Introduced Aquatic Species in California Coastal Waters

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INTRODUCTION

The Ballast Water Management Act of 1999, Government Code 71211, stipulates that the California Department of Fish and Game (DFG) conduct appropriate studies necessary to develop a list of non-indigenous species (NIS) occurring in the marine and estuarine waters of the state. The DFG's Office of Spill Prevention and Response (OSPR) was assigned the task of conducting the NIS investigations. The OSPR has identified seven regions of the state, representing the state's major ports and estuaries to conduct field, laboratory, and literature studies on the presence of NIS. These areas include: the ports of San Diego, Los Angeles/Long Beach, Hueneme, Stockton, Sacramento; San Francisco Bay and adjacent waters and Humboldt Bay. In addition, supplemental samples were collected from numerous small harbors and bays along the entire California coast. The work described below is part of an effort that began in the fall of 2000 in the ports of Stockton, Sacramento and Hueneme, and has continued since that time for the additional targeted ports, harbors and bays in northern and central California. Field and laboratory studies were jointly conducted by DFG/OSPR and Moss Landing Marine Laboratory's Marine Pollution Studies Lab (MLML/MPSL). Additional universities and specialized laboratories provided taxonomic expertise in identification of marine and estuarine species.

While marine and estuarine environments are known to experience high rates of invasion from non-indigenous species, these systems have not been at the forefront of invasion ecology studies. Until recent decades, large-scale biological invasion research of marine habitats was limited, and only lately has this topic been increasingly studied above the species level (Grosholz, 2002). More recent research is identifying the intensity of the ecological alterations that are taking place at the community and evolutionary levels, as a result of introduced species (Carlton and Geller, 1993). Even with the identification of numerous introductory vectors, which include the ballast of a ship, aquaculture (trade), and fisheries enhancement, the power to predict invasions and viable establishment is still not strong because of the variety of biological and oceanographic factors that influence the ecosystem (Carlton, 1999). As these studies continue, it is apparent that knowledge of the natural histories of both native and non-native species is vital to understanding and predicting sustainable invasions (Carlton, 1996). The survey presented here should aid our knowledge of the extent of invasions and subsequent ecological adaptations, as well as prevalent trends in recruitment and succession caused by bio-invasions.

The primary objective of this survey was to identify the presence and relative abundance of introduced aquatic species in California's bays and harbors. In order to meet this objective, it was necessary to refine the current status of introduced species in California through a comprehensive literature review. Reconciliation of taxonomic vocabulary, naming convention updates, defensible species descriptions, introduction documentation and identification of source vectors were all needed to provide a working master list of introduced species. The literature review was also needed to provide current knowledge and methods for design of a systematic field investigation of infaunal, epifaunal and planktonic communities throughout the state. Information related to the presence and range of introduced species will also be used as baseline information in future studies for assessing rates ands modes of introduction, as well as range extensions.

The sampling design focused on recording whole community structure rather than singling out any one "invasive" species or habitat. This approach reflects the view that invasive species do not only affect a single niche, but rather an entire eco-system, as in the introduction of the Asian Clam (*Potamocorbula amurensis)* to San Francisco Bay. The filter feeding abilities of the Asian clam have impacted the entire pelagic eco-system by decreasing the available phytoplankton stores of the bay. This has further impacted invertebrate and larval fish populations and subsequently the entire food web (Alpine and Cloern, 1992).

METHODS

Summary of Literature Review

An extensive literature review was undertaken to compile information about introduced aquatic species in California. The review targeted multiple sources of information including peer reviewed scientific publications, web sites, agency literature, field surveys and personal communications. The goal of the review was two-fold, the first targeted at a review of sampling protocols and study designs for investigating introduced species and the second targeted at assembling comprehensive information about specific introduced taxa in California. Information gathered about sampling protocols and study designs was used to help appropriately design a field survey of California's bays and harbors.

The specific taxa information was used to develop a master taxa list of introduced species in California, along with specifics on where the species is found, where it originated, its date of introduction, its status as introduced or cryptogenic, and sources for the documentation. Numerous websites were consulted to gain the initial framework for developing the introduced species list. The beginning of the list was a composite of previous research and ongoing studies from various groups that have presented data on the web. In addition to website searches, literature from numerous scientific journals was consulted for additional species believed to be introduced. The list was supplemented further with species from additional studies, including the U.S. Environmental Protection Agency's Western Environmental Monitoring and Assessment Program (EPA-WEMAP) and the Introduced Species Survey of Humboldt Bay by Humboldt State University. Once the list of species was compiled, the current taxon status of introduced or cryptogenic was verified from documented research and contact with taxonomic experts.

The master taxa list of introduced species was used to identify introduced and cryptogenic species from historical monitoring data sets where infaunal communities were surveyed. The master taxa list was also used to identify introduced and cryptogenic species collected in the field surveys of this study.

Summary of Historical Monitoring Data for Infauna

Introduced, cryptogenic, and native species with a possible range extension benthic invertebrate species were identified from four historical data sets: Southern California Bight Pilot Project, Southern California Bight 1998 Regional Marine Monitoring Survey, Bay Protection and Toxic Cleanup Program, and EPA-WEMAP. Although the scope of work differed for each project, species lists were generated for many sites throughout coastal California, and therefore provide a unique opportunity to compare data from various locations, depths, and time periods.

The Southern California Bight Pilot Project (SCBPP) and the Southern California Bight 1998 Regional Marine Monitoring Survey (Bight'98) collected sediment samples (n=251 for Pilot; n=404 for Bight '98) from the continental shelf of the Southern California Bight ranging from Point Conception, California to the United States-Mexico border (Bergen et al., 1998; Ranasinghe et al., in prep). Station locations were selected using a probability-based sampling design. Samples were collected for SCBPP between July 1994 and August 1994, while Bight'98 samples were taken between July 1998 and September 1998. Samples were collected with a 0.1 m^2 Van Veen grab at depths ranging from 5-220 m. Sediment was rinsed through a 1.0 mm sieve.

The Bay Protection and Toxic Cleanup Program (BPTCP) was a statewide program that sampled over 300 coastal and marine stations (from depths of 0-75 m) along the California coastline, beginning in July 1992 and ending December 1997 (Fairey et al., 1996; Anderson et al., 1998; Downing et al., 1998; Hunt et al., 1998; Jacobi et al., 1998; Phillips et al., 1998). A targeted design focusing on anthropogenic activities and hotspots was used in selecting stations. At each station, three replicate sediment cores were collected with each core having a surface area of approximately 0.0075 m^2. Each core was sieved separately through a 0.5 mm sieve. Out of the 630 taxonomic entities identified, 380 were identified to the genus and species level.

The U.S. Environmental Protection Agency's Western Environmental Monitoring and Assessment Program (EPA-WEMAP) was a regional program designed to collect coastal and estuarine samples from the states of California, Oregon, and Washington. In California, infaunal samples were collected along the length of the state (n=80) and at various depths (0-65 m) between July 1999 and October 1999. Station locations were selected using a probability-based sampling design. Samples were collected with a 0.1 m^2 Van Veen grab or 0.1 m^2 core depending on location, and sediment samples were rinsed through a 1.0 mm sieve (T N & Associates, Inc., 2002).

Introduced and cryptogenic species were identified in each data set by comparison to the master taxonomic list developed from the literature and field surveys. Some species that were classified as native but had shown a possible range extension were identified as nativeX. When needed, species names were updated based on the Southern California Association of Marine Invertebrate Taxonomists (SCAMIT) taxonomic listing (SCAMIT, 2001). To be classified as introduced, cryptogenic, or native with possible range extension (nativeX), a specimen in the data set had to be identified to the genus and species level or that specimen was classified within a particular data set (e.g., EPA-WEMAP) that was used to create the master taxonomic list. Specimens that could not be identified beyond genus level but were from a genus with a high probability of being introduced or cryptogenic, based on the master taxonomic list genera, were put into a separate table (Appendix A). These specimens require additional taxonomic review before a classification of native, cryptogenic, or introduced can be confidently determined.

Summary of Sampling Design

The sampling design for this project was developed to survey a broad range of habitats and communities within California's bays, small craft harbors and international ports. Depending on sampling location and the collection method, sampling can potentially underestimate the true

populations if not all habitat types are represented, as seen in studies of ships' ballast (Carlton and Geller, 1993). It must be acknowledged that all possible subtidal and intertidal habitats and communities were not sampled in this broad statewide survey, but every attempt was made to be as comprehensive as possible within the logistical and budgetary constraints of the project. Our attempts to be as comprehensive as possible resulted in the following design.

The survey was completed throughout all major ports and a significant number of small craft harbors along the coast of California. Study areas included the major ports of San Diego, Los Angeles/Long Beach, Hueneme, Stockton, and Sacramento, as well as 16 smaller harbors and bays (Figure 1). Epifaunal communities were sampled primarily though infuanal communities were surveyed in some smaller harbors. Infaunal communities were not sampled in larger harbors (e.g.- Los Angeles/Long Beach and San Diego) because other cooperating programs have recently completed infaunal surveys of these areas. Infaunal information from those programs is summarized in this report. This survey additionally conducted sampling of plankton and fish communities in the major harbors and evaluated larval recruitment on settling plates in Humboldt Bay. Additional sampling of epifaunal, infaunal and fish communities was done in a similar survey of Humboldt Bay that was conducted by Humboldt State University (HSU; Boyd *et al*., 2002). Some of the introduced species results from the HSU survey are considered in this report and are included in our taxa lists. Because San Francisco Bay has been the site of numerous invasive species studies, providing a large amount of pre-existing data (Carlton, 1979; Cohen, 1996; Cohen and Carlton, 1995; and Hanna, 1966), this area was not included in the current survey. Based on literature reviews, however, previously determined introduced species from this area are included in our taxa lists.

Field protocols and sampling considerations were modified from Australia's Center for Research on Introduced Marine Pests' Technical Report (Hewitt and Martin, 1996). These protocols were developed to maximize the likelihood that introduced species would be detected by concentrating sampling on habitats and locations most likely to have been colonized by these species. Possible sample locations were identified within each harbor by completion of reconnaissance surveys that were requested from harbor management officials. Survey forms identified areas with high potential for ballast water release (heavy international shipping traffic), calm backwaters, recently established docks, older harbor docks, and harbor entrances. Prioritized sampling areas within ports, harbors and bays included active and inactive shipping berths, fishing vessel berths and docks, recreational vessel marinas and berths, mariculture facilities, and newly constructed structures. Sample sites were spread throughout each port, harbor or bay to give spatial representation and to accommodate differences in tidal flushing and mixing.

The physical surfaces sampled included soft bottom sediments (to 10 cm depth), riprap, floating docks, pier pilings and barge surfaces. The majority of the sampling effort focused on collecting intertidal and subtidal epifaunal samples, although infaunal and seasonal plankton samples were also collected at certain locations where existing data were sparse. Due to habitat differences that could influence larval recruitment and subsequent colonization, the sampling strategy encompassed multiple depths, substrates and light exposure conditions.

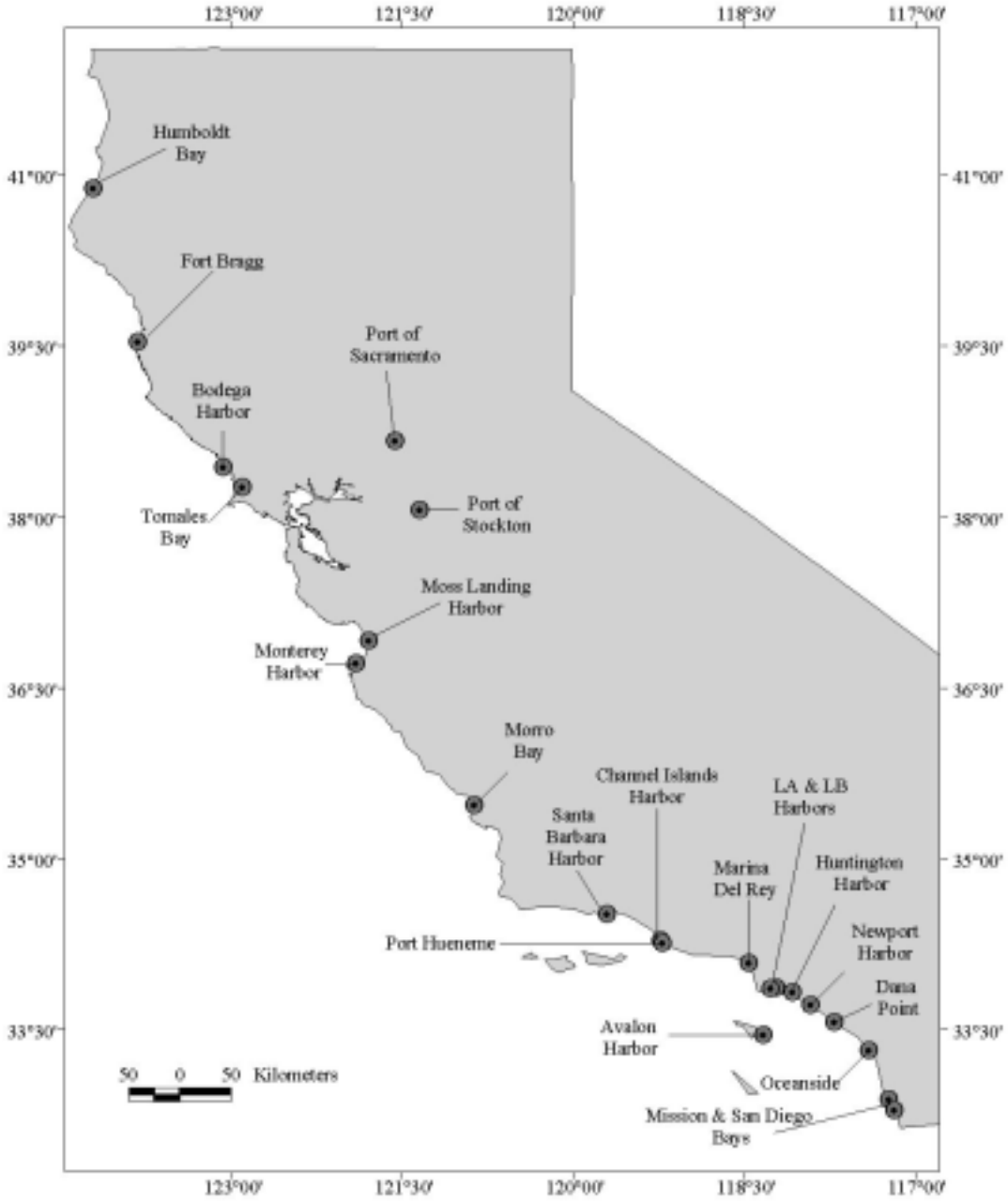


Figure 1. Harbors and bays sampled during the 2000 and 2001 surveys.

Summary of Field Sampling Methods

Sampling Vessel

All collections were made using a 19 ft Boston Whaler (*Ms. B1*) with a Johnson 100 hp commercial outboard engine and 15 hp spare outboard engine. *Ms. B1* was outfitted with a 5.5 hp Honda motor that powers a hydraulic winch, used for the sediment grab. All sampling events were recorded as latitude and longitude (decimal minutes, NAD83 datum) using a Magellan 315 Global Positioning System. All station information pertinent to the sampling effort was recorded in a field logbook.

Infaunal Sample Collection

Benthic infaunal samples were collected for community analyses from the boat with a Young-modified Van Veen sediment grab (0.1m² area). Seventy-seven sediments sample were collected from 4 harbors at 77 stations (Figure 1). Samples were sieved through a 0.5 mm screen, residues (e.g., organisms and remaining sediments) rinsed into pre-labeled storage containers and preserved with a 10% formalin solution. After 3 to 4 days, samples were rinsed and transferred into 70% isopropyl alcohol and stored for future taxonomic identification and enumeration.

Epifaunal Sample Collection

Once on station, divers visually surveyed the vicinity for the most biologically diverse area. Surrounding docksides, undersides, and pilings were all examined before samples were taken. At many locations, the diversity ranged so much that multiple samples were taken at different depths from the same piling, dock or structure. Before samples were collected at each station, underwater photographs were taken of the undisturbed habitat, showing both whole community assemblages and individual species' characteristics.

Epifaunal samples were collected from the fouling community in 21 harbors at a total of 136 (301 samples) stations for community analyses. Biological material was collected with the aid of SCUBA by removing all organisms within the area of a 0.1 m^2 quadrat. A custom made 0.1 m^2 collection bag made from 0.5 mm mesh vinyl and PVC frame was used to collect and carry the samples. Typically, 7-10 samples were collected from the small craft harbors while in larger ports up to 30 samples were collected. Divers covered a vertical transect on pilings, if possible, ranging in depth from 0-20 feet. Up to three samples were collected from one of each habitat type, at each station within a harbor; substrate types included pilings (wooden or concrete, of which some were metal or PVC encased), and the side or bottom of floating docks (wooden, concrete, Styrofoam or PVC encased). A 5 cm wide metal paint scraper was used to dislodge the fouling community species from the substrate. While one diver held the bag against the substrate, the other diver was able to scrape off the organisms through a slit in the bag. This procedure, combined with the design of the bag, ensures minimal sample loss. The epifaunal sample is sieved through a 0.5 mm mesh vinyl screen and residues (e.g., organisms and remaining sediments) were rinsed into pre-labeled storage containers and preserved with a 10% formalin solution. Tunicates were not preserved separately. Tunicate samples were not relaxed before being fixed in the 10% formalin solution, but photographs of tunicate specimens were taken when possible to aid in identification. Any sponges and bryozoans found in the samples were stored in separate containers, filled with 90-95% ethyl alcohol. Algae were also stored in separate containers and were preserved with a 5% formalin solution. After 3 to 4 days, epifaunal

samples were rinsed and transferred into 70% isopropyl alcohol and stored for future taxonomic identification and enumeration.

Upon return to Moss Landing Marine Laboratories, Chain of Record (COR) documents were maintained for each sample type. IDORG (a unique identification number for only that sample), station numbers and location names, and date collected were included on each sheet. A Chain of Custody (COC) form accompanied every sample so that each person releasing or receiving a subsample signed and dated the form. Sample containers for grain size were placed in a refrigerator (4^oC).

Summary of Laboratory Processing Methods

Samples were fixed in 10% formalin in the field. Formaldehyde penetrates tissue at about 5 mm per day and, after a few days, acidity can begin breaking down small calcareous structures. Because almost all organisms were very small, complete penetration through all tissue was easily completed in 2 days and samples were changed from formalin to a preserving solution of 70% isopropyl alcohol. All samples were stained with rose Bengal, a vital stain that colors animal tissue red. The red color allows animals, particularly small ones, to be more easily recognized and separated from detritus and sediment during sorting. Staining was necessary because of the very large size of samples, great quantity of detritus, and great disparity in animal sizes.

Subsampling

Subsampling of the $0.1m^2$ samples was accomplished by placing all the residues into a large, flat photographic tray marked into 4 equal-sized quadrats for subsampling, a procedure modified from Harrington and Born (1999; see Lazorchak et al., 1999). The sample was gently agitated until equally distributed across the tray. Most of the alcohol was then drawn off the sample by suctioning with a turkey baster from the center of the tray until the sample was immobile within the tray. Animals that were drawn up with the alcohol were caught on a screen guard and returned to the center to the tray. A flat plastic blade was used to draw the sample in from the sides of a randomly selected quadrat until the sample was concentrated into the corner of the selected quadrat, away from the other three quadrats. This isolated portion of the entire sample was the one-quarter quantitative subsample. It was then sorted by standard sorting procedure. After thorough sorting of the one-quarter fraction was completed, the three-quarters faction was redistributed in the tray and inspected with a magnifying glass. Any taxa that were not represented in the one-quarter fraction were removed for a qualitative subsample of the remaining three-quarter sample. The remaining residues were archived.

Sorting

High-resolution dissecting microscopes (Wild, Nikon and Olympus) with high intensity (fiber optic) light sources were used to sort the sieved sample materials. Samples were sorted into 1 dm or 2 dm shell vials with airtight plastic stoppers or Wheaton snap-cap vials, also with airtight lids. Some samples needed to be retained in quart or gallon plastic or glass jars. Labels were prepared with underwater paper (which is not affected by water or preservatives) and pencil (which does not break down, fade, or run as some ink does). The embossing affect of pencil is further assurance of permanence. Each label contains the name of the project, site and habitat (piling, side, or underside of dock) for epifauna or station and replicate number for infauna, and date. All samples were always maintained within secondary containers. This was a mandated

human safety procedure, due to alcohol flammability, and also ensured greater protection for the samples in case of a spill.

Epifaunal sample sorting began with swirling the residue and decanting it with the preserving alcohol through a 0.25 mm screen. This screen residue was washed into a Petri dish and the alcohol temporarily stored in a sealed jar. Subsequent swirling first in alcohol and then fresh water brought off increasingly dense residue. Most animals came off with the initial swirls. Since swirling separates things by specific density, not only were most animals separated from most of the residue, but animal groups also tend to separate from each other. This kind of stratification allows sorting to be faster and more accurate. Animals were sorted in water with fine forceps from residue into appropriate size container, mostly 1 dm glass shell vials. They were separated into phylogenetic group: Crustacea, Mollusca, Polychaeta, Echinodermata, and other. A label was placed into each vial and the animals stored in fresh alcohol. Exceptionally large or entangling organisms were separated into a large container within which a smaller vial with the rest of organisms in that group was placed.

Each catalogued sample was processed individually in the laboratory to obtain an accurate assessment of species diversity and abundance. One hundred and sixteen of 373 samples were enumerated by subsampling an aliquot of the original sample. The sample was distributed evenly into a flat pan and divided into four equal parts. One of the four parts was selected randomly for analysis. All macroinvertebrates were sorted from residues under a dissecting microscope, identified to lowest possible taxon, and counted. Laboratory processing of benthic samples consisted of rough and fine sorting. Initial sorting separated animals into large taxonomic groups such as polychaetes, crustaceans, mollusks and other (e.g., phoronids). Bound laboratory logbooks were maintained and used to record number of samples processed by each technician, as well as results of any sample re-sorts, if necessary. Specimens of similar taxonomic groups were placed in vials and labeled internally and externally with project, date collected, station information, and IDORG. In-house senior taxonomists and outside specialists processed and verified the accuracy of species identification and enumeration. All specimens and non-enumerated portions of the samples were archived.

Infaunal samples were processed similarly to epifaunal samples with the major exception that the whole sample was processed. In the absence of bulky epifauna, algae, and foulers, the infauna required no special containers or other treatment. Most sorted samples fit within 1 dm or 2 dm vials. The sample always made up one half or less of the total container volume, the other half or more was preservative fluid (isopropyl alcohol).

QA/QC

Laboratory quality assurance/quality control (QA/QC) procedures have been described in Stephenson et al. (1994). The more important ones are summarized here along with applications specific to this project. The prime quality assurance rests with competent personnel. All workers on this project are associated with academic institutions, experienced laboratory and microscope workers, and familiar with sample management and care. In addition, all were trained on the job to refine their skills specifically to this project. A senior biologist was present and supervised sorting technicians.

Chain of custody of samples was initiated in the field with the log. Chain of custody was maintained in the sorting lab where samples were delivered and logged into the master ledger where each individual sample was recorded. Sample labels in the jars were verified and checked against the master ledger and field log. Sample lists from the field log were entered into computer and new printouts provided after each sampling trip.

Chain of custody extended to taxonomists who were provided vouchers of the sorted samples sent to them, which they used to verify samples received. They signed and returned the vouchers. Finally, data were transmitted from taxonomists electronically and stored as such and also in hard copy form.

Each sorter logged out the replicate to be sorted and recorded it in the master ledger with their initials and date opposite the sample replicate. Many samples were very large and often several entries were required over several days to complete sorting of a given sample. In fact, a number of samples were stored in more than a single jar. Each jar was fully labeled including a note of the total number of jars for that sample. Thus, several sorters often worked on the same sample through different jars, and each jar was recorded as a separate entity in the master ledger.

Following is a summary of our laboratory QA/QC principles:

1. Adherence to chain-of-custody procedure with written documentation to sample condition, location, and status.
2. Instructions to sorters and taxonomists on project objectives, sample handling, sorting procedures, and taxonomic procedures.
3. Check points of sample fidelity to schedule of progress.
4. Instrument maintenance.
5. Proper supply availability.
6. Competent and experienced laboratory personnel.
7. Professional expertise of taxonomists.
8. Efficiency checks and verification of sample progress. Includes checks on sorting technique, efficiency, accuracy, productivity, taxonomic determination, and compliance with established protocols such as labeling, sample storage, supply use and equipment functioning.

The most vulnerable point in the sample processing was during sorting, when the sample was open and exposed. Samples were processed over safeguard trays, large photographic trays that could contain spills so contents of jars, dishes, and other containers subject to spilling were always protected by an underlying tray. Transfer of alcohol to water always took place over the trays. No spills occurred. All samples were stored in glass or plastic containers, grouped by station or taxon and placed within secondary containment vessels of plastic.

Samples were grouped by phylogeny for convenience in sending to taxonomists. The primary categories were tunicates, bryozoans, sponges, polychaetes, echinoderms, crustaceans, and molluscs. Specimens from the first four categories were sent to taxonomists in well protected, sealed containers within cardboard boxes, picked up by FedEx at the lab, and shipped by overnight or 2 day delivery. Included within the shipments were QA sheets identifying the sender, recipient, and listing the samples by project, station and date. A copy of the shipment

form was kept on file in our lab. Delivery of samples was confirmed by phone. No problems were encountered.

Archiving
All samples, including sorted and partially sorted samples, are archived within the Moss Landing Marine Laboratories storage facilities. Many more epifaunal samples were taken than were needed to develop thorough species lists. Oversampling is a reasonable precaution if the diversity and abundance of the fauna is not predictable, as was the case in this project. Unsorted samples will be archived with the rest of the processed samples where they are available for processing if it is determined that more data are required.

Summary of Methods for Humboldt Bay Fouling Plates
In order to study patterns of recruitment, succession, and changes in species composition of subtidal marine communities through time, two sets of artificial "fouling" panels were deployed below the dock at Woodley Island Marina in Humboldt Bay, CA. This work in Humboldt Bay was conducted as a supplement to similar work being conducted in San Francisco Bay and San Diego Bay by the Smithsonian Environmental Research Center (SERC). Each set of artificial panels consists of 20 (4 x 6 in) ABS black plastic sheets bolted (with stainless steel hardware) to a PVC pipe frame deployed 2 ft below the dock such that all panels are oriented horizontally below the "shade" of the dock. The first set of 20 artificial panels, deployed in February 2001, were designed to record newly arrived recruits of various marine invertebrates each month to determine which species are present and competent to settle in the water column. These panels were then scraped clean to ensure free substrate is continually available for settlement of marine larvae each month. These will be called "recruitment" panels henceforth.

The second set of settlement panels, deployed on the same day in February 2001, were allowed to become "fouled" and have remained unaltered to allow the establishment of an invertebrate community which can be followed through time. This second set of twenty panels, henceforth termed "undisturbed panels", thus allows us to record seasonal fluctuations in species abundance and composition, and compare any increases in population size of a given species to increases in larval input seen on the "recruitment" panels.

A third set of 20 artificial panels were deployed in July 2001 to take advantage of a fortuitous event in which an introduced species of the bryozoan *Watersipora* was found to have settled in significant numbers on our "recruitment" panels. We took advantage of this natural event by replacing the "recruitment" panels with a new set of 20 panels so that we could follow the growth and fate of *Watersipora* from July 2001 onwards. Hence the third set of "*Watersipora*" panels represent another set of unaltered panels, but differ from the first set by both deployment date (February versus July) and the species initially present (*Watersipora* has yet to be found on the initial "undisturbed" set begun in February).

Each month, all three sets of panels were retrieved and returned (immersed in seawater in Tupperware containers) to the Telonicher Marine Lab (Trinidad, CA) for close examination. Each panel was then censused photographically, using a Nikon Coolpix 995 digital camera to photograph the entire surface and allow us to digitally "zoom in" on the image (which is 3 million pixels in size) when displayed on an IBM Compatible Personal Computer. This

technology allowed us to identify and quantify the size of both large and small solitary and colonial marine invertebrates easily (using the image-analysis software package Image Pro Plus), while saving costs involved with standard photographic techniques (including film & development costs). In addition, we used an Olympus SZ9 Microscope with attached DP11 2.5 mega-pixel digital camera to take photographs of individual invertebrate larvae. This allowed identification of newly settled and/or metamorphosed individuals that cannot be identified in the "whole panel" photos. Examination in the laboratory allowed us to key out invertebrate species that have not been previously identified, as well as photograph key features (such as skeletal morphology of bryozoan zooids) in order to consult with taxonomic experts so we can identify all species.

Summary of Fish Collection and Analysis

Fish were collected using the appropriate gear for the desired species and existing water conditions. Three different methods of capture were used: minnow traps, fyke nets, and electrofishing. Fish caught during this study were identified in the field whenever possible, but were kept as voucher specimens if they could not be readily identified or if they appeared to be an invasive species.

Minnow traps were set in 3 harbors to identify and collect target fish species. The sampling sites included Port Hueneme, Los Angeles, and Long Beach harbors. Ten weight filled traps were set within each port, at varying harbor regions, by tying off a long line to either riprap or undisturbed pier structures. Traps were baited with cat food, deployed overnight and recovered the following day.

Fyke nets and eloctroshocking methods were used for sampling in the Sacramento and Stockton Delta regions. The electrofisher boat crew, once on site, adjusted the voltage, amps, and pulse for the ambient water, and then proceeded to electrofish within the sample area. The shocked target fish were captured with a nylon net and placed in a steel well with circulating ambient water. Fish were identified, recorded, and then released or kept as voucher specimens.

Fyke nets, consisting of six-36 inch diameter hoops connected with 1 inch square mesh net, were used to collect bottom feeding fish. The net was placed parallel to shore with the open hoop end facing downstream in areas of slow moving water. A partially opened can of cat food was placed in the upstream end of the net. Between 2-6 nets were placed at a site overnight. Upon retrieval, a grappling hook was used to pull up the downstream anchor. Captured fish were identified and recorded; fish were then released or kept as voucher specimens. Every effort was made to identify fish in the field. When this was not possible, the fish in question were identified by taxonomist at Moss Landing Marine Laboratories.

Summary of Sampling and Analysis of the Plankton Community

Plankton samples were collected seasonally (4 times/year) within four different harbors (Figure 6). Quarterly vertical plankton tows from bottom to the surface were done in San Diego, Los Angeles, and Long Beach harbors. Quarterly ten-minute oblique plankton tows traversing the water column were done in Humboldt Bay. Six plankton samples were collected each quarter, in each harbor, using a 150 µm mesh zooplankton net. The net was rinsed with ambient seawater,

ensuring that all biological material was washed into the cod end of the net. Samples were then washed into a labeled glass or high density polyethylene (HDPE) containers and were preserved in a 5% formalin solution. Plankton material was stored for taxonomic identification.

In the laboratory, each sample was washed in fresh water through a 73 µm sieve to remove preservative and place its entirety in a glass Petri dish. The sample was examined with a dissecting microscope at approximately 10X power, and all large organisms (e.g., mysids, amphipods) were removed and identified. The remainder of the sample was scanned at approximately 50X power and taxa names were recorded until no new taxa were found. The entire sample was then scanned at approximately 40X power and any rare taxa were recorded. Abundance of each taxon was recorded as follows: abundant (hundreds of organisms), common (tens of organisms), and uncommon (less than 10 organisms).

Summary of Sampling and Analysis for Grain Size

Sediment samples were collected for grain size analysis using a 0.1m² Young-modified Van Veen grab at the four harbors where infaunal samples were taken: Tomales Bay and the ports of Hueneme, Sacramento, and Stockton. Modifications include a non-contaminating Tefzel® coating which covers the grab's sample box and jaws. Between stations, the grab was rinsed with seawater. The top 5 cm of sediment was subsampled and placed in a clean, labeled 125 ml glass jar for grain size analysis

The analysis procedure combined wet and dry sieve techniques to determine particle size of sediment samples. Methods follow those of Folk (1974). The sediment sample size was approximated between 50 and 100g, less being used when duplicates were required. Subsamples were placed in clean, pre-weighed beakers. Debris was removed and any adhering sediment was washed into the beaker.

Beakers were placed in a drying oven and sediments were dried at less than 55°C until completely dry (approximately three days). Sample beakers were placed in an ultrasonic cleaner for 15 minutes of de-aggregation. Sediment dispersant slurry was poured into a 63 µm (ASTM #230, 4 phi) stainless steel or brass sieve in a large glass funnel suspended over a 1 l hydrometer cylinder by a ring stand. All fine sediments were washed through the sieve with water. Fine sediments were captured in a 1 l hydrometer cylinder. Coarse sediments remaining in the sieve were collected and returned to the original sample beaker for quantification.

The coarse fraction was placed into a pre-weighed beaker, dried at 55-65° C (approximately three days), allowed to acclimate to room temperature, and then weighed to 0.01 g. This weight minus the empty beaker weight gave the coarse fraction weight. The coarse fraction was poured into the stack of ASTM sieves in the following order (sizes): No. 10 (2.0 mm), 18 (1.0 mm), 45 (0.354 mm), 60 (0.250 mm), 80 (0.177 mm), 120 (0.125 mm), and 170 (0.088 mm). The stack was placed on a mechanical shaker and shaken at medium intensity for 15 minutes. Sieve fractions were added cumulatively to a pre-weighed dish, and cumulative weight after each addition was determined to 0.01 g. Fractional weights and percentages for the sieve were calculated using custom written software on a Macintosh computer. Calibration factors were stored in the computer. All raw data is preserved on hard copy and filed.

Summary of Photographic Database

While on station, representative pictures were taken of both species and community structure from the sampled substrate. At most sites, before the substrate was disturbed, underwater pictures were taken with a Nikonos V (28mm lens and external close-up kit) and Nikon strobe, using 100 ASA slide film. When unique species were found, pictures were taken out of the water with a Kodak DC120 digital camera. Underwater slides were converted onto a Kodak digital science photo CD, while digital pictures were burned onto CDs within the lab. Thumbnail pictures, as well as relevant sample and species data are maintained in a photo database. The photo CDs are stored at MLML/MPSL as a reference for the photo catalogue program, Extensis Portfolio 5.0 Desktop.

RESULTS AND DISCUSSION

Summary of Literature Review

The comprehensive literature review produced a master taxa list of 484 coastal species, including 292 introduced species, 178 cryptogenic species and 14 nativeX species. Valuable information has been retained for each taxon such as native range, introduction range, entry date, introduction vector (if known), and any other pertinent comments on each species. An abbreviated version of selected species from the master taxa list is shown in Table 1, but all information is not presented

Table 1. Selected species and related information from the master taxa list.

Phylum	Crustacea	Crustacea	Porifera	Mollusca
Class	Peracarida	Malacostraca	Demospongiae	Gastropoda
Species Name	*Phtisica marina*	*Grandidierella japonica*	*Halichondria bowerbanki*	*Philine auriformis*
Taxon Status	Introduced	Introduced	Introduced	Introduced
Introduced From	Caribbean	Japan	North Atlantic	New Zealand
Introduced To	Port Hueneme	CA coast	Northern CA, Sacramento/Stockton Delta	SF Bay
First Observation	2001	1980	1950	1920
Source	Moss Landing Marine Laboratories	http://nas.er.usgs.gov; Cohen, A.N., and J.T. Carlton, 1995	http://nas.er.usgs.gov, Cohen, A.N., and J.T. Carlton, 1995	http://nas.er.usgs.gov
Documentation	Peter Slattery pers. Comm.	Chapman & Dorman, 1975; Carlton, J.T., 1979a	Smith 1896; Shebley 1917; Neale 1931; Moyle 1976a; Wydoski and Whitney 1979; Smith 1982	Cohen, A.N., and J.T. Carlton, 1995; Carlton, J.T., 1979a;Hanna, G.D., 1966; Hopkins, D.R., 1986; Gosliner, TM, 1995
Comments	Newly found in CA. Species is from the Caribbean.		Synonym: Halichondria coalita. It was likely introduced with Atlantic oysters or as a fouling organism.	Found in Humboldt, but unknown if established there, very dominant and established in SF.

due to the extensive size of the completed table. The complete table is available in soft copy in the Introduced Species Survey MS ACCESS database. Species represent all major taxonomic groups, including Algae, Annelids, Bryozoans, Cnidarians, Crustaceans, Mollusks, Fishes (Osteichthyes), and Sponges (Porifera). Species documentation was collected from historical documents as well as current research, producing a list that encompasses data from the early 1800's through the present survey. An extensive bibliography is also available in the database.

