

**Introduced Aquatic Species in California Bays and Harbors
2011 Survey**

March 2014

California Department of Fish and Wildlife,
Office of Spill Prevention and Response,
Marine Invasive Species Program

INTRODUCTION

The Marine Invasive Species Act (Chapter 491, Statutes of 2003) stipulates that the California Department of Fish and Wildlife (CDFW) will conduct appropriate studies necessary to develop a baseline of non-indigenous species (NIS) occurring in the coastal marine waters of the state, and then monitor those areas for any new introductions. The CDFW's Office of Spill Prevention and Response (OSPR) provides the lead role for the NIS investigations and the work described below is part of the monitoring effort required under the statute.

CDFW established an NIS baseline for bays, ports, and harbors through surveys conducted in 2000/2001 (Foss et al., 2007) at the ports of San Diego, Los Angeles/Long Beach, Hueneme, Stockton, Sacramento, San Francisco Bay and adjacent waters, Humboldt Bay, Tomales Bay and numerous small harbors (Figure 1). In a 2006 survey, we resampled the same sites. In this survey, we sampled these sites again (in 2011), with the exception of the ports of Sacramento and Stockton. Field and laboratory studies were complimented by literature and data reviews jointly conducted by CDFW/OSPR and Moss Landing Marine Laboratories (MLML).

Most marine introductions in California have occurred in bays and estuaries, probably because several of the major introduction vectors (e.g. ballast water, aquaculture, and ship hull fouling) have historically concentrated in ports and harbors (Wasson et al., 2005; Ruiz et al., 2009). As studies of marine bioinvasions continue, it is apparent that knowledge of the invasion histories of 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 spread of coastal aquatic organisms.

This investigation aimed at collecting information on the presence, distribution, and abundance of NIS in California bays and harbors. We relied on taxonomic experts for each taxonomic group for comments and direction in determining the status of species as introduced, cryptogenic, or native. Taxonomist's comments were supplemented with literature reviews in many cases to address questionable or problematic species determinations. This process led to several updates to the introduction statuses previously reported by MLML/CDFW (Foss et al., 2007; Maloney et al., 2006; CDFW, 2008 and 2011), and these updates are described in the text and tables below. We adapted the sampling design from that used in previous MLML/CDFW NIS surveys conducted in California bays and harbors (Maloney et al. 2007), and focused on whole community structure rather than focusing on one "invasive" species or habitat.



Figure 1. California bays and harbors surveyed in the current study.

METHODS

Introduction Status Determinations

Taxonomists provided introduction statuses for species they identified, which were used to establish a master taxa list for the current survey. The master taxa list was compared to the taxa list stored in CDFW's California Aquatic Non-native Organism Database (CANOD), which is available to the public through the CDFW website at:

http://www.dfg.ca.gov/ospr/Science/invasive_species.aspx. If we found introduction status discrepancies between taxonomists for the current survey and other sources, we reviewed the

literature to refine information regarding the species' native range, current known distribution and reported introductions. We documented all sources used in making final status determinations.

This survey did not attempt to determine the population status of the NIS identified. Instead, this survey reports the presence of these species at the survey sites at the time of the survey. Since most survey sites were visited just once during the course of this survey, and often times the introduced species were identified well after the sampling had taken place, further efforts would be necessary to reliably determine if some populations are established or not.

Site Selection

Epifaunal and infaunal habitats were surveyed in 18 bays and harbors. Most survey sites were specifically selected to correspond to the sites surveyed by MLML/CDFW in 2001 and 2006 to monitor changes in the species detected at these sites over time. Additional criteria used during site selection for epifaunal and infaunal sampling included 1) obtain good geographic distribution over sample regions, 2) target as many areas affected by anthropogenic activities occurring in the sample region as possible, 3) locate and sample sites harboring a variety of hard substrates with fouling communities. Sampling was not conducted at the freshwater ports of Sacramento and Stockton, as in previous surveys, due to limited funding.

Sampling Design

The sampling design follows that of the MLML/CDFW 2000-2001 NIS survey of California's bays and harbors (Foss et al., 2007). We targeted two main habitat types: subtidal fouling (also called epifaunal in this report), and subtidal infaunal communities. The aim was to collect samples from as many different habitats as possible, and within each of those habitats to target the most diverse appearing areas, rather than randomly selecting locations for sample collections. We employed both qualitative and quantitative techniques, including the use of sediment grabs, quadrat clearings, visual scans of intertidal areas and plankton tows. Samples were preserved and transported to the appropriate laboratories and taxonomists for identification and enumeration. Appendix A lists taxonomists involved with identifying specimens for this study.

