively low compared to the concentrations at the Chollas Creek or Paleta Creek stations (Figure 10). The average concentrations at Stations C10 and C14 were eight times the average concentration at the reference sites, while Station P11 was 15 times the average concentration, and Station P17 was 13 times the average concentration.

DDTs. DDT isomers were often below the method detection limit for many of the sampling events at the reference stations, and some of the sampling events at the Chollas and Paleta sites. Since non-detect values are replaced with half the method detection limit, and many of the isomers that make up the total DDT value were non-detects, apparent trends in the total DDT values among sampling events could be misleading; the apparent trends could be nothing more than differences among detection limits. Because of this, trends among the sampling events in this report will be expressed as specific DDT isomers (4,4'-DDT or 4,4'-DDE), instead of the total DDT value. The isomer 4,4'-DDT was selected because it was detected the greatest number of times among all six DDT isomers. The isomer 4,4'-DDE was selected because this is often the most abundant DDT isomer reported in previous studies. This approach to expressing DDT contamination is different than the approach used in the spatial study report. However, we believe using isomers gives the most accurate assessment of temporal trends.

Concentrations of 4,4'-DDT were highly variable among sampling events. 4,4'-DDT varied by more than a factor of 2.5 at four of the five stations that had measurable amounts of this contaminant (for at least three of the five sampling events) (Figure 11). 4,4'-DDE concentrations were highly variable at two of the three stations with sufficient data for trends analysis.

4,4'-DDT was detected at both reference sites at all sampling events except October (Figure 11). Concentrations of 4,4'-DDT at Station CP2243 ranged from 1.5 – 3.1 ng/g, while concentrations at Station CP2433 ranged from 0.11 – 1.7 ng/g. The mean concentration of 4,4'-DDT at Station CP2243 (1.6 ng/g) was similar to the mean

concentration at Station CP2433 (1.3 ng/g). 4,4'-DDE was only detected in the July samples from the reference stations (Figure 11), with concentrations of 0.57 ng/g at Station CP2243 and 1.1 ng/g at Station CP2433.

None of the samples from the reference sites exceeded the 95% prediction limit for 4,4'-DDT or 4,4'-DDE (Figure 11). Measurable concentrations of these isomers were less than half the prediction limits.

The isomer 4,4'-DDT was detected at all five sampling events from Station C10, but was only detected in the January sample from Station C14. The concentrations of 4,4'-DDT at Station C10 varied by a factor of 11, ranging from 2.1 ng/g in January to 23 ng/g in November. The January sample from Station C14 had a 4,4'-DDT value of 20 ng/g. The isomer 4,4'-DDE was below the detection limits for the November and October samples from Station C10 , but was detected for all sampling events from Station C14. Concentrations of 4,4'-DDE at Station C10 ranged from <9 in October to 12 ng/g in July. Concentrations at Station C14 varied by a factor of three, ranging from 17 ng/g in the February and June samples to 51 ng/g in the July sample.

Concentrations of 4,4'-DDT exceeded the 95% prediction limit at Station C10 for all sampling events except July. Concentrations of 4,4'-DDT also exceeded the prediction limit for the July sample from Station C14 (the only sampling event with measurable amounts of this isomer). Concentrations of 4,4'-DDE exceeded the 95% prediction limit at each sampling event from Stations C10 and C14 that had measurable amounts of this isomer. The threshold was exceeded by up to a factor of five at Station C10, and up to a factor of 21 at Station C14.

For Paleta Creek stations, 4,4'-DDT was detected during all sampling events from both Station P11 and P17. Concentrations at P11 varied by a factor of 46, ranging from 0.7 ng/g in August to 32 ng/g in June. For P17, 4,4'-DDT concentrations varied by a factor of two, ranging from 21 ng/g in October to 44 ng/g in June. There were no trends in sampling order between stations associated with 4,4'-DDT. The isomer 4,4'-DDE was below the MDL in the samples from November, June, and October at Station P11. Concentrations in the samples with measurable amounts of 4,4'-DDE at Station P11 were 12 ng/g for the February, and 27 ng/g for August. 4,4'-DDE was measured in all samples from Station P17. Concentrations ranged from 12 ng/g in February to 28 ng/g in October.

All samples from the Paleta stations exceeded the 95% prediction limit for 4,4,'-DDT, except the August sample from Station P11. Concentrations of 4,4'-DDT exceeded the threshold by up to a factor of four at Station P11, and up to a factor of five at Station P17. All sampling events with measurable amounts at the Paleta Creek stations exceeded the 95% prediction limit for 4,4'-DDE by more than a factor of two. Concentrations of 4,4'-DDE exceeded the threshold by up to a factor of 11 at Station P11, and up to a factor of 12 at Station P17.

The average 4,4'-DDT concentration of the reference stations was relatively low compared to the concentrations at the Chollas Creek or Paleta Creek stations (Figure 11). The average concentration at Station C10 was 9 times the average concentration at the reference sites, while Station P11 was 15 times the average concentration, and Station P17 was 27 times the average reference site concentration. There were too many samples below the detection limit at Station C14 to make the same types of comparisons. There were also too many samples below the detection limit for 4,4'-DDE to make adequate comparisons between reference stations and the Chollas and Paleta Creek study sites.

Chlordanes. Most of the measurements of total chlordane at Stations CP2243 and CP2433 were below the method detection limit (Figure 12, Table 6). The samples from July were the only quarterly samples with measurable amounts of gamma and alpha chlordane. The concentration of chlordane was 0.20 ng/g at Station CP2243, and 0.57 ng/g at Station CP2433. Both of these measurements were below the 95% prediction limit (Figure 12).

Measurable concentrations of chlordane at Station C10 varied by a factor of three (Figure 12, Table 6), ranging from 6.5 – 21.7 ng/g. For Station C14, the concentrations of total chlordane varied by a factor three, ranging from 45 – 119 ng/g. The highest concentration for both Chollas Creek stations was measured in the July 2001 sample.

All of the quarterly samples with measurable amounts of chlordane from Stations C10 and C14 exceeded the 95% prediction limit. Total chlordane concentrations exceeded the prediction limit by up to a factor of 16 at Station C10, and up to a factor of 89 at Station C14.

For Station P11, concentrations of total chlordane ranged from 9.0 ng/g in February to 23.0 ng/g in June. For P17, total chlordane concentrations ranged from 14.2 ng/g in August to 26.6 ng/g in November. There were no trends in sampling order among total chlordane concentration for the Paleta Creek stations. The average concentration of chlordane from the quarterly events for Station P11 was 14.7 ng/g, while the average value for Station P17 was 21.6 ng/g.

Total chlordane concentrations exceeded the 95% prediction limit by up to a factor of 17 at Station P11, and up to a factor of 20 at Station P17.

The average total chlordane concentration of the reference stations was relatively low compared to the concentrations at the Chollas Creek or Paleta Creek stations. The average concentration at Station C10 was nine times the average concentration at the reference sites, while Station C14 was 55 times the average concentration, Station P11 was 12 times the average concentration, and Station P17 was 17 times the average reference site concentration.

Sediment Quality Guideline Quotient. The mean Sediment Quality Guideline Quotient (SQGQ1) for Station CP2243 ranged from 0.16 – 0.33 (Table 6, Figure 13). The range in

SQGQ1 values was similar for Station CP2433 (0.15 – 0.22). For both stations, the lowest SQGQ1 was measured in the June sample, while the highest value was from the October sample. The average of the five SQGQ1 values at Station CP2243 (0.20) was similar to the average value at Station CP2433 (0.18).

The October sample from Station CP2243 was the only reference station sample that exceeded the lower SQGQ1 effects threshold of 0.25. This was also the only sampling event to exceed the 95% prediction limit. None of the reference station samples exceeded the upper effects threshold of 1.0.

The SQGQ1 values from Station C10 ranged from 0.52 in June to 0.91 in July, with an average value of 0.66. The July sample at Station C14 was also the highest SQGQ1 value among the events (2.88), although almost three times greater than at Station C10. The lowest SQGQ1 value from Station C14 was from November (1.32). The mean value at Station C14 was 1.88.

All of the quarterly events at Stations C10 and C14 exceeded the 95% prediction limit and the lower effects threshold (Figure 13). All samples from Station C14 also exceeded the upper effects threshold. None of the samples from Station C10 exceeded the upper effect threshold.

The SQGQ1 values at Station P11 ranged from 0.59 in the February sample to 1.12 in June, with an average value of 0.79. For Station P17, the SQGQ1 values ranged from 0.78 in August to 1.23 in October, with an average value of 1.00. There were no consistent temporal trends in the data among the stations.

All of the samples from Stations P11 and P17 exceeded the 95% prediction limit, as well as the lower effects threshold. The July and June samples from Station P11 and the November, June and October samples from Station P17 were also at or above the upper effects threshold (Figure 13).

TOXICITY

Bulk Sediment

Amphipod survival in the reference site sediments ranged from 70-103% control adjusted survival, after removing outliers (Table 8, Figure 14). Among the samples from Station CP2243, mean survival ranged from 70% of control in February 2002 to 94% in November 2001. The only toxic sample (<75% adjusted survival and significantly different from control) among the five quarterly samples from Station CP2243 samples was collected in February. Among the samples from Station CP2433, survival ranged from 84% in July to 103% in October. The sample collected in July had marginal toxicity (≥75% adjusted survival, but significantly different from control) to amphipods.

The difference in amphipod survival among sampling events was significant for both reference stations (Station CP2243 $p = 0.05$, Station CP2433 $p = 0.01$, Kruskal-Wallis).

Amphipod survival tended to increase each sampling event for Station CP2433. There were no apparent trends in the data for Station CP2243.

The concentrations of unionized ammonia among reference site sediments ranged from <0.001-0.074 mg/L in the overlying water, and from 0.003-0.145 mg/L in the pore water (Table 9). These concentrations are below the toxic effects threshold for *Eohaustorius estuarius* survival (1.15 mg/L NH_3). Therefore ammonia did not cause the toxicity to the amphipods.

The February sample collected from Station CP2243 was the only reference station sample to exceed the 95% prediction limit for amphipod survival.

Amphipod survival among Chollas Creek sediments ranged from 2-97% control adjusted survival, after removing outliers. Among the samples from Station C10, the mean survival ranged from 69% in July to 97% in November. The February and October samples from Station C10 had marginal toxicity, while the July sample was toxic. Among the samples from Station C14, the mean survival ranged from 2% in the February sample to 79% in the November sample. The November sample from Station C10 had marginal toxicity, while sediments from the other four sampling events were toxic to amphipods. The difference in amphipod survival among sampling events was significant for both Chollas Creek stations (Station C10 $p = 0.03$, Station C14 $p > 0.01$, Kruskal-Wallis).

The July sample was the only sample from Station C10 that exceeded the 95% prediction limit, with survival for this sample (69%) being slightly lower than the prediction limit (73%). For Station C14, the November sample (79%) was the only sample that did not exceed the prediction limit.

The concentrations of unionized ammonia among Chollas Creek sediments ranged from 0.003-0.372 mg/L in the overlying water, and 0.008-0.277 mg/L in the pore water. These concentrations were below the toxic effects threshold for *E. estuarius* survival, and therefore ammonia did not cause the toxicity to the amphipods.

Amphipod survival among Paleta Creek sediments ranged from 33-96% control adjusted survival. Among the samples from Station P11, the mean survival ranged from 47% in both February and June to 96% in October. Three out of five of the quarterly samples from Station P11 (August, February and June) were toxic to amphipods. Among the samples from Station P17, the mean survival ranged from 33% in February to 89% in August. The August and November samples from Station P17 had marginal toxicity, while the February, June and October samples were toxic. The difference in amphipod survival among sampling events was significant for both Paleta Creek stations (Station P11 $p > 0.01$, Station P17 $p > 0.01$, Kruskal-Wallis).

The July, February, and June sampling events from Station P11 exceeded the amphipod survival 95% prediction limit. For Station P17, the February and October samples exceeded the prediction limit.

For four of the six stations (Stations CP2243, C14, P11, P17), amphipod survival was lowest (or was tied with the lowest) in the February sample.

The concentrations of unionized ammonia among Paleta Creek sediments ranged from 0.001-0.372 mg/L in the overlying water, and 0.010-0.135 mg/L in the pore water. These concentrations are below the toxic effects threshold for *E. estuarius* survival, and therefore ammonia did not cause the toxicity to the amphipods.

Sediment-Water Interface Toxicity

Sea urchin embryo development among reference site sediments ranged from 55-116% of control adjusted embryo development, after removing outliers and correcting for ammonia-influence (Table 8, Figure 15). Among the samples from Station CP2243, adjusted embryo development ranged from 55% in February 2002 to 106% in July 2001. The February sample was the only quarterly sample from Station 2243 that was toxic to sea urchin embryos. Among the samples from Station CP2433, adjusted embryo development ranged from 56% in February to 116% in July. None of the quarterly samples from Station CP2433 were toxic to sea urchin embryo development. While sea urchin development varied by up to a factor of two among sampling events for both reference sites, the differences were not significant (Station CP2243 $p = 0.22$, Station CP2433 $p = 0.07$, Kruskal-Wallis).

The February samples from both Stations CP2243 and CP2433 exceeded the sea urchin development 95% prediction limit. These were the only reference station samples to exceed this threshold.

Sea urchin embryo development among Chollas Creek sediments ranged from 4-104% control adjusted embryo development, after removing outliers and correcting for ammonia-influence. Among the samples from Station C10, the mean embryo development ranged from 4% in February to 93% in November. The February sample was toxic from Station C10 was toxic to sea urchin embryos, while the July, June and October samples were marginally toxic. Among the samples from Station C14, the mean embryo development ranged from 33% in the July sample to 104% in the November sample. Two of the five samples from Station C14 were toxic to sea urchin embryo development (July and February).

The difference in sea urchin normal development among sampling events was significant for both Chollas Creek stations (Station C10 $p = 0.02$, Station C14 $p = 0.01$, Kruskal-Wallis). There was a 16 fold difference in embryo development between the sample collected from Station C10 in February 2002 (the event with the lowest normal development, 4%) and the sample collected in July 2001 (the next lowest normal development, 63%).

The July, February, and October samples from Station C10 exceeded the sea urchin development 95% prediction limit. The July and October samples were very close to the threshold value. For Station C14, the July and February samples exceeded the prediction limit.

Sea urchin embryo development among Paleta Creek sediments ranged from 2-94% control adjusted embryo development, after removing outliers and correcting for ammonia-influence. Among the samples from Station P11, the mean embryo development ranged from 46% in June 2002 to 94% in November 2001. Two of the five quarterly samples collected from Station P11 were toxic to sea urchin embryos (August 2001 and June 2002). Among the samples from Station P17, the mean adjusted embryo development ranged from 2% in February to 66% in November. The August, February and June samples from Station P17 were toxic to sea urchin embryo development. The sample collected in October had low normal development, but the variability among the replicates was high and this sample was not significantly different from the control.

The differences in sea urchin normal development among sampling events were not significant for either Paleta Creek station (Station P11 $p = 0.08$, Station P17 $p = 0.15$, Kruskal-Wallis). The variability within each sampling event may have been too great to detect a difference among events, despite an 18 fold difference in normal development between the sample collected from Station P17 in February (the event with the lowest value) and October (the next lowest value).

The August 2001 and June 2002 samples from Station P11 exceeded the sea urchin development prediction limit. For Station P17, the November sample was the only sample that did not exceed the prediction limit.

There was also a temporal trend in development across stations. For four of the six stations (Stations CP2243, CP2433, C10, P17), the February sampling event had the lowest normal development.

Porewater Toxicity

Sea urchin fertilization among reference site sediments ranged from 97-124% of control adjusted fertilization (Table 8, Figure 16). Among the samples from Station CP2243, adjusted fertilization ranged from 97% in July to 121% in November. Among the samples from Station CP2433, adjusted fertilization ranged from 100% in July to 124% in November. None of the quarterly samples from the reference sites were toxic to sea urchin fertilization.

While none of the samples from the reference sites were toxic to sea urchin gametes, there was a significant difference among sampling events (CP2243 $p < 0.001$, CP2433 $p < 0.01$, ANOVA on ranks). The significance probably resulted from a combination of the wide range of values that exceeded 100% of the control value, and the high precision among replicates for each sampling event (the coefficients of variation ranged from 0-3% for CP2243, and from 0.5-3% for Station CP2433).

The concentrations of unionized ammonia among reference site sediments ranged from <0.001-0.073 mg/L in the pore water (Table 9). These concentrations are below the toxic effects threshold for *S. purpuratus* fertilization (0.44 mg/L NH_3).

None of the reference stations exceeded the sea urchin fertilization prediction limit.

Sea urchin fertilization among Chollas Creek sediments ranged from 0.3 - 125% control adjusted fertilization. Among the samples from Station C10, the mean fertilization ranged from 88% in July to 111% in November. One out of the five quarterly samples from Station C10 was toxic to sea urchin fertilization; pore water from the July sample had marginal toxicity. Among the samples from Station C14, the mean fertilization ranged from 0.3% in the June sample to 125% in the November sample. Two of the five quarterly samples from Station C14 were toxic to sea urchin fertilization; the June and October samples were highly toxic, which is in contrast to the July, November and February samples which had >90% fertilization success.

The difference in sea urchin fertilization among sampling events was significant for both Chollas Creek stations (Station C10 $p > 0.01$, Station C14 $p < 0.01$). There did not appear to be any trend to Station C10. For Station C14, the last two sampling events (June and October 2002) were considerably lower than the next highest event (July 2001).

The concentrations of unionized ammonia among Chollas Creek sediments ranged from <0.001-0.122 mg/L in the pore water. These concentrations are below the toxic effects threshold for *S. purpuratus* fertilization, and therefore ammonia did not cause the toxicity to the sea urchin fertilization.

None of the samples from Station C10 exceeded the sea urchin fertilization prediction limit. For Station C14, however, both the June and October samples exceeded the 95% prediction limit.

Sea urchin fertilization among Paleta Creek sediments ranged from 0-128% control adjusted fertilization. Among the samples from Station P11, the mean fertilization ranged from 100% in June to 128% in November. None of the samples from Station P11 were toxic to sea urchin fertilization. Among the samples from Station P17, the mean fertilization ranged from 0% in November to 120% in August. The November sample was the only quarterly sample from Station P17 that was toxic.

The difference in sea urchin fertilization among sampling events was significant for both Paleta Creek stations (Station P11 $p < 0.01$, Station P17 $p < 0.01$), even though none of the porewater samples from Station P11 were toxic. Similar to the situation at the reference sites, the significance among sampling events at Station P11 probably resulted from a combination of the wide range of values exceeding 100% of the control value, and the high precision among replicates for each sampling event (%CV ranged from 0.5-5%). The samples from Station P17 also had high precision, but the sample from November had 0% fertilization success, compared to the other four sampling events which had >100% control adjusted fertilization.

The concentrations of unionized ammonia among Paleta Creek sediments ranged from 0.012-0.096 mg/L in the pore water (Table 9). These concentrations are below the toxic effects threshold for *S. purpuratus* fertilization, and therefore ammonia did not cause the toxicity to the sea urchin fertilization.

The November sample from Station P17 was the only Paleta Creek sample that exceeded the sea urchin fertilization 95% prediction limit.

the November sampling event had the highest fertilization success at five of the six stations (Stations CP2243, CP2433, C10, C14 and P11). None of the sampling events had consistently lower fertilization success than the others.

BENTHIC COMMUNITY ANALYSIS

Community Measures

Organism Abundance. Organism abundance varied by a factor of 16 at Station CP2243, ranging from 65 organisms/grab in the November sample to 1053 organisms/grab in the February sample (Table 10, Figure 17). Organism abundance was more consistent at Station CP2433, varying by a factor of three. The lowest abundance was found in the October sample (329 organisms/grab), while the highest abundance was found in the February sample (959 organisms/grab).

The November sample from Station CP2243 was the only reference station that exceeded the 95% prediction limit.

Abundance at Chollas Creek Station C10 varied by a factor of three, ranging from 156 in the October 2002 sample to 467 in the November 2001 sample. Abundance was less consistent at Station C14, varying by a factor of six. Abundance ranged from 288 organisms/grab in the October sample to 1789 organisms/grab in the February sample.

The February and October samples from Station C10 were the only Chollas Creek samples that exceeded the 95% prediction limit.

At P11, organism abundance varied by a factor of 10, ranging from 28 organisms/grab in the October sample to 280 organisms/grab in the November sample. Abundance at P17 varied by a factor of six, ranging from 151 organisms/grab in the August sample to 888 in the November sample. There were no temporal trends in the data among the stations.

Most samples from Station P11 exceeded the 95% prediction limit for abundance, including the samples from August, February, June and October. The August sample was the only sample from Station P17 that exceeded the prediction limit.

For three of the stations (CP2243, CP2433 and C14), the highest abundance was found in the February sample. This trend was not consistent for the other sites, however. Among the six stations, Station P11 had the lowest average organism abundance (115 organisms/grab), followed by Station C10 (287 organisms/grab). The average abundance at Station P11 was approximately $^1/_5$ the mean abundance found at the reference sites (620 organisms/grab at CP2243, 593 organisms/grab at CP2433), while the average abundance at Station C10 was approximately ½ the average reference site value.

Number of Taxa. The number of taxa varied by a factor of three among samples from Station CP2243 (Table 10, Figure 18). The lowest number of taxa was found in the November sample (17 species/grab), while the highest number of taxa (58 species/grab) was found in the February sample. For Station CP2433, the number of taxa varied less than a factor of two. The lowest number was found in the October sample (41 species/grab), while the highest number was found in the June sample (61 species/grab).

The November sample from Station CP2243 was the only reference station samples that exceeded the 95% prediction limit for number of taxa.

For Station C10, the number of species/grab ranged from 21 in the October sample to 39 in the November sample. For Station C14, the number ranged from nine species/grab in the June sample to 22 species/grab in the November sample.

The October sample from Station C10 and all five samples from Station C14 exceeded the 95% prediction limit for number of taxa.

The number of taxa at Station P11 ranged from 12 species/grab in the October sample to 28 species/grab in the November sample. For Station P17, the number of taxa ranged from 20 in the August sample to 49 in the November sample.

The June and October samples from Station P11, and the August sample from Station P17 exceeded the 95% prediction limit for number of taxa.

The highest number of species/grab for the four stations (C10, C14, P11 and P17) was found in the samples from November. This trend was not consistent, however, for the reference sites.

Comparing the average number of taxa from the five quarterly events, the lowest average number of taxa was found at Station C14 (12 species/grab). This station had approximately ¼ the average number of taxa found at the reference sites (48 species/grab), followed by Station P11 (average = 21 species/grab), which was approximately ½ the average reference site value. The average number of taxa at Stations C10 (29 species/grab) and P17 (33 species/grab) were more than half the average number found at the reference sites.

Species Diversity. For Station CP2243, species diversity (Shannon-Weiner Index) ranged from 2.33 in the samples from both July and November to 3.04 in the sample from February (Table 10, Figure 19). For Station CP2433, the diversity ranged from 2.35 in the February sample to 2.82 in the June sample. None of the reference station samples exceeded the 95% prediction limit for species diversity.

Among samples from Station C10, the lowest species diversity (Index = 1.91) was found in the October sample, while the highest species diversity (Index = 2.52) was found in the

November sample. For Station C14, species diversity ranged from 0.44 in the July sample to 1.64 in the November sample.

None of the samples from Station C10 exceeded the 95% prediction limit for species diversity. All five samples from Station C14, however, exceeded this threshold.

The species diversity index among Station P11 ranged from 1.75 in the June sample to 2.82 in the August sample. For Station P17, the lowest species diversity was found in the June sample (Index = 2.13), while the highest species diversity was found in the November sample (Index = 2.71).

The June sample from Station P11 was the only Paleta Creek station that exceeded the 95% prediction limit.

Station C14 had the lowest average species diversity (Index = 1.04), while the highest average species diversity was found at the reference sites (Index = 2.66 for CP2243, and 2.65 for CP2433). The average diversity at Station C10 (Index = 2.33), Station P11 (Index = 2.36) and Station P17 (Index = 2.48) were closer to the average reference site values.

Benthic Response Index. Most of the sampling events at Station CP2243 had BRI values that exceeded the "marginal" category (Table 10, Figure 20). The sample from June was the only sample from Station CP2243 in the marginal category. BRI values ranged from 40 for the June sample to 57 in the November sample. For Station CP2433, all BRI values were in the "reference" category. BRI values at this station ranged from 20 in the June sample to 24 in the October sample. None of the reference station samples exceeded the 95% prediction limit for the BRI.

All of the samples from Stations C10 and C14 exceeded the marginal category. For Station C10, BRI values ranged from 44 for the June sample to 56 for the October sample, which were all below the 95% prediction limit. For Station C14, BRI values ranged from 62 for the November sample to 83 in the July sample, and exceeded the prediction limit.

For Stations P11 and P17, all samples exceeded the marginal category. BRI values ranged from 43 in the October sample to 55 in the August sample from Station P11. For Station P17, BRI values ranged from 47 in the February sample to 65 in the August sample. None of the samples from Station P11 exceeded the 95% prediction limit, while both the October and August samples from Station P17 exceeded this threshold.

The average BRI values at most of the creek stations were greater than the average BRI values at the reference stations (average BRI = 52 at Station C10, = 76 at Station C14 , = 49 at Station P11, and = 54 at Station P17).

Indicator Species

Capitella. No *Capitella* were found during any of the sampling events at Stations CP2243, CP2433, C10, or P11 (Table 10). At Station C14, however, this species was consistently found during all sampling events. Abundances at this station ranged from 38 individuals/grab in the October sample to 1405 individuals/grab in February. This species was usually absent at Station P17, however one individual was found in the grab from October, and two individuals were found in the grab from February.

***Streblospio*.** No *Streblospio* were found in any of the sampling events at Stations CP2243, CP2433, C10, or P11 (Table 10). For Station C14, one specimen was found in the July, November and October grabs, and four individuals were found in the June grab. One individual was also found in the October sample from Station P17; no other individuals were found at this station.

Euphilomedes. Specimens of *Euphilomedes* were found in the November, February, June and October sampling events at Station CP2243 (Table 10). The number of individuals at this station ranged from 0 in the July sample to 19 in the November sample. For Station CP2433, the only specimen of *Euphilomedes* was found in the June sampling event.

The number of *Euphilomedes* at Station C10 ranged from 0 for the June and October samples to 7 in the July sample. For Station C14, the only specimen of *Euphilomedes* was found in the November sampling event.

The number of *Euphilomedes* at Station P11 ranged from 0 in the June sample to 30 in the November sample. For Station C14, the number of *Euphilomedes* ranged from one individual in both the November and June samples to 74 in the February sampling event.

Amphiurids. Amphiurids were only found at the reference stations. One individual was found in the June sample from Station CP2243, while five individuals were found in the October sample. For Station CP2433, two individuals were found in the July, November and February samples.

LINES OF EVIDENCE

The Lines of Evidence (LOE) approach described in the spatial study was applied to the temporal data in this investigation. Flow charts for determining the levels of impact from chemistry, benthos and toxicity can be found in Figure 21 - Figure 22, respectively.

Chemistry

Most samples from the reference stations had chemistry values in the "no/low" impact category (Table 11). Only one sampling event from the reference sites (the October sample from Station CP2243) was in the "moderate" category. One constituent, total chlordane, exceeded both the 95% prediction limit, and the PEL in this sample.

All sampling events for Station C10 were in the "moderate" category. Total chlordane exceeded the PEL and prediction limit for all five samples, while Cu exceeded these criteria in the July sample. For Station C14, all samples were in the "high" category. The SQGQ1 for all five sampling events from Station C14 was >1.0, and exceeded the 95% prediction limit. Total chlordane concentrations were 34-89 times the prediction limit. Concentrations of Zn at Station C14 were also elevated at all five sampling events, up to two times the prediction limit, but exceeded the ERM only in the February, June and October samples.

The chemistry LOE category at Station P11 was in the moderate category for November, February and October samples, and in the high category for August and June. Total chlordane exceeded the prediction limit and PEL in all five sampling events, while Hg exceeded the prediction limit and ERM in the August and June samples. Station P17 was in the moderate category for chemistry during August and February, and in the high category during November, June and October. Total chlordane exceeded the prediction limit and PEL during all five sampling events, while Zn exceeded the prediction limit and ERM in the October sample.

Toxicity

Most of the samples from the reference stations were in the no/low category for toxicity (Table 11). The February sample from Station CP2243, the exception, was classified as high impact. Amphipod survival and sea urchin embryo development in this sample were both significantly different from the control, and exceeded the 95% prediction limit.

The July and February samples from Station C10 were in the moderate LOE category, while all other samples were in the no/low category. In the July sample, amphipod survival was both significantly different from the control and below the prediction limit. In the February sample from Station C10, sea urchin embryo development was both significantly different from the control, and below the prediction limit. For Station C14, all samples were in the high category except November, which was in the no/low category for toxicity. The magnitude of amphipod toxicity was great enough in the February, June and October samples to categorize these events as high impact. Amphipod survival in the July sample from Station C14 was significantly different from the control and below the prediction level, but was not below 50%. This sample was classified as high impact because it also had poor sea urchin development (significantly different from the control and below the prediction limit).

The November and October samples from Station P11 were in the no/low impact category for toxicity, while the other three samples were classified as high impact. The magnitude of amphipod toxicity was great enough in the February and June samples for the high category. The August sample from P11 had amphipod survival and sea urchin embryo development that were both significantly different from the control and below the prediction limit. All samples from Station P17 were in the moderate category excepot the February sample, which was classified as high impact. The August and June samples were classified as moderate because sea urchin development was both significantly different from the control, and below the prediction limit in both of these samples. The

November sample from Station P17 was classified as moderate because sea urchin fertilization was both significantly different from the control and below the prediction limit. The October sample had amphipod survival and sea urchin development that was significantly different from the control, and below the prediction limit. The February sample was classified as high impact due to the magnitude of amphipod toxicity.

Benthic Community

Most of the samples from the reference stations were classified in the no/low impact category for benthos (Table 11). The November sample from Station CP2243, the exception, was classified as having moderate impact to benthos because abundance and # taxa were both below the prediction limit.

Most samples from Station C10 were in the no/low categories for benthos, except the February and October samples. These samples were classified as moderate because abundance was below the prediction limit in both samples, and # taxa was below the prediction limit in the sample from October. All five samples from Station C14 were classified as having high impact to benthos. The July, February, June and October samples each had BRI values >73. The November sample had a BRI value that was >53 and exceeded the prediction limit, and had species diversity and # taxa below the prediction limit.

Most of the samples from Station P11 were in the moderate category, with the exception of the November sample, which was classified as no/low impact to benthos. The August and February samples from Station P11 had abundance below the prediction limit, while the October sample had abundance and # taxa exceed the limit, and the June sample exceeded the prediction limit for abundance, # taxa and diversity. For Station P17, the November, February and June samples were in the no/low category, the October sample was in the moderate category, and the August sample was in the high category. The August and October samples had a BRI values that were both >42 and exceeded the prediction limit. The August sample also had abundance and # taxa values exceed the prediction limits.

WEIGHT OF EVIDENCE

The weight of evidence (WOE) approach described in the spatial study was applied to the temporal LOE data in this investigation. The key to the WOE categories is presented in Table 12.

All of the samples from the reference stations were classified as having "unlikely" impairment (Table 11, Figure 24). While not all of the individual parameters (chemistry, toxicity, benthos) were in the no/low impact LOE category (e.g., the October sample from Station CP2243 had moderate impact for chemistry), the overall WOE determination for each sampling event from the reference stations was "unlikely" impairment.

The WOE classifications at Station C10 ranged from "unlikely" in the November and June samples to "likely" for the February sampling events. The August sample had moderate impact in the chemistry and toxicity LOE classification, while the October sample had moderate impact from chemistry and benthos, and the February sample had moderate impact from chemistry, toxicity and benthos. At Station C14, all five sampling events were classified as having "likely" impairment. Chemistry, toxicity and benthos had LOE designations in the high impact category for all sampling events, except for toxicity in the November sample, which was in the no/low category.

The WOE classifications at Station P11 were highly variable, but tended to be in the likely category. The station had unlikely impairment in the November sample, possible impairment in the October sample, and likely impairment in the August, February and June samples. Impacted chemistry and benthos caused the October sample to be classified as having possible impairment. For the August, February and June samples, all three parameters (chemistry, benthos and toxicity) had some level of impact, leading these samples to be classified as having likely impairment.

There was greater consistency in the WOE classifications at Station P17. The February sampling event at Station P17 was classified as having possible impairment, while the other four sampling events were classified as likely. The February sample had moderate impact from chemistry, high impact to toxicity, and no impact to benthos, which lead to the possible impairment classification. The November and June samples had moderate impact from toxicity, but high impact from sediment chemistry, which lead to the likely impairment classification. All three parameters had some level of impact in the samples from August and October, leading these samples to be classified as having likely impairment.

DISCUSSION

This study found that most sediment parameters were consistent over the five sampling periods at most stations. Most of the station/analyte combinations in this study (79%) had variability below a factor of three. [The combinations refer to the number of stations where at least three out of the five sampling events had detectable amounts of a given contaminant. For example four out of the six stations in this study had at least three sampling events with detectable amounts of Cd. Therefore there were four station/analyte combinations for this contaminant]. Out of the 67 total station/analyte combinations, there were 14 instances where the variability was greater than a factor of three. Much of the high variability was associated with 4,4'-DDT and chlordane measurements. Over half of the stations had high variability among sampling events, for those stations that had measurable amounts of these contaminants. PCB concentrations were highly variable at two out of the six stations, while five other contaminants (As, Hg, Pb, and PPPAHs) had high variability at only one out of six stations. Cadmium was highly variable at one out of four stations that had at least three sampling events with measurable amounts of this contaminant.

While there was high variability in a few instances, the variability was not consistently associated with any particular station or sampling event. That is, no single sampling event or station had consistently high or low values. The differences in concentrations also did not appear to be related to season or rainfall (there were no consistent patterns in concentrations for any of the analytes relative to days from the last rain event, the amount of rain in the last event, or the seasonal totals). The lack of relationship between sediment contamination and rainfall may not be typical of seasons with average amounts of rainfall, however. The 2001-2002 rainfall year (July 1 to June 30) was the driest on record for San Diego, with only about 28% of the average amount of rainfall. The differences among sampling events are also probably not due to differences between analytical laboratories (the July/August samples were analyzed by a different lab than the other four events), or differences in sampling technique among events. Both of these situations would have resulted in a consistent bias towards a particular sampling event, which was not the case. In addition, the differences are probably not entirely due to an influx of contaminants from the creeks. For example, the concentrations of PCBs at Station P11 varied by a factor of three between June and October 2002, yet there is no current upstream source of these contaminants that would account for this variability. A possible cause of the differences among sampling events that may be worth investigating in future studies is small-scale spatial heterogeneity. Replicate field grab data indicate that while most of the metals were very consistent between grabs, concentrations of Hg at Station P11 varied by a factor of 2.4 (data not shown in this report). Organic contaminants were not analyzed in the field replicate samples, which is unfortunate because these constituents tended to have greater variability among the five sampling events than the metals.

Some of the metals and all of the organic constituents at the Chollas and Paleta Creek stations exceeded the prediction limit thresholds. The incidence of exceedence, however, was not affected by high variability. For metals, the exceedences appeared to be more of

a result of where the prediction limit was in relation to the range of measured values, rather than the amount of variability in the measurements. Because metal concentrations were near the thresholds, small changes in concentrations between sampling events resulted in exceedences. For the organic constituents, the concentrations in all samples from the Chollas and Paleta stations were so high that every sample exceeded the prediction limits, even when concentrations varied by more than a factor of three. Unlike the metal or organic constituents, high variability among the amphipod and sea urchin toxicity tests was associated with exceedance of the 95% prediction limit. For those stations that had high variability among sampling events, the lowest survival, development or fertilization consistently exceeded the lower 95% prediction level.

There were a few contaminants that had a high incidence of non-detect values. As mentioned in the Results section, trends in DDT concentrations were monitored by using the isomers 4,4'-DDT and 4,4'-DDE, which had a high incidence of detection, instead of using total DDTs. For chlordane and PCBs, most of the non-detects were associated with the reference stations, where concentrations are expected to be low. There were also a few sampling events at Station C14 where several PCB congeners were below the MDL. Over half (24 out of the 41) of the PCB congeners analyzed at Station C14 in June and October were non-detects. However, the proportion of total PCBs that was represented by using half the MDL for the non-detects was low, accounting for only 26% of the total PCB value in June, and 29% in October. Only one PPPAH compound was below the MDL, and therefore non-detects were not an issue for PPPAHs. For metals, there were many non-detects among Ag and Cd analyses. The majority of sampling events (at least three out of five) at each of the six stations had Ag concentrations below the MDL. Therefore, trend analysis for Ag was not possible. There were fewer non-detects for Cd, but trends analysis was affected at four stations.

Some indicators were found to be consistently above or below the 95% prediction limit for all five sampling events. Specifically, total PCBs, PPPAHs and total chlordanes were consistently above the prediction limit at each of the Chollas and Paleta Creek stations for all five sampling events. Copper and zinc were consistently above or below the predicition limit on a station-by-station basis. The fact that most metals were not consistently above or below the prediction limit appears to be more of a result of where the prediction limit was in relation to the range of measured values, rather than the amount of variability in the measurements. For example, the variability (measured as %CV) for PCBs (14-46% for the six stations), PPPAHs (13-73%) and chlordane (24-56%) was greater than for most metals (i.e., Cr = 16-29%, Ni = 8-24%, Pb = 15-43%), yet the organic constituents consistently exceeded the threshold values at the Chollas and Paleta sites, while most metals were not consistently above or below the prediction limits.

The weight of evidence classifications were consistent among the five sampling events at the reference stations (all events showed unlikely impairment), and at Station C14 (all events indicated likely impairment). The WOE classifications for Stations C10, P11 and P17, however, often varied in this study. The stations with the greatest amount of variability in WOE classifications were Stations C10 and P11, which ranged from unlikely to likely impairment over the five sampling events. Stations C14 and P17,

located further back into the study sites, closer to the creek inlets, had a greater consistency of the likely impairment designation. This suggests that station location may have affected the consistency of WOE impairment. Presumably, sediments closer to the bay would have a greater rate of contaminant dispersion than sediments closer to the creek inlets. However, it was the benthic parameters and measures of toxicity which varied at Station C10, and caused the differences in WOE designations. The chemistry lines of evidence did not vary at C10; elevated chlordane levels were reponsible for the consistent moderate impact to sediment chemistry at this station. The fact that chlordane levels at Station C10 were consistently above the prediction limit and PEL without consistent toxicity or benthic community impairment draws attention to the reality that differences from the Baseline pool (which play a large part in the LOE determination) are statistical differences, but not necessarily biologically significant differences. This is the reason that three parameters (chemistry, toxicology, benthic community assessment) are used in the WOE determination, instead of relying solely on any one parameter to indicate impairment.

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Table 1. Effects Range Median (ERM), Probable Effects Level (PEL), and Consensus values used to evaluate contaminant concentrations in San Diego Bay sediments. * = values used for calculating the mean sediment quality guideline quotient (SQGQ1). NA = not available; guidelines do not exist for this constituent.

Constituent	ERM	PEL	Consensus-based guidelines
Metal/Metalloid (mg/kg)			
Ag	3.7	1.77*	
As	70	41.6	
Cd	9.6	4.21*	
Cr	370	160	
Cu	270*	108	
Hg	0.71	0.7	
Ni	51.6	42.8	
Pb	218	112*	
Zn	410*	271	
Organics (ng/g)			
Acenaphthene	500	89	
Acenaphthylene	640	128	
Anthracene	1,100	245	
Fluorene	540	144	
Naphthalene	2,100	391	
Phenanthrene	1,500	544	
Benz(a)anthracene	1,600	693	
Benzo(a)pyrene	1,600	763	
Chrysene	2,800	846	
Dibenz(a,h)anthracene	260	135	
Fluoranthene	5,100	1,494	
Pyrene	2,600	1,398	
Total PAHs	44,792	16,770	1,800* [1]
Total PCBs	180	189	400* [2]
4,4'-DDT	NA	4.77	
4,4'-DDE	2.2	374.17	
Total chlordanes	6.0* [3]	4.79	

[1] Swartz 1999. Organic carbon normalized value (µg/g OC).

[2] MacDonald et al. 2000.

[3] Long and Morgan 1990. All other ERM values are from Long et.al 1995.

Table 2. Data Quality Objectives and Criteria for metal analyses.

Metal	Reference Method	Range of Recovery	SRM Accuracy	Relative Precision	Target Detection Limit (µg/g)	Achieved Detection Limit (µg/g)
Aluminum	ICP-AES	70-130%	≤30%	≤30%	6	2.4
Antimony	ICP-MS	70-130%	≤30%	≤30%	0.2	0.03
Arsenic	ICP-MS	70-130%	≤30%	≤30%	0.1	0.07
Barium	ICP-AES	70-130%	≤30%	≤30%	0.01	0.02
Beryllium	ICP-MS	70-130%	≤30%	≤30%	0.01	0.02
Cadmium	ICP-MS	70-130%	≤30%	≤30%	0.01	0.02
Chromium	ICP-AES	70-130%	≤30%	≤30%	1	0.5
Copper	ICP-AES	70-130%	≤30%	≤30%	2	0.24
Iron	ICP-AES	70-130%	≤30%	≤30%	5	0.6
Lead	ICP-MS	70-130%	≤30%	≤30%	0.1	0.2
Mercury	CVAF	70-130%	≤30%	≤30%	0.001	0.002
Nickel	ICP-MS	70-130%	≤30%	≤30%	0.2	0.2
Selenium	FIAS	70-130%	≤30%	≤30%	0.01	0.067
Silver	GFAA	70-130%	≤30%	≤30%	0.3	.08
Zinc	ICP-MS	70-130%	≤30%	≤30%	1.0	0.6

CVAF- Cold Vapor Atomic Absorption
FIAS- Flow Injection Atomic Absorption
GFAA- Graphite Furnace Atomic Absorption
ICP-AES- Inductively Coupled Plasma-Atomic Emission Spectrometry
ICP-MS- Inductively Coupled Plasma-Mass Spectrometry
SRM- Standard Reference Material

Table 3. Data Quality Objectives and Criteria for organic constituents.

Element or Sample Type	Minimum Frequency	Data Quality Objective/ Acceptance Criteria
Initial Calibration	Prior to every batch sequence.	5 point curve. %RSD ≤25% for 90% of analytes and ≤35% for all analytes.
Continuing Calibration	Must end analytical sequence and every 12 field samples or 16 hours, whichever is more frequent.	%RSD ≤25% for 90% of analytes. %RSD ≤35% for all analytes.
Procedural Blank	Every batch/every 20 field samples.	No more than 2 analytes to exceed 5x PQL unless analyte not detected in associated sample(s) or associated sample analyte concentration is > 10x blank value.
Blank Spike Sample	Every batch/every 20 field samples.	50-150% recovery, RPD ≤35%.
SRMs (SRM 1941a for sediment, 1974a for tissue).	Every sediment or tissue batch/every 20 field samples.	Values ±35% difference of true value for all certified analytes, two may exceed.
Matrix Spike, Matrix Spike Duplicate Sample	Every sediment or tissue batch/every 20 field samples.	45-150% recovery, RPD ≤35%.
Recovery/Surrogate Standards	Every Sample	40-125% d8-napththalene, d10-acenaphthene, d10-phenenthrene 40-135% d12-benzo[a]pyrene 40-125% DBOFB, PCB-103, PCB-198 with one out of criteria.
Instrumental SRM (SRM 1491)	One set per batch of samples after every ICAL.	Values ≤15% difference of true value for all certified analytes.
Control Oil (North Slope Crude)	One set per batch of samples after every ICAL (PAH only).	Values ≤35% difference of laboratory average values.

DBOFB- 1,2,3-Trichlorobenzene and 4,4'-Dibromooctafluorobiphenyl
ICAL- Instrument Calibration
PQL- Practical Quantitation Limit
RPD- Relative Percent Difference
RSD- Relative Standard Deviation
SRM- Standard Reference Material

Table 4. Summary of toxicity test data quality objectives. * = Comparisons would normally be made to the control chart mean, however only a limited number of reference toxicant tests have been performed at SCCWRP using ammonia with *E. estuarius*.

Parameter	Bulk Sediment	Sediment-Water Interface	Pore water
	Amphipod Survival	Sea Urchin Development	Sea Urchin Fertilization
Sediment holding time	<2 weeks	<2 weeks	<2 weeks
Animal acclimation period	2-3 days	No objective	No objective
Control response	≥90% survival	≥80% normal development	≥70% fertilization
Reference toxicant test	Normal NH_3 response curve*	Cu EC50 within 2 SD of control chart mean (16.7 ± 10.6)	Cu EC50 within 2 SD of control chart mean (34.7 ± 17.8)
Water quality parameters:			
Temperature	15°C ± 2°	15°C ± 2°	15°C ± 2°
Salinity	18-22‰	32-35‰	32-35‰
Unionized Ammonia	<1.15 mg/L	<0.03 mg/L	<0.44 mg/L
Dissolved Oxygen	>5 mg/L	>5 mg/L	>5 mg/L
pH	7.8-8.2	7.8-8.2	7.8-8.2

Table 5. Average concentrations and variability of metals and metalloids (mg/kg dry wt), and % fines in sediments during the quarterly sampling events. Non-detects were treated as equal to half the reporting level, and are indicated by a "u" suffix. NA = Not applicable (at least three out of the five quarterly measurements were below the reporting level).