Terminology

Standardization of terms used in this study is crucial because many descriptors were encountered that describe species' biogeography as being either native, including pre-historical invasions (Carlton, 1996), introduced, invasive, or cryptogenic (Cohen and Carlton, 1995). Because most literature does not use a standard definition in describing the analogous terms "introduced", "exotic", and "non-indigenous" species, some assumptions must be made. This report used the definition of Boudouresque and Verlaque (2002), as they categorize an introduced species with these four succinct points:

> "1) It colonizes a new area where it was not previously.
> 2) The extension of range is linked, directly or indirectly, to human activity.
> 3) There is a geographic discontinuity between native area and new area (remote dispersal).
> 4) Finally, new generations of the non-native species are born in situ without human assistance, thus constituting self-sustaining populations: the species is established."

In addition, the classification as "introduced" species used in this study, will only refer to innocuous introductions. A cryptogenic species is defined as "a species that is not demonstrably native or introduced" (Carlton, 1996). Cryptogenic is used as a catchall category for species with insufficiently documented life histories to allow characterization as either native or introduced. As has been suggested by Carlton (1996), cryptogenic species are quite common, but have been underestimated to such an extent as to misshape our understanding of the true effects that invasions have on the eco-system.

After careful consideration, the above terms "introduced", "cryptogenic" or "native" were assigned to each species, based on all available documentation. The native designation is surprisingly troublesome to use because species that have been historically reported as native in southern California, may not have been historically native in northern California, and vice versa. In the current survey, native California species were identified in areas where they have not been previously reported (e.g., southern California species were found in Humboldt Bay). There is no way to convincingly state whether the new identification is a result of this survey sampling previously unsampled habitats, whether it is a natural range extension, or whether it is from an anthropogenic introduction. Considering the physical impediments to major natural range expansions in California, it is likely that many of these new identifications are a result of recent intrastate vessel activity, but proof is lacking. To note this disparity, these species have been flagged as "nativeX" to note that they are native to California, but that they are being identified in this survey in areas where not previously reported. The body of this report focuses only on introduced, cryptogenic and nativeX species, and does not report on true native species within their historic range. These assigned terms of introduced, cryptogenic and nativeX should not be considered as static, but instead should be modified as research continues and taxonomy and vectors of introduction are better resolved.

Specimens that could not be identified beyond the genus level (eg- *Brania sp. 1*) and could not be confidently classified as introduced, cryptogenic or nativeX were assigned an "unknown" status. Specimens that could not be identified beyond the family, class, or order level (eg- Capitellidae) were designated as not assignable (N/A) in the database. These specimens will require additional taxonomic resolution before their status can be confidently assigned. It is however important to include these specimens in our reporting because they may include unrecognizable new species or represent significant range extensions.

An additional term used to describe some biota in the literature is "invasive". An invasive species includes any introduced species that has caused a disruption to the ecosystem resulting in damage either environmentally or economically. Literature that uses the word "invasive" as a descriptor may use these to designate species with detrimental economic impacts on native populations, while others use the term to simply indicate weedy species that may or may not impact native communities. Our review found that the use of the term was so subjective in the literature that consistent application of the term was impossible. To avoid the mixing of poorly clarified uses of the subsequently ambiguous term "invasive", it was not used in this report.

Summary of Historical Monitoring Data for Infauna

In addition to the literature review, a review was conducted of the infaunal data from recently completed California coastal monitoring programs. An infaunal species list from each of these programs was compared to our master taxa list to identify introduced, cryptogenic, and native infaunal species. A total of 157 cryptogenic, introduced, and native species with possible range extensions were identified from historic data sets from the Southern California Bight Pilot Project (SCBPP), Southern California Bight 1998 Regional Marine Monitoring Survey (Bight'98), Bay Protection and Toxic Cleanup Program (BPTCP), and the Western Environmental Monitoring and Assessment Program (WEMAP). Most of these species were polychaetes (n=98), amphipods (n=26), or bivalves (n=12). Bight'98 (n=107) and WEMAP (n=98) had the highest total number of cryptogenic, introduced, and nativeX species. The highest number of cryptogenic species was found in the Bight'98 (n=71) and WEMAP (n=64) data sets. The BPTCP had the highest number of introduced species (n=35); however, Bight'98 (n=31) and WEMAP (n=30) almost had as many introduced species. Table 2 gives an abbreviated version of species identified from the historical infaunal data sets, but only selected species are presented due to the extensive size of the complete table. This table is an alphabetical list of the infaunal cryptogenic, introduced, and nativeX species identified and the surveys from which it was found. The complete table is available in Appendix A and also as soft copy in the Introduced Species Survey MS ACCESS database. Also in Appendix A is a list of unresolved taxa that could not be confidently categorized as cryptogenic, introduced, nativeX or native. These specimens could only be resolved to genus level, but are from genera that a high probability of being classified as introduced or cryptogenic. These unresolved taxa were flagged to ensure that future studies recognize the probability that these specimens may represent introduced or cryptogenic and that further taxonomic resolution could resolve the uncertainties.

Comparisons among the four data sets are difficult because sieve size (0.5 mm vs. 1.0 mm), sample surface area (0.0075 m^2 vs. 0.1 m^2), sample size, location (Southern California vs. whole state), sample design (probability-based vs. targeted), time, and depth varied across programs. Bight'98 had the highest overlap of cryptogenic species with WEMAP (n=45) and SCBPP

(n=42). The highest overlap of introduced species occurred between Bight'98 and WEMAP (n=21), but BPTCP and WEMAP (n=18) and Bight'98 and BPTCP (n=16) had relatively high overlap compared to the other possible comparisons (n≤10). Eighteen cryptogenic, four introduced, and one native species with possible range extension occurred in the four datasets. The infaunal data from the four datasets can be found in the MS Access database named HistoricInfauna.mdb.

Table 2. Historical Infaunal Data Summary.

Introduced (I), cryptogenic (C), and native species with possible range extension (nativeX) identified from Southern California Bight Pilot Project (SCBPP), Southern California Bight 1998 Regional Marine Monitoring Survey (Bight'98), Bay Protection and Toxic Cleanup Program (BPTCP), and the Western Environmental Monitoring and Assessment Program (WEMAP) historical data sets. Species name, Class/Order, and classification are based on the master taxonomic list in this report.

Class/Order	Name	SCBPP	BIGHT'98	BPTCP	WEMAP
Gastropoda	*Alderia modesta*		C		C
Amphipoda	*Ampelisca abdita*			I	
Amphipoda	*Ampelisca agassizi*	C	C	C	
Polychaeta	*Ampharete acutifrons*	C	C		C
Polychaeta	*Ampharete cf. goesi*		C		
Ophiuroidea	*Amphipholis squamata*	C	C		C
Amphipoda	*Ampithoe lacertosa*				C
Amphipoda	*Ampithoe valida*			I	
Polychaeta	*Anobothrus gracilis*	I	I	I	
Amphipoda	*Anonyx cf. lilljeborgi*	C	C		
Polychaeta	*Aphelochaeta monilaris*	C	C	C	C
Amphipoda	*Argissa hamatipes*	C	C	C	
Polychaeta	*Aricidea (Acmira) catherinae*	C	C	C	C
Polychaeta	*Aricidea (Acmira) horikoshii*	C	C	C	C
Polychaeta	*Aricidea (Acmira) lopezi*	C	C		
Polychaeta	*Aricidea (Aricidea) wassi*	C	C	C	C
	Total cryptogenic in dataset	44	71	47	64
	Total introduced in dataset	12	31	35	30
	Total nativeX in dataset	4	5	1	4

Summary of Field Surveys and Taxonomic Identifications

A total of 430 epifaunal samples were collected from 19 harbors and bays in the current survey. Station position and sampling information for each location are given in Appendix B. Infaunal samples were collected from seven locations in Tomales Bay and twenty-five locations in Port Hueneme (Figure 2). Epifaunal samples were collected from 205 locations in nineteen harbors and bays (Figures 3 and 4), primarily from pilings, docks and the undersides of floating structures. From those samples, 818 species were identified, of which 84 species were classified as introduced, 84 species as cryptogenic, 7 species as nativeX, and 642 species as native. One hundred and ninety four specimens could not be taxonomically resolved at a level to

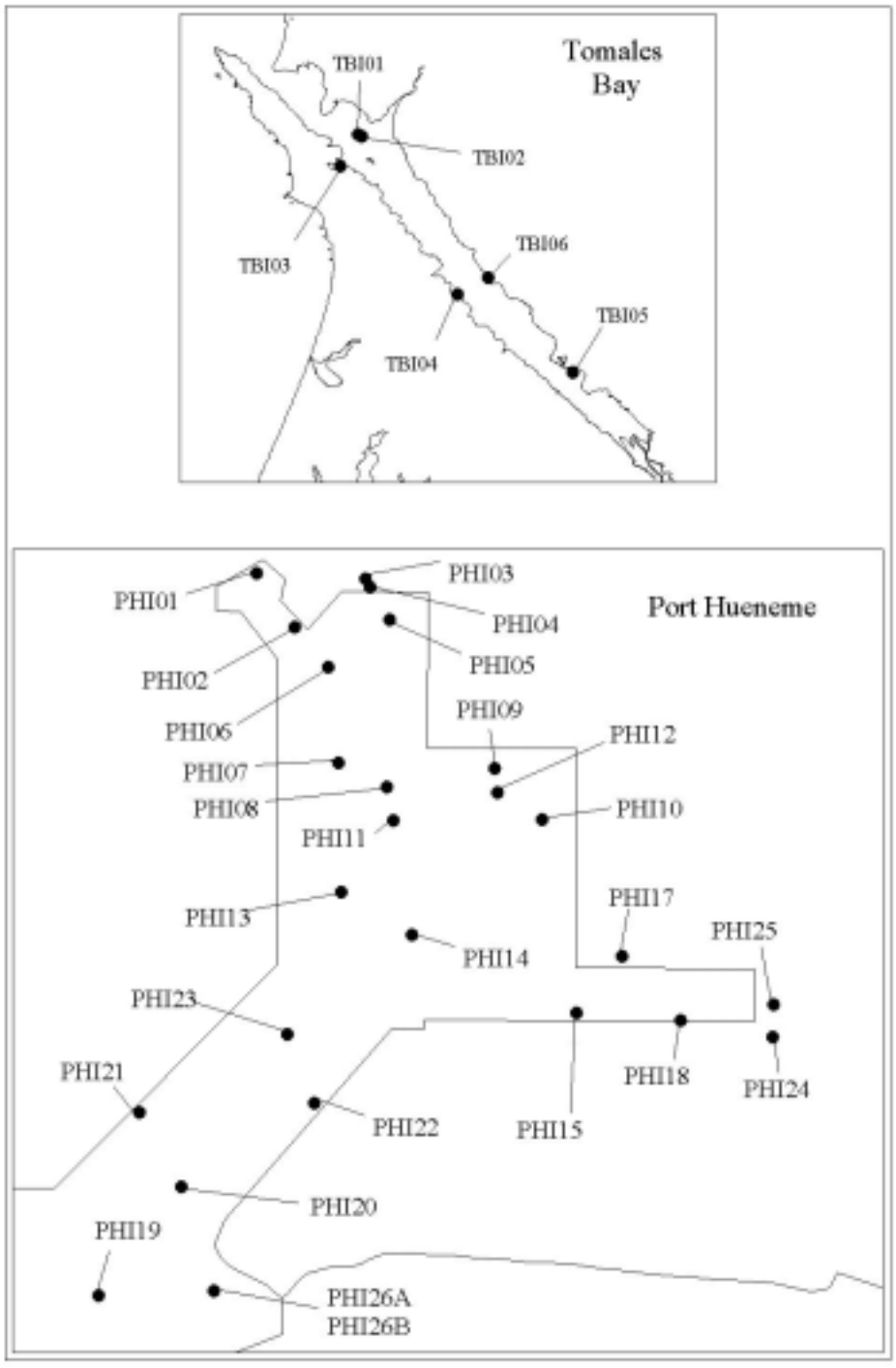


Figure 2. Infuana samples collected from Tomales Bay and Port Hueneme.

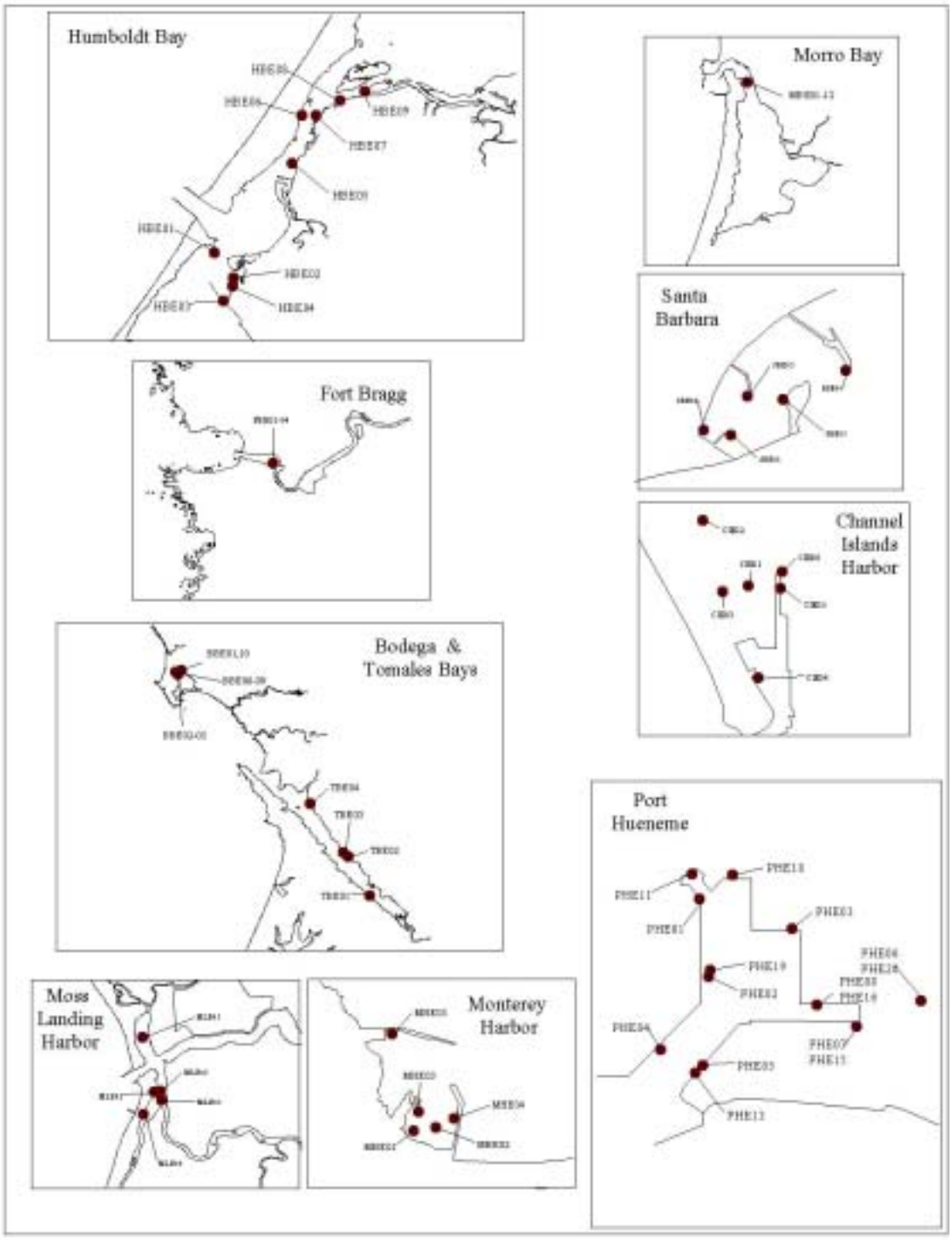


Figure 3. Epifuanal samples collected from Humboldt Bay to Port Hueneme.

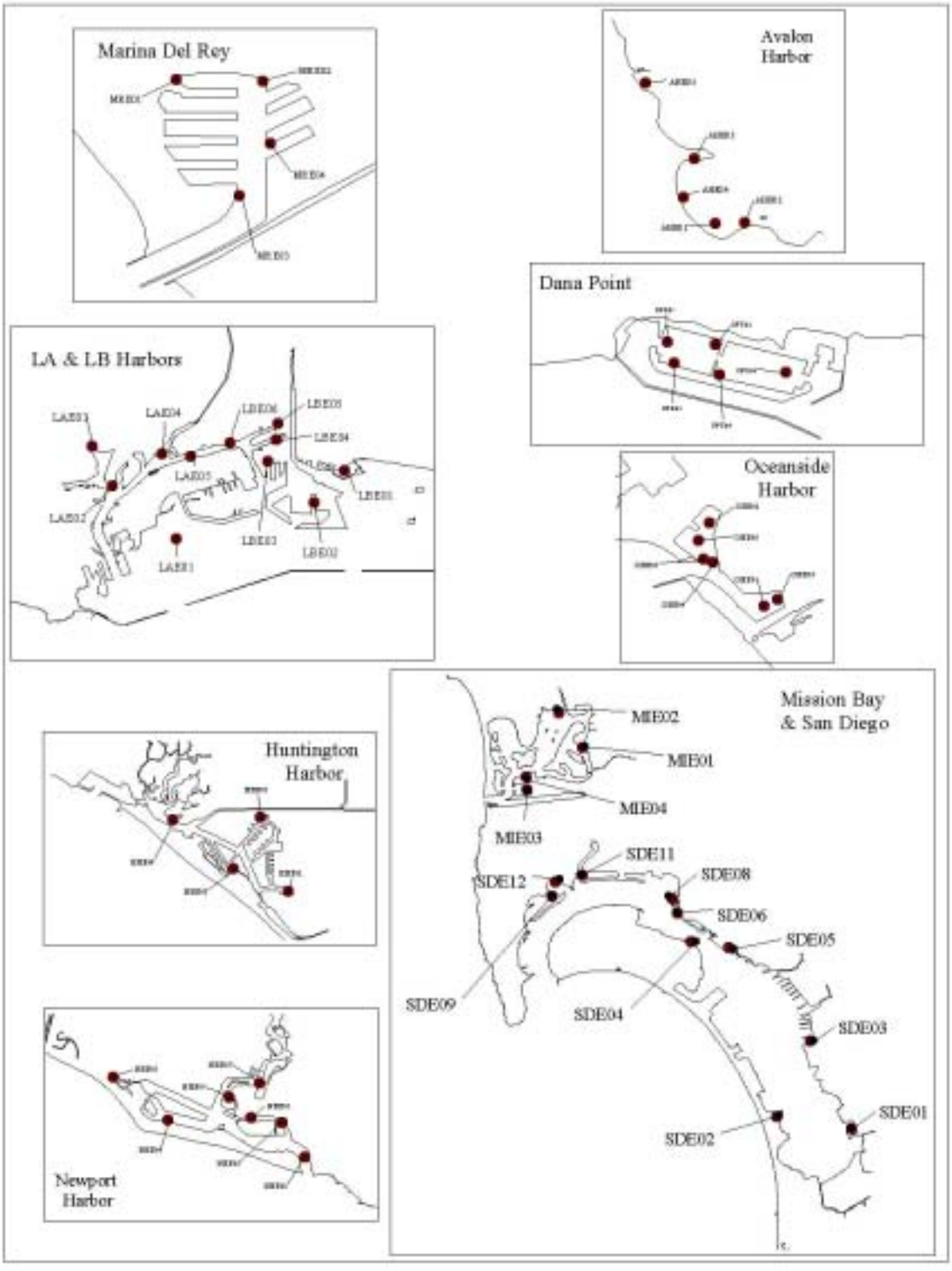


Figure 4. Epifuanal samples collected from Marina Del Rey to San Diego Bay.

confidently determine the appropriate classification, so were classified unknown. The compiled database (MS Access) gives detailed information for all samples, sampling information and all species identified (including true natives), and is available through Moss Landing Marine Laboratories.

Figure 5 shows a gradual change in the composition of Native epifaunal species from south to north, but this geographic trend is not present for Introduced or Cryptogenic species. . Similarities between sites and clusters of sites are based on Bray-Curtis coefficients using group average linking. Groupings for introduced species shows the highest between site similarities and correlate well with geographic location. The cluster diagrams indicate that Fort Bragg is distinct but this is primarily due to the very small sample size. The two freshwater systems (Sacramento and Stockton) cluster together, as expected. Finally, there is no geographic pattern in the abundances observed for the epifauna. Santa Barbara and Channel Islands had the highest frequency of occurrence of abundant taxa while Los Angeles, Long Beach, and Huntington had the next highest.

Summary of Relative Species Abundance

The approach used here to determine abundance was to combine all the stations within a harbor to classify each species' relative abundance. All occurrences of a particular species within that harbor generally were assigned the same relative abundance code. Due to the limited number of samples, no attempt was made to assess within-harbor spatial differentiations in abundance. For "harbor" determination, the first three letters of the Station Code were grouped, and epifaunal stations were grouped separately from infaunal stations at the same harbor.

Within this overall approach, determining the relative abundances for the main taxonomic groups were approached somewhat differently. Under the best of circumstances, comparisons of diverse taxonomic groups is difficult, since abundances of some groups are best determined using a percent cover or similar method (sponges, tunicates, bryozoans), while direct counts of individuals work best for other phyla (molluscs, polychaetes, echinoderms, crustaceans). For the same reason, the thresholds for classification into the three relative abundance codes (rare, common, abundant) were different between phyla.

Because we were attempting to derive a feel for abundance from samples collected, sorted and processed in both quantitative and qualitative fashion, all of the threshold levels, and the entire approach, can be second-guessed. However, we feel satisfied with the results, and are confident that the relative abundances are generally representative of the impression an experienced observer would get after some time spent exploring an area.

The relative abundance categories are defined as follows:
Rare: a rare species would be found in a small percentage of the habitats examined, and generally would have low numbers of individuals or percent cover.
Common: a common species would be relatively easy to find, and often would occur in significant numbers.

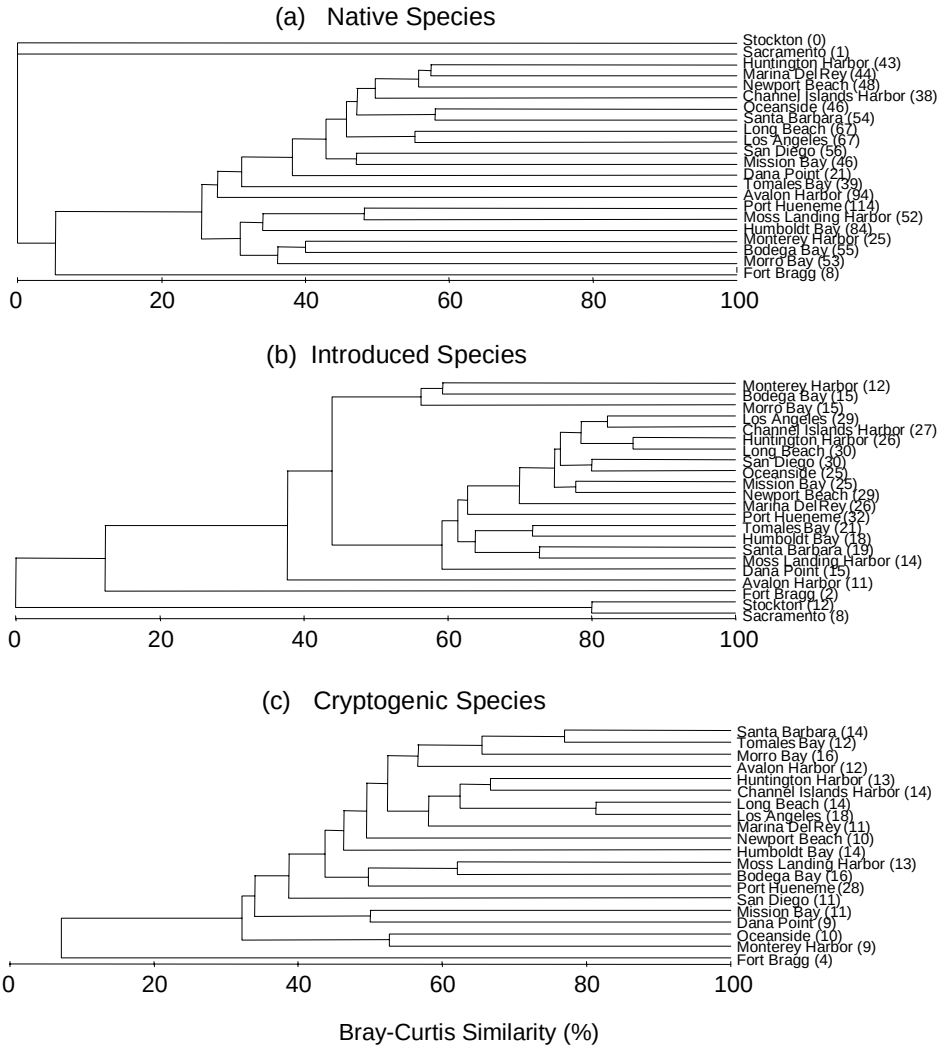


Figure 5. Similarity Dendograms. Dendograms showing groupings of similarity of (a) native, (b) introduced and (c) cryptogenic species between sites. Numbers in parentheses represent the number of species of each type recorded from each site.

Abundant: an abundant species would be widespread within the area, would probably be one of the first species noticed, and would often occur in high numbers or high density.

Below are the criteria used for determining relative abundance for the following taxonomic groups: Molluscs, Echinoderms, Crustaceans, and Polychaetes. The relative abundance codes were determined using both numbers of stations of occurrence and total numbers of individuals for each species. Six categories were used. One point was assigned if the critical level was exceeded in any category. If a species totaled 0 or 1 point, it was considered rare; 2 to 4 points, common; 5 or 6 points, abundant. The categories were as follows:
Occurs in greater than 40% of the stations.
Occurs in greater than 65% of the stations.
Occurs in all the stations.
Averaged more than 20 individuals per station.
Averaged more than 40 individuals per station.
Any one station contained more than 100 individuals.

Tunicates: The relative abundance codes were based on presence/absence of the species and were weighted by abundance. If individual stations had elevated numbers, they were elevated to the next group. If a species (or group) was found in 60% or more of the locations in a harbor or had highly elevated numbers in at least half the samples from the harbor, it was considered abundant. If the species was found in at least 50% of the locations in a harbor, or had elevated numbers at some locations, it was called common. If the species was found in less than 50% of the samples it was considered rare.

Bryozoans: The relative abundance codes were determined by combining presence/absence and the volume of material (measured in a graduated cylinder) in each sample. If multiple samples/sort types (mussel sorts, scrapes) were present from a particular station, they were combined and weighted according to the sample type. If a species (or group) was found in 60% or more of the locations in a harbor or had highly elevated numbers in at least half the samples from the harbor, it was considered abundant. If the species was found in at least 50% of the locations in a harbor, or had elevated numbers at some locations, it was called common. If the species was found in less than 50% of the samples, it was considered rare.

Sponges: Where sponge species (or group) were found in 80% of the examined samples they were considered abundant. Because it was not possible to weight sponges by counts of individuals, due to their colonial nature, the relative abundance codes were based solely on presence/absence of the species. The determination was made to be conservative with this group and raise the threshold to a higher level of confidence (80% rather than 60%) before assigning abundant status. If the species was found in at least 50% of the samples, it was called common. If the species was found in less than 50% of the samples, it was considered rare.

The relative abundance of identified species from the epifaunal and infaunal samples collected during current survey is given in Appendix C. Relative abundances for all identified species in all harbors and water bodies can be found in the MS Access database. An example of some the data presented in Appendix C is shown in Table 3.

Table 3. Examples of relative abundance designations for selected species.

Phylum	Taxon	TaxonStatus	Total Harbors Observed	Humboldt Bay	Monterey Harbor	Morro Bay	Santa Barbara	Port Hueneme	Los Angeles	Newport Beach	San Diego
Annelida	*Harmothoe imbricata*	Cryptogenic	5	R		R	R	R	C		R
Bryozoa	*Cryptosula pallasiana*	Introduced	7	R	R	C	R	R	C	A	R
Crustacea	*Ampithoe lacertosa*	Cryptogenic	4	R		R	R		R		R
Mollusca	*Hiatella arctica*	NativeX	1					R			
Porifera	*Leucosolenia nautilia*	Native	5			C	R	A	R	R	

Summary of Field Surveys

Introduced epifaunal species across the state ranged from a low of two species at Fort Bragg to a high of 31 species from Port Hueneme. These introduced species represent 6% to 25% of the total taxa in each water body from Humboldt Bay southward to San Diego Harbor. Three of the introduced species have not been previously documented in California, two being isopods (*Munnogonium wilsoni* and *Pleurocope floridensis*) and the other a caprellid amphipod (*Phtisica marina).* Cryptogenic species ranged from four to 28 species from the harbors across the state, representing 7% to 20% of total taxa. Seven nativeX species were identified, representing 1% to 2% from all harbors, except Fort Bragg and Monterey harbor; this may represent range extensions of a native species. Native species ranged from a low of 8 species at Fort Bragg to a high of 111 species at Port Hueneme, representing 31% to 53% of the total taxa. Unknown taxa ranged from six to 112 species, representing 24% to 39% of total taxa in each harbor. Specimens classified as unknown were most often a result of insufficient taxonomic resolution at the species level. Although genus level identification was possible with these specimens, the genera included both native and introduced species, making any other classification imprudent without additional taxonomic specificity. This large percentage of unknown specimens points to the difficulty facing taxonomists when evaluating introductions throughout the world and the need for continued basic research on resolving taxonomy of marine species.

Table 4 details the number and percentage of species within each classification for all harbors surveyed across the state. The percentage of species in each classification is remarkably consistent moving north to south indicating that there are no discernable trends in introductions with latitude or area sampled. In most harbors, the majority of species were found to be native, but combined introduced and cryptogenic species often exceeded a third of the species present.

Although infaunal samples were collected from two very different sedimentary environments, the relative proportions of native and introduced species were similar for both harbors (Table 5). A relatively lower percentage of taxa were introduced or cryptogenic in the infaunal samples when compared to the epifauna samples, indicating epifaunal communities may be more susceptible to introductions than infaunal communities (Tables 4 and 5).

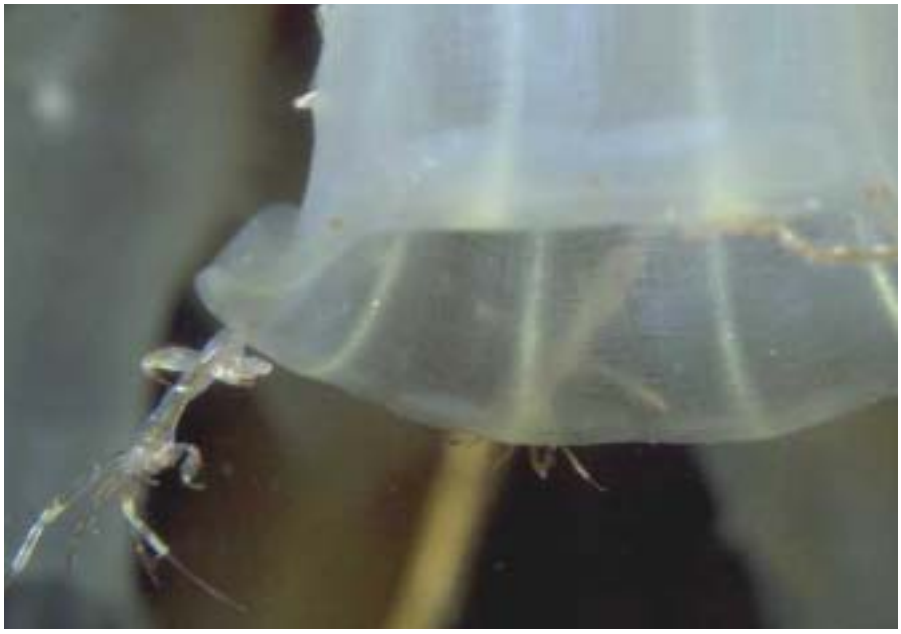
Table 4. Number of epifaunal species and percentage of total taxa for each classification.

Water Body	Total Taxa	Introduced	Cryptogenic	Native	NativeX	Unknown
Humboldt Bay	**159**	18 (11%)	14 (9%)	82 (52%)	2 (1%)	43 (27%)
Fort Bragg	**20**	2 (10%)	4 (20%)	8 (40%)		6 (30%)
Tomales Bay	**99**	21 (21%)	12 (12%)	38 (38%)	1 (1%)	27 (27%)
Bodega Bay	**131**	15 (11%)	16 (12%)	53 (40%)	1 (1%)	46 (35%)
Moss Landing Harbor	**121**	14 (12%)	13 (11%)	51 (42%)	1 (1%)	42 (35%)
Monterey Harbor	**72**	12 (17%)	9 (13%)	25 (35%)		26 (36%)
Morro Bay	**135**	15 (11%)	16 (12%)	51 (38%)	2 (1%)	51(38%)
Santa Barbara	**120**	18 (15%)	14 (12%)	53 (44%)	1 (1%)	34 (28%)
Channel Islands Harbor	**118**	27 (23%)	14 (12%)	36(31%)	2 (2%)	39 (33%)
Port Hueneme	**285**	31 (11%)	28 (10%)	111 (39%)	3(1%)	112 (39%)
Marina Del Rey	**108**	26 (24%)	11 (10%)	42 (39%)	2 (2%)	27 (25%)
Los Angeles	**159**	29 (18%)	19 (12%)	64 (40%)	2 (1%)	45 (28%)
Long Beach	**156**	29 (19%)	15 (10%)	66 (42%)	1(1%)	45 (29%)
Avalon Harbor	**175**	11 (6%)	12 (7%)	92 (53%)	2(1%)	58 (33%)
Huntington Harbor	**122**	26 (21%)	13 (11%)	43 (35%)	1 (1%)	39 (32%)
Newport Beach	**123**	29 (24%)	10 (8%)	46 (37%)	2 (2%)	36 (29%)
Dana Point	**59**	15 (25%)	9 (15%)	20 (34%)	1 (2%)	14 (24%)
Oceanside	**110**	25 (23%)	11 (10%)	44 (40%)	1(1%)	29 (26%)
Mission Bay	**113**	24 (21%)	12 (11%)	45 (40%)	1 (1%)	31 (27%)
San Diego	**132**	29 (22%)	11 (8%)	55 (42%)	1 (1%)	36 (27%)

Table 5. Number of infaunal species and percentage of total taxa for each classification.

Water Body	Total Taxa	Introduced	Cryptogenic	Native	Native X	Unknown
Tomales Bay	**118**	10 (8%)	17 (14%)	67 (57%)	2(2%)	22 (19%)
Port Hueneme	**346**	26(8%)	33 (10%)	197 (57%)	2(1%)	88 (25%)

Summary of Mollusc, Echinoderm, and Crustacean Taxonomy



Mollusc- Seven species of introduced molluscs and one species of crytogenic mollusc were identified in the current survey. *Theora fragilas* was quite abundant in Tomales Bay (though rare in Port Hueneme) and the mussel *Mytilus sp.* was abundant in many areas of the state. Three species of *Mytilus* are found in California and *Mytilus galloprovincialis* is introduced and reported as common in southern California, however identification at the molecular is needed for species differentiation. Because of theses taxonomic difficulties, all Mytilus are reported as "*sp*." with the understanding that the geographical distribution of the samples likely includes the introduced species. No introduced mollusc were found in eight harbors though as many as five introduced species were found in Port Hueneme. Introduced species represented 0% to 33% of the total mollusc species in each harbor (Table 6). A single cryptogenic species (*Philine sp*.) was observed in the infaunal community at Port Hueneme and Tomales Bay but constituted a small portion of the total taxa (<5%). Native species of molluscs from the epifaunal habitats represented greater than 35% of the total taxa in all water bodies, except Dana Point where no native species were identified. One NativeX Molluscan species was found in Port Hueneme, representing 6% of the epifauna. The Unknown taxa ranged from 15% to 67% in the epifaunal habitats. Among the two infaunal sampling areas (Tomales and Port Hueneme), Introduced infauna ranged from 6-11%; Native species of mollusc ranged from 61-70%; Cryptogenic infauna varied from 0-4%; and Unknown infauna ranged from 15-31%.