While all subtidal sampling focused on average depths less than 30 feet, epifaunal subtidal sampling, in particular, focused on substrates at or near the surface. Due to habitat differences that could influence larval recruitment and subsequent colonization, the sampling strategy encompassed multiple depths, substrates, orientations and light exposure conditions.

Field Sampling Methods

Epifaunal Sample Collection

Quantitative quadrat clearings

Four quadrats (0.05 m² each) were collected quantitatively from subtidal substrates via divers using SCUBA. Divers scraped and collected the biological contents from quadrats of known

areas. All quadrat clearing collections were taken from a target bottom depth of 30 feet or less, and most were taken from waters less than 15 feet deep.

To increase the probability of detecting a non-native species in the harbors, researchers selectively placed quadrats in areas that appeared to have the most diversity or were likely to harbor non-native species, including but not limited to wooden piers, dock sides and undersides, wooden and concrete pilings, buoys, and hulls of vessels. A variety of substrates were targeted from each survey site. Vertical and horizontal orientations of substrates were noted.

Quadrat samples collected underwater were placed in mesh bags (0.5mm mesh), which were closed tight, secured with cable ties and transferred to the surface. On the boat, the entire contents within the mesh bags for each sample were sieved through a 0.5mm screen and then transferred into separate containers and labeled. Of the four quadrat clearings collected, two each were combined into one sample, making up two samples for each site. All quantitative clearing samples were fixed in 10% formalin in the field and later preserved in 80% ethanol.

Visual Searches

Divers conducted swimming visual searches via SCUBA for approximately 20 minutes, focusing on fouling communities. To maximize detection of NIS, search time, expertise and search effort was only roughly standardized between sites. During swimming surveys, all introduced species and any unidentified species observed were collected for later verification.

Infaunal Sample Collection

We used a Young-modified Van Veen sediment grab (0.05m² area) to collect one benthic infaunal sample for community analysis at approximately half of the epifauna collection sites. Each grab was sieved through a 0.5 mm screen; residues (e.g., organisms and remaining sediments) were rinsed into unique, pre-labeled storage containers and fixed with a 10% formalin solution. After at least 24 hours in formalin, we transferred samples to 80% ethanol.

Laboratory Processing Methods for Quantitative Samples

Samples were sent to MLML's Benthic Laboratory for processing and sorting and were then sent to taxonomists for identification. Animals were sorted by phylogenetic group: Arthropoda, Bryozoa, Cirripedia, Cnidaria, Crustacea, Echinodermata, Gastropoda, Hydrozoa, Insecta, Isopoda, Kamptozoa, Mollusca, Mytilus, Nemertea, Oligochaeta, Ophiuroidea, Platyhelminthes, Polychaeta, Porifera, Pycnogonida, Sipuncula, Urochordata, and Other. Epifaunal and infaunal samples were fixed in 10% buffered formalin in the field, and water column samples were fixed in a 5% buffered formalin solution.

Voucher and Archiving

Representative examples of introduced, cryptogenic, and provisional species have been vouchered. In addition, taxonomists submitted descriptions of unpublished provisional species reported in this survey to be stored in conjunction with the voucher collection. These voucher specimens will be made available to interested taxonomists for purposes of species verification or appropriate related research.

Terminology

This report uses the definition of Boudouresque and Verlaque (2002), who categorize an introduced species by these criteria:

- “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, “introduced” refers to both innocuous and invasive introductions without specificity to either. In order to address the stipulations of the legislation, and for the purposes of this report, any species that is not native to California waters and whose native range is known to be outside of the California borders is considered an introduced species. This includes species whose native range is elsewhere along the northeast Pacific coastline, not including California. These criteria may result in a non-intuitive definition of “introduction” based on geopolitical boundaries rather than biological range or habitats, but this is necessary to meet the legislative mandate of the Marine Invasive Species Act of 2003 in collecting baseline information on the presence, distribution and abundance of NIS in California waters.

A cryptogenic species is defined as “a species that is not demonstrably native or introduced” (Carlton, 1996). Cryptogenics have insufficiently documented life histories or native ranges to allow characterization as either native or introduced. In addition, when status discrepancies are found in the literature, that species is labeled here as cryptogenic until the discrepancy is resolved. As has been suggested by Carlton (1996), cryptogenic species are numerous and likely underestimated to such an extent as to misshape our understanding of the true effects that invasions have on the eco-system.