Sample	% Fines	Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn
CP2243										
Range	(30-36)	(0.7-1.0u)	(4.1-5.9)	(0.14-0.6)	(26.3-40.2)	(56-58)	(0.26-0.33)	(5.9-10.2)	(16.2-30.7)	(107-125)
Mean	32	NA	4.8	NA	29.4	57	0.29	7.4	22.6	115
%CV	7.1	NA	14.6	NA	20.7	1.2	9.9	23.1	25.6	5.6
CP2433										
Range	(34-45)	(0.4-1.2u)	(4.1-5.6)	(0.29-0.90)	(23.2-42.2)	(40-48)	(0.19-0.25)	(6.5-11.2)	(11.2-23.2)	(93-115)
Mean	40	NA	4.6	0.58	28.9	44	0.21	8.8	16.7	104
%CV	10.4	NA	12.2	38.1	26.8	6.5	11.4	18.8	30.1	9.3
C10										
Range	(54-67)	(0.8-2.0)	(7.0-9.6)	(0.38-0.90)	(36.0-55.0)	(146-314)	(0.34-0.49)	(10.0-16.5)	(57.2-84.0)	(211-350)
Mean	58	NA	8.0	NA	46.9	185	0.41	13.7	73.0	251
%CV	9.3	NA	12.0	NA	16.6	39.1	13.9	18.3	14.6	22.7
C14										
Range	(71-92)	(0.5-1.1)	(7.1-9.6)	(0.55u-2.00)	(33.4-51.6)	(95-119)	(0.14-0.24)	(18.5-22.8)	(73.8-107.0)	(347-543)
Mean	83	NA	8.7	1.38	40.5	105	0.19	20.4	92.2	457
%CV	10.4	NA	12.1	43.1	18.2	8.5	26.2	8.1	17.3	19.4
P11										
Range	(41-56)	(0.85-1.2)	(4.3-6.8)	(0.50u-2.30)	(38.6-72.2)	(123-152)	(0.39-1.08)	(10.8-18.4)	(46.8-129.0)	(225-380)
Mean	46	NA	5.6	1.16	51.5	133	0.65	13.7	83.8	276
%CV	12.2	NA	18.8	64.4	28.8	8.7	42.0	24.1	43.2	24.0
P17										
Range	(55-78)	(0.85-1.6)	(6.2-19.8)	(1.10-1.90)	(39.7-57.0)	(150-228)	(0.32-0.60)	(12.8-20.7)	(77.6-136.0)	(339-497)
Mean	63	NA	9.6	1.43	48.3	178	0.45	15.8	101.0	386
%CV	14.8	NA	60.3	24.2	16.0	17.2	25.2	21.5	22.4	16.3

Table 6. Concentration of organic contaminants, and the mean Sediment Quality Guideline Quotient (SQGQ1) in sediments from the quarterly sampling events. Non-detects were treated as equal to half the method detection limit, and are indicated by a "u" suffix. NA = Not applicable (at least three of the five quarterly measurements were below the method detection limit).

Sample	Mean SQGQ1	PPPAHs (ng/g)	Total PCBs (ng/g)	4,4'-DDT (ng/g)	4,4'-DDE (ng/g)	Total Chlordanes (ng/g)
CP2243						
Range	(0.16-0.33)	(184-267)	(14-21)	(0.15-3.1)	(0.21u-2.2u)	(0.21-6.95u)
Mean	0.20	218	17	1.3	NA	NA
%CV	35.2	14.9	18.1	92.5	NA	NA
CP2433						
Range	(0.15-0.22)	(338-780)	(14-27)	(0.11-1.7)	(0.18u-2.2u)	(0.22u-2.3u)
Mean	0.18	503	18	1.23	NA	NA
%CV	14.7	35.0	27.3	79.9	NA	NA
C10						
Range	(0.52-0.91)	(2,993-5,565)	(109-202)	(2.1-23)	(3.4-12)	(5.2-21.7)
Mean	0.66	4,419	138	15.0	6.4	11.8
%CV	22.2	23.7	27.3	56.6	53.3	55.8
C14						
Range	(1.32-2.88)	(6,526-10,104)	(77-212)	(10u-27u)	(17-51)	(45.0-119.0)
Mean	1.88	7,495	136	NA	25.6	69.2
%CV	31.6	19.5	37.8	NA	56.6	41.6
P11						
Range	(0.59-1.12)	(6,317-8,936)	(135-402)	(0.7-32)	(2.1u-27)	(9.0-23.0)
Mean	0.79	7,821	258	19.7	NA	14.7
%CV	32.5	12.9	46.1	59.6	NA	47.3
P17						
Range	(0.78-1.23)	(7,078-27,804)	(189-265)	(21-44)	(12-28)	(14.2-26.6)
Mean	1.00	12,252	223	34.6	18	21.6
%CV	16.5	72.8	13.7	26.4	33.6	23.5

Table 7. 95% prediction limits from the Baseline Pool. Constituents that are normally low at reference sites (e.g., concentrations of PAHs) use the upper prediction limit, whereas constituents that are relatively high at reference sites (e.g., amphipod survival) use the lower prediction limit.

Constituent	95% Prediction limit	Upper/Lower limit
Organics (ng/g)		
Priority pollutant PAHs	1,233	Upper
Total PCBs	69.7	Upper
4,4'-DDT	8.3	Upper
4,4'-DDE	2.4	Upper
Total Chlordanes	1.33	Upper
SQGQ1	0.32	Upper
Benthic parameters		
Abundance	-141.4	Lower
# Taxa	10.15	Lower
S-W Diversity	1.828	Lower
Shallow water BRI	57.74	Upper
Toxicity		
Amphipod survival (% control)	72.9	Lower
Sea urchin embryo normal development (% control)	64.7	Lower
Sea urchin fertilization (% control)	41.9	Lower

Table 8. Toxicity of sediments from the quarterly testing events using whole sediment, sediment-water interface, or porewater toxicity tests. * = Marginal toxicity (significantly different, but ≥75% of control response for amphipod test, ≥59% of control for sea urchin development test, or ≥88% for sea urchin fertilization test); ** = Toxic (significantly different and <75% of control response for amphipod test, <59% of control for sea urchin development test, or <88% for sea urchin fertilization test). Outlier results have been removed from the amphipod and sea urchin development data. The sea urchin development data have also been corrected for NH_3-influence.

	Amphipod 10 day survival Whole Sediment				Sea urchin development Sediment-water interface			Sea urchin fertilization 100% pore water			
Sample	**Mean**	**Std Dev**	**% Control**	**Sig. Diff. from Control**	**Mean**	**Std Dev**	**Sig. Diff. from Control**	**Mean**	**Std Dev**	**% Control**	**Sig. Diff. from Control**
CP2243											
July 2001	83	16.1	84		106	6.7		91	2.1	97	
November 2001	94	8.2	96		66	43.4		91	2.6	121	
February 2002	69	18.2	70	**	55	28.9	**	99	0.8	111	
June 2002	91	8.2	95		71	43.0		99	0.5	101	
October 2002	95	5.0	102		79	34.0		99	0.0	103	
CP2433											
July 2001	83	13.0	84	*	116	4.3		93	2.6	100	
November 2001	95	3.5	97		102	10.5		93	1.3	124	
February 2002	94	4.8	96		56	53.1		99	1.7	111	
June 2002	94	5.5	98		93	6.4		100	0.5	102	
October 2002	96	6.5	103		97	9.7		100	0.6	103	
C10											
July 2001	68	15.3	69	**	63	23.6	*	82	3.3	88	*
November 2001	95	6.1	97		93	15.4		83	4.6	111	
February 2002	80	9.4	82	*	4	6.6	**	93	7.1	104	

Table 8. continued

Sample	Amphipod 10 day survival Whole Sediment				Sea urchin development Sediment-water interface			Sea urchin fertilization 100% pore water			
	Mean	Std Dev	% Control	Sig. Diff. from Control	Mean	Std Dev	Sig. Diff. from Control	Mean	Std Dev	% Control	Sig. Diff. from Control
June 2002	85	19.7	89		79	13.0	*	97	2.1	99	
October 2002	77	4.5	83	*	64	26.5	*	97	2.1	100	
C14											
July 2001	53	3.5	53	**	33	42.6	**	86	5.6	92	
November 2001	77	13.5	79	*	104	1.2		94	1.8	125	
February 2002	2	2.7	2	**	52	21.9	**	99	0.0	111	
June 2002	9	12.4	9	**	94	6.7		0	0.5	0	**
October 2002	38	13.0	41	**	94	17.0		3	1.5	3	**
P11											
August 2001	47	11	50	**	47	21.2	**	88	4.2	107	
November 2001	91	10.2	93		94	22.0		96	0.6	128	
February 2002	46	5.5	47	**	85	35.1		99	0.5	111	
June 2002	45	8.7	47	**	46	13.7	**	98	1.2	100	
October 2002	89	8.2	96		85	18.8		99	1.0	102	
P17											
August 2001	84	6.5	89	*	47	46.1	**	98	0.8	120	
November 2001	85	9.4	87	*	66	36.9		0	0.0	0	**
February 2002	32	10.4	33	**	2	2.8	**	98	2.7	110	
June 2002	71	4.8	74	**	41	40.9	**	100	0.6	102	
October 2002	64	18.5	69	**	37	59.0		100	1.0	103	

Table 9. Concentrations of unionized ammonia (mg/L) in sediment samples from the quarterly sampling events. Water quality measurements were made on the individual replicates for the sediment-water interface test, whereas a single replicate was used for water quality measurements in the amphipod survival test. **Bolded** values indicate exceedance of the toxic effects threshold for the species being tested (threshold for *E. estuarius* survival = 1.15 mg/L NH_3, *S. purpuratus* embryo development = 0.033 mg/L NH_3, *S. purpuratus* fertilization = 0.44 mg/L NH_3). NA = not analyzed.

	Bulk sediment test Unionized ammonia (mg/L)				Sediment-water interface test Unionized ammonia (mg/L)			Pore water test Unionized ammonia (mg/L)
	Overlying water		Pore water					
Sample	Initial	Final	Initial	Final	Replicate	Initial	Final	
July/August 2001								
CP2243	0.012	0.105	0.033	0.159	1	0.016	**0.066**	0.004
					2	0.015	**0.058**	
					3	**0.062**	**0.114**	
					4	**0.190**	**0.792**	
CP2433	0.011	0.023	0.008	0.009	1	**0.039**	**0.098**	0.005
					2	**0.047**	**0.085**	
					3	0.031	0.019	
					4	0.023	**0.035**	
C10	0.008	0.083	0.008	0.034	1	0.023	0.031	0.006
					2	0.011	<0.001	
					3	0.025	0.008	
					4	0.012	**0.035**	
C14	0.016	0.121	0.012	0.031	1	0.019	**0.044**	0.009
					2	0.020	0.020	
					3	0.020	**0.035**	
					4	0.029	0.016	
P11	0.079	0.011	0.028	0.028	1	NA	**0.064**	NA
					2	NA	**0.096**	
					3	NA	**0.198**	
					4	NA	**0.074**	
P17	0.009	0.173	0.017	0.013	1	NA	0.031	NA
					2	NA	0.029	
					3	NA	**0.056**	
					4	NA	**0.072**	
November 2001								
CP2243	0.016	0.005	0.074	0.121	1	0.002	0.014	0.031
					2	0.001	0.003	
					3	0.001	0.001	
					4	0.003	0.018	

Table 9. continued

Sample	Bulk sediment test Unionized ammonia (mg/L)				Sediment-water interface test Unionized ammonia (mg/L)			Pore water test Unionized ammonia (mg/L)
	Overlying water		Pore water					
	Initial	Final	Initial	Final	Replicate	Initial	Final	
CP2433	0.010	0.031	0.055	0.145	1	0.005	0.031	0.037
					2	0.003	0.018	
					3	0.009	**0.053**	
					4	0.004	0.018	
C10	0.005	0.004	0.052	0.012	1	0.003	0.007	0.034
					2	0.006	0.024	
					3	0.003	**0.145**	
					4	0.001	0.006	
C14	0.006	0.012	0.068	0.117	1	0.002	0.026	0.029
					2	0.007	0.032	
					3	0.003	0.027	
P11	0.015	0.002	0.055	0.031	1	0.004	0.017	0.096
					2	0.004	**0.038**	
					3	0.009	**0.039**	
					4	0.008	**0.053**	
P17	0.013	0.120	0.067	0.019	1	0.010	**0.123**	0.096
					2	0.011	**0.119**	
					3	0.007	0.032	
					4	0.008	**0.074**	
February 2001								
CP2243	0.003	0.074	0.016	0.033	1	<0.001	0.009	<0.001
					2	<0.001	0.004	
					3	<0.001	0.008	
					4	<0.001	0.021	
CP2433	0.002	0.062	0.015	0.024	1	<0.001	0.011	0.017
					2	<0.001	0.016	
					3	<0.001	0.007	
					4	<0.001	0.022	
C10	0.003	0.014	0.013	0.015	1	<0.001	0.004	<0.001
					2	<0.001	0.004	
					3	<0.001	0.030	
					4	0.003	**0.052**	
C14	0.007	NA	0.012	0.211	1	0.006	**0.109**	0.049
					2	0.008	**0.083**	
					3	0.014	**0.079**	
					4	0.023	**0.091**	
P11	0.001	0.051	0.012	0.040	1	<0.001	<0.001	0.059

Table 9. continued

Sample	Bulk sediment test Unionized ammonia (mg/L)				Sediment-water interface test Unionized ammonia (mg/L)			Pore water test Unionized ammonia (mg/L)
	Overlying water		Pore water					
	Initial	Final	Initial	Final	Replicate	Initial	Final	
					2	<0.001	0.020	
					3	<0.001	0.002	
					4	<0.001	<0.001	
P17	0.007	0.199	0.043	0.071	1	<0.001	0.024	0.047
					2	<0.001	<0.001	
					3	<0.001	0.009	
					4	<0.001	0.025	
June 2002								
CP2243	0.009	0.016	0.015	0.013	1	0.006	**0.042**	0.056
					2	0.001	0.011	
					3	0.001	**0.075**	
					4	0.001	NA	
CP2433	0.011	0.070	0.025	0.011	1	0.004	0.031	0.073
					2	0.002	0.019	
					3	0.003	0.017	
					4	0.002	0.018	
C10	0.015	0.015	0.020	0.008	1	<0.001	0.005	0.049
					2	0.001	0.003	
					3	0.005	0.023	
					4	0.002	0.013	
C14	0.008	0.372	0.049	0.010	1	0.007	**0.073**	0.122
					2	0.004	**0.054**	
					3	0.010	0.030	
					4	0.005	**0.098**	
P11	0.006	0.012	0.024	0.010	1	0.001	0.012	0.088
					2	0.007	0.032	
					3	0.002	0.011	
					4	0.001	0.009	
P17	0.010	0.141	0.041	0.039	1	0.020	**0.051**	0.069
					2	0.001	0.011	
					3	0.002	0.024	
					4	0.002	0.022	
October 2002								
CP2243	0.008	<0.001	0.050	0.003	1	0.007	<0.001	0.005
					2	<0.001	<0.001	
					3	0.006	<0.001	

Table 9. continued

Sample	Bulk sediment test Unionized ammonia (mg/L)				Sediment-water interface test Unionized ammonia (mg/L)			Pore water test Unionized ammonia (mg/L)
	Overlying water		Pore water					
	Initial	Final	Initial	Final	Replicate	Initial	Final	
					4	0.002	<0.001	
CP2433	0.017	0.010	0.054	0.005	1	0.006	<0.001	0.013
					2	0.004	<0.001	
					3	0.003	<0.001	
					4	0.003	<0.001	
C10	0.016	0.042	0.047	0.010	1	0.002	0.016	0.009
					2	0.005	0.033	
					3	0.003	0.014	
					4	0.002	0.004	
C14	0.008	0.255	0.277	0.022	1	0.002	<0.001	0.017
					2	0.003	<0.001	
					3	0.001	<0.001	
					4	0.002	<0.001	
P11	0.006	0.040	0.065	0.013	1	0.001	<0.001	0.012
					2	0.001	<0.001	
					3	<0.001	<0.001	
					4	<0.001	<0.001	
P17	0.010	0.116	0.135	0.022	1	0.008	**0.036**	0.016
					2	0.007	0.028	
					3	0.004	0.022	

Table 10. Benthic community measures and indicator species from reference site sediments, Chollas Creek sediments, and Paleta Creek sediments. The value listed for each indicator species represents the number of individuals collected. * = Marginal category (BRI = 31-41). ** = Exceeds the threshold for the marginal category.

	Community measures				Indicator species			
Station	Abundance	Number of Taxa	Shannon-Wiener Diversity	Benthic Response Index	*Capitella*	*Streblospio*	*Euphilomedes*	Amphiuridae
CP2243								
July 2001	689	39	2.33	55**	0	0	0	0
November 2001	65	17	2.33	57**	0	0	19	0
February 2002	1053	58	3.04	48**	0	0	1	0
June 2002	775	53	2.75	40*	0	0	1	1
October 2002	520	44	2.83	45**	0	0	3	5
CP2433								
July 2001	420	56	2.81	23	0	0	0	2
November 2001	594	59	2.63	23	0	0	0	2
February 2002	959	54	2.35	22	0	0	0	2
June 2002	663	61	2.82	20	0	0	1	0
October 2002	329	41	2.66	24	0	0	0	0
C10								
July 2001	314	30	2.46	53**	0	0	7	0
November 2001	467	39	2.52	54**	0	0	1	0
February 2002	197	24	2.30	53**	0	0	3	0
June 2002	303	31	2.43	44**	0	0	0	0
October 2002	156	21	1.91	56**	0	0	0	0
C14								
July 2001	553	10	0.44	83**	501	1	0	0
November 2001	672	22	1.64	62**	236	1	1	0
February 2002	1789	11	0.70	80**	1405	0	0	0
June 2002	344	9	1.17	82**	217	4	0	0
October 2002	288	10	1.25	74**	38	1	0	0

Table 10. continued

Station	Community measures				Indicator species			
	Abundance	Number of Taxa	Shannon-Wiener Diversity	Benthic Response Index	*Capitella*	*Streblospio*	*Euphilomedes*	Amphiuridae
P11								
August 2001	88	24	2.82	55**	0	0	6	0
November 2001	280	28	2.43	48**	0	0	30	0
February 2002	105	24	2.58	54**	0	0	1	0
June 2002	74	15	1.75	47**	0	0	0	0
October 2002	28	12	2.24	43**	0	0	2	0
P17								
August 2001	151	20	2.63	65**	0	0	21	0
November 2001	888	49	2.71	50**	0	0	1	0
February 2002	382	34	2.61	47**	2	0	74	0
June 2002	714	35	2.13	49**	0	0	1	0
October 2002	266	27	2.30	60**	1	1	4	0

Table 11. Results of weight of evidence determination of aquatic life impairment for each sampling event.

Station	Sampling Event	Chemistry	Toxicity	Benthos	Impairment?
CP2243	July/August 2001	O	O	O	Unlikely
CP2243	November 2001	O	O	⊙	Unlikely
CP2243	February 2002	O	●	O	Unlikely
CP2243	June 2002	O	O	O	Unlikely
CP2243	October 2002	⊙	O	O	Unlikely
CP2433	July/August 2001	O	O	O	Unlikely
CP2433	November 2001	O	O	O	Unlikely
CP2433	February 2002	O	O	O	Unlikely
CP2433	June 2002	O	O	O	Unlikely
CP2433	October 2002	O	O	O	Unlikely
C10	July/August 2001	⊙	⊙	O	Possible
C10	November 2001	⊙	O	O	Unlikely
C10	February 2002	⊙	⊙	⊙	Likely
C10	June 2002	⊙	O	O	Unlikely
C10	October 2002	⊙	O	⊙	Possible
C14	July/August 2001	●	●	●	Likely
C14	November 2001	●	O	●	Likely
C14	February 2002	●	●	●	Likely
C14	June 2002	●	●	●	Likely
C14	October 2002	●	●	●	Likely
P11	July/August 2001	●	●	⊙	Likely
P11	November 2001	⊙	O	O	Unlikely
P11	February 2002	⊙	●	⊙	Likely
P11	June 2002	●	●	⊙	Likely
P11	October 2002	⊙	O	⊙	Possible
P17	July/August 2001	⊙	⊙	●	Likely
P17	November 2001	●	⊙	O	Likely
P17	February 2002	⊙	●	O	Possible
P17	June 2002	●	⊙	O	Likely
P17	October 2002	●	⊙	⊙	Likely

O No/Low impact from contaminants of concern relative to baseline. For chemistry, there were no constituents that exceeded both the sediment quality guideline and prediction limit, and the SQGQ1 was either <0.25, or <95% prediction limit. For benthos, the BRI <42 and neither abundance, #taxa, nor diversity exceeded the prediction limit. For toxicity, none of the three tests (amphipod survival, sea urchin development, sea urchin fertilization) had significant toxicity or exceeded the prediction limit.

⊙ **Moderate impact.** For chemistry, the SQGQ1 exceeded the prediction limit, but was $\leq$1. Or, 1-5 constituents exceeded both the sediment quality guideline and prediction limit. For benthos, the BRI is both $\geq$42 and exceeded the prediction limit. Or, either abundance, #taxa, or diversity exceeded the prediction limit. For toxicity, either amphipod survival, sea urchin development, or sea urchin fertilization was both significantly toxic and exceeded the 95% prediction limit.

● **High impact.** For chemistry, the SQGQ1 was both $\geq$1.0 and $\geq$ prediction limit. Or, more than 5 constituents exceeded both the sediment quality guideline and the prediction limit. For benthos, the BRI >72. Or, the BRI was both >52 and exceeded the prediction limit, and adundance, #taxa or diversity exceeded the prediction limit. For toxicity, the amphipod survival test had significant toxicity, exceeded the prediction limit, and had <50% of the control survival. Or, both the sea urchin development and fertilization tests had significant toxicity, exceeded the prediction limits, and were <50% control response. Or, both the amphipod survival test and one of the other tests had significant toxicity and exceeded the prediction limit.

Table 12. Key to determining site-specific impairment in the weight of evidence approach. All three categories of sediment constituents (chemistry, toxicity, benthos) were used to determine the likelihood of impairment at each station.

Chemistry	Toxicity	Benthic Community	Site-specific Impairment
●	●	●	Likely impairment
●	●	⊙	
●	⊙	●	
⊙	●	●	
●	●	O	
●	O	●	
●	⊙	⊙	
⊙	●	⊙	
⊙	⊙	●	
⊙	⊙	⊙	
●	⊙	O	
●	O	⊙	
⊙	●	O	Possible Impairment
⊙	O	●	
⊙	⊙	O	
⊙	O	⊙	
●	O	O	
O	●	●	Unlikely impairment
O	●	⊙	
O	⊙	●	
O	⊙	⊙	
O	O	●	
O	●	O	
O	O	⊙	
O	⊙	O	
⊙	O	O	
O	O	O	

Figure 1. Collection sites for the quarterly sampling events in San Diego Bay.

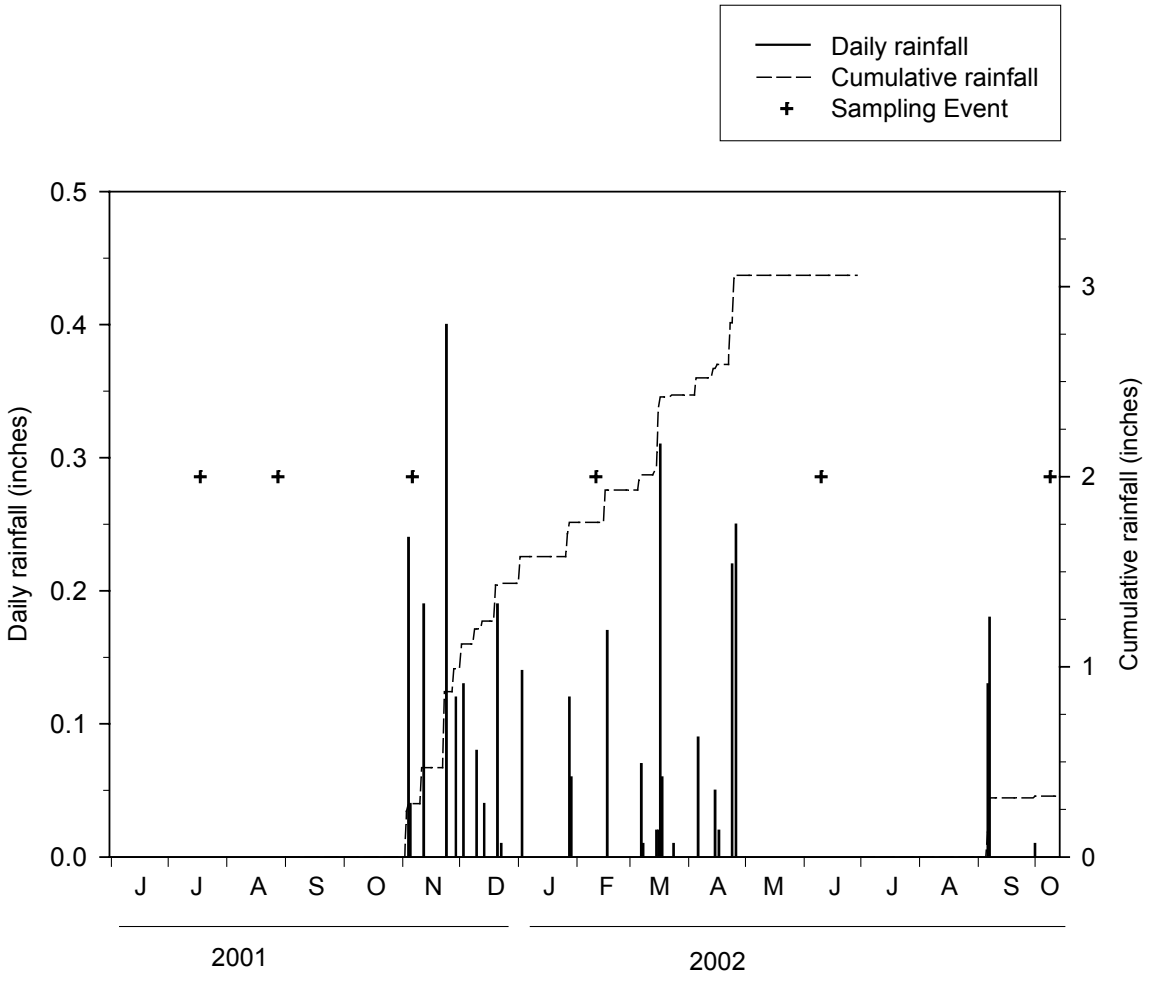


Figure 2. Rainfall amounts and seasonal totals during the quarterly sampling events. The 2001-2002 season was the driest on record, with only 28% of the normal total rainfall.

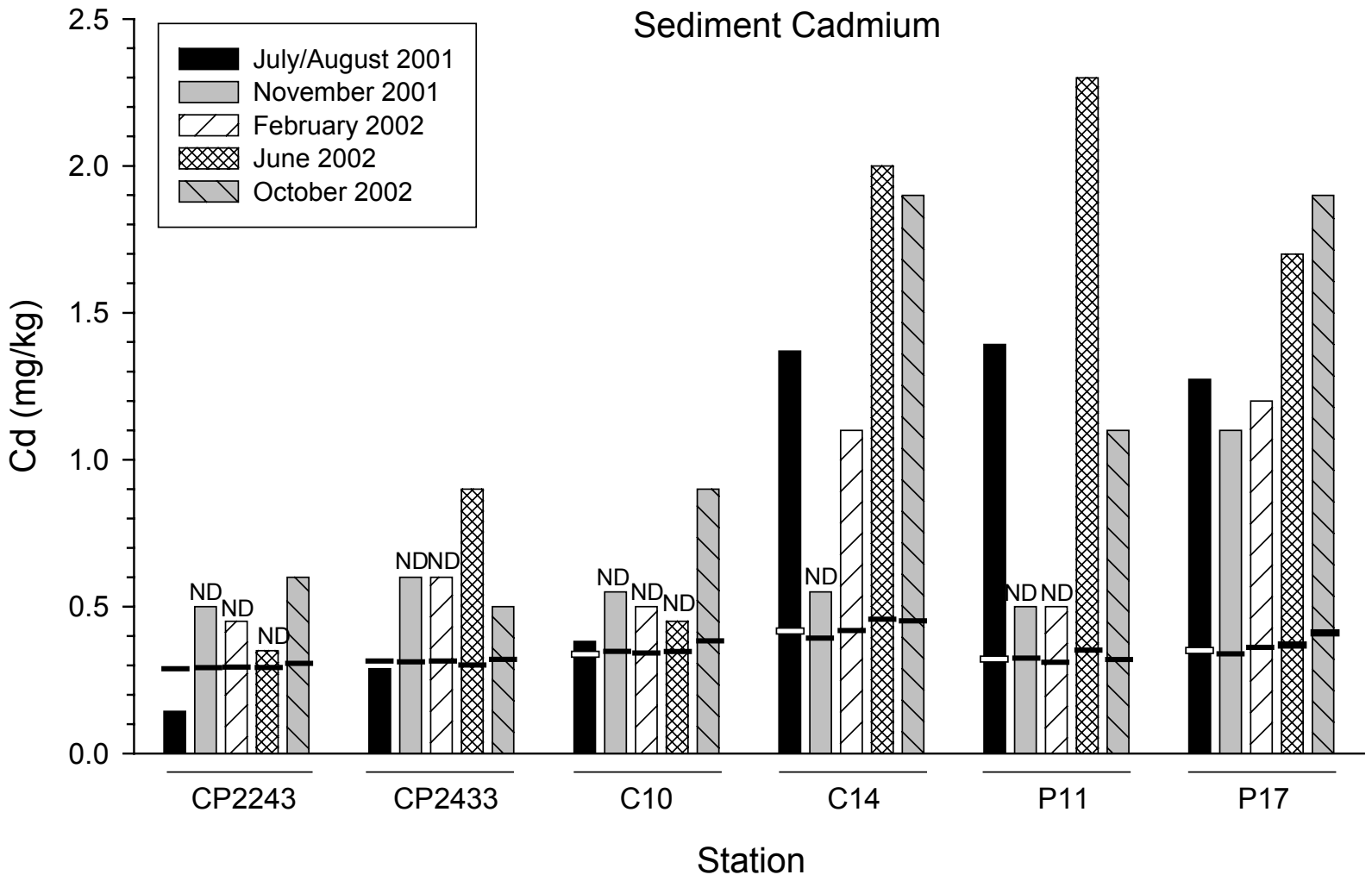


Figure 3. Concentrations of cadmium in quarterly sediment samples. ND = non-detect treated as equal to half the reporting level, which varied by analysis. The dashes are threshold values calculated from the Baseline Pool using metals:%fines regression analysis. The ERM for Cd (not shown) is 9.6 mg/kg.

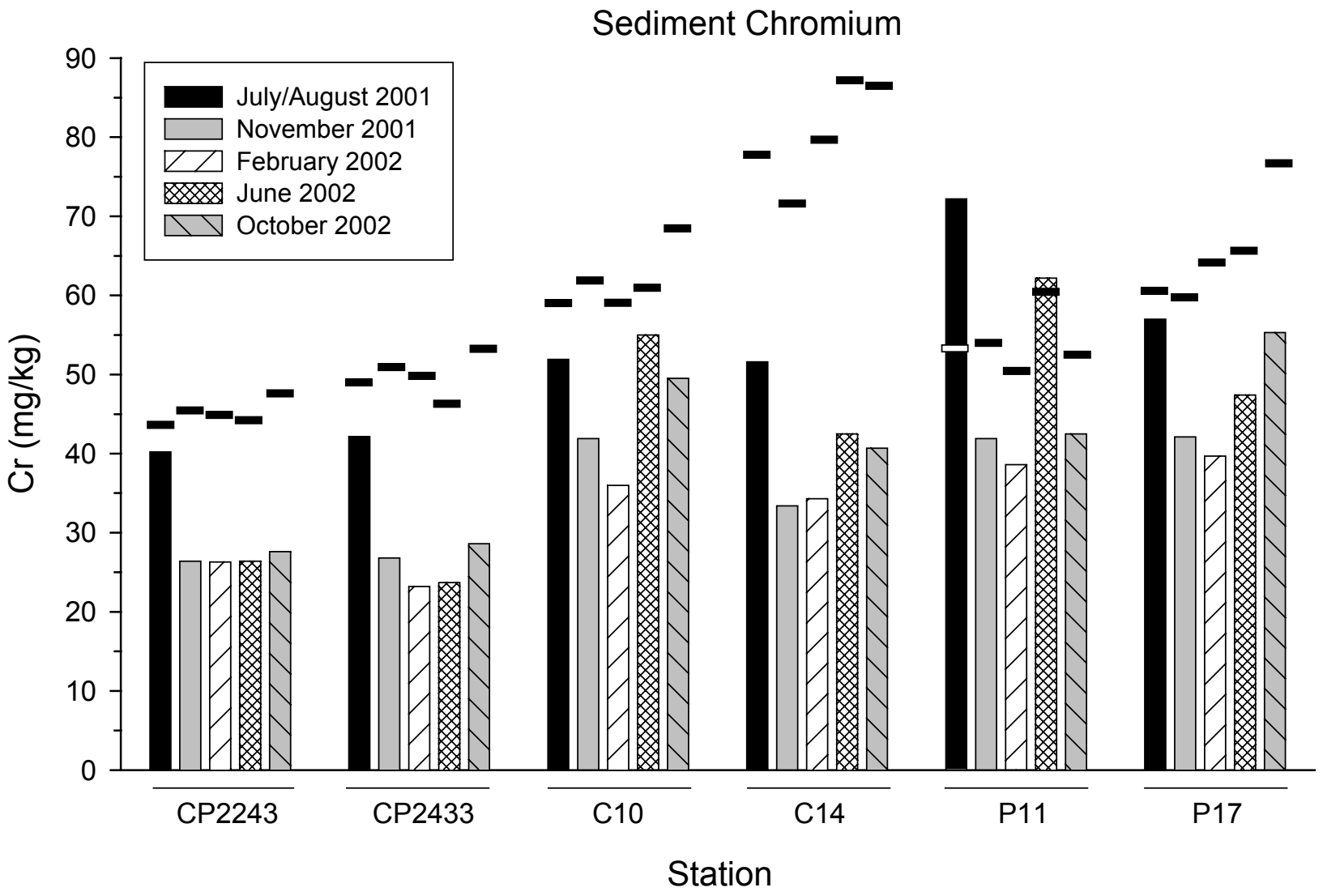


Figure 4. Concentrations of chromium in the quarterly sediment samples. The dashes are threshold values calculated from the Baseline Pool using metals:%fines regression analysis. The ERM for Cr (not shown) is 370 mg/kg.

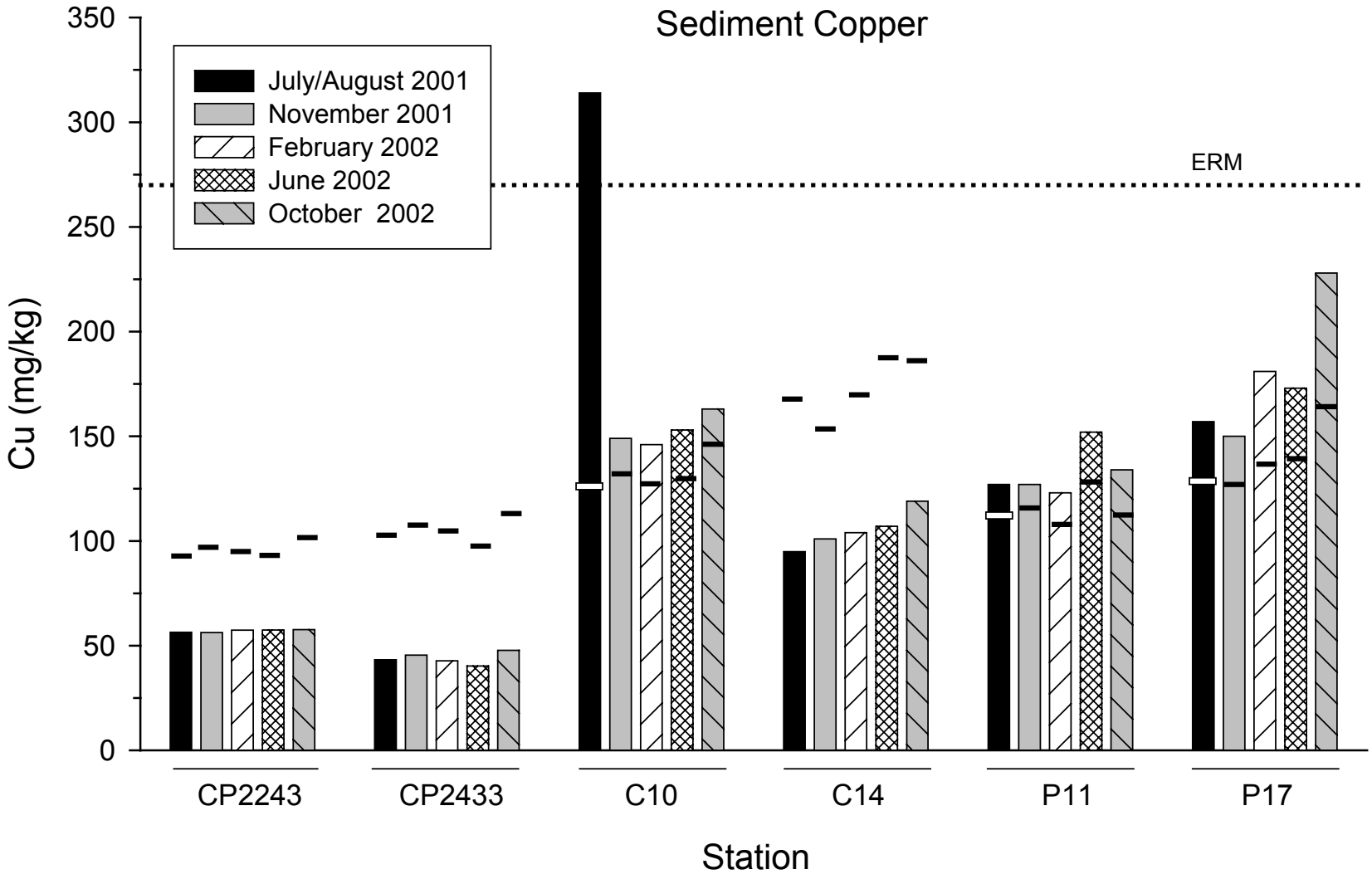


Figure 5. Concentrations of copper in the quarterly sediment samples. The dashes are threshold values calculated from the Baseline Pool using metals:%fines regression analysis. The dotted line is the ERM.

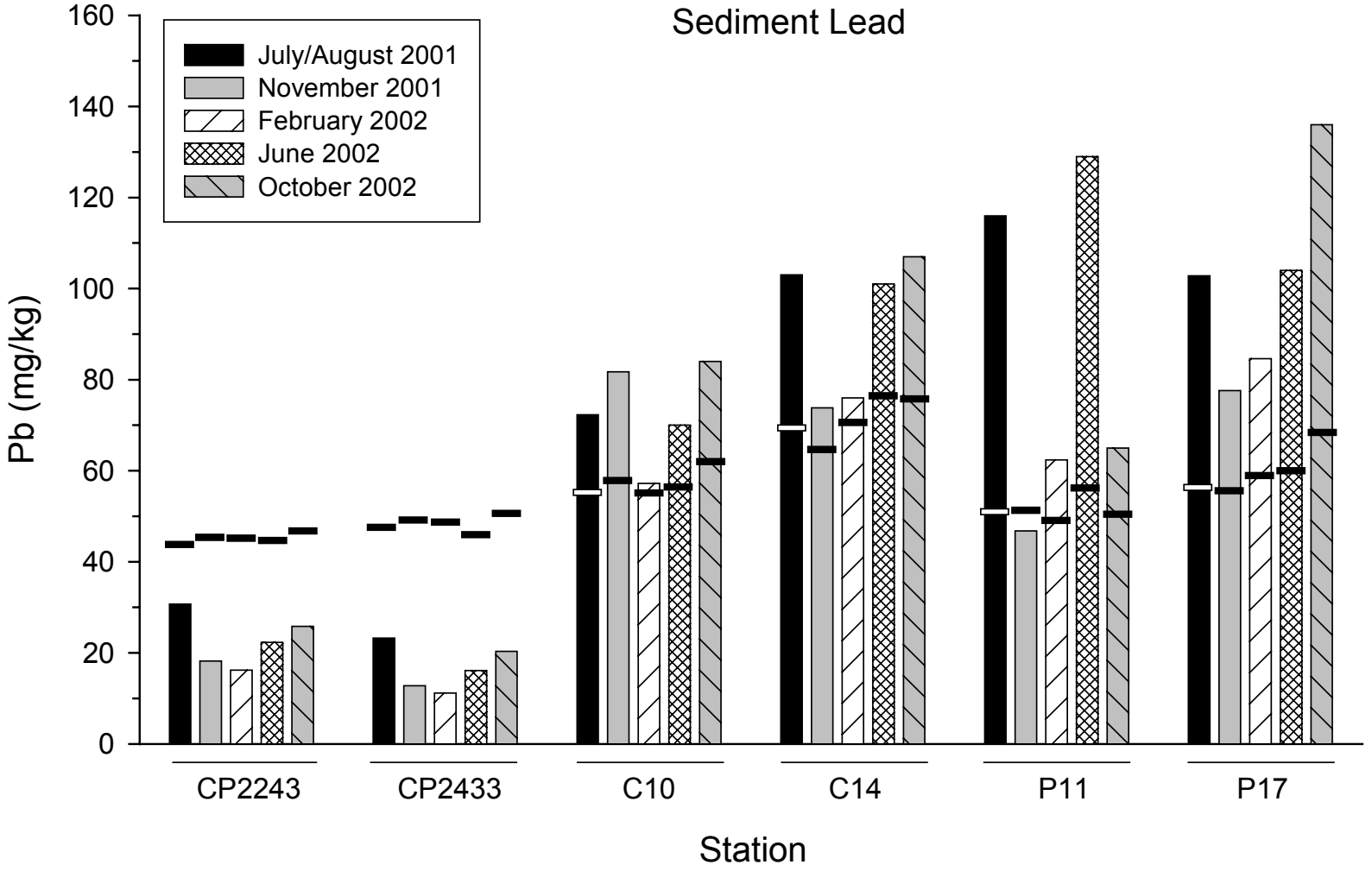


Figure 6. Concentrations of lead in the quarterly sediment samples. The dashes are threshold values calculated from the Baseline Pool using metals:%fines regression analysis. The ERM for Pb (not shown) is 218 mg/kg.

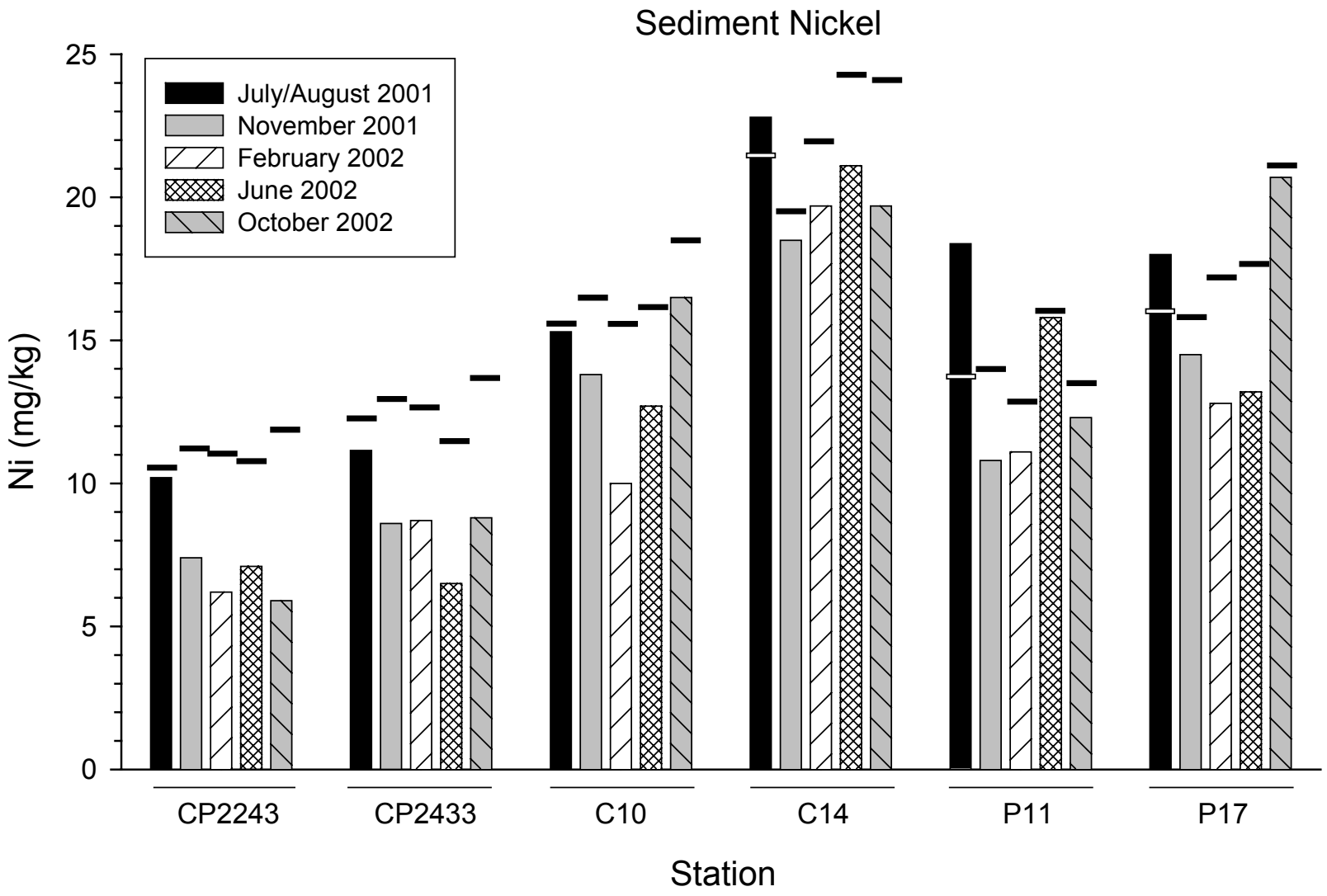


Figure 7. Concentrations of nickel in the quarterly sediment samples. The dashes are threshold values calculated from the Baseline Pool using metals:%fines regression analysis. The ERM for Ni (not shown) is 51.6 mg/kg.