Crustacean- Twenty-seven species of introduced Crustaceans and twenty-four species of cryptogenic Crustaceans were found in the current survey. The introduced Crustacean *Monocorophium* sp. complex and *Jassa* sp. occurred commonly in harbors throughout the state. The *Jassa* sp. complex consists of both native and introduced species but difficulties in

taxonomic differentiation and in clarifying species origins make this genus troublesome to categorize. Additional research will be required to clarify this group.

The caprellid, *Phtisica marina*, was identified throughout Port Hueneme and to our knowledge is the first time this species has been identified in California. Similarly, two new isopods were identified, *Munnogonium wilsoni* and *Pleurocope floridensis*, both originally from the

Table 6. Number of species and percentage of total Mollusca taxa for each classification.

Phylum	Water Body	Sample	Total Taxa	Introduced	Cryptogenic	Native	NativeX	Unknown
Mollusca	Avalon Harbor	Epifaunal	**28**			19 (68%)		9 (32%)
Mollusca	Bodega Bay	Epifaunal	**7**			4 (57%)		3 (43%)
Mollusca	Channel Islands Harbor	Epifaunal	**11**			6 (55%)		5 (45%)
Mollusca	Dana Point	Epifaunal	**3**	1 (33%)				2 (67%)
Mollusca	Humboldt Bay	Epifaunal	**26**	2 (8%)		14 (54%)		10 (38%)
Mollusca	Huntington Harbor	Epifaunal	**11**	3 (27%)		6 (55%)		2 (18%)
Mollusca	Long Beach	Epifaunal	**21**	3 (14%)		12 (57%)		6 (29%)
Mollusca	Los Angeles	Epifaunal	**20**	3 (15%)		10 (50%)		7 (35%)
Mollusca	Marina Del Rey	Epifaunal	**8**			5 (63%)		3 (38%)
Mollusca	Mission Bay	Epifaunal	**15**	3 (20%)		7 (47%)		5 (33%)
Mollusca	Monterey Harbor	Epifaunal	**8**			4 (50%)		4 (50%)
Mollusca	Morro Bay	Epifaunal	**2**			1 (50%)		1 (50%)
Mollusca	Moss Landing Harbor	Epifaunal	**3**			2 (67%)		1 (33%)
Mollusca	Newport Beach	Epifaunal	**8**	2 (25%)		4 (50%)		2 (25%)
Mollusca	Oceanside	Epifaunal	**16**	3 (19%)		7 (44%)		6 (38%)
Mollusca	Port Hueneme	Infaunal	**62**	4 (6%)	1 (2%)	38 (61%)		19 (31%)
Mollusca	Port Hueneme	Epifaunal	**17**	1 (6%)		6 (35%)	1(6%)	9 (53%)
Mollusca	San Diego	Epifaunal	**11**	3 (27%)		5 (45%)		3 (27%)
Mollusca	Santa Barbara	Epifaunal	**8**			5 (63%)		3 (38%)
Mollusca	Tomales Bay	Infaunal	**27**	3 (11%)	1 (4%)	19 (70%)		4 (15%)
Mollusca	Tomales Bay	Epifaunal	**9**	2 (22%)		5 (56%)		2 (22%)

Caribbean, and are introductions that have not been previously documented. *Munnogonium wilsoni* was relatively rare and identified in Long Beach and Los Angeles harbors. *Pleurocope floridensis* was only identified from one location in Avalon Harbor on Catalina Island.

Introduced Crustacean species ranged from a low of three in Monterey Harbor to a high of 16 species in Port Hueneme (representing 8% to 23% of total taxa) (Table 7). Cryptogenic species ranged from two to ten species representing 8% to 20% of total Crustacean taxa in each water body. The epifaunal Unknown taxa ranged from 7% to 22% of the total number of species. A total of two NativeX Crustacean species were found in the epifauna at all harbors, except Fort Bragg and Monterey Harbor. Native species of Crustaceans from the epifaunal habitats varied

43% to 68% of the total species in each harbor from San Diego to Humboldt. In the two infaunal sampling regions, Tomales Bay and Port Hueneme, six and sixteen introduced species were

Table 7. Number of species and percentage of total Crustacea taxa for each classification.

Phylum	Water Body	Sample	Total Taxa	Introduced	Cryptogenic	Native	NativeX	Unknown
Crustacea	Avalon Harbor	Epifaunal	**78**	6 (8%)	7 (9%)	47 (60%)	1(1%)	17 (22%)
Crustacea	Bodega Bay	Epifaunal	**36**	4 (11%)	4 (11%)	19 (53%)	1(3%)	8 (22%)
Crustacea	Channel Islands Harbor	Epifaunal	**35**	8 (23%)	5 (14%)	15 (43%)	2(6%)	5 (14%)
Crustacea	Dana Point	Epifaunal	**21**	4 (19%)	2 (10%)	11 (52%)	1(5%)	3 (14%)
Crustacea	Fort Bragg	Epifaunal	**10**		2 (20%)	6 (60%)		2 (20%)
Crustacea	Humboldt Bay	Epifaunal	**57**	6 (11%)	7 (12%)	38 (67%)	1 (2%)	5 (9%)
Crustacea	Huntington Harbor	Epifaunal	**36**	6 (17%)	6 (17%)	16 (44%)	1(3%)	7 (19%)
Crustacea	Long Beach	Epifaunal	**56**	11 (20%)	6 (11%)	28 (50%)	1 (2%)	10 (18%)
Crustacea	Los Angeles	Epifaunal	**53**	9 (17%)	7 (13%)	28 (53%)	2(4%)	7 (13%)
Crustacea	Marina Del Rey	Epifaunal	**37**	7 (19%)	6 (16%)	18 (49%)	2(5%)	4 (11%)
Crustacea	Mission Bay	Epifaunal	**26**	5 (19%)	2 (8%)	13 (50%)	1(4%)	5 (19%)
Crustacea	Monterey Harbor	Epifaunal	**14**	3 (21%)	2 (14%)	1 (57%)		8 (7%)
Crustacea	Morro Bay	Epifaunal	**46**	7 (15%)	7 (15%)	24 (52%)	2(4%)	6 (13%)
Crustacea	Moss Landing Harbor	Epifaunal	**38**	5 (13%)	4 (11%)	26 (68%)	2(5%)	1 (3%)
Crustacea	Newport Beach	Epifaunal	**37**	8 (22%)	5 (14%)	17 (46%)	2(5%)	5 (14%)
Crustacea	Oceanside	Epifaunal	**31**	5 (16%)	3 (10%)	18 (58%)	1(3%)	4 (13%)
Crustacea	Port Hueneme	Infaunal	**160**	16 (10%)	9 (6%)	103 (64%)	1(1%)	31 (19%)
Crustacea	Port Hueneme	Epifaunal	**108**	14 (13%)	9 (8%)	60 (56%)	1(1%)	24 (22%)
Crustacea	San Diego	Epifaunal	**48**	7 (15%)	5 (10%)	28 (58%)	1(2%)	7 (15%)
Crustacea	Santa Barbara	Epifaunal	**41**	6 (15%)	6 (15%)	23 (56%)	1(2%)	5 (12%)
Crustacea	Tomales Bay	Infaunal	**38**	6 (16%)	7 (18%)	20 (53%)	1(3%)	4 (11%)
Crustacea	Tomales Bay	Epifaunal	**34**	6 (18%)	5 (15%)	17 (50%)	1(3%)	5 (15%)

observed, while seven and nine cryptogenic species, respectively, were observed. In both harbors, this represented <30% of the total Crustacean taxa. There were no observable trends in Crustacean introductions with latitude changes or with the area sampled.

Echinoderm- There was no introduced Echinoderms identified in this survey. Only one cryptogenic species (*Amphipholis squamata*) was identified though it occurred in four harbors (Table 8). Identifiable native species of Echinoderms were generally low from the epifaunal habitats ranging from zero species in five harbors to as many as three species in Port Hueneme and Humboldt Bay. No NativeX species were identified. Unknown specimens were encountered in almost all harbors and occasionally represented 100% of the observed Echinoderms. There were no observable spatial trends because Echinoderms were present in so few samples.

Table 8. Number of species and percentages of total Echinoderm taxa for each classification.

Phylum	Water Body	Sample	Total Taxa	Introduced	Cryptogenic	Native	NativeX	Unknown
Echinodermata	Avalon Harbor	Epifaunal	**6**			2 (33%)		2 (67%)
Echinodermata	Humboldt Bay	Epifaunal	**5**		1 (20%)	3 (60%)		1 (20%)
Echinodermata	Huntington Harbor	Epifaunal	**1**			1 (100%)		
Echinodermata	Long Beach	Epifaunal	**5**		1 (20%)			4 (80%)
Echinodermata	Los Angeles	Epifaunal	**3**		1 (33%)			2 (67%)
Echinodermata	Mission Bay	Epifaunal	**2**					1 (100%)
Echinodermata	Monterey Harbor	Epifaunal	**2**			2 (50%)		2 (50%)
Echinodermata	Moss Landing Harbor	Epifaunal	**1**					1 (100%)
Echinodermata	Newport Beach	Epifaunal	**3**		1 (33%)	1 (33%)		1 (33%)
Echinodermata	Oceanside	Epifaunal	**3**			1 (33%)		2 (67%)
Echinodermata	Port Hueneme	Infaunal	**6**			3 (50%)		3 (50%)
Echinodermata	San Diego	Epifaunal	**2**					2 (100%)

Summary of Polychaete Taxonomy

The polychaete species list is quite typical for the areas and habitats sampled. All of the described species have previously been found along this coast. New species records or range distributions are in most cases the result of recent taxonomic revisions, such as that for the family Cirratulidae (Blake, 2000). Other introduced species have been collected for years but these records remain buried in gray literature. For example, *Typosyllis nipponica* was first found in San Francisco Bay six years ago while *Nicolea* sp. A has been in Los Angeles and Long Beach Harbors over 20 years (L. Harris, pers. rec.).

Despite the wealth of literature dealing with the polychaete fauna of California, finding undescribed native species is still a common occurrence. Therefore, provisional species like *Spinosphaera* sp. 1, collected in Moss Landing and Morro Bay, cannot be evaluated as either native or introduced without direct comparison to the two described and two undescribed species of Spinosphaera (L. Harris, pers. rec.) currently known from California.

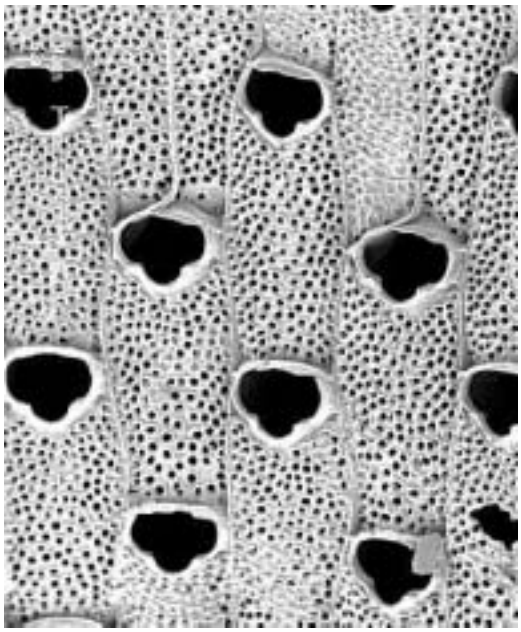
Nine introduced species of polychaete worms were identified from the infaunal and epifaunal habitats. Six of the nine introduced species were observed in Port Hueneme. The difficulties described above regarding poorly described species and limited knowledge of life histories forced many identifiable species into the cryptogenic category. This resulted in 51 species classified as cryptogenic and represented a range 10% to 38% of the total polychaete taxa for the water bodies (Table 9). As expected with this phylum, the numbers of Unknown taxa were high and ranged from 42% to 63% of the total polychaete taxa within a water body. Native species ranged from 13% to 45%. There were no discernable trends with latitude or area sampled.

Among the two infaunal sampling regions (Tomales and Port Hueneme), Introduced species ranged from 2-5% of total polychaete taxa (2- 5 species); Cryptogenic infauna ranged from 18-22% (9-21 species); Native species of polychaetes ranged from 51-56% (28-48 species); one NativeX species was found in Port Hueneme, representing 1% of the infauna; Unknown polychaete infauna ranged from 21-24% (12-20 species) of total polychaete taxa in each water body .

Table 9. Number of species and percentages of total Polychaete taxa for each classification.

Phylum	Water Body	Sample	Total Taxa	Introduced	Cryptogenic	Native	NativeX	Unknown
Annelida	Avalon Harbor	Epifaunal	**36**		5 (14%)	9 (25%)		22 (61%)
Annelida	Bodega Bay	Epifaunal	**65**		12 (18%)	24 (37%)		29 (45%)
Annelida	Channel Islands Harbor	Epifaunal	**38**	2 (5%)	7 (18%)	5 (13%)		24 (63%)
Annelida	Dana Point	Epifaunal	**16**		6 (38%)	3 (19%)		7 (44%)
Annelida	Fort Bragg	Epifaunal	**8**		2 (25%)	2 (25%)		4 (50%)
Annelida	Humboldt Bay	Epifaunal	**38**		5 (13%)	17 (45%)		16 (42%)
Annelida	Huntington Harbor	Epifaunal	**36**		5 (14%)	11 (31%)		20 (56%)
Annelida	Long Beach	Epifaunal	**30**		5 (17%)	8 (27%)		17 (57%)
Annelida	Los Angeles	Epifaunal	**43**	2 (5%)	8 (19%)	13 (30%)		20 (47%)
Annelida	Marina Del Rey	Epifaunal	**32**	4 (13%)	5 (16%)	9(28%)		14 (44%)
Annelida	Mission Bay	Epifaunal	**37**	1 (3%)	9 (24%)	11 (30%)		16 (43%)
Annelida	Monterey Harbor	Epifaunal	**35**	3 (9%)	6 (17%)	9 (26%)		17 (49%)
Annelida	Morro Bay	Epifaunal	**77**	3 (4%)	8 (10%)	24 (31%)		42 (55%)
Annelida	Moss Landing Harbor	Epifaunal	**58**		8 (14%)	17 (29%)		33 (57%)
Annelida	Newport Beach	Epifaunal	**30**	2 (7%)	4 (13%)	8 (27%)		16 (53%)
Annelida	Oceanside	Epifaunal	**19**	1 (5%)	5 (26%)	4 (21%)		9 (47%)
Annelida	Port Hueneme	Infaunal	**95**	5 (5%)	21 (22%)	48 (51%)	1 (1%)	20 (21%)
Annelida	Port Hueneme	Epifaunal	**106**	4 (4%)	17 (16%)	30 (28%)		55 (52%)
Annelida	San Diego	Epifaunal	**24**	1 (4%)	3 (13%)	7 (29%)		13 (54%)
Annelida	Santa Barbara	Epifaunal	**41**		6 (15%)	14 (34%)		21 (51%)
Annelida	Tomales Bay	Infaunal	**50**	1 (2%)	9 (18%)	28 (56%)		12 (24%)
Annelida	Tomales Bay	Epifaunal	**18**		5 (28%)	5 (28%)		8 (44%)

Summary of Bryozoan Taxonomy



Five bryozoan species were identified and classified as introduced in this survey. Four species were classified as cryptogenic. The most commonly encountered introduced species was *Watersipora subtorquata* (d'Orbigny, 1852), which was found in a vast majority of the samples examined and was present in all areas surveyed. In this survey, *W. subtorquata* was often found growing over colonies of indigenous bryozoans such as *Holoporella* (=*Celleporaria*) *brunnea*, which had been reported to be the most common encrusting bryozoan species in the Monterey harbor in 1980 (Morris et al., 1980). Currently in Monterey harbor, *W. subtorquata* is the most conspicuous species on the pilings of piers and wharfs. In Bodega Bay, *W. subtorquata* was present in every sample of bryozoans examined, and was up to 25 times more abundant than any other species of bryozoan in some of the samples. During 2001 in Humboldt harbor, we encountered "reefs" up to 25 cm thick of *W. subtorquata* growing on floating docks that were erected two years prior to the survey. These data indicate that this species is prolific, dominating free space, and perhaps out-competing indigenous species in embayments. Another species from this genus, *Watersipora arcuata* (Banta, 1969), was only identified in Southern California locations from this survey. The apparent pattern of *Watersipora arcuata* being present only in Southern California samples may need to be re-examined as the differences in the sinusoid aperture used for identification are not always distinct, and *W. arcuata* can be mistakenly identified as *W. subtorquata*. It is, however, apparent that these *Watersipora* species, particularly *W. subtorquata*, are very successful introduced species in embayments throughout California, and often dominate the bryozoan fauna and even the entire fouling community in some areas.

Another common introduced species encountered in this survey was *Bugula neritina* (Linnaeus, 1758). This species was found in nearly all areas surveyed, and was the most abundant species in

several samples. It was consistently present in samples collected north of Monterey Bay, which may reflect a range expansion.

The number of Introduced species of Bryozoa ranged from one in Port Hueneme and Avalon to five in and San Diego Harbor, representing from 6% to 100% of total epifaunal taxa in each water body (Table 10). One to two Cryptogenic species were present in the majority of water bodies and represented from 5% to 25% of the total Bryozoa taxa observed. The Unknown taxa ranged from 0% to 30%. One NativeX species was identified in five of the harbors surveyed, ranging from 6% to 100% of the epifaunal taxa. Native species of Bryozoa were identified in all water bodies except Fort Bragg and Morro Bay ranging from zero to 11 native species per water body (0-69% of total Bryozoa taxa). Bryozoa were not common members of the infaunal communities.

Table 10. Number of species and percentages of total Bryozoa taxa for each classification.

Phylum	Water Body	Sample	Total Taxa	Introduced	Cryptogenic	Native	NativeX	Unknown
Bryozoa	Avalon Harbor	Epifaunal	**16**	1 (6%)		11 (69%)	1(6%)	3 (19%)
Bryozoa	Bodega Bay	Epifaunal	**6**	4 (67%)		2 (33%)		
Bryozoa	Channel Islands Harbor	Epifaunal	**9**	4 (44%)	2 (22%)	3 (33%)		
Bryozoa	Dana Point	Epifaunal	**7**	3 (43%)	1 (14%)	3 (43%)		
Bryozoa	Fort Bragg	Epifaunal	**2**	2 (100%)				
Bryozoa	Humboldt Bay	Epifaunal	**13**	4 (31%)	1 (8%)	5 (38%)	1 (8%)	2 (15%)
Bryozoa	Huntington Harbor	Epifaunal	**7**	4 (57%)	1 (14%)	1 (14%)		1 (14%)
Bryozoa	Long Beach	Epifaunal	**14**	3 (21%)	2 (14%)	8 (57%)		1 (7%)
Bryozoa	Los Angeles	Epifaunal	**12**	3 (25%)	2 (17%)	6 (50%)		1 (8%)
Bryozoa	Marina Del Rey	Epifaunal	**8**	4 (50%)		4 (50%)		
Bryozoa	Mission Bay	Epifaunal	**11**	4 (36%)		7 (64%)		
Bryozoa	Monterey Harbor	Epifaunal	**7**	4 (57%)	1 (14%)	1 (14%)		1 (14%)
Bryozoa	Morro Bay	Epifaunal	**4**	3 (75%)	1 (25%)			
Bryozoa	Moss Landing Harbor	Epifaunal	**9**	4 (45%)	1 (11%)	2 (22%)	1 (11%)	1 (11%)
Bryozoa	Newport Beach	Epifaunal	**12**	5 (42%)		5 (42%)		2 (17%)
Bryozoa	Oceanside	Epifaunal	**14**	4 (29%)	2 (14%)	6 (43%)		2 (14%)
Bryozoa	Port Hueneme	Infaunal	**9**	1 (11%)	2 (22%)	4 (44%)		2 (22%)
Bryozoa	Port Hueneme	Epifaunal	**20**	4 (20%)	1 (5%)	8 (40%)	1 (5%)	6 (30%)
Bryozoa	San Diego	Epifaunal	**17**	5 (29%)	2 (12%)	7 (41%)		3 (18%)
Bryozoa	Santa Barbara	Epifaunal	**9**	3 (33%)	1 (11%)	4 (44%)		1 (11%)
Bryozoa	Tomales Bay	Infaunal	**1**				1 (100%)	
Bryozoa	Tomales Bay	Epifaunal	**10**	4 (40%)	2 (20%)	3 (30%)		1 (10%)

Summary of Tunicate Taxonomy

Most of the fifteen introduced tunicates species identified in this survey were found in locations that have not been previously documented. The exceptions were *Botryllus schlosseri, Botrylloides violaceus, Microcosmus squamiger* and *Styela plicata* that were found within the ranges that had previously been reported. *Symplegma reptans* was originally found in Mission Bay in 1997 (Lambert and Lambert 1998), but in this study was only found in San Diego Bay where it had not been previously reported. *Styela clava* was found throughout the state, including Humboldt Bay, though it had not been found north of San Francisco previously. *Styela canopus* was common in the San Diego area, including Mission Bay and San Diego harbor, but was found expanding northward in Huntington Harbor in the current survey. *Mogula manhattensis* was first introduced in 1984 into Long Beach and Newport but was found in Huntington and Channel Islands Harbors. *Ciona intestinalis* was found throughout the sampling ranges, and for the first time in Oceanside, although it was rare. *Ciona savignyi*, was previously reported as being present from San Diego to Santa Barbara, though the current survey identified this species throughout the state. Each of these new occurrences could be a result of sampling new habitats within these harbors, but it is more likely that the ranges of introduced tunicates are expanding throughout the state.

The number of Introduced tunicate (Urochordata) species ranged from two to thirteen, representing 30% to 71% of the total number of tunicate species in each water body (Table 11). No cryptogenic tunicate species were identified in the current survey. The epifaunal Unknown taxa ranged from 14% to 100%. Native species of tunicates from the epifaunal habitats varied

Table 11. Number of species and percentages of Urochordata taxa for each classification.

SubPhylum	Water Body	Sample Type	Total Taxa	Introduced	Cryptogenic	Native	NativeX	Unknown
Urochordata	Avalon Harbor	Epifaunal	**7**	4 (57%)		2 (29%)		1 (14%)
Urochordata	Bodega Bay	Epifaunal	**13**	7 (54%)		3 (23%)		2 (23%)
Urochordata	Channel Islands Harbor	Epifaunal	**19**	9 (58%)		3 (16%)		5 (26%)
Urochordata	Dana Point	Epifaunal	**9**	6 (67%)		1 (11%)		2 (22%)
Urochordata	Humboldt Bay	Epifaunal	**22**	7 (30%)		5 (25%)		10 (45%)
Urochordata	Huntington Harbor	Epifaunal	**25**	13 (50%)		4 (17%)		8 (33%)
Urochordata	Long Beach	Epifaunal	**24**	11 (46%)		6 (25%)		7 (29%)
Urochordata	Los Angeles	Epifaunal	**17**	9 (53%)		3 (18%)		5 (29%)
Urochordata	Marina Del Rey	Epifaunal	**18**	10 (56%)		3 (17%)		5 (28%)
Urochordata	Mission Bay	Epifaunal	**14**	9 (64%)		3 (14%)		3 (21%)
Urochordata	Monterey Harbor	Epifaunal	**5**	2 (40%)		2 (40%)		1 (20%)
Urochordata	Morro Bay	Epifaunal	**4**	2 (50%)		1 (25%)		1 (25%)
Urochordata	Moss Landing Harbor	Epifaunal	**7**	5 (71%)		1 (14%)		1 (14%)
Urochordata	Newport Beach	Epifaunal	**21**	10 (48%)		4 (19%)		7 (33%)
Urochordata	Oceanside	Epifaunal	**21**	11 (52%)		5 (24%)		5 (24%)
Urochordata	Port Hueneme	Epifaunal	**16**	8 (50%)		2 (13%)		6 (38%)
Urochordata	San Diego	Epifaunal	**23**	13 (57%)		3 (13%)		7 (30%)
Urochordata	Santa Barbara	Epifaunal	**15**	9 (60%)		3 (20%)		3 (20%)
Urochordata	Tomales Bay	Epifaunal	**19**	7 (37%)		4 (21%)		8 (42%)

from 11% to 100% (1-6 species). No tunicates were identified in the infaunal samples from this survey.

Summary of Sponge Taxonomy

Identification of the Porifera (sponge) fauna is not trivial because California has a poor history in terms of both quality and quantity of its marine research on sponges. Today we still use a publication that is over seventy years old (de Laubenfels, 1930) as the main source of information. There have been a few more recent papers produced, but, unfortunately, many are substandard in their quality. To add to the problem is a worldwide concern with the present quality and ambiguity of sponge systematics. This problem is being addressed and in the near future there will be a publication, the Systema Porifera, that will replace the older, less rigid system with new reviews of type species. Identifications of the current samples were made on the basis of this new unpublished and more detailed work to the extent that it was available.

Identifications were also hampered by the fact that the majority of the groups represented here are some of the poorest known and least understood worldwide. These include the Class Calcarea for which there are only two world experts, one in Brazil and the other in France. Others, such as the Halichondrida have a dearth of useable characteristics but few researchers are interested in unraveling the intricacies of their identifications. Yet another is Haplosclerida, a group represented by species with very few identifiable characteristics, enormous variability and

a history of inadequate description.

Given these restrictions, the present survey revealed a number of species long known as California residents and a smaller group of difficult species in need of revision. In many cases, review of the current specimens provided important information that will contribute to making their identifications more reliable in the future. Furthermore, several species were revealed that have not been previously described from the areas collected. In all cases, the stated status as an introduced species is presented on the basis of current evidence, but it is critical to note that this evaluation is based on inadequate knowledge and research of California Porifera. Furthermore, new species are being discovered regularly, making it difficult to assess whether these are natives that have not been seen before, or whether they represent introduced species.

A total of 119 specimen lots were examined from the current survey yielding only 13 known species and a handful of partially identified specimens. An initial observation is that this is an incredibly small number of species for areas that once abounded with sponge species. This paucity gives insight to the importance of keeping track of introduced species, but it might be equally important to monitor the reduction of species diversity as well. Of the thirteen species, three were classified as introduced (*Halichondria bowerbanki*, *Halichondria panicea* and *Haliclona loosanoffi*) and two were classified as cryptogenic (*Clathrina coriacea* and *Sycon nr. Coronatum*).

Introduced sponge species from the epifaunal habitats only ranged one to three species, representing 14% to 38% of the total sponge taxa (Table 12). The two cryptogenic species constituted 14-20% of the sponge taxa in four water bodies. Native species of sponges ranged zero to five species, representing 50% to 100% of the total sponge taxa. There were no

discernable trends with latitude or area sampled. The sponges in infaunal samples were small pieces that could not be confidently identified.

Table 12. Number of species and percentages of Porifera taxa for each classification.

Phylum	Water Body	Sample Type	Total Taxa	Introduced	Cryptogenic	Native	NativeX	Unknown
Porifera	Avalon Harbor	Epifaunal	**3**			2 (67%)		1 (33%
Porifera	Bodega Bay	Epifaunal	**2**			1 (50%)		1 (50%)
Porifera	Channel Islands Harbor	Epifaunal	**5**	2 (40%)		3 (60%)		
Porifera	Dana Point	Epifaunal	**3**	1 (33%)		2 (67%)		
Porifera	Huntington Harbor	Epifaunal	**7**	1 (14%)	1 (14%)	4 (57%)		1 (14%)
Porifera	Long Beach	Epifaunal	**5**	1 (20%)		4 (80%)		
Porifera	Los Angeles	Epifaunal	**8**	3 (38%)		4 (50%)		1 (13%)
Porifera	Marina Del Rey	Epifaunal	**4**	1 (25%)		3 (75%)		
Porifera	Mission Bay	Epifaunal	**7**	2 (29%)		5 (71%)		
Porifera	Morro Bay	Epifaunal	**1**			1 (100%)		
Porifera	Moss Landing Harbor	Epifaunal	**3**			1 (100%)		
Porifera	Newport Beach	Epifaunal	**11**	2 (18%)		7 (64%)		2 (18%)
Porifera	Oceanside	Epifaunal	**4**	1 (25%)		3 (75%)		
Porifera	Port Hueneme	Infaunal	**1**					1 (100%)
Porifera	Port Hueneme	Epifaunal	**7**		1 (14%)	4 (57%)		2 (29%)
Porifera	San Diego	Epifaunal	**6**		1 (17%)	4 (67%)		1 (17%)
Porifera	Santa Barbara	Epifaunal	**5**		1 (20%)	4 (80%)		
Porifera	Tomales Bay	Epifaunal	**6**	2 (33%)		4 (67%)		

Summary of Algae Taxonomy

Algae were separated from the quantitative epifaunal samples for a subset of the first six harbors sampled: Port Hueneme, Fort Bragg, Bodega Bay, Morro Bay, Moss Landing and Monterey Harbors. Due to the lack of observed introductions, in subsequent harbors, algal samples were taken qualitatively with special attention being given to the two recent introduced species, *Undaria pinnatifida* (Harvey) Suringer and *Caulerpa taxifolia* (Vahl) C. Ag. During diver collections of the epifaunal samples, if these plants were seen, the occurrence was noted and a representative sample was collected. The algal results of this survey are not comprehensive for this study and many of the sampled species have been preserved but not identified.

The only introduced species confirmed during this survey was *Undaria pinnatifida.* This species was found at two locations in Long Beach Harbor and one location each at Port Hueneme and Santa Barbara Harbors. Because this plant has a distinct macro and microphytic life history phase (Bold and Wynne, 1985), it is possible the timing of sampling may have affected the ability to detect the plant in many harbors. *Caulerpa taxafolia* was never observed during this survey but has been previously reported in two areas along the coast.

One species classified as cryptogenic, *Grateloupia doryphora* (Montagne) Howe, was collected from two locations in Bodega Bay and one location in Fort Bragg. Although this plant has long been described as common in both harbors and exposed areas along coastal California (Abbott and Hollenberg, 1976), it is listed by Cohen and Carlton (1995) as cryptogenic for San Francisco Bay. Of the remaining species that were identified, there were 14 Rhodophyte species, 10 Chlorophyte species, and 8 Phaeophyta species. Two samples were listed as unknown.

Summary of Fish Community Surveys

Fish traps were deployed along rocky riprap and under piers throughout Los Angeles/Long Beach Harbors and San Diego Harbors, but no introduced species were captured. In the freshwater ports of Stockton and Sacramento, a number of common introduced species were collected using traps and electrofishing gear. Included were the striped bass (*Morone chrysops*), white catfish (*Amerius catus*), largemouth bass (*Micropterus notius*), common carp (*Cyprinus carpio*), threadfin shad (*Dorosoma petenense*), redear sunfish (*Lepomis microlophus*), black crappie (*Pomoxis nigromaculatus*), bluegill (*Lepomis macrochirus*), and inland silverside (*Menidia beryllina*). These fish have been historically introduced in California waters as sportfish or forage. As reported by Cohen and Carlton (1995), "Nearly 30 species of introduced marine, brackish and freshwater fish are now important carnivores throughout the Bay and Delta. Eastern and central American fish -- carp, mosquitofish, catfish, green sunfish, bluegills, inland silverside, largemouth and smallmouth bass, and striped bass -- are among the most significant predators, competitors, and habitat disturbers throughout the brackish and freshwater reaches of the Delta, with often concomitant impacts on native fish communities." A single yellowfin goby (*Acanthogobius flavimanus*) was captured from the Port of Sacramento and represents the only specimen from unintentional introduced fish species collected during this survey. Surprisingly, no yellowfin goby were captured from harbors in southern California where they are common.

Summary of Plankton Surveys

The results from the survey of zooplankton communities were consistent with previous work. The samples were dominated by native copepods (especially the genera Acartia, Eurytemora, Paracalanus, Pseudocalanus, Oithona and Corycaeus),as well as cladocerans, Cirripedia, and larvaceans, as is expected from California (and other temperate northeast Pacific) estuaries. Three introduced species, all copepods, were collected: *Pseudodiaptomus marinus*, *Limnoithona* sp., and *Oithona davisae*. Of these three, only *Pseudodiaptomusmarinus* and *Oithona davisae* would be considered relatively abundant in the samples. Only two cryptogenic species were observed, the copepod *Stephos pacificus* and the amphipod *Eochelidium sp*. and both of these were relatively rare.

Samples collected from Los Angeles/Long Beach (Figure 6) yielded all five of the above species while only two species were found in San Diego Harbor. *Oithona davisae* was the only species observed in Port Hueneme and is the only species observed throughout southern California (LA/LB Harbors, San Diego Harbors and Port Hueneme.) Samples collected from Humboldt Bay did not reveal any introduced or cryptogenic species.

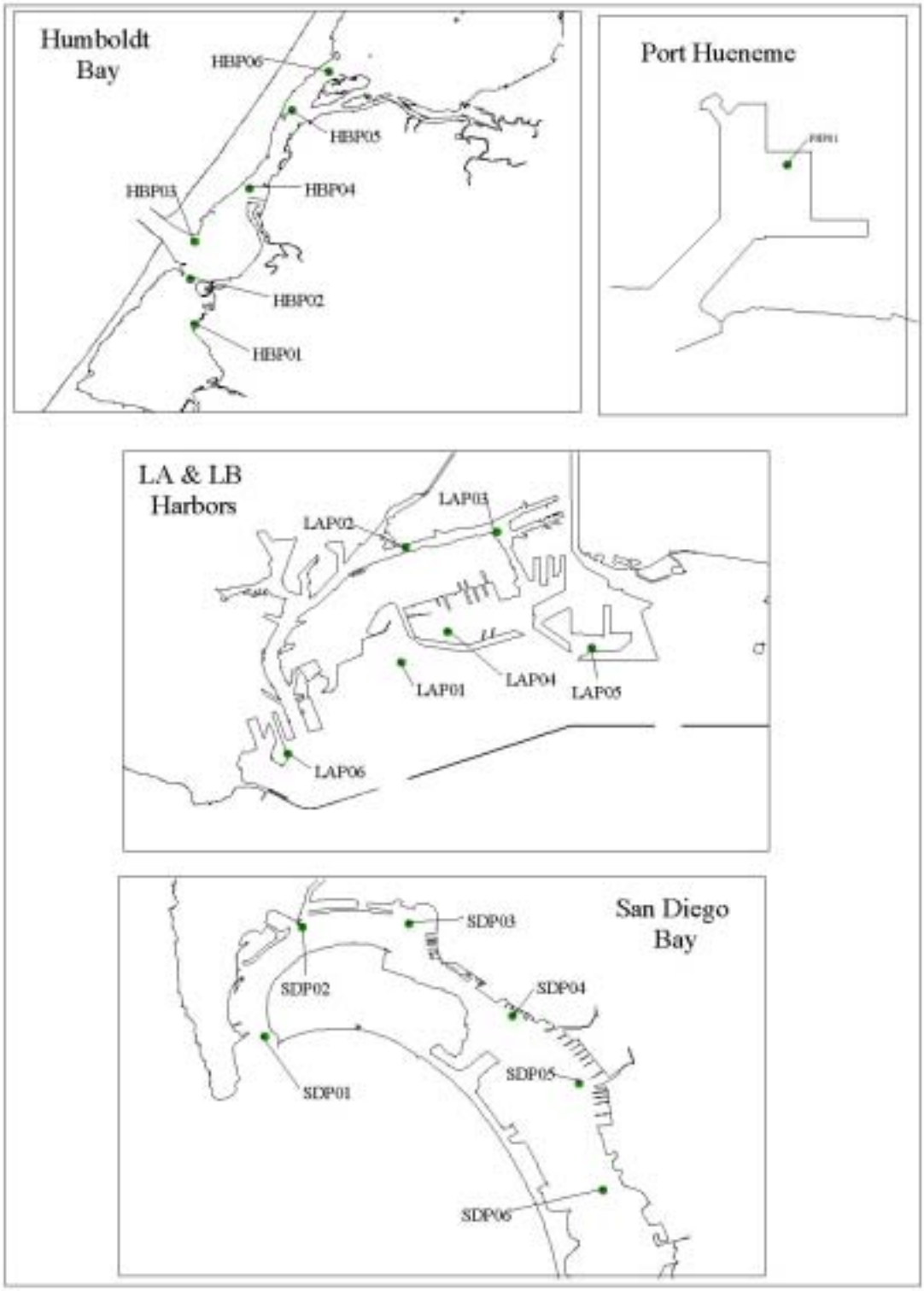


Figure 6. Plankton tow locations for this survey.