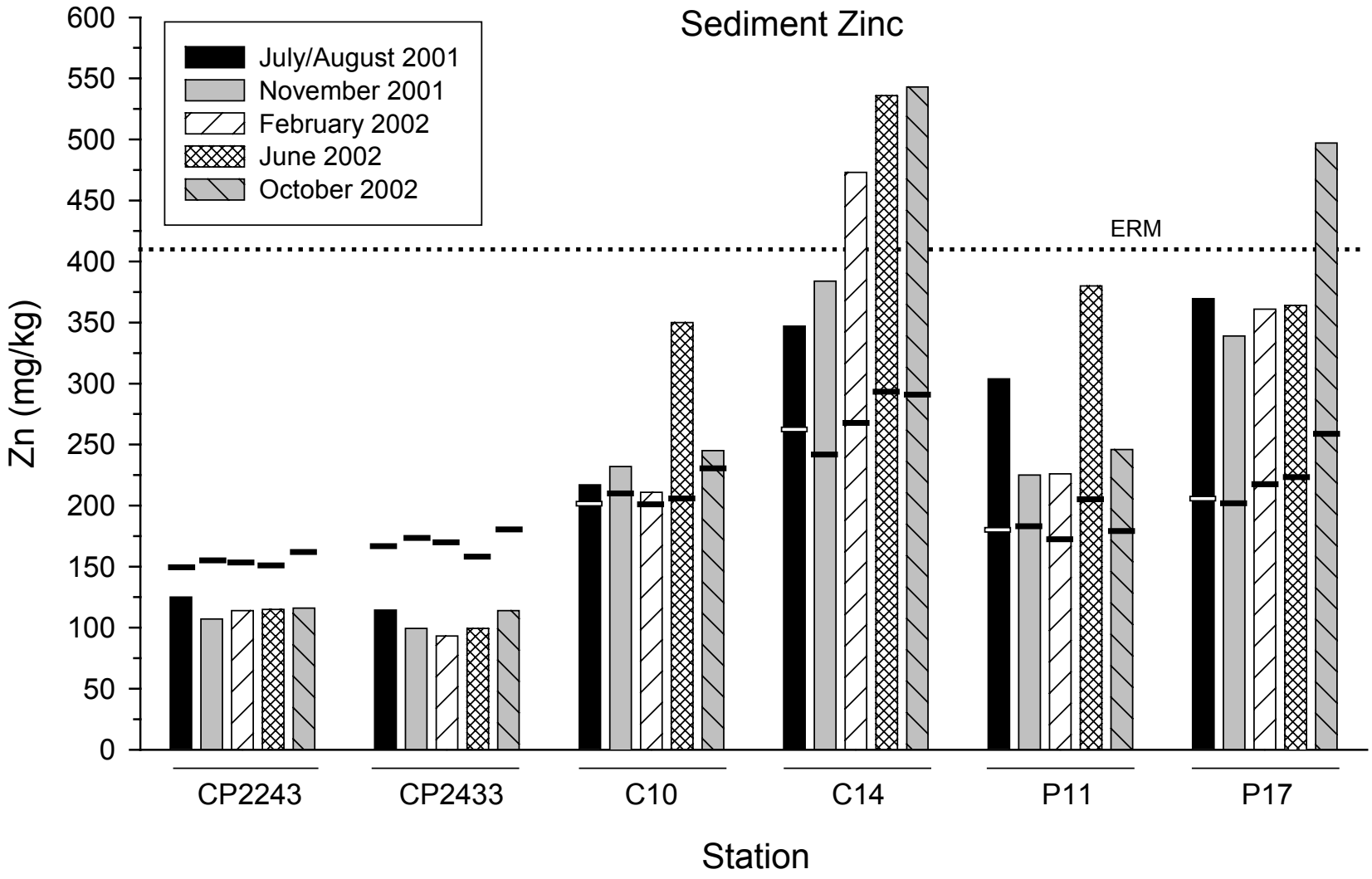


Figure 8. Concentrations of zinc in the quarterly sediment samples. The dashes are threshold values calculated from the Baseline Pool using metals:%fines regression analysis.

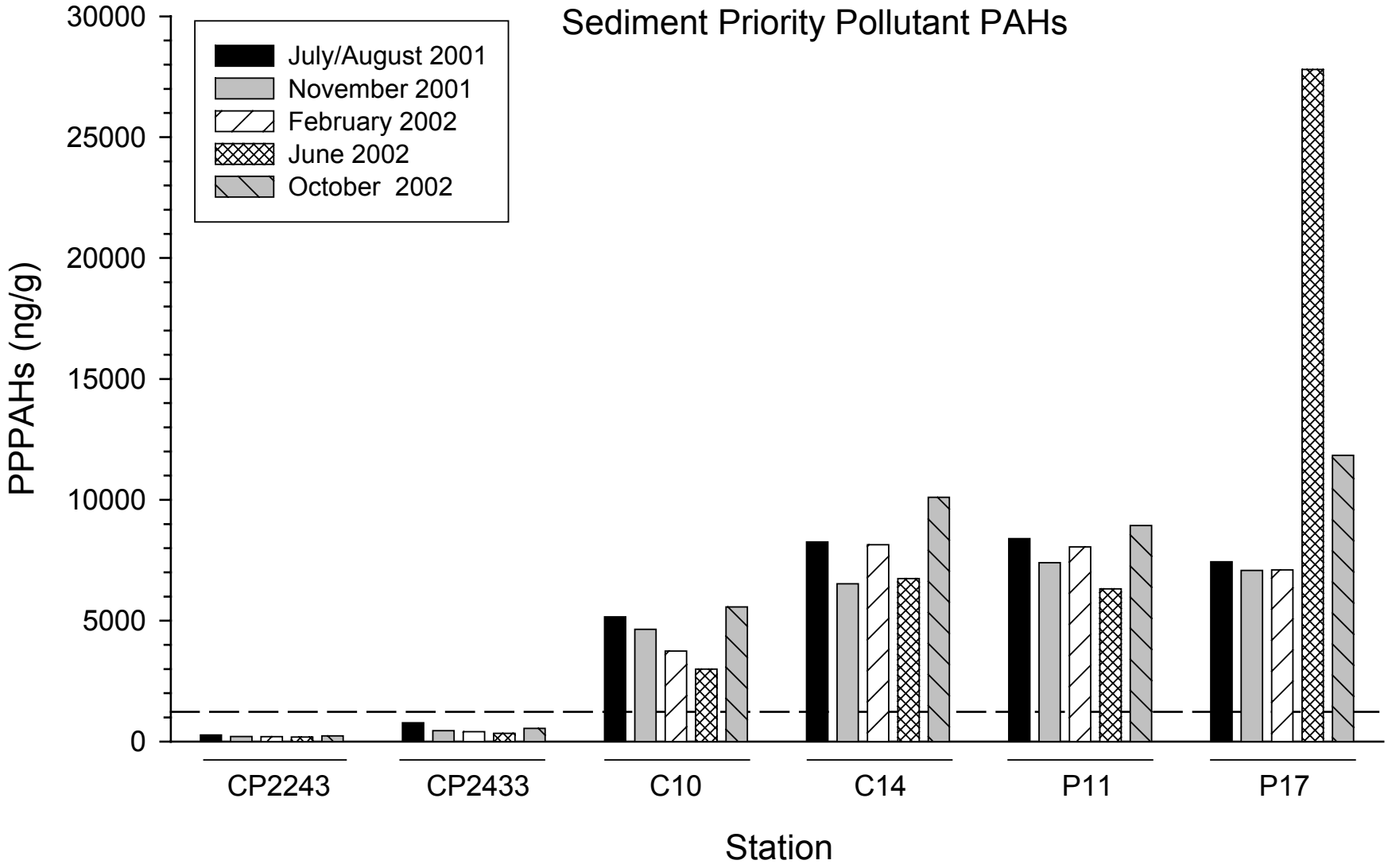


Figure 9. Concentrations of priority pollutant PAHs in the quarterly sediment samples. The dashed line is the 95% prediction limit from the Baseline Pool.

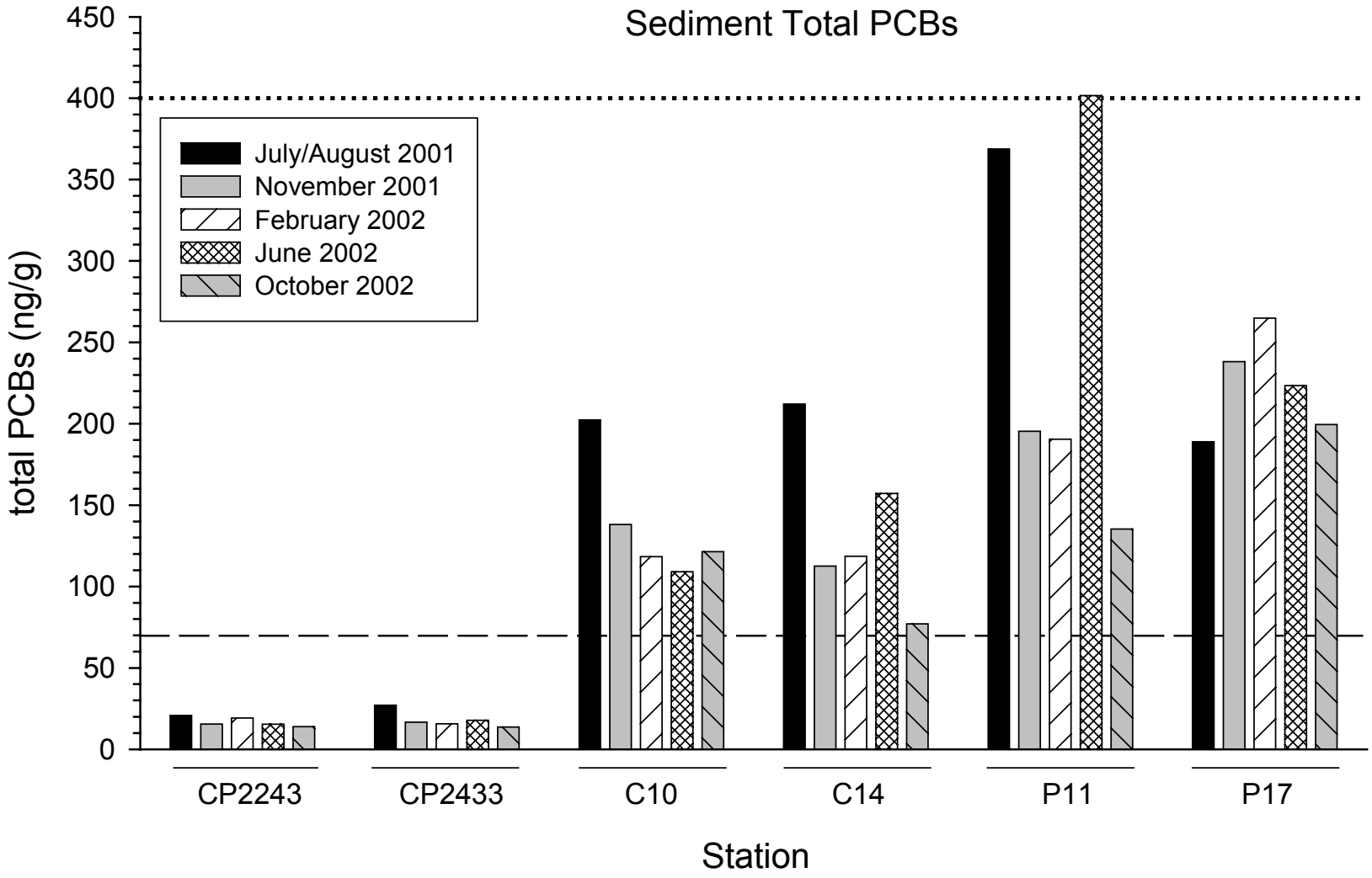


Figure 10. Concentrations of total PCBs in the quarterly sediment samples. The dashed line is the 95% prediction limit from the Baseline Pool. The dotted line is the consensus-based guideline for total PCBs.

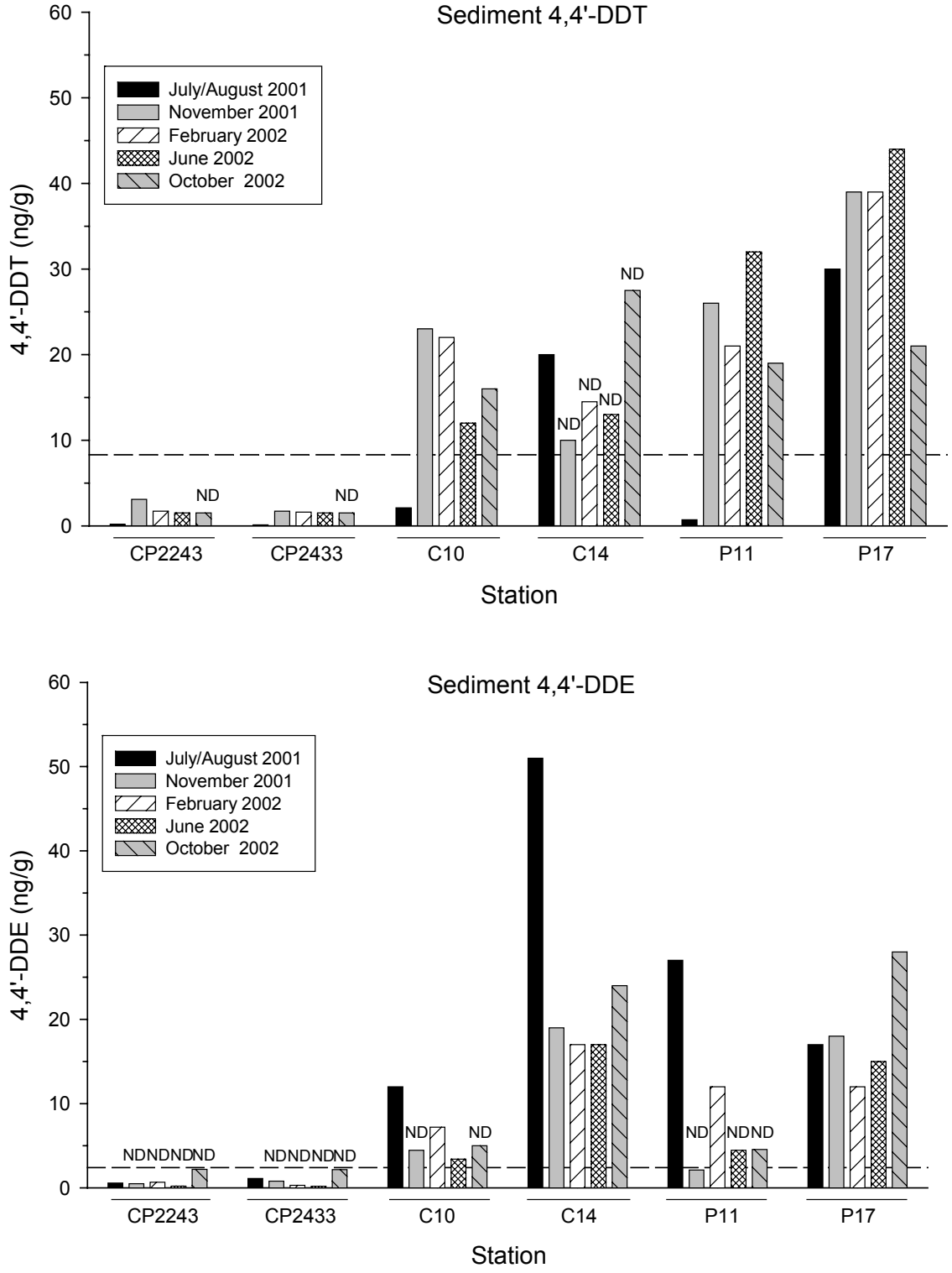


Figure 11. Concentrations of 4,4'-DDT and 4,4'-DDE in the quarterly sediment samples. The dashed line is the 95% prediction limit from the Baseline Pool. ND = not detected. The method detection limit varied by DDT isomer, and by analysis.

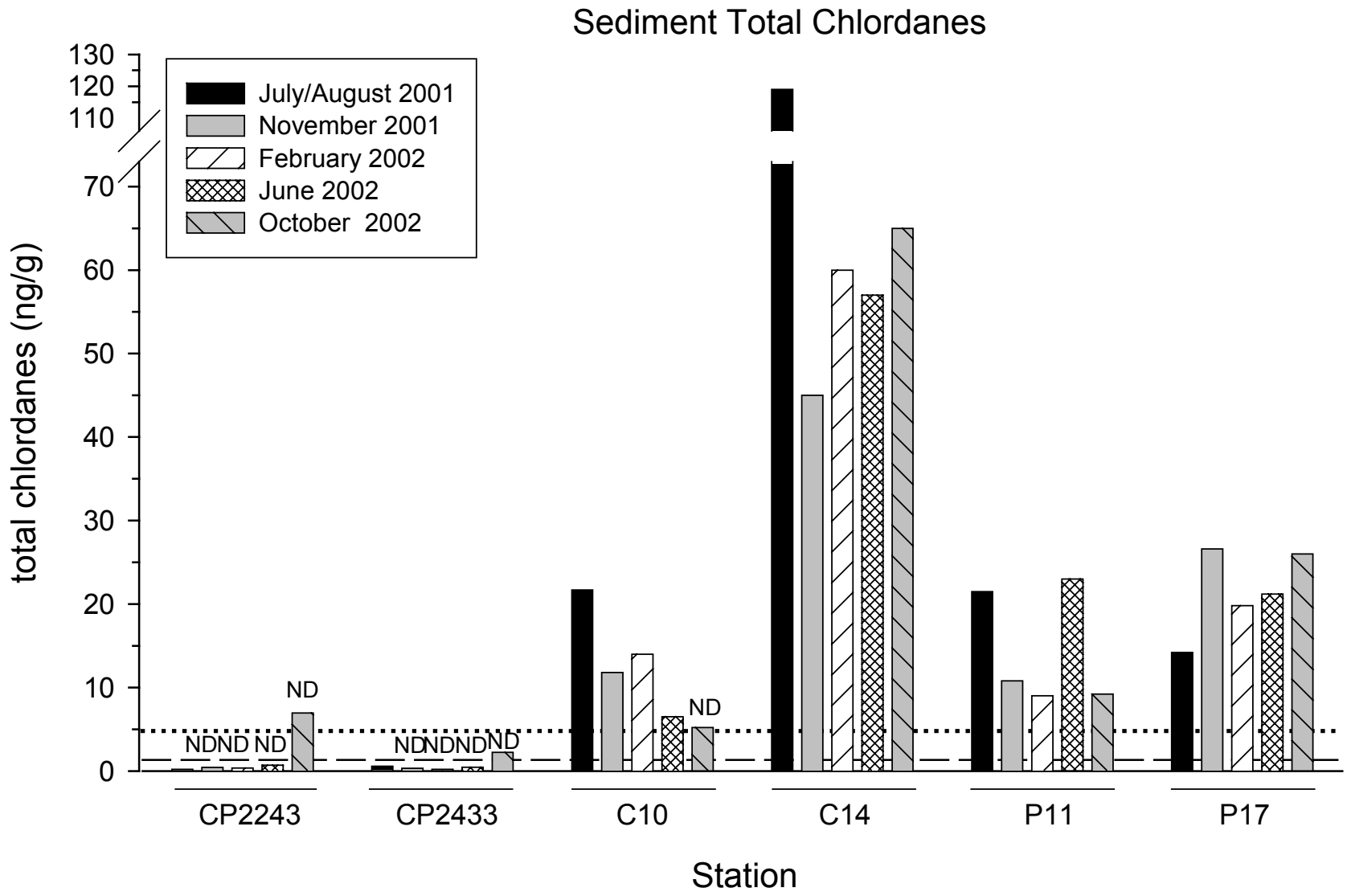


Figure 12. Concentrations of total chlordanes in the quarterly sediment samples. ND = non-detect treated as equal to half the method detection limit, which varied by analysis. The dashed line is the 95% prediction limit from the Baseline Pool. The dotted line is the PEL.

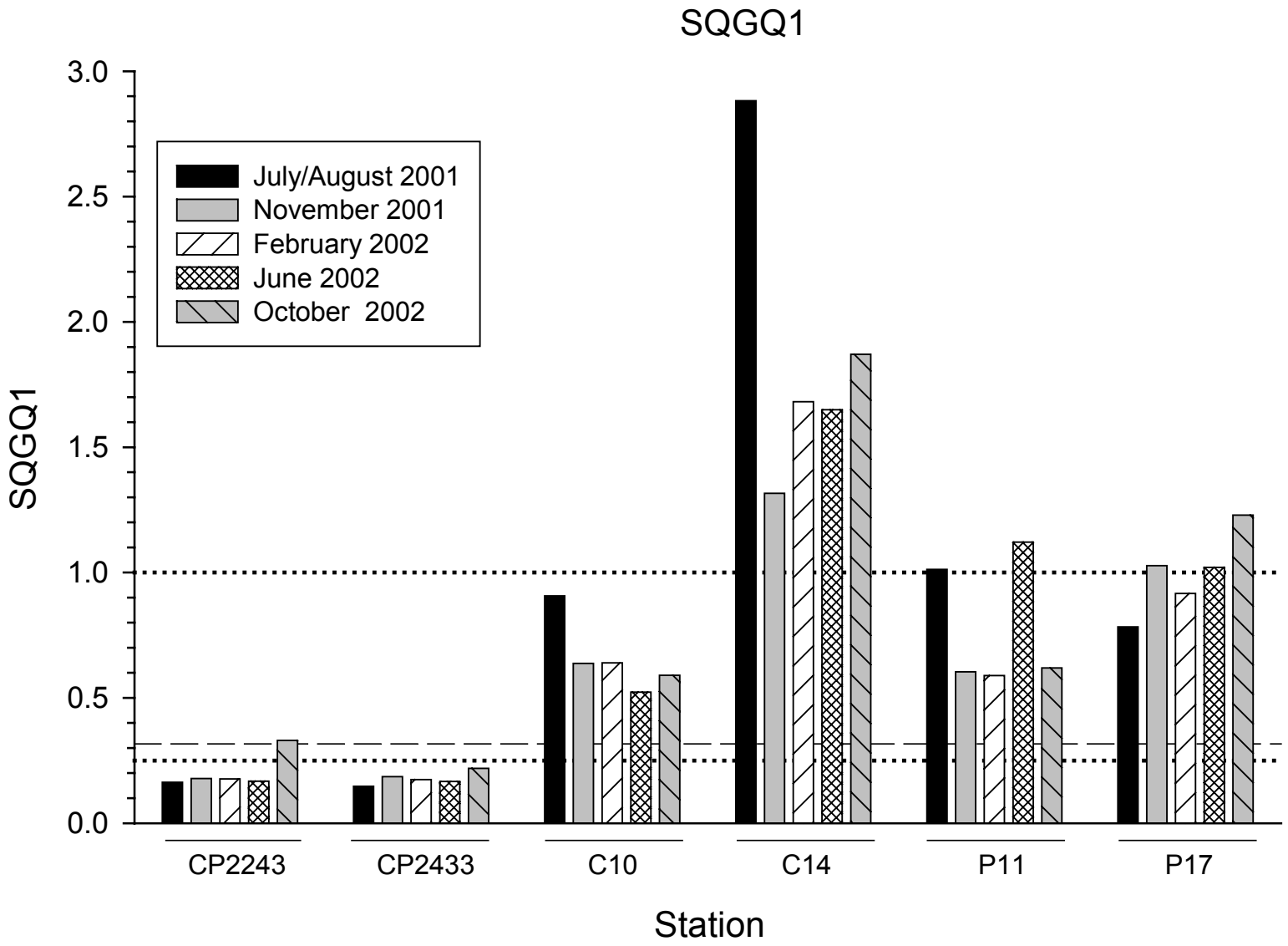


Figure 13. Sediment Quality Guideline Quotient (SQGQ1) in quarterly sediment samples. The dashed line is the 95% prediction limit from the Baseline Pool. The dotted lines represent the thresholds that correspond with unlikely (lower line) and likely (upper line) acute toxicity to amphipods.

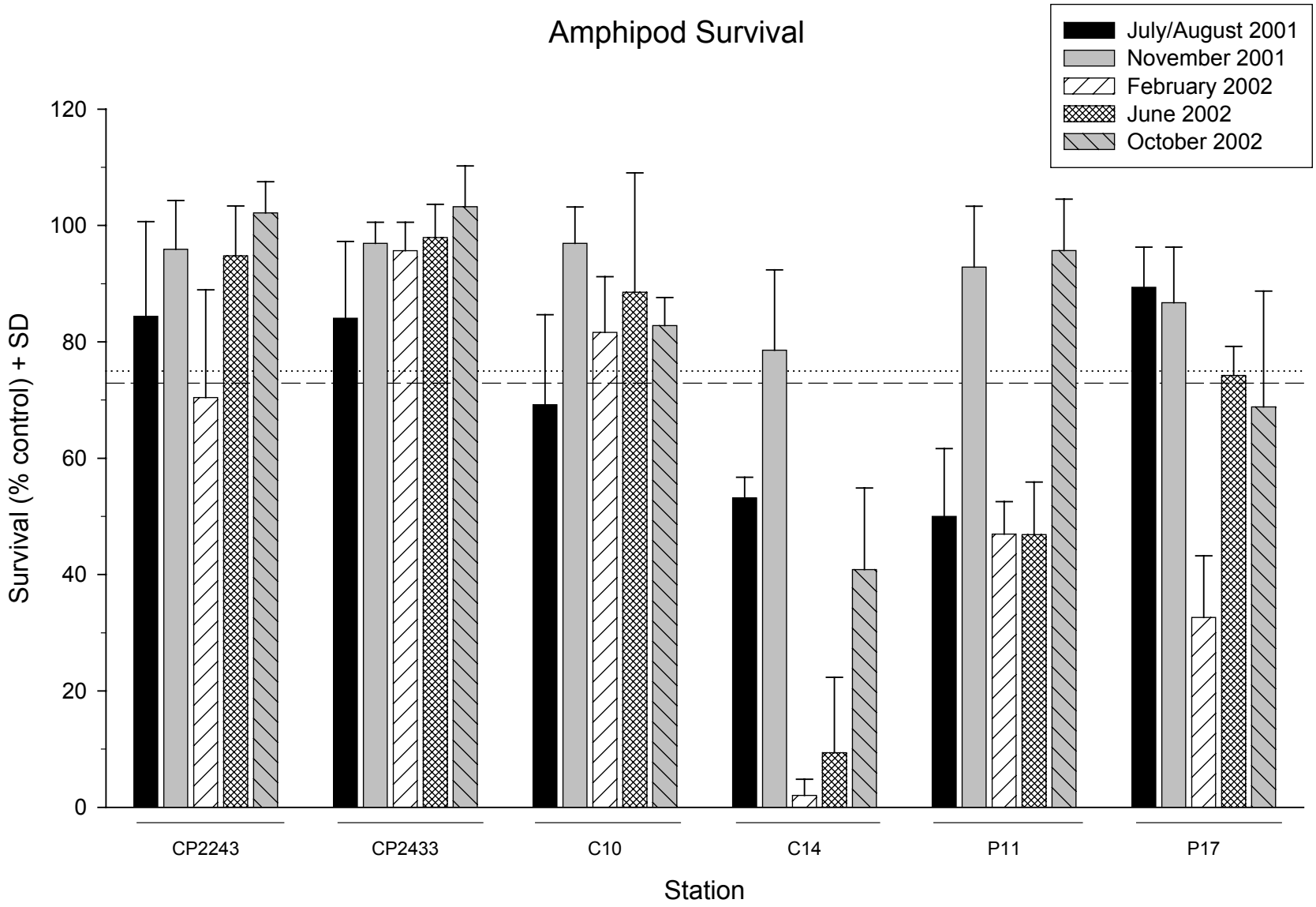


Figure 14. Amphipod survival in quarterly bulk sediment samples. Data are control adjusted. The dotted line is the 75% survival threshold. The dashed line is the lower 95% prediction limit from the Baseline Pool.

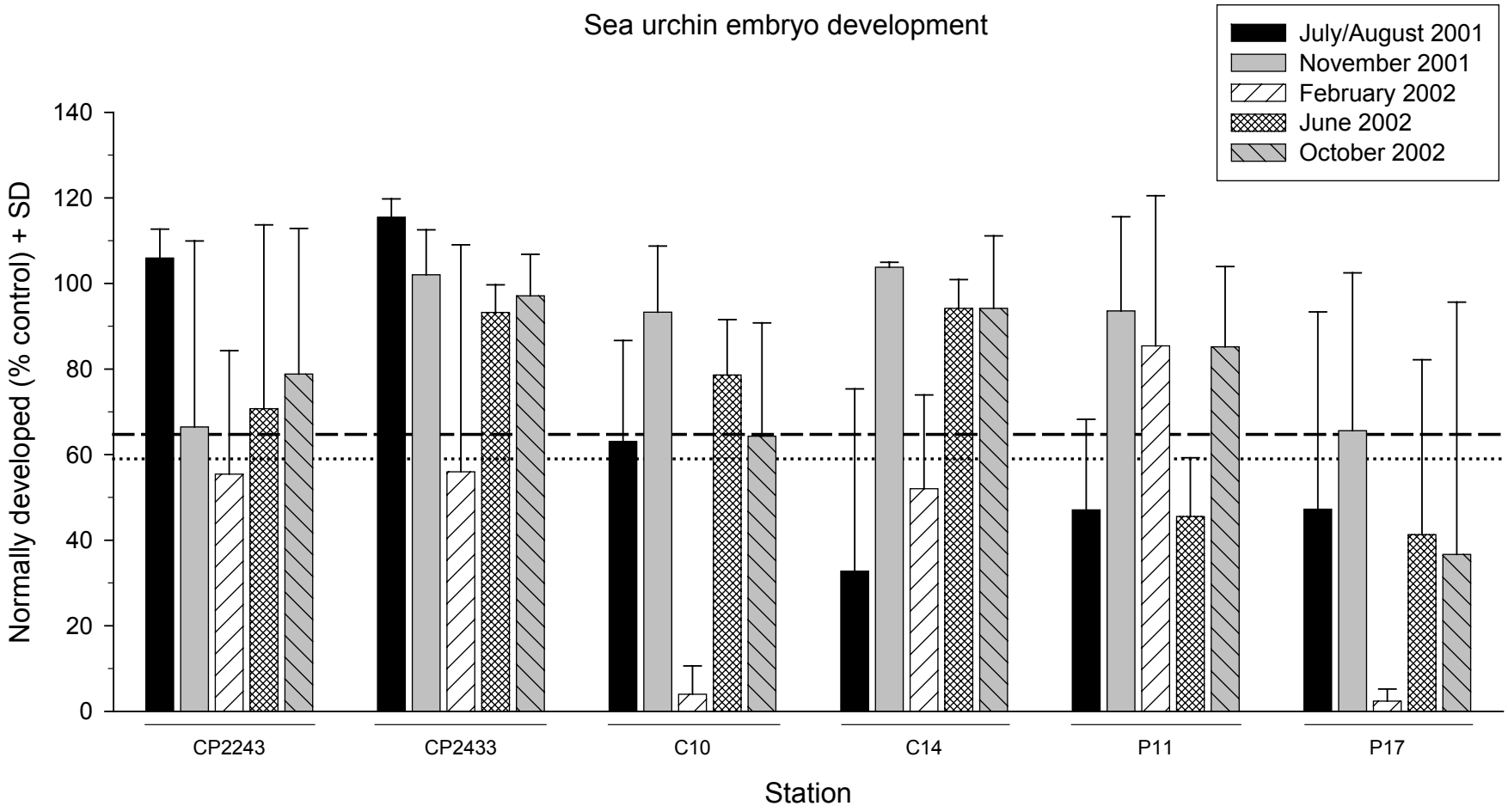


Figure 15. Sea urchin embryo development in quarterly sediment-water interface samples. Data are control adjusted. The dashed line is the lower 95% prediction limit from the Baseline Pool. The dotted line is the 59% normal development threshold.

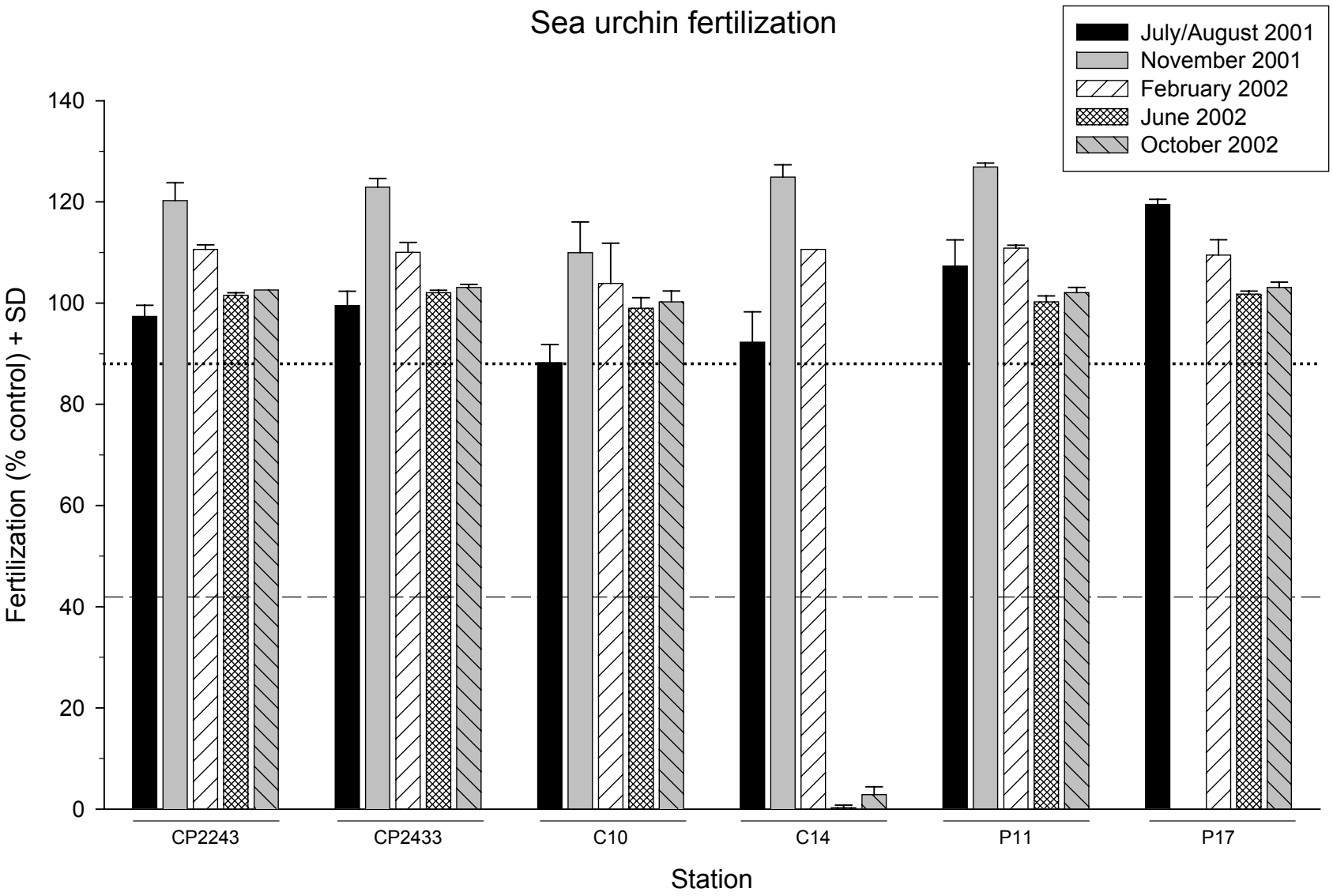


Figure 16. Sea urchin fertilization in quarterly pore water samples. Data are control adjusted. The dotted line is the 88% development threshold. The dashed line is the lower 95% prediction limit from the Baseline Pool.

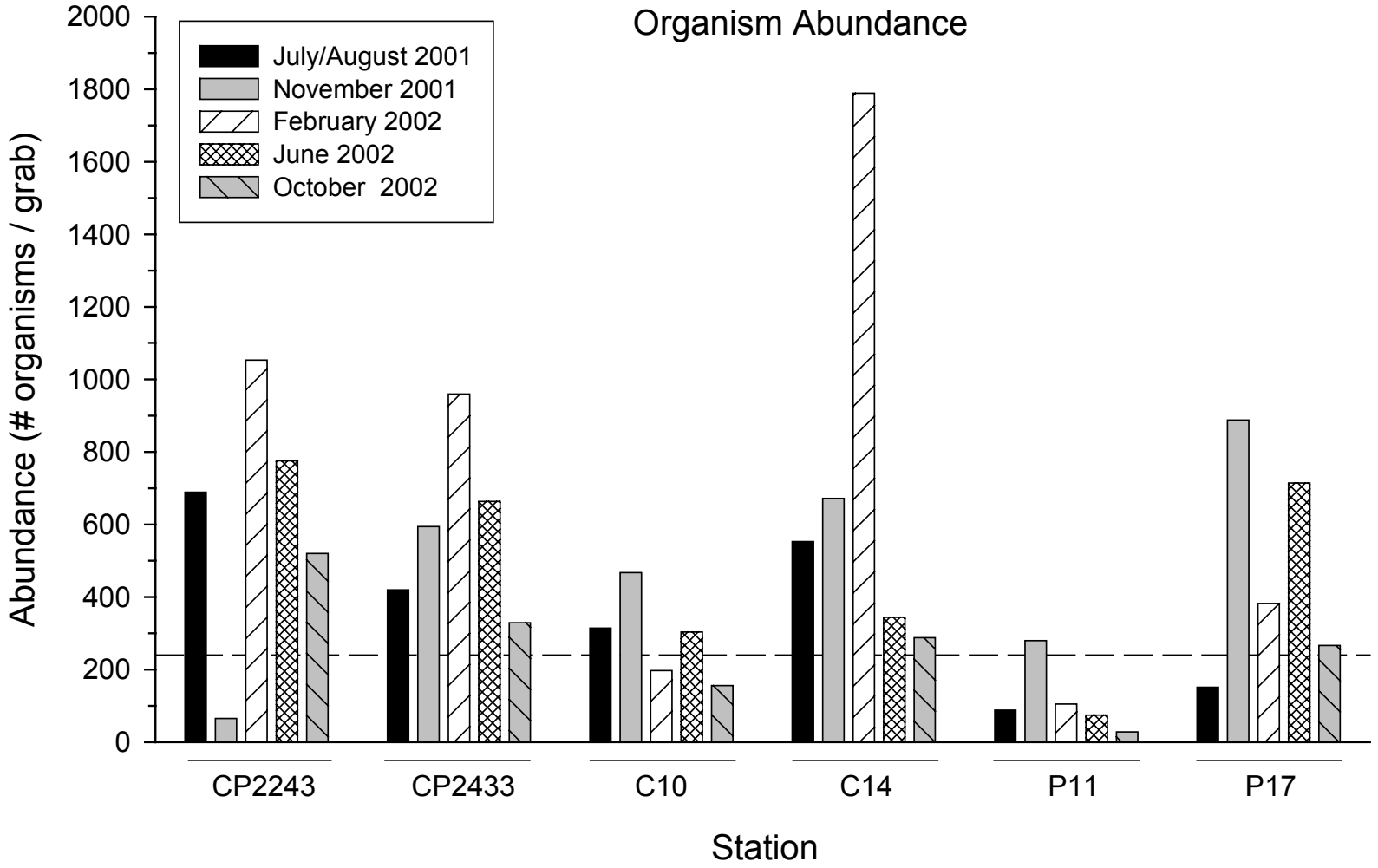


Figure 17. Macrofauna organism abundance in the quarterly samples. The dashed line is the lower 95% prediction limit from the Baseline Pool.

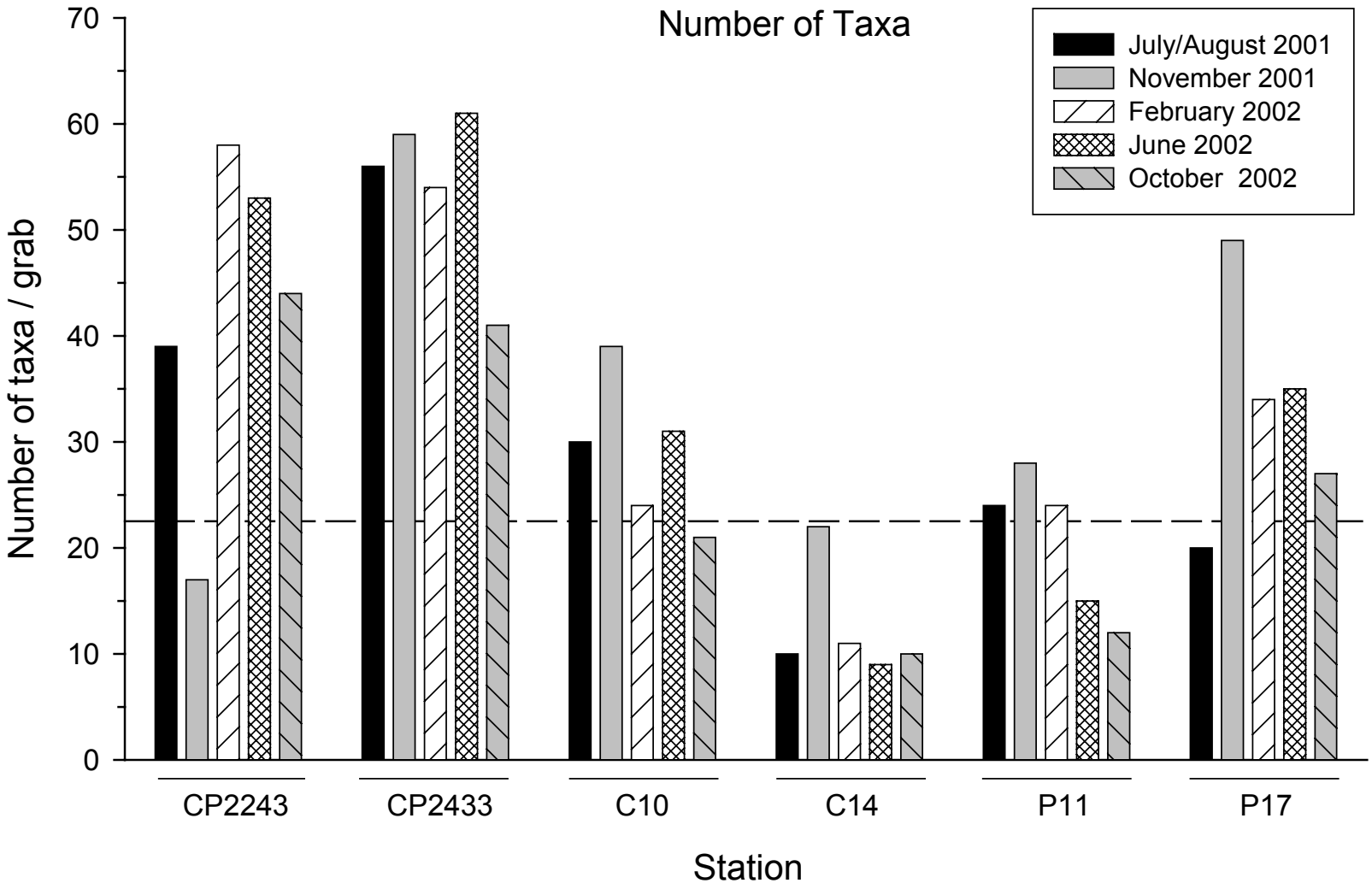


Figure 18. Number of macrofauna taxa at each station in the quarterly samples. The dashed line is the 95% prediction limit from the Baseline Pool.

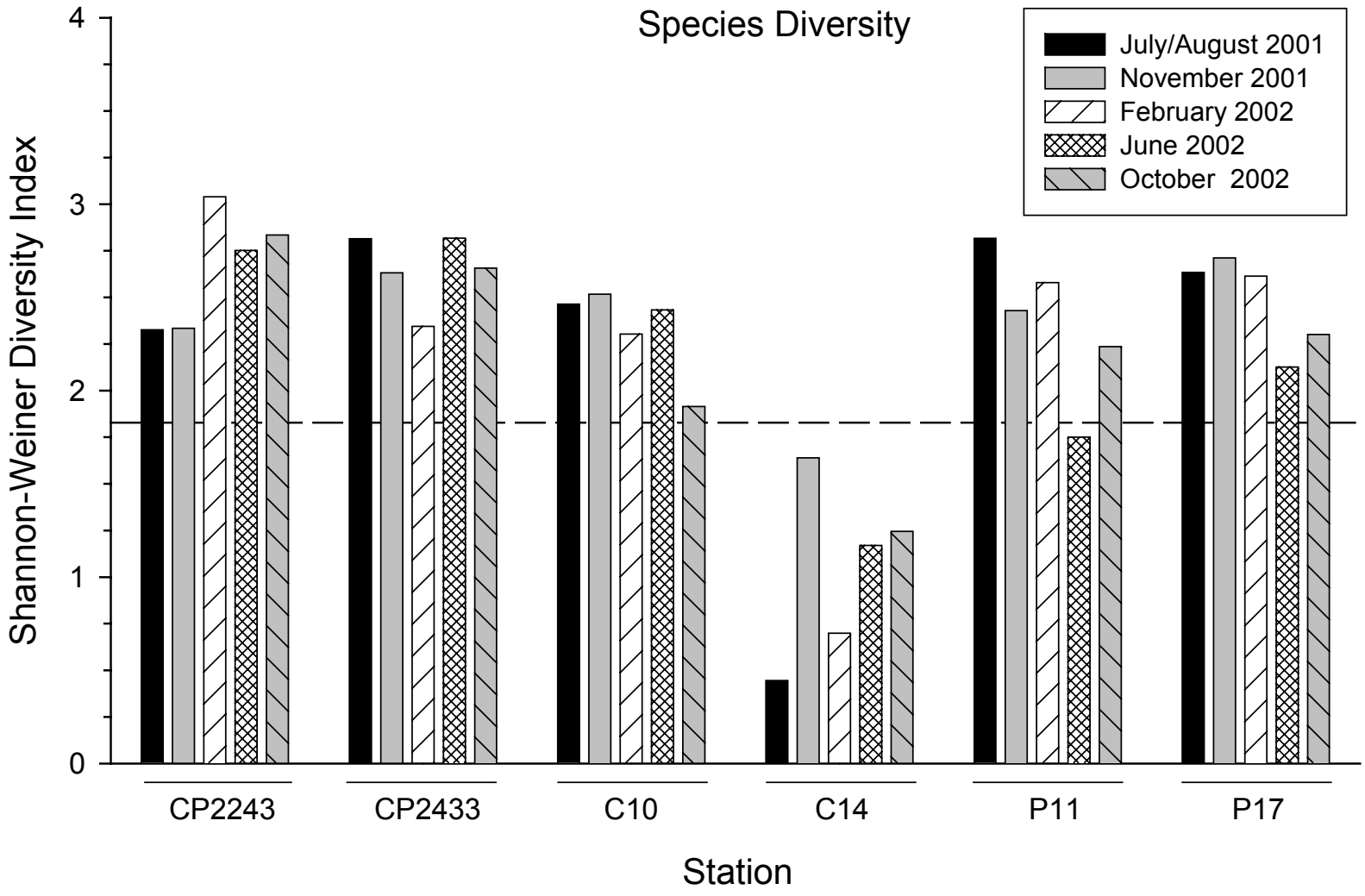


Figure 19. Diversity of benthic macrofauna at each station in the quarterly samples. The dashed line is the 95% prediction limit from the Baseline Pool.

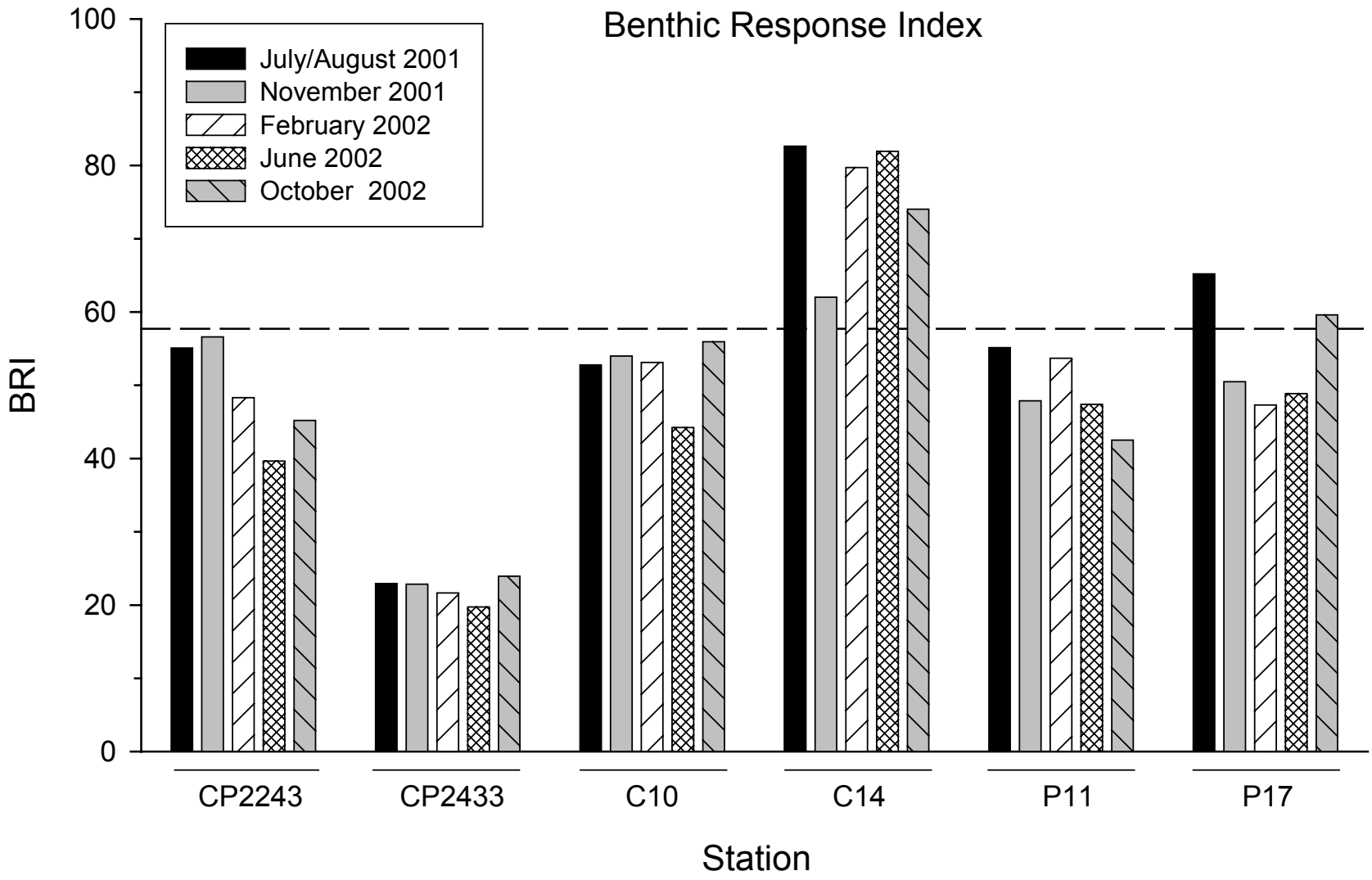


Figure 20. Benthic Response Index at each station in the quarterly samples. The dashed line is the 95% prediction limit from the Baseline Pool.

Figure 21. Sediment chemistry Lines of Evidence flow chart.

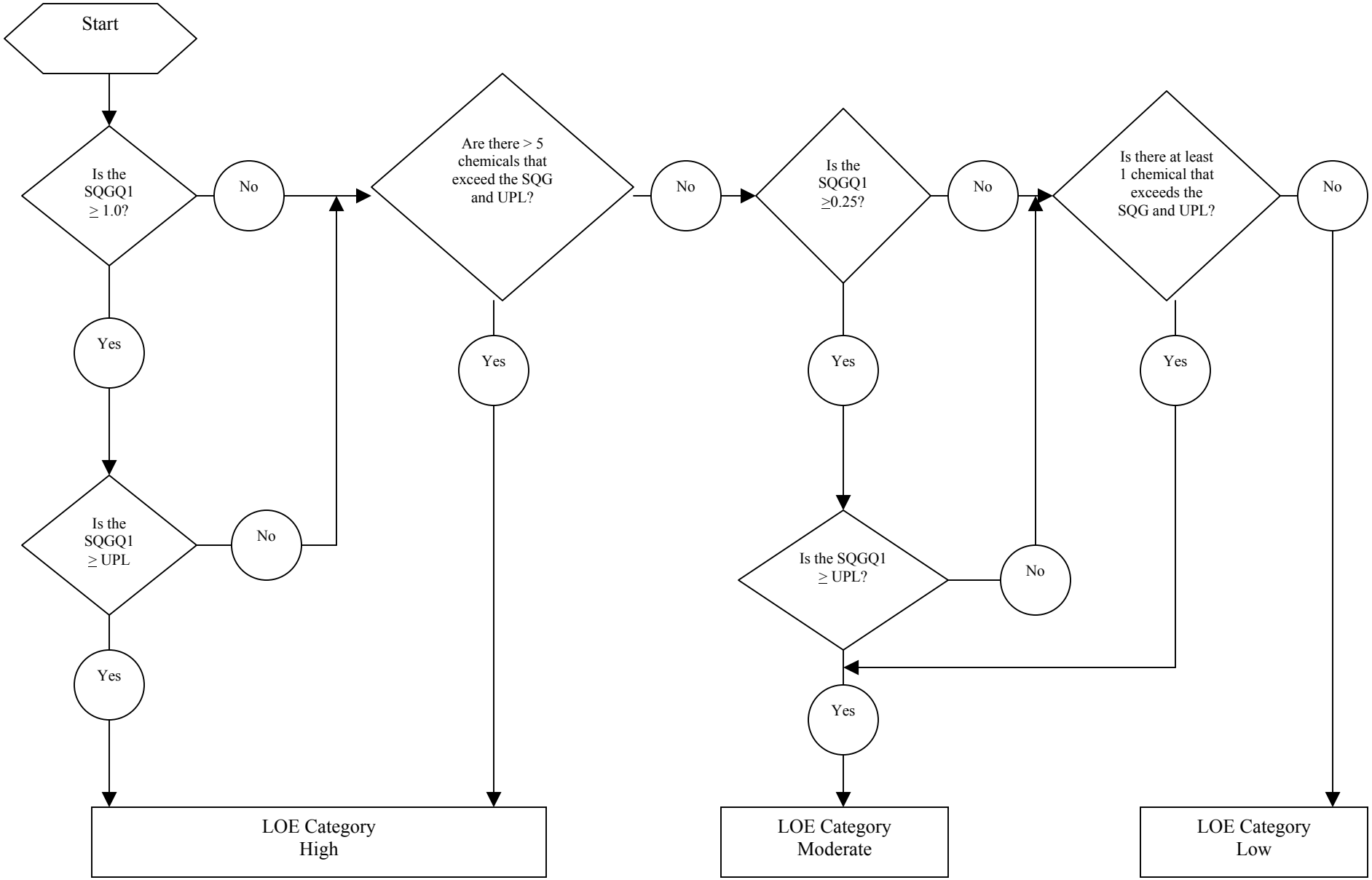


Figure 22. Benthic community Lines of Evidence flow chart.

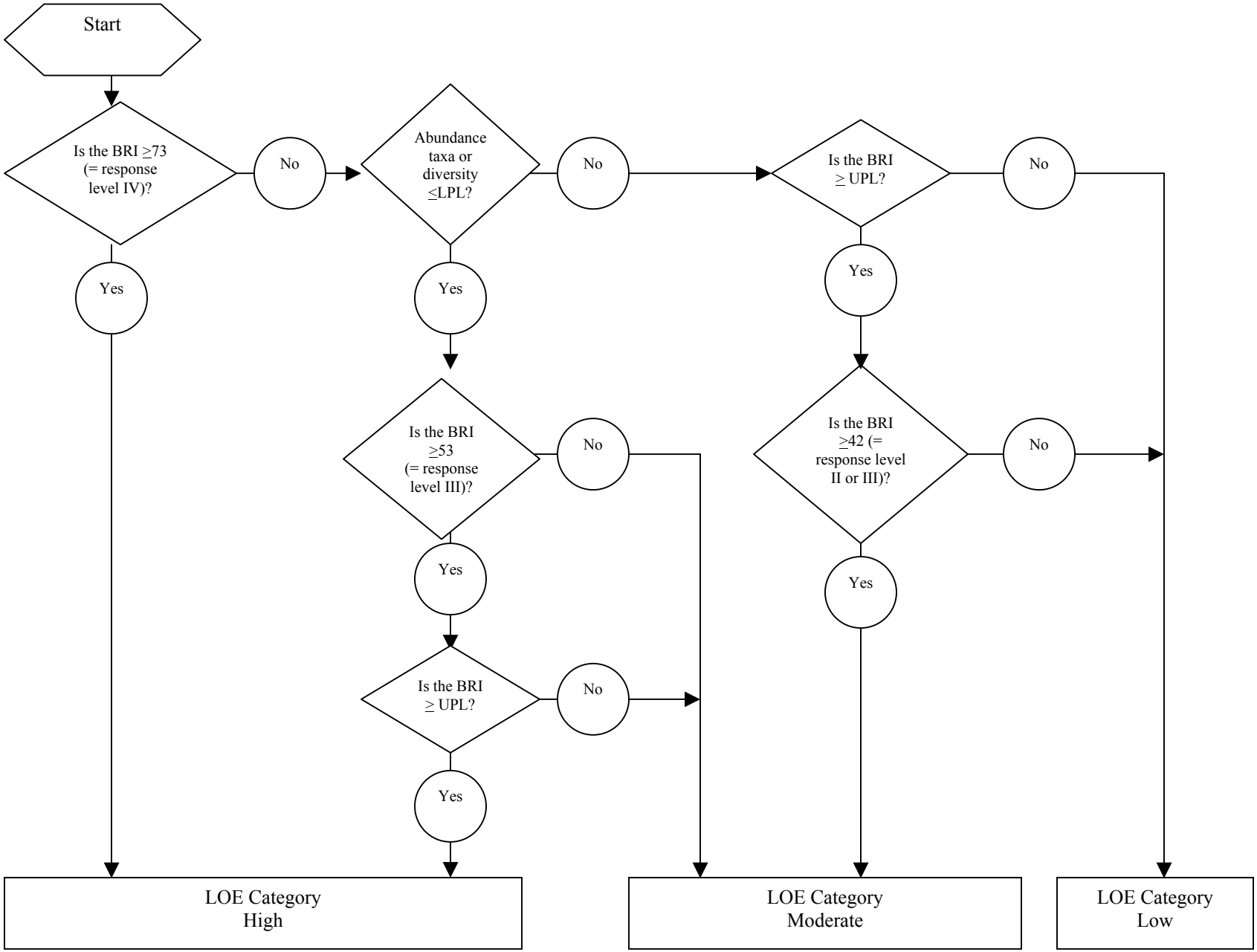
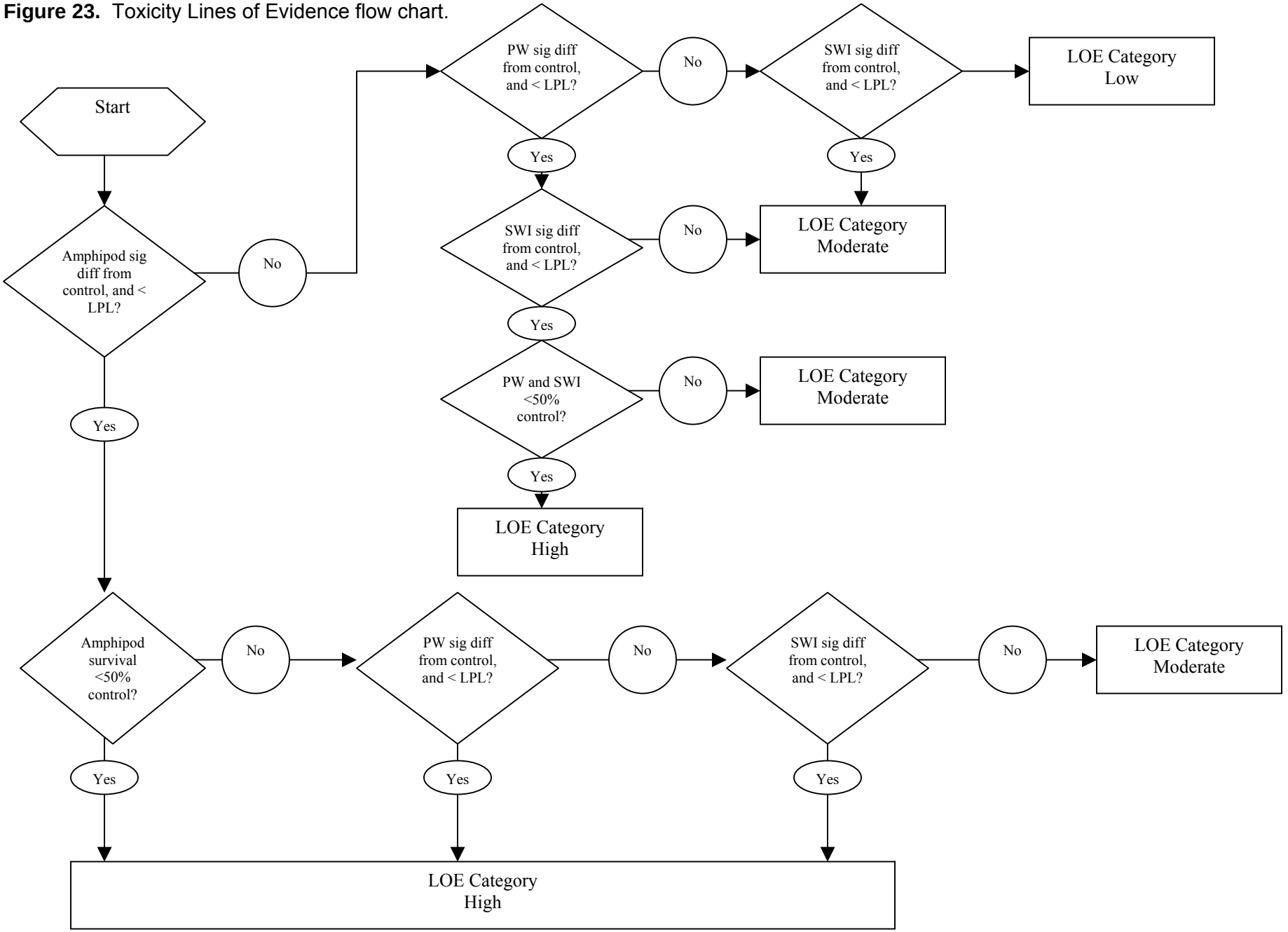


Figure 23. Toxicity Lines of Evidence flow chart.



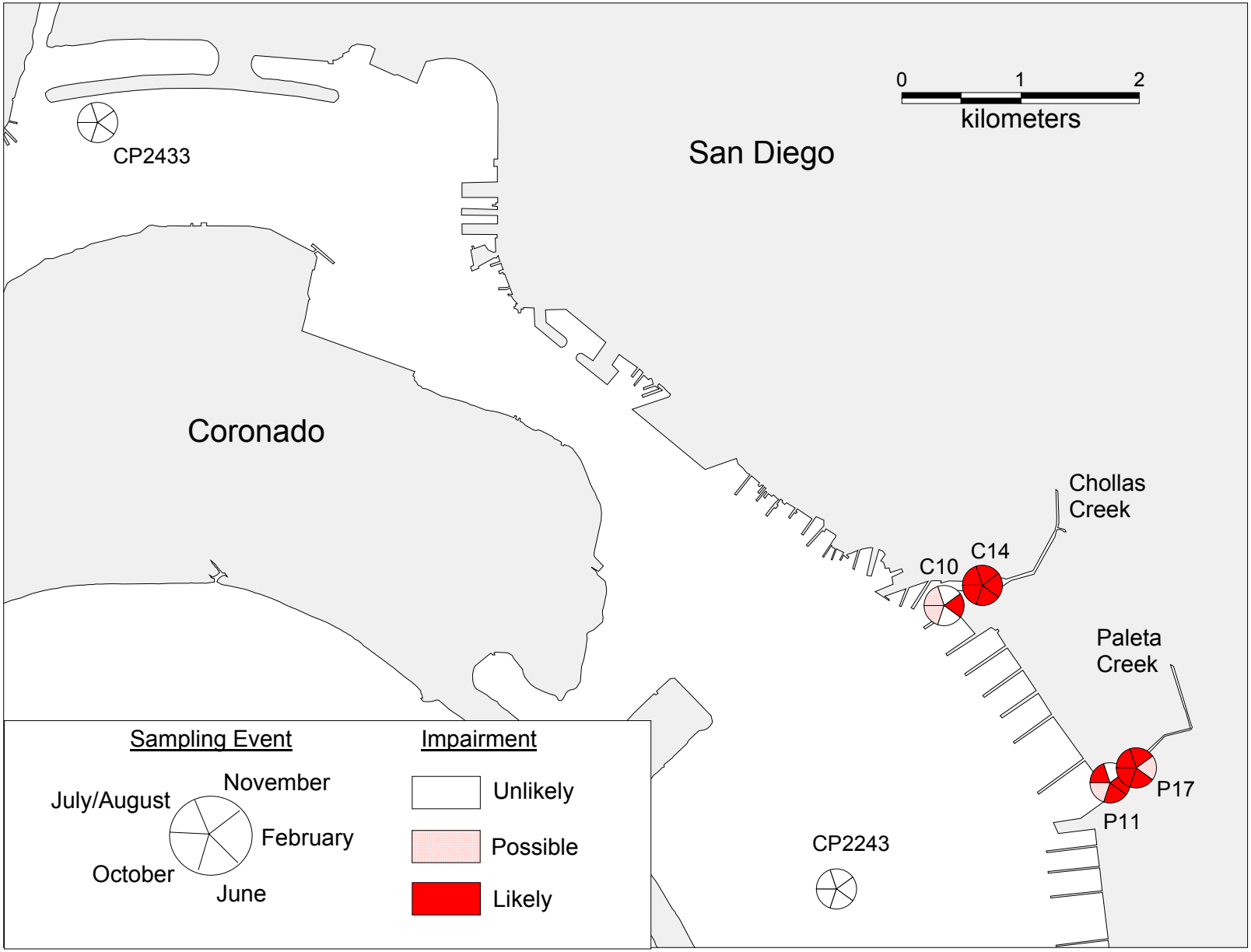


Figure 24. Aquatic life impairment weight of evidence for San Diego Bay temporal sampling study.

APPENDICES

Appendix A. Sampling location coordinates

Station	Sampling Date	Longitude	Latitude
CP2243	06-Nov-01	-117.14277	32.6645
CP2433	06-Nov-01	-117.20934	32.72238
C10	06-Nov-01	-117.13323	32.68602
C14	06-Nov-01	-117.1298	32.68757
P11	06-Nov-01	-117.11829	32.67263
P17	06-Nov-01	-117.11594	32.67377

Appendix B

Using Percent Fines to Determine Trace Metal Enrichment in Chollas and Paleta Creek Sediments

Introduction

This document describes the procedure used to help identify concentrations of metals that were enriched in Chollas and Paleta Creek study site sediments. Metal enrichment was determined using %fines:metals relationships based on regression analysis with the Baseline Pool. The procedure was based on the methods reported by Schiff and Weisberg (1997) that used iron as a reference element.

Methods

The first step was to eliminate data from the Baseline Pool that were not normally distributed. To do this, regressions were developed between each metal and %fines in the Baseline Pool (excluding Cr at Bight'98 Station 2265), then normality of the regression residuals was assessed with the Kolmogorov-Smirnov test. If the residuals were not normally distributed, sites with residuals >2 standard deviations were eliminated, and the regression was recalculated. The process of testing for normality and removal of data based on standard deviations was iterated until a normal distribution was achieved.

The second step was to identify background levels for each metal. After the non-normally distributed data were eliminated, the slope and y-intercept of the regression lines were calculated for each metal (Table B1, Figure B1).

The third step was to identify concentrations of metals in the quarterly field samples that were enriched. This was performed by comparing the metal concentration to a threshold value based in part on the % fines measured at each station. Because the % fines varied by station and sampling event, the threshold used to evaluate metal enrichment was also variable. The threshold value was calculated as the background level + the 95% prediction limit. The 95% prediction limit is derived as:

$$\text{95\% prediction limit} = SE\sqrt{1+\frac{1}{n}+\frac{(X-\overline{X})^2}{(n-1)(SD^2)}} * (t-statistic)$$

The t-statistic for a one-tailed test, n-2, α = 0.05 was used. Measured concentrations of metals that exceeded the threshold value were identified as being enriched (Figure 2, Table 2).

Results

Arsenic and cadmium were the only elements that had non-normally distributed residuals. Two stations were removed from the Baseline Pool for As. However, none of the residuals for Cd were greater than 2 standard deviations, and therefore none of the data were removed for Cd. All other metals had normally distributed residuals, and thus data from all 18 stations were used (except for Cr, which had data from 17 stations).

Table B1. Regression results of fines:metals relationships in the Baseline Pool. Results are for the data pool after removing residuals that exceed 2 standard deviations. All relationships are significant at $p < 0.05$.

Element	Sample size	r^2	Slope	Y-intercept	Range in thresholds	
					9% fines	80% fines
Ag	18	0.289	0.00827	0.1778	0.78	1.37
As	16	0.881	0.0841	2.001	4.15	10.07
Cd	18	0.249	0.0024	0.0519	0.25	0.42
Cr	17	0.728	0.673	7.90	30.61	77.78
Cu	18	0.596	1.44	3.80	65.65	167.18
Hg	18	0.376	0.0047	0.0999	0.39	0.72
Ni	18	0.869	0.215	0.840	6.25	21.41
Pb	18	0.433	0.481	8.25	35.23	69.15
Zn	18	0.721	2.21	28.98	105.68	261.50

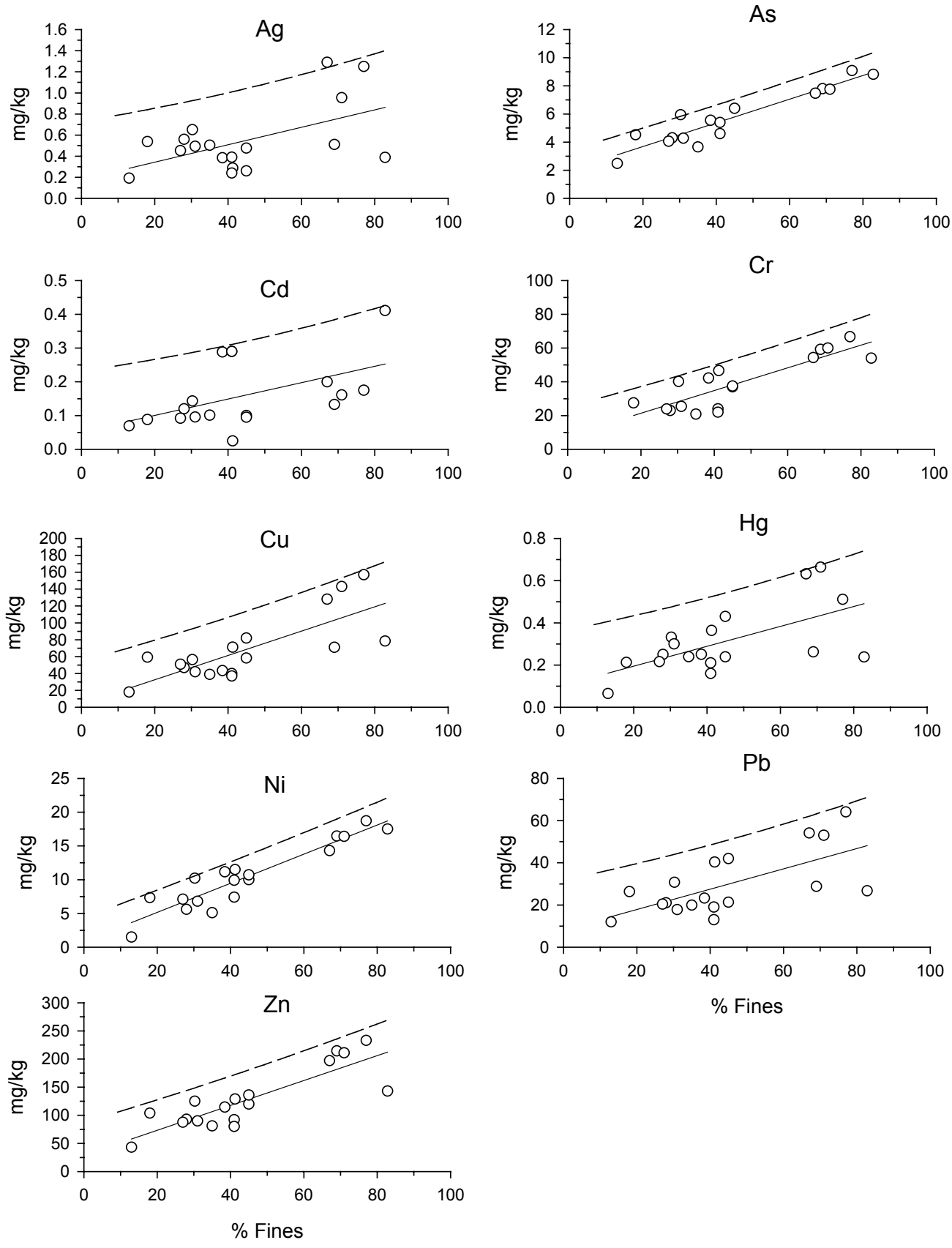


Figure B1. % Fines:metals plots from the Baseline Pool. The solid line is the relationship from linear regression. The dashed line is the threshold (predicted value + 95% prediction interval).

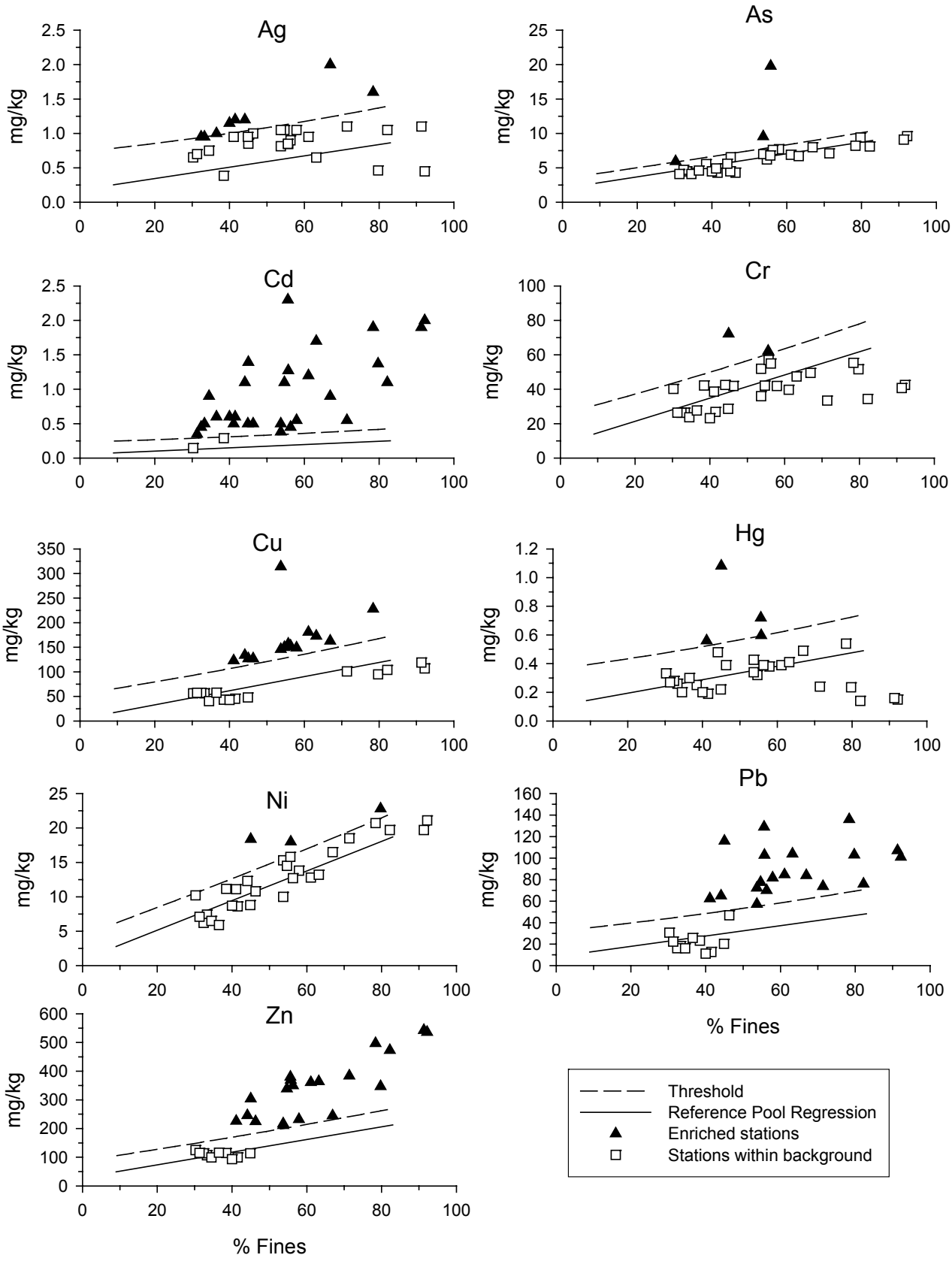


Figure B2. %Fines:metals plots from Chollas and Paleta Creek stations overlaid on the threshold and regression lines from the Baseline Pool. Sites which fall below the threshold are considered uncontaminated. Sites which lie above the threshold are considered enriched.

Table B2. Identification of Chollas and Paleta Creek sediment metal concentrations (Value) that exceed the threshold values (Thrsh). The threshold values were derived from the Baseline Pool, using the fines:metal regression approach. Boxed measured values are those which exceed the threshold.

Station	Sample Event	% Fines	Ag		As		Cd		Cr		Cu		Hg		Ni		Pb		Zn	
			Value	Thrsh	Value	Thrsh	Value	Thrsh	Value	Thrsh	Value	Thrsh	Value	Thrsh	Value	Thrsh	Value	Thrsh	Value	Thrsh
CP2243	7/01	30	0.651	0.93	5.9	5.8	0.143	0.29	40	44	56	93	0.332	0.48	10	11	31	44	125	149
CP2433	7/01	38	0.38	0.99	5.6	6.5	0.29	0.30	42	49	43	104	0.25	0.51	11	12	23	48	115	166
C10	7/01	54	0.814	1.12	9.6	7.8	0.381	0.34	52	59	314	126	0.427	0.58	15	16	72	55	217	200
C14	7/01	80	0.461	1.37	9.4	10.1	1.37	0.42	52	78	95	167	0.235	0.72	23	21	103	69	347	262
P11	8/01	45	0.852	1.04	6.5	7.1	1.392	0.32	72	53	127	114	1.081	0.54	18	14	116	51	304	181
P17	8/01	56	0.848	1.13	19.8	8.0	1.273	0.35	57	60	157	129	0.597	0.59	18	16	103	56	370	205
CP2243	11/01	33.3	0.95	0.95	4.5	6.1	0.50	0.29	26	45	56	97	0.26	0.49	7	11	18	45	107	155
CP2433	11/01	41.5	1.20	1.01	4.3	6.8	0.60	0.31	27	51	46	109	0.19	0.53	9	13	13	49	99	173
C10	11/01	57.9	1.05	1.15	7.7	8.2	0.55	0.35	42	62	149	133	0.38	0.61	14	16	82	57	232	210
C14	11/01	71.4	1.10	1.28	7.1	9.3	0.55	0.39	33	72	101	154	0.24	0.68	19	20	74	64	384	241
P11	11/01	46.3	1.00	1.05	4.3	7.2	0.50	0.32	42	54	127	115	0.39	0.55	11	14	47	51	225	183
P17	11/01	54.7	1.05	1.12	6.2	7.9	1.10	0.34	42	60	150	128	0.32	0.59	15	16	78	56	339	202
CP2243	2/02	32.4	0.95	0.94	4.7	6.0	0.45	0.29	26	45	57	96	0.28	0.48	6	11	16	45	114	153
CP2433	2/02	40	1.15	1.00	4.5	6.6	0.60	0.31	23	50	43	106	0.20	0.52	9	13	11	48	93	170
C10	2/02	53.7	1.05	1.12	7.0	7.8	0.50	0.34	36	59	146	126	0.34	0.58	10	16	57	55	211	200
C14	2/02	82.2	1.05	1.39	8.1	10.3	1.10	0.42	34	80	104	171	0.14	0.74	20	22	76	71	473	268
P11	2/02	41.1	0.95	1.01	4.9	6.7	0.50	0.31	39	51	123	108	0.56	0.52	11	13	62	49	226	172
P17	2/02	61.1	0.95	1.18	6.9	8.4	1.20	0.36	40	64	181	138	0.39	0.62	13	17	85	59	361	217
CP2243	6/02	31.3	0.70	0.93	4.1	5.9	0.35	0.29	26	44	58	94	0.27	0.48	7	11	22	44	115	151
CP2433	6/02	34.5	0.75	0.96	4.1	6.2	0.90	0.30	24	46	40	99	0.20	0.49	7	11	16	46	99	158
C10	6/02	56.3	0.90	1.14	7.6	8.0	0.45	0.35	55	61	153	130	0.39	0.60	13	16	70	56	350	206
C14	6/02	92.2	0.45	1.50	9.6	11.2	2.00	0.46	43	87	107	188	0.15	0.80	21	24	101	76	536	292
P11	6/02	55.6	0.85	1.13	6.8	8.0	2.30	0.35	62	60	152	129	0.72	0.59	16	16	129	56	380	204
P17	6/02	63.2	0.65	1.20	6.7	8.6	1.70	0.37	47	66	173	141	0.41	0.63	13	18	104	60	364	222
CP2243	10/02	36.5	1.00	0.97	4.6	6.3	0.60	0.30	28	48	58	102	0.30	0.50	6	12	26	47	116	162
CP2433	10/02	44.9	0.95	1.04	4.5	7.0	0.50	0.32	29	53	48	113	0.22	0.54	9	14	20	51	114	180
C10	10/02	66.9	2.00	1.24	8.0	8.9	0.90	0.38	50	68	163	147	0.49	0.65	17	18	84	62	245	231
C14	10/02	91.3	1.10	1.49	9.1	11.1	1.90	0.45	41	87	119	186	0.16	0.79	20	24	107	76	543	290
P11	10/02	44.1	1.20	1.03	5.6	7.0	1.10	0.32	43	53	134	112	0.48	0.54	12	13	65	50	246	179
P17	10/02	78.4	1.60	1.35	8.2	10.0	1.90	0.41	55	77	228	165	0.54	0.72	21	21	136	68	497	258

Reference

Schiff, K. and S.B. Weisberg. 1997. Iron as a reference element for determining trace metal enrichment in California coastal shelf sediments. Pp 68-77 *in*: S.B. Weinberg, C. Francisco and D. Hallock (eds.) Southern California Coastal Water Research Project Annual Report 1996. Westminster, CA.

Appendix C

Identification of outliers and adjustment for ammonia influence in the sediment-water interface test

An approach was used to identify outliers and determine the amount of toxicity that was due to ammonia in the sediment-water interface tests with San Diego Bay sediments. The toxicity due to ammonia was then offset and the percentage of normal development adjusted to reflect the amount of toxicity due to other constituents.

Identification of Outliers

The results from previous experiments using ammonia-spiked seawater were used to describe the effect of ammonia on sea urchin development (Figure C1). The lower 95% confidence limit from the dose-response experiments was calculated using logistic regression analysis and used to develop two thresholds to classify ammonia influence. The ammonia effect threshold was established as the concentration of ammonia where the lower 95% confidence limit was associated with 80% normal development (0.033 mg/L). Samples with concentrations above the effect threshold and <80% normal development were considered to be affected by unionized ammonia (Figure C1). Samples with concentrations below the effects threshold, and any sample with ≥80% normal embryo development (regardless of ammonia concentration), were considered to be unaffected by ammonia.

The second threshold represented the concentration of ammonia that was associated with extreme effects, sufficient to cause all of the toxicity observed in samples with <80% normal development. This threshold was determined as the x-intercept of the lower 95% confidence limit, which is equivalent to the concentration associated with 0% normal embryo development (0.067 mg/L). Samples with ammonia concentrations above this threshold were considered to be outliers and not useful for further analysis.

The concentration of ammonia was measured in each SWI core tube replicate from the study at the beginning of each experiment and again after 72 h when the experiments were terminated. The average unionized ammonia concentration for each replicate was calculated and compared to the effects thresholds to help identify ammonia influence (Figure C2). Stations CP2433, P11 and P14 from July, and Station C10 from November each had one replicate that was an outlier, while Station CP2243 from July had two outliers (>extreme effect threshold).

Data Adjustment

Thirteen replicate samples were classified as ammonia influenced due to <80% normal development and ammonia concentrations in the range between the two thresholds (Figure C2). The concentration of ammonia in these samples, however, was not high enough to prevent assessment of the influence of other constituents on sea urchin embryo development. The amount of toxicity due to other constituents was estimated as follows.

For samples below the lower confidence limit, an adjusted development value was calculated as: 100 – (development predicted by lower confidence limit – observed development) (Figure C3). For samples with development above the lower confidence limit, an adjustment based upon the lower 95% confidence limit would inflate the adjusted percent development above a likely value so the adjustment equation was not applied. The adjusted development for these samples was set as equal to the average development of samples that were not influenced by ammonia in the Baseline Pool (=100.3% of control development). Replicates that exceeded the effects threshold and were adjusted included three replicates from the November sampling of Station P17, one replicate from the June sampling of Station C14, one replicate from the August and June sampling events from Station P17, three replicates from the August sampling of Station P11, and all four replicates from the February sampling of Station C14.

Due to operator error, initial ammonia concentrations were not measured for the experiment that included the Paleta Creek stations from August 2001. Therefore, the initial values for these samples was estimated as the 10^{th} percentile of measured initial values from the samples collected from the Chollas Creek and other reference stations from July 2001 (0.012 mg/L NH_3), when the final concentrations from Paleta Creek samples were low (<0.10 mg/L NH_3). For stations having a final concentration $\geq$0.10 mg/L NH_3, the average initial value from the Chollas Creek samples from July 2001 was used (0.031 mg/L NH_3).

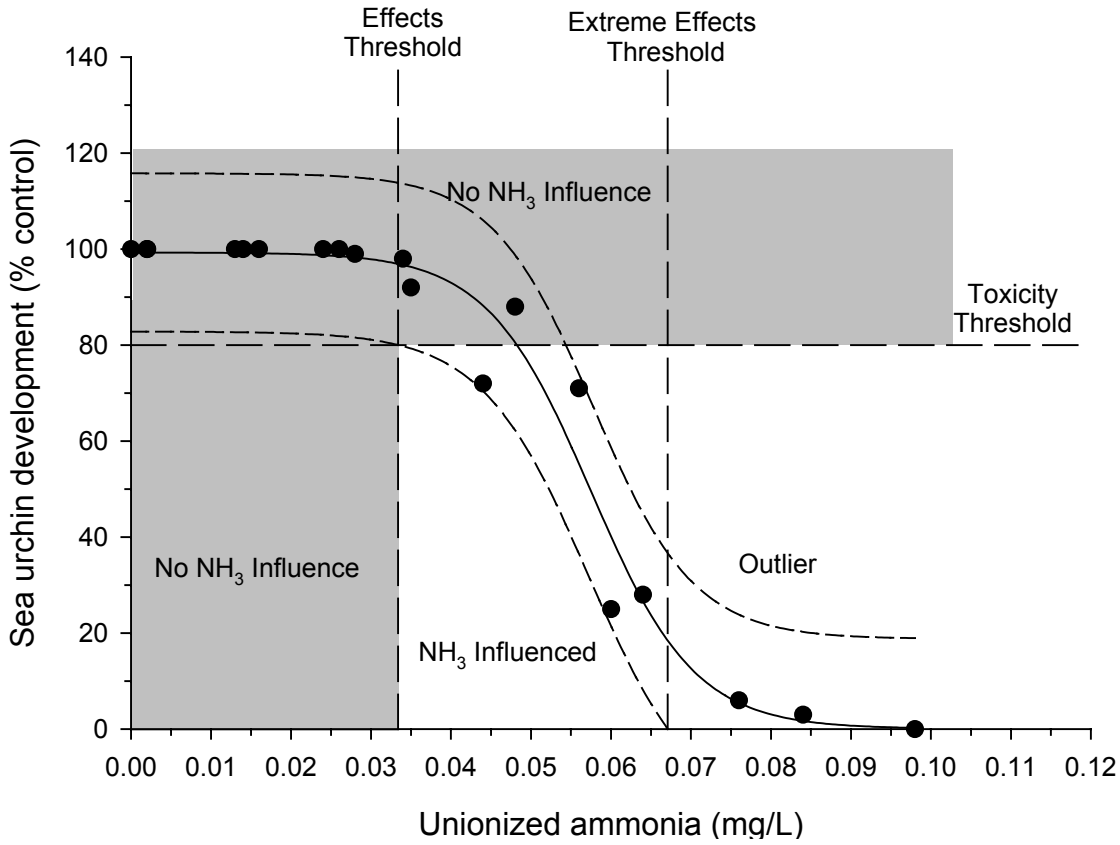


Figure C1. Effect of unionized ammonia on sea urchin embryo development. The plotted points are from experiments using seawater spiked with various concentrations of ammonia. The three categories (No NH_3 influence, NH_3 influenced, Outlier) reflect the concentration of unionized ammonia and level of normal embryo development observed.