Although samples were collected seasonally, no distinct pattern in seasonal zooplankton abundance could be discerned for introduced or cryptogenic species, though in general the most abundant species had the greatest densities in winter and early spring.

Summary of Humboldt Bay Fouling Plate Survey

This summary describes the results of research on artificial "fouling panels" which were deployed on Feb 23, 2001 to study the settlement, subsequent establishment, and succession of marine invertebrate communities under the Woodley Island Dock in Humboldt Bay, CA. The goal was to determine the number of introduced and native species present on these artificial panels in a non-destructive manner, so that the relative importance of introduced species in these "fouling communities" could be followed through time. The non-destructive photographic methods allowed investigation of the role of introduced species in biological interactions (e.g. competition and predation) with native species during ecological succession, and subsequent community development. Humboldt Bay's Woodley Island Marina is heavily used by fisherman and pleasure boaters and was therefore suspected of being one of the most likely places for introduced species to first become established.

Through examination of photographs of our artificial panels, we identified 52 invertebrate species (Table 11). It should be noted, however, that it is quite likely that many species were not identified. These species would have been missed for a variety of reasons, including the possibility that they were hiding under the "canopy" layer of hydroids and ascidians. In addition,

it is evident from looking at Table 11 that several (at least 4) species that could not be identified in the photographs, in part because appropriate close-up photos of the morphology of these bryozoans and hydroids were either not taken or too fuzzy to reveal key morphological features.

Nevertheless, we are confident that the species that are major space occupiers in this "fouling" community were identified. More than a third (35%) of the species identified on these fouling panels were introduced. In fact, in several cases the major space-occupying organism was an introduced species (e.g., the hydroid *Obelia dichotoma* which covered 10-20% of the surface of our fouling panels, on average, during the spring of 2001 and 2002), and the bryozoan *Celleporella hyalina*, which reached a peak of 23% cover in May 2001 (Figure 7). Introduced species were found from a wide variety of taxa, including sponges (poriferans), cnidarians, bryozoans and hydroids. These introduced species also represented a wide variety of body plans, including both solitary organisms such as the tunicate *Ciona intestinalis* (which grew to 6 inches in length and dominated fouling panels after 6 months of immersion) and colonial organisms such as the tunicate *Botryllus tuberatus*. Most species that were abundant on these panels, however, were sessile. An exception was caprellid amphipods, which were found in incredible numbers clinging onto hydroid stems in the first few months of immersion, and which appear to have rapidly eaten all of the hydranths off these growing colonies.

Percent cover plots through time show a highly dynamic system (Figures 7 and 8). It is clear that in numerous cases an introduced species that dominated the panels in one month (such as the solitary tunicate *Molgula manhattensis*, which covered 15% of the panels in May 2001) can virtually disappear from these panels a month later. In addition, winter storms increased freshwater runoff and sediment load in Humboldt Bay during the winter of 2001-2002 (see time period from December 2001 to February of 2002) and lead to a catastrophic decline in all suspension feeding invertebrates in these "fouling" communities (see plots for *Ciona intestinalis*, *Bugula neritina*, *Botrylloides* sp., and *Botryllus* sp. in Figures 7 and 8). Hence natural disturbance events may be important in "knocking back" these communities, opening up free space for so-called fugitive species (such as the hydroid *Obelia dichotoma*). The addition of fine sediment, which accumulated amongst the upright "stems" of hydroids and bryozoans, appears to have led to a dramatic increase in tubiculous amphipods following the end of these winter storms (Figure 8; March 2002). Because of the highly dynamic nature of this system, it should be emphasized that collections taken in any one month would not accurately reflect the number of introduced species present in this system. Because "boom and bust" population cycles appear to be the rule for many sessile, colonial invertebrates, it is critical that studies of fouling organisms on docks and pier pilings be carried out over long time periods in order to (1) reveal the dynamic nature of these systems, including which species dominate through time and whether or not these species are native to the location studied, (2) accurately identify species which have been introduced into these artificial habitats, by shipping and other means, which may literally "blink on and off" with time, and (3) attempt to identify patterns of when and where invasions occur in space and time. With enough panels spread around Humboldt Bay that were followed each month over the course of many years, for example, it may be possible to determine whether winter storms or other natural disturbance events lead to an increase in the percentage of free space available for colonization, and a subsequent increase in the likelihood of successful invasion by introduced species.

Table 13. Identified Species from Fouling Plates

Group	Species Name	Introduced - I Cryptogenic - C	Source of Introduced Species
Ascidians			
	Botrylloides sp.	I	
	Botryllus sp.	I	Atlantic?
	Botryllus tuberatus	I	Atlantic?
	Ciona intestinalis	I	North Atlantic
	Didemnum sp.	unknown	
	Molgula manhattensis	I	North Atlantic
Bryozoans			
	Alcyonidium polyoum	I	Atlantic
	Bugula neritina	I	
	Bugula spp.	unknown	
	Bowerbankia gracilis	I	Atlantic?
	Celleporella hyalina	I	Atlantic
	Watersipora subtorquata	I	Pacific?
	Schizoporella unicornis	I	
	Filicrisia sp.	unknown	
	Fenestrulina sp.	unknown	
Cnidarians			
	Diadumene leucolena	I	Atlantic
	Obelia dichotoma	I	Europe
Poriferans			
	Halichondria bowerbanki	I	Atlantic
	Haliclona sp.	unknown	
Polychaetes			
	Harmothoe imbricata	C	
Molluscs			
	Dendronotus frondosus	C	
	Odostomia sp.	unknown	
Crustaceans			
	Caprella mutica	I	Sea of Japan
	Caprella spp.	unknown	
	Corophium acherusicum	C	
	Corophium spp.	unknown	
	Ianiropsis sp.		
	Idotea sp.	unknown	
	Leptochelia savignyi	C	
Echinoderms			
	Achelia sp.	unknown	

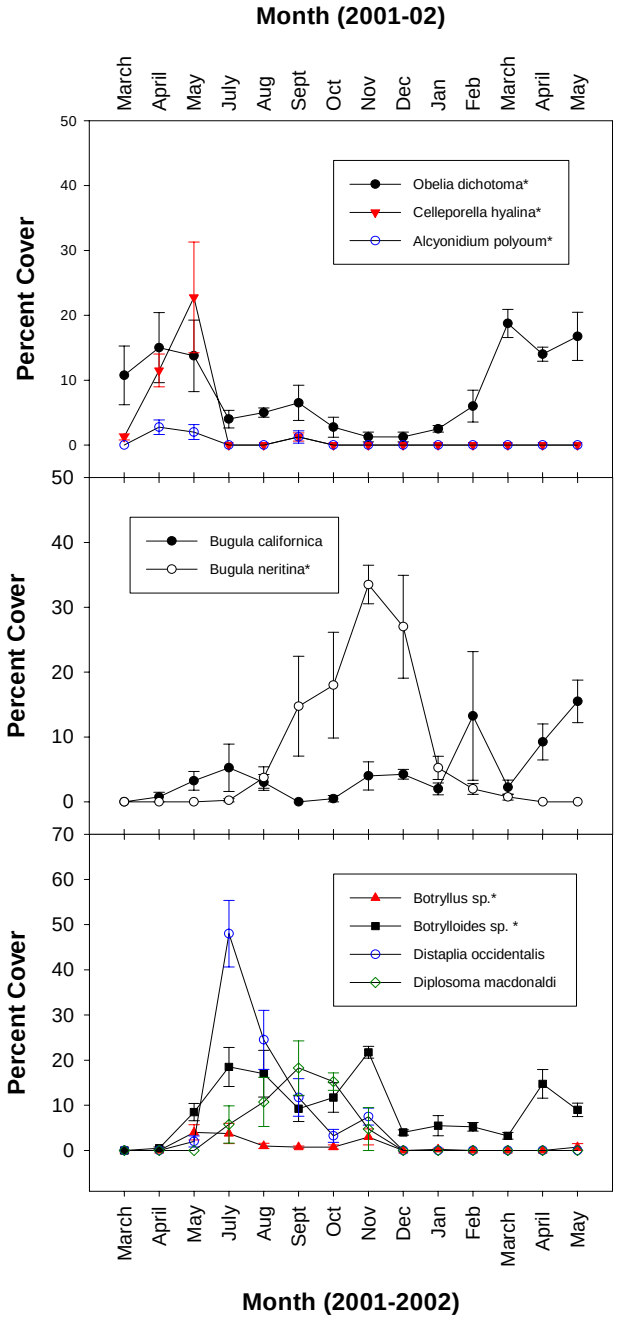


Figure 7. Percent cover for selected fouling species. Organisms plotted represent both native and introduced species on undisturbed fouling panels. (*) indicates introduced species. Percent cover for each taxa represents the sum of both overstory and understory values for those species were both were recorded. Because photographic censuses were taken every 4-5 weeks, One month (June 2001) did not have a census.

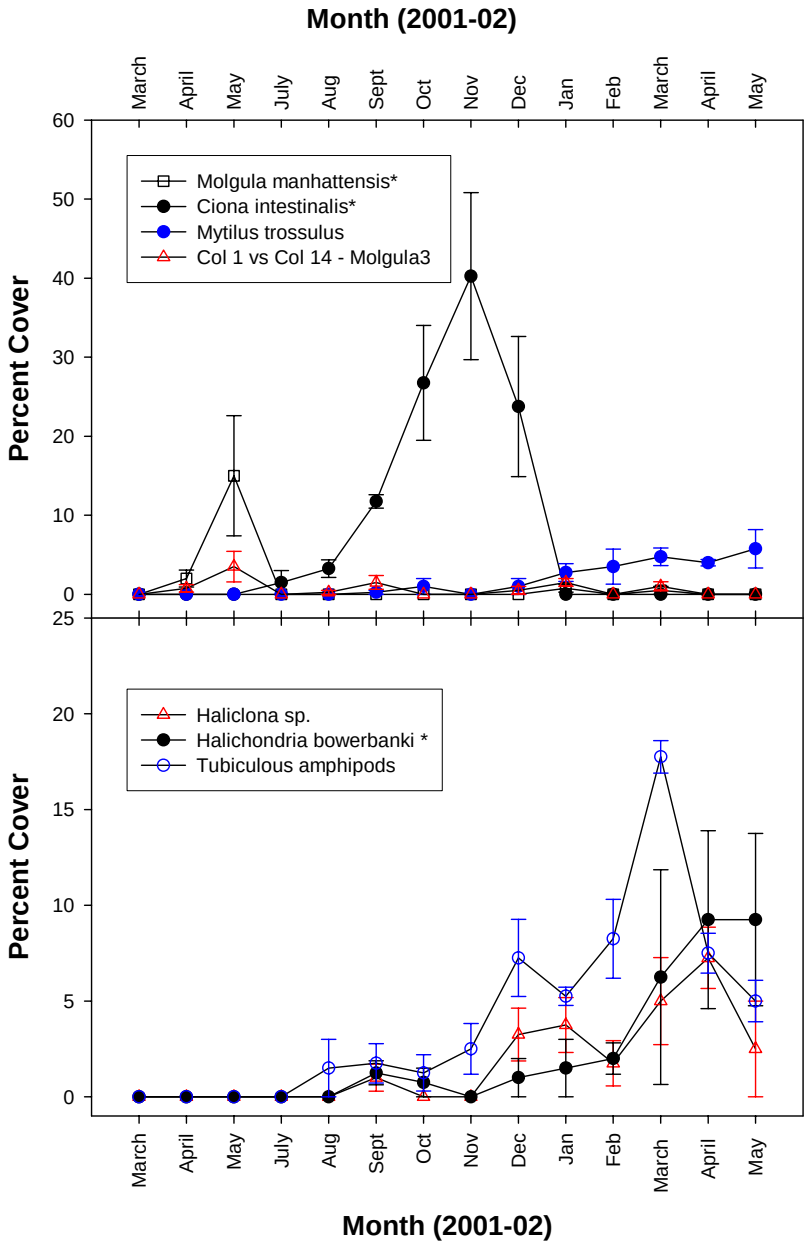


Figure 8. Percent cover for selected fouling species. Organisms plotted represent both native and introduced species on undisturbed fouling panels. (*) indicates introduced species. Percent cover for each taxa represents the sum of both overstory and understory values for those species were both were recorded. Because photographic censuses were taken every 4-5 weeks, One month (June 2001) did not have a census. Note that the scale of the y-axis differs for the two graphs shown.

Summary of Voucher Collection

Representative specimens of most introduced species that were identified in field samples from the current survey are stored in a voucher collection at Moss Landing Marine Laboratories. Some unique specimens are stored at the laboratories of participating taxonomists based on special requests (e.g., Sponges kept at the California Academy of Sciences). These voucher specimens will be made available to interested taxonomists for purposes of species verification or appropriate related research.

Summary of Photographic Library

The Extensis Portfolio photo database contains 199 photographs of subtidal communities and individual specimens at sampling stations from both the 2000 and 2001 seasons. Within this database, a thumbnail picture and specific site or taxon information is retained. Station location and comments are also noted in the description for each photograph. Four CDs hold the original images in a larger format and multiple resolutions. The specific CD archive is listed in the photo description. Each picture is assigned multiple keywords from the master keyword list (created specifically for this project). The keywords make it possible to group pictures according to species, location, or sampling date. Each harbor sampled has representative pictures ranging in content from sampling technique to community structure to species.

Summary of MS Access Database

The data for this survey is assembled in a Microsoft (MS) Access 2000 relational database that includes both field and analytical data. A detailed database description is provided in Appendix D. This database is available through the Department of Fish and Game's Office of Spill Prevention and Response. A copy of the database resides at Moss Landing Marine Laboratory's Marine Pollution Studies Lab.

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Also see: http://www.anstaskforce.gov/sfinvade.htm

Also see: http://www.civgeo.rmit.edu.au/bryozoa/genw.html

APPENDICES

Appendix A- Historical Infaunal Data Summary.

Introduced (I), cryptogenic (C), and native species with possible range extension (nativeX) identified from Southern California Bight Pilot Project (SCBPP), Southern California Bight 1998 Regional Marine Monitoring Survey (Bight'98), Bay Protection and Toxic Cleanup Program (BPTCP), and the Western Environmental Monitoring and Assessment Program (WEMAP) historical data sets. Species name, Class/Order, and classification are based on the master taxonomic list in this report.

Class/Order	Name	SCBPP	BIGHT'98	BPTCP	WEMAP
Gastropoda	Alderia modesta		C		C
Amphipoda	Ampelisca abdita			I	
Amphipoda	Ampelisca agassizi	C	C	C	
Polychaeta	Ampharete acutifrons	C	C		C
Polychaeta	Ampharete cf. goesi		C		
Ophiuroidea	Amphipholis squamata	C	C		C
Amphipoda	Ampithoe lacertosa				C
Amphipoda	Ampithoe valida			I	
Polychaeta	Anobothrus gracilis	I	I	I	
Amphipoda	Anonyx cf. lilljeborgi	C	C		
Polychaeta	Aphelochaeta monilaris	C	C	C	C
Amphipoda	Argissa hamatipes	C	C	C	
Polychaeta	Aricidea (Acmira) catherinae	C	C	C	C
Polychaeta	Aricidea (Acmira) horikoshii	C	C	C	C
Polychaeta	Aricidea (Acmira) lopezi	C	C		
Polychaeta	Aricidea (Aricidea) wassi	C	C	C	C
Polychaeta	Boccardiella hamata	C	C	C	
Polychaeta	Boccardiella ligerica			I	
Polychaeta	Brania brevipharyngea			C	
Polychaeta	Capitella capitata Cmplx	C	C	C	C
Amphipoda	Caprella californica	C	C	C	C
Amphipoda	Caprella drepanochir				C
Amphipoda	Caprella equilibra		C		
Amphipoda	Caprella natalensis		I		I
Polychaeta	Chaetozone bansei				C
Polychaeta	Chaetozone setosa Cmplx	C	C		
Polychaeta	Chone infundibuliformis				C
Ascidiacea	Ciona intestinalis		I		
Bivalvia	Corbicula fluminea			I	
Bivalvia	Crassostrea virginica			I	
Gastropoda	Crepidula onyx		I	I	I
Polychaeta	Ctenodrilus serratus		C		
Polychaeta	Diopatra tridentata	C	C	C	C
Polychaeta	Diplocirrus sp.				C
Polychaeta	Dipolydora bidentata		C		C
Polychaeta	Dipolydora caulleryi			I	I
Polychaeta	Dipolydora giardi		C		
Polychaeta	Dipolydora socialis	C	C	C	C
Polychaeta	Dispio uncinata	C	C		C

Class/Order	Name	SCBPP	BIGHT'98	BPTCP	WEMAP
Hydrozoa	Ectopleura crocea		I		
Bivalvia	Ennucula tenuis	C	C		
Amphipoda	Eochelidium sp. A		I		I
Amphipoda	Ericthonius brasiliensis	I	I		I
Polychaeta	Euchone incolor	C	C	C	
Polychaeta	Euchone limnicola		C	C	C
Polychaeta	Euchone sp.				C
Polychaeta	Euclymeninae sp.				C
Ostracoda	Eusarsiella zostericola			I	I
Polychaeta	Eusyllis habei	C	C		
Polychaeta	Exogone lourei	C	C	C	C
Polychaeta	Ficopomatus enigmaticus			I	
Bivalvia	Gemma gemma			I	
Amphipoda	Gibberosus myersi	I	I		
Polychaeta	Glycera americana	C	C	C	C
Polychaeta	Glycera convoluta	C	C	C	C
Polychaeta	Goniada maculata	C	C		C
Amphipoda	Grandidierella japonica		I	I	I
Polychaeta	Harmothoe imbricata		C	C	C
Cumacea	Hemilamprops californicus	C	C		C
Polychaeta	Heteromastus filiformis		I	I	
Polychaeta	Heteropodarke heteromorpha		I		I
Bivalvia	Hiatella arctica	nativeX	nativeX		nativeX
Gastropoda	Ilyanassa obsoleta			I	
Amphipoda	Ischyrocerus anguipes		I		
Amphipoda	Ischyrocerus litotes	C			
Amphipoda	Ischyrocerus pelagops	C	C		
Polychaeta	Lanassa venusta venusta	I	I		I
Polychaeta	Laonice cirrata	I	I		I
Tanaidacea	Leptochelia dubia	C	C	C	C
Polychaeta	Levinsenia gracilis		C	C	
Polychaeta	Levinsenia oculata		C		
Polychaeta	Lumbrineris japonica		C		C
Polychaeta	Lumbrineris latreilli		C	C	C
Bivalvia	Macoma balthica			I	
Polychaeta	Marphysa sanguinea			C	
Polychaeta	Mediomastus ambiseta			C	C
Polychaeta	Megalomma pigmentum	C	C	C	C
Polychaeta	Melinna oculata	I	I	I	I
Amphipoda	Metatiron tropakis		C		C
Ascidiacea	Microcosmus squamiger		I		
Amphipoda	Microjassa litotes		C	C	
Polychaeta	Microspio pigmentata	C	C	C	C
Amphipoda	Monocorophium acherusicum			I	I
Amphipoda	Monocorophium insidiosum			I	I
Polychaeta	Monticellina siblina		C	C	C
Polychaeta	Monticellina sp.				C
Bivalvia	Musculista senhousia		I	I	I
Bivalvia	Mya arenaria	I		I	

Class/Order	Name	SCBPP	BIGHT'98	BPTCP	WEMAP
Bivalvia	Mytilus galloprovincialis				I
Polychaeta	Myxicola infundibulum	I			
Polychaeta	Neanthes acuminata (=caudata)		I	I	I
Polychaeta	Neanthes virens			C	
Polychaeta	Nereiophylla castanea	C			
Polychaeta	Nereis (Neanthes) succinea			I	
Polychaeta	Nereis pelagica		C		
Polychaeta	Nereis zonata				C
Cumacea	Nippoleucon hinumensis			I	
Polychaeta	Notomastus hemipodus		C		C
Polychaeta	Notomastus latericeus	C	C	C	C
Polychaeta	Ophelina acuminata	C	C	C	
Polychaeta	Owenia fusiformis		C	C	C
Amphipoda	Paracorophium sp.				I
Isopoda	Paranthura elegans	I	I	I	I
Phascolosomatidea	Phascolosoma agassizii				C
Gastropoda	Philine auriformis		I		I
Polychaeta	Pholoe minuta			C	
Polychaeta	Phyllodoce groenlandica	C	C		C
Polychaeta	Phyllodoce maculata				C
Polychaeta	Pista brevibranchiata			C	C
Polychaeta	Pista cf. disjuncta		C	C	C
Polychaeta	Platynereis bicanaliculata	C	C	C	C
Amphipoda	Podocerus cristatus		I	I	
Amphipoda	Podocerus fulanus		C	C	C
Polychaeta	Poecilochaetus johnsoni	C	C		C
Polychaeta	Polydora cornuta		C	C	C
Polychaeta	Polydora limicola	I	I		
Polychaeta	Polyophthalmus pictus		C	C	C
Amphipoda	Pontogeneia rostrata		I	I	I
Bivalvia	Potamocorbula amurensis			I	
Polychaeta	Prionospio (Prionospio) heterobranchia		C	C	C
Polychaeta	Prionospio lighti	nativeX	nativeX	nativeX	nativeX
Polychaeta	Prionospio steenstrupi			C	C
Polychaeta	Proceraea cornuta				C
Polychaeta	Pseudopolydora kempi			I	I
Polychaeta	Pseudopolydora paucibranchiata		I	I	I
Polychaeta	Pygospio elegans			C	C
Polychaeta	Sabellaria gracilis		nativeX		
Polychaeta	Scalibregma inflatum	C	C	C	
Polychaeta	Scionella japonica	C	C		
Polychaeta	Scolelepis squamata		I		I
Polychaeta	Scolelepis tridentata	C	C		C
Polychaeta	Scoletoma tetraura Cmplx		C	C	C
Polychaeta	Scoloplos armiger	C	C		C
Polychaeta	Sigambra bassi		C		C
Tanaidacea	Sinelobus stanfordi			I	
Amphipoda	Sinocorophium heteroceratum		I	I	I
Polychaeta	Sphaerosyllis sp. N				C

Class/Order	Name	SCBPP	BIGHT'98	BPTCP	WEMAP
Polychaeta	Spio filicornis	C	C		
Polychaeta	Spiochaetopterus costarum	I	I	I	I
Polychaeta	Spiophanes bombyx	C	C	C	C
Polychaeta	Spiophanes wigleyi		C		
Polychaeta	Sternaspis fossor	C	C	C	C
Polychaeta	Streblospio benedicti		I	I	I
Ascidiacea	Styela plicata		I		
Polychaeta	Syllides longocirrata				C
Polychaeta	Syllis gracilis		C		
Hoplonemertea	Tetrastemma candidum		C		
Polychaeta	Thelepus setosus	C	C		
Bivalvia	Theora lubrica	I	I	I	I
Sipunculidea	Thysanocardia nigra		C		C
Polychaeta	Trochochaeta multisetosa				I
Palaeonemertea	Tubulanus cingulatus	nativeX	nativeX		nativeX
Palaeonemertea	Tubulanus polymorphus	nativeX	nativeX		nativeX
Polychaeta	Typosyllis hyalina			C	
Polychaeta	Typosyllis nipponica				I
Bivalvia	Venerupis philippinarum		I	I	I
Tanaidacea	Zeuxo normani			C	C
	Total Cryptogenic	44	71	47	64
	Total Introduced	12	31	35	30
	Total nativeX	4	5	1	4

Unresolved Taxa from Historic Infaunal Data.

Specimens from the Southern California Bight Pilot Project (SCBPP), Southern California Bight 1998 Regional Marine Monitoring Survey (Bight'98), Bay Protection and Toxic Cleanup Program (BPTCP), and the Western Environmental Monitoring and Assessment Program (WEMAP) historical data sets that could not be identified beyond genus level but were from a genus with a high probability of being introduced or cryptogenic based on the master taxonomic list genera.

Class/Order	Name	SCBPP	BIGHT'98	BPTCP	WEMAP
Amphipoda	Ampelisca sp.	x	x		
Polychaeta	Ampharete sp.	x	x		
Ophiuroidea	Amphipholis sp.	x	x		x
Polychaeta	Amphitrite sp.	x			
Amphipoda	Ampithoe sp.			x	x
Polychaeta	Anobothrus sp.		x		
Polychaeta	Aphelochaeta sp.	x	x	x	x
Polychaeta	Aphelochaeta sp. 1	x			x
Polychaeta	Aphelochaeta sp. A		x		
Polychaeta	Aphelochaeta sp. C	x			
Polychaeta	Aphelochaeta sp. LA1		x		
Polychaeta	Aphelochaeta sp. LA2		x		
Polychaeta	Aphelochaeta sp. SD2		x		
Polychaeta	Aphelochaeta sp. SD3		x		
Polychaeta	Aphelochaeta sp. SD5		x		
Polychaeta	Arabella sp.		x		x
Polychaeta	Aricidea (Acmira) sp.		x		

Class/Order	Name	SCBPP	BIGHT'98	BPTCP	WEMAP
Polychaeta	Aricidea (Acmira) sp. LA1		x		
Polychaeta	Aricidea (Acmira) sp. SD1		x		
Polychaeta	Aricidea (Aricidea) sp. SD1		x		
Polychaeta	Aricidea (Aricidea) sp. SD2		x		
Cirripedia	Balanus sp.	x			
Polychaeta	Brania sp.		x		
Polychaeta	Brania sp. SD 1	x			
Anthozoa	Bunodeopsis sp. A		x		
Amphipoda	Caprella sp.	x	x	x	x
Polychaeta	Chaetozone sp. 1	x	x		x
Polychaeta	Chaetozone sp. 1			x	
Polychaeta	Chaetozone sp. HYP1		x		
Polychaeta	Chaetozone sp. HYP2		x		
Polychaeta	Chaetozone sp. HYP3		x		
Polychaeta	Chaetozone sp. HYP6		x		
Polychaeta	Chaetozone sp. SD2		x		
Polychaeta	Chaetozone sp. SD3		x		
Polychaeta	Chaetozone sp. SD5		x		
Polychaeta	Chaetozone sp. SD6		x		
Polychaeta	Chone sp. 1	x	x	x	x
Polychaeta	Chone sp. 1				x
Polychaeta	Chone sp. B	x	x		
Polychaeta	Chone sp. C	x	x		
Polychaeta	Chone sp. HYP1		x		
Polychaeta	Chone sp. HYP2		x		
Polychaeta	Chone sp. SD1		x		
Polychaeta	Chone sp. SD2		x		
Amphipoda	Corophium sp.		x	x	x
Hydrozoa	Corymorpha sp.	x			
Gastropoda	Crepidula sp.	x	x		
Cumacea	Cumella sp.	x	x	x	x
Cumacea	Cumella sp. 1				x
Cumacea	Cumella sp. A	x			
Cumacea	Cumella sp. I	x			
Mysidacea	Deltamysis sp. A		x		
Gastropoda	Dendronotus sp.		x		
Anthozoa	Diadumene sp.				x
Polychaeta	Diopatra sp.	x	x		
Polychaeta	Diplocirrus sp.			x	
Polychaeta	Diplocirrus sp. SD1		x		
Polychaeta	Dipolydora sp.		x		
Polychaeta	Dorvillea (Dorvillea) sp.		x		
Polychaeta	Dorvillea (Schistomeringos) sp.		x		x
Oedicerotidae	Eochelidium sp.		x		
Amphipoda	Ericthonius sp.	x	x		x
Amphipoda	Ericthonius sp. SD1		x		
Polychaeta	Eteone sp.	x	x	x	x
Polychaeta	Euchone sp.	x	x		
Polychaeta	Euchone sp. A	x	x	x	
Polychaeta	Euchone sp. LA1		x		
Polychaeta	Euclymeninae sp. A	x	x	x	x

Class/Order	Name	SCBPP	BIGHT'98	BPTCP	WEMAP
Ostracoda	Eusarsiella sp. A		x		
Polychaeta	Eusyllis sp.		x		
Polychaeta	Exogone sp.	x	x		
Polychaeta	Exogone sp. B	x			
Polychaeta	Exogone sp. C	x			
Polychaeta	Exogone sp. MEC1		x		
Amphipoda	Gibberosus sp.	x			
Polychaeta	Glycera sp.	x	x		x
Polychaeta	Glycera sp. A	x			
Polychaeta	Glycera sp. LA1		x		
Polychaeta	Goniada sp.	x	x		x
Polychaeta	Harmothoe sp.	x	x	x	
Amphipoda	Ischyrocerus sp.	x	x		
Amphipoda	Jassa sp.				x
Polychaeta	Lanassa sp.	x	x		
Polychaeta	Lanassa sp. D	x	x		
Polychaeta	Laonice sp.	x	x		
Tanaidacea	Leptochelia sp.			x	
Polychaeta	Levinsenia sp.	x			
Polychaeta	Lumbrineris sp.	x	x		x
Polychaeta	Lumbrineris sp. A		x		x
Polychaeta	Lumbrineris sp. B		x		
Polychaeta	Lumbrineris sp. C		x		x
Bivalvia	Macoma sp.	x	x	x	x
Polychaeta	Marphysa sp.	x	x		
Polychaeta	Marphysa sp. A	x	x	x	x
Polychaeta	Marphysa sp. HYP1		x		
Polychaeta	Mediomastus sp.	x	x	x	x
Polychaeta	Megalomma sp.	x	x		
Polychaeta	Melinna sp.	x	x		
Amphipoda	Melita sp.			x	
Polychaeta	Microphthalmus sp.		x		
Ascidiacea	Molgula sp.		x		
Amphipoda	Monocorophium sp.				x
Polychaeta	Monticellina sp.	x	x	x	x
Polychaeta	Monticellina sp. C			x	
Polychaeta	Monticellina sp. HYP1		x		
Polychaeta	Monticellina sp. SD4		x		
Bivalvia	Mytilus sp.		x	x	
Polychaeta	Myxicola sp.		x		
Polychaeta	Neanthes sp.				x
Polychaeta	Nereis sp.	x	x	x	x
Polychaeta	Nephtys sp.		x		x
Polychaeta	Nephtys sp. SD2		x		
Polychaeta	Nereiphylla sp. 1		x		
Polychaeta	Nereiphylla sp. 3		x		
Polychaeta	Nicolea sp.				x
Polychaeta	Notomastus sp.	x	x		
Hydrozoa	Obelia sp. A	x	x		
Gastropoda	Okenia sp. A	x			
Polychaeta	Ophelina sp.	x			

Class/Order	Name	SCBPP	BIGHT'98	BPTCP	WEMAP
Polychaeta	Ophelina sp. SD1		x		
Bivalvia	Ostrea sp.		x		
Amphipoda	Paradexamine sp.			x	
Amphipoda	Paradexamine sp. SD1		x		
Polychaeta	Pherusa sp.	x	x	x	
Polychaeta	Pherusa sp. SD1		x		
Gastropoda	Philine sp.		x	x	
Gastropoda	Philine sp. A	x	x		
Polychaeta	Pholoe sp.				x
Polychaeta	Pholoe sp. N1				x
Amphipoda	Photis sp.	x	x	x	x
Amphipoda	Photis sp. A	x			
Amphipoda	Photis sp. B	x	x		
Amphipoda	Photis sp. C		x		
Amphipoda	Photis sp. OC1		x		
Polychaeta	Phyllochaetopterus sp.	x	x		
Polychaeta	Phyllodoce sp.	x	x		x
Polychaeta	Pionosyllis sp.	x	x		
Polychaeta	Pionosyllis sp. SD1		x		
Polychaeta	Pionosyllis sp. SD2		x		
Polychaeta	Pista sp.	x	x	x	x
Polychaeta	Pista sp. B	x	x		
Amphipoda	Podocerus sp.	x			x
Polychaeta	Poecilochaetus sp.	x	x		
Polychaeta	Poecilochaetus sp. A	x	x	x	
Polychaeta	Polydora sp.	x	x	x	
Polychaeta	Polydora sp. 1	x			
Polychaeta	Polydora sp. SD10	x			
Amphipoda	Pontogeneia sp.				x
Polychaeta	Prionospio (Prionospio) sp.	x	x	x	x
Polychaeta	Prionospio sp. A	x		x	
Polychaeta	Proceraea sp.	x	x		
Polychaeta	Sabellaria sp.		x		
Polychaeta	Scolelepis sp.	x	x		x
Polychaeta	Scolelepis sp. 1	x	x		x
Polychaeta	Scolelepis sp. HYP1		x		
Polychaeta	Scoletoma sp.			x	x
Polychaeta	Scoloplos sp.	x	x	x	x
Isopoda	Sphaeroma sp.			x	
Polychaeta	Sphaerosyllis sp.	x	x		x
Polychaeta	Sphaerosyllis sp. HYP1		x		
Polychaeta	Sphaerosyllis sp. LA1		x		
Polychaeta	Sphaerosyllis sp. LA2		x		
Polychaeta	Spio sp.		x		
Polychaeta	Spiophanes sp.	x	x		x
Polychaeta	Streblospio sp. B			x	
Polychaeta	Syllides sp.		x	x	
Polychaeta	Syllis sp.		x		
Polychaeta	Syllis sp. LA1		x		
Polychaeta	Syllis sp. SD1		x		
Isopoda	Synidotea sp.	x	x		x

Class/Order	Name		SCBPP	BIGHT'98	BPTCP	WEMAP
Polychaeta	Terebella sp.				x	
Hoplonemertea	Tetrastemma sp.		x	x		x
Hoplonemertea	Tetrastemma sp. A			x		
Polychaeta	Trochochaeta sp.					x
Paleonemertea	Tubulanus sp.		x	x		
Paleonemertea	Tubulanus sp. SD1			x		
Polychaeta	Typosyllis sp.					x
		Total	78	134	36	50

Appendix B - Station and Sample Locations.