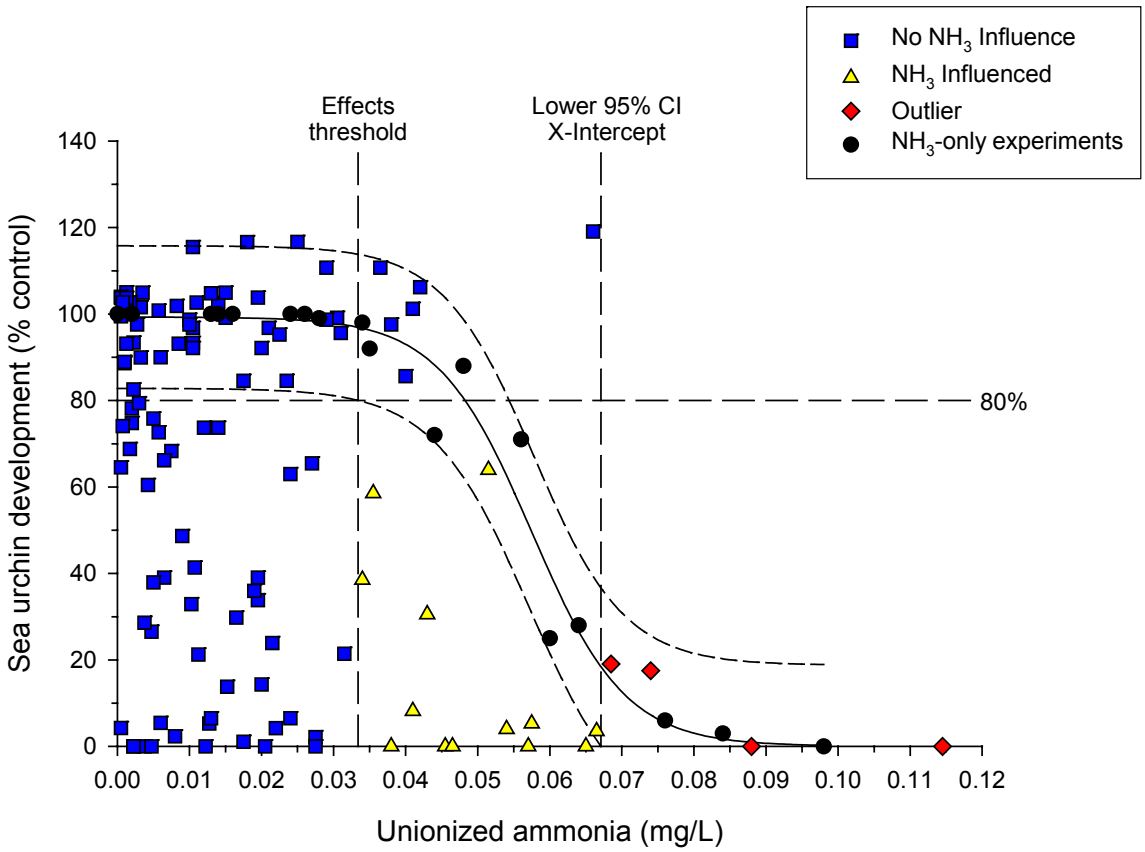


Figure C2. Sea urchin embryo development and unionized ammonia concentrations from Chollas and Paleta Creek stations, the San Diego Bay reference sites, and ammonia-only experiments. The San Diego Bay samples are categorized by influence of ammonia.

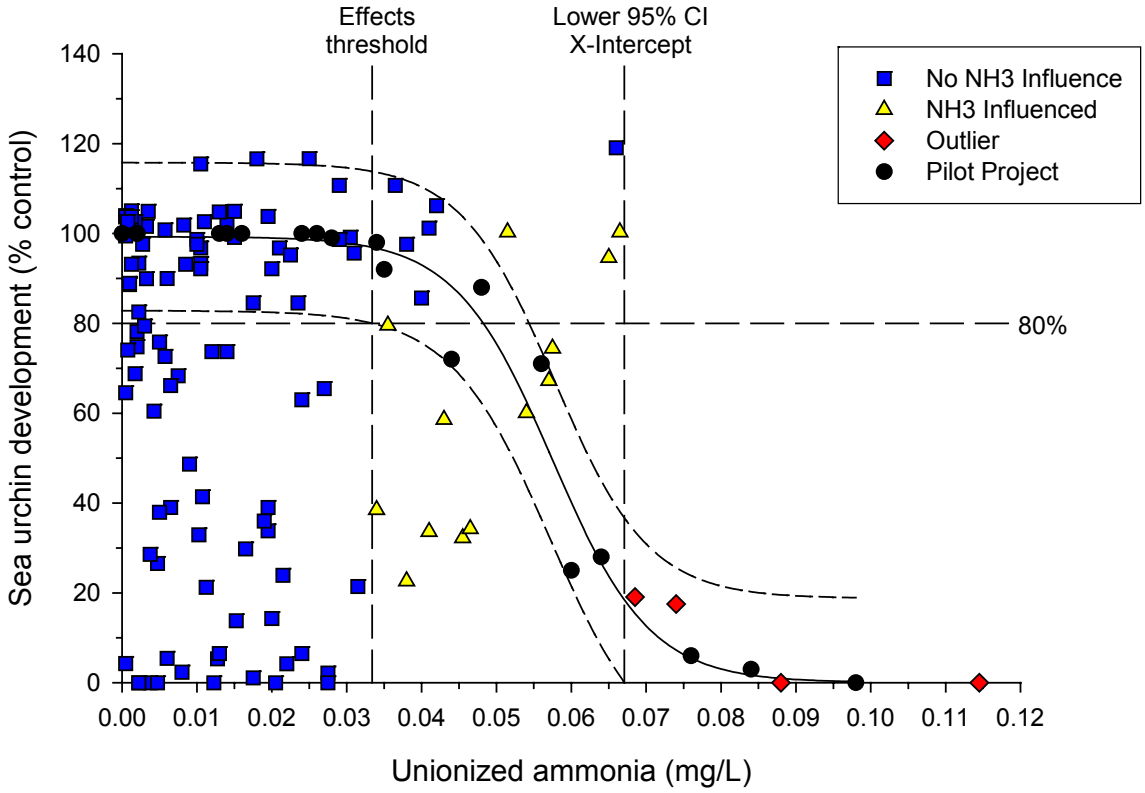


Figure C3. Adjusted sea urchin embryo development results that exclude the effect of ammonia for the NH_3 influenced samples.

Appendix D

Concentrations of metals and metalloids (mg/kg dry wt) and % fines in sediments during the quarterly sampling events. Non-detects are treated as equal to half the reporting level, and are indicated by a "u" suffix. NA = Not analyzed.

Sample	% Fines	Mean SQGQ1	Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Sn	Zn
CP2243													
July 2001	30	0.163	0.65	5.9	0.143	40.2	56	0.33	10.2	30.7	0.095	NA	125
November 2001	33	0.178	0.95u	4.5	0.5u	26.4	56	0.26	7.4	18.2	0.5u	9.5u	107
February 2002	32	0.176	0.95u	4.7	0.45u	26.3	57	0.28	6.2	16.2	0.45u	9.5u	114
June 2002	31	0.168	0.7u	4.1	0.35u	26.4	58	0.27	7.1	22.3	0.9u	3.6u	115
October 2002	36	0.331	1u	4.6	0.6	27.6	58	0.30	5.9	25.8	0.6	11.9	116
CP2433													
July 2001	38	0.147	0.38	5.6	0.29	42.2	43	0.25	11.15	23.2	0.18	NA	115
November 2001	42	0.186	1.2u	4.3	0.6u	26.8	46	0.19	8.6	12.8	0.6u	12.0u	99
February 2002	40	0.174	1.15u	4.5	0.6u	23.2	43	0.20	8.7	11.2	0.55u	11.5u	93
June 2002	34	0.166	0.75u	4.1	0.9	23.7	40	0.20	6.5	16.1	0.75u	7.6	99
October 2002	45	0.218	0.95u	4.5	0.5	28.6	48	0.22	8.8	20.3	0.6	7.1	114
C10													
July 2001	54	0.908	0.81	9.6	0.38	51.9	314	0.43	15.3	72.3	0.29	NA	217
November 2001	58	0.638	1.05u	7.7	0.55u	41.9	149	0.38	13.8	81.7	0.5u	10.5u	232
February 2002	54	0.640	1.05u	7	0.5u	36	146	0.34	10.0	57.2	0.5u	10.5u	211
June 2002	56	0.523	0.9u	7.6	0.45u	55	153	0.39	12.7	70.0	1.15u	15.6	350
October 2002	67	0.590	2	8	0.9	49.5	163	0.49	16.5	84.0	0.6	15.4	245
C14													
July 2001	80	2.882	0.46	9.4	1.37	51.6	95	0.24	22.8	103.0	0.45	NA	347
November 2001	71	1.316	1.1u	7.1	0.55u	33.4	101	0.24	18.5	73.8	0.55u	11.0u	384
February 2002	82	1.682	1.05u	8.1	1.1	34.3	104	0.14	19.7	76.0	0.55u	10.5u	473
June 2002	92	1.650	0.45u	9.6	2	42.5	107	0.15	21.1	101.0	1.1u	11.6	536
October 2002	91	1.871	1.1	9.1	1.9	40.7	119	0.16	19.7	107.0	0.8	15.8	543
P11													
August 2001	45	1.014	0.85	6.5	1.39	72.2	127	1.08	18.4	116.0	0.22	NA	304
November 2001	46	0.604	1u	4.3	0.5u	41.9	127	0.39	10.8	46.8	0.5u	10u	225
February 2002	41	0.590	0.95u	4.9	0.5u	38.6	123	0.56	11.1	62.4	0.5u	9.5u	226
June 2002	56	1.122	0.85u	6.8	2.3	62.2	152	0.72	15.8	129.0	1u	16.0	380
October 2002	44	0.620	1.2	5.6	1.1	42.5	134	0.48	12.3	65.0	0.5u	19.5	246
P17													
August 2001	56	0.784	0.85	19.8	1.27	57	157	0.60	18	102.8	0.22	NA	370
November 2001	55	1.028	1.05u	6.2	1.1	42.1	150	0.32	14.5	77.6	0.55u	10.5u	339
February 2002	61	0.917	0.95u	6.9	1.2	39.7	181	0.39	12.8	84.6	0.5u	9.5u	361
June 2002	63	1.021	0.65u	6.7	1.7	47.4	173	0.41	13.2	104.0	0.95u	10.7	364
October 2002	78	1.230	1.6	8.2	1.9	55.3	228	0.54	20.7	136.0	0.55u	6.9	497

Appendix E

Organic contaminants in quarterly sediment samples. Non-detects were treated as equal to half the detection limit, and are indicated by a "u" suffix. NA = not analyzed.

Station/Constituent	July/ August 2001	November 2001	February 2002	June 2002	October 2002
CP2243					
PAHs (ng/g) Station CP2243					
Naphthalene	2.1	1.1	1.4	0.97	1.5
C2-Naphthalenes	1.3	3.75u	3.75u	4.2u	4.45u
C3-Naphthalenes	2.2	3.75u	3.75u	4.2u	4.45u
C4-Naphthalenes	1.3	3.75u	3.75u	4.2u	4.45u
Acenaphthylene	2.6	2.2	2.5	2.2	1.5
Acenaphthene	0.87	0.16u	0.16u	0.18u	0.19u
Fluorene	1.2	0.66	0.42	0.4	0.55
C1-Fluorenes	0.2u	3.75u	3.75u	4.2u	4.45u
C2-Fluorenes	0.2u	3.75u	3.75u	4.2u	4.45u
C3-Fluorenes	0.2u	3.75u	3.75u	4.2u	4.45u
Dibenzothiophene	0.6	0.52	0.37	0.49	0.17u
C1-Dibenzothiophenes	0.91	3.75u	3.75u	4.2u	4.45u
C2-Dibenzothiophenes	2.2	3.75u	3.75u	4.2u	4.45u
C3-Dibenzothiophenes	2.5	3.75u	3.75u	4.2u	4.45u
Phenanthrene	7.8	6.4	4.5	6.8	5.4
Anthracene	4.5	4	4.1	3.4	2.2
C1-Phenanthrenes/Anthracenes	5.2	3.75u	3.75u	4.2u	4.45u
C2-Phenanthrenes/Anthracenes	5.6	3.75u	3.75u	4.2u	4.45u
C3-Phenanthrenes/Anthracenes	5.7	3.75u	3.75u	4.2u	4.45u
C4-Phenanthrenes/Anthracenes	6	3.75u	3.75u	4.2u	4.45u
Fluoranthene	26	21	19	20	23
Pyrene	27	22	21	23	27
C1-Fluoranthenes/Pyrenes	15	10	10	10	13
Benz(a)anthracene	13	11	10	11	12
Chrysene	18	15	14	16	18
C1-Chrysenes	8.3	9.4	11	4.2u	11
C2-Chrysenes	6.1	9.1	3.75u	4.2u	13
C3-Chrysenes	6.2	3.75u	3.75u	4.2u	4.45u
C4-Chrysenes	5.5	3.75u	3.75u	4.2u	4.45u
Benzo(b)fluoranthene	55	26	24	20	34
Benzo(k)fluoranthene	11	18	18	14	19
Benzo(a)pyrene	28	23	24	22	26
Indeno(1,2,3-cd)pyrene	32	28	28	21	30
Dibenz(a,h)anthracene	5.8	3.7	3.8	3.6	4.5

Appendix E. continued

Station/Constituent	July/ August 2001	November 2001	February 2002	June 2002	October 2002
Benzo(g,h,i)perylene	32	26	25	19	29
PPPAHs	266.9	208.2	199.9	183.6	233.8
Total PAHs	342.1	293.5	281.2	265.4	337.8
Pesticides (ng/g) Station CP2243					
gamma-Chlordane	0.11	0.36	0.28	0.61	6u
alpha-Chlordane	0.095	0.080u	0.085u	0.09u	0.95u
4,4'-DDE	0.57	0.49u	0.65u	0.21u	2.2u
4,4'-DDD	0.33	0.44u	0.75u	0.13u	1.35u
4,4'-DDT	0.18	3.1	1.7	1.5	1.5u
2,4'-DDE	0.11u	0.14u	0.19u	0.11u	0.435u
2,4'-DDD	0.15	0.61	0.46	0.38	0.285u
2,4'-DDT	0.2	0.61	0.59	0.57	1.3u
Total DDTs	1.54	5.39	4.34	2.90	7.07
PCBs (ng/g) Station CP2243					
PCB18	0.15	0.0395u	0.0395u	0.0445u	0.047u
PCB28	0.28	0.055u	0.055u	0.065u	0.065u
PCB44	0.15	0.04u	0.11	0.0455u	0.13
PCB49	0.27	0.375u	0.375u	0.42u	0.445u
PCB52	0.38	0.44	0.44	0.095u	0.35
PCB66	0.33	0.18	0.28	0.29	0.105u
PCB70	0.25	0.375u	0.375u	0.42u	0.445u
PCB74	0.18	0.375u	0.375u	0.42u	0.445u
PCB87	0.2	0.22	0.26	0.18	0.26
PCB90/101	1.1	0.66	0.95	0.63	0.36u
PCB99	0.79	0.375u	0.375u	0.42u	0.445u
PCB110	0.67	0.375u	0.375u	0.42u	0.445u
PCB114	0.14	0.235u	0.24u	0.27u	0.285u
PCB123	0.41	0.06u	0.235u	0.07u	0.075u
PCB138	2.1	1.5	1.8	1.3	1.3
PCB149	1.1	0.78	0.98	0.42u	0.445u
PCB151	0.38	0.375u	0.375u	0.42u	0.445u
PCB153	2.7	2	2.2	1.6	1.5
PCB156	0.11	0.1u	0.38	0.145u	0.085u
PCB167	0.21	0.245u	0.245u	0.28u	0.295u
PCB170	0.53	0.35	0.5	0.31	0.30
PCB177	0.44	0.375u	0.375u	0.42u	0.445u
PCB180	0.72	0.52	0.95	0.61	0.48
PCB183	0.3	0.09u	0.375u	0.42u	0.08u
PCB187	1	0.79	1	1.2	0.60
PCB189	0.012	0.07u	0.07u	0.295u	0.085u
PCB194	0.24	0.375u	0.375u	0.42u	0.445u

Station/Constituent	July/ August 2001	November 2001	February 2002	June 2002	October 2002
PCB201	0.43	0.375u	0.375u	0.42u	0.445u
PCB206	0.17	0.21	0.19	0.08u	0.085u
PCB37	0.25	0.375u	0.375u	0.42u	0.445u
PCB77	0.11u	0.0375u	0.375u	0.042u	0.0445u
PCB81	0.25	0.075u	0.465u	0.085u	0.09u
PCB105	0.33	0.25	0.29	0.08u	0.115u
PCB118	1.2	1.1	1.3	1.1	0.76
PCB119	0.059	0.375u	0.375u	0.42u	0.445u
PCB126	0.085	0.105u	0.105u	0.12u	0.125u
PCB128	0.3	0.215u	0.22u	0.245u	0.26u
PCB157	0.039	0.145u	0.15u	0.165u	0.175u
PCB158	2.2	0.37u	0.375u	0.0345u	0.0365u
PCB168	0.075u	0.375u	0.375u	0.42u	0.445u
PCB169	0.075u	0.1u	0.1u	0.115u	0.12u
Total PCBs	20.7	15.5	19.2	15.4	14.0
CP2433					
PAHs (ng/g) Station CP2433					
Naphthalene	3.1	1.2	1.3	1.2	1.7
C2-Naphthalenes	6	4.05u	4.15u	3.65u	4.35u
C3-Naphthalenes	6.1	4.05u	4.15u	3.65u	4.35u
C4-Naphthalenes	4.7	4.05u	4.15u	3.65u	4.35u
Acenaphthylene	6	4	3.5	3.6	3.0
Acenaphthene	1.5	0.48	0.44	0.54	0.96
Fluorene	3.1	0.91	0.85	0.73	1.7
C1-Fluorenes	0.026u	4.05u	4.15u	3.65u	4.35u
C2-Fluorenes	0.026u	4.05u	4.15u	3.65u	4.35u
C3-Fluorenes	7.5	4.05u	4.15u	3.65u	4.35u
Dibenzothiophene	1.4	0.52	0.5	0.68	0.91
C1-Dibenzothiophenes	2.2	4.05u	4.15u	3.65u	4.35u
C2-Dibenzothiophenes	5.1	4.05u	4.15u	3.65u	4.35u
C3-Dibenzothiophenes	5.1	4.05u	4.15u	3.65u	4.35u
Phenanthrene	21	9	9.2	7.3	16
Anthracene	18	9.6	9.3	7	8.7
C1-Phenanthrenes/Anthracenes	18	9.9	11	8.1	13
C2-Phenanthrenes/Anthracenes	16	11	11	8.8	13
C3-Phenanthrenes/Anthracenes	10	4.05u	4.15u	3.65u	9.2
C4-Phenanthrenes/Anthracenes	26	4.05u	4.15u	3.65u	4.35u
Fluoranthene	78	40	36	30	59
Pyrene	89	46	47	38	59
C1-Fluoranthenes/Pyrenes	66	38	36	25	44

Appendix E. continued

Station/Constituent	July/ August 2001	November 2001	February 2002	June 2002	October 2002
Benz(a)anthracene	58	40	35	26	40
Chrysene	86	49	47	37	63
C1-Chrysenes	32	32	27	25	36
C2-Chrysenes	19	18	12	14	33
C3-Chrysenes	15	11	4.15u	9.3	12
C4-Chrysenes	9.1	4.05u	4.15u	3.65u	4.35u
Benzo(b)fluoranthene	140	50	45	38	66
Benzo(k)fluoranthene	51	40	38	32	47
Benzo(a)pyrene	90	66	57	47	63
Indeno(1,2,3-cd)pyrene	62	45	39	34	54
Dibenz(a,h)anthracene	14	7.7	6.7	5.5	10
Benzo(g,h,i)perylene	59	38	34	30	49
PPPAHs	779.7	446.9	409.3	337.9	542.1
Total PAHs	1,029.0	615.9	560.7	472.6	751.0
Pesticides (ng/g) Station CP2433					
gamma-Chlordane	0.39	0.25	0.125u	0.38	1.3u
alpha-Chlordane	0.18	0.09u	0.09u	0.08u	0.95u
4,4'-DDE	1.1	0.8u	0.305u	0.18u	2.15u
4,4'-DDD	0.34	0.85u	0.215u	0.11u	1.35u
4,4'-DDT	0.11	1.7	1.6	1.5	1.5u
2,4'-DDE	0.145u	0.17u	0.155u	0.16u	0.425u
2,4'-DDD	0.22	0.72	0.5	0.62	0.28u
2,4'-DDT	0.18	0.44	0.34	0.61	1.3u
Total DDTs	2.10	4.68	3.12	3.18	7.01
PCBs (ng/g) Station CP2433					
PCB18	0.51	0.043u	0.044u	0.0385u	0.046u
PCB28	0.5	0.06u	0.06u	0.055u	0.065u
PCB44	0.41	0.18	0.15	0.15	0.17
PCB49	0.38	0.405u	0.415u	0.365u	0.435u
PCB52	0.52	0.46	0.37	0.36	0.38
PCB66	0.68	0.3	0.3	0.3	0.31
PCB70	0.64	0.405u	0.415u	0.365u	0.435u
PCB74	0.41	0.405u	0.415u	0.365u	0.435u
PCB87	0.31	0.36	0.28	0.3	0.29
PCB90/101	1.4	0.9	0.71	0.79	0.375u
PCB99	0.91	0.405u	0.415u	0.365u	0.435u
PCB110	0.83	0.84	0.415u	0.83	0.435u
PCB114	0.16	0.26u	0.265u	0.23u	0.275u
PCB123	0.83	0.065u	0.07u	0.06u	0.07u
PCB138	2.6	1.1	1.2	1.3	0.98
PCB149	1.2	0.405u	0.415u	0.77	0.435u

Station/Constituent	July/ August 2001	November 2001	February 2002	June 2002	October 2002
PCB151	0.59	0.405u	0.415u	0.365u	0.435u
PCB153	3	1.4	1.3	1.6	1.2
PCB156	0.26	0.28	0.2	0.45	0.085u
PCB167	0.35	0.265u	0.275u	0.24u	0.285u
PCB170	0.77	0.53	0.38	0.77	0.33
PCB177	0.58	0.405u	0.415u	0.365u	0.435u
PCB180	1.2	0.79	0.7	1.4	0.58
PCB183	0.42	0.19	0.23	0.32	0.17
PCB187	1.1	0.62	0.54	0.67	0.45
PCB189	0.054	0.08u	0.08u	0.07u	0.085u
PCB194	0.35	0.405u	0.415u	0.365u	0.435u
PCB201	0.61	0.405u	0.415u	0.365u	0.435u
PCB206	0.21	0.26	0.34	0.47	0.085u
PCB37	0.58	0.405u	0.415u	0.365u	0.435u
PCB77	0.64	0.0405u	0.0415u	0.365u	0.0435u
PCB81	0.4	0.325u	0.405u	0.07u	0.085u
PCB105	0.72	0.37	0.29	0.28	0.14u
PCB118	1.5	1.1	1	0.97	0.79
PCB119	0.072	0.405u	0.415u	0.365u	0.435u
PCB126	0.115	0.115u	0.12u	0.105u	0.125u
PCB128	0.37	0.235u	0.24u	0.21u	0.255u
PCB157	0.054	0.16u	0.165u	0.145u	0.17u
PCB158	0.64	0.405u	0.415u	0.365u	0.0425u
PCB168	0.095u	0.405u	0.415u	0.365u	0.435u
PCB169	0.095u	0.11u	0.11u	0.1u	0.115u
Total PCBs	27.1	16.7	15.7	17.8	13.6
Station C10					
PAHs (ng/g) Station C10					
Naphthalene	8.5	5.9	4.1	5.3	6.9
C2-Naphthalenes	9.8	4.3u	4.6u	4.35u	5.5u
C3-Naphthalenes	14	20	4.6u	14	5.5u
C4-Naphthalenes	16	57	4.6u	4.35u	15
Acenaphthylene	51	77	48	42	35
Acenaphthene	6.8	4.2	5.1	4.4	4.9
Fluorene	14	8.7	9.1	7.5	9.9
C1-Fluorenes	8.7	18	13	4.35u	5.5u
C2-Fluorenes	13	4.3u	4.6u	4.35u	16
C3-Fluorenes	47	4.3u	4.6u	4.35u	5.5u
Dibenzothiophene	6.5	5.3	5.4	4	6.1
C1-Dibenzothiophenes	10	4.3u	4.6u	4.35u	5.5u

Appendix E. continued

Station/Constituent	July/ August 2001	November 2001	February 2002	June 2002	October 2002
C2-Dibenzothiophenes	28	4.3u	4.6u	4.35u	5.5u
C3-Dibenzothiophenes	38	4.3u	4.6u	4.35u	5.5u
Phenanthrene	95	77	98	61	88
Anthracene	150	180	120	100	110
C1-Phenanthrenes/Anthracenes	86	86	82	56	100
C2-Phenanthrenes/Anthracenes	77	66	51	42	95
C3-Phenanthrenes/Anthracenes	66	77	52	48	84
C4-Phenanthrenes/Anthracenes	160	160	130	110	5.5u
Fluoranthene	290	240	320	210	270
Pyrene	460	470	480	360	440
C1-Fluoranthenes/Pyrenes	430	440	310	230	570
Benz(a)anthracene	280	260	240	160	320
Chrysene	680	480	320	280	690
C1-Chrysenes	270	380	280	220	550
C2-Chrysenes	210	280	190	160	470
C3-Chrysenes	160	180	120	120	190
C4-Chrysenes	100	4.3u	140	4.35u	92
Benzo(b)fluoranthene	1200	780	530	430	950
Benzo(k)fluoranthene	280	510	390	340	690
Benzo(a)pyrene	730	740	550	430	890
Indeno(1,2,3-cd)pyrene	400	410	320	280	530
Dibenz(a,h)anthracene	120	75	59	53	110
Benzo(g,h,i)perylene	390	320	250	230	420
PPPAHs	5155.3	4637.8	3743.3	2993.2	5564.7
Total PAHs	6,905.3	6,437.2	5,153.5	4,036.4	7,796.8
Pesticides (ng/g) Station C10					
gamma-Chlordane	13	8.7	9.9	4.9	3u
alpha-Chlordane	8.7	3.1	4.1	1.6	2.2u
4,4'-DDE	12	4.45u	7.2	3.4	5u
4,4'-DDD	4.9	2.55u	1.5u	1.5	3.1u
4,4'-DDT	2.1	23	22	12	16
2,4'-DDE	0.09u	1.4u	1.15u	0.105u	1u
2,4'-DDD	3.2	7.2	7.3	0.9u	20.5u
2,4'-DDT	2.2	5.7	4.9	3.9	3u
Total DDTs	24.5	44.3	44.1	21.8	48.6
PCBs (ng/g) Station C10					
PCB18	0.94	0.13u	0.64	0.43	1.1
PCB28	1.6	0.7	1.4	0.64	0.94
PCB44	4.1	1.5	1.7	1.5	1.7
PCB49	4.4	2.9	2.7	2.4	2.9
PCB52	5	3.7	4	3.1	3.9

Station/Constituent	July/ August 2001	November 2001	February 2002	June 2002	October 2002
PCB66	4.1	2.2	2.3	2	2.3
PCB70	4.5	2.4	2.3	1.9	2.3
PCB74	2.9	1.2	1.1	0.435u	0.55u
PCB87	3.2	9.1	1.45u	3.1u	3.3
PCB90/101	12	8.9	8.6	7.3	8.5
PCB99	6.8	4.9	4.5	4.1	4.7
PCB110	11	8.8	9.5	7.8	8.8
PCB114	3.1	0.275u	0.29u	0.2757u	0.325u
PCB123	2.8	1.1u	0.65u	0.65u	0.75u
PCB138	17	15	13	11	13
PCB149	8.6	7.6	7.2	6.6	7.7
PCB151	4.2	3.1	2.9	2.4	2.8
PCB153	18	13	12	11	12
PCB156	2.8	3	2.7	2.3	2.2
PCB167	2.7	0.75	0.305u	0.285u	0.55u
PCB170	5.2	3.6	3.3	3.7	3.4
PCB177	4.4	2	1.9	2	2.0
PCB180	10	6.7	6.4	6.6	6.6
PCB183	3.1	1.7	1.7	2.2	1.6
PCB187	8	4	4	4.2	4.7
PCB189	0.35	0.18	0.26	0.2	0.1u
PCB194	3.9	2.5	2.5	5	2.8
PCB201	4.5	1.4	0.46u	0.435u	0.55u
PCB206	5.2	1.1	1.3	0.65u	1.4
PCB37	3.3	0.43u	0.46u	0.435u	0.55u
PCB77	5.6	0.043u	0.46u	0.437u	0.55u
PCB81	2.5	4.5u	0.09u	0.085u	1.9u
PCB105	5.9	4.4	3.8	3	1.6u
PCB118	10	10	8.1	7.2	8.2
PCB119	1.3	0.43u	0.46u	0.435u	0.55u
PCB126	0.07u	0.125u	0.13u	0.125u	0.145u
PCB128	3.3	2.8	2.3	1.9	3.0
PCB157	0.76	0.5u	0.18u	0.17u	0.2u
PCB158	5.1	0.9u	0.7u	0.6u	0.6u
PCB168	0.06u	0.43u	0.46u	0.435u	0.55u
PCB169	0.06u	0.115u	0.125u	0.115u	0.14u
Total PCBs	202.3	138.1	118.3	109.1	121.4
Station C14					
PAHs (ng/g) Station C14					
Naphthalene	35	13	5.8	22	20

Station/Constituent	July/ August 2001	November 2001	February 2002	June 2002	October 2002
C2-Naphthalenes	71	39	52	48	61
C3-Naphthalenes	120	71	110	99	120
C4-Naphthalenes	130	120	150	170	120
Acenaphthylene	34	38	55	44	47
Acenaphthene	93	39	44	45	46
Fluorene	120	67	83	81	81
C1-Fluorenes	60	44	61	56	63
C2-Fluorenes	130	100	150	110	160
C3-Fluorenes	280	190	240	180	280
Anthracene	300	37	48	42	53
Phenanthrene	600	69	97	79	91
C1-Phenanthrenes/anthracenes	370	140	210	140	230
C2-Phenanthrenes/anthracenes	530	260	330	250	320
C3-Phenanthrenes/anthracenes	510	270	480	420	370
C4-Phenanthrenes/anthracenes	560	280	350	290	340
Dibenzothiophene	59	230	360	360	320
C1-Dibenzothiophenes	87	320	450	360	430
C2-Dibenzothiophenes	230	380	500	380	500
C3-Dibenzothiophenes	350	500	570	500	310
Fluoranthene	1800	1600	1700	1400	2000
Pyrene	1500	1100	1500	1200	1800
C1-Fluoranthenes/pyrenes	720	620	820	620	1100
Benz(a)anthracene	520	520	590	480	720
Chrysene	840	730	830	690	1100
C1-Chrysenes	510	500	660	450	720
C2-Chrysenes	550	480	660	490	720
C3-Chrysenes	570	390	540	430	450
C4-Chrysenes	400	340	420	380	290
Benzo(b)fluoranthene	850	500	630	490	960
Benzo(k)fluoranthene	210	370	440	360	590
Benzo(a)pyrene	450	450	590	480	750
Indeno(1,2,3,-c,d]pyrene	340	240	360	310	540
Dibenz(a,h)anthracene	84	49	68	56	110
Benzo(g,h,i)perylene	480	260	410	370	630
PPPAHs	8,256	6,526	8,135.8	6,738	10,104
Total PAHs	14,283	11,356.0	14,563.80	11,882.0	16,442.0
Pesticides (ng/g) Station C14					
gamma-Chlordane	65	31	44	31	31
alpha-Chlordane	54	14	16	26	34
4,4'-DDE	51	19	17	17	24
4,4'-DDD	25	12	8.2	6.3	27

Appendix E. continued

Station/Constituent	July/ August 2001	November 2001	February 2002	June 2002	October 2002
4,4'-DDT	20	10u	14.5u	13u	27.5u
2,4'-DDE	4	3.8u	9.4	1u	20.5u
2,4'-DDD	9.8	6.3	6.6	10	27.5u
2,4'-DDT	13	5.6	2.1u	11	4u
Total DDTs	122.8	56.7	57.8	58.3	130.5
PCBs (ng/g) Station C14					
PCB18	0.16u	0.41	0.53	0.99	0.39
PCB28	3.5	1.4	0.75u	0.85u	1.4
PCB44	14	3.3	4	4.6	3.2
PCB49	6	2.2	2.5	2.8	2.5
PCB52	5.6	4.7	6.4	7.2	3.8
PCB66	5.4	2.5	3.4	3.7	2.3
PCB70	5.8	2.8	3.4	6	2.3
PCB74	9.7	2.1	2.2	2.4	0.7u
PCB87	2.6	29	11.5u	47	1.55u
PCB90/101	9.6	4.8	5.5	5.7	2.45u
PCB99	6.6	2.3	2.9	3.6	2.6
PCB110	10	7.3	10	4.9u	2.75u
PCB114	17	0.31u	0.45u	0.65u	0.43u
PCB123	3	0.375u	1	1.9	0.405u
PCB138	9.6	6.9	8.6	2.45u	12
PCB149	6.9	3.3	3.8	5.1	4.1
PCB151	6.3	3.4	0.75u	1.05u	0.7u
PCB153	10	6.2	6.7	8.9	6.1
PCB156	0.08u	0.65u	0.135u	0.12u	0.13u
PCB167	1.2	0.32u	0.465u	0.42u	0.7u
PCB170	2.2	2.1	2.8	0.7u	1.8
PCB177	9.3	1.1	0.75u	0.65u	0.7u
PCB180	4.5	4	4.8	2.8u	3.6
PCB183	2.2	0.495u	1.2	0.657u	1.1
PCB187	3.3	2.2	3.4	1.85u	2.0
PCB189	0.07u	0.095u	0.135u	0.12u	0.13u
PCB194	1.3	0.6u	1u	1.157u	0.7u
PCB201	4	0.485u	0.75u	0.65u	0.7u
PCB206	1.5	0.69	1.9	2.1	0.79
PCB37	8.2	0.55u	0.75u	0.85u	0.75u
PCB77	4.9	0.55u	2	3.3	0.75u
PCB81	4	6u	9u	11.5u	1.75u
PCB105	5.4	0.8u	2.6u	3.7u	2.1u
PCB118	8.3	4.8	5.7	7.9	4.6
PCB119	3.9	0.485u	0.75u	0.65u	0.7u

Appendix E. continued

Station/Constituent	July/ August 2001	November 2001	February 2002	June 2002	October 2002
PCB126	0.1u	0.14u	0.2u	0.65u	0.195u
PCB128	2.4	1.5	1.7	3.2	1.35u
PCB157	0.37	0.6u	2.45u	2.65u	1.3u
PCB158	13	0.485u	0.75u	0.95u	0.7u
PCB168	0.08u	0.485u	0.75u	0.65u	0.7u
PCB169	0.08u	0.13u	0.19u	0.17u	0.185u
Total PCBs	212.1	112.6	118.6	157.2	77.1
Station P11					
PAHs (ng/g) Station P11					
Naphthalene	9.4	4.1	21	14	11
C2-Naphthalenes	47	17	54	43	14
C3-Naphthalenes	77	35	120	160	14
C4-Naphthalenes	190	4.9u	270	350	110
Acenaphthylene	26	53	68	49	69
Acenaphthene	23	11	180	32	13
Fluorene	18	14	130	38	23
C1-Fluorenes	0.08u	4.9u	3.85u	4.1u	29
C2-Fluorenes	0.08u	4.9u	3.85u	4.1u	59
C3-Fluorenes	310	4.9u	3.85u	730	320
Dibenzothiophene	0.043u	10	33	11	10
C1-Dibenzothiophenes	0.043u	4.9u	3.85u	410	4.65u
C2-Dibenzothiophenes	0.043u	4.9u	160	200	110
C3-Dibenzothiophenes	1200	290	440	820	270
Phenanthrene	160	140	560	100	120
Anthracene	170	180	310	150	160
C1-Phenanthrenes/Anthracenes	170	180	260	160	140
C2-Phenanthrenes/Anthracenes	510	180	230	260	260
C3-Phenanthrenes/Anthracenes	780	250	520	720	400
C4-Phenanthrenes/Anthracenes	1100	490	690	1200	350
Fluoranthene	1100	1900	1400	640	910
Pyrene	2100	1400	1500	1600	1600
C1-Fluoranthenes/Pyrenes	1400	670	830	940	1500
Benz(a)anthracene	610	510	490	370	490
Chrysene	840	780	610	480	920
C1-Chrysenes	660	420	510	620	900
C2-Chrysenes	550	280	340	470	700
C3-Chrysenes	300	150	220	290	240
C4-Chrysenes	210	4.9u	3.85u	240	120
Benzo(b)fluoranthene	1300	710	780	830	1400
Benzo(k)fluoranthene	310	500	550	550	890

Appendix E. continued

Station/Constituent	July/ August 2001	November 2001	February 2002	June 2002	October 2002
Benzo(a)pyrene	730	570	730	750	1200
Indeno(1,2,3-cd)pyrene	440	330	370	370	580
Dibenz(a,h)anthracene	160	63	72	74	140
Benzo(g,h,i)perylene	400	240	280	270	410
PPPAHs	8396.4	7405.1	8051	6317	8936
Total PAHs	15,900.7	10,411.4	12,747.2	13,949.2	14,486.6
Pesticides (ng/g) Station P11					
gamma-Chlordane	14	9.2	7.7	19	7.2
alpha-Chlordane	7.5	1.6	1.3	4	2u
4,4'-DDE	27	2.1u	12	4.45u	4.55u
4,4'-DDD	11	6	3.5	6.3	5.9
4,4'-DDT	0.7	26	21	32	19
2,4'-DDE	9.9	0.49	0.8	2.5	0.9u
2,4'-DDD	5.7	1.95u	0.8u	4.1u	18.5u
2,4'-DDT	0.044u	4.8	8	19	2.7u
Total DDTs	54.3	41.3	46.1	68.4	51.6
PCBs (ng/g) Station P11					
PCB18	0.18	1.6	2.6	3.9	0.465u
PCB28	4.2	2.3	3.1	6.5	2.1
PCB44	12	4.5	4.9	11	2.2
PCB49	7.2	4.3	6.1	10	4.1
PCB52	15	7	8.6	16	4.8
PCB66	7.6	5.5	6.6	14	3.5
PCB70	19	7.4	8.3	18	3.7
PCB74	7.2	3.9	4.7	11	1.7
PCB87	6.6	8.6	4.2u	9.5u	4.6
PCB90/101	24	12	13	25	8.7
PCB99	9.5	6.3	6.9	13	4.9
PCB110	20	14	14	29	9.7
PCB114	9.5	0.31u	0.245u	0.41u	0.295u
PCB123	0.034u	2.4	1.15u	1.65u	0.95u
PCB138	29	14	14	27	9.7
PCB149	22	15	5.5u	31	9.9
PCB151	4.6	3.8	4.2	7.2	2.9
PCB153	34	14	15	26	12
PCB156	2.6	2.7	2.7	5.4	1.8
PCB167	2.6	0.49u	0.255u	1.1	0.55u
PCB170	7.5	4.8	5.3	10	3.5
PCB177	4.3	2.5	2.5	5.1	2.1
PCB180	20	8.6	9.7	19	7.7
PCB183	4.3	3.4	3.7	7.7	1.6

Station/Constituent	July/ August 2001	November 2001	February 2002	June 2002	October 2002
PCB187	8.3	5.3	6.5	14	5.9
PCB189	0.29	0.5	0.45	0.6	0.09u
PCB194	4.1	2.9	3.4	6.4	3.3
PCB201	5.4	0.49u	0.89	1.9	0.465u
PCB206	3.6	3.7	3.3	6.1	4.5
PCB37	8.6	0.55u	2.8	1.8u	0.465u
PCB77	23	0.49u	0.395u	1u	0.465u
PCB81	4.4	7.5u	0.075u	16.5u	1.9u
PCB105	10	8.9	9	14	2.75u
PCB118	23	12	12	22	7.5
PCB119	0.97	0.49u	0.39u	0.41u	0.465u
PCB126	0.034u	0.14u	0.11u	0.41u	0.13u
PCB128	2.7	1.35u	2.3	4.7	2.4
PCB157	1.2	0.28u	0.215u	1.05u	0.18u
PCB158	0.029u	0.8u	0.85u	1.77u	0.75u
PCB168	0.029u	0.49u	0.385u	0.41u	0.465u
PCB169	0.36	0.13u	0.105u	0.11u	0.125u
Total PCBs	368.9	195.4	190.4	401.6	135.3
Station P17					
PAHs (ng/g) Station P17					
Naphthalene	9.1	7.8	9.6	130	14
C2-Naphthalenes	26	18	18	52	27
C3-Naphthalenes	28	49	39	59	72
C4-Naphthalenes	0.205u	4.7u	64	4.95u	120
Acenaphthylene	70	72	70	74	60
Acenaphthene	24	14	9.2	230	15
Fluorene	31	19	19	400	25
C1-Fluorenes	0.085u	4.7u	35	160	6u
C2-Fluorenes	0.085u	4.7u	4.45u	4.95u	99
C3-Fluorenes	270	4.7u	4.45u	4.95u	630
Dibenzothiophene	14	9.2	13	200	20
C1-Dibenzothiophenes	0.046u	4.7u	4.45u	4.95u	6u
C2-Dibenzothiophenes	0.046u	4.7u	4.45u	96	6u
C3-Dibenzothiophenes	410	240	190	230	620
Phenanthrene	170	130	160	3400	190
Anthracene	240	220	220	630	230
C1-Phenanthrenes/Anthracenes	130	4.7u	160	1000	270
C2-Phenanthrenes/Anthracenes	260	160	160	400	340
C3-Phenanthrenes/Anthracenes	430	290	240	370	810
C4-Phenanthrenes/Anthracenes	720	580	450	390	790

Station/Constituent	July/ August 2001	November 2001	February 2002	June 2002	October 2002
Fluoranthene	730	730	760	4500	1200
Pyrene	1600	1100	1200	4200	1700
C1-Fluoranthenes/Pyrenes	990	840	870	2600	1600
Benz(a)anthracene	480	440	470	2100	750
Chrysene	760	690	700	2700	1300
C1-Chrysenes	550	660	600	1500	1100
C2-Chrysenes	390	530	400	750	1000
C3-Chrysenes	230	320	370	330	440
C4-Chrysenes	170	290	360	4.95u	250
Benzo(b)fluoranthene	1200	1100	1100	2800	1900
Benzo(k)fluoranthene	470	720	640	1500	1200
Benzo(a)pyrene	730	960	880	2400	1500
Indeno(1,2,3-cd)pyrene	400	440	430	1400	870
Dibenz(a,h)anthracene	140	95	94	340	200
Benzo(g,h,i)perylene	380	340	340	1000	690
PPPAHs	7434.1	7077.8	7101.8	27804	11844
Total PAHs	12,052.6	11,096.9	11,088.6	35,965.8	20,050.0
Pesticides (ng/g) Station P17					
gamma-Chlordane	6.4	20	12	13	16
alpha-Chlordane	7.8	6.6	7.8	8.2	10
4,4'-DDE	17	18	12	15	28
4,4'-DDD	12	14	8.1	7.7	24
4,4'-DDT	30	39	39	44	21
2,4'-DDE	0.047u	1.95u	0.43u	0.65u	1.15u
2,4'-DDD	4.8	4.7u	11	2u	24u
2,4'-DDT	0.047u	7.7	11	9.1	13.5u
Total DDTs	63.89	85.4	81.5	78.4	111.6
PCBs (ng/g) Station P17					
PCB18	1.4	1	1.2	1.3	0.93
PCB28	2.3	2.6	4.2	2.5	2.4
PCB44	3.6	4.4	4.8	4.1	3.9
PCB49	9.8	3.9	4.6	3.9	3.9
PCB52	3.9	6.8	8	6.5	5.7
PCB66	3.9	5.4	7.1	5.1	4.7
PCB70	5.5	6.7	7.1	6.3	5.2
PCB74	3.3	3.4	3	3	2.6
PCB87	3.1	15	18	10.5u	13
PCB90/101	7.9	14	15	14	12
PCB99	4.7	5.8	7.1	5.7	5.5
PCB110	9.6	17	19	15	15
PCB114	12	0.3u	0.28u	0.315u	0.375u

Station/Constituent	July/ August 2001	November 2001	February 2002	June 2002	October 2002
PCB123	0.037u	2.6	2.3	0.495u	1.1u
PCB138	18	21	22	20	16
PCB149	9.5	14	14	14	13
PCB151	3.3	5.6	6.8	5.5	5.1
PCB153	19	19	19	19	17
PCB156	1.3	3.2	6	4.9	4.9
PCB167	2.7	1	1.3	0.67	1u
PCB170	5.5	7.1	6.9	8.4	6.0
PCB177	3.5	3.6	3.5	4.1	3.5
PCB180	10	14	14	14	13
PCB183	3.2	4.4	3.7	5.2	3.1
PCB187	5.4	8.2	7.7	8.1	7.6
PCB189	0.12	0.09u	0.48	0.53	0.115u
PCB194	2.7	9.3	13	7.4	1.55u
PCB201	3.6	1.45u	2.9	1.9	2.8
PCB206	4.1	4	3.4	5.3	0.95u
PCB37	4	1.15u	1.3u	0.495u	1.25u
PCB77	5.5	1.15u	0.46u	0.65u	0.6u
PCB81	1	9.5u	11u	0.095u	3.2u
PCB105	4.1	3.5u	4.1u	6.3	3.1u
PCB118	8.4	12	13	12	11
PCB119	0.66	0.47u	0.445u	0.495u	0.6u
PCB126	0.037u	0.135u	0.445u	0.14u	0.17u
PCB128	1.3	3.3	4.4	3.2	5.5
PCB157	0.93	0.185u	1.6u	0.195u	0.23u
PCB158	0.031u	1.3u	1.2u	1.45u	1.1u
PCB168	0.031u	0.47u	0.445u	0.495u	0.6u
PCB169	0.031u	0.125u	0.12u	0.135u	0.16u
Total PCBs	189.0	238.1	264.9	223.4	199.4

Appendix F. Amphipod survival in quarterly bulk sediment samples

Sample	Sample Type	Month Sampled	QA Batch	Percent Survival	Outlier
Home Sediment	Negative Control	November	EE35	100	
Home Sediment	Negative Control	November	EE35	100	
Home Sediment	Negative Control	November	EE35	100	
Home Sediment	Negative Control	November	EE35	95	
Home Sediment	Negative Control	November	EE35	95	
CP2243	Result	November	EE35	100	
CP2243	Result	November	EE35	95	
CP2243	Result	November	EE35	95	
CP2243	Result	November	EE35	80	
CP2243	Result	November	EE35	100	
CP2433	Result	November	EE35	100	
CP2433	Result	November	EE35	95	
CP2433	Result	November	EE35	90	
CP2433	Result	November	EE35	95	
CP2433	Result	November	EE35	95	
C10	Result	November	EE35	100	
C10	Result	November	EE35	100	
C10	Result	November	EE35	95	
C10	Result	November	EE35	85	
C10	Result	November	EE35	95	
C14	Result	November	EE35	85	
C14	Result	November	EE35	65	
C14	Result	November	EE35	90	
C14	Result	November	EE35	60	
C14	Result	November	EE35	85	
P11	Result	November	EE35	90	
P11	Result	November	EE35	100	
P11	Result	November	EE35	90	
P11	Result	November	EE35	100	
P11	Result	November	EE35	75	
P17	Result	November	EE35	75	
P17	Result	November	EE35	85	
P17	Result	November	EE35	80	
P17	Result	November	EE35	100	

Appendix F. continued

Sample	Sample Type	Month Sampled	QA Batch	Percent Survival	Outlier
Home Sediment	Negative Control	February	EE40	100	
Home Sediment	Negative Control	February	EE40	95	
Home Sediment	Negative Control	February	EE40	100	
Home Sediment	Negative Control	February	EE40	95	
Home Sediment	Negative Control	February	EE40	100	
CP2243	Result	February	EE40	70	
CP2243	Result	February	EE40	55	
CP2243	Result	February	EE40	100	
CP2243	Result	February	EE40	60	
CP2243	Result	February	EE40	60	
CP2433	Result	February	EE40	95	
CP2433	Result	February	EE40	45	Outlier
CP2433	Result	February	EE40	100	
CP2433	Result	February	EE40	90	
CP2433	Result	February	EE40	90	
C10	Result	February	EE40	85	
C10	Result	February	EE40	80	
C10	Result	February	EE40	80	
C10	Result	February	EE40	90	
C10	Result	February	EE40	65	
C14	Result	February	EE40	0	
C14	Result	February	EE40	0	
C14	Result	February	EE40	5	
C14	Result	February	EE40	5	
C14	Result	February	EE40	0	
P11	Result	February	EE40	55	
P11	Result	February	EE40	40	
P11	Result	February	EE40	45	
P11	Result	February	EE40	45	
P11	Result	February	EE40	45	
P17	Result	February	EE40	15	
P17	Result	February	EE40	40	
P17	Result	February	EE40	30	
P17	Result	February	EE40	40	
P17	Result	February	EE40	35	
Home Sediment	Negative Control	June	EE48	100	
Home Sediment	Negative Control	June	EE48	90	

Appendix F. continued

Sample	Sample Type	Month Sampled	QA Batch	Percent Survival	Outlier
Home Sediment	Negative Control	June	EE48	100	
Home Sediment	Negative Control	June	EE48	100	
Home Sediment	Negative Control	June	EE48	90	
CP2243	Result	June	EE48	100	
CP2243	Result	June	EE48	95	
CP2243	Result	June	EE48	80	
CP2243	Result	June	EE48	95	
CP2243	Result	June	EE48	85	
CP2433	Result	June	EE48	100	
CP2433	Result	June	EE48	95	
CP2433	Result	June	EE48	95	
CP2433	Result	June	EE48	95	
CP2433	Result	June	EE48	85	
C10	Result	June	EE48	90	
C10	Result	June	EE48	95	
C10	Result	June	EE48	95	
C10	Result	June	EE48	95	
C10	Result	June	EE48	50	
C14	Result	June	EE48	0	
C14	Result	June	EE48	0	
C14	Result	June	EE48	20	
C14	Result	June	EE48	0	
C14	Result	June	EE48	25	
P11	Result	June	EE48	40	
P11	Result	June	EE48	40	
P11	Result	June	EE48	60	
P11	Result	June	EE48	45	
P11	Result	June	EE48	40	
P17	Result	June	EE48	65	
P17	Result	June	EE48	0	Outlier
P17	Result	June	EE48	70	
P17	Result	June	EE48	75	
P17	Result	June	EE48	75	
Home Sediment	Negative Control	October	EE50	95	
Home Sediment	Negative Control	October	EE50	95	
Home Sediment	Negative Control	October	EE50	85	
Home Sediment	Negative Control	October	EE50	100	

Appendix F. continued

Sample	Sample Type	Month Sampled	QA Batch	Percent Survival	Outlier
Home Sediment	Negative Control	October	EE50	90	
CP2243	Result	October	EE50	95	
CP2243	Result	October	EE50	100	
CP2243	Result	October	EE50	100	
CP2243	Result	October	EE50	90	
CP2243	Result	October	EE50	90	
CP2433	Result	October	EE50	95	
CP2433	Result	October	EE50	100	
CP2433	Result	October	EE50	100	
CP2433	Result	October	EE50	85	
CP2433	Result	October	EE50	100	
C10	Result	October	EE50	80	
C10	Result	October	EE50	70	
C10	Result	October	EE50	80	
C10	Result	October	EE50	75	
C10	Result	October	EE50	80	
C14	Result	October	EE50	40	
C14	Result	October	EE50	20	
C14	Result	October	EE50	50	
C14	Result	October	EE50	30	
C14	Result	October	EE50	50	
P11	Result	October	EE50	85	
P11	Result	October	EE50	80	
P11	Result	October	EE50	85	
P11	Result	October	EE50	95	
P11	Result	October	EE50	100	
P17	Result	October	EE50	45	
P17	Result	October	EE50	95	
P17	Result	October	EE50	60	
P17	Result	October	EE50	60	
P17	Result	October	EE50	60	

Appendix G

Sea urchin fertilization in quarterly pore water samples. NA = not applicable. NC = analyzed, but not counted. The values are not control adjusted.

Sample	Sample Type	QA Batch	Month Sampled	Percent Sample / Percent Fertilization		
				25%	50%	100%
Seawater Control	Result	S565	November	NA	NA	62
Seawater Control	Result	S565	November	NA	NA	28
Seawater Control	Result	S565	November	NA	NA	80
Seawater Control	Result	S565	November	NA	NA	80
Centrifuge Blank	Negative Control	S565	November	NA	NA	76
Centrifuge Blank	Negative Control	S565	November	NA	NA	81
Centrifuge Blank	Negative Control	S565	November	NA	NA	70
Centrifuge Blank	Negative Control	S565	November	NA	NA	74
CP2243	Result	S565	November	NC	90	88
CP2243	Result	S565	November	NC	85	94
CP2243	Result	S565	November	NC	86	91
CP2243	Result	S565	November	NC	78	89
CP2433	Result	S565	November	NC	95	93
CP2433	Result	S565	November	NC	95	91
CP2433	Result	S565	November	NC	94	94
CP2433	Result	S565	November	NC	92	92
C10	Result	S565	November	94	84	84
C10	Result	S565	November	94	92	85
C10	Result	S565	November	92	90	76
C10	Result	S565	November	95	91	86
C14	Result	S565	November	NC	96	92
C14	Result	S565	November	NC	95	95
C14	Result	S565	November	NC	94	96
C14	Result	S565	November	NC	94	93
P11	Result	S565	November	NC	97	95
P11	Result	S565	November	NC	97	96
P11	Result	S565	November	NC	97	95
P11	Result	S565	November	NC	97	96
P17	Result	S565	November	2	1	0
P17	Result	S565	November	2	0	0
P17	Result	S565	November	8	0	0

Appendix G. continued

Sample	Sample Type	QA Batch	Month Sampled	Percent Sample / Percent Fertilization		
				25%	50%	100%
P17	Result	S565	November	2	0	0
Seawater Control	Result	S581	February	NA	NA	99
Seawater Control	Result	S581	February	NC	NC	98
Seawater Control	Result	S581	February	NC	NC	100
Seawater Control	Result	S581	February	NC	NC	97
Centrifuge Blank	Negative Control	S581	February	NC	NC	95
Centrifuge Blank	Negative Control	S581	February	NC	NC	93
Centrifuge Blank	Negative Control	S581	February	NC	NC	68
Centrifuge Blank	Negative Control	S581	February	NC	NC	98
CP2243	Result	S581	February	NC	NC	100
CP2243	Result	S581	February	NC	NC	99
CP2243	Result	S581	February	NC	NC	99
CP2243	Result	S581	February	NC	NC	98
CP2433	Result	S581	February	NC	NC	100
CP2433	Result	S581	February	NC	NC	99
CP2433	Result	S581	February	NC	NC	99
CP2433	Result	S581	February	NC	NC	96
C10	Result	S581	February	NC	99	99
C10	Result	S581	February	NC	99	85
C10	Result	S581	February	NC	99	99
C10	Result	S581	February	NC	99	89
C14	Result	S581	February	NC	NC	99
C14	Result	S581	February	NC	NC	99
C14	Result	S581	February	NC	NC	99
C14	Result	S581	February	NC	NC	99
P11	Result	S581	February	NC	NC	99
P11	Result	S581	February	NC	NC	99
P11	Result	S581	February	NC	NC	99
P11	Result	S581	February	NC	NC	100
P17	Result	S581	February	NC	NC	99
P17	Result	S581	February	NC	NC	100
P17	Result	S581	February	NC	NC	94
P17	Result	S581	February	NC	NC	99
Seawater Control	Negative Control	S598	June	NA	NA	94
Seawater Control	Negative Control	S598	June	NA	NA	99

Appendix G. continued

Sample	Sample Type	QA Batch	Month Sampled	Percent Sample / Percent Fertilization		
				25%	50%	100%
Seawater Control	Negative Control	S598	June	NA	NA	99
Seawater Control	Negative Control	S598	June	NA	NA	99
Centrifuge Blank	Result	S598	June	NA	93	35
Centrifuge Blank	Result	S598	June	NA	99	43
Centrifuge Blank	Result	S598	June	NA	95	51
Centrifuge Blank	Result	S598	June	NA	93	69
CP2243	Result	S598	June	NC	99	99
CP2243	Result	S598	June	NC	99	99
CP2243	Result	S598	June	NC	99	100
CP2243	Result	S598	June	NC	99	99
CP2433	Result	S598	June	NC	99	100
CP2433	Result	S598	June	NC	99	100
CP2433	Result	S598	June	NC	100	100
CP2433	Result	S598	June	NC	99	99
C10	Result	S598	June	NC	100	97
C10	Result	S598	June	NC	100	97
C10	Result	S598	June	NC	99	94
C10	Result	S598	June	NC	99	99
C14	Result	S598	June	92	8	1
C14	Result	S598	June	92	1	0
C14	Result	S598	June	95	6	0
C14	Result	S598	June	90	9	0
P11	Result	S598	June	NC	93	97
P11	Result	S598	June	NC	97	97
P11	Result	S598	June	NC	96	99
P11	Result	S598	June	NC	96	99
P17	Result	S598	June	NC	99	99
P17	Result	S598	June	NC	99	99
P17	Result	S598	June	NC	99	100
P17	Result	S598	June	NC	99	100
Seawater Control	Result	S608	October	NA	NA	100
Seawater Control	Result	S608	October	NA	NA	99
Seawater Control	Result	S608	October	NA	NA	97
Seawater Control	Result	S608	October	NA	NA	98
Centrifuge Blank	Negative Control	S608	October	NA	98	99

Appendix G. continued

Sample	Sample Type	QA Batch	Month Sampled	Percent Sample / Percent Fertilization		
				25%	50%	100%
Centrifuge Blank	Negative Control	S608	October	NA	99	95
Centrifuge Blank	Negative Control	S608	October	NA	99	94
Centrifuge Blank	Negative Control	S608	October	NA	99	98
CP2243	Result	S608	October	NC	98	99
CP2243	Result	S608	October	NC	98	99
CP2243	Result	S608	October	NC	98	99
CP2243	Result	S608	October	99	99	99
CP2433	Result	S608	October	100	100	99
CP2433	Result	S608	October	NC	99	99
CP2433	Result	S608	October	NC	99	100
CP2433	Result	S608	October	100	99	100
C10	Result	S608	October	98	99	95
C10	Result	S608	October	NC	100	98
C10	Result	S608	October	NC	98	95
C10	Result	S608	October	NC	97	99
C14	Result	S608	October	7	4	2
C14	Result	S608	October	18	5	4
C14	Result	S608	October	9	8	4
C14	Result	S608	October	10	6	1
P11	Result	S608	October	NC	98	97
P11	Result	S608	October	NC	100	99
P11	Result	S608	October	NC	99	99
P11	Result	S608	October	99	98	99
P17	Result	S608	October	NC	97	100
P17	Result	S608	October	97	98	100
P17	Result	S608	October	98	99	100
P17	Result	S608	October	NC	98	98

Appendix H

Sea urchin embryo normal development in quarterly sediment-water interface samples. Values are for measurements before correcting for ammonia influence, and have not been control adjusted.

Sample	Sample Type	QA Batch	Month Sampled	Percent Normal Development	Outlier or NH_3 Influenced
Tube Blank	Negative control	S543	July	85	
Tube Blank	Negative control	S543	July	89	
Tube Blank	Negative control	S543	July	78	
CP2243	Result	S543	July	85	
CP2243	Result	S543	July	93	
CP2243	Result	S543	July	0	Outlier
CP2243	Result	S543	July	0	Outlier
CP2433	Result	S543	July	16	Outlier
CP2433	Result	S543	July	100	
CP2433	Result	S543	July	98	
CP2433	Result	S543	July	93	
C10	Result	S543	July	55	
C10	Result	S543	July	61	
C10	Result	S543	July	25	
C10	Result	S543	July	71	
C14	Result	S543	July	18	
C14	Result	S543	July	12	
C14	Result	S543	July	0	
C14	Result	S543	July	80	
Tube Blank	Negative control	S557	August	78	
Tube Blank	Negative control	S557	August	70	
Tube Blank	Negative control	S557	August	78	
Tube Blank	Negative control	S557	August	91	
P11	Result	S557	August	0	Outlier
P11	Result	S557	August	3	Ammonia Influenced
P11	Result	S557	August	0	Outlier
P11	Result	S557	August	23	Outlier
P17	Result	S557	August	18	
P17	Result	S557	August	0	
P17	Result	S557	August	29	
P17	Result	S557	August	80	Ammonia Influenced
Core Tube Blank	Result	S567	November	100	

Sample	Sample Type	QA Batch	Month Sampled	Percent Normal Development	Outlier or NH_3 Influenced
Core Tube Blank	Result	S567	November	88	
Core Tube Blank	Result	S567	November	85	
Core Tube Blank	Result	S567	November	90	
Screen Tube Blank	Negative Control	S567	November	81	
Screen Tube Blank	Negative Control	S567	November	97	
Screen Tube Blank	Negative Control	S567	November	87	
Screen Tube Blank	Negative Control	S567	November	78	
CP2243	Result	S567	November	2	
CP2243	Result	S567	November	67	
CP2243	Result	S567	November	76	
CP2243	Result	S567	November	83	
CP2433	Result	S567	November	100	
CP2433	Result	S567	November	80	
CP2433	Result	S567	November	82	
CP2433	Result	S567	November	88	
C10	Result	S567	November	65	
C10	Result	S567	November	85	
C10	Result	S567	November	15	Outlier
C10	Result	S567	November	90	
C14	Result	S567	November	88	
C14	Result	S567	November	89	
C14	Result	S567	November	90	
P11	Result	S567	November	99	
P11	Result	S567	November	83	
P11	Result	S567	November	54	
P11	Result	S567	November	85	
P17	Result	S567	November	3	Ammonia Influenced
P17	Result	S567	November	0	Ammonia Influenced
P17	Result	S567	November	29	
P17	Result	S567	November	7	Ammonia Influenced
Core Tube Blank	Result	S583	February	99	
Core Tube Blank	Result	S583	February	89	
Core Tube Blank	Result	S583	February	98	
Core Tube Blank	Result	S583	February	100	
Screen Tube Blank	Negative Control	S583	February	97	
Screen Tube Blank	Negative Control	S583	February	85	

Sample	Sample Type	QA Batch	Month Sampled	Percent Normal Development	Outlier or NH_3 Influenced
Screen Tube Blank	Negative Control	S583	February	97	
Screen Tube Blank	Negative Control	S583	February	98	
CP2243	Result	S583	February	25	
CP2243	Result	S583	February	88	
CP2243	Result	S583	February	57	
CP2243	Result	S583	February	39	
CP2433	Result	S583	February	95	
CP2433	Result	S583	February	96	
CP2433	Result	S583	February	0	
CP2433	Result	S583	February	20	
C10	Result	S583	February	0	
C10	Result	S583	February	0	
C10	Result	S583	February	13	
C10	Result	S583	February	2	
C14	Result	S583	February	5	Ammonia Influenced
C14	Result	S583	February	0	Ammonia Influenced
C14	Result	S583	February	0	Ammonia Influenced
C14	Result	S583	February	0	Ammonia Influenced
P11	Result	S583	February	94	
P11	Result	S583	February	31	
P11	Result	S583	February	99	
P11	Result	S583	February	98	
P17	Result	S583	February	0	
P17	Result	S583	February	4	
P17	Result	S583	February	0	
P17	Result	S583	February	5	
Screen Tube Blank	Negative Control	S600	June	91	
Screen Tube Blank	Negative Control	S600	June	93	
Screen Tube Blank	Negative Control	S600	June	91	
Screen Tube Blank	Negative Control	S600	June	94	
CP2243	Result	S600	June	6	
CP2243	Result	S600	June	83	
CP2243	Result	S600	June	90	
CP2243	Result	S600	June	82	
CP2433	Result	S600	June	78	
CP2433	Result	S600	June	85	

Sample	Sample Type	QA Batch	Month Sampled	Percent Normal Development	Outlier or NH_3 Influenced
CP2433	Result	S600	June	91	
CP2433	Result	S600	June	90	
C10	Result	S600	June	90	
C10	Result	S600	June	69	
C10	Result	S600	June	68	
C10	Result	S600	June	63	
C14	Result	S600	June	79	
C14	Result	S600	June	91	
C14	Result	S600	June	85	
C14	Result	S600	June	59	Ammonia Influenced
P11	Result	S600	June	61	
P11	Result	S600	June	36	
P11	Result	S600	June	36	
P11	Result	S600	June	35	
P17	Result	S600	June	54	Ammonia Influenced
P17	Result	S600	June	5	
P17	Result	S600	June	6	
P17	Result	S600	June	68	
Screen Tube Blank	Negative Control	S610	October	97	
Screen Tube Blank	Negative Control	S610	October	97	
Screen Tube Blank	Negative Control	S610	October	97	
Screen Tube Blank	Negative Control	S610	October	87	
CP2243	Result	S610	October	27	
CP2243	Result	S610	October	98	
CP2243	Result	S610	October	85	
CP2243	Result	S610	October	88	
CP2433	Result	S610	October	96	
CP2433	Result	S610	October	78	
CP2433	Result	S610	October	96	
CP2433	Result	S610	October	97	
C10	Result	S610	October	46	
C10	Result	S610	October	34	
C10	Result	S610	October	88	
C10	Result	S610	October	75	
C14	Result	S610	October	97	
C14	Result	S610	October	65	

Sample	Sample Type	QA Batch	Month Sampled	Percent Normal Development	Outlier or NH_3 Influenced
C14	Result	S610	October	96	
C14	Result	S610	October	98	
P11	Result	S610	October	97	
P11	Result	S610	October	70	
P11	Result	S610	October	94	
P11	Result	S610	October	61	
P17	Result	S610	October	4	
P17	Result	S610	October	1	
P17	Result	S610	October	99	
P17	Result	S610	October	97	

Appendix I. Benthic species abundance

StationID	Date	Name	Phylum	Class	Order	Family	Abundance
CP2243	7/18/2001	Amphideutopus oculatus	Arthropoda	Malacostraca	Amphipoda	Isaeidae	3
CP2243	7/18/2001	Atylus tridens	Arthropoda	Malacostraca	Amphipoda	Dexaminidae	1
CP2243	7/18/2001	Barleeia haliotiphila	Mollusca	Gastropoda	Neotaenioglossa	Barleeidae	1
CP2243	7/18/2001	Caprella equilibra	Arthropoda	Malacostraca	Amphipoda	Caprellidae	8
CP2243	7/18/2001	Ceriantharia	Cnidaria	Anthozoa	Ceriantharia		2
CP2243	7/18/2001	Dorvillea (Schistomeringos) longicornis	Annelida	Polychaeta	Eunicida	Dorvilleidae	2
CP2243	7/18/2001	Edwardsia californica	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	31
CP2243	7/18/2001	Edwardsiidae	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	2
CP2243	7/18/2001	Euchone limnicola	Annelida	Polychaeta	Sabellida	Sabellidae	1
CP2243	7/18/2001	Exogone lourei	Annelida	Polychaeta	Phyllodocida	Syllidae	70
CP2243	7/18/2001	Fabricinuda limnicola	Annelida	Polychaeta	Sabellida	Sabellidae	3
CP2243	7/18/2001	Glycera americana	Annelida	Polychaeta	Phyllodocida	Glyceridae	1
CP2243	7/18/2001	Harmothoe imbricata Cmplx	Annelida	Polychaeta	Phyllodocida	Polynoidae	2
CP2243	7/18/2001	Hartmanodes hartmanae	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	1
CP2243	7/18/2001	Heterophoxus oculatus	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	1
CP2243	7/18/2001	Leitoscoloplos pugettensis	Annelida	Polychaeta	Orbiniida	Orbiniidae	10
CP2243	7/18/2001	Leptopecten latiauratus	Mollusca	Bivalvia	Ostreoida	Pectinidae	1
CP2243	7/18/2001	Lineidae	Nemertea	Anopla	Heteronemertea	Lineidae	1
CP2243	7/18/2001	Lumbrineridae	Annelida	Polychaeta	Eunicida	Lumbrineridae	3
CP2243	7/18/2001	Lumbrineris erecta	Annelida	Polychaeta	Eunicida	Lumbrineridae	8
CP2243	7/18/2001	Macoma nasuta	Mollusca	Bivalvia	Veneroida	Tellinidae	6
CP2243	7/18/2001	Mediomastus sp	Annelida	Polychaeta	Capitellida	Capitellidae	50
CP2243	7/18/2001	Musculista senhousia	Mollusca	Bivalvia	Mytiloida	Mytilidae	50
CP2243	7/18/2001	Nassarius tiarula	Mollusca	Gastropoda	Neogastropoda	Nassariidae	7
CP2243	7/18/2001	Neanthes acuminata Cmplx	Annelida	Polychaeta	Phyllodocida	Nereididae	12
CP2243	7/18/2001	Oligochaeta	Annelida	Oligochaeta			1
CP2243	7/18/2001	Oxyurostylis pacifica	Arthropoda	Malacostraca	Cumacea	Diastylidae	1
CP2243	7/18/2001	Paracerceis sculpta	Arthropoda	Malacostraca	Isopoda	Sphaeromatidae	7
CP2243	7/18/2001	Paranemertes californica	Nemertea	Enopla	Hoplonemertea	Emplectonematidae	1
CP2243	7/18/2001	Phoronis sp	Phorona		Phoronida	Phoronidae	6
CP2243	7/18/2001	Pista agassizi	Annelida	Polychaeta	Terebellida	Terebellidae	11
CP2243	7/18/2001	Podocerus brasiliensis	Arthropoda	Malacostraca	Amphipoda	Podoceridae	7
CP2243	7/18/2001	Poecilochaetus johnsoni	Annelida	Polychaeta	Spionida	Poecilochaetidae	1
CP2243	7/18/2001	Prionospio (Prionospio) heterobranchia	Annelida	Polychaeta	Spionida	Spionidae	7
CP2243	7/18/2001	Pseudopolydora paucibranchiata	Annelida	Polychaeta	Spionida	Spionidae	7
CP2243	7/18/2001	Scolanthus sp A	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	3
CP2243	7/18/2001	Scoletoma sp C	Annelida	Polychaeta	Eunicida	Lumbrineridae	240
CP2243	7/18/2001	Scyphoproctus oculatus	Annelida	Polychaeta	Capitellida	Capitellidae	119
CP2243	7/18/2001	Theora lubrica	Mollusca	Bivalvia	Veneroida	Semelidae	1
CP2433	7/18/2001	Acteocina culcitella	Mollusca	Gastropoda	Cephalaspidea	Scaphandridae	1
CP2433	7/18/2001	Aglaja ocelligera	Mollusca	Gastropoda	Cephalaspidea	Aglajidae	1
CP2433	7/18/2001	Amaeana occidentalis	Annelida	Polychaeta	Terebellida	Terebellidae	2
CP2433	7/18/2001	Amphicteis scaphobranchiata	Annelida	Polychaeta	Terebellida	Ampharetidae	1
CP2433	7/18/2001	Amphideutopus oculatus	Arthropoda	Malacostraca	Amphipoda	Isaeidae	2
CP2433	7/18/2001	Amphiodia psara	Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	1
CP2433	7/18/2001	Amphiodia urtica	Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	1
CP2433	7/18/2001	Asteropella slatteryi	Arthropoda	Ostracoda	Myodocopida	Cylindroleberididae	1

Appendix I. continued

StationID	Date	Name	Phylum	Class	Order	Family	Abundance
CP2433	7/18/2001	Asthenothaerus diegensis	Mollusca	Bivalvia	Pholadomyoida	Thraciidae	1
CP2433	7/18/2001	Chaetozone corona	Annelida	Polychaeta	Spionida	Cirratulidae	13
CP2433	7/18/2001	Cossura candida	Annelida	Polychaeta	Cossurida	Cossuridae	2
CP2433	7/18/2001	Cryptomya californica	Mollusca	Bivalvia	Myoida	Myidae	4
CP2433	7/18/2001	Diplocirrus sp SD1	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	81
CP2433	7/18/2001	Euchone limnicola	Annelida	Polychaeta	Sabellida	Sabellidae	1
CP2433	7/18/2001	Euclymeninae	Annelida	Polychaeta	Capitellida	Maldanidae	4
CP2433	7/18/2001	Euclymeninae sp A	Annelida	Polychaeta	Capitellida	Maldanidae	8
CP2433	7/18/2001	Glycera americana	Annelida	Polychaeta	Phyllodocida	Glyceridae	2
CP2433	7/18/2001	Hoplonemertea	Nemertea	Enopla	Hoplonemertea		1
CP2433	7/18/2001	Laevicardium substriatum	Mollusca	Bivalvia	Veneroida	Cardiidae	1
CP2433	7/18/2001	Leitoscoloplos pugettensis	Annelida	Polychaeta	Orbiniida	Orbiniidae	57
CP2433	7/18/2001	Leptosynapta sp	Echinodermata	Holothuroidea	Apodida	Synaptidae	1
CP2433	7/18/2001	Lucinisca nuttalli	Mollusca	Bivalvia	Veneroida	Lucinidae	1
CP2433	7/18/2001	Lumbrineris erecta	Annelida	Polychaeta	Eunicida	Lumbrineridae	1
CP2433	7/18/2001	Lyonsia californica	Mollusca	Bivalvia	Pholadomyoida	Lyonsiidae	1
CP2433	7/18/2001	Macoma yoldiformis	Mollusca	Bivalvia	Veneroida	Tellinidae	2
CP2433	7/18/2001	Malacoplax californiensis	Arthropoda	Malacostraca	Decapoda	Gonoplacidae	2
CP2433	7/18/2001	Mediomastus sp	Annelida	Polychaeta	Capitellida	Capitellidae	28
CP2433	7/18/2001	Mysidopsis californica	Arthropoda	Malacostraca	Mysidacea	Mysidae	1
CP2433	7/18/2001	Neastacilla californica	Arthropoda	Malacostraca	Isopoda	Arcturidae	2
CP2433	7/18/2001	Neotrypaea gigas	Arthropoda	Malacostraca	Decapoda	Callianassidae	4
CP2433	7/18/2001	Neotrypaea sp	Arthropoda	Malacostraca	Decapoda	Callianassidae	7
CP2433	7/18/2001	Nephtys cornuta	Annelida	Polychaeta	Phyllodocida	Nephtyidae	2
CP2433	7/18/2001	Notomastus latericeus	Annelida	Polychaeta	Capitellida	Capitellidae	2
CP2433	7/18/2001	Oxyurostylis pacifica	Arthropoda	Malacostraca	Cumacea	Diastylidae	1
CP2433	7/18/2001	Paranemertes californica	Nemertea	Enopla	Hoplonemertea	Emplectonematidae	1
CP2433	7/18/2001	Paraprionospio pinnata	Annelida	Polychaeta	Spionida	Spionidae	1
CP2433	7/18/2001	Phyllodoce hartmanae	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	1
CP2433	7/18/2001	Pista agassizi	Annelida	Polychaeta	Terebellida	Terebellidae	5
CP2433	7/18/2001	Pista disjuncta	Annelida	Polychaeta	Terebellida	Terebellidae	1
CP2433	7/18/2001	Praxillella pacifica	Annelida	Polychaeta	Capitellida	Maldanidae	1
CP2433	7/18/2001	Rochefortia coani	Mollusca	Bivalvia	Veneroida	Lasaeidae	2
CP2433	7/18/2001	Rudilemboides stenopropodus	Arthropoda	Malacostraca	Amphipoda	Aoridae	1
CP2433	7/18/2001	Scleroplax granulata	Arthropoda	Malacostraca	Decapoda	Pinnotheridae	29
CP2433	7/18/2001	Scoletoma sp	Annelida	Polychaeta	Eunicida	Lumbrineridae	23
CP2433	7/18/2001	Scoletoma sp A	Annelida	Polychaeta	Eunicida	Lumbrineridae	8
CP2433	7/18/2001	Scoletoma sp B	Annelida	Polychaeta	Eunicida	Lumbrineridae	2
CP2433	7/18/2001	Scoletoma sp C	Annelida	Polychaeta	Eunicida	Lumbrineridae	80
CP2433	7/18/2001	Spiophanes duplex	Annelida	Polychaeta	Spionida	Spionidae	2
CP2433	7/18/2001	Syllis (Typosyllis) nipponica	Annelida	Polychaeta	Phyllodocida	Syllidae	9
CP2433	7/18/2001	Tagelus subteres	Mollusca	Bivalvia	Veneroida	Solecurtidae	4
CP2433	7/18/2001	Tellina carpenteri	Mollusca	Bivalvia	Veneroida	Tellinidae	1
CP2433	7/18/2001	Terebellidae	Annelida	Polychaeta	Terebellida	Terebellidae	1
CP2433	7/18/2001	Theora lubrica	Mollusca	Bivalvia	Veneroida	Semelidae	5
CP2433	7/18/2001	Thracia trapezoides	Mollusca	Bivalvia	Pholadomyoida	Thraciidae	1
CP2433	7/18/2001	Tubulanus nothus	Nemertea	Anopla	Palaeonemertea	Tubulanidae	1
CP2433	7/18/2001	Zygeupolia rubens	Nemertea	Anopla	Heteronemertea	Valenciniidae	1
C10	7/18/2001	Amphideutopus oculatus	Arthropoda	Malacostraca	Amphipoda	Isaeidae	3
C10	7/18/2001	Armandia brevis	Annelida	Polychaeta	Opheliida	Opheliidae	2

Appendix I. continued

StationID	Date	Name	Phylum	Class	Order	Family	Abundance
C10	7/18/2001	Calocarides spinulicauda	Arthropoda	Malacostraca	Decapoda	Axiidae	3
C10	7/18/2001	Cossura candida	Annelida	Polychaeta	Cossurida	Cossuridae	7
C10	7/18/2001	Diplocirrus sp SD1	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	7
C10	7/18/2001	Dorvillea (Schistomeringos) longicornis	Annelida	Polychaeta	Eunicida	Dorvilleidae	3
C10	7/18/2001	Drilonereis mexicana	Annelida	Polychaeta	Eunicida	Oenonidae	1
C10	7/18/2001	Edwardsia californica	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	3
C10	7/18/2001	Euchone limnicola	Annelida	Polychaeta	Sabellida	Sabellidae	2
C10	7/18/2001	Euphilomedes carcharodonta	Arthropoda	Ostracoda	Myodocopida	Philomedidae	7
C10	7/18/2001	Exogone lourei	Annelida	Polychaeta	Phyllodocida	Syllidae	14
C10	7/18/2001	Fabricinuda limnicola	Annelida	Polychaeta	Sabellida	Sabellidae	4
C10	7/18/2001	Glycera americana	Annelida	Polychaeta	Phyllodocida	Glyceridae	1
C10	7/18/2001	Harmothoe imbricata Cmplx	Annelida	Polychaeta	Phyllodocida	Polynoidae	4
C10	7/18/2001	Heterophoxus oculatus	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	1
C10	7/18/2001	Leitoscoloplos pugettensis	Annelida	Polychaeta	Orbiniida	Orbiniidae	69
C10	7/18/2001	Lumbrineridae	Annelida	Polychaeta	Eunicida	Lumbrineridae	1
C10	7/18/2001	Mediomastus sp	Annelida	Polychaeta	Capitellida	Capitellidae	19
C10	7/18/2001	Musculista senhousia	Mollusca	Bivalvia	Mytiloida	Mytilidae	45
C10	7/18/2001	Nemertea	Nemertea				1
C10	7/18/2001	Nephtys cornuta	Annelida	Polychaeta	Phyllodocida	Nephtyidae	1
C10	7/18/2001	Notomastus sp A	Annelida	Polychaeta	Capitellida	Capitellidae	1
C10	7/18/2001	Odontosyllis phosphorea	Annelida	Polychaeta	Phyllodocida	Syllidae	2
C10	7/18/2001	Pista agassizi	Annelida	Polychaeta	Terebellida	Terebellidae	12
C10	7/18/2001	Prionospio (Prionospio) heterobranchia	Annelida	Polychaeta	Spionida	Spionidae	18
C10	7/18/2001	Pseudopolydora paucibranchiata	Annelida	Polychaeta	Spionida	Spionidae	4
C10	7/18/2001	Pyromaia tuberculata	Arthropoda	Malacostraca	Decapoda	Majidae	1
C10	7/18/2001	Rudilemboides stenopropodus	Arthropoda	Malacostraca	Amphipoda	Aoridae	1
C10	7/18/2001	Scolanthus sp A	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	4
C10	7/18/2001	Scoletoma sp C	Annelida	Polychaeta	Eunicida	Lumbrineridae	73
C14	7/18/2001	Bemlos sp	Arthropoda	Malacostraca	Amphipoda	Aoridae	1
C14	7/18/2001	Bulla gouldiana	Mollusca	Gastropoda	Cephalaspidea	Bullidae	3
C14	7/18/2001	Capitella capitata Cmplx	Annelida	Polychaeta	Capitellida	Capitellidae	501
C14	7/18/2001	Dorvillea (Schistomeringos) longicornis	Annelida	Polychaeta	Eunicida	Dorvilleidae	27
C14	7/18/2001	Grandidierella japonica	Arthropoda	Malacostraca	Amphipoda	Aoridae	2
C14	7/18/2001	Harmothoe imbricata Cmplx	Annelida	Polychaeta	Phyllodocida	Polynoidae	1
C14	7/18/2001	Nassarius tiarula	Mollusca	Gastropoda	Neogastropoda	Nassariidae	1
C14	7/18/2001	Neanthes acuminata Cmplx	Annelida	Polychaeta	Phyllodocida	Nereididae	14
C14	7/18/2001	Oligochaeta	Annelida	Oligochaeta			2
C14	7/18/2001	Streblospio benedicti	Annelida	Polychaeta	Spionida	Spionidae	1
C10	7/18/2001	Amphideutopus oculatus	Arthropoda	Malacostraca	Amphipoda	Isaeidae	3
C10	7/18/2001	Armandia brevis	Annelida	Polychaeta	Opheliida	Opheliidae	2
C10	7/18/2001	Calocarides spinulicauda	Arthropoda	Malacostraca	Decapoda	Axiidae	3
C10	7/18/2001	Cossura candida	Annelida	Polychaeta	Cossurida	Cossuridae	7
C10	7/18/2001	Diplocirrus sp SD1	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	7
C10	7/18/2001	Dorvillea (Schistomeringos) longicornis	Annelida	Polychaeta	Eunicida	Dorvilleidae	3
C10	7/18/2001	Drilonereis mexicana	Annelida	Polychaeta	Eunicida	Oenonidae	1
C10	7/18/2001	Edwardsia californica	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	3
C10	7/18/2001	Euchone limnicola	Annelida	Polychaeta	Sabellida	Sabellidae	2
C10	7/18/2001	Euphilomedes carcharodonta	Arthropoda	Ostracoda	Myodocopida	Philomedidae	7
C10	7/18/2001	Exogone lourei	Annelida	Polychaeta	Phyllodocida	Syllidae	14
C10	7/18/2001	Fabricinuda limnicola	Annelida	Polychaeta	Sabellida	Sabellidae	4

Appendix I. continued

StationID	Date	Name	Phylum	Class	Order	Family	Abundance
C10	7/18/2001	Glycera americana	Annelida	Polychaeta	Phyllodocida	Glyceridae	1
C10	7/18/2001	Harmothoe imbricata Cmplx	Annelida	Polychaeta	Phyllodocida	Polynoidae	4
C10	7/18/2001	Heterophoxus oculatus	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	1
C10	7/18/2001	Leitoscoloplos pugettensis	Annelida	Polychaeta	Orbiniida	Orbiniidae	69
C10	7/18/2001	Lumbrineridae	Annelida	Polychaeta	Eunicida	Lumbrineridae	1
C10	7/18/2001	Mediomastus sp	Annelida	Polychaeta	Capitellida	Capitellidae	19
C10	7/18/2001	Musculista senhousia	Mollusca	Bivalvia	Mytiloida	Mytilidae	45
C10	7/18/2001	Nemertea	Nemertea				1
C10	7/18/2001	Nephtys cornuta	Annelida	Polychaeta	Phyllodocida	Nephtyidae	1
C10	7/18/2001	Notomastus sp A	Annelida	Polychaeta	Capitellida	Capitellidae	1
C10	7/18/2001	Odontosyllis phosphorea	Annelida	Polychaeta	Phyllodocida	Syllidae	2
C10	7/18/2001	Pista agassizi	Annelida	Polychaeta	Terebellida	Terebellidae	12
C10	7/18/2001	Prionospio (Prionospio) heterobranchia	Annelida	Polychaeta	Spionida	Spionidae	18
C10	7/18/2001	Pseudopolydora paucibranchiata	Annelida	Polychaeta	Spionida	Spionidae	4
C10	7/18/2001	Pyromaia tuberculata	Arthropoda	Malacostraca	Decapoda	Majidae	1
C10	7/18/2001	Rudilemboides stenopropodus	Arthropoda	Malacostraca	Amphipoda	Aoridae	1
C10	7/18/2001	Scolanthus sp A	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	4
C10	7/18/2001	Scoletoma sp C	Annelida	Polychaeta	Eunicida	Lumbrineridae	73
C14	7/18/2001	Bemlos sp	Arthropoda	Malacostraca	Amphipoda	Aoridae	1
C14	7/18/2001	Bulla gouldiana	Mollusca	Gastropoda	Cephalaspidea	Bullidae	3
C14	7/18/2001	Capitella capitata Cmplx	Annelida	Polychaeta	Capitellida	Capitellidae	501
C14	7/18/2001	Dorvillea (Schistomeringos) longicornis	Annelida	Polychaeta	Eunicida	Dorvilleidae	27
C14	7/18/2001	Grandidierella japonica	Arthropoda	Malacostraca	Amphipoda	Aoridae	2
C14	7/18/2001	Harmothoe imbricata Cmplx	Annelida	Polychaeta	Phyllodocida	Polynoidae	1
C14	7/18/2001	Nassarius tiarula	Mollusca	Gastropoda	Neogastropoda	Nassariidae	1
C14	7/18/2001	Neanthes acuminata Cmplx	Annelida	Polychaeta	Phyllodocida	Nereididae	14
C14	7/18/2001	Oligochaeta	Annelida	Oligochaeta			2
C14	7/18/2001	Streblospio benedicti	Annelida	Polychaeta	Spionida	Spionidae	1
P11	8/28/2001	Ambidexter panamensis	Arthropoda	Malacostraca	Decapoda	Processidae	1
P11	8/28/2001	Bulla gouldiana	Mollusca	Gastropoda	Cephalaspidea	Bullidae	3
P11	8/28/2001	Cryptomya californica	Mollusca	Bivalvia	Myoida	Myidae	1
P11	8/28/2001	Diplocirrus sp SD1	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	1
P11	8/28/2001	Dorvillea (Schistomeringos) longicornis	Annelida	Polychaeta	Eunicida	Dorvilleidae	1
P11	8/28/2001	Euphilomedes carcharodonta	Arthropoda	Ostracoda	Myodocopida	Philomedidae	6
P11	8/28/2001	Leitoscoloplos pugettensis	Annelida	Polychaeta	Orbiniida	Orbiniidae	12
P11	8/28/2001	Lumbrineris erecta	Annelida	Polychaeta	Eunicida	Lumbrineridae	5
P11	8/28/2001	Lyonsia californica	Mollusca	Bivalvia	Pholadomyoida	Lyonsiidae	4
P11	8/28/2001	Mediomastus sp	Annelida	Polychaeta	Capitellida	Capitellidae	10
P11	8/28/2001	Musculista senhousia	Mollusca	Bivalvia	Mytiloida	Mytilidae	3
P11	8/28/2001	Nassarius tiarula	Mollusca	Gastropoda	Neogastropoda	Nassariidae	1
P11	8/28/2001	Odontosyllis phosphorea	Annelida	Polychaeta	Phyllodocida	Syllidae	1
P11	8/28/2001	Palaeonemertea	Nemertea	Anopla	Palaeonemertea		1
P11	8/28/2001	Paranemertes californica	Nemertea	Enopla	Hoplonemertea	Emplectonematidae	2
P11	8/28/2001	Pista agassizi	Annelida	Polychaeta	Terebellida	Terebellidae	5
P11	8/28/2001	Prionospio (Prionospio) heterobranchia	Annelida	Polychaeta	Spionida	Spionidae	6
P11	8/28/2001	Pseudopolydora paucibranchiata	Annelida	Polychaeta	Spionida	Spionidae	1
P11	8/28/2001	Pyromaia tuberculata	Arthropoda	Malacostraca	Decapoda	Majidae	1
P11	8/28/2001	Scoletoma sp	Annelida	Polychaeta	Eunicida	Lumbrineridae	4
P11	8/28/2001	Scoletoma sp C	Annelida	Polychaeta	Eunicida	Lumbrineridae	10
P11	8/28/2001	Tetrastemma candidum	Nemertea	Enopla	Hoplonemertea	Tetrastemmatidae	1