WaterBody	StationId	SampleType	SampleDate	Depth (ft)	Habitat/Gear	LatDD	LongDD	%Fines
Avalon Harbor	AHE01P	Epifaunal	8/1/2001	10	Pier Piling	33.3441	-118.3245	
Avalon Harbor	AHE02P	Epifaunal	8/1/2001	10	Pier Piling	33.3442	-118.3225	
Avalon Harbor	AHE02S	Epifaunal	8/1/2001	2	Side of Dock	33.3442	-118.3225	
Avalon Harbor	AHE03P	Epifaunal	8/1/2001	8	Pier Piling	33.3485	-118.3260	
Avalon Harbor	AHE03U	Epifaunal	8/1/2001	surface	Underneath Dock	33.3485	-118.3260	
Avalon Harbor	AHE04P	Epifaunal	8/1/2001	6	Pier Piling	33.3459	-118.3267	
Avalon Harbor	AHE04X	Epifaunal	8/1/2001	multiple	All Habitats	33.3459	-118.3267	
Avalon Harbor	AHE04Y	Algae	8/1/2001	multiple	All Habitats	33.3459	-118.3267	
Avalon Harbor	AHE05P	Epifaunal	8/1/2001	12	Pier Piling	33.3537	-118.3293	
Bodega Bay	BBE01	Algae	9/11/2000	multiple		38.3341	-123.0511	
Bodega Bay	BBE01	Epifaunal	9/11/2000	surface		38.3341	-123.0511	
Bodega Bay	BBE02	Algae	9/11/2000	multiple		38.3293	-123.0552	
Bodega Bay	BBE02	Epifaunal	9/11/2000	surface		38.3293	-123.0552	
Bodega Bay	BBE03	Algae	9/11/2000	multiple		38.3293	-123.0552	
Bodega Bay	BBE03	Epifaunal	9/11/2000	surface		38.3293	-123.0552	
Bodega Bay	BBE04	Algae	9/11/2000	multiple		38.3293	-123.0552	
Bodega Bay	BBE04	Epifaunal	9/11/2000	surface		38.3293	-123.0552	
Bodega Bay	BBE05	Algae	9/11/2000	multiple		38.3293	-123.0552	
Bodega Bay	BBE05	Epifaunal	9/11/2000	surface		38.3293	-123.0552	
Bodega Bay	BBE06	Algae	9/11/2000	multiple		38.3317	-123.0571	
Bodega Bay	BBE06	Epifaunal	9/11/2000	surface		38.3317	-123.0571	
Bodega Bay	BBE07	Algae	9/11/2000	multiple		38.3317	-123.0571	
Bodega Bay	BBE07	Epifaunal	9/11/2000	surface		38.3317	-123.0571	
Bodega Bay	BBE08	Algae	9/11/2000	multiple		38.3317	-123.0571	
Bodega Bay	BBE08	Epifaunal	9/11/2000	surface		38.3317	-123.0571	
Bodega Bay	BBE09	Algae	9/11/2000	multiple		38.3317	-123.0571	
Bodega Bay	BBE09	Epifaunal	9/11/2000	surface		38.3317	-123.0571	
Bodega Bay	BBE10	Algae	9/11/2000	multiple		38.3341	-123.0511	
Bodega Bay	BBE10	Epifaunal	9/11/2000	surface		38.3341	-123.0511	
Channel Islands Harbor	CIE01U	Epifaunal	7/10/2001	surface	Underneath Dock	34.1742	-119.2271	
Channel Islands Harbor	CIE01X	Epifaunal	7/10/2001	surface	Side of dock	34.1742	-119.2271	
Channel Islands Harbor	CIE02P	Epifaunal	7/10/2001	4.5	Pier piling	34.1811	-119.2319	
Channel Islands Harbor	CIE02S	Epifaunal	7/10/2001	surface	Side of Dock	34.1811	-119.2319	
Channel Islands Harbor	CIE02U	Epifaunal	7/10/2001	surface	Underneath Dock	34.1811	-119.2319	
Channel Islands Harbor	CIE02X	Epifaunal	7/10/2001	multiple	All habitats	34.1811	-119.2319	
Channel Islands Harbor	CIE02Y	Algae	7/10/2001	multiple	All habitats	34.1811	-119.2319	
Channel Islands Harbor	CIE03P	Epifaunal	7/10/2001	10	Pier piling	34.1735	-119.2298	
Channel Islands Harbor	CIE03X	Epifaunal	7/10/2001	multiple	All habitats	34.1735	-119.2298	
Channel Islands Harbor	CIE04P	Epifaunal	7/10/2001	8	Pier piling	34.1642	-119.2260	
Channel Islands Harbor	CIE04U	Epifaunal	7/10/2001	surface	Underneath dock	34.1642	-119.2260	
Channel Islands Harbor	CIE04X	Epifaunal	7/10/2001	multiple	All habitats	34.1642	-119.2260	
Channel Islands Harbor	CIE04Y	Algae	7/10/2001	multiple	All habitats	34.1642	-119.2260	
Channel Islands Harbor	CIE05S	Epifaunal	7/10/2001	surface	Side of dock	34.1739	-119.2236	
Channel Islands Harbor	CIE05U	Epifaunal	7/10/2001	surface	Underneath dock	34.1739	-119.2236	
Channel Islands Harbor	CIE05X	Epifaunal	7/10/2001	multiple	All habitats	34.1739	-119.2236	
Channel Islands Harbor	CIE06P	Epifaunal	7/10/2001	4	Pier piling	34.1757	-119.2234	
Channel Islands Harbor	CIE06X	Epifaunal	7/10/2001	multiple	All habitats	34.1757	-119.2234	
Channel Islands Harbor	CIE06Y	Algae	7/10/2001	multiple	All habitats	34.1757	-119.2234	
Dana Point	DPE01P	Epifaunal	8/14/2001	6	Pier Piling	33.4615	-117.7031	
Dana Point	DPE01S	Epifaunal	8/14/2001	surface	Side of Dock	33.4615	-117.7031	
Dana Point	DPE01U	Epifaunal	8/14/2001	surface	Underneath Dock	33.4615	-117.7031	
Dana Point	DPE01X	Epifaunal	8/14/2001	multiple	All Habitats	33.4615	-117.7031	

WaterBody	StationId	SampleType	SampleDate	Depth (ft)	Habitat/Gear	LatDD	LongDD	%Fines
Dana Point	DPE01Y	Algae	8/14/2001	multiple	All Habitats	33.4615	-117.7031	
Dana Point	DPE02P	Epifaunal	8/14/2001	5	Pier Piling	33.4599	-117.7025	
Dana Point	DPE02X	Epifaunal	8/14/2001	multiple	All Habitats	33.4599	-117.7025	
Dana Point	DPE03SD	Epifaunal	8/14/2001	surface	Side of Dock-Shade	33.4613	-117.6995	
Dana Point	DPE03SL	Epifaunal	8/14/2001	surface	Side of Dock-Sun	33.4613	-117.6995	
Dana Point	DPE03X	Epifaunal	8/14/2001	not recorded	Pier Piling	33.4613	-117.6995	
Dana Point	DPE04P	Epifaunal	8/14/2001	3	Pier Piling	33.4590	-117.6991	
Dana Point	DPE04U	Epifaunal	8/14/2001	surface	Underneath Dock	33.4590	-117.6991	
Dana Point	DPE04X	Epifaunal	8/14/2001	multiple	All Habitats	33.4590	-117.6991	
Dana Point	DPE05U	Epifaunal	8/14/2001	surface	Underneath Dock	33.4592	-117.6941	
Fort Bragg	FBE01	Algae	9/11/2000	multiple		39.4266	-123.8057	
Fort Bragg	FBE01	Epifaunal	9/11/2000	surface		39.4266	-123.8057	
Fort Bragg	FBE02	Algae	9/11/2000	multiple		39.4266	-123.8057	
Fort Bragg	FBE02	Epifaunal	9/11/2000	surface		39.4266	-123.8057	
Fort Bragg	FBE03	Algae	9/11/2000	multiple		39.4266	-123.8057	
Fort Bragg	FBE03	Epifaunal	9/11/2000	surface		39.4266	-123.8057	
Fort Bragg	FBE04	Algae	9/11/2000	multiple		39.4266	-123.8057	
Fort Bragg	FBE04	Epifaunal	9/11/2000	surface		39.4266	-123.8057	
Humboldt Bay	HBE01P	Epifaunal	9/18/2001	2.5	Pier Piling	40.7425	-124.2270	
Humboldt Bay	HBE01X	Epifaunal	9/18/2001	multiple	All Habitats	40.7425	-124.2270	
Humboldt Bay	HBE02P	Epifaunal	9/18/2001	3.5	Pier Piling	40.7325	-124.2193	
Humboldt Bay	HBE02X	Epifaunal	9/18/2001	multiple	All Habitats	40.7325	-124.2193	
Humboldt Bay	HBE03P	Epifaunal	9/18/2001	1.8	Pier Piling	40.7233	-124.2234	
Humboldt Bay	HBE03X	Epifaunal	9/18/2001	multiple	All Habitats	40.7233	-124.2234	
Humboldt Bay	HBE03Y	Algae	9/18/2001	multiple	All Habitats	40.7233	-124.2234	
Humboldt Bay	HBE04S	Epifaunal	9/18/2001	surface	Side of Dock	40.7294	-124.2199	
Humboldt Bay	HBE04U	Epifaunal	9/18/2001	surface	Underneath Dock	40.7294	-124.2199	
Humboldt Bay	HBE04X	Epifaunal	9/18/2001	multiple	All Habitats	40.7294	-124.2199	
Humboldt Bay	HBE05P	Epifaunal	9/18/2001	2.5	Pier Piling	40.7784	-124.1959	
Humboldt Bay	HBE05S	Epifaunal	9/18/2001	surface	Side of Dock	40.7784	-124.1959	
Humboldt Bay	HBE05U	Epifaunal	9/18/2001	surface	Underneath Dock	40.7784	-124.1959	
Humboldt Bay	HBE05X	Epifaunal	9/18/2001	multiple	All Habitats	40.7784	-124.1959	
Humboldt Bay	HBE06U	Epifaunal	9/18/2001	surface	Underneath Dock	40.7978	-124.1920	
Humboldt Bay	HBE06Y	Algae	9/18/2001	multiple	All Habitats	40.7978	-124.1920	
Humboldt Bay	HBE07P	Epifaunal	9/18/2001	4.0	Pier Piling	40.7976	-124.1862	
Humboldt Bay	HBE07S	Epifaunal	9/18/2001	surface	Side of Dock	40.7976	-124.1862	
Humboldt Bay	HBE07U	Epifaunal	9/18/2001	surface	Underneath Dock	40.7976	-124.1862	
Humboldt Bay	HBE07X	Epifaunal	9/18/2001	multiple	All Habitats	40.7976	-124.1862	
Humboldt Bay	HBE08P	Epifaunal	9/18/2001	2.5	Pier Piling	40.8039	-124.1767	
Humboldt Bay	HBE08S	Epifaunal	9/18/2001	surface	Side of Dock	40.8039	-124.1767	
Humboldt Bay	HBE08U	Epifaunal	9/18/2001	surface	Underneath Dock	40.8039	-124.1767	
Humboldt Bay	HBE08X	Epifaunal	9/18/2001	multiple	All Habitats	40.8039	-124.1767	
Humboldt Bay	HBE09P	Epifaunal	9/18/2001	3.0	Pier Piling	40.8074	-124.1666	
Humboldt Bay	HBE09S	Epifaunal	9/18/2001	surface	Side of Dock	40.8074	-124.1666	
Humboldt Bay	HBE09U	Epifaunal	9/18/2001	surface	Underneath Dock	40.8074	-124.1666	
Humboldt Bay	HBE09X	Epifaunal	9/18/2001	multiple	All Habitats	40.8074	-124.1666	
Huntington Harbor	HHE01P	Epifaunal	7/12/2001	4	Pier piling	33.7128	-118.0543	
Huntington Harbor	HHE01S	Epifaunal	7/12/2001	surface	Side of dock	33.7128	-118.0543	
Huntington Harbor	HHE01U	Epifaunal	7/12/2001	surface	Underneath dock	33.7128	-118.0543	
Huntington Harbor	HHE01X	Epifaunal	7/12/2001	multiple	All Habitats	33.7128	-118.0543	
Huntington Harbor	HHE01Y	Algae	7/12/2001	multiple	All Habitats	33.7128	-118.0543	
Huntington Harbor	HHE02P	Epifaunal	7/12/2001	3	Pier piling	33.7175	-118.0658	
Huntington Harbor	HHE02U	Epifaunal	7/12/2001	surface	Underneath dock	33.7175	-118.0658	
Huntington Harbor	HHE02X	Epifaunal	7/12/2001	multiple	All Habitats	33.7175	-118.0658	
Huntington Harbor	HHE03P	Epifaunal	7/12/2001	not recorded	Pier piling	33.7283	-118.0601	

WaterBody	StationId	SampleType	SampleDate	Depth (ft)	Habitat/Gear	LatDD	LongDD	%Fines
Huntington Harbor	HHE03S	Epifaunal	7/12/2001	surface	Side of dock	33.7283	-118.0601	
Huntington Harbor	HHE03X	Epifaunal	7/12/2001	multiple	All Habitats	33.7283	-118.0601	
Huntington Harbor	HHE03Y	Algae	7/12/2001	multiple	All Habitats	33.7283	-118.0601	
Huntington Harbor	HHE04P	Epifaunal	7/12/2001	4	Pier piling	33.7278	-118.0787	
Huntington Harbor	HHE04S	Epifaunal	7/12/2001	surface	Side of dock	33.7278	-118.0787	
Huntington Harbor	HHE04X	Epifaunal	7/12/2001	multiple	All Habitats	33.7278	-118.0787	
Huntington Harbor	HHE04Y	Algae	7/12/2001	multiple	All Habitats	33.7278	-118.0787	
Long Beach	LBE01P	Epifaunal	8/16/2001	15	Pier Piling	33.7596	-118.1865	
Long Beach	LBE01X	Epifaunal	8/16/2001	multiple	All Habitats	33.7596	-118.1865	
Long Beach	LBE02P	Epifaunal	8/16/2001	15	Pier Piling	33.7477	-118.1975	
Long Beach	LBE02P	Epifaunal	8/16/2001	35	Pier Piling	33.7477	-118.1975	
Long Beach	LBE02X	Epifaunal	8/16/2001	multiple	All Habitats	33.7477	-118.1975	
Long Beach	LBE03P	Epifaunal	8/16/2001	not recorded	Pier Piling	33.7628	-118.2145	
Long Beach	LBE03U	Epifaunal	8/16/2001	surface	Underneath Dock	33.7628	-118.2145	
Long Beach	LBE03X	Epifaunal	8/16/2001	multiple	All Habitats	33.7628	-118.2145	
Long Beach	LBE03Y	Algae	8/16/2001	multiple	All Habitats	33.7628	-118.2145	
Long Beach	LBE04PA	Epifaunal	8/16/2001	12	Pier Piling	33.7709	-118.2113	
Long Beach	LBE04PB	Epifaunal	8/16/2001	5	Pier Piling	33.7709	-118.2113	
Long Beach	LBE04X	Epifaunal	8/16/2001	multiple	All Habitats	33.7709	-118.2113	
Long Beach	LBE05P	Epifaunal	8/16/2001	5	Pier Piling	33.7766	-118.2107	
Long Beach	LBE05X	Epifaunal	8/16/2001	not recorded	Pier Piling	33.7766	-118.2107	
Long Beach	LBE05Y	Algae	8/16/2001	not recorded	Pier Piling	33.7766	-118.2107	
Long Beach	LBE06P	Epifaunal	8/16/2001	15	Pier Piling	33.7697	-118.2283	
Long Beach	LBE06Y	Algae	8/16/2001	not recorded	Pier Piling	33.7697	-118.2283	
Los Angeles	LAE01P	Epifaunal	7/11/2001	5	Pier piling	33.7348	-118.2478	
Los Angeles	LAE01P	Epifaunal	7/11/2001	18	Pier piling	33.7348	-118.2478	
Los Angeles	LAE01X	Epifaunal	7/11/2001	multiple	All habitats	33.7348	-118.2478	
Los Angeles	LAE02P	Epifaunal	7/11/2001	10	Pier piling	33.7541	-118.2709	
Los Angeles	LAE02P	Epifaunal	7/11/2001	25	Pier piling	33.7541	-118.2709	
Los Angeles	LAE02X	Epifaunal	7/11/2001	multiple	All Habitats	33.7541	-118.2709	
Los Angeles	LAE02Y	Algae	7/11/2001	multiple	All Habitats	33.7541	-118.2709	
Los Angeles	LAE03P	Epifaunal	7/11/2001	5	Pier piling	33.7684	-118.2782	
Los Angeles	LAE03X	Epifaunal	7/11/2001	multiple	All Habitats	33.7684	-118.2782	
Los Angeles	LAE03Y	Algae	7/11/2001	multiple	All Habitats	33.7684	-118.2782	
Los Angeles	LAE04P	Epifaunal	7/11/2001	20	Pier piling	33.7655	-118.2529	
Los Angeles	LAE04U	Epifaunal	7/11/2001	surface	Underneath dock	33.7655	-118.2529	
Los Angeles	LAE04X	Epifaunal	7/11/2001	multiple	All Habitats	33.7655	-118.2529	
Los Angeles	LAE04Y	Algae	7/11/2001	multiple	All Habitats	33.7655	-118.2529	
Los Angeles	LAE05P	Epifaunal	7/11/2001	not recorded	Pier piling	33.7648	-118.2424	
Los Angeles	LAE05S	Epifaunal	7/11/2001	surface	Side of dock	33.7648	-118.2424	
Los Angeles	LAE05U	Epifaunal	7/11/2001	surface	Underneath dock	33.7648	-118.2424	
Los Angeles	LAE05X	Epifaunal	7/11/2001	multiple	All Habitats	33.7648	-118.2424	
Los Angeles	LAE05Y	Algae	7/11/2001	multiple	All Habitats	33.7648	-118.2424	
Los Angeles	LAF01	Fish	7/11/2001	not recorded	traps	33.7158	-118.2821	
Los Angeles	LAF02	Fish	7/11/2001	20	traps	33.7050	-118.2705	
Los Angeles	LAF03	Fish	7/11/2001	not recorded	traps	33.7291	-118.2665	
Los Angeles	LAF04	Fish	7/11/2001	11	traps	33.7387	-118.2489	
Los Angeles	LAF05	Fish	7/11/2001	not recorded	traps	33.7539	-118.2762	
Los Angeles	LAF06	Fish	7/11/2001	20	traps	33.7652	-118.2385	
Los Angeles	LAF07	Fish	7/11/2001	26	traps	33.7587	-118.2197	
Los Angeles	LAF08	Fish	7/11/2001	46	traps	33.7440	-118.2355	
Los Angeles	LAF09	Fish	7/11/2001	54	traps	33.7408	-118.2022	
Los Angeles	LAF10	Fish	7/11/2001	53	traps	33.7166	-118.2729	
Marina Del Rey	MRE01P	Epifaunal	7/11/2001	4	Pier piling	33.9830	-118.4562	
Marina Del Rey	MRE01U	Epifaunal	7/11/2001	surface	Underneath dock	33.9830	-118.4562	

WaterBody	StationId	SampleType	SampleDate	Depth (ft)	Habitat/Gear	LatDD	LongDD	%Fines
Marina Del Rey	MRE01X	Epifaunal	7/11/2001	multiple	All habitats	33.9830	-118.4562	
Marina Del Rey	MRE02P	Epifaunal	7/11/2001	6	Pier piling	33.9828	-118.4467	
Marina Del Rey	MRE02S	Epifaunal	7/11/2001	surface	Side of dock	33.9828	-118.4467	
Marina Del Rey	MRE02U	Epifaunal	7/11/2001	surface	Underneath dock	33.9828	-118.4467	
Marina Del Rey	MRE02X	Epifaunal	7/11/2001	multiple	All habitats	33.9828	-118.4467	
Marina Del Rey	MRE02Y	Algae	7/11/2001	multiple	All habitats	33.9828	-118.4467	
Marina Del Rey	MRE03P	Epifaunal	7/11/2001	11	Pier piling	33.9703	-118.4494	
Marina Del Rey	MRE03S	Epifaunal	7/11/2001	surface	Side of dock	33.9703	-118.4494	
Marina Del Rey	MRE03X	Epifaunal	7/11/2001	surface	Underneath dock	33.9703	-118.4494	
Marina Del Rey	MRE03Y	Algae	7/11/2001	surface	Underneath dock	33.9703	-118.4494	
Marina Del Rey	MRE04P	Epifaunal	7/11/2001	4	Pier piling	33.9760	-118.4460	
Marina Del Rey	MRE04S	Epifaunal	7/11/2001	surface	Side of dock	33.9760	-118.4460	
Marina Del Rey	MRE04X	Epifaunal	7/11/2001	multiple	All habitats	33.9760	-118.4460	
Marina Del Rey	MRE04Y	Algae	7/11/2001	multiple	All habitats	33.9760	-118.4460	
Mission Bay	MIE01P	Epifaunal	10/10/2001	2	Pier Piling	32.7791	-117.2128	
Mission Bay	MIE01U	Epifaunal	10/10/2001	surface	Underneath Dock	32.7791	-117.2128	
Mission Bay	MIE01X	Epifaunal	10/10/2001	multiple	All Habitats	32.7791	-117.2128	
Mission Bay	MIE01Y	Algae	10/10/2001	multiple	All Habitats	32.7791	-117.2128	
Mission Bay	MIE02P	Epifaunal	10/10/2001	2	Pier Piling	32.7933	-117.2226	
Mission Bay	MIE02S	Epifaunal	10/10/2001	surface	Side of Dock	32.7933	-117.2226	
Mission Bay	MIE02U	Epifaunal	10/10/2001	surface	Underneath Dock	32.7933	-117.2226	
Mission Bay	MIE02X	Epifaunal	10/10/2001	multiple	All Habitats	32.7933	-117.2226	
Mission Bay	MIE02Y	Algae	10/10/2001	multiple	All Habitats	32.7933	-117.2226	
Mission Bay	MIE03S	Epifaunal	10/10/2001	surface	Side of Dock	32.7619	-117.2357	
Mission Bay	MIE03U	Epifaunal	10/10/2001	surface	Underneath Dock	32.7619	-117.2357	
Mission Bay	MIE03Y	Algae	10/10/2001	multiple	All Habitats	32.7619	-117.2357	
Mission Bay	MIE04S	Epifaunal	10/10/2001	surface	Side of Dock	32.7671	-117.2361	
Mission Bay	MIE04U	Epifaunal	10/10/2001	surface	Underneath Dock	32.7671	-117.2361	
Mission Bay	MIE04X	Epifaunal	10/10/2001	multiple	All Habitats	32.7671	-117.2361	
Mission Bay	MIE04Y	Algae	10/10/2001	multiple	All Habitats	32.7671	-117.2361	
Monterey Harbor	MHE01	Epifaunal	10/25/2000	surface	Floating docks	36.6032	-121.8920	
Monterey Harbor	MHE02	Algae	10/25/2000	surface	Floating docks	36.6034	-121.8907	
Monterey Harbor	MHE02	Epifaunal	10/25/2000	surface	Floating docks	36.6034	-121.8907	
Monterey Harbor	MHE03	Epifaunal	10/25/2000	surface	Floating docks	36.6043	-121.8918	
Monterey Harbor	MHE04	Epifaunal	10/25/2000	surface	Floating docks	36.6039	-121.8896	
Monterey Harbor	MHE05	Epifaunal	10/25/2000	surface	Floating docks	36.6090	-121.8933	
Morro Bay	MBE01	Algae	9/12/2000	multiple		35.3644	-120.8549	
Morro Bay	MBE01	Epifaunal	9/12/2000	surface		35.3644	-120.8549	
Morro Bay	MBE02	Algae	9/13/2000	multiple		35.3644	-120.8549	
Morro Bay	MBE02	Epifaunal	9/13/2000	surface		35.3644	-120.8549	
Morro Bay	MBE03	Algae	9/13/2000	multiple		35.3644	-120.8549	
Morro Bay	MBE03	Epifaunal	9/13/2000	surface		35.3644	-120.8549	
Morro Bay	MBE04	Algae	9/13/2000	multiple		35.3644	-120.8549	
Morro Bay	MBE04	Epifaunal	9/13/2000	surface		35.3644	-120.8549	
Morro Bay	MBE05	Algae	9/13/2000	multiple		35.3644	-120.8549	
Morro Bay	MBE05	Epifaunal	9/13/2000	surface		35.3644	-120.8549	
Morro Bay	MBE06	Algae	9/13/2000	multiple		35.3644	-120.8549	
Morro Bay	MBE06	Epifaunal	9/13/2000	surface		35.3644	-120.8549	
Morro Bay	MBE07	Algae	9/13/2000	multiple		35.3644	-120.8549	
Morro Bay	MBE07	Epifaunal	9/13/2000	surface		35.3644	-120.8549	
Morro Bay	MBE08	Algae	9/13/2000	multiple		35.3644	-120.8549	
Morro Bay	MBE08	Epifaunal	9/13/2000	surface		35.3644	-120.8549	
Morro Bay	MBE09	Algae	9/13/2000	multiple		35.3644	-120.8549	
Morro Bay	MBE09	Epifaunal	9/13/2000	surface		35.3644	-120.8549	
Morro Bay	MBE10	Algae	9/13/2000	multiple		35.3644	-120.8549	

WaterBody	StationId	SampleType	SampleDate	Depth (ft)	Habitat/Gear	LatDD LongDD	%Fines
Morro Bay	MBE10	Epifaunal	9/13/2000	surface		35.3644-120.8549	
Morro Bay	MBE11	Algae	9/13/2000	multiple		35.3644-120.8549	
Morro Bay	MBE11	Epifaunal	9/13/2000	surface		35.3644-120.8549	
Morro Bay	MBE12	Algae	9/13/2000	multiple		35.3644-120.8549	
Morro Bay	MBE12	Epifaunal	9/13/2000	surface		35.3644-120.8549	
Moss Landing Harbor	MLE01	Epifaunal	10/25/2000	surface	Floating docks	36.8040-121.7861	
Moss Landing Harbor	MLE02	Algae	10/25/2000	surface	Floating docks	36.8042-121.7851	
Moss Landing Harbor	MLE02	Epifaunal	10/25/2000	surface	Floating docks	36.8042-121.7851	
Moss Landing Harbor	MLE03	Epifaunal	10/25/2000	surface	Floating docks	36.8028-121.7850	
Moss Landing Harbor	MLE04	Epifaunal	10/25/2000	surface	Floating docks	36.8005-121.7879	
Moss Landing Harbor	MLE05	Epifaunal	10/25/2000	surface	Floating docks	36.8128-121.7880	
Newport Beach	NHE01S	Epifaunal	8/15/2001	surface	Side of Dock	33.5978-117.8800	
Newport Beach	NHE01X	Epifaunal	8/15/2001	multiple	All Habitats	33.5978-117.8800	
Newport Beach	NHE01Y	Algae	8/15/2001	multiple	All Habitats	33.5978-117.8800	
Newport Beach	NHE02U	Epifaunal	8/15/2001	surface	Underneath Dock	33.6079-117.8868	
Newport Beach	NHE02X	Epifaunal	8/15/2001	multiple	All Habitats	33.6079-117.8868	
Newport Beach	NHE03P	Epifaunal	8/15/2001	4	Pier Piling	33.6094-117.8958	
Newport Beach	NHE03X	Epifaunal	8/15/2001	multiple	All Habitats	33.6094-117.8958	
Newport Beach	NHE04S	Epifaunal	8/15/2001	surface	Side of Dock	33.6085-117.9202	
Newport Beach	NHE04U	Epifaunal	8/15/2001	surface	Underneath Dock	33.6085-117.9202	
Newport Beach	NHE04X	Epifaunal	8/15/2001	multiple	All Habitats	33.6085-117.9202	
Newport Beach	NHE05P	Epifaunal	8/15/2001	5	Pier Piling	33.6212-117.9364	
Newport Beach	NHE05S	Epifaunal	8/15/2001	surface	Side of Dock	33.6212-117.9364	
Newport Beach	NHE05U	Epifaunal	8/15/2001	surface	Underneath Dock	33.6212-117.9364	
Newport Beach	NHE05X	Epifaunal	8/15/2001	multiple	All Habitats	33.6212-117.9364	
Newport Beach	NHE06S	Epifaunal	8/15/2001	surface	Side of Dock	33.6154-117.9022	
Newport Beach	NHE07S	Epifaunal	8/15/2001	surface	Side of Dock	33.6193-117.8933	
Newport Beach	NHE07U	Epifaunal	8/15/2001	surface	Underneath Dock	33.6193-117.8933	
Newport Beach	NHE07X	Epifaunal	8/15/2001	multiple	All Habitats	33.6193-117.8933	
Oceanside	OHE01P	Epifaunal	8/14/2001	6	Pier Piling	33.2118-117.3951	
Oceanside	OHE01U	Epifaunal	8/14/2001	surface	Underneath Dock	33.2118-117.3951	
Oceanside	OHE01X	Epifaunal	8/14/2001	multiple	All Habitats	33.2118-117.3951	
Oceanside	OHE02P	Epifaunal	8/14/2001	6	Pier Piling	33.2104-117.3960	
Oceanside	OHE02S	Epifaunal	8/14/2001	surface	Side of Dock	33.2104-117.3960	
Oceanside	OHE02U	Epifaunal	8/14/2001	surface	Underneath Dock	33.2104-117.3960	
Oceanside	OHE02X	Epifaunal	8/14/2001	multiple	All Habitats	33.2104-117.3960	
Oceanside	OHE03S	Epifaunal	8/14/2001	surface	Side of Dock	33.2090-117.3956	
Oceanside	OHE03X	Epifaunal	8/14/2001	multiple	All Habitats	33.2090-117.3956	
Oceanside	OHE04U	Epifaunal	8/14/2001	surface	Underneath Dock	33.2087-117.3949	
Oceanside	OHE04X	Epifaunal	8/14/2001	multiple	All Habitats	33.2087-117.3949	
Oceanside	OHE04Y	Algae	8/14/2001	multiple	All Habitats	33.2087-117.3949	
Oceanside	OHE05U	Epifaunal	8/14/2001	surface	Underneath Dock	33.2058-117.3898	
Oceanside	OHE05X	Epifaunal	8/14/2001	multiple	All Habitats	33.2058-117.3898	
Oceanside	OHE06S	Epifaunal	8/14/2001	surface	Side of Dock	33.2052-117.3908	
Oceanside	OHE06X	Epifaunal	8/14/2001	multiple	All Habitats	33.2052-117.3908	
Port Hueneme	PHE01A	Epifaunal	11/8/2000	20	Pier piling	34.1527-119.2103	
Port Hueneme	PHE01B	Epifaunal	11/8/2000	20	Pier piling	34.1527-119.2103	
Port Hueneme	PHE02A	Epifaunal	11/8/2000	6	Pier piling	34.1497-119.2100	
Port Hueneme	PHE02B	Epifaunal	11/8/2000	20	Pier piling	34.1497-119.2100	
Port Hueneme	PHE02C	Epifaunal	11/8/2000	not recorded	Pier piling	34.1497-119.2100	
Port Hueneme	PHE02D	Algae	11/8/2000	not recorded	Pier piling	34.1497-119.2100	
Port Hueneme	PHE03A	Epifaunal	11/8/2000	not recorded	Pier piling	34.1516-119.2067	
Port Hueneme	PHE03B	Epifaunal	11/8/2000	8	Pier piling	34.1516-119.2067	
Port Hueneme	PHE03C	Epifaunal	11/8/2000	22	Pier piling	34.1516-119.2067	
Port Hueneme	PHE04A	Epifaunal	11/8/2000	7	Pier piling	34.1468-119.2119	

WaterBody	StationId	SampleType	SampleDate	Depth (ft)	Habitat/Gear	LatDD	LongDD	%Fines
Port Hueneme	PHE04B	Epifaunal	11/8/2000	5	Pier piling	34.1468	-119.2119	
Port Hueneme	PHE05	Epifaunal	11/8/2000	11	Pier piling	34.1462	-119.2102	
Port Hueneme	PHE06A	Epifaunal	11/8/2000	not recorded	Pier piling	34.1487	-119.2016	
Port Hueneme	PHE06B	Epifaunal	11/8/2000	10	Pier piling	34.1487	-119.2016	
Port Hueneme	PHE06C	Epifaunal	11/8/2000	8	Pier piling	34.1487	-119.2016	
Port Hueneme	PHE07A	Epifaunal	11/8/2000	10	Pier piling	34.1477	-119.2042	
Port Hueneme	PHE07B	Epifaunal	11/8/2000	15	Pier piling	34.1477	-119.2042	
Port Hueneme	PHE07C	Epifaunal	11/8/2000	not recorded	Pier piling	34.1477	-119.2042	
Port Hueneme	PHE08A	Epifaunal	11/8/2000	14	Pier piling	34.1486	-119.2057	
Port Hueneme	PHE08B	Epifaunal	11/8/2000	not recorded	Pier piling	34.1486	-119.2057	
Port Hueneme	PHE08C	Epifaunal	11/8/2000	8	Pier piling	34.1486	-119.2057	
Port Hueneme	PHE11A	Epifaunal	11/8/2000	5	Rocky rip rap	34.1537	-119.2106	
Port Hueneme	PHE11B	Algae	11/8/2000	5	Rocky rip rap	34.1537	-119.2106	
Port Hueneme	PHE12A	Epifaunal	11/8/2000	13	Rocky rip rap	34.1471	-119.2119	
Port Hueneme	PHE12B	Algae	11/8/2000	13	Rocky rip rap	34.1471	-119.2119	
Port Hueneme	PHE13A	Epifaunal	11/8/2000	surface	Rocky rip rap	34.1459	-119.2105	
Port Hueneme	PHE13B	Epifaunal	11/8/2000	5	Rocky rip rap	34.1459	-119.2105	
Port Hueneme	PHE14A	Algae	11/8/2000	10	Rocky rip rap	34.1487	-119.2016	
Port Hueneme	PHE14B	Epifaunal	11/8/2000	10	Rocky rip rap	34.1487	-119.2016	
Port Hueneme	PHE15	Epifaunal	11/8/2000	5	Rocky rip rap	34.1477	-119.2042	
Port Hueneme	PHE16	Epifaunal	11/8/2000	12	Rocky rip rap	34.1486	-119.2057	
Port Hueneme	PHE18	Algae	11/8/2000	surface	Floating dock	34.1537	-119.2090	
Port Hueneme	PHE18A	Epifaunal	11/8/2000	surface	Floating dock	34.1537	-119.2090	
Port Hueneme	PHE18B	Epifaunal	11/8/2000	surface	Floating dock	34.1537	-119.2090	
Port Hueneme	PHE19A	Epifaunal	11/8/2000	3	Floating dock	34.1499	-119.2099	
Port Hueneme	PHE19B	Epifaunal	11/8/2000	surface	Floating dock	34.1499	-119.2099	
Port Hueneme	PHE20A	Epifaunal	11/8/2000	surface	Floating dock	34.1487	-119.2016	
Port Hueneme	PHE20B	Epifaunal	11/8/2000	surface	Floating dock	34.1487	-119.2016	
Port Hueneme	PHF01	Fish	7/9/2001	not recorded	traps	34.1465	-119.2098	
Port Hueneme	PHF02	Fish	7/9/2001	not recorded	traps	34.1460	-119.2102	
Port Hueneme	PHF03	Fish	7/9/2001	not recorded	traps	34.1480	-119.2021	
Port Hueneme	PHF04	Fish	7/9/2001	not recorded	traps	34.1485	-119.2018	
Port Hueneme	PHF05	Fish	7/9/2001	not recorded	traps	34.1537	-119.2108	
Port Hueneme	PHF06	Fish	7/9/2001	not recorded	traps	34.1535	-119.2107	
Port Hueneme	PHF07	Fish	7/9/2001	not recorded	traps	34.1472	-119.2114	
Port Hueneme	PHF08	Fish	7/9/2001	not recorded	traps	34.1471	-119.2121	
Port Hueneme	PHF09	Fish	7/9/2001	not recorded	traps	34.1487	-119.2102	
Port Hueneme	PHI01	Infaunal	9/13/2000	12	Van Veen grab	34.1538	-119.2106	68.52
Port Hueneme	PHI02	Infaunal	9/13/2000	22	Van Veen grab	34.1531	-119.2101	33.70
Port Hueneme	PHI03	Infaunal	9/13/2000	15	Van Veen grab	34.1537	-119.2091	10.19
Port Hueneme	PHI04	Infaunal	9/13/2000	32	Van Veen grab	34.1536	-119.2091	74.91
Port Hueneme	PHI05	Infaunal	9/13/2000	36	Van Veen grab	34.1532	-119.2088	81.17
Port Hueneme	PHI06	Infaunal	9/13/2000	39	Van Veen grab	34.1526	-119.2096	88.93
Port Hueneme	PHI07	Infaunal	9/13/2000	39	Van Veen grab	34.1513	-119.2095	60.03
Port Hueneme	PHI07	Infaunal	9/13/2000	39	Van Veen grab	34.1513	-119.2095	60.29
Port Hueneme	PHI08	Infaunal	9/13/2000	39	Van Veen grab	34.1510	-119.2089	35.65
Port Hueneme	PHI09	Infaunal	9/13/2000	39	Van Veen grab	34.1512	-119.2075	38.23
Port Hueneme	PHI10	Infaunal	9/13/2000	37	Van Veen grab	34.1506	-119.2068	39.61
Port Hueneme	PHI11	Infaunal	9/13/2000	36	Van Veen grab	34.1506	-119.2088	29.11
Port Hueneme	PHI12	Infaunal	9/13/2000	35	Van Veen grab	34.1509	-119.2074	11.63
Port Hueneme	PHI13	Infaunal	9/13/2000	35	Van Veen grab	34.1496	-119.2095	41.31
Port Hueneme	PHI14	Infaunal	9/13/2000	42	Van Veen grab	34.1491	-119.2085	5.28
Port Hueneme	PHI15	Infaunal	9/13/2000	37	Van Veen grab	34.1481	-119.2064	27.60
Port Hueneme	PHI16	Infaunal	9/14/2000	37	Van Veen grab	34.1486	-119.2019	76.71
Port Hueneme	PHI17	Infaunal	9/14/2000	31	Van Veen grab	34.1488	-119.2058	45.25