Appendix I. continued

StationID	Date	Name	Phylum	Class	Order	Family	Abundance
P11	8/28/2001	Theora lubrica	Mollusca	Bivalvia	Veneroida	Semelidae	7
P11	8/28/2001	Zygeupolia rubens	Nemertea	Anopla	Heteronemertea	Valenciniidae	1
P17	8/28/2001	Acteocina inculta	Mollusca	Gastropoda	Cephalaspidea	Scaphandridae	4
P17	8/28/2001	Ambidexter panamensis	Arthropoda	Malacostraca	Decapoda	Processidae	1
P17	8/28/2001	Aphelochaeta sp	Annelida	Polychaeta	Spionida	Cirratulidae	10
P17	8/28/2001	Bulla gouldiana	Mollusca	Gastropoda	Cephalaspidea	Bullidae	11
P17	8/28/2001	Caulleriella pacifica	Annelida	Polychaeta	Spionida	Cirratulidae	2
P17	8/28/2001	Euphilomedes carcharodonta	Arthropoda	Ostracoda	Myodocopida	Philomedidae	21
P17	8/28/2001	Leitoscoloplos pugettensis	Annelida	Polychaeta	Orbiniida	Orbiniidae	13
P17	8/28/2001	Lumbrineris erecta	Annelida	Polychaeta	Eunicida	Lumbrineridae	3
P17	8/28/2001	Macoma indentata	Mollusca	Bivalvia	Veneroida	Tellinidae	1
P17	8/28/2001	Mediomastus sp	Annelida	Polychaeta	Capitellida	Capitellidae	9
P17	8/28/2001	Musculista senhousia	Mollusca	Bivalvia	Mytiloida	Mytilidae	21
P17	8/28/2001	Nassarius tiarula	Mollusca	Gastropoda	Neogastropoda	Nassariidae	2
P17	8/28/2001	Natantia	Arthropoda	Malacostraca	Decapoda		1
P17	8/28/2001	Pista agassizi	Annelida	Polychaeta	Terebellida	Terebellidae	8
P17	8/28/2001	Prionospio (Prionospio) heterobranchia	Annelida	Polychaeta	Spionida	Spionidae	8
P17	8/28/2001	Pseudopolydora paucibranchiata	Annelida	Polychaeta	Spionida	Spionidae	2
P17	8/28/2001	Scoletoma sp	Annelida	Polychaeta	Eunicida	Lumbrineridae	4
P17	8/28/2001	Scoletoma sp A	Annelida	Polychaeta	Eunicida	Lumbrineridae	1
P17	8/28/2001	Scoletoma sp C	Annelida	Polychaeta	Eunicida	Lumbrineridae	16
P17	8/28/2001	Theora lubrica	Mollusca	Bivalvia	Veneroida	Semelidae	13
CP2243	11/6/2001	Acteocina inculta	Mollusca	Gastropoda	Cephalaspidea	Scaphandridae	3
CP2243	11/6/2001	Americhelidium rectipalmum	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	1
CP2243	11/6/2001	Bulla gouldiana	Mollusca	Gastropoda	Cephalaspidea	Bullidae	1
CP2243	11/6/2001	Caprella sp	Arthropoda	Malacostraca	Amphipoda	Caprellidae	1
CP2243	11/6/2001	Cossura candida	Annelida	Polychaeta	Cossurida	Cossuridae	1
CP2243	11/6/2001	Euphilomedes carcharodonta	Arthropoda	Ostracoda	Myodocopida	Philomedidae	19
CP2243	11/6/2001	Leitoscoloplos pugettensis	Annelida	Polychaeta	Orbiniida	Orbiniidae	6
CP2243	11/6/2001	Lumbrineris erecta	Annelida	Polychaeta	Eunicida	Lumbrineridae	2
CP2243	11/6/2001	Lumbrineris limicola	Annelida	Polychaeta	Eunicida	Lumbrineridae	1
CP2243	11/6/2001	Mediomastus sp	Annelida	Polychaeta	Capitellida	Capitellidae	2
CP2243	11/6/2001	Musculista senhousia	Mollusca	Bivalvia	Mytiloida	Mytilidae	6
CP2243	11/6/2001	Neanthes acuminata Cmplx	Annelida	Polychaeta	Phyllodocida	Nereididae	2
CP2243	11/6/2001	Pista agassizi	Annelida	Polychaeta	Terebellida	Terebellidae	4
CP2243	11/6/2001	Scoletoma sp	Annelida	Polychaeta	Eunicida	Lumbrineridae	2
CP2243	11/6/2001	Scoletoma sp A	Annelida	Polychaeta	Eunicida	Lumbrineridae	1
CP2243	11/6/2001	Scoletoma sp C	Annelida	Polychaeta	Eunicida	Lumbrineridae	11
CP2243	11/6/2001	Theora lubrica	Mollusca	Bivalvia	Veneroida	Semelidae	2
CP2433	11/6/2001	Acanthoptilum sp	Cnidaria	Anthozoa	Pennatulacea	Virgulariidae	20
CP2433	11/6/2001	Acteocina culcitella	Mollusca	Gastropoda	Cephalaspidea	Scaphandridae	1
CP2433	11/6/2001	Amaeana occidentalis	Annelida	Polychaeta	Terebellida	Terebellidae	2
CP2433	11/6/2001	Ampelisca cristata microdentata	Arthropoda	Malacostraca	Amphipoda	Ampeliscidae	1
CP2433	11/6/2001	Amphideutopus oculatus	Arthropoda	Malacostraca	Amphipoda	Isaeidae	13
CP2433	11/6/2001	Amphiodia urtica	Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	2
CP2433	11/6/2001	Asteropella slatteryi	Arthropoda	Ostracoda	Myodocopida	Cylindroleberididae	1
CP2433	11/6/2001	Cancer sp	Arthropoda	Malacostraca	Decapoda	Cancridae	1
CP2433	11/6/2001	Chaetozone corona	Annelida	Polychaeta	Spionida	Cirratulidae	5
CP2433	11/6/2001	Cossura candida	Annelida	Polychaeta	Cossurida	Cossuridae	1
CP2433	11/6/2001	Diplocirrus sp SD1	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	221

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StationID	Date	Name	Phylum	Class	Order	Family	Abundance
CP2433	11/6/2001	Euchone limnicola	Annelida	Polychaeta	Sabellida	Sabellidae	1
CP2433	11/6/2001	Euclymeninae	Annelida	Polychaeta	Capitellida	Maldanidae	2
CP2433	11/6/2001	Euclymeninae sp A	Annelida	Polychaeta	Capitellida	Maldanidae	1
CP2433	11/6/2001	Glycera americana	Annelida	Polychaeta	Phyllodocida	Glyceridae	2
CP2433	11/6/2001	Goniada littorea	Annelida	Polychaeta	Phyllodocida	Goniadidae	3
CP2433	11/6/2001	Heteroserolis carinata	Arthropoda	Malacostraca	Isopoda	Serolidae	2
CP2433	11/6/2001	Laevicardium substriatum	Mollusca	Bivalvia	Veneroida	Cardiidae	1
CP2433	11/6/2001	Leitoscoloplos pugettensis	Annelida	Polychaeta	Orbiniida	Orbiniidae	41
CP2433	11/6/2001	Leptosynapta sp	Echinodermata	Holothuroidea	Apodida	Synaptidae	3
CP2433	11/6/2001	Lyonsia californica	Mollusca	Bivalvia	Pholadomyoida	Lyonsiidae	2
CP2433	11/6/2001	Macoma yoldiformis	Mollusca	Bivalvia	Veneroida	Tellinidae	1
CP2433	11/6/2001	Malacoplax californiensis	Arthropoda	Malacostraca	Decapoda	Gonoplacidae	1
CP2433	11/6/2001	Mediomastus sp	Annelida	Polychaeta	Capitellida	Capitellidae	52
CP2433	11/6/2001	Micrura sp	Nemertea	Anopla	Heteronemertea	Lineidae	2
CP2433	11/6/2001	Monticellina cryptica	Annelida	Polychaeta	Spionida	Cirratulidae	1
CP2433	11/6/2001	Monticellina siblina	Annelida	Polychaeta	Spionida	Cirratulidae	1
CP2433	11/6/2001	Neastacilla californica	Arthropoda	Malacostraca	Isopoda	Arcturidae	6
CP2433	11/6/2001	Neotrypaea gigas	Arthropoda	Malacostraca	Decapoda	Callianassidae	8
CP2433	11/6/2001	Nephtys cornuta	Annelida	Polychaeta	Phyllodocida	Nephtyidae	1
CP2433	11/6/2001	Nephtys ferruginea	Annelida	Polychaeta	Phyllodocida	Nephtyidae	1
CP2433	11/6/2001	Nereis procera	Annelida	Polychaeta	Phyllodocida	Nereididae	2
CP2433	11/6/2001	Notomastus magnus	Annelida	Polychaeta	Capitellida	Capitellidae	1
CP2433	11/6/2001	Obelia sp A	Cnidaria	Hydrozoa	Thecatae	Campanulariidae	1
CP2433	11/6/2001	Palaeonemertea sp C	Nemertea	Anopla	Palaeonemertea		1
CP2433	11/6/2001	Paraprionospio pinnata	Annelida	Polychaeta	Spionida	Spionidae	1
CP2433	11/6/2001	Pista agassizi	Annelida	Polychaeta	Terebellida	Terebellidae	15
CP2433	11/6/2001	Pista disjuncta	Annelida	Polychaeta	Terebellida	Terebellidae	1
CP2433	11/6/2001	Podocerus sp	Arthropoda	Malacostraca	Amphipoda	Podoceridae	1
CP2433	11/6/2001	Prionospio (Minuspio) lighti	Annelida	Polychaeta	Spionida	Spionidae	7
CP2433	11/6/2001	Protothaca staminea	Mollusca	Bivalvia	Veneroida	Veneridae	1
CP2433	11/6/2001	Pyromaia tuberculata	Arthropoda	Malacostraca	Decapoda	Majidae	3
CP2433	11/6/2001	Rochefortia coani	Mollusca	Bivalvia	Veneroida	Lasaeidae	2
CP2433	11/6/2001	Scleroplax granulata	Arthropoda	Malacostraca	Decapoda	Pinnotheridae	4
CP2433	11/6/2001	Scolanthus sp A	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	1
CP2433	11/6/2001	Scoletoma sp	Annelida	Polychaeta	Eunicida	Lumbrineridae	40
CP2433	11/6/2001	Scoletoma sp A	Annelida	Polychaeta	Eunicida	Lumbrineridae	12
CP2433	11/6/2001	Scoletoma sp B	Annelida	Polychaeta	Eunicida	Lumbrineridae	1
CP2433	11/6/2001	Scoletoma sp C	Annelida	Polychaeta	Eunicida	Lumbrineridae	29
CP2433	11/6/2001	Spiophanes duplex	Annelida	Polychaeta	Spionida	Spionidae	40
CP2433	11/6/2001	Syllis (Typosyllis) nipponica	Annelida	Polychaeta	Phyllodocida	Syllidae	2
CP2433	11/6/2001	Tagelus subteres	Mollusca	Bivalvia	Veneroida	Solecurtidae	2
CP2433	11/6/2001	Terebellidae	Annelida	Polychaeta	Terebellida	Terebellidae	2
CP2433	11/6/2001	Theora lubrica	Mollusca	Bivalvia	Veneroida	Semelidae	10
CP2433	11/6/2001	Thracia trapezoides	Mollusca	Bivalvia	Pholadomyoida	Thraciidae	3
CP2433	11/6/2001	Tubulanus cingulatus	Nemertea	Anopla	Palaeonemertea	Tubulanidae	1
CP2433	11/6/2001	Tubulanus polymorphus	Nemertea	Anopla	Palaeonemertea	Tubulanidae	1
CP2433	11/6/2001	Virgularia sp	Cnidaria	Anthozoa	Pennatulacea	Virgulariidae	5
CP2433	11/6/2001	Virgulariidae	Cnidaria	Anthozoa	Pennatulacea	Virgulariidae	5
C10	11/6/2001	Alpheus sp	Arthropoda	Malacostraca	Decapoda	Alpheidae	1
C10	11/6/2001	Ambidexter panamensis	Arthropoda	Malacostraca	Decapoda	Processidae	1

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StationID	Date	Name	Phylum	Class	Order	Family	Abundance
C10	11/6/2001	Americhelidium rectipalmum	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	1
C10	11/6/2001	Ampelisca lobata	Arthropoda	Malacostraca	Amphipoda	Ampeliscidae	1
C10	11/6/2001	Amphiporus cruentatus	Nemertea	Enopla	Hoplonemertea	Amphiporidae	1
C10	11/6/2001	Aphelochaeta phillipsi	Annelida	Polychaeta	Spionida	Cirratulidae	1
C10	11/6/2001	Cossura candida	Annelida	Polychaeta	Cossurida	Cossuridae	9
C10	11/6/2001	Crepidula onyx	Mollusca	Gastropoda	Neotaenioglossa	Calyptraeidae	1
C10	11/6/2001	Crucibulum spinosum	Mollusca	Gastropoda	Neotaenioglossa	Calyptraeidae	2
C10	11/6/2001	Diplocirrus sp SD1	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	5
C10	11/6/2001	Dorvillea (Schistomeringos) longicornis	Annelida	Polychaeta	Eunicida	Dorvilleidae	2
C10	11/6/2001	Eteone aestuarina	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	1
C10	11/6/2001	Euphilomedes carcharodonta	Arthropoda	Ostracoda	Myodocopida	Philomedidae	1
C10	11/6/2001	Exogone lourei	Annelida	Polychaeta	Phyllodocida	Syllidae	34
C10	11/6/2001	Halosydna latior	Annelida	Polychaeta	Phyllodocida	Polynoidae	1
C10	11/6/2001	Harmothoe imbricata Cmplx	Annelida	Polychaeta	Phyllodocida	Polynoidae	1
C10	11/6/2001	Heterophoxus oculatus	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	3
C10	11/6/2001	Leitoscoloplos pugettensis	Annelida	Polychaeta	Orbiniida	Orbiniidae	45
C10	11/6/2001	Lepidonotus spiculus	Annelida	Polychaeta	Phyllodocida	Polynoidae	2
C10	11/6/2001	Liljeborgia geminata	Arthropoda	Malacostraca	Amphipoda	Liljeborgiidae	2
C10	11/6/2001	Lineidae	Nemertea	Anopla	Heteronemertea	Lineidae	1
C10	11/6/2001	Lumbrineris erecta	Annelida	Polychaeta	Eunicida	Lumbrineridae	9
C10	11/6/2001	Lumbrineris limicola	Annelida	Polychaeta	Eunicida	Lumbrineridae	5
C10	11/6/2001	Mediomastus sp	Annelida	Polychaeta	Capitellida	Capitellidae	76
C10	11/6/2001	Musculista senhousia	Mollusca	Bivalvia	Mytiloida	Mytilidae	112
C10	11/6/2001	Odontosyllis phosphorea	Annelida	Polychaeta	Phyllodocida	Syllidae	1
C10	11/6/2001	Oligochaeta	Annelida	Oligochaeta			3
C10	11/6/2001	Paranemertes californica	Nemertea	Enopla	Hoplonemertea	Emplectonematidae	4
C10	11/6/2001	Pista agassizi	Annelida	Polychaeta	Terebellida	Terebellidae	23
C10	11/6/2001	Prionospio (Prionospio) heterobranchia	Annelida	Polychaeta	Spionida	Spionidae	17
C10	11/6/2001	Pyromaia tuberculata	Arthropoda	Malacostraca	Decapoda	Majidae	5
C10	11/6/2001	Rudilemboides stenopropodus	Arthropoda	Malacostraca	Amphipoda	Aoridae	1
C10	11/6/2001	Scolanthus sp A	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	5
C10	11/6/2001	Scoletoma sp	Annelida	Polychaeta	Eunicida	Lumbrineridae	20
C10	11/6/2001	Scoletoma sp A	Annelida	Polychaeta	Eunicida	Lumbrineridae	1
C10	11/6/2001	Scoletoma sp C	Annelida	Polychaeta	Eunicida	Lumbrineridae	66
C10	11/6/2001	Syllis (Syllis) gracilis	Annelida	Polychaeta	Phyllodocida	Syllidae	1
C10	11/6/2001	Theora lubrica	Mollusca	Bivalvia	Veneroida	Semelidae	1
C10	11/6/2001	Trypanosyllis sp	Annelida	Polychaeta	Phyllodocida	Syllidae	1
C14	11/6/2001	Acteocina inculta	Mollusca	Gastropoda	Cephalaspidea	Scaphandridae	8
C14	11/6/2001	Bulla gouldiana	Mollusca	Gastropoda	Cephalaspidea	Bullidae	4
C14	11/6/2001	Capitella capitata Cmplx	Annelida	Polychaeta	Capitellida	Capitellidae	236
C14	11/6/2001	Cirriformia sp	Annelida	Polychaeta	Spionida	Cirratulidae	1
C14	11/6/2001	Dorvillea (Schistomeringos) longicornis	Annelida	Polychaeta	Eunicida	Dorvilleidae	29
C14	11/6/2001	Eumida longicornuta	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	1
C14	11/6/2001	Euphilomedes carcharodonta	Arthropoda	Ostracoda	Myodocopida	Philomedidae	1
C14	11/6/2001	Grandidierella japonica	Arthropoda	Malacostraca	Amphipoda	Aoridae	17
C14	11/6/2001	Imogine exiguus	Platyhelminthes	Turbellaria	Polycladida	Stylochidae	1
C14	11/6/2001	Lumbrineris erecta	Annelida	Polychaeta	Eunicida	Lumbrineridae	1
C14	11/6/2001	Mediomastus sp	Annelida	Polychaeta	Capitellida	Capitellidae	3
C14	11/6/2001	Musculista senhousia	Mollusca	Bivalvia	Mytiloida	Mytilidae	3
C14	11/6/2001	Neanthes acuminata Cmplx	Annelida	Polychaeta	Phyllodocida	Nereididae	188

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StationID	Date	Name	Phylum	Class	Order	Family	Abundance
C14	11/6/2001	Notoplana sp	Platyhelminthes	Turbellaria	Polycladida	Leptoplanidae	4
C14	11/6/2001	Oligochaeta	Annelida	Oligochaeta			158
C14	11/6/2001	Polydora limicola	Annelida	Polychaeta	Spionida	Spionidae	7
C14	11/6/2001	Prionospio (Prionospio) heterobranchia	Annelida	Polychaeta	Spionida	Spionidae	2
C14	11/6/2001	Pseudopolydora paucibranchiata	Annelida	Polychaeta	Spionida	Spionidae	2
C14	11/6/2001	Rudilemboides stenopropodus	Arthropoda	Malacostraca	Amphipoda	Aoridae	1
C14	11/6/2001	Scoletoma sp C	Annelida	Polychaeta	Eunicida	Lumbrineridae	2
C14	11/6/2001	Streblospio benedicti	Annelida	Polychaeta	Spionida	Spionidae	1
C14	11/6/2001	Synaptotanais notabilis	Arthropoda	Malacostraca	Tanaidacea	Tanaidae	2
P11	11/6/2001	Amphideutopus oculatus	Arthropoda	Malacostraca	Amphipoda	Isaeidae	5
P11	11/6/2001	Armandia brevis	Annelida	Polychaeta	Opheliida	Opheliidae	1
P11	11/6/2001	Bulla gouldiana	Mollusca	Gastropoda	Cephalaspidea	Bullidae	1
P11	11/6/2001	Diopatra splendidissima	Annelida	Polychaeta	Eunicida	Onuphidae	1
P11	11/6/2001	Diplocirrus sp SD1	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	11
P11	11/6/2001	Eteone aestuarina	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	1
P11	11/6/2001	Euphilomedes carcharodonta	Arthropoda	Ostracoda	Myodocopida	Philomedidae	30
P11	11/6/2001	Hartmanodes hartmanae	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	1
P11	11/6/2001	Leitoscoloplos pugettensis	Annelida	Polychaeta	Orbiniida	Orbiniidae	83
P11	11/6/2001	Lumbrineris erecta	Annelida	Polychaeta	Eunicida	Lumbrineridae	1
P11	11/6/2001	Lumbrineris limicola	Annelida	Polychaeta	Eunicida	Lumbrineridae	4
P11	11/6/2001	Macoma inquinata	Mollusca	Bivalvia	Veneroida	Tellinidae	6
P11	11/6/2001	Mediomastus sp	Annelida	Polychaeta	Capitellida	Capitellidae	11
P11	11/6/2001	Musculista senhousia	Mollusca	Bivalvia	Mytiloida	Mytilidae	11
P11	11/6/2001	Neanthes acuminata Cmplx	Annelida	Polychaeta	Phyllodocida	Nereididae	1
P11	11/6/2001	Odontosyllis phosphorea	Annelida	Polychaeta	Phyllodocida	Syllidae	2
P11	11/6/2001	Paranemertes californica	Nemertea	Enopla	Hoplonemertea	Emplectonematidae	10
P11	11/6/2001	Pista agassizi	Annelida	Polychaeta	Terebellida	Terebellidae	32
P11	11/6/2001	Poecilochaetus johnsoni	Annelida	Polychaeta	Spionida	Poecilochaetidae	1
P11	11/6/2001	Prionospio (Prionospio) heterobranchia	Annelida	Polychaeta	Spionida	Spionidae	5
P11	11/6/2001	Pyromaia tuberculata	Arthropoda	Malacostraca	Decapoda	Majidae	1
P11	11/6/2001	Rudilemboides stenopropodus	Arthropoda	Malacostraca	Amphipoda	Aoridae	3
P11	11/6/2001	Scolanthus sp A	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	2
P11	11/6/2001	Scoletoma sp	Annelida	Polychaeta	Eunicida	Lumbrineridae	6
P11	11/6/2001	Scoletoma sp A	Annelida	Polychaeta	Eunicida	Lumbrineridae	2
P11	11/6/2001	Scoletoma sp C	Annelida	Polychaeta	Eunicida	Lumbrineridae	42
P11	11/6/2001	Tellina cadieni	Mollusca	Bivalvia	Veneroida	Tellinidae	1
P11	11/6/2001	Theora lubrica	Mollusca	Bivalvia	Veneroida	Semelidae	5
P17	11/6/2001	Alpheus sp	Arthropoda	Malacostraca	Decapoda	Alpheidae	1
P17	11/6/2001	Amphideutopus oculatus	Arthropoda	Malacostraca	Amphipoda	Isaeidae	1
P17	11/6/2001	Amphiporus californicus	Nemertea	Enopla	Hoplonemertea	Amphiporidae	1
P17	11/6/2001	Anthozoa	Cnidaria	Anthozoa			3
P17	11/6/2001	Armandia brevis	Annelida	Polychaeta	Opheliida	Opheliidae	1
P17	11/6/2001	Bemlos macromanus	Arthropoda	Malacostraca	Amphipoda	Aoridae	6
P17	11/6/2001	Caprella californica	Arthropoda	Malacostraca	Amphipoda	Caprellidae	39
P17	11/6/2001	Dorvillea (Schistomeringos) longicornis	Annelida	Polychaeta	Eunicida	Dorvilleidae	9
P17	11/6/2001	Edwardsia californica	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	28
P17	11/6/2001	Edwardsiidae	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	3
P17	11/6/2001	Ericthonius brasiliensis	Arthropoda	Malacostraca	Amphipoda	Ischyroceridae	1
P17	11/6/2001	Eteone aestuarina	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	3
P17	11/6/2001	Euphilomedes carcharodonta	Arthropoda	Ostracoda	Myodocopida	Philomedidae	1

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StationID	Date	Name	Phylum	Class	Order	Family	Abundance
P17	11/6/2001	Exogone lourei	Annelida	Polychaeta	Phyllodocida	Syllidae	4
P17	11/6/2001	Fabricinuda limnicola	Annelida	Polychaeta	Sabellida	Sabellidae	1
P17	11/6/2001	Glycera americana	Annelida	Polychaeta	Phyllodocida	Glyceridae	1
P17	11/6/2001	Harmothoe imbricata Cmplx	Annelida	Polychaeta	Phyllodocida	Polynoidae	1
P17	11/6/2001	Hartmanodes hartmanae	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	1
P17	11/6/2001	Heterophoxus oculatus	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	1
P17	11/6/2001	Hippolytidae	Arthropoda	Malacostraca	Decapoda	Hippolytidae	3
P17	11/6/2001	Leitoscoloplos pugettensis	Annelida	Polychaeta	Orbiniida	Orbiniidae	7
P17	11/6/2001	Lophopanopeus sp	Arthropoda	Malacostraca	Decapoda	Xanthidae	4
P17	11/6/2001	Lumbrineris erecta	Annelida	Polychaeta	Eunicida	Lumbrineridae	11
P17	11/6/2001	Lumbrineris limicola	Annelida	Polychaeta	Eunicida	Lumbrineridae	1
P17	11/6/2001	Macoma inquinata	Mollusca	Bivalvia	Veneroida	Tellinidae	6
P17	11/6/2001	Macoma nasuta	Mollusca	Bivalvia	Veneroida	Tellinidae	23
P17	11/6/2001	Mediomastus sp	Annelida	Polychaeta	Capitellida	Capitellidae	80
P17	11/6/2001	Musculista senhousia	Mollusca	Bivalvia	Mytiloida	Mytilidae	44
P17	11/6/2001	Nassarius tiarula	Mollusca	Gastropoda	Neogastropoda	Nassariidae	1
P17	11/6/2001	Neanthes acuminata Cmplx	Annelida	Polychaeta	Phyllodocida	Nereididae	42
P17	11/6/2001	Odontosyllis phosphorea	Annelida	Polychaeta	Phyllodocida	Syllidae	14
P17	11/6/2001	Paracerceis sculpta	Arthropoda	Malacostraca	Isopoda	Sphaeromatidae	82
P17	11/6/2001	Paranemertes californica	Nemertea	Enopla	Hoplonemertea	Emplectonematidae	1
P17	11/6/2001	Pherusa capulata	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	4
P17	11/6/2001	Phoronis sp	Phorona		Phoronida	Phoronidae	1
P17	11/6/2001	Pista agassizi	Annelida	Polychaeta	Terebellida	Terebellidae	11
P17	11/6/2001	Podocerus fulanus	Arthropoda	Malacostraca	Amphipoda	Podoceridae	231
P17	11/6/2001	Polycladida sp E	Platyhelminthes	Turbellaria	Polycladida	Uncertain	1
P17	11/6/2001	Prionospio (Prionospio) heterobranchia	Annelida	Polychaeta	Spionida	Spionidae	9
P17	11/6/2001	Pseudopolydora paucibranchiata	Annelida	Polychaeta	Spionida	Spionidae	2
P17	11/6/2001	Pyromaia tuberculata	Arthropoda	Malacostraca	Decapoda	Majidae	1
P17	11/6/2001	Scolanthus sp A	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	6
P17	11/6/2001	Scoletoma sp	Annelida	Polychaeta	Eunicida	Lumbrineridae	75
P17	11/6/2001	Scoletoma sp C	Annelida	Polychaeta	Eunicida	Lumbrineridae	87
P17	11/6/2001	Scyphoproctus oculatus	Annelida	Polychaeta	Capitellida	Capitellidae	29
P17	11/6/2001	Spiophanes duplex	Annelida	Polychaeta	Spionida	Spionidae	1
P17	11/6/2001	Syllis (Typosyllis) sp	Annelida	Polychaeta	Phyllodocida	Syllidae	3
P17	11/6/2001	Tagelus subteres	Mollusca	Bivalvia	Veneroida	Solecurtidae	1
P17	11/6/2001	Theora lubrica	Mollusca	Bivalvia	Veneroida	Semelidae	1
CP2243	2/11/2002	Acteocina inculta	Mollusca	Gastropoda	Cephalaspidea	Scaphandridae	2
CP2243	2/11/2002	Amphideutopus oculatus	Arthropoda	Malacostraca	Amphipoda	Isaeidae	35
CP2243	2/11/2002	Anthozoa	Cnidaria	Anthozoa			2
CP2243	2/11/2002	Armandia brevis	Annelida	Polychaeta	Opheliida	Opheliidae	6
CP2243	2/11/2002	Caprella equilibra	Arthropoda	Malacostraca	Amphipoda	Caprellidae	3
CP2243	2/11/2002	Caprella gracilior	Arthropoda	Malacostraca	Amphipoda	Caprellidae	2
CP2243	2/11/2002	Demonax sp	Annelida	Polychaeta	Sabellida	Sabellidae	1
CP2243	2/11/2002	Dorvillea (Schistomeringos) longicornis	Annelida	Polychaeta	Eunicida	Dorvilleidae	33
CP2243	2/11/2002	Drilonereis sp	Annelida	Polychaeta	Eunicida	Oenonidae	1
CP2243	2/11/2002	Edwardsia californica	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	42
CP2243	2/11/2002	Edwardsiidae	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	1
CP2243	2/11/2002	Euphilomedes carcharodonta	Arthropoda	Ostracoda	Myodocopida	Philomedidae	1
CP2243	2/11/2002	Exogone lourei	Annelida	Polychaeta	Phyllodocida	Syllidae	93
CP2243	2/11/2002	Fabricinuda limnicola	Annelida	Polychaeta	Sabellida	Sabellidae	9

Appendix I. continued

StationID	Date	Name	Phylum	Class	Order	Family	Abundance
CP2243	2/11/2002	Goniada littorea	Annelida	Polychaeta	Phyllodocida	Goniadidae	1
CP2243	2/11/2002	Grandidierella japonica	Arthropoda	Malacostraca	Amphipoda	Aoridae	4
CP2243	2/11/2002	Harmothoe imbricata Cmplx	Annelida	Polychaeta	Phyllodocida	Polynoidae	7
CP2243	2/11/2002	Hartmanodes hartmanae	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	1
CP2243	2/11/2002	Heteroserolis carinata	Arthropoda	Malacostraca	Isopoda	Serolidae	2
CP2243	2/11/2002	Kalliapsuedes crassus	Arthropoda	Malacostraca	Tanaidacea	Kalliapseudidae	1
CP2243	2/11/2002	Laevicardium substriatum	Mollusca	Bivalvia	Veneroida	Cardiidae	2
CP2243	2/11/2002	Leitoscoloplos pugettensis	Annelida	Polychaeta	Orbiniida	Orbiniidae	16
CP2243	2/11/2002	Leptochelia dubia	Arthropoda	Malacostraca	Tanaidacea	Leptocheliidae	12
CP2243	2/11/2002	Leptosynapta sp	Echinodermata	Holothuroidea	Apodida	Synaptidae	5
CP2243	2/11/2002	Lumbrineris erecta	Annelida	Polychaeta	Eunicida	Lumbrineridae	2
CP2243	2/11/2002	Lyonsia californica	Mollusca	Bivalvia	Pholadomyoida	Lyonsiidae	2
CP2243	2/11/2002	Macoma inquinata	Mollusca	Bivalvia	Veneroida	Tellinidae	22
CP2243	2/11/2002	Mayerella banksia	Arthropoda	Malacostraca	Amphipoda	Protellidae	1
CP2243	2/11/2002	Mediomastus sp	Annelida	Polychaeta	Capitellida	Capitellidae	134
CP2243	2/11/2002	Musculista senhousia	Mollusca	Bivalvia	Mytiloida	Mytilidae	54
CP2243	2/11/2002	Mysidopsis californica	Arthropoda	Malacostraca	Mysidacea	Mysidae	2
CP2243	2/11/2002	Nassarius tiarula	Mollusca	Gastropoda	Neogastropoda	Nassariidae	9
CP2243	2/11/2002	Neanthes acuminata Cmplx	Annelida	Polychaeta	Phyllodocida	Nereididae	25
CP2243	2/11/2002	Notomastus magnus	Annelida	Polychaeta	Capitellida	Capitellidae	1
CP2243	2/11/2002	Odontosyllis phosphorea	Annelida	Polychaeta	Phyllodocida	Syllidae	6
CP2243	2/11/2002	Oligochaeta	Annelida	Oligochaeta			4
CP2243	2/11/2002	Paracerceis sculpta	Arthropoda	Malacostraca	Isopoda	Sphaeromatidae	3
CP2243	2/11/2002	Paranemertes californica	Nemertea	Enopla	Hoplonemertea	Emplectonematidae	5
CP2243	2/11/2002	Paratanais sp	Arthropoda	Malacostraca	Tanaidacea	Paratanaidae	3
CP2243	2/11/2002	Phoronis sp	Phorona		Phoronida	Phoronidae	8
CP2243	2/11/2002	Pista agassizi	Annelida	Polychaeta	Terebellida	Terebellidae	68
CP2243	2/11/2002	Podocerus brasiliensis	Arthropoda	Malacostraca	Amphipoda	Podoceridae	3
CP2243	2/11/2002	Podocerus fulanus	Arthropoda	Malacostraca	Amphipoda	Podoceridae	7
CP2243	2/11/2002	Prionospio (Prionospio) heterobranchia	Annelida	Polychaeta	Spionida	Spionidae	35
CP2243	2/11/2002	Pseudopolydora paucibranchiata	Annelida	Polychaeta	Spionida	Spionidae	79
CP2243	2/11/2002	Pyromaia tuberculata	Arthropoda	Malacostraca	Decapoda	Majidae	2
CP2243	2/11/2002	Rudilemboides stenopropodus	Arthropoda	Malacostraca	Amphipoda	Aoridae	64
CP2243	2/11/2002	Schmittius politus	Arthropoda	Malacostraca	Stomatopoda	Squillidae	1
CP2243	2/11/2002	Scolanthus sp A	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	5
CP2243	2/11/2002	Scoletoma sp	Annelida	Polychaeta	Eunicida	Lumbrineridae	29
CP2243	2/11/2002	Scoletoma sp A	Annelida	Polychaeta	Eunicida	Lumbrineridae	1
CP2243	2/11/2002	Scoletoma sp C	Annelida	Polychaeta	Eunicida	Lumbrineridae	166
CP2243	2/11/2002	Scyphoproctus oculatus	Annelida	Polychaeta	Capitellida	Capitellidae	25
CP2243	2/11/2002	Syllis (Syllis) gracilis	Annelida	Polychaeta	Phyllodocida	Syllidae	1
CP2243	2/11/2002	Tagelus subteres	Mollusca	Bivalvia	Veneroida	Solecurtidae	1
CP2243	2/11/2002	Terebellides californica	Annelida	Polychaeta	Terebellida	Trichobranchidae	1
CP2243	2/11/2002	Theora lubrica	Mollusca	Bivalvia	Veneroida	Semelidae	1
CP2243	2/11/2002	Tubulanus frenatus	Nemertea	Anopla	Palaeonemertea	Tubulanidae	1
CP2433	2/11/2002	Acanthoptilum sp	Cnidaria	Anthozoa	Pennatulacea	Virgulariidae	25
CP2433	2/11/2002	Acteocina harpa	Mollusca	Gastropoda	Cephalaspidea	Scaphandridae	8
CP2433	2/11/2002	Amaeana occidentalis	Annelida	Polychaeta	Terebellida	Terebellidae	1
CP2433	2/11/2002	Ampelisca brevisimulata	Arthropoda	Malacostraca	Amphipoda	Ampeliscidae	1
CP2433	2/11/2002	Ampelisca sp	Arthropoda	Malacostraca	Amphipoda	Ampeliscidae	1
CP2433	2/11/2002	Amphideutopus oculatus	Arthropoda	Malacostraca	Amphipoda	Isaeidae	2

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StationID	Date	Name	Phylum	Class	Order	Family	Abundance
CP2433	2/11/2002	Amphiuridae	Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	2
CP2433	2/11/2002	Apoprionospio pygmaea	Annelida	Polychaeta	Spionida	Spionidae	2
CP2433	2/11/2002	Asteropella slatteryi	Arthropoda	Ostracoda	Myodocopida	Cylindroleberididae	1
CP2433	2/11/2002	Betaeus longidactylus	Arthropoda	Malacostraca	Decapoda	Alpheidae	1
CP2433	2/11/2002	Carinoma mutabilis	Nemertea	Anopla	Palaeonemertea	Carinomidae	1
CP2433	2/11/2002	Chaetozone corona	Annelida	Polychaeta	Spionida	Cirratulidae	13
CP2433	2/11/2002	Cossura candida	Annelida	Polychaeta	Cossurida	Cossuridae	4
CP2433	2/11/2002	Crangon alaskensis	Arthropoda	Malacostraca	Decapoda	Crangonidae	1
CP2433	2/11/2002	Cryptomya californica	Mollusca	Bivalvia	Myoida	Myidae	2
CP2433	2/11/2002	Diplocirrus sp SD1	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	193
CP2433	2/11/2002	Eteone sp	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	1
CP2433	2/11/2002	Euchone limnicola	Annelida	Polychaeta	Sabellida	Sabellidae	2
CP2433	2/11/2002	Euclymeninae	Annelida	Polychaeta	Capitellida	Maldanidae	2
CP2433	2/11/2002	Euclymeninae sp A	Annelida	Polychaeta	Capitellida	Maldanidae	4
CP2433	2/11/2002	Goniada littorea	Annelida	Polychaeta	Phyllodocida	Goniadidae	1
CP2433	2/11/2002	Heterophoxus oculatus	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	1
CP2433	2/11/2002	Laevicardium substriatum	Mollusca	Bivalvia	Veneroida	Cardiidae	1
CP2433	2/11/2002	Leitoscoloplos pugettensis	Annelida	Polychaeta	Orbiniida	Orbiniidae	53
CP2433	2/11/2002	Leptosynapta sp	Echinodermata	Holothuroidea	Apodida	Synaptidae	2
CP2433	2/11/2002	Lineidae	Nemertea	Anopla	Heteronemertea	Lineidae	5
CP2433	2/11/2002	Listriella goleta	Arthropoda	Malacostraca	Amphipoda	Liljeborgiidae	2
CP2433	2/11/2002	Mediomastus sp	Annelida	Polychaeta	Capitellida	Capitellidae	368
CP2433	2/11/2002	Metasychis disparidentatus	Annelida	Polychaeta	Capitellida	Maldanidae	1
CP2433	2/11/2002	Monticellina cryptica	Annelida	Polychaeta	Spionida	Cirratulidae	5
CP2433	2/11/2002	Monticellina siblina	Annelida	Polychaeta	Spionida	Cirratulidae	1
CP2433	2/11/2002	Neastacilla californica	Arthropoda	Malacostraca	Isopoda	Arcturidae	17
CP2433	2/11/2002	Neotrypaea californiensis	Arthropoda	Malacostraca	Decapoda	Callianassidae	11
CP2433	2/11/2002	Nephtys caecoides	Annelida	Polychaeta	Phyllodocida	Nephtyidae	2
CP2433	2/11/2002	Nephtys cornuta	Annelida	Polychaeta	Phyllodocida	Nephtyidae	5
CP2433	2/11/2002	Notomastus magnus	Annelida	Polychaeta	Capitellida	Capitellidae	1
CP2433	2/11/2002	Palaeonemertea	Nemertea	Anopla	Palaeonemertea		1
CP2433	2/11/2002	Paraprionospio pinnata	Annelida	Polychaeta	Spionida	Spionidae	2
CP2433	2/11/2002	Phyllodoce longipes	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	1
CP2433	2/11/2002	Pista agassizi	Annelida	Polychaeta	Terebellida	Terebellidae	5
CP2433	2/11/2002	Praxillella pacifica	Annelida	Polychaeta	Capitellida	Maldanidae	1
CP2433	2/11/2002	Prionospio (Minuspio) lighti	Annelida	Polychaeta	Spionida	Spionidae	19
CP2433	2/11/2002	Prionospio (Prionospio) heterobranchia	Annelida	Polychaeta	Spionida	Spionidae	2
CP2433	2/11/2002	Pyromaia tuberculata	Arthropoda	Malacostraca	Decapoda	Majidae	1
CP2433	2/11/2002	Scleroplax granulata	Arthropoda	Malacostraca	Decapoda	Pinnotheridae	29
CP2433	2/11/2002	Scoletoma sp	Annelida	Polychaeta	Eunicida	Lumbrineridae	35
CP2433	2/11/2002	Scoletoma sp A	Annelida	Polychaeta	Eunicida	Lumbrineridae	37
CP2433	2/11/2002	Scoletoma sp B	Annelida	Polychaeta	Eunicida	Lumbrineridae	4
CP2433	2/11/2002	Scoletoma sp C	Annelida	Polychaeta	Eunicida	Lumbrineridae	47
CP2433	2/11/2002	Spiophanes duplex	Annelida	Polychaeta	Spionida	Spionidae	11
CP2433	2/11/2002	Syllis (Typosyllis) nipponica	Annelida	Polychaeta	Phyllodocida	Syllidae	2
CP2433	2/11/2002	Tagelus subteres	Mollusca	Bivalvia	Veneroida	Solecurtidae	2
CP2433	2/11/2002	Theora lubrica	Mollusca	Bivalvia	Veneroida	Semelidae	16
CP2433	2/11/2002	Tubulanus polymorphus	Nemertea	Anopla	Palaeonemertea	Tubulanidae	1
C10	2/11/2002	Bivalvia	Mollusca	Bivalvia			1
C10	2/11/2002	Cossura candida	Annelida	Polychaeta	Cossurida	Cossuridae	5

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StationID	Date	Name	Phylum	Class	Order	Family	Abundance
C10	2/11/2002	Diplocirrus sp SD1	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	4
C10	2/11/2002	Dorvillea (Schistomeringos) longicornis	Annelida	Polychaeta	Eunicida	Dorvilleidae	1
C10	2/11/2002	Euchone limnicola	Annelida	Polychaeta	Sabellida	Sabellidae	4
C10	2/11/2002	Euphilomedes carcharodonta	Arthropoda	Ostracoda	Myodocopida	Philomedidae	3
C10	2/11/2002	Exogone lourei	Annelida	Polychaeta	Phyllodocida	Syllidae	4
C10	2/11/2002	Grandidierella japonica	Arthropoda	Malacostraca	Amphipoda	Aoridae	1
C10	2/11/2002	Harmothoe imbricata Cmplx	Annelida	Polychaeta	Phyllodocida	Polynoidae	1
C10	2/11/2002	Insecta	Arthropoda	Insecta			1
C10	2/11/2002	Leitoscoloplos pugettensis	Annelida	Polychaeta	Orbiniida	Orbiniidae	20
C10	2/11/2002	Lineidae	Nemertea	Anopla	Heteronemertea	Lineidae	2
C10	2/11/2002	Lumbrineris erecta	Annelida	Polychaeta	Eunicida	Lumbrineridae	2
C10	2/11/2002	Mediomastus sp	Annelida	Polychaeta	Capitellida	Capitellidae	14
C10	2/11/2002	Musculista senhousia	Mollusca	Bivalvia	Mytiloida	Mytilidae	2
C10	2/11/2002	Neanthes acuminata Cmplx	Annelida	Polychaeta	Phyllodocida	Nereididae	1
C10	2/11/2002	Prionospio (Prionospio) heterobranchia	Annelida	Polychaeta	Spionida	Spionidae	11
C10	2/11/2002	Pseudopolydora paucibranchiata	Annelida	Polychaeta	Spionida	Spionidae	74
C10	2/11/2002	Pyromaia tuberculata	Arthropoda	Malacostraca	Decapoda	Majidae	1
C10	2/11/2002	Scolanthus sp A	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	12
C10	2/11/2002	Scoletoma sp	Annelida	Polychaeta	Eunicida	Lumbrineridae	12
C10	2/11/2002	Scoletoma sp C	Annelida	Polychaeta	Eunicida	Lumbrineridae	18
C10	2/11/2002	Sthenelanella uniformis	Annelida	Polychaeta	Phyllodocida	Sigalionidae	1
C10	2/11/2002	Theora lubrica	Mollusca	Bivalvia	Veneroida	Semelidae	2
C14	2/11/2002	Alienacanthomysis macropsis	Arthropoda	Malacostraca	Mysidacea	Mysidae	1
C14	2/11/2002	Capitella capitata Cmplx	Annelida	Polychaeta	Capitellida	Capitellidae	1405
C14	2/11/2002	Cirriformia sp SD1	Annelida	Polychaeta	Spionida	Cirratulidae	1
C14	2/11/2002	Dorvillea (Schistomeringos) longicornis	Annelida	Polychaeta	Eunicida	Dorvilleidae	299
C14	2/11/2002	Exogone lourei	Annelida	Polychaeta	Phyllodocida	Syllidae	1
C14	2/11/2002	Grandidierella japonica	Arthropoda	Malacostraca	Amphipoda	Aoridae	3
C14	2/11/2002	Lineidae	Nemertea	Anopla	Heteronemertea	Lineidae	3
C14	2/11/2002	Neanthes acuminata Cmplx	Annelida	Polychaeta	Phyllodocida	Nereididae	42
C14	2/11/2002	Nebalia pugettensis Cmplx	Arthropoda	Malacostraca	Leptostraca	Nebaliidae	8
C14	2/11/2002	Oligochaeta	Annelida	Oligochaeta			25
C14	2/11/2002	Prionospio (Minuspio) lighti	Annelida	Polychaeta	Spionida	Spionidae	1
P11	2/11/2002	Amphideutopus oculatus	Arthropoda	Malacostraca	Amphipoda	Isaeidae	1
P11	2/11/2002	Carinoma mutabilis	Nemertea	Anopla	Palaeonemertea	Carinomidae	1
P11	2/11/2002	Cirratulus sp	Annelida	Polychaeta	Spionida	Cirratulidae	1
P11	2/11/2002	Crepipatella dorsata	Mollusca	Gastropoda	Neotaenioglossa	Calyptraeidae	1
P11	2/11/2002	Diplocirrus sp SD1	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	3
P11	2/11/2002	Dorvillea (Schistomeringos) longicornis	Annelida	Polychaeta	Eunicida	Dorvilleidae	6
P11	2/11/2002	Drilonereis sp	Annelida	Polychaeta	Eunicida	Oenonidae	1
P11	2/11/2002	Euphilomedes carcharodonta	Arthropoda	Ostracoda	Myodocopida	Philomedidae	1
P11	2/11/2002	Eupolymnia heterobranchia	Annelida	Polychaeta	Terebellida	Terebellidae	1
P11	2/11/2002	Leitoscoloplos pugettensis	Annelida	Polychaeta	Orbiniida	Orbiniidae	17
P11	2/11/2002	Lumbrineris erecta	Annelida	Polychaeta	Eunicida	Lumbrineridae	1
P11	2/11/2002	Macoma sp	Mollusca	Bivalvia	Veneroida	Tellinidae	1
P11	2/11/2002	Mediomastus sp	Annelida	Polychaeta	Capitellida	Capitellidae	10
P11	2/11/2002	Musculista senhousia	Mollusca	Bivalvia	Mytiloida	Mytilidae	10
P11	2/11/2002	Mysidacea	Arthropoda	Malacostraca	Mysidacea		1
P11	2/11/2002	Pherusa capulata	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	1
P11	2/11/2002	Pista sp	Annelida	Polychaeta	Terebellida	Terebellidae	1

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StationID	Date	Name	Phylum	Class	Order	Family	Abundance
P11	2/11/2002	Prionospio (Prionospio) heterobranchia	Annelida	Polychaeta	Spionida	Spionidae	9
P11	2/11/2002	Protothaca staminea	Mollusca	Bivalvia	Veneroida	Veneridae	2
P11	2/11/2002	Scolanthus sp A	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	1
P11	2/11/2002	Scoletoma sp	Annelida	Polychaeta	Eunicida	Lumbrineridae	10
P11	2/11/2002	Scoletoma sp C	Annelida	Polychaeta	Eunicida	Lumbrineridae	20
P11	2/11/2002	Tagelus subteres	Mollusca	Bivalvia	Veneroida	Solecurtidae	1
P11	2/11/2002	Theora lubrica	Mollusca	Bivalvia	Veneroida	Semelidae	4
P17	2/11/2002	Acteocina inculta	Mollusca	Gastropoda	Cephalaspidea	Scaphandridae	20
P17	2/11/2002	Ambidexter panamensis	Arthropoda	Malacostraca	Decapoda	Processidae	2
P17	2/11/2002	Americhelidium shoemakeri	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	1
P17	2/11/2002	Amphideutopus oculatus	Arthropoda	Malacostraca	Amphipoda	Isaeidae	2
P17	2/11/2002	Bulla gouldiana	Mollusca	Gastropoda	Cephalaspidea	Bullidae	4
P17	2/11/2002	Capitella capitata Cmplx	Annelida	Polychaeta	Capitellida	Capitellidae	2
P17	2/11/2002	Caulleriella pacifica	Annelida	Polychaeta	Spionida	Cirratulidae	3
P17	2/11/2002	Cirratulidae	Annelida	Polychaeta	Spionida	Cirratulidae	1
P17	2/11/2002	Cirriformia sp SD1	Annelida	Polychaeta	Spionida	Cirratulidae	1
P17	2/11/2002	Cossura candida	Annelida	Polychaeta	Cossurida	Cossuridae	8
P17	2/11/2002	Dorvillea (Schistomeringos) longicornis	Annelida	Polychaeta	Eunicida	Dorvilleidae	2
P17	2/11/2002	Euphilomedes carcharodonta	Arthropoda	Ostracoda	Myodocopida	Philomedidae	74
P17	2/11/2002	Exogone lourei	Annelida	Polychaeta	Phyllodocida	Syllidae	4
P17	2/11/2002	Harmothoe imbricata Cmplx	Annelida	Polychaeta	Phyllodocida	Polynoidae	1
P17	2/11/2002	Heteroserolis carinata	Arthropoda	Malacostraca	Isopoda	Serolidae	4
P17	2/11/2002	Laevicardium substriatum	Mollusca	Bivalvia	Veneroida	Cardiidae	4
P17	2/11/2002	Leitoscoloplos pugettensis	Annelida	Polychaeta	Orbiniida	Orbiniidae	15
P17	2/11/2002	Lineidae	Nemertea	Anopla	Heteronemertea	Lineidae	1
P17	2/11/2002	Lumbrineris erecta	Annelida	Polychaeta	Eunicida	Lumbrineridae	8
P17	2/11/2002	Macoma inquinata	Mollusca	Bivalvia	Veneroida	Tellinidae	2
P17	2/11/2002	Mediomastus sp	Annelida	Polychaeta	Capitellida	Capitellidae	4
P17	2/11/2002	Musculista senhousia	Mollusca	Bivalvia	Mytiloida	Mytilidae	38
P17	2/11/2002	Neanthes acuminata Cmplx	Annelida	Polychaeta	Phyllodocida	Nereididae	1
P17	2/11/2002	Oligochaeta	Annelida	Oligochaeta			4
P17	2/11/2002	Oxyurostylis pacifica	Arthropoda	Malacostraca	Cumacea	Diastylidae	1
P17	2/11/2002	Paranemertes californica	Nemertea	Enopla	Hoplonemertea	Emplectonematidae	1
P17	2/11/2002	Prionospio (Prionospio) heterobranchia	Annelida	Polychaeta	Spionida	Spionidae	48
P17	2/11/2002	Pseudopolydora paucibranchiata	Annelida	Polychaeta	Spionida	Spionidae	7
P17	2/11/2002	Scolanthus sp A	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	1
P17	2/11/2002	Scoletoma sp	Annelida	Polychaeta	Eunicida	Lumbrineridae	19
P17	2/11/2002	Scoletoma sp C	Annelida	Polychaeta	Eunicida	Lumbrineridae	66
P17	2/11/2002	Tellina carpenteri	Mollusca	Bivalvia	Veneroida	Tellinidae	1
P17	2/11/2002	Tellina modesta	Mollusca	Bivalvia	Veneroida	Tellinidae	1
P17	2/11/2002	Theora lubrica	Mollusca	Bivalvia	Veneroida	Semelidae	31
CP2243	6/12/2002	Acteocina inculta	Mollusca	Gastropoda	Cephalaspidea	Scaphandridae	13
CP2243	6/12/2002	Agnezia septentrionalis	Chordata	Ascidiacea	Phlebobranchiata	Agneziidae	1
CP2243	6/12/2002	Amphideutopus oculatus	Arthropoda	Malacostraca	Amphipoda	Isaeidae	5
CP2243	6/12/2002	Amphipholis squamata	Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	1
CP2243	6/12/2002	Anoplodactylus erectus	Arthropoda	Pycnogonida	Pegmata	Phoxichilidiidae	3
CP2243	6/12/2002	Armandia brevis	Annelida	Polychaeta	Opheliida	Opheliidae	5
CP2243	6/12/2002	Ceriantharia	Cnidaria	Anthozoa	Ceriantharia		1
CP2243	6/12/2002	Cirratulidae	Annelida	Polychaeta	Spionida	Cirratulidae	1
CP2243	6/12/2002	Demonax sp	Annelida	Polychaeta	Sabellida	Sabellidae	1

Appendix I. continued

StationID	Date	Name	Phylum	Class	Order	Family	Abundance
CP2243	6/12/2002	Diplocirrus sp SD1	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	2
CP2243	6/12/2002	Dorvillea (Schistomeringos) longicornis	Annelida	Polychaeta	Eunicida	Dorvilleidae	9
CP2243	6/12/2002	Edwardsiidae	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	3
CP2243	6/12/2002	Eteone sp	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	1
CP2243	6/12/2002	Eteone sp	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	1
CP2243	6/12/2002	Euclymeninae sp A	Annelida	Polychaeta	Capitellida	Maldanidae	1
CP2243	6/12/2002	Euphilomedes carcharodonta	Arthropoda	Ostracoda	Myodocopida	Philomedidae	1
CP2243	6/12/2002	Exogone lourei	Annelida	Polychaeta	Phyllodocida	Syllidae	49
CP2243	6/12/2002	Fabricinuda limnicola	Annelida	Polychaeta	Sabellida	Sabellidae	21
CP2243	6/12/2002	Glycera americana	Annelida	Polychaeta	Phyllodocida	Glyceridae	2
CP2243	6/12/2002	Goniada littorea	Annelida	Polychaeta	Phyllodocida	Goniadidae	1
CP2243	6/12/2002	Heteroserolis carinata	Arthropoda	Malacostraca	Isopoda	Serolidae	3
CP2243	6/12/2002	Leitoscoloplos pugettensis	Annelida	Polychaeta	Orbiniida	Orbiniidae	83
CP2243	6/12/2002	Lumbrineris erecta	Annelida	Polychaeta	Eunicida	Lumbrineridae	1
CP2243	6/12/2002	Lyonsia californica	Mollusca	Bivalvia	Pholadomyoida	Lyonsiidae	24
CP2243	6/12/2002	Macoma inquinata	Mollusca	Bivalvia	Veneroida	Tellinidae	15
CP2243	6/12/2002	Mayerella banksia	Arthropoda	Malacostraca	Amphipoda	Protellidae	4
CP2243	6/12/2002	Mediomastus sp	Annelida	Polychaeta	Capitellida	Capitellidae	123
CP2243	6/12/2002	Musculista senhousia	Mollusca	Bivalvia	Mytiloida	Mytilidae	19
CP2243	6/12/2002	Nassarius tiarula	Mollusca	Gastropoda	Neogastropoda	Nassariidae	1
CP2243	6/12/2002	Neanthes acuminata Cmplx	Annelida	Polychaeta	Phyllodocida	Nereididae	2
CP2243	6/12/2002	Nephtys sp	Annelida	Polychaeta	Phyllodocida	Nephtyidae	1
CP2243	6/12/2002	Notomastus magnus	Annelida	Polychaeta	Capitellida	Capitellidae	2
CP2243	6/12/2002	Odontosyllis phosphorea	Annelida	Polychaeta	Phyllodocida	Syllidae	4
CP2243	6/12/2002	Oligochaeta	Annelida	Oligochaeta			3
CP2243	6/12/2002	Oxyurostylis pacifica	Arthropoda	Malacostraca	Cumacea	Diastylidae	2
CP2243	6/12/2002	Paranemertes californica	Nemertea	Enopla	Hoplonemertea	Emplectonematidae	1
CP2243	6/12/2002	Phoronis sp	Phorona		Phoronida	Phoronidae	7
CP2243	6/12/2002	Pista sp	Annelida	Polychaeta	Terebellida	Terebellidae	28
CP2243	6/12/2002	Postasterope barnesi	Arthropoda	Ostracoda	Myodocopida	Cylindroleberididae	1
CP2243	6/12/2002	Prionospio (Prionospio) heterobranchia	Annelida	Polychaeta	Spionida	Spionidae	23
CP2243	6/12/2002	Protothaca staminea	Mollusca	Bivalvia	Veneroida	Veneridae	1
CP2243	6/12/2002	Pseudopolydora paucibranchiata	Annelida	Polychaeta	Spionida	Spionidae	23
CP2243	6/12/2002	Rudilemboides stenopropodus	Arthropoda	Malacostraca	Amphipoda	Aoridae	2
CP2243	6/12/2002	Scolanthus sp A	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	11
CP2243	6/12/2002	Scoletoma sp	Annelida	Polychaeta	Eunicida	Lumbrineridae	7
CP2243	6/12/2002	Scoletoma sp C	Annelida	Polychaeta	Eunicida	Lumbrineridae	202
CP2243	6/12/2002	Scyphoproctus oculatus	Annelida	Polychaeta	Capitellida	Capitellidae	27
CP2243	6/12/2002	Solen rostriformis	Mollusca	Bivalvia	Veneroida	Solenidae	24
CP2243	6/12/2002	Spiophanes duplex	Annelida	Polychaeta	Spionida	Spionidae	4
CP2243	6/12/2002	Tagelus subteres	Mollusca	Bivalvia	Veneroida	Solecurtidae	1
CP2243	6/12/2002	Theora lubrica	Mollusca	Bivalvia	Veneroida	Semelidae	1
CP2243	6/12/2002	Thracia trapezoides	Mollusca	Bivalvia	Pholadomyoida	Thraciidae	2
CP2243	6/12/2002	Tubulanus cingulatus	Nemertea	Anopla	Palaeonemertea	Tubulanidae	1
CP2433	6/12/2002	Acanthoptilum sp	Cnidaria	Anthozoa	Pennatulacea	Virgulariidae	11
CP2433	6/12/2002	Acteocina harpa	Mollusca	Gastropoda	Cephalaspidea	Scaphandridae	1
CP2433	6/12/2002	Agnezia septentrionalis	Chordata	Ascidiacea	Phlebobranchiata	Agneziidae	1
CP2433	6/12/2002	Amphicteis scaphobranchiata	Annelida	Polychaeta	Terebellida	Ampharetidae	1
CP2433	6/12/2002	Amphideutopus oculatus	Arthropoda	Malacostraca	Amphipoda	Isaeidae	6
CP2433	6/12/2002	Asteropella slatteryi	Arthropoda	Ostracoda	Myodocopida	Cylindroleberididae	1

Appendix I. continued

StationID	Date	Name	Phylum	Class	Order	Family	Abundance
CP2433	6/12/2002	Betaeus sp	Arthropoda	Malacostraca	Decapoda	Alpheidae	1
CP2433	6/12/2002	Chaetozone corona	Annelida	Polychaeta	Spionida	Cirratulidae	16
CP2433	6/12/2002	Chione californiensis	Mollusca	Bivalvia	Veneroida	Veneridae	1
CP2433	6/12/2002	Corymorpha palma	Cnidaria	Hydrozoa	Athecatae	Corymorphidae	1
CP2433	6/12/2002	Diplocirrus sp SD1	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	201
CP2433	6/12/2002	Edwardsiidae	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	3
CP2433	6/12/2002	Euchone limnicola	Annelida	Polychaeta	Sabellida	Sabellidae	3
CP2433	6/12/2002	Euclymeninae sp A	Annelida	Polychaeta	Capitellida	Maldanidae	20
CP2433	6/12/2002	Euphilomedes carcharodonta	Arthropoda	Ostracoda	Myodocopida	Philomedidae	1
CP2433	6/12/2002	Exogone lourei	Annelida	Polychaeta	Phyllodocida	Syllidae	1
CP2433	6/12/2002	Glycera americana	Annelida	Polychaeta	Phyllodocida	Glyceridae	1
CP2433	6/12/2002	Glycinde armigera	Annelida	Polychaeta	Phyllodocida	Goniadidae	1
CP2433	6/12/2002	Goniada littorea	Annelida	Polychaeta	Phyllodocida	Goniadidae	6
CP2433	6/12/2002	Heterophoxus oculatus	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	1
CP2433	6/12/2002	Heteroserolis carinata	Arthropoda	Malacostraca	Isopoda	Serolidae	6
CP2433	6/12/2002	Laevicardium substriatum	Mollusca	Bivalvia	Veneroida	Cardiidae	1
CP2433	6/12/2002	Leitoscoloplos pugettensis	Annelida	Polychaeta	Orbiniida	Orbiniidae	29
CP2433	6/12/2002	Lineidae	Nemertea	Anopla	Heteronemertea	Lineidae	1
CP2433	6/12/2002	Lumbrineris erecta	Annelida	Polychaeta	Eunicida	Lumbrineridae	1
CP2433	6/12/2002	Lyonsia californica	Mollusca	Bivalvia	Pholadomyoida	Lyonsiidae	5
CP2433	6/12/2002	Macoma yoldiformis	Mollusca	Bivalvia	Veneroida	Tellinidae	2
CP2433	6/12/2002	Malacoplax californiensis	Arthropoda	Malacostraca	Decapoda	Gonoplacidae	1
CP2433	6/12/2002	Mediomastus sp	Annelida	Polychaeta	Capitellida	Capitellidae	66
CP2433	6/12/2002	Metasychis disparidentatus	Annelida	Polychaeta	Capitellida	Maldanidae	1
CP2433	6/12/2002	Microspio pigmentata	Annelida	Polychaeta	Spionida	Spionidae	5
CP2433	6/12/2002	Monticellina cryptica	Annelida	Polychaeta	Spionida	Cirratulidae	6
CP2433	6/12/2002	Monticellina siblina	Annelida	Polychaeta	Spionida	Cirratulidae	2
CP2433	6/12/2002	Neastacilla californica	Arthropoda	Malacostraca	Isopoda	Arcturidae	12
CP2433	6/12/2002	Neotrypaea californiensis	Arthropoda	Malacostraca	Decapoda	Callianassidae	5
CP2433	6/12/2002	Nephtys caecoides	Annelida	Polychaeta	Phyllodocida	Nephtyidae	2
CP2433	6/12/2002	Nephtys cornuta	Annelida	Polychaeta	Phyllodocida	Nephtyidae	2
CP2433	6/12/2002	Nereis procera	Annelida	Polychaeta	Phyllodocida	Nereididae	2
CP2433	6/12/2002	Notomastus magnus	Annelida	Polychaeta	Capitellida	Capitellidae	1
CP2433	6/12/2002	Notomastus sp A	Annelida	Polychaeta	Capitellida	Capitellidae	1
CP2433	6/12/2002	Ophiodromus pugettensis	Annelida	Polychaeta	Phyllodocida	Hesionidae	1
CP2433	6/12/2002	Parvilucina tenuisculpta	Mollusca	Bivalvia	Veneroida	Lucinidae	1
CP2433	6/12/2002	Petaloclymene pacifica	Annelida	Polychaeta	Capitellida	Maldanidae	1
CP2433	6/12/2002	Pista disjuncta	Annelida	Polychaeta	Terebellida	Terebellidae	5
CP2433	6/12/2002	Pista sp	Annelida	Polychaeta	Terebellida	Terebellidae	23
CP2433	6/12/2002	Poecilochaetus sp A	Annelida	Polychaeta	Spionida	Poecilochaetidae	1
CP2433	6/12/2002	Prionospio (Minuspio) lighti	Annelida	Polychaeta	Spionida	Spionidae	4
CP2433	6/12/2002	Prionospio (Prionospio) heterobranchia	Annelida	Polychaeta	Spionida	Spionidae	1
CP2433	6/12/2002	Rudilemboides stenopropodus	Arthropoda	Malacostraca	Amphipoda	Aoridae	4
CP2433	6/12/2002	Scleroplax granulata	Arthropoda	Malacostraca	Decapoda	Pinnotheridae	34
CP2433	6/12/2002	Scoletoma sp	Annelida	Polychaeta	Eunicida	Lumbrineridae	45
CP2433	6/12/2002	Scoletoma sp A	Annelida	Polychaeta	Eunicida	Lumbrineridae	25
CP2433	6/12/2002	Scoletoma sp B	Annelida	Polychaeta	Eunicida	Lumbrineridae	1
CP2433	6/12/2002	Scoletoma sp C	Annelida	Polychaeta	Eunicida	Lumbrineridae	59
CP2433	6/12/2002	Spiophanes duplex	Annelida	Polychaeta	Spionida	Spionidae	14
CP2433	6/12/2002	Stylatula elongata	Cnidaria	Anthozoa	Pennatulacea	Virgulariidae	1

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StationID	Date	Name	Phylum	Class	Order	Family	Abundance
CP2433	6/12/2002	Syllis (Typosyllis) nipponica	Annelida	Polychaeta	Phyllodocida	Syllidae	3
CP2433	6/12/2002	Tellina carpenteri	Mollusca	Bivalvia	Veneroida	Tellinidae	1
CP2433	6/12/2002	Theora lubrica	Mollusca	Bivalvia	Veneroida	Semelidae	6
CP2433	6/12/2002	Thracia trapezoides	Mollusca	Bivalvia	Pholadomyoida	Thraciidae	3
CP2433	6/12/2002	Tubulanus polymorphus	Nemertea	Anopla	Palaeonemertea	Tubulanidae	1
C10	6/12/2002	Amphideutopus oculatus	Arthropoda	Malacostraca	Amphipoda	Isaeidae	3
C10	6/12/2002	Carinoma mutabilis	Nemertea	Anopla	Palaeonemertea	Carinomidae	1
C10	6/12/2002	Cossura candida	Annelida	Polychaeta	Cossurida	Cossuridae	19
C10	6/12/2002	Crucibulum spinosum	Mollusca	Gastropoda	Neotaenioglossa	Calyptraeidae	1
C10	6/12/2002	Decapoda	Arthropoda	Malacostraca	Decapoda		1
C10	6/12/2002	Dorvillea (Schistomeringos) longicornis	Annelida	Polychaeta	Eunicida	Dorvilleidae	3
C10	6/12/2002	Euchone limnicola	Annelida	Polychaeta	Sabellida	Sabellidae	3
C10	6/12/2002	Exogone lourei	Annelida	Polychaeta	Phyllodocida	Syllidae	22
C10	6/12/2002	Harmothoe imbricata Cmplx	Annelida	Polychaeta	Phyllodocida	Polynoidae	3
C10	6/12/2002	Heterophoxus oculatus	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	1
C10	6/12/2002	Heteroserolis carinata	Arthropoda	Malacostraca	Isopoda	Serolidae	1
C10	6/12/2002	Laevicardium substriatum	Mollusca	Bivalvia	Veneroida	Cardiidae	1
C10	6/12/2002	Leitoscoloplos pugettensis	Annelida	Polychaeta	Orbiniida	Orbiniidae	14
C10	6/12/2002	Lumbrineris erecta	Annelida	Polychaeta	Eunicida	Lumbrineridae	8
C10	6/12/2002	Lyonsia californica	Mollusca	Bivalvia	Pholadomyoida	Lyonsiidae	2
C10	6/12/2002	Mediomastus sp	Annelida	Polychaeta	Capitellida	Capitellidae	26
C10	6/12/2002	Molgula sp	Chordata	Ascidiacea	Stolidobranchiata	Molgulidae	1
C10	6/12/2002	Musculista senhousia	Mollusca	Bivalvia	Mytiloida	Mytilidae	75
C10	6/12/2002	Notomastus sp A	Annelida	Polychaeta	Capitellida	Capitellidae	1
C10	6/12/2002	Oligochaeta	Annelida	Oligochaeta			1
C10	6/12/2002	Paranemertes californica	Nemertea	Enopla	Hoplonemertea	Emplectonematidae	1
C10	6/12/2002	Pista sp	Annelida	Polychaeta	Terebellida	Terebellidae	6
C10	6/12/2002	Prionospio (Prionospio) heterobranchia	Annelida	Polychaeta	Spionida	Spionidae	7
C10	6/12/2002	Pseudopolydora paucibranchiata	Annelida	Polychaeta	Spionida	Spionidae	3
C10	6/12/2002	Pyromaia tuberculata	Arthropoda	Malacostraca	Decapoda	Majidae	2
C10	6/12/2002	Rudilemboides stenopropodus	Arthropoda	Malacostraca	Amphipoda	Aoridae	1
C10	6/12/2002	Scolanthus sp A	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	9
C10	6/12/2002	Scoletoma sp	Annelida	Polychaeta	Eunicida	Lumbrineridae	11
C10	6/12/2002	Scoletoma sp A	Annelida	Polychaeta	Eunicida	Lumbrineridae	1
C10	6/12/2002	Scoletoma sp C	Annelida	Polychaeta	Eunicida	Lumbrineridae	74
C10	6/12/2002	Theora lubrica	Mollusca	Bivalvia	Veneroida	Semelidae	1
C14	6/12/2002	Capitella capitata Cmplx	Annelida	Polychaeta	Capitellida	Capitellidae	217
C14	6/12/2002	Dorvillea (Schistomeringos) longicornis	Annelida	Polychaeta	Eunicida	Dorvilleidae	58
C14	6/12/2002	Grandidierella japonica	Arthropoda	Malacostraca	Amphipoda	Aoridae	8
C14	6/12/2002	Neanthes acuminata Cmplx	Annelida	Polychaeta	Phyllodocida	Nereididae	37
C14	6/12/2002	Nebalia pugettensis Cmplx	Arthropoda	Malacostraca	Leptostraca	Nebaliidae	1
C14	6/12/2002	Oligochaeta	Annelida	Oligochaeta			17
C14	6/12/2002	Protocirrineris sp	Annelida	Polychaeta	Spionida	Cirratulidae	1
C14	6/12/2002	Streblospio benedicti	Annelida	Polychaeta	Spionida	Spionidae	4
C14	6/12/2002	Theora lubrica	Mollusca	Bivalvia	Veneroida	Semelidae	1
P11	6/12/2002	Cumingia californica	Mollusca	Bivalvia	Veneroida	Semelidae	1
P11	6/12/2002	Exogone lourei	Annelida	Polychaeta	Phyllodocida	Syllidae	1
P11	6/12/2002	Glycera americana	Annelida	Polychaeta	Phyllodocida	Glyceridae	1
P11	6/12/2002	Leitoscoloplos pugettensis	Annelida	Polychaeta	Orbiniida	Orbiniidae	1
P11	6/12/2002	Lumbrineris erecta	Annelida	Polychaeta	Eunicida	Lumbrineridae	6

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StationID	Date	Name	Phylum	Class	Order	Family	Abundance
P11	6/12/2002	Mediomastus sp	Annelida	Polychaeta	Capitellida	Capitellidae	16
P11	6/12/2002	Musculista senhousia	Mollusca	Bivalvia	Mytiloida	Mytilidae	5
P11	6/12/2002	Nassarius tiarula	Mollusca	Gastropoda	Neogastropoda	Nassariidae	1
P11	6/12/2002	Oligochaeta	Annelida	Oligochaeta			1
P11	6/12/2002	Paranemertes californica	Nemertea	Enopla	Hoplonemertea	Emplectonematidae	1
P11	6/12/2002	Scolanthus sp A	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	1
P11	6/12/2002	Scoletoma sp	Annelida	Polychaeta	Eunicida	Lumbrineridae	2
P11	6/12/2002	Scoletoma sp C	Annelida	Polychaeta	Eunicida	Lumbrineridae	35
P11	6/12/2002	Theora lubrica	Mollusca	Bivalvia	Veneroida	Semelidae	1
P11	6/12/2002	Tubulanus polymorphus	Nemertea	Anopla	Palaeonemertea	Tubulanidae	1
P17	6/12/2002	Amphideutopus oculatus	Arthropoda	Malacostraca	Amphipoda	Isaeidae	2
P17	6/12/2002	Aphelochaeta sp SD5	Annelida	Polychaeta	Spionida	Cirratulidae	314
P17	6/12/2002	Arabella sp	Annelida	Polychaeta	Eunicida	Oenonidae	3
P17	6/12/2002	Brania californiensis	Annelida	Polychaeta	Phyllodocida	Syllidae	5
P17	6/12/2002	Bulla gouldiana	Mollusca	Gastropoda	Cephalaspidea	Bullidae	1
P17	6/12/2002	Campylaspis rubromaculata	Arthropoda	Malacostraca	Cumacea	Nannastacidae	1
P17	6/12/2002	Caulleriella pacifica	Annelida	Polychaeta	Spionida	Cirratulidae	8
P17	6/12/2002	Diplocirrus sp SD1	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	2
P17	6/12/2002	Dorvillea (Schistomeringos) longicornis	Annelida	Polychaeta	Eunicida	Dorvilleidae	9
P17	6/12/2002	Euchone limnicola	Annelida	Polychaeta	Sabellida	Sabellidae	10
P17	6/12/2002	Euphilomedes carcharodonta	Arthropoda	Ostracoda	Myodocopida	Philomedidae	1
P17	6/12/2002	Exogone lourei	Annelida	Polychaeta	Phyllodocida	Syllidae	8
P17	6/12/2002	Exogone sp	Annelida	Polychaeta	Phyllodocida	Syllidae	1
P17	6/12/2002	Glycera americana	Annelida	Polychaeta	Phyllodocida	Glyceridae	2
P17	6/12/2002	Harmothoe imbricata Cmplx	Annelida	Polychaeta	Phyllodocida	Polynoidae	2
P17	6/12/2002	Heteroserolis carinata	Arthropoda	Malacostraca	Isopoda	Serolidae	3
P17	6/12/2002	Laevicardium substriatum	Mollusca	Bivalvia	Veneroida	Cardiidae	1
P17	6/12/2002	Leitoscoloplos pugettensis	Annelida	Polychaeta	Orbiniida	Orbiniidae	24
P17	6/12/2002	Lumbrineris erecta	Annelida	Polychaeta	Eunicida	Lumbrineridae	3
P17	6/12/2002	Mactridae	Mollusca	Bivalvia	Veneroida	Mactridae	1
P17	6/12/2002	Mediomastus sp	Annelida	Polychaeta	Capitellida	Capitellidae	20
P17	6/12/2002	Musculista senhousia	Mollusca	Bivalvia	Mytiloida	Mytilidae	66
P17	6/12/2002	Natantia	Arthropoda	Malacostraca	Decapoda		1
P17	6/12/2002	Neanthes acuminata Cmplx	Annelida	Polychaeta	Phyllodocida	Nereididae	1
P17	6/12/2002	Odontosyllis phosphorea	Annelida	Polychaeta	Phyllodocida	Syllidae	1
P17	6/12/2002	Pista sp	Annelida	Polychaeta	Terebellida	Terebellidae	8
P17	6/12/2002	Polydora cornuta	Annelida	Polychaeta	Spionida	Spionidae	5
P17	6/12/2002	Prionospio (Prionospio) heterobranchia	Annelida	Polychaeta	Spionida	Spionidae	13
P17	6/12/2002	Pseudopolydora paucibranchiata	Annelida	Polychaeta	Spionida	Spionidae	79
P17	6/12/2002	Rudilemboides stenopropodus	Arthropoda	Malacostraca	Amphipoda	Aoridae	1
P17	6/12/2002	Scoletoma sp	Annelida	Polychaeta	Eunicida	Lumbrineridae	7
P17	6/12/2002	Scoletoma sp C	Annelida	Polychaeta	Eunicida	Lumbrineridae	83
P17	6/12/2002	Spiophanes duplex	Annelida	Polychaeta	Spionida	Spionidae	1
P17	6/12/2002	Synaptotanais notabilis	Arthropoda	Malacostraca	Tanaidacea	Tanaidae	19
P17	6/12/2002	Theora lubrica	Mollusca	Bivalvia	Veneroida	Semelidae	8
CP2243	10/9/2002	Ambidexter panamensis	Arthropoda	Malacostraca	Decapoda	Processidae	2
CP2243	10/9/2002	Amphideutopus oculatus	Arthropoda	Malacostraca	Amphipoda	Isaeidae	5
CP2243	10/9/2002	Amphipholis squamata	Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	5
CP2243	10/9/2002	Anthozoa	Cnidaria	Anthozoa			3
CP2243	10/9/2002	Armandia brevis	Annelida	Polychaeta	Opheliida	Opheliidae	1

Appendix I. continued

StationID	Date	Name	Phylum	Class	Order	Family	Abundance
CP2243	10/9/2002	Corymorpha bigelowi	Cnidaria	Hydrozoa	Athecatae	Corymorphidae	1
CP2243	10/9/2002	Diplocirrus sp SD1	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	5
CP2243	10/9/2002	Dorvillea (Schistomeringos) annulata	Annelida	Polychaeta	Eunicida	Dorvilleidae	3
CP2243	10/9/2002	Edwardsia californica	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	21
CP2243	10/9/2002	Edwardsiidae	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	1
CP2243	10/9/2002	Ensis myrae	Mollusca	Bivalvia	Veneroida	Pharidae	8
CP2243	10/9/2002	Euclymeninae	Annelida	Polychaeta	Capitellida	Maldanidae	1
CP2243	10/9/2002	Euphilomedes carcharodonta	Arthropoda	Ostracoda	Myodocopida	Philomedidae	3
CP2243	10/9/2002	Exogone lourei	Annelida	Polychaeta	Phyllodocida	Syllidae	35
CP2243	10/9/2002	Fabricinuda limnicola	Annelida	Polychaeta	Sabellida	Sabellidae	19
CP2243	10/9/2002	Glycera americana	Annelida	Polychaeta	Phyllodocida	Glyceridae	1
CP2243	10/9/2002	Goniada littorea	Annelida	Polychaeta	Phyllodocida	Goniadidae	4
CP2243	10/9/2002	Heterophoxus oculatus	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	1
CP2243	10/9/2002	Laevicardium substriatum	Mollusca	Bivalvia	Veneroida	Cardiidae	1
CP2243	10/9/2002	Leitoscoloplos pugettensis	Annelida	Polychaeta	Orbiniida	Orbiniidae	60
CP2243	10/9/2002	Leptosynapta sp	Echinodermata	Holothuroidea	Apodida	Synaptidae	3
CP2243	10/9/2002	Lyonsia californica	Mollusca	Bivalvia	Pholadomyoida	Lyonsiidae	18
CP2243	10/9/2002	Macoma inquinata	Mollusca	Bivalvia	Veneroida	Tellinidae	15
CP2243	10/9/2002	Mayerella banksia	Arthropoda	Malacostraca	Amphipoda	Protellidae	2
CP2243	10/9/2002	Mediomastus sp	Annelida	Polychaeta	Capitellida	Capitellidae	36
CP2243	10/9/2002	Musculista senhousia	Mollusca	Bivalvia	Mytiloida	Mytilidae	45
CP2243	10/9/2002	Mysidopsis californica	Arthropoda	Malacostraca	Mysidacea	Mysidae	2
CP2243	10/9/2002	Nassarius tiarula	Mollusca	Gastropoda	Neogastropoda	Nassariidae	2
CP2243	10/9/2002	Oligochaeta	Annelida	Oligochaeta			7
CP2243	10/9/2002	Oxyurostylis pacifica	Arthropoda	Malacostraca	Cumacea	Diastylidae	1
CP2243	10/9/2002	Paranemertes californica	Nemertea	Enopla	Hoplonemertea	Emplectonematidae	5
CP2243	10/9/2002	Phoronis sp	Phorona		Phoronida	Phoronidae	6
CP2243	10/9/2002	Pista agassizi	Annelida	Polychaeta	Terebellida	Terebellidae	7
CP2243	10/9/2002	Prionospio (Prionospio) heterobranchia	Annelida	Polychaeta	Spionida	Spionidae	8
CP2243	10/9/2002	Pseudopolydora paucibranchiata	Annelida	Polychaeta	Spionida	Spionidae	11
CP2243	10/9/2002	Rudilemboides stenopropodus	Arthropoda	Malacostraca	Amphipoda	Aoridae	2
CP2243	10/9/2002	Scolanthus sp A	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	3
CP2243	10/9/2002	Scoletoma sp	Annelida	Polychaeta	Eunicida	Lumbrineridae	9
CP2243	10/9/2002	Scoletoma sp A	Annelida	Polychaeta	Eunicida	Lumbrineridae	1
CP2243	10/9/2002	Scoletoma sp B	Annelida	Polychaeta	Eunicida	Lumbrineridae	1
CP2243	10/9/2002	Scoletoma sp C	Annelida	Polychaeta	Eunicida	Lumbrineridae	137
CP2243	10/9/2002	Scyphoproctus oculatus	Annelida	Polychaeta	Capitellida	Capitellidae	4
CP2243	10/9/2002	Theora lubrica	Mollusca	Bivalvia	Veneroida	Semelidae	14
CP2243	10/9/2002	Thracia trapezoides	Mollusca	Bivalvia	Pholadomyoida	Thraciidae	1
CP2433	10/9/2002	Amphideutopus oculatus	Arthropoda	Malacostraca	Amphipoda	Isaeidae	1
CP2433	10/9/2002	Aphelochaeta sp	Annelida	Polychaeta	Spionida	Cirratulidae	1
CP2433	10/9/2002	Asteropella slatteryi	Arthropoda	Ostracoda	Myodocopida	Cylindroleberididae	3
CP2433	10/9/2002	Caridea	Arthropoda	Malacostraca	Decapoda		1
CP2433	10/9/2002	Chione californiensis	Mollusca	Bivalvia	Veneroida	Veneridae	1
CP2433	10/9/2002	Chone mollis	Annelida	Polychaeta	Sabellida	Sabellidae	1
CP2433	10/9/2002	Diplocirrus sp SD1	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	46
CP2433	10/9/2002	Eualus lineatus	Arthropoda	Malacostraca	Decapoda	Hippolytidae	2
CP2433	10/9/2002	Euchone limnicola	Annelida	Polychaeta	Sabellida	Sabellidae	5
CP2433	10/9/2002	Euclymeninae sp A	Annelida	Polychaeta	Capitellida	Maldanidae	3
CP2433	10/9/2002	Exogone lourei	Annelida	Polychaeta	Phyllodocida	Syllidae	1

Appendix I. continued

StationID	Date	Name	Phylum	Class	Order	Family	Abundance
CP2433	10/9/2002	Glycera americana	Annelida	Polychaeta	Phyllodocida	Glyceridae	2
CP2433	10/9/2002	Goniada littorea	Annelida	Polychaeta	Phyllodocida	Goniadidae	2
CP2433	10/9/2002	Heterophoxus oculatus	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	7
CP2433	10/9/2002	Heteroserolis carinata	Arthropoda	Malacostraca	Isopoda	Serolidae	6
CP2433	10/9/2002	Hippomedon zetesimus	Arthropoda	Malacostraca	Amphipoda	Lysianassidae	1
CP2433	10/9/2002	Leitoscoloplos pugettensis	Annelida	Polychaeta	Orbiniida	Orbiniidae	39
CP2433	10/9/2002	Lineidae	Nemertea	Anopla	Heteronemertea	Lineidae	1
CP2433	10/9/2002	Lyonsia californica	Mollusca	Bivalvia	Pholadomyoida	Lyonsiidae	3
CP2433	10/9/2002	Mediomastus sp	Annelida	Polychaeta	Capitellida	Capitellidae	22
CP2433	10/9/2002	Monticellina cryptica	Annelida	Polychaeta	Spionida	Cirratulidae	3
CP2433	10/9/2002	Musculista senhousia	Mollusca	Bivalvia	Mytiloida	Mytilidae	1
CP2433	10/9/2002	Neotrypaea californiensis	Arthropoda	Malacostraca	Decapoda	Callianassidae	3
CP2433	10/9/2002	Nephtys cornuta	Annelida	Polychaeta	Phyllodocida	Nephtyidae	2
CP2433	10/9/2002	Nereis procera	Annelida	Polychaeta	Phyllodocida	Nereididae	1
CP2433	10/9/2002	Notomastus sp A	Annelida	Polychaeta	Capitellida	Capitellidae	1
CP2433	10/9/2002	Pista agassizi	Annelida	Polychaeta	Terebellida	Terebellidae	1
CP2433	10/9/2002	Praxillella pacifica	Annelida	Polychaeta	Capitellida	Maldanidae	1
CP2433	10/9/2002	Prionospio (Minuspio) lighti	Annelida	Polychaeta	Spionida	Spionidae	1
CP2433	10/9/2002	Scleroplax granulata	Arthropoda	Malacostraca	Decapoda	Pinnotheridae	3
CP2433	10/9/2002	Scoletoma sp	Annelida	Polychaeta	Eunicida	Lumbrineridae	14
CP2433	10/9/2002	Scoletoma sp A	Annelida	Polychaeta	Eunicida	Lumbrineridae	27
CP2433	10/9/2002	Scoletoma sp B	Annelida	Polychaeta	Eunicida	Lumbrineridae	3
CP2433	10/9/2002	Scoletoma sp C	Annelida	Polychaeta	Eunicida	Lumbrineridae	86
CP2433	10/9/2002	Spiophanes berkeleyorum	Annelida	Polychaeta	Spionida	Spionidae	1
CP2433	10/9/2002	Spiophanes duplex	Annelida	Polychaeta	Spionida	Spionidae	17
CP2433	10/9/2002	Tagelus subteres	Mollusca	Bivalvia	Veneroida	Solecurtidae	1
CP2433	10/9/2002	Tellina modesta	Mollusca	Bivalvia	Veneroida	Tellinidae	1
CP2433	10/9/2002	Theora lubrica	Mollusca	Bivalvia	Veneroida	Semelidae	11
CP2433	10/9/2002	Thracia trapezoides	Mollusca	Bivalvia	Pholadomyoida	Thraciidae	2
CP2433	10/9/2002	Tubulanus polymorphus	Nemertea	Anopla	Palaeonemertea	Tubulanidae	1
C10	10/9/2002	Ascidiacea	Chordata	Ascidiacea			1
C10	10/9/2002	Cossura sp A	Annelida	Polychaeta	Cossurida	Cossuridae	3
C10	10/9/2002	Diplocirrus sp SD1	Annelida	Polychaeta	Flabelligerida	Flabelligeridae	2
C10	10/9/2002	Exogone lourei	Annelida	Polychaeta	Phyllodocida	Syllidae	7
C10	10/9/2002	Glycera americana	Annelida	Polychaeta	Phyllodocida	Glyceridae	1
C10	10/9/2002	Harmothoe imbricata Cmplx	Annelida	Polychaeta	Phyllodocida	Polynoidae	1
C10	10/9/2002	Leitoscoloplos pugettensis	Annelida	Polychaeta	Orbiniida	Orbiniidae	29
C10	10/9/2002	Leucothoe sp	Arthropoda	Malacostraca	Amphipoda	Leucothoidae	1
C10	10/9/2002	Lyonsia californica	Mollusca	Bivalvia	Pholadomyoida	Lyonsiidae	1
C10	10/9/2002	Mediomastus sp	Annelida	Polychaeta	Capitellida	Capitellidae	4
C10	10/9/2002	Musculista senhousia	Mollusca	Bivalvia	Mytiloida	Mytilidae	7
C10	10/9/2002	Nassarius tiarula	Mollusca	Gastropoda	Neogastropoda	Nassariidae	1
C10	10/9/2002	Oligochaeta	Annelida	Oligochaeta			1
C10	10/9/2002	Pista agassizi	Annelida	Polychaeta	Terebellida	Terebellidae	5
C10	10/9/2002	Prionospio (Prionospio) heterobranchia	Annelida	Polychaeta	Spionida	Spionidae	1
C10	10/9/2002	Protocirrineris sp	Annelida	Polychaeta	Spionida	Cirratulidae	1
C10	10/9/2002	Pseudopolydora paucibranchiata	Annelida	Polychaeta	Spionida	Spionidae	6
C10	10/9/2002	Scolanthus sp A	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	8
C10	10/9/2002	Scoletoma sp C	Annelida	Polychaeta	Eunicida	Lumbrineridae	74
C10	10/9/2002	Sthenelanella uniformis	Annelida	Polychaeta	Phyllodocida	Sigalionidae	1

Appendix I. continued

StationID	Date	Name	Phylum	Class	Order	Family	Abundance
C10	10/9/2002	Theora lubrica	Mollusca	Bivalvia	Veneroida	Semelidae	1
C14	10/9/2002	Acteocina inculta	Mollusca	Gastropoda	Cephalaspidea	Scaphandridae	1
C14	10/9/2002	Capitella capitata Cmplx	Annelida	Polychaeta	Capitellida	Capitellidae	38
C14	10/9/2002	Cirriformia sp SD1	Annelida	Polychaeta	Spionida	Cirratulidae	3
C14	10/9/2002	Dorvillea (Schistomeringos) annulata	Annelida	Polychaeta	Eunicida	Dorvilleidae	11
C14	10/9/2002	Imogine exiguus	Platyhelminthes	Turbellaria	Polycladida	Stylochidae	3
C14	10/9/2002	Neanthes acuminata Cmplx	Annelida	Polychaeta	Phyllodocida	Nereididae	73
C14	10/9/2002	Oligochaeta	Annelida	Oligochaeta			156
C14	10/9/2002	Scleroplax granulata	Arthropoda	Malacostraca	Decapoda	Pinnotheridae	1
C14	10/9/2002	Scoletoma sp C	Annelida	Polychaeta	Eunicida	Lumbrineridae	1
C14	10/9/2002	Streblospio benedicti	Annelida	Polychaeta	Spionida	Spionidae	1
P11	10/9/2002	Alpheus clamator	Arthropoda	Malacostraca	Decapoda	Alpheidae	1
P11	10/9/2002	Amphideutopus oculatus	Arthropoda	Malacostraca	Amphipoda	Isaeidae	1
P11	10/9/2002	Euphilomedes carcharodonta	Arthropoda	Ostracoda	Myodocopida	Philomedidae	2
P11	10/9/2002	Glycera americana	Annelida	Polychaeta	Phyllodocida	Glyceridae	1
P11	10/9/2002	Leitoscoloplos pugettensis	Annelida	Polychaeta	Orbiniida	Orbiniidae	8
P11	10/9/2002	Lumbrineris erecta	Annelida	Polychaeta	Eunicida	Lumbrineridae	3
P11	10/9/2002	Macoma sp	Mollusca	Bivalvia	Veneroida	Tellinidae	1
P11	10/9/2002	Prionospio (Prionospio) heterobranchia	Annelida	Polychaeta	Spionida	Spionidae	1
P11	10/9/2002	Rudilemboides stenopropodus	Arthropoda	Malacostraca	Amphipoda	Aoridae	2
P11	10/9/2002	Scoletoma sp	Annelida	Polychaeta	Eunicida	Lumbrineridae	3
P11	10/9/2002	Scoletoma sp C	Annelida	Polychaeta	Eunicida	Lumbrineridae	3
P11	10/9/2002	Theora lubrica	Mollusca	Bivalvia	Veneroida	Semelidae	2
P17	10/9/2002	Aphelochaeta sp	Annelida	Polychaeta	Spionida	Cirratulidae	19
P17	10/9/2002	Armandia brevis	Annelida	Polychaeta	Opheliida	Opheliidae	3
P17	10/9/2002	Capitella capitata Cmplx	Annelida	Polychaeta	Capitellida	Capitellidae	1
P17	10/9/2002	Caulleriella pacifica	Annelida	Polychaeta	Spionida	Cirratulidae	10
P17	10/9/2002	Dorvillea (Schistomeringos) annulata	Annelida	Polychaeta	Eunicida	Dorvilleidae	1
P17	10/9/2002	Euphilomedes carcharodonta	Arthropoda	Ostracoda	Myodocopida	Philomedidae	4
P17	10/9/2002	Exogone lourei	Annelida	Polychaeta	Phyllodocida	Syllidae	10
P17	10/9/2002	Glycera americana	Annelida	Polychaeta	Phyllodocida	Glyceridae	1
P17	10/9/2002	Leitoscoloplos pugettensis	Annelida	Polychaeta	Orbiniida	Orbiniidae	28
P17	10/9/2002	Lumbrineris erecta	Annelida	Polychaeta	Eunicida	Lumbrineridae	11
P17	10/9/2002	Macoma inquinata	Mollusca	Bivalvia	Veneroida	Tellinidae	8
P17	10/9/2002	Mediomastus sp	Annelida	Polychaeta	Capitellida	Capitellidae	3
P17	10/9/2002	Musculista senhousia	Mollusca	Bivalvia	Mytiloida	Mytilidae	47
P17	10/9/2002	Neanthes acuminata Cmplx	Annelida	Polychaeta	Phyllodocida	Nereididae	3
P17	10/9/2002	Odontosyllis phosphorea	Annelida	Polychaeta	Phyllodocida	Syllidae	1
P17	10/9/2002	Oligochaeta	Annelida	Oligochaeta			1
P17	10/9/2002	Paranemertes californica	Nemertea	Enopla	Hoplonemertea	Emplectonematidae	3
P17	10/9/2002	Phoronis sp	Phorona		Phoronida	Phoronidae	1
P17	10/9/2002	Prionospio (Prionospio) heterobranchia	Annelida	Polychaeta	Spionida	Spionidae	3
P17	10/9/2002	Pseudopolydora paucibranchiata	Annelida	Polychaeta	Spionida	Spionidae	2
P17	10/9/2002	Rudilemboides stenopropodus	Arthropoda	Malacostraca	Amphipoda	Aoridae	1
P17	10/9/2002	Scolanthus sp A	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	1
P17	10/9/2002	Scoletoma sp	Annelida	Polychaeta	Eunicida	Lumbrineridae	1
P17	10/9/2002	Scoletoma sp C	Annelida	Polychaeta	Eunicida	Lumbrineridae	91
P17	10/9/2002	Streblospio benedicti	Annelida	Polychaeta	Spionida	Spionidae	1
P17	10/9/2002	Theora lubrica	Mollusca	Bivalvia	Veneroida	Semelidae	8
P17	10/9/2002	Upogebia macginitieorum	Arthropoda	Malacostraca	Decapoda	Upogebiidae	3