WaterBody	StationId	SampleType	SampleDate	Depth (ft)	Habitat/Gear	LatDD	LongDD	%Fines
Port Hueneme	PHI17	Infaunal	9/14/2000	31	Van Veen grab	34.1488	-119.2058	51.94
Port Hueneme	PHI18	Infaunal	9/14/2000	34	Van Veen grab	34.1480	-119.2050	22.27
Port Hueneme	PHI19	Infaunal	9/14/2000	42	Van Veen grab	34.1444	-119.2126	51.54
Port Hueneme	PHI20	Infaunal	9/14/2000	40	Van Veen grab	34.1458	-119.2115	33.48
Port Hueneme	PHI21	Infaunal	9/14/2000	11	Van Veen grab	34.1468	-119.2121	21.32
Port Hueneme	PHI22	Infaunal	9/14/2000	37	Van Veen grab	34.1469	-119.2098	52.85
Port Hueneme	PHI23	Infaunal	9/14/2000	34	Van Veen grab	34.1478	-119.2102	45.04
Port Hueneme	PHI24	Infaunal	9/14/2000	35	Van Veen grab	34.1477	-119.2038	44.17
Port Hueneme	PHI25	Infaunal	9/14/2000	38	Van Veen grab	34.1482	-119.2038	58.39
Port Hueneme	PHI26A	Infaunal	11/8/2000	16	Van Veen grab	34.1444	-119.2111	
Port Hueneme	PHI26B	Infaunal	11/8/2000	2	Van Veen grab	34.1444	-119.2111	
Sacramento	SAF01	Fish	9/11/2001	20	Fyke nets	38.5607	-121.5544	
Sacramento	SAF01	Fish	9/11/2001	10	traps	38.5660	-121.5514	
Sacramento	SAF02	Fish	9/25/2001	5	e-boat	38.5660	-121.5514	
Sacramento	SAI01	Infaunal	8/29/2000	15	Van Veen grab	38.5604	-121.5609	54.60
Sacramento	SAI02	Infaunal	8/29/2000	39	Van Veen grab	38.5609	-121.5610	100.00
Sacramento	SAI02	Infaunal	8/29/2000	39	Van Veen grab	38.5609	-121.5610	100.00
Sacramento	SAI03	Infaunal	8/29/2000	13	Van Veen grab	38.5607	-121.5542	100.00
Sacramento	SAI04	Infaunal	8/29/2000	36	Van Veen grab	38.5620	-121.5545	100.00
Sacramento	SAI05	Infaunal	8/29/2000	12	Van Veen grab	38.5609	-121.5507	37.86
Sacramento	SAI06	Infaunal	8/29/2000	37	Van Veen grab	38.5626	-121.5506	94.78
Sacramento	SAI07	Infaunal	8/29/2000	14	Van Veen grab	38.5608	-121.5477	49.12
Sacramento	SAI08	Infaunal	8/29/2000	36	Van Veen grab	38.5620	-121.5478	95.95
Sacramento	SAI09	Infaunal	8/29/2000	15	Van Veen grab	38.5611	-121.5403	42.67
Sacramento	SAI10	Infaunal	8/29/2000	22	Van Veen grab	38.5613	-121.5403	24.69
Sacramento	SAI11	Infaunal	8/29/2000	12	Van Veen grab	38.5608	-121.5374	22.51
Sacramento	SAI12	Infaunal	8/29/2000	15	Van Veen grab	38.5612	-121.5373	95.21
Sacramento	SAI12	Infaunal	8/29/2000	15	Van Veen grab	38.5612	-121.5373	93.95
Sacramento	SAI13	Infaunal	8/29/2000	34	Van Veen grab	38.5660	-121.5525	97.75
Sacramento	SAI14	Infaunal	8/29/2000	13	Van Veen grab	38.5664	-121.5528	54.34
Sacramento	SAI15	Infaunal	8/29/2000	4	Van Veen grab	38.5655	-121.5563	88.62
Sacramento	SAI16	Infaunal	8/29/2000	6	Van Veen grab	38.5660	-121.5561	97.22
Sacramento	SAI17	Infaunal	8/29/2000	3	Van Veen grab	38.5679	-121.5586	88.46
Sacramento	SAI18	Infaunal	8/29/2000	5	Van Veen grab	38.5685	-121.5584	92.17
Sacramento	SAI19	Infaunal	8/29/2000	3	Van Veen grab	38.5709	-121.5601	99.51
Sacramento	SAI20	Infaunal	8/29/2000	3	Van Veen grab	38.5713	-121.5597	99.60
San Diego	SDE01P	Epifaunal	10/9/2001	2	Pier Piling	32.6225	-117.1023	
San Diego	SDE01S	Epifaunal	10/9/2001	surface	Side of Dock	32.6225	-117.1023	
San Diego	SDE01U	Epifaunal	10/9/2001	surface	Underneath Dock	32.6225	-117.1023	
San Diego	SDE01X	Epifaunal	10/9/2001	multiple	All Habitats	32.6225	-117.1023	
San Diego	SDE02P	Epifaunal	10/9/2001	2	Pier Piling	32.6274	-117.1329	
San Diego	SDE02S	Epifaunal	10/9/2001	surface	Side of Dock	32.6274	-117.1329	
San Diego	SDE02U	Epifaunal	10/9/2001	surface	Underneath Dock	32.6274	-117.1329	
San Diego	SDE02X	Epifaunal	10/9/2001	multiple	All Habitats	32.6274	-117.1329	
San Diego	SDE02Y	Algae	10/9/2001	multiple	All Habitats	32.6274	-117.1329	
San Diego	SDE03P	Epifaunal	10/9/2001	6	Pier Piling	32.6584	-117.1191	
San Diego	SDE03S	Epifaunal	10/9/2001	surface	Side of Dock	32.6584	-117.1191	
San Diego	SDE03U	Epifaunal	10/9/2001	surface	Underneath Dock	32.6584	-117.1191	
San Diego	SDE03X	Epifaunal	10/9/2001	multiple	All Habitats	32.6584	-117.1191	
San Diego	SDE04P	Epifaunal	10/9/2001	4	Pier Piling	32.6992	-117.1684	
San Diego	SDE04S	Epifaunal	10/9/2001	surface	Side of Dock	32.6992	-117.1684	
San Diego	SDE04U	Epifaunal	10/9/2001	surface	Underneath Dock	32.6992	-117.1684	
San Diego	SDE04X	Epifaunal	10/9/2001	multiple	All Habitats	32.6992	-117.1684	
San Diego	SDE04Y	Algae	10/9/2001	multiple	All Habitats	32.6992	-117.1684	
San Diego	SDE05P	Epifaunal	10/9/2001	3	Pier Piling	32.6969	-117.1526	

WaterBody	StationId	SampleType	SampleDate	Depth (ft)	Habitat/Gear	LatDD	LongDD	%Fines
San Diego	SDE05U	Epifaunal	10/9/2001	surface	Underneath Dock	32.6969	-117.1526	
San Diego	SDE05X	Epifaunal	10/9/2001	multiple	All Habitats	32.6969	-117.1526	
San Diego	SDE05Y	Algae	10/9/2001	multiple	All Habitats	32.6969	-117.1526	
San Diego	SDE06P	Epifaunal	10/9/2001	6	Pier Piling	32.7109	-117.1739	
San Diego	SDE06U	Epifaunal	10/9/2001	surface	Underneath Dock	32.7109	-117.1739	
San Diego	SDE06X	Epifaunal	10/9/2001	multiple	All Habitats	32.7109	-117.1739	
San Diego	SDE07P	Epifaunal	10/9/2001	5	Pier Piling	32.7043	-117.1615	
San Diego	SDE07S	Epifaunal	10/9/2001	3	Side of Dock	32.7043	-117.1615	
San Diego	SDE07U	Epifaunal	10/9/2001	surface	Underneath Dock	32.7043	-117.1615	
San Diego	SDE07X	Epifaunal	10/9/2001	multiple	All Habitats	32.7043	-117.1615	
San Diego	SDE07Y	Algae	10/9/2001	multiple	All Habitats	32.7043	-117.1615	
San Diego	SDE08P	Epifaunal	10/9/2001	5	Pier Piling	32.7168	-117.1759	
San Diego	SDE08S	Epifaunal	10/9/2001	surface	Side of Dock	32.7168	-117.1759	
San Diego	SDE08X	Epifaunal	10/9/2001	multiple	All Habitats	32.7168	-117.1759	
San Diego	SDE09P	Epifaunal	10/10/2001	3	Pier Piling	32.7180	-117.2255	
San Diego	SDE09U	Epifaunal	10/10/2001	surface	Underneath Dock	32.7180	-117.2255	
San Diego	SDE09X	Epifaunal	10/10/2001	multiple	All Habitats	32.7180	-117.2255	
San Diego	SDE10P	Epifaunal	10/10/2001	3	Pier Piling	32.7078	-117.2368	
San Diego	SDE10S	Epifaunal	10/10/2001	surface	Side of Dock	32.7078	-117.2368	
San Diego	SDE10U	Epifaunal	10/10/2001	surface	Underneath Dock	32.7078	-117.2368	
San Diego	SDE10X	Epifaunal	10/10/2001	multiple	All Habitats	32.7078	-117.2368	
San Diego	SDE10Y	Algae	10/10/2001	multiple	All Habitats	32.7078	-117.2368	
San Diego	SDE11P	Epifaunal	10/10/2001	3	Pier Piling	32.7266	-117.2128	
San Diego	SDE11S	Epifaunal	10/10/2001	surface	Side of Dock	32.7266	-117.2128	
San Diego	SDE11X	Epifaunal	10/10/2001	multiple	All Habitats	32.7266	-117.2128	
San Diego	SDE11Y	Algae	10/10/2001	multiple	All Habitats	32.7266	-117.2128	
San Diego	SDE12P	Epifaunal	10/10/2001	2.5	Pier Piling	32.7239	-117.2240	
San Diego	SDE12U	Epifaunal	10/10/2001	surface	Underneath Dock	32.7239	-117.2240	
San Diego	SDE12X	Epifaunal	10/10/2001	multiple	All Habitats	32.7239	-117.2240	
San Diego	SDE12Y	Algae	10/10/2001	multiple	All Habitats	32.7239	-117.2240	
Santa Barbara	SBE01P	Epifaunal	7/9/2001	15	Pier Piling	34.4045	-119.6920	
Santa Barbara	SBE01S	Epifaunal	7/9/2001	surface	Side of dock	34.4045	-119.6920	
Santa Barbara	SBE01U	Epifaunal	7/9/2001	surface	Underneath dock	34.4045	-119.6920	
Santa Barbara	SBE01X	Epifaunal	7/9/2001	multiple	All habitats	34.4045	-119.6920	
Santa Barbara	SBE01Y	Algae	7/9/2001	multiple	All habitats	34.4045	-119.6920	
Santa Barbara	SBE02P	Epifaunal	7/9/2001	8	Pier piling	34.4048	-119.6936	
Santa Barbara	SBE02U	Epifaunal	7/9/2001	surface	Underneath dock	34.4048	-119.6936	
Santa Barbara	SBE02X	Epifaunal	7/9/2001	not recorded	Pier piling	34.4048	-119.6936	
Santa Barbara	SBE03P	Epifaunal	7/9/2001	16	Pier piling	34.4067	-119.6889	
Santa Barbara	SBE03S	Epifaunal	7/9/2001	surface	Side of dock	34.4067	-119.6889	
Santa Barbara	SBE03U	Epifaunal	7/9/2001	surface	Underneath dock	34.4067	-119.6889	
Santa Barbara	SBE03X	Epifaunal	7/9/2001	multiple	All habitats	34.4067	-119.6889	
Santa Barbara	SBE03Y	Algae	7/9/2001	multiple	All habitats	34.4067	-119.6889	
Santa Barbara	SBE04P	Epifaunal	7/9/2001	10	Pier piling	34.4084	-119.6851	
Santa Barbara	SBE04X	Epifaunal	7/9/2001	not recorded	Pier piling	34.4084	-119.6851	
Santa Barbara	SBE04Y	Algae	7/9/2001	multiple	All habitats	34.4084	-119.6851	
Santa Barbara	SBE05U	Epifaunal	7/9/2001	surface	Underneath dock	34.4068	-119.6910	
Santa Barbara	SBE05X	Epifaunal	7/9/2001	multiple	All habitats	34.4068	-119.6910	
Santa Barbara	SBE05Y	Algae	7/9/2001	multiple	All Habitats	34.4068	-119.6910	
Stockton	STF01	Fish	9/10/2001	5	e-boat	37.9571	-121.3529	
Stockton	STF02	Fish	9/11/2001	20	fyke net	37.9519	-121.3147	
Stockton	STF02	Fish	9/11/2001	26	traps	37.9513	-121.3151	
Stockton	STI01	Infaunal	8/30/2000	7	Van Veen grab	37.9529	-121.3435	67.16
Stockton	STI02	Infaunal	8/30/2000	34	Van Veen grab	37.9534	-121.3431	92.63
Stockton	STI02	Infaunal	8/30/2000	34	Van Veen grab	37.9534	-121.3431	93.14

WaterBody	StationId	SampleType	SampleDate	Depth (ft)	Habitat/Gear	LatDD	LongDD	%Fines
Stockton	STI03	Infaunal	8/30/2000	5	Van Veen grab	37.9520	-121.3402	24.55
Stockton	STI04	Infaunal	8/30/2000	39	Van Veen grab	37.9525	-121.3403	88.22
Stockton	STI05	Infaunal	8/30/2000	34	Van Veen grab	37.9517	-121.3296	97.85
Stockton	STI06	Infaunal	8/30/2000	36	Van Veen grab	37.9520	-121.3294	95.14
Stockton	STI07	Infaunal	8/30/2000	15	Van Veen grab	37.9529	-121.3238	56.48
Stockton	STI08	Infaunal	8/30/2000	37	Van Veen grab	37.9525	-121.3236	90.91
Stockton	STI09	Infaunal	8/30/2000	26	Van Veen grab	37.9537	-121.3195	24.02
Stockton	STI10	Infaunal	8/30/2000	40	Van Veen grab	37.9522	-121.3195	90.08
Stockton	STI11	Infaunal	8/30/2000	20	Van Veen grab	37.9539	-121.3155	31.99
Stockton	STI12	Infaunal	8/30/2000	37	Van Veen grab	37.9524	-121.3156	93.06
Stockton	STI12	Infaunal	8/30/2000	37	Van Veen grab	37.9524	-121.3156	93.39
Stockton	STI13	Infaunal	8/30/2000	13	Van Veen grab	37.9539	-121.3047	5.07
Stockton	STI14	Infaunal	8/30/2000	21	Van Veen grab	37.9532	-121.3046	96.82
Stockton	STI15	Infaunal	8/30/2000	10	Van Veen grab	37.9506	-121.3365	61.95
Stockton	STI16	Infaunal	8/30/2000	39	Van Veen grab	37.9506	-121.3357	74.65
Stockton	STI17	Infaunal	8/30/2000	22	Van Veen grab	37.9502	-121.3259	98.94
Stockton	STI18	Infaunal	8/30/2000	31	Van Veen grab	37.9505	-121.3263	96.14
Stockton	STI19	Infaunal	8/30/2000	11	Van Veen grab	37.9493	-121.3087	77.23
Stockton	STI20	Infaunal	8/30/2000	16	Van Veen grab	37.9492	-121.3117	97.29
Stockton	STI21	Infaunal	8/30/2000	3	Van Veen grab	37.9573	-121.3534	70.29
Stockton	STI22	Infaunal	8/30/2000	36	Van Veen grab	37.9565	-121.3533	96.63
Stockton	STI22	Infaunal	8/30/2000	36	Van Veen grab	37.9565	-121.3533	96.81
Stockton	STI23	Infaunal	8/30/2000	19	Van Veen grab	37.9532	-121.3033	30.35
Stockton	STI24	Infaunal	8/30/2000	10	Van Veen grab	37.9538	-121.3033	6.14
Tomales Bay	TBE01S	Epifaunal	9/19/2001	surface	Side of Dock	38.1078	-122.8624	
Tomales Bay	TBE01U	Epifaunal	9/19/2001	surface	Underneath Dock	38.1078	-122.8624	
Tomales Bay	TBE01X	Epifaunal	9/19/2001	multiple	All Habitats	38.1078	-122.8624	
Tomales Bay	TBE02P	Epifaunal	9/19/2001	2	Pier Piling	38.1467	-122.8835	
Tomales Bay	TBE02S	Epifaunal	9/19/2001	surface	Side of Dock	38.1467	-122.8835	
Tomales Bay	TBE02U	Epifaunal	9/19/2001	surface	Underneath Dock	38.1467	-122.8835	
Tomales Bay	TBE02X	Epifaunal	9/19/2001	multiple	All Habitats	38.1467	-122.8835	
Tomales Bay	TBE02Y	Algae	9/19/2001	multiple	All Habitats	38.1467	-122.8835	
Tomales Bay	TBE03P	Epifaunal	9/19/2001	1.8	Pier Piling	38.1511	-122.8887	
Tomales Bay	TBE03U	Epifaunal	9/19/2001	surface	Underneath Dock	38.1511	-122.8887	
Tomales Bay	TBE03X	Epifaunal	9/19/2001	multiple	All Habitats	38.1511	-122.8887	
Tomales Bay	TBE03Y	Algae	9/19/2001	multiple	All Habitats	38.1511	-122.8887	
Tomales Bay	TBE04S	Epifaunal	9/19/2001	surface	Side of Dock	38.1996	-122.9219	
Tomales Bay	TBE04X	Epifaunal	9/19/2001	multiple	All Habitats	38.1996	-122.9219	
Tomales Bay	TBI01	Infaunal	9/19/2001	8	Van Veen grab	38.2062	-122.9381	39.99
Tomales Bay	TBI02	Infaunal	9/19/2001	7	Van Veen grab	38.2067	-122.9392	40.25
Tomales Bay	TBI03	Infaunal	9/19/2001	16	Van Veen grab	38.1944	-122.9461	10.73
Tomales Bay	TBI04	Infaunal	9/19/2001	19	Van Veen grab	38.1444	-122.9006	88.78
Tomales Bay	TBI05	Infaunal	9/19/2001	8	Van Veen grab	38.1140	-122.8557	98.24
Tomales Bay	TBI05	Infaunal	9/19/2001	8	Van Veen grab	38.1140	-122.8557	98.92
Tomales Bay	TBI06	Infaunal	9/19/2001	9	Van Veen grab	38.1511	-122.8887	87.43

Appendix C - Relative Abundance of Species in California Bays and Harbors.

(Abundances shown for Sacramento and Stockton epifauna are actual counts.)

Epifaunal Samples

Phylum	Epifanal Sample Taxon	TaxonStatus	Total Harbors Observed	Humboldt Bay	Fort Bragg	Bodega Bay	Tomales Bay	Sacramento	Stockton	Moss Landing Harbor	Monterey Harbor	Morro Bay	Santa Barbara	Channel Islands Harbor	Port Hueneme	Marina Del Rey	Los Angeles	Long Beach	Avalon Harbor	Huntington Harbor	Newport Beach	Dana Point	Oceanside	Mission Bay	San Diego
Annelida	Amphitrite robusta	Native	4	R		R					R													R	
Annelida	Amphitritinae	N/A	12	R		R						R	R	R	R		C	R	R	R	R				C
Annelida	Aphelochaeta sp.	Unknown	4							R	R				R				R						
Annelida	Arabella iricolor	Cryptogenic	1			R																			
Annelida	Armandia brevis	Native	6	R						R		R			R		R			R					
Annelida	Armandia sp.	Unknown	1												R										
Annelida	Autolytinae	N/A	13	R		R	C			R		R	R	R	R		C	R	R		R				R
Annelida	Autolytus sp.	Unknown	1												R										
Annelida	Boccardia columbiana	Native	2									R	R												
Annelida	Boccardia sp.	Unknown	2							R					R										
Annelida	Boccardiella hamata	Cryptogenic	1																		R				
Annelida	Branchiomaldane	N/A	1																	R					
Annelida	Branchiosyllis sp. 1	Unknown	1																					R	
Annelida	Brania brevipharyngea	Cryptogenic	1			R																			
Annelida	Brania sp. 1	Unknown	1												R										
Annelida	Capitella capitata -hyperspecies	Cryptogenic	11	R		R				R			R	R	R	R	C	R		C	R				
Annelida	Capitellidae	N/A	1												R										
Annelida	Caulleriella cristata	Native	2									R	R												
Annelida	Caulleriella pacifica	Native	2									R			R										
Annelida	Caulleriella sp.	Unknown	6							R		R	R	R	R					R					
Annelida	Caulleriella sp. 1	Unknown	7											C	R		C	C			R	R		R	
Annelida	Chone ecaudata	Native	1			R																			

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Annelida	Chone sp.	Unknown	8		R	R	R					C	R	R	R				C						
Annelida	Chone sp. 1	Unknown	6	R		C	R			R		R			R										
Annelida	Chrysopetalidae	N/A	1				R																		
Annelida	Chrysopetalum occidentale	Native	4							R			R		R				R						
Annelida	Cirratulidae	N/A	6									R	R		R		R	R						C	
Annelida	Cirratulus robustus	Native	4				R			R					R									R	
Annelida	Cirratulus sp.	Unknown	12			R				R		R	R		C	R	R		R	R	R	R	C		
Annelida	Cirriformia moorei	Native	4				R									R				R	R				
Annelida	Cirriformia spirabrancha	Native	3														R	R		R					
Annelida	Clymenella sp. 1	Unknown	1												R										
Annelida	Cossura candida	Native	1												R										
Annelida	Ctenodrilus serratus	Cryptogenic	11			R	R			R	R	R	R	R	R		R	R		R					
Annelida	Dasybranchus lumbricoides	Cryptogenic	1																					R	
Annelida	Demonax sp. 1	Unknown	6	R																R	R	C		R	C
Annelida	Demonax sp. 2	Unknown	1											R											
Annelida	Dipolydora bidentata	Cryptogenic	1	R																					
Annelida	Dipolydora giardi	Cryptogenic	1												R										
Annelida	Dipolydora socialis	Cryptogenic	4			R	R				R												R		
Annelida	Dipolydora sp.	Unknown	1									R													
Annelida	Dodecaceria fewkesi	Native	8			R							R		R	R		R	R	R		R			
Annelida	Dorvillea annulata	Native	12	R		R	R								R	R	R	R		R	R	C		R	R
Annelida	Dorvillea moniloceras	Native	1							R															
Annelida	Dorvillea sp.	Unknown	3									R			R		R								
Annelida	Dorvilleidae	N/A	2										R											R	
Annelida	Dorvilleidae sp. 1	Unknown	1																					R	
Annelida	Eteone pacifica	Native	1									R													
Annelida	Eteone sp.	Unknown	1									R													
Annelida	Euclymeninae	N/A	1												R										
Annelida	Eudistylia polymorpha	Native	4			R					R	R			R										

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Annelida	Eudistylia sp.	Unknown	1												R										
Annelida	Eudistylia vancouveri	Native	1			R																			
Annelida	Eulalia californiensis	Native	3									R			R	R									
Annelida	Eulalia quadrioculata	Native	7	R	R	C				R	C	C			R										
Annelida	Eulalia sp.	Unknown	2			R						C													
Annelida	Eulalia sp. 1	Unknown	1			R																			
Annelida	Eumida longicornuta	Native	4	R								R			R			R							
Annelida	Eumida sp.	Unknown	7	R		R				R	R	R	R		R										
Annelida	Eunicidae	N/A	4																R	R	R		R		
Annelida	Eupolymnia heterobranchia	Native	1											R											
Annelida	Eupolymnia sp.	Unknown	1											R											
Annelida	Eupomatus sp. 1	Unknown	1												R										
Annelida	Eusyllinae	N/A	10	R		C				R		R	R	R		R			R	R				R	
Annelida	Eusyllis habei	Cryptogenic	1									R													
Annelida	Eusyllis sp.	Unknown	2								R	R													
Annelida	Exogone dwisula	Native	8			R						R	R		R		R		R				C	R	
Annelida	Exogone lourei	Cryptogenic	17	R		R	A			C	R	C	A	A	C	R	A	R	C	R	R	R		R	
Annelida	Exogone sp.	Unknown	2			R									R										
Annelida	Exogoninae	N/A	17			R	R			C		R	A	A	R	R	C	A	R	C	A	R	C	R	A
Annelida	Fabriciinae	N/A	1											R											
Annelida	Ficopomatus enigmaticus	Introduced	1								R														
Annelida	Glycinde armigera	Native	1	R																					
Annelida	Halosydna brevisetosa	Native	9	R		C	R			R	C	C	R		R					R					
Annelida	Halosydna johnsoni	Native	13	C		C				C	R	C	C		R	R	R	R	R		R				C
Annelida	Halosydna sp.	Unknown	3	R		R						R													
Annelida	Harmothoe hirsuta	Native	3										R		R				R						
Annelida	Harmothoe imbricata	Cryptogenic	13	R		R	R			R		R	R	C	R	R	C			R				R	R
Annelida	Harmothoe sp. 1	Unknown	1																						R
Annelida	Harmothoinae	N/A	6	R		R						R			R		R	R							

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Annelida	Hesionidae	N/A	3							R		R							R						
Annelida	Hydroides elegans	Cryptogenic	5													C						C	C	R	R
Annelida	Hydroides gracilis	Native	10							R		R	R		R	R	R	R		R			R	R	
Annelida	Laonome sp.	Unknown	1							R															
Annelida	Lepidonotinae sp.	Unknown	1									R													
Annelida	Lepidonotus sp.	Unknown	2			R									R										
Annelida	Lepidonotus spiculus	Native	3	R													R				R				
Annelida	Levinsenia gracilis	Cryptogenic	1		R																				
Annelida	Lumbrineridae	N/A	1									R													
Annelida	Lumbrineris cruzensis	Native	1																					R	
Annelida	Lumbrineris erecta	Native	1																						R
Annelida	Lumbrineris inflata	Native	1																					R	
Annelida	Lumbrineris latreilli	Cryptogenic	2							R					R										
Annelida	Lumbrineris sp.	Unknown	2									R	R												
Annelida	Maldanidae	N/A	3									R			R					R					
Annelida	Marphysa sp.	Unknown	1																		R				
Annelida	Marphysa stylobranchiata	Native	1																		R				
Annelida	Mediomastus californiensis	Native	2									R			R										
Annelida	Mediomastus spp. indet.	Cryptogenic	3									R			R		R								
Annelida	Micropodarke dubia	Cryptogenic	2			R						R													
Annelida	Myxicola infundibulum	Introduced	5								R			R	R		R								R
Annelida	Myxicola sp.	Unknown	1												R										
Annelida	Naineris dendritica	Native	14	R		C					C	A	R	R	R	R	R	R		R	R	R		R	
Annelida	Naineris sp.	Unknown	8			R				R	R			R	R				R	R	R				
Annelida	Neanthes acuminata	Introduced	1													R									
Annelida	Neanthes sp.	Unknown	2												R									R	
Annelida	Neodexiospira pseudocorrugata	Introduced	1																		C				
Annelida	Neoleprea japonica	Cryptogenic	1								R														
Annelida	Neosabellaria cementarium	Native	3	R								R			R										

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Annelida	Nereididae	N/A	12			R					R	C	R	R	R	R	R		R	R	R	R			
Annelida	Nereiphylla castanea	Cryptogenic	2			R				R															
Annelida	Nereis eakini	Native	2			R				R															
Annelida	Nereis grubei	Cryptogenic	1																					R	
Annelida	Nereis latescens	Native	7	R		R				R	R	C		R	R										
Annelida	Nereis pelagica	Cryptogenic	2									R			R										
Annelida	Nereis procera	Native	2							R				R											
Annelida	Nereis sp.	Unknown	11	R		C				R		C		R		R	R	C	C	R	R				
Annelida	Nereis vexillosa	Native	2		R	R																			
Annelida	Nereis zonata	Cryptogenic	1												R										
Annelida	Nerilla digitata	Native	1			R																			
Annelida	Nicolea sp.	Unknown	1												R										
Annelida	Nicolea sp. A	Cryptogenic	5													R	R	R						C	R
Annelida	Notomastus tenuis	Native	1														R								
Annelida	Odontosyllis phosphorea	Native	5			R				R					R				R					R	
Annelida	Odontosyllis sp. 1	Unknown	1																R						
Annelida	oligochaeta	N/A	6		R						R		R		R	R				R					
Annelida	Opheliidae sp.	Unknown	8				R			R	R	R		R	R			R	R						
Annelida	Ophelina sp.	Unknown	2							R					R										
Annelida	Ophiodromus pugettensis	Native	3	R		R	R																		
Annelida	Ophryotrocha sp.	Unknown	11			R				R				R	R	R	C	C		R	R		R		R
Annelida	Orbiniidae	N/A	1							R															
Annelida	Paleanotus bellis	Native	12	R		R				A	R	A	R	R	R		R			R	R		R		
Annelida	Palola paloloides	Native	2																R						R
Annelida	Pherusa capulata	Native	3																	R	R			R	
Annelida	Pherusa inflata	Native	1																R						
Annelida	Pherusa sp.	Unknown	2														R		R						
Annelida	Pholoe sp.	Unknown	1									R													
Annelida	Pholoides asperus	Native	3							R		R			R										

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Annelida	Phragmatopoma californica	Native	1							R															
Annelida	Phyllochaetopterus prolifica	Native	1									R													
Annelida	Phyllodoce groenlandica	Cryptogenic	1																			R			
Annelida	Phyllodoce sp.	Unknown	5	R						R		R	R		R										
Annelida	Phyllodocidae	N/A	4			R						R			R				R						
Annelida	Pileolaria (Pileolaria) lateralis	Cryptogenic	1												R										
Annelida	Pileolaria (Simplicaria) potswaldi	Native	3							R			C		R										
Annelida	Pileolaria sp. 1	Unknown	1													C									
Annelida	Pionosyllis sp.	Unknown	1							R															
Annelida	Pionosyllis sp. 1	Unknown	1												R										
Annelida	Pista agassizi	Native	1												R										
Annelida	Pista alata	Native	1													R									
Annelida	Pista elongata	Native	2	R											R										
Annelida	Pista sp.	Unknown	1														R								
Annelida	Platynereis bicanaliculata	Cryptogenic	12	R	C	A	R			C	C	C	R		R		R		R				R		
Annelida	Platynereis sp.	Unknown	2			R						R													
Annelida	Podarke sp.	Unknown	2							R	R														
Annelida	Polycirrus californicus	Native	5			R					R				R		R	R							
Annelida	Polycirrus sp.	Unknown	10	R		R				R		R	R	R	R					R				R	R
Annelida	Polydora cornuta	Cryptogenic	2								R												R		
Annelida	Polydora limicola	Introduced	4								R	R			R	R									
Annelida	Polydora sp.	Unknown	18	R		R	R			C	R	R	C	R	R	R	C	A	C	R	R		R	C	R
Annelida	Polynoidae	N/A	4			R				R					R			R							
Annelida	Polyophthalmus pictus	Cryptogenic	6											R	R				C			R	R	R	
Annelida	Prionospio heterobranchia	Cryptogenic	2												R					R					
Annelida	Prionospio sp.	Unknown	2												R		R								
Annelida	Proceraea sp.	Unknown	1												R										
Annelida	Proceraea sp. 1	Unknown	1												R										
Annelida	Proceraea sp. 2	Unknown	2							R					R										

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Annelida	Protolaeospira eximia	Cryptogenic	2												R				R						
Annelida	Pseudopolydora paucibranchiata	Introduced	4									R			R	R							R		
Annelida	Pterocirrus sp.	Unknown	4							R	R	R		R											
Annelida	Pygospio elegans	Cryptogenic	1			R																			
Annelida	Raricirrus sp. 1	Unknown	3											R	C					R					
Annelida	Sabellinae	N/A	18	R		C				R	R	R	C	R	C	C	C	C	C	R	R	R	R	R	C
Annelida	Schizobranchia insignis	Native	2	R		R																			
Annelida	Scoletoma luti	Native	1														R								
Annelida	Scoletoma zonata	Native	1																						R
Annelida	Scyphoproctus sp. 1	Unknown	1																					R	
Annelida	Serpula columbiana	Native	3							R			R										C		
Annelida	Serpula sp.	Unknown	3							R						R								R	
Annelida	Serpulidae	N/A	7							R		R			R		R	R					C		R
Annelida	Simplaria pseudomilitaris	Cryptogenic	1												R										
Annelida	Sphaerosyllis californiensis	Native	5	R		R						C	C		R										
Annelida	Sphaerosyllis ranunculus	Native	1			R																			
Annelida	Sphaerosyllis sp.	Unknown	6			R					R	R	R		R								R		
Annelida	Sphaerosyllis sp. A	Unknown	5							R	R	R		R	R										
Annelida	Spinosphaera sp. 1	Unknown	2							R		R													
Annelida	Spionidae	N/A	7		R	R					R	R	R		R			R							
Annelida	Spirobranchus spinosus	Native	1																C						
Annelida	Spirorbidae	N/A	17	R		R				A		R	A	A	C	C	C	A	C	A	C	R	C	R	A
Annelida	Syllidae	N/A	4							R		R			R	R									
Annelida	Syllides mikeli	Native	1																	R					
Annelida	Syllis gracilis	Cryptogenic	5			R				R					R							R		R	
Annelida	Syllis sp.	Unknown	1								R														
Annelida	Synelmis sp. 1	Unknown	1																R						
Annelida	Terebellidae	N/A	5								R	R			R		R	R							
Annelida	Thormora johnstoni	Cryptogenic	2											R					R						

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Annelida	Timarete luxuriosa	Native	3													R								R	R
Annelida	Trypanosyllis gemmipara	Native	2												R										C
Annelida	Trypanosyllis sp.	Unknown	4	R		R								R					R						
Annelida	Typosyllis adamanteus	Native	1									R													
Annelida	Typosyllis armillaris	Cryptogenic	8										R	R	R		R	R			C	R		R	
Annelida	Typosyllis elongatus	Native	3			R						R					R								
Annelida	Typosyllis nipponica	Introduced	7									R		A	C	R	R				R			R	
Annelida	Typosyllis pigmentata	Native	3			R						R			R										
Annelida	Typosyllis sp.	Unknown	18	R	C	A	R			A	R	C	R	R	C	C	C	C	C	R	C			R	C
Annelida	Typosyllis sp. 1	Unknown	1												R										
Annelida	Vermiliopsis sp. 1	Unknown	1																						C
Arthropoda	Halacaridae	N/A	4			R	C			R					R										
Bryozoa	Alcyonidium parasiticum	Cryptogenic	1				R																		
Bryozoa	Bicrisia sp.	Unknown	1																R						
Bryozoa	Bowerbankia gracilis	Cryptogenic	13	R			R			R	R	R	R	R	R		R	R				R	R		R
Bryozoa	Bryozoa sp. A	Unknown	1																						R
Bryozoa	Bugula californica	Native	16	C		R	C			C	R		C	C	C	R		R		C	R	C	R	R	R
Bryozoa	Bugula neritina	Introduced	18	C		R	C			C	R	R	C	R	R	R	R	R		C	A	R	R	R	R
Bryozoa	Bugula sp.	Unknown	1												R										
Bryozoa	Celleporaria brunnea	Native	14			R				R			C	C	A	R	C	R	A		R	C	C	C	A
Bryozoa	Celleporella hyalina	NativeX	4	R						R					R				R						
Bryozoa	Celleporina ventricosa	Native	8												R		R	C	R		R	R	R		R
Bryozoa	Crisia maxima	Native	1																R						
Bryozoa	Crisia occidentalis	Native	2												R			R							
Bryozoa	Crisia sp.	Unknown	9	R						R					C		R	C	C		R		R		R
Bryozoa	Crisulipora occidentalis	Native	8										R		R		R	R	R				R	R	C
Bryozoa	Crisulipora sp.	Unknown	2										R										R		
Bryozoa	Cryptosula pallasiana	Introduced	18	R	R	R	C			R	R	C	R	C	R	C	C	C		C	A		R	C	R
Bryozoa	Diaperoecia californica	Native	7													R	R	C			R		R	R	C

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Bryozoa	Fasciculipora pacifica	Native	1															R							
Bryozoa	Fenestrulina malusii	Native	1											R											
Bryozoa	Fenestrulina malusii var. umbonata	Native	1												R										
Bryozoa	Filicrisia geniculata	Native	1												R										
Bryozoa	Filicrisia sp.	Unknown	1												R										
Bryozoa	Hippodiplosia insculpta	Native	1				R																		
Bryozoa	Lagenipora socialis	Native	1																R						
Bryozoa	Lichenopora intricata	Native	1														R								
Bryozoa	Lichenopora sp.	Unknown	1												R										
Bryozoa	Membranipora perfragilis	Native	1																					R	
Bryozoa	Membranipora serrilamella	Native	1				R																		
Bryozoa	Membranipora sp.	Unknown	5				R				R				R					R	R				
Bryozoa	Microporella cribosa	Native	1																R						
Bryozoa	Parasmittina californica	Native	2	R															R						
Bryozoa	Pedicellinidae	N/A	1												R										
Bryozoa	Reginella nitida	Native	1	R																					
Bryozoa	Rhynchozoon rostratum	Native	1																R						
Bryozoa	Schizoporella unicornis	Introduced	11	R	C	C	R			R	R			R	R						R			R	R
Bryozoa	Scrupocellaria bertholetti	Native	2																					R	R
Bryozoa	Scrupocellaria diegensis	Native	4	R									R		C		R								
Bryozoa	Scrupocellaria sp.	Unknown	3	R															R						R
Bryozoa	Scrupocellaria spingera	Native	1																C						
Bryozoa	Smittoidea prolifica	Native	1																R						
Bryozoa	Thalamoporella californica	Native	6													R		C	R		R			C	R
Bryozoa	Tricellaria occidentalis	Native	1	R																					
Bryozoa	Tubulipora pacifica	Native	1																				R		
Bryozoa	Watersipora arcuata	Introduced	6													C				R	R	R	C		R
Bryozoa	Watersipora subtorquata	Introduced	19	C		A	C			R	C	C	A	A	C	C	C	C	R	A	C	C	C	R	C
Bryozoa	Zoobotryon verticillatum	Cryptogenic	6											R			R	R		R			R		R

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Chordata	Acanthogobius flavimanus	Introduced	2					1	>1																
Chordata	Ameiurus catus	Introduced	2					1	25																
Chordata	Aplidium californicum	Native	4	R													R				R			R
Chordata	Aplidium sp.	Unknown	12	C		R	R				R		R		R	R				R	R	C	R		R
Chordata	Aplidium sp. A	Unknown	2				R													R					
Chordata	Aplidium sp. B	Unknown	1	R																					
Chordata	Aplidium sp. C	Unknown	1																						R
Chordata	Ascidia	Unknown	2	R										R											
Chordata	Ascidia ceratodes	Native	15				R			C	R		R	R	R	R	R	C	R	R	R		R	R	R
Chordata	Ascidia paratropa	Unknown	1																		R				
Chordata	Ascidia sp.	Unknown	6										R		R		R	R					R		R
Chordata	Ascidia zara	Introduced	16			R	R			C	R		C	C	C	R	R	C		R	R	R	R	R	R
Chordata	Ascidiacea	N/A	1												R										
Chordata	Atherinops regius	Introduced	1						1																
Chordata	Botryllidae	N/A	8			R								R			R	R		R			R	R	R
Chordata	Botrylloides diegensis	Native	11	R		R	R						R	R		R	R	R		R	R		R		
Chordata	Botrylloides perspicuum	Introduced	12	R		R	R						R	C	R	R		R		R	R		R		R
Chordata	Botrylloides sp.	Unknown	7	R			R							R			R	R		R		R			
Chordata	Botrylloides violaceus	Introduced	16			R	R			R	R	R	R	R	R	R	R	C	R	R		R	R		R
Chordata	Botryllus schlosseri	Introduced	16	R		R	R						R	C	R	C	R	R	R	C	R	C	C	R	R
Chordata	Botryllus sp.	Unknown	5	R			C							R		R					R				
Chordata	Chaenobryttus gulosus	Introduced	1						1																
Chordata	Ciona intestinalis	Introduced	15	R			R			R			C	C	R	C	C	C		C	A	R	R	R	C
Chordata	Ciona savignyi	Introduced	12	R			R						R	C		R	R	R		R	R		R	R	R
Chordata	Ciona sp.	Unknown	9										R		R	R	R	R		R	R		R		R
Chordata	Clavelina huntsmani	Native	2															R	R						
Chordata	Cyprinus carpio	Introduced	2					12	30																
Chordata	Cystodytes lobatus	Native	1										R												
Chordata	Didemnidae	N/A	2				R											R							

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Chordata	Didemnum carnulentum	Native	5	C		C	A					R											R		
Chordata	Didemnum sp.	Unknown	1				R																		
Chordata	Diplosoma listerianum	Introduced	18	C		R	C			R		R	C	A	R	C	R	C	R	C	C	C	C	R	R
Chordata	Diplosoma navicula	UNKNOWN	1																		R				
Chordata	Distaplia occidentalis	Native	6	R		R	R				R							R					R		
Chordata	Dorosoma petenense	Introduced	2					>100	>100																
Chordata	Gibbonsia metzi	Native	2											R											R
Chordata	Gobiesox maeandricus	Native	3														R						R	R	
Chordata	Hysterocarpus traski	Native	1					1																	
Chordata	Lepomis macrochirus	Introduced	2					12	1																
Chordata	Lepomis microlophus	Introduced	1						>100																
Chordata	Microcosmus squamiger	Introduced	9											R			R	R	R	R	R		R	C	C
Chordata	Micropterus salmoides	Introduced	2					60	60																
Chordata	Molgula manhattensis	Introduced	4											C				R		R	C				
Chordata	Molgula pugetiensis	Native	4	R												R				R	R				
Chordata	Molgula sp.	Unknown	7	R												R		R		R	R			R	R
Chordata	Molgula verrucifera	Native	9											R	R		R	R		C	R		R	R	C
Chordata	Mollusca	N/A	1																	R					
Chordata	Morone saxatilis	Introduced	2					60	30																
Chordata	Oncorhynchus sp.	Unknown	1					1																	
Chordata	Paraclinus intergipinnis		1															R							
Chordata	Percina macrolepida	Introduced	1						1																
Chordata	Perophora sp.	Unknown	1				R																		
Chordata	Polyandrocarpa zorritensis	Introduced	4			R										R							R		R
Chordata	Polyclinum planum	Unknown	1	R																					
Chordata	Pomoxis sp.	Introduced	2					1	2																
Chordata	Styela canopus	Introduced	3																	R				R	R
Chordata	Styela clava	Introduced	14	R		R				R			R	R	C	R	C	C		C	R		R	R	R
Chordata	Styela plicata	Introduced	12										R	R	R	C	R	R		C	R	R	A	R	R

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Chordata	Styela sp.	Unknown	14	R						R		R		R	R	R	R	R	R	R		R	R	R
Chordata	Symplegma reptans	Introduced	1																						R
Chordata	Tunicata	N/A	4	R		R	R								R										
Cnidaria	Aglaophenia sp.	Unknown	1												R										
Cnidaria	Anthopleura sola	Native	1												R										
Cnidaria	Anthozoa	N/A	2												R		R								
Cnidaria	Diadumene sp.	Unknown	1				R																		
Cnidaria	Hydrozoa	N/A	1												R										
Crustacea	Acanthomysis californica	Native	1												R										
Crustacea	Achelia echinata	Introduced	1												R										
Crustacea	Aeginella sp.	Introduced	1																R						
Crustacea	Allorchestes angusta	Native	2	R								C													
Crustacea	Allorchestes sp.	Native	1				R																		
Crustacea	Alpheidae	N/A	1																				R		
Crustacea	Amathimysis trigibba	Native	1															R							
Crustacea	Americhelidium millsi	Native	1												R										
Crustacea	Americorophium brevis	Native	11	R	A	C	C			C			R		R					R	C		C		R
Crustacea	Americorophium sp.	Native	7	R										R	R	R	R					R			R
Crustacea	Americorophium spinicorne	Native	1								C														
Crustacea	Ampelisca lobata	Native	1														R								
Crustacea	Amphideutopus oculatus	Native	1												R										
Crustacea	Amphilochus picadurus	Native	2			R									R										
Crustacea	Ampithoe lacertosa	Cryptogenic	9	R		R						R	R	C			R		R	R					R
Crustacea	Ampithoe plumulosa	Native	1									R													
Crustacea	Ampithoe ramondi	Native	1																R						
Crustacea	Ampithoe simulans	Native	2		R	R																			
Crustacea	Ampithoe sp.	Unknown	6			R	R					R			R			R			R				
Crustacea	Ampithoe valida	Introduced	11	R								R		R	R		R	R	R		R		R	R	R
Crustacea	Anamixis pacifica	Native	5												C			C		R			R		R

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Crustacea	Anoplodactylus sp.	Native	1																R						
Crustacea	Aoridae	Native	1												R										
Crustacea	Aoridae sp. B	Native	1												R										
Crustacea	Aoroides columbiae	Native	16	R		C	R			A			A	A	R	A	A	A	R	A	C	R	C		C
Crustacea	Aoroides sp.	Native	1												R										
Crustacea	Aoroides spinipes	Native	1												C										
Crustacea	Apolochus barnardi	Native	9											R	R		R	R	R	R	R		R	R	
Crustacea	Argula pugettensis	Native	1													R									
Crustacea	Austrosignum tillerae	Native	1												R										
Crustacea	Balanus crenatus	Native	11	R			R						R	R		R	R	R	R		R		R	R	
Crustacea	Balanus glandula	Native	1			C																			
Crustacea	Balanus nubilus	Native	4	R						R		R					R								
Crustacea	Balanus sp.	Unknown	6			R						R					R	R	R				R		
Crustacea	Balanus trigonus	Native	2															R	R						
Crustacea	Bemlos audbettius	Native	1																R						
Crustacea	Bemlos concavus	Native	1																R						
Crustacea	Bemlos sp.	Native	1											R											
Crustacea	Calliopiidae	N/A	1			R																			
Crustacea	Cancer antennarius	Native	1	R																					
Crustacea	Cancer jordani	Native	2	R								R													
Crustacea	Caprella acanthogaster	Introduced	10	C			A			R	R	C	R	R			A	C							R
Crustacea	Caprella alaskana	Native	1									R													
Crustacea	Caprella angusta	Cryptogenic	1		R																				
Crustacea	Caprella californica	Cryptogenic	15	R		C	R			R	R		R	C	C	R	A	R	R	R		R	R		
Crustacea	Caprella drepanochir	Cryptogenic	1	R																					
Crustacea	Caprella equilibra	Cryptogenic	2									R			R										
Crustacea	Caprella incisa	Native	1													R									
Crustacea	Caprella laeviscula	Native	1	R																					
Crustacea	Caprella mendax	Native	7							R	R	R	R		C				C						R

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Crustacea	Caprella mutica	Introduced	1			C																			
Crustacea	Caprella penantis	Introduced	3									R				R					R				
Crustacea	Caprella pilidigitata	Native	1												R										
Crustacea	Caprella scaura	Introduced	6											R		R	A	C		C					R
Crustacea	Caprella sp.	Unknown	15	R		R	R			R	C	R	R		R	R	C	C	R		R	R				R
Crustacea	Caprella verrucosa	Native	3										R		R				A							
Crustacea	Caridea	N/A	1														R								
Crustacea	Cerapus tubularis	Native	1																R						
Crustacea	Chthalamus fissus	Native	1												R										
Crustacea	Cirolana diminuta	Native	1														R								
Crustacea	Cirripedia	N/A	1												R										
Crustacea	Cobaldus hedgpethi	Native	1																R						
Crustacea	Colomastix pusilla	Native	6													R	R	R	R					R	R
Crustacea	Copepoda	N/A	1			R																			
Crustacea	Cumella californica	Native	4							R					R			R	R						
Crustacea	Cumella sp.	Unknown	4				R			R		R			R										
Crustacea	Cumella sp. B	Cryptogenic	1									R													
Crustacea	Cumella vulgaris	Cryptogenic	2	R	R																				
Crustacea	Cylindroleberididae	N/A	8			R								R	R	R		R		R				R	R
Crustacea	Decapoda	N/A	1																			R			
Crustacea	Desdimelita desdichada	Native	2	R													R								
Crustacea	Deutella californica	Native	5	R						R		R			C				C						
Crustacea	Deutella sp.	Unknown	1																R						
Crustacea	Deutella venenosa	Native	2										R						R						
Crustacea	Dissiminassa dissimilis	Native	10				R						R			R	R	C		R		R	C	R	C
Crustacea	Dyopedos arcticus	Native	1											R											
Crustacea	Dyopedos sp.	Unknown	1										R												
Crustacea	Elasmopus bampo	Native	16	R			R			C			A	R	C	C	C	C	C	A	A	R	C	C	C
Crustacea	Elasmopus rapax	Native	9							R	R			R	R	R					C	C		C	R

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Crustacea	Elasmopus sp.	Unknown	3			R									R					R					
Crustacea	Eogammarus confervicolus	Native	1								R														
Crustacea	Ericthonius brasiliensis	Introduced	13							R			R	R	R	C	C	R	C	R	R		R	A	C
Crustacea	Ericthonius sp.	Cryptogenic	1												R										
Crustacea	Eusirid sp. A	Unknown	1												R										
Crustacea	Eusirid sp. B	Unknown	1												R										
Crustacea	Eusiridae	N/A	1												R										
Crustacea	Eusiroides monoculoides	Cryptogenic	7												R	R	R	R	R	R					R
Crustacea	Exosphaeroma octoncum	Native	3		R	R						R													
Crustacea	Gammaropsis sp.	Unknown	1												R										
Crustacea	Gammaropsis thompsoni	Native	7	R						R					R		R	C	R						R
Crustacea	Gitanopsis neopolitana	Native	1												R										
Crustacea	Gitanopsis sp.	Unknown	4																R		R			R	R
Crustacea	Gitanopsis vilordes	Native	2			R									R										
Crustacea	Gnathia santacruziensis	Native	1																R						
Crustacea	Gnathia sp.	Unknown	2										R						R						
Crustacea	Gnathia steveni	Native	2																R						R
Crustacea	Gnathoplustes pugettensis	Native	1							R															
Crustacea	Gnorimospheroma lutea	Native	1				R																		
Crustacea	Gnorimospheroma rayi	Native	1				C																		
Crustacea	Grandidierella japonica	Introduced	5				R								R		R	R					R		
Crustacea	Harpacticoida	N/A	16	R	A		R						C	R	C	C	C	R	R	C	R	R	R	R	R
Crustacea	Heptacarpus brevirostris	Native	3	R														R							R
Crustacea	Heptacarpus palpator	Native	4							R					R			R	R						
Crustacea	Heptacarpus paludicola	Native	4	R						R			R					R							
Crustacea	Heptacarpus sitchensis	Native	2			R											R								
Crustacea	Heptacarpus taylori	Native	2	R								R													
Crustacea	Heteromysis odontops	Native	12										R	R	R	R	R	R		R	R	R	R	C	C
Crustacea	Hippolyte californiensis	Native	1												R										

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Crustacea	Hyale anceps	Native	2	R			R																		
Crustacea	Hyale frequens	Native	4		A	R					R	C													
Crustacea	Hyale sp.	Native	1												R										
Crustacea	Ianiropsis analoga	Native	1														C								
Crustacea	Ianiropsis kincaidi	Native	1														R								
Crustacea	Ianiropsis tridens	Native	17	R		A	C			R	R	R	A	A	R	R	R	C	R	A	R	R	R		
Crustacea	Idotea rufescens	Native	1			R																			
Crustacea	Idotea wosnesenskii	Native	1	R																					
Crustacea	Incisocalliope bairdi	Native	4				R			C					R				C						
Crustacea	Incisocalliope sp.	Native	2										R										R		
Crustacea	Irusella lamellifera	Native	1												R										
Crustacea	Isaeidae	N/A	1												R										
Crustacea	Ischyrocerus anguipes	Introduced	1												R										
Crustacea	Ischyrocerus litotes	Cryptogenic	2							R					R										
Crustacea	Ischyrocerus pelagops	Cryptogenic	1												R										
Crustacea	Ischyrocerus sp.	Native	4	R						R			R		R										
Crustacea	Janiralata occidentalis	Native	2							C					R										
Crustacea	Janiralata rajata	Native	1												C										
Crustacea	Jassa carltoni	Cryptogenic	11				R					C	R	R		R	R	R	R	R	R		R		
Crustacea	Jassa marmorata	Introduced	7	R		C	R			R		C			R				C						
Crustacea	Jassa slatteryi	NativeX	10	R		C	C					R	R	R		R	R		C		R				
Crustacea	Jassa sp.	Cryptogenic	7				R					R	R	R		R			R		R				
Crustacea	Jassa staudei	Cryptogenic	1	R																					
Crustacea	Joeropsis concava	Native	6	R						R					R			R	C						R
Crustacea	Joeropsis sp.	Unknown	1												R										
Crustacea	Laticorophium baconi	Cryptogenic	13			C	A			R		R	R		R	R	R	R	R		R	R			C
Crustacea	Leptochelia dubia	Cryptogenic	12	R		R	R					R	R		C		R	C	C		R			R	R
Crustacea	Leucothoe alata	Introduced	13				R						R	R	R	C	R	R		R	R	R	R	C	C
Crustacea	Leucothoe sp.	Introduced	1												R										

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Crustacea	Leucothoe spinicarpa	Native	1															C							
Crustacea	Liljeborgia geminata	Native	5												R	R	R	C							C
Crustacea	Limnoria algarum	Native	1																						R
Crustacea	Limnoria sp.	Unknown	2											R	R										
Crustacea	Limnoria tripunctata	Introduced	2												R			C							
Crustacea	Listriella melanica	Native	1												R										
Crustacea	Lophopanopeus bellus diegensis	Native	1																R						
Crustacea	Lophopanopeus diegensis	Native	1																R						
Crustacea	Lophopanopeus leucomanus	Native	5										R		R			R	R						R
Crustacea	Lophopanopeus sp.	Native	5	R									R						R				R		R
Crustacea	Lysianassa sp.	Native	2											R										R	
Crustacea	Maera similis	Native	2												R										R
Crustacea	Maera sp.	Unknown	1												R										
Crustacea	Majiidae	N/A	1														R								
Crustacea	Mayerella banksia	Native	1													R									
Crustacea	Megabalanus californicus	Native	9		C	R				R		R			R		R		R		R		R		
Crustacea	Megamoera subtener	Native	1	R																					
Crustacea	Melphidippa borealis	Native	8											C		R	R	R		R	R	R			R
Crustacea	Melphidippa sp.	Native	2																R		R				
Crustacea	Metacaprella anomala	Native	2	R											R										
Crustacea	Metacaprella kennerlyi	Native	1	R																					
Crustacea	Metopa cistella	Native	1	R																					
Crustacea	Metopa dawsoni	Native	2	R													R								
Crustacea	Metopa estacola	Native	1																						R
Crustacea	Metopella sp.	Native	1																	R					
Crustacea	Monocorophium acherusicum	Introduced	13	C		R	C				C	C		C	R	R	C	R		C	R	R			
Crustacea	Monocorophium insidiosum	Introduced	3			R					A	C													
Crustacea	Monocorophium sp.	Introduced	13	R						R		R	R	R	R	R		R		R	R	R		R	R
Crustacea	Munna chromatocephala	Native	1									R													

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Crustacea	Munna kroyeri	Native	1	R																					
Crustacea	Munna sp.	Unknown	1	R																					
Crustacea	Munna stephenseni	Native	4	R											R			R	R						
Crustacea	Munnogonium tillerae	Native	1												R										
Crustacea	Munnogonium wilsoni	Introduced	2														R	R							
Crustacea	Mysidacea	N/A	1																	R					
Crustacea	Nebalia sp.	Unknown	1															R							
Crustacea	Orchomene sp.	Native	1												R										
Crustacea	Pachycheles pubescens	Native	2				R			R															
Crustacea	Pachycheles rudis	Native	3			R	R					R													
Crustacea	Pachygrapsus crassipes	Native	4									R			R	R					R				
Crustacea	Pachygrapsus transversus	Native	4										R		R								R	R	
Crustacea	Paracerceis cordata	Native	5	R			R					R			R				R						
Crustacea	Paracerceis sculpta	Native	1																			R			
Crustacea	Paracerceis sculpta	NativeX	12									R		R	R	C	R	R		R	C	R	R	R	C
Crustacea	Paracerceis sp.	Unknown	5	R										R				R	R						R
Crustacea	Parametaphoxus sp.	Native	1															R							
Crustacea	Parametopella sp.	Native	1															R							
Crustacea	Paramicrodeutopus schmitti	Native	1																R						
Crustacea	Paramphithoe sp.	Native	1												R										
Crustacea	Paranthura elegans	Introduced	15				R			R			R	C	R	C	C	C	R	C	C	C	C	C	C
Crustacea	Parapleustes pugettensis	Native	1												R										
Crustacea	Parapseudes pedispinis	Native	1																R						
Crustacea	Paratanais intermedius	Native	1																R						
Crustacea	Pelia sp.	Unknown	1																R						
Crustacea	Pentidotea montereyensis	Native	1		C																				
Crustacea	Perotripus brevis	Native	3							R					C				C						
Crustacea	Petrolisthes cincipes	Native	1				R																		
Crustacea	Photis bifurcata	Native	2	R											C										

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Crustacea	Photis brevipes	Native	1	R																					
Crustacea	Photis conchicola	Native	1												R										
Crustacea	Photis parvidens	Native	1																C						
Crustacea	Photis sp.	Native	7	R						R		R	R		R		R		R						
Crustacea	Phtiscidae	Introduced	1												R										
Crustacea	Phtisica marina	Introduced	1												R										
Crustacea	Pleurocope floridensis	Introduced	1																R						
Crustacea	Pleustid sp. A	Unknown	1												R										
Crustacea	Pleustid sp. B	Unknown	1												R										
Crustacea	Pleustidae	N/A	1									R													
Crustacea	Podocerus brasiliensis	Native	14	R						R		R	C		C	C	C		C	R	C	R	C	R	R
Crustacea	Podocerus cristatus	Introduced	3	R									R								R				
Crustacea	Podocerus fulanus	Cryptogenic	9	R										R		C	R			C	R		R	R	R
Crustacea	Podocerus sp.	Unknown	7	R									R	R	R					R				R	R
Crustacea	Podochela sp.	Unknown	1																R						
Crustacea	Podocopida	N/A	3															R	R					R	
Crustacea	Polycheria osborni	Native	1			R																			
Crustacea	Pontogeneia sp.	Unknown	2			R									R										
Crustacea	Pontogenia rostrata	Native	1	R																					
Crustacea	Porcellanidae	N/A	1							R															
Crustacea	Postasterope sp.	Unknown	1												R										
Crustacea	Prototrygaeus jordani	Native	2									R									R				
Crustacea	Prototrygeus sp.	Unknown	1																R						
Crustacea	Pseudomma sp.	Unknown	4																	R	R		R		R
Crustacea	Pugettia dalli	Native	1																R						
Crustacea	Pugettia gracilis	Native	1	R																					
Crustacea	Pugettia producta	Native	2			R						R													
Crustacea	Pugettia richii	Native	1												R										
Crustacea	Pugettia sp.	Unknown	1																R						

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Crustacea	Pycnogonida	N/A	6				R								R	R	R	R	R						
Crustacea	Pygodelphys aquilonaris	Cryptogenic	4							R					R			R		R					
Crustacea	Pygoscelis sp.	Unknown	1												R										
Crustacea	Pyromaia tuberculata	Native	1																						R
Crustacea	Quadrimaera carla	Native	7										R					R	C		R		R	R	C
Crustacea	Rudilemboides stenopropodus	Native	2			R								R											
Crustacea	Rutiderma sp.	Unknown	1																R						
Crustacea	Semibalanus cariosus	Native	1			R																			
Crustacea	Siriella pacifica	Native	6											R			R	R		R	R		R		
Crustacea	Sphaeroma quoyannum	Cryptogenic	1								C														
Crustacea	Sphaeromatidae	N/A	1									R													
Crustacea	Stenothoe estacola	Native	6							C	R	R			C				C						R
Crustacea	Stenothoe frecanda	Native	8	R			R						R			R	R		R	R			R		
Crustacea	Stenothoidae	N/A	3												R		R	R							
Crustacea	Sympleustes sp.	Native	1							R															
Crustacea	Synalpheus lockingtoni	Native	1																						R
Crustacea	Talitroidea	N/A	2																R	R					
Crustacea	Tanaidacea	N/A	1												R										
Crustacea	Tanystylum occidentalis	Native	3														R		R						R
Crustacea	Tanystylum sp.	Unknown	1																R						
Crustacea	Teraterythrops robusta	Native	3										R							R		R			
Crustacea	Tethygeneia inermis	Native	1									R													
Crustacea	Tetraclita squamosa	Native	1									R													
Crustacea	Tetraclita squamosa rubescens	Native	1												R										
Crustacea	Tritella laevis	Native	1																R						
Crustacea	Tritella sp.	Unknown	1		R																				
Crustacea	Typhlotanais sp.	Unknown	1																C						
Crustacea	Uromunna ubiquita	Native	7			R				R			R		C		R	R	R						
Crustacea	Zeuxo paranormani	Native	19	C		C	C			C	R	C	A	A	C	A	A	A	C	A	C	C	A	R	C

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Echinodermata	Amphiodia sp.	Native	1																	R					
Echinodermata	Amphipholis sp.	Unknown	2														R	C							
Echinodermata	Amphipholis squamata	Cryptogenic	4	R													C	C			R				
Echinodermata	Eupentacta quinquesemita	Native	1	C																					
Echinodermata	Ophiactis simplex	Native	1																				R		
Echinodermata	Ophiactis sp.	Unknown	5															R	R				R	R	R
Echinodermata	Ophionereis sp.	Unknown	1															R							
Echinodermata	Ophiopholis aculeata	Native	1	R																					
Echinodermata	Ophiopholis bakeri	Native	1	R																					
Echinodermata	Ophiothrix sp.	Unknown	1																R						
Echinodermata	Ophiothrix spiculata	Native	1																R						
Echinodermata	Ophiuroidea	N/A	7														R	C	R		R		R	R	R
Echinodermata	Ophiuroidea sp A.	Unknown	1																R						
Echinodermata	Pentamera sp.	Unknown	2	R							R														
Echinodermata	Strongylocentrotus purpuratus	Native	3								R								R		R				
Echinodermata	Strongylocentrotus sp.	Unknown	1							R															
Entoprocta	Barentsia sp.	Unknown	1												R										
Mollusca	Acanthina spirata	Native	1																R						
Mollusca	Acmaeoidea	N/A	7	R		R								R	R		R	R							R
Mollusca	Adula californiensis	Native	1																R						
Mollusca	Adula diegensis	Native	1	R																					
Mollusca	Alvania sp.	Native	1																R						
Mollusca	Amphissa cendata	Native	1																R						
Mollusca	Amphissa columbiana	Native	1	R																					
Mollusca	Amphissa versicolor	Native	2															R	R						
Mollusca	Anomia peruviana	Native	1																						R
Mollusca	Astyris gausapata	Native	1														R								
Mollusca	Astyris sp.	Native	3	R							R												R		
Mollusca	Barleeia sp.	Native	4														R	R	R				R		

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Mollusca	Bittium sp.	Native	1																					R	
Mollusca	Bivalvia	N/A	6											R	R			R	R			R	R		
Mollusca	Bulla gouldiana	Native	1																					R	
Mollusca	Calliostoma sp.	Unknown	1																R						
Mollusca	Calyptraeidae	N/A	1												R										
Mollusca	Cerithiopsidae	N/A	1																					R	
Mollusca	Certhiopsis carpenteri	Native	1																		R				
Mollusca	Chama arcana	Native	3										R						R				R		
Mollusca	Columbellidae	N/A	1														R								
Mollusca	Conidae	N/A	1								R														
Mollusca	Conus californicus	Native	1															R							
Mollusca	Cooperella subdiaphana	Native	4			R					R					R			R						
Mollusca	Crassadoma gigantea	Native	4	R						R							R							R	
Mollusca	Crassostrea gigas	Introduced	2														R							R	
Mollusca	Crepidula onyx	Introduced	7												R		C	R		R	R		R		R
Mollusca	Crepidula sp.	Unknown	5								R		R	R			R		R						
Mollusca	Crepipatella dorsata	Native	5										R				R	R	C		R				
Mollusca	Cryptochiton stelleri	Native	1												R										
Mollusca	Doto sp.	Unknown	3												R	R	R								
Mollusca	Entodesma navicula	Native	16	R		R	R			R	C		R	R	R	R	R	R	C	R	R		C		R
Mollusca	Entodesma sp.	Unknown	1									R													
Mollusca	Gastropoda	N/A	1																R						
Mollusca	Geukensia sp.	Native	1																R						
Mollusca	Granulina margaritula	Native	1											R											
Mollusca	Guekensia demissa	Native	3				R							R					R						
Mollusca	Hancockia californica	Native	1			R																			
Mollusca	Hiatella arctica	NativeX	1												R										
Mollusca	Iselica ovoidea	Native	13	R									R	R	R	R	C	R	R	R	R		R	R	R
Mollusca	Lacuna sp.	Unknown	2	R															R						

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Mollusca	Lammellaria rhombia	Native	1	R																					
Mollusca	Lasaeidae	N/A	2											R										R	
Mollusca	Leptopecten sp.	Native	1														R								
Mollusca	Lithophaga plumula	Native	1											R											
Mollusca	Littorinidae	N/A	1	R																					
Mollusca	Luconacia incerta	Native	1																R						
Mollusca	Lyonsia bracteata	Native	1	R																					
Mollusca	Modiolus modiolus	Native	3								R	C							R						
Mollusca	Modiolus rectus	Native	3	R			R																	R	
Mollusca	Modiolus sp.	Unknown	1												R										
Mollusca	Mopalia ciliata	Native	1	R																					
Mollusca	Mopalia muscosa	Native	7	R		R	R								R		R	R						R	
Mollusca	Mopalia sp.	Unknown	2	R														R							
Mollusca	Musculista senhousia	Introduced	9	R			R										R	R		R	R		R	R	C
Mollusca	Mylilus sp.	Unknown	1													R									
Mollusca	Myoidea	N/A	1																	R					
Mollusca	Mytilus sp.	Unknown	17	C		R	R				C		C	C	R	C	C	R	C	C	R	R	C	C	C
Mollusca	Naticidae	N/A	2	R		R																			
Mollusca	Nudibranchia	N/A	7	R											R		R	R	R				R	R	
Mollusca	Nutricola sp.	Unknown	1																R						
Mollusca	Ocenebra beta	Native	1															R							
Mollusca	Odostomia cincta	Native	4	R													R	R	R						
Mollusca	Odostomia clementina	Native	2											R						R					
Mollusca	Odostomia dinella	Native	3															R		R					R
Mollusca	Odostomia harfordensis	Native	1				R																		
Mollusca	Odostomia sp.	Unknown	6	R			R								R		R	R						R	
Mollusca	Oribitella californica	Native	1	R																					
Mollusca	Ostrea conchaphila	Native	1																						R
Mollusca	Ostrea edulis	Introduced	8	R			R											R		R		R	R	R	C

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Mollusca	Ostrea sp.	Unknown	2	R																			R		
Mollusca	Ostreidae	N/A	1	R																					
Mollusca	Pectinidae	N/A	5							R	R		R						R				R		
Mollusca	Petaloconchus montereyensis	Native	1												R										
Mollusca	Petricola californiensis	Native	1																				R		
Mollusca	Philobrya setosa	Native	1																C						
Mollusca	Protothaca staminea	Native	9	R									R			R	R	R	R	R			R	R	
Mollusca	Pseudochama sp.	Unknown	1																		R				
Mollusca	Rhamphidonta retifera	Native	2													R				R					
Mollusca	Sinezona rimuloides	Native	2															R	R						
Mollusca	Spathochlamys vestalis	Native	1												R										
Mollusca	Thracia sp.	Unknown	1																						R
Mollusca	Trophonopsis sp.	Unknown	1																				R		
Mollusca	Turbonilla sp.	Unknown	1												R										
Nematoda	Nematoda	N/A	10			R	R			R	R	R	R		R		R		R		R				
Nemertea	Nemertea	N/A	1												R										
Platyhelminthes	Polycladida	N/A	1												R										
Porifera	Calcarea	Native	5										C	C				C	C		R				
Porifera	Calcarea A.	Native	2														R				R				
Porifera	Chalinidae	N/A	1												R										
Porifera	Chalinula sp.	Native	3				R														R	C			
Porifera	Clathrina coriacea	Cryptogenic	3										R		C					R					
Porifera	Halichondria bowerbanki	Introduced	8				C							R		C	C	R		C	C			C	
Porifera	Halichondria panicea	Introduced	2				R										R								
Porifera	Halichondria sp.	Native	10				R			R			R	R	R	C				C			C	C	R
Porifera	Halichondria sp. A	Native	1				R																		
Porifera	Haliclona ecbasis	Native	1													R									
Porifera	Haliclona loosanoffi	Introduced	6											R			R				R	R	R	R	
Porifera	Haliclona sp.	Native	2																					R	C

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Porifera	Haliclona sp. A	Native	1																	R					
Porifera	Hymeniacidon sinapium	Native	9				R						C		R	R				R	R		R	R	R
Porifera	Leucetta losangelensis	Native	9											C			R	C	C	R	R		R	R	R
Porifera	Leucilla nuttingi	Native	2												R						R				
Porifera	Leucosolenia eleanor	Native	1							R															
Porifera	Leucosolenia nautilia	Native	8			C				C		C	R		A		R	R			R				
Porifera	Leucosolenia sp.	Unknown	1																		R				
Porifera	Lissodendoryx firma	Native	1																					R	
Porifera	Mycale macginitiei	Native	1															R							
Porifera	Porifera	N/A	7			C									A		R		C	R	R				R
Porifera	Sycon nr. coronatum	Cryptogenic	1																						R
Porifera	Sycon sp.	Native	2														R					R			
Protozoa	Gromia sp.	Unknown	1												R										
Rhodophyta	Porphyra spp.	Unknown	2													R							R		
Sipuncula	Sipuncula	N/A	1												R										

Infaunal Samples

Phylum	Infaunal Sample Taxon	TaxonStatus	Total Harbors Observed	Tomales Bay	Port Hueneme
Annelida	Amaeana occidentalis	Native	2	R	C
Annelida	Amage sp.	Unknown	1		R
Annelida	Amphicteis scaphobranchiata	Native	2	R	R
Annelida	Anotomastus gordiodes	Native	1		R
Annelida	Aphelochaeta glandaria	Native	1		R
Annelida	Aphelochaeta monilaris	Cryptogenic	1		R
Annelida	Aphelochaeta sp.	Unknown	1	R	
Annelida	Aphelochaeta sp. 1	Unknown	1	R	
Annelida	Apoprionospio pygmaea	Cryptogenic	2	R	C
Annelida	Armandia brevis	Native	2	C	R
Annelida	Capitella capitata -hyperspecies	Cryptogenic	2	R	R
Annelida	Caulleriella pacifica	Native	1		R
Annelida	Chaetozone columbiana	Native	1	R	
Annelida	Chaetozone corona	Native	1		R
Annelida	Chaetozone lunula	Native	1		R
Annelida	Chaetozone sp.	Unknown	1		R
Annelida	Chirimia sp.	Unknown	1		R
Annelida	Chone magna	Native	1	C	
Annelida	Chone mollis	Native	1		R
Annelida	Chone sp.	Unknown	1	R	
Annelida	Chone sp. 1	Unknown	1		R
Annelida	Chone sp. 2	Unknown	1		R
Annelida	Cirriformia moorei	Native	2	R	R
Annelida	Cossura candida	Native	2	R	C
Annelida	Cossura pygodactylata	Cryptogenic	1		R
Annelida	Cossura sp.	Unknown	1		R
Annelida	Demonax sp. 1	Unknown	1		R
Annelida	Diopatra ornata	Native	1		R
Annelida	Dorvillea annulata	Native	2	C	C
Annelida	Dorvillea nr. japonica	Cryptogenic	1		R

Phylum	Infaunal Sample Taxon	TaxonStatus	Total Harbors Observed	Tomales Bay	Port Hueneme
Annelida	Eranno lagunae	Native	1	R	
Annelida	Eteone spilotus	Native	1	R	
Annelida	Euchone limnicola	Cryptogenic	2	C	R
Annelida	Euclymeninae	N/A	2	R	R
Annelida	Eumida sp.	Unknown	1	R	
Annelida	Eunice americana	Native	1		R
Annelida	Eunice sp.	Unknown	1		R
Annelida	Exogone dwisula	Native	1		R
Annelida	Exogone lourei	Cryptogenic	2	C	R
Annelida	Glycera americana	Cryptogenic	2	R	R
Annelida	Glycera convoluta	Cryptogenic	1		R
Annelida	Glycera nana	Native	2	R	R
Annelida	Glycinde armigera	Native	2	R	R
Annelida	Glycinde polygnatha	Native	2	C	R
Annelida	Goniada littorea	Native	1		R
Annelida	Halosydna johnsoni	Native	2	R	R
Annelida	Harmothoe imbricata	Cryptogenic	1	R	
Annelida	Harmothoinae	N/A	1	R	
Annelida	Leitoscoloplos pugettensis	Native	2	R	C
Annelida	Levinsenia gracilis	Cryptogenic	1		C
Annelida	Lumbrineridae	N/A	1		R
Annelida	Lumbrineris californiensis	Native	1		R
Annelida	Lumbrineris cruzensis	Native	1		R
Annelida	Lumbrineris japonica	Cryptogenic	1		R
Annelida	Lumbrineris limicola	Native	1		R
Annelida	Maldanidae	N/A	1		R
Annelida	Malmgreniella macginitiei	Native	1	R	
Annelida	Malmgreniella sp.	Unknown	1		R
Annelida	Mediomastus acutus	Native	1		R
Annelida	Mediomastus ambiseta	Cryptogenic	2	R	R
Annelida	Mediomastus californiensis	Native	2	R	C
Annelida	Mediomastus spp. indet.	Cryptogenic	1		C
Annelida	Melinna oculata	Native	1		R

Phylum	Infaunal Sample Taxon	TaxonStatus	Total Harbors Observed	Tomales Bay	Port Hueneme
Annelida	Monticellina cryptica	Native	1		R
Annelida	Monticellina siblina	Cryptogenic	1		C
Annelida	Myxicola infundibulum	Introduced	1		R
Annelida	Nephtys caecoides	Native	1		R
Annelida	Nephtys californiensis	Native	1	R	
Annelida	Nephtys cornuta	Native	2	C	C
Annelida	Nephtys sp.	Unknown	1	R	
Annelida	Notomastus hemipodus	Cryptogenic	1	R	
Annelida	Notomastus tenuis	Native	1		R
Annelida	oligochaeta	N/A	2	C	A
Annelida	Ophiodromus pugettensis	Native	1	C	
Annelida	Paleanotus bellis	Native	1		R
Annelida	Paraonella platybranchia	Native	1		R
Annelida	Paraprionospio pinnata	Native	1		R
Annelida	Pectinaria californiensis	Native	1		R
Annelida	Pholoe glabra	Native	2	R	R
Annelida	Pholoe sp. N-1	Unknown	1		R
Annelida	Pholoides asperus	Native	1		R
Annelida	Phyllodoce hartmanae	Native	1		R
Annelida	Phyllodoce longipes	Native	1	R	
Annelida	Phyllodoce sp.	Unknown	1	R	
Annelida	Phyllodoce williamsi	Native	1	R	
Annelida	Pilargis berkeleyae	Native	1		R
Annelida	Pista agassizi	Native	1	R	
Annelida	Pista cf. disjuncta	Cryptogenic	1		R
Annelida	Pista sp.	Unknown	1	R	
Annelida	Platynereis bicanaliculata	Cryptogenic	2	C	R
Annelida	Poecilochaetus johnsoni	Cryptogenic	1		R
Annelida	Polychaeta	N/A	1		R
Annelida	Polycirrus sp.	Unknown	1	R	
Annelida	Polydora cornuta	Cryptogenic	1		R
Annelida	Polydora sp.	Unknown	1	R	
Annelida	Praxillella pacifica	Native	1		R

Phylum	Infaunal Sample Taxon	TaxonStatus	Total Harbors Observed	Tomales Bay	Port Hueneme
Annelida	Prionospio heterobranchia	Cryptogenic	1		C
Annelida	Prionospio lighti	NativeX	1		R
Annelida	Prionospio steenstrupi	Cryptogenic	1		R
Annelida	Protodorvillea gracilis	Native	1		R
Annelida	Pseudopolydora paucibranchiata	Introduced	2	R	R
Annelida	Sabaco elongatus	Introduced	1		R
Annelida	Scalibregma californicum	Native	1		R
Annelida	Scolelepis sp.	Unknown	1		R
Annelida	Scoletoma luti	Native	2	R	R
Annelida	Sigambra bassi	Cryptogenic	1		R
Annelida	Sphaerosyllis californiensis	Native	2	R	C
Annelida	Sphaerosyllis ranunculus	Native	2	R	R
Annelida	Sphaerosyllis sp.	Unknown	1		R
Annelida	Spiophanes berkeleyorum	Native	1		R
Annelida	Spiophanes duplex	Native	1		R
Annelida	Sthenelanella uniformis	Native	1		R
Annelida	Streblosoma sp.	Unknown	1		R
Annelida	Syllidae	N/A	1		R
Annelida	Tenonia priops	Native	1	R	
Annelida	Trochochaeta multisetosa	Introduced	1		R
Annelida	Typosyllis nipponica	Introduced	1		C
Annelida	Typosyllis sp.	Unknown	1		R
Bryozoa	Amathia distans	Cryptogenic	1		R
Bryozoa	Bowerbankia gracilis	Cryptogenic	1		R
Bryozoa	Branched bryozoa hard	N/A	1		R
Bryozoa	Branched bryozoa soft	N/A	1		R
Bryozoa	Bugula californica	Native	1		R
Bryozoa	Celleporaria brunnea	Native	1		R
Bryozoa	Celleporella hyalina	NativeX	1	R	
Bryozoa	Diaperoecia californica	Native	1		R
Bryozoa	Scrupocellaria diegensis	Native	1		R
Bryozoa	Watersipora subtorquata	Introduced	1		R
Chordata	Amphioxus sp.	Unknown	1		R

Phylum	Infaunal Sample Taxon	TaxonStatus	Total Harbors Observed	Tomales Bay	Port Hueneme
Chordata	Cephalochordata	N/A	1		R
Cnidaria	Anthozoa	N/A	1		R
Cnidaria	Edwardsiidae	N/A	1		R
Cnidaria	Hydrozoa	N/A	1		R
Crustacea	Acuminodeutopus oculatus	Native	1		R
Crustacea	Allorchestes sp.	Native	1		R
Crustacea	Americhelidium millsi	Native	2	R	R
Crustacea	Americhelidium rectipalmum	Native	1		R
Crustacea	Americhelidium shoemakeri	Native	1		R
Crustacea	Americhelidium sp.	Native	1		R
Crustacea	Americorophium brevis	Native	1		R
Crustacea	Americorophium sp.	Native	2	R	R
Crustacea	Ampelisca abdita	Introduced	1		C
Crustacea	Ampelisca agassizi	Cryptogenic	1	R	
Crustacea	Ampelisca cristata	Native	2	R	R
Crustacea	Ampelisca fageri	Native	1		R
Crustacea	Ampelisca sp.	Unknown	1		R
Crustacea	Amphideutopus oculatus	Native	1		A
Crustacea	Amphilochidae	N/A	2	R	R
Crustacea	Amphilochus neopolitanus	Native	1		R
Crustacea	Ampithoe lacertosa	Cryptogenic	1	R	
Crustacea	Ampithoe sp.	Unknown	1		R
Crustacea	Ampithoe valida	Introduced	1		R
Crustacea	Anamixis pacifica	Native	1		C
Crustacea	Anchicolurus occidentalis	Native	1		R
Crustacea	Aoridae	Native	1		C
Crustacea	Aoroides columbiae	Native	2	R	R
Crustacea	Aoroides exilis	Native	1		C
Crustacea	Aoroides inermis	Native	1		R
Crustacea	Aoroides intermedia	Native	1		R
Crustacea	Aoroides sp.	Native	1		R
Crustacea	Aoroides spinipes	Native	1		C
Crustacea	Argissa hamatipes	Cryptogenic	1		R

Phylum	Infaunal Sample Taxon	TaxonStatus	Total Harbors Observed	Tomales Bay	Port Hueneme
Crustacea	Asteropella slatteryi	Native	1		R
Crustacea	Asteropella sp.	Native	1		R
Crustacea	Atylus sp.	Native	1		R
Crustacea	Austrosignum tillerae	Native	1		R
Crustacea	Balanus sp.	Unknown	1		R
Crustacea	Campylaspis biplicata	Native	1		R
Crustacea	Campylaspis sp.	Native	1		R
Crustacea	Cancer jordani	Native	1		R
Crustacea	Cancer productus	Native	2	R	R
Crustacea	Cancer sp.	Native	1		R
Crustacea	Caprella acanthogaster	Introduced	1		R
Crustacea	Caprella californica	Cryptogenic	2	C	R
Crustacea	Caprella mendax	Native	1		C
Crustacea	Caprella penantis	Introduced	1		C
Crustacea	Caprella pilidigitata	Native	1		C
Crustacea	Caprella sp.	Unknown	1		R
Crustacea	Cerapus tubularis	Native	1		R
Crustacea	Copepoda	N/A	1		R
Crustacea	Crangon nigricauda	Native	1	R	
Crustacea	Crangon sp.	Unknown	1		R
Crustacea	Cumella californica	Native	1		A
Crustacea	Cumella sp.	Unknown	1		C
Crustacea	Cumella sp. A	Cryptogenic	1		R
Crustacea	Cumella vulgaris	Cryptogenic	1	R	
Crustacea	Cyclaspis sp. B	Unknown	1		R
Crustacea	Cylindroleberididae	N/A	2	C	R
Crustacea	Cymadusa uncinata	Native	1		R
Crustacea	Deutella californica	Native	1		R
Crustacea	Deutella sp.	Unknown	1		R
Crustacea	Dexamine sp.	Native	1		R
Crustacea	Diastylis pellucida	Native	1		R
Crustacea	Diastylis sp.	Native	1		R
Crustacea	Diastylopsis sp.	Native	1		R

Phylum	Infaunal Sample Taxon	TaxonStatus	Total Harbors Observed	Tomales Bay	Port Hueneme
Crustacea	Diastylopsis tenuis	Native	1		R
Crustacea	Dissiminassa dissimilis	Native	1		R
Crustacea	Edotea sublittoralis	Native	1		R
Crustacea	Elasmopus bampo	Native	1		R
Crustacea	Elasmopus rapax	Native	1		R
Crustacea	Eochelidium sp.	Cryptogenic	1		R
Crustacea	Ericthonius brasiliensis	Introduced	2	R	R
Crustacea	Euphilomedes carcharodonta	Native	2	C	C
Crustacea	Euphilomedes morini	Native	1		R
Crustacea	Eusiroides monoculoides	Cryptogenic	1		R
Crustacea	Foxiphalus obtusidens	Native	2	R	R
Crustacea	Foxiphalus sp.	Native	1		R
Crustacea	Gammaropsis thompsoni	Native	2	R	R
Crustacea	Gibberosus sp.	Unknown	1		R
Crustacea	Gitanopsis sp.	Unknown	1		R
Crustacea	Gnathia crenulatifrons	Native	1		R
Crustacea	Gnathia sp.	Unknown	1		R
Crustacea	Grandidierella japonica	Introduced	2	R	C
Crustacea	Harpacticoida	N/A	1		A
Crustacea	Hartmanodes hartmanae	Native	1		R
Crustacea	Hemigrapsis oregonensis	Native	1	R	
Crustacea	Hemilamprops californica	Native	1		R
Crustacea	Heptacarpus brevirostris	Native	1		R
Crustacea	Heterocrypta occidentalis	Native	1		R
Crustacea	Heteromysis odontops	Native	1		R
Crustacea	Heterophoxus sp.	Native	1		R
Crustacea	Ianiropsis tridens	Native	2	R	R
Crustacea	Idarcturus allelomorphus	Native	1		R
Crustacea	Idarcturus hedgpethi	Native	1		R
Crustacea	Idotea resecata	Native	1	R	
Crustacea	Isaeidae	N/A	1		R
Crustacea	Ischyrocerus litotes	Cryptogenic	1		R
Crustacea	Janiralata occidentalis	Native	1		R

Phylum	Infaunal Sample Taxon	TaxonStatus	Total Harbors Observed	Tomales Bay	Port Hueneme
Crustacea	Janiralata rajata	Native	1		R
Crustacea	Jassa carltoni	Cryptogenic	1	R	
Crustacea	Jassa slatteryi	NativeX	2	R	R
Crustacea	Joeropsis concava	Native	1		R
Crustacea	Lamprops quadriplicatus	Native	1		R
Crustacea	Lamprops sp.	Native	1		R
Crustacea	Laticorophium baconi	Cryptogenic	2	R	R
Crustacea	Leptochelia dubia	Cryptogenic	2	C	A
Crustacea	Leucon sp.	Unknown	1		R
Crustacea	Leuconidae	N/A	1		R
Crustacea	Leucothoe alata	Introduced	1		R
Crustacea	Leuroleberis sharpei	Native	1		R
Crustacea	Liljeborgia geminata	Native	1		R
Crustacea	Limnoria algarum	Native	1		R
Crustacea	Listriella albina	Native	1		R
Crustacea	Listriella diffusa	Native	1		R
Crustacea	Listriella melanica	Native	2	R	R
Crustacea	Lophopanopeus sp.	Native	1		R
Crustacea	Maera similis	Native	1		R
Crustacea	Malacoplax californiensis	Native	1		R
Crustacea	Mayerella banksia	Native	1		C
Crustacea	Mayerella sp.	Unknown	1		C
Crustacea	Megabalanus californicus	Native	1		R
Crustacea	Megamoera subtener	Native	1	R	
Crustacea	Melphidippa borealis	Native	1		R
Crustacea	Metamysidopsis sp.	Native	1		R
Crustacea	Metatiron tropakis	Cryptogenic	1		R
Crustacea	Microjassa sp.	Native	1		R
Crustacea	Monocorophium acherusicum	Introduced	1		C
Crustacea	Monocorophium insidiosum	Introduced	1		R
Crustacea	Monocorophium sp.	Introduced	2	R	R
Crustacea	Munna halei	Native	1		R
Crustacea	Munna sp.	Unknown	1		C

Phylum	Infaunal Sample Taxon	TaxonStatus	Total Harbors Observed	Tomales Bay	Port Hueneme
Crustacea	Munnogonium tillerae	Native	1		R
Crustacea	Mysidacea	N/A	1		R
Crustacea	Mysidopsis onofrensis	Native	1		R
Crustacea	Mysidopsis sp.	Unknown	1		R
Crustacea	Neastacilla californica	Native	1		R
Crustacea	Nebalia gerkenae	Native	1	R	
Crustacea	Nippoleucon hinumensis	Introduced	2	R	R
Crustacea	Paracerceis cordata	Native	1	R	
Crustacea	Paracerceis sp.	Unknown	1		R
Crustacea	Paramicrodeutopus schmitti	Native	1	C	
Crustacea	Paranthura elegans	Introduced	2	R	R
Crustacea	Perotripus brevis	Native	1		R
Crustacea	Photis bifurcata	Native	1		R
Crustacea	Photis brevipes	Native	2	R	R
Crustacea	Photis californica	Native	1		C
Crustacea	Photis sp.	Native	1		C
Crustacea	Phoxocephalidae	Native	1		R
Crustacea	Phtiscidae	Introduced	1		C
Crustacea	Phtisica marina	Introduced	1		R
Crustacea	Pinnixa franciscana	Native	1		R
Crustacea	Pinnixa longipes	Native	1		R
Crustacea	Pinnixa sp.	Unknown	1	R	
Crustacea	Pleurogonium sp.	Unknown	1		R
Crustacea	Pleusirus secorrus	Native	1		R
Crustacea	Pleustidae	N/A	1		R
Crustacea	Podoceridae	N/A	1		R
Crustacea	Podocerus brasiliensis	Native	1		R
Crustacea	Podocerus cristatus	Introduced	1		R
Crustacea	Podocerus sp.	Unknown	1		R
Crustacea	Podocopida	N/A	1		R
Crustacea	Postasterope barnesi	Native	1		C
Crustacea	Postasterope sp.	Unknown	1		C
Crustacea	Protomedeia articulata	Native	1	R	

Phylum	Infaunal Sample Taxon	TaxonStatus	Total Harbors Observed	Tomales Bay	Port Hueneme
Crustacea	Pycnogonida	N/A	1		R
Crustacea	Quadrimaera carla	Native	1		R
Crustacea	Rhepoxynius lucubrans	Native	1		R
Crustacea	Rhepoxynius sp.	Native	1		R
Crustacea	Rudilemboides stenopropodus	Native	1		A
Crustacea	Sinocorophium heteroceratum	Introduced	1	R	
Crustacea	Sinocorophium sp.	Introduced	1		R
Crustacea	Stenothoe estacola	Native	1		R
Crustacea	Stenothoidae	N/A	1		R
Crustacea	Tiron biocellata	Native	1		R
Crustacea	Uromunna ubiquita	Native	1		R
Crustacea	Zeugophilomedes oblonga	Native	1		R
Crustacea	Zeuxo paranormani	Native	2	R	A
Crustacea	Zeuxo sp.	Unknown	1	R	
Echinodermata	Amphiodia sp.	Native	1		R
Echinodermata	Dendraster sp.	Unknown	1		R
Echinodermata	Ophiopholis sp.	Unknown	1		C
Echinodermata	Ophiuroidea	N/A	1		R
Echinodermata	Strongylocentrotus franciscianus	Native	1		R
Echinodermata	Strongylocentrotus purpuratus	Native	1		R
Echiura	Echiura	N/A	1		R
Mollusca	Acmaeoidea	N/A	1		R
Mollusca	Acteocina harpa	Native	1		R
Mollusca	Acteocina sp.	Native	1		R
Mollusca	Alia carinata	Native	1		R
Mollusca	Amphissa columbiana	Native	1		R
Mollusca	Amphissa versicolor	Native	1	R	
Mollusca	Astyris gausapata	Native	1	R	
Mollusca	Barleeia sp.	Native	2	R	R
Mollusca	Bittium sp.	Native	1	R	
Mollusca	Bivalvia	N/A	1		R
Mollusca	Calliostoma sp.	Unknown	1		R
Mollusca	Chione californiensis	Native	1		R

Phylum	Infaunal Sample Taxon	TaxonStatus	Total Harbors Observed	Tomales Bay	Port Hueneme
Mollusca	Chione sp.	Native	1		R
Mollusca	Chlamys sp.	Native	1		R
Mollusca	Crepidula glottidiarum	Native	1		R
Mollusca	Crepidula onyx	Introduced	1		R
Mollusca	Crepipatella dorsata	Native	1		R
Mollusca	Cryptomya californica	Native	1	R	
Mollusca	Cylichna sp.	Unknown	1		R
Mollusca	Donax gouldi	Native	1		R
Mollusca	Entodesma navicula	Native	2	R	R
Mollusca	Epitonium sp.	Unknown	1		R
Mollusca	Gastropoda	N/A	1		R
Mollusca	Haminaea virescens	Native	1		R
Mollusca	Homalopoma luridum	Native	1	R	
Mollusca	Kurtzia arteaga	Native	1		R
Mollusca	Laevicardium substriatum	Native	1		R
Mollusca	Littorina sp.	Unknown	1		R
Mollusca	Littorinidae	N/A	1	R	
Mollusca	Lyonsia californica	Native	1		R
Mollusca	Macoma acolasta	Native	2	R	R
Mollusca	Macoma nasuta	Native	2	R	R
Mollusca	Macoma secta	Native	1		R
Mollusca	Macoma sp.	Native	1		R
Mollusca	Macoma yoldiformis	Native	2	R	R
Mollusca	Mactra sp.	Native	1		R
Mollusca	Melanochlamys diomedea	Native	1		R
Mollusca	Musculista senhousia	Introduced	2	R	R
Mollusca	Mya arenaria	Introduced	1	R	
Mollusca	Mya sp.	Unknown	1		R
Mollusca	Myidae	N/A	1		R
Mollusca	Mysella sp.	Native	1		R
Mollusca	Mytilus sp.	Unknown	2	R	R
Mollusca	Naticidae	N/A	1	R	
Mollusca	Nuculana taphria	Native	1		R

Phylum	Infaunal Sample Taxon	TaxonStatus	Total Harbors Observed	Tomales Bay	Port Hueneme
Mollusca	Nudibranchia	N/A	1		R
Mollusca	Nutricola tantilla	Native	1	R	
Mollusca	Odostomia sp.	Unknown	1		R
Mollusca	Olivella biplicata	Native	1		R
Mollusca	Opistobranchia	N/A	1		R
Mollusca	Parvilucina approximata	Native	1		R
Mollusca	Parvilucina tenuisculpta	Native	1		R
Mollusca	Pectinidae	N/A	1		R
Mollusca	Philine sp.	Cryptogenic	2	R	R
Mollusca	Phyllaplysia taylori	Native	1	R	
Mollusca	Protothaca staminea	Native	2	R	R
Mollusca	Rictaxis punctocaelatus	Native	1		R
Mollusca	Rictaxis sp.	Unknown	1		R
Mollusca	Rochefortia coani	Native	2	R	R
Mollusca	Rochefortia tumida	Native	2	R	R
Mollusca	Scaphopoda	N/A	2	R	R
Mollusca	Siliqua lucida	Native	1	R	
Mollusca	Solen rostriformis	Native	1		R
Mollusca	Solen sicarius	Native	2	R	R
Mollusca	Spathochlamys vestalis	Native	1		R
Mollusca	Tagelus californianus	Native	1		R
Mollusca	Tagelus subteres	Native	1		R
Mollusca	Tellina modesta	Native	2	R	R
Mollusca	Theora lubrica	Introduced	2	C	R
Mollusca	Trachycardium quadrigenarum	Native	1	R	
Mollusca	Turbonilla sp.	Unknown	1		R
Mollusca	Venerupis philippinarum	Introduced	1		R
Mollusca	Vesicomya sp.	Unknown	1		R
Mollusca	Vitrinella sp.	Unknown	1		R
Nematoda	Nematoda	N/A	2	R	C
Nemertea	Nemertea	N/A	1		C
Phorona	Phoronidae	N/A	1		R
Platyhelminthes	Polycladida	N/A	2	R	R

Phylum	Infaunal Sample Taxon	TaxonStatus	Total Harbors Observed	Tomales Bay	Port Hueneme
Platyhelminthes	Stylochus exiguus	Native	1		R
Porifera	Porifera	N/A	1		R
Sipuncula	Apionosoma sp.	Unknown	1		R
Sipuncula	Sipuncula	N/A	1		R

Appendix D - Database description.

Data Tables Structure and Description

The following describes the database structure for information collected for the Introduced Species Survey. The data assembled includes both field and analytical data and are stored in an Access 2000 relational database. The Station ID is the unique identifier for most tables; however, in some tables, several fields are used to make a record unique and multiple primary keys were used in these tables. Primary keys for each table are bolded.

Table. tblInvasiveSpeciesList

This table is the final product of the introduced species list. It contains information on species that are either introduced or cryptogenic within California waters. It is a combination of website searches and literature from numerous scientific journals.

Field Name	Data Type	Size	Description
Common Name	Text	50	
Phylum	Text	50	
Class	Text	50	
Order	Text	50	
Family	Text	50	
Species Name	Text	50	
TaxonStatus	Text	50	Introduced (linked, directly or indirectly, to human activity), Cryptogenic (not demonstrably native or introduced),Native (aboriginal species; including pre-historical invasions), or NativeX (Rare or new appearance within native range)
Introduced From	Text	100	
Introduced To	Text	100	
First Observation	Text	50	
Source	Memo		Where this datum was found.
Documentation- General	Memo		Literature cited for Taxon status.
Documentation- Identification	Memo		Literature cited for identification of species.
Comments	Memo		Any comments on introductory vector.
Affiliation	Text	50	Where (lab/project) Species info originally came from.
MLML Survey	Yes/No		Check if species was found in MLMLM survey 2000-2001

Table. tblStation Location

The Station Location table holds information that describes the sampling event. Samples collected specifically for this study were given a Station ID. This is a code derived from Harbor, Sample Type (Epifaunal, Infaunal, Plankton), sample number, and the location the sample was taken from (dock, piling). The field data table has a one-to-many relationship with other tables in this database, and IDORG is the primary key. GIS information was not differentially corrected and the datum used was NAD83.

Field Name	Data Type	Size	Description
Station ID	Text	30	
StationName	Text	40	
IDORG	Text	30	
Sample Type	Text	50	Fish, Infaunal ,Epifaunal, Algae, Grain Size
Sample Date	Date/Time		
Sample Depth	Text	50	
Water Body	Text	50	
StartTime	Date/Time		
LatDegree	Number		
LatMin	Number		
LongDegree	Number		
LongMin	Number		
LatDD	Number		
LongDD	Number		
Habitat	Text	50	Habitat where sample was taken from (Port, marina, dockside, underside, piling)
BottomeDepth(M)	Number		
SampleArea	Number		Qualitative or quantitative
SampleCollected	Yes/No		Was a sample collected?
SampleJar	Text	50	Type and size of sample receptacle.
CollectedBy	Text	50	Agency who did field sampling
FieldCrew	Text	50	Field crew staff
Comments	Memo		Special comments relating to field work, analyses, etc.
OtherSpeciesObserved	Text	255	Any notable species in surrounding area; not collected
Pictures	Text	50	If taken, enter type if known(underwater, field, slide, community,species etc.)
Status	Text	255	Current location of sample

Table. tblPlanktonStationLocation

The Plankton Station Location table holds information that describes the sampling event. Samples collected specifically for this study were given a Station ID. This is a code derived from Harbor, Sample Type (Epifaunal, Infaunal, Plankton), sample number, and the location the sample was taken from (dock, piling). A flow meter reading is also captured in this table. The field data table has a one-to-many relationship with other tables in this database, and IDORG is the primary key. GIS information was not differentially corrected and the datum used was NAD83.

Field Name	Data Type	Size	Description
WaterBody	Text	255	
Station ID	Text	255	
StationName	Text	255	
IDORG	Text	255	
Sample Type	Text	255	
Sample Date	Date/Time		
SampleTime	Date/Time		
StartLatitude	Text	255	
StartLatDegree	Number		
StartLatMin	Number		
Start Longitude	text	255	
StartLongDegree	Number		
StartLongMin	Number		
StartLatDD	Number		
StartLongDD	Number		
EndLatitude	Text	255	
EndLatDegree	Number		
EndLatMin	Number		
EndLongitude	Text	255	
EndLongDegree	Number	50	
EndLongMin	Number		
EndLatDD	Number		
EndLongDD	Number		
Habitat	Text	255	Habitat where sample was taken from (Port, marina)
StartFlowMeter	Number		
EndFlowMeter	Number	255	
BottomDepth(m)	Number		
SampleArea	Text	255	Qualitative or quantitative
SampleJar	Text	255	Type and size of sample receptacle.
CollectedBy	Text	255	Agency who did field sampling
Comments	Text	255	Special comments relating to field work, analyses, etc.
OtherSpeciesObserved	Text	255	Any notable species in surrounding area; not collected
Pictures	Text	255	If taken, enter type if known(underwater, field, slide, community,species etc.)
Status	text	255	Current location of sample
LabCode	text	255	Lab where sample is to be analyzed
Checkoff	Yes/No		

Table. tblTracking

The tracking table holds information regarding the whereabouts of samples and associated data.

Field Name	Data Type	Size	Description
Station ID	Text	30	
Sample Date	Date/Time		
Sample Type	Text	50	Fish, Infaunal ,Epifaunal, Algae, Grain Size
Sample Depth	Text	50	
Collected By	Text	50	Agency who did field sampling
Status	Text	255	
Sent	Yes/No		
Date Sent	Date/Time		
Pressed	Yes/No		Date pressed for algae samples
Date Pressed	Date/Time		
Sample Returned	Yes/No		
DateReturned	Date/Time		
Data Received	Date/Time		
Comments	Text	200	Special comments relating to field work, analyses, etc.

Table. tblPlanktonTracking

The Plankton tracking table holds information regarding the whereabouts of samples and associated data.

Field Name	Data Type	Size	Description
Station ID	Text	30	
Sample Date	Date/Time		
Sample Type	Text	50	Plankton
Sample Depth	Text	50	
Collected By	Text	50	Agency who did field sampling
Status	Text	255	
Sent	Yes/No		
Date Sent	Date/Time		
Sample Returned	Yes/No		
DateReturned	Date/Time		
Data Received	Date/Time		
Comments	Text	200	Special comments relating to field work, analyses, etc.

Table. tblEpifauanl Results

The Epifaunal Results table carries information about epifaunal species abundance collected from samples ($0.1m^2$), scraped off of fouled harbor structures. Each record represents the abundance of a particular infaunal species at an individual station. The "Abundance" field is an average given to each species per harbor. The "sample collected" field is used for tracking samples, as some identifications were made in the field without any sample being collected. Additional remarks were carried in the Comments field.

Field Name	Data Type	Size	Description
Station ID	Text	255	Sample ID from label
Sample Date	Date/Time	50	
Sample Type	Text	50	
Sample Depth (m)	Text	255	Depth (m) of location or where sample was taken from.
Phylum	Text	255	
Class	Text	255	
Order	Text	255	
Family	Text	255	
Taxon	Text	255	
Common Name	Text	50	
Abundance	Text	50	Number of species counted, or relative abundance (rare, uncommon, common, abundant)
Number Collected	Text	50	Number collected
Sample Collected	Yes/No		An effort was made at all sites, but a sample was not always collected (i.e. fish)
Qualitative	Text	15	Refers to how initial sample was collected
LabCode	Text	50	Lab analyzing sample
Taxon Status	Text	20	Cryptogenic, Introduced, Native, NativeX (Rare or new appearance within native range), Unknown (ID not compared to type specimens), or N/A (ID not specific)
References	Text	200	References used to establish ID or taxon status
Comments	Memo		Special comments relating to field work, analyses, etc.
Qualifier	Text	50	notes for problems

Table. tblInfauanl Results

The Infaunal Results table carries information about benthic infaunal species abundance collected from a VanVeen grab ($0.1m^2$). Each record represents the abundance of a particular infaunal species at an individual station. The "Abundance" field is an average given to each species per harbor. The "sample collected" field is used for tracking samples, as some identifications were made in the field without any sample being collected. Additional remarks were carried in the Comments field

Field Name	Data Type	Size	Description
Station ID	Text	255	Sample ID from label
Sample Date	Date/Time	50	
Sample Type	Text	50	
Sample Depth (m)	Text	255	Depth (m) of location or where sample was taken from.
Phylum	Text	255	
Class	Text	255	
Order	Text	255	
Family	Text	255	
Taxon	Text	255	
Common Name	Text	50	
Estimated Abundance	Text	50	Number of species counted, or relative abundance (rare, uncommon, common, abundant)
Abundance	Text	50	Number collected
Qualitative	Text	15	Refers to how initial sample was collected
LabCode	Text	50	Lab analyzing sample
Taxon Status	Text	20	Cryptogenic, Introduced, Native, NativeX (Rare or new appearance within native range), Unknown (ID not compared to type specimens), or N/A (ID not specific)
References	Text	200	References used to establish ID or taxon status
Comments	Memo		Special comments relating to field work, analyses, etc.
Qualifier	Text	50	notes for problems

Table. tblPlankton Results

The Plankton Results Table carries information about taxon abundance collected from plankton tow samples. Each record represents a qualitative abundance assessment of a particular species identified to the lowest possible taxonomic level at an individual station. The Comments field allows for additional remarks.

Field Name	Data Type	Size	Description
Station ID	Text	255	Sample ID from label
Sample Date	Date/Time	50	
Phylum	Text	255	
Class	Text	255	
Family	Text	255	
Taxon	Text	255	
Taxon Type	Text	50	Type of life stage found in sample.
Split	Text	50	What portion of the sample was split
Abundance	Text	50	Number of species counted, or relative abundance (rare, uncommon, common, abundant)
Estimated Count	Text	50	Number collected
Qualitative	Text	15	Refers to how initial sample was collected
LabCode	Text	50	Lab analyzing sample
Taxon Status	Text	20	Cryptogenic, Introduced, Native, NativeX (Rare or new appearance within native range), Unknown (ID not compared to type specimens), or N/A (ID not specific)
References	Text	200	References used to establish ID or taxon status
Comments	Memo		Special comments relating to field work, analyses, etc.

Table. tblPictures

The Pictures table holds date and location information for each station and community structure picture taken. The "photoCD ID" field refers to which cd the picture is on, this also acts as a cross reference for the photo database that stores these pictures with extended information.

Field Name	Data Type	Size	Description
Water Body	Text	50	
Station ID	Text	50	
Station	Text	50	
Photo CD ID	Text	50	photo CD number-ID code from cd
Sample Date	Date/Time		
Lat DD	Number		
Long DD	Number		
Habitat	Text	50	
Picture Description	Text	50	Description of picture
Bottom Depth (m)	Number		

Look Up Tables
These tables are used as reference table for the tables listed above to help ensure data quality.

Table. lutblCollectedBy

This list describes which institution collected the sample.

Collected By	Institution Name
MPSL	Marine Pollution Studies lab/MLML
Benthic Lab	Benthic Lab
Sowby	Ca. Dept. of Fish and Game
MPSL/CDFG	Marine Pollution Studies lab/ CDFG

Table. lutblLabCodes

This list describes the labs that were used to analyze samples.

LabCode	Description
MPSL	Marine Pollution Studies Lab
Benthic Lab	Moss Landing marine Lab
Harrington	Ca. Dept. of Fish and Game
Silva	Dr. Paul Silva; UC Berkeley
Hunt	John Hunt; Granite Canyon
USGS	US Geological Survey
UCD	UC Davis
MPSL/CDFG	Marine Pollution Studies Lab/CDFG
Bollens	Dr. Stephen Bollens; SFSU

Table. lutblQualifierCode

This list describes the codes that were used to track problems or changes with individual records.

QualifierCode	Definition
A	Abundance corrected
D	Duplication corrected
H	Harbor is separated into divisions, abundance differs between divisions
I	Indentification being checked
N	Name changed from original data
NA	Name change, abundance corrected
Q	Questionable ID
UD	Unknown depth analyzed