Unless compelling evidence was present that a species is either native or introduced to California, it was designated as cryptogenic. For instance, species were classified as cryptogenic if records of collections from outside of California were found in the literature and native ranges were unclear. Many of the species listed as cryptogenic may be native to the California coastline but have gone previously undescribed. Occasionally, evidence suggests that a cryptogenic species is either more likely to be native or more likely to be introduced, even though not enough solid evidence is present to make the full determination of introduced or native. These cryptogenic species have been labeled in CANOD, and may be referred to in this report, as “Likely Native” or “Likely Introduced”.

Specimens that could not be identified beyond the family, class, order, or genus level (e.g. - *Ophiopholis* sp) in most cases could not be confidently classified as introduced, cryptogenic or native, and were assigned an introduction status of ‘unresolved’. Likewise, most specimens which have been given provisional names were assigned an introduction status of unresolved. Exceptions were made if the genus or higher taxon had not previously been known on this coast and met the criteria for “introduced”. In most cases, specimens given the introduction status of unresolved will require additional taxonomic resolution before their true status can be confidently assigned. Specimens that were identified to the level of species complex in this survey were assigned introduction statuses according to the present understanding of the entire species complex. Thus, the term, “unresolved complex,” was used to highlight instances

where indistinguishable members of a species complex would be considered native if collected from some locations or habitats in California (e.g. the outer coast) and introduced from other locations or habitats in California (e.g.. bays and harbors).

Another term used to describe some biota in the literature is “invasive”. An invasive species is generally thought of as any introduced species that has caused a disruption to the ecosystem resulting in damage either environmentally or economically. However, the term has been used inconsistently and is thus ambiguous, so was not used in this report.

RESULTS AND DISCUSSION

Introduction Status Determinations

We update introduction status designations as new information becomes available for species that have been identified during the previous surveys. Literature reviews and communications with taxonomists and other authorities on invasive species led to introduction status revisions or name changes for several species (Appendix B). Ten statuses were revised to introduced: 2 from cryptogenic to introduced and 8 from unresolved to introduced. One revision (*Salmonella* sp. A Cadien) resulted in a status change from introduced to cryptogenic. There were also 3 status revisions from cryptogenic to unresolved and 6 from cryptogenic to native. Additionally, this process highlighted the need for basic taxonomic and ecological research before many determinations can be finalized.

Field Surveys

Paired epifaunal samples (hard substrate scrapings) and infaunal samples (sediment grabs) were collected from 52 sites in 18 bays and harbors. All of the epifaunal, qualitative and infaunal samples collected were sent to taxonomists for identifications of the specimens. Station location, sample date, and habitats sampled are listed for each location in Appendix C.

Taxonomic Identifications

A total of 1,033 species were identified, of which 105 were introduced, 189 were cryptogenic, and 739 were native to California. Among the samples collected, 599 different taxa were not identified to species level and were classified as unresolved. In addition, a total of 7 taxa identified as species complexes and were assigned an introduction status of “unresolved complex”. These taxa may or may not be introduced to California's bays and harbors as explained above.

The number of introduced species ranged from a low of 18 (7.7% of all taxa, excluding unresolved) in Morro Bay to a high of 57 (13.9%) in LA/LB Harbor (Table 1). Introduced species represented 7.7% to 21.6% of the resolved taxa collected from each harbor. Tomales Bay had the highest percentage of introduced species. Cryptogenic species ranged from 23 species collected in Tomales Bay to 96 species collected in Los Angeles Harbor.

Table 1. Number of taxa per classification in each harbor.

Waterbody	Taxa Totals	Introduced	Cryptogenic	Native	Unresolved Complex	Unresolved
Humboldt Bay	364	20	51	135	1	157
Bodega Bay	183	22	28	57	3	73
Tomales Bay	164	24	23	64	4	49
Moss Landing Harbor	350	23	49	144	2	132
Monterey Harbor	458	20	50	190	3	195
Morro Bay	361	18	48	151	0	144
Santa Barbara Harbor	345	28	48	128	2	139
Channel Islands Harbor	401	42	56	145	2	156
Port Hueneme	407	32	54	175	2	144
Marina del Rey Harbor	313	32	38	108	3	132
LA/Long Beach Harbor	675	57	96	256	3	263
Huntington Harbor	287	33	49	101	3	101
Newport Bay	360	39	53	125	3	140
Dana Point Harbor	336	35	46	120	1	134
Avalon Harbor	513	23	60	243	2	185
Oceanside Harbor	364	38	57	121	2	146
Mission Bay	476	53	70	166	3	184
San Diego Bay	441	53	63	153	3	169

The waterbodies with the highest number of introduced species were Los Angeles/Long Beach Harbor, Mission Bay, and San Diego Bay (Figure 2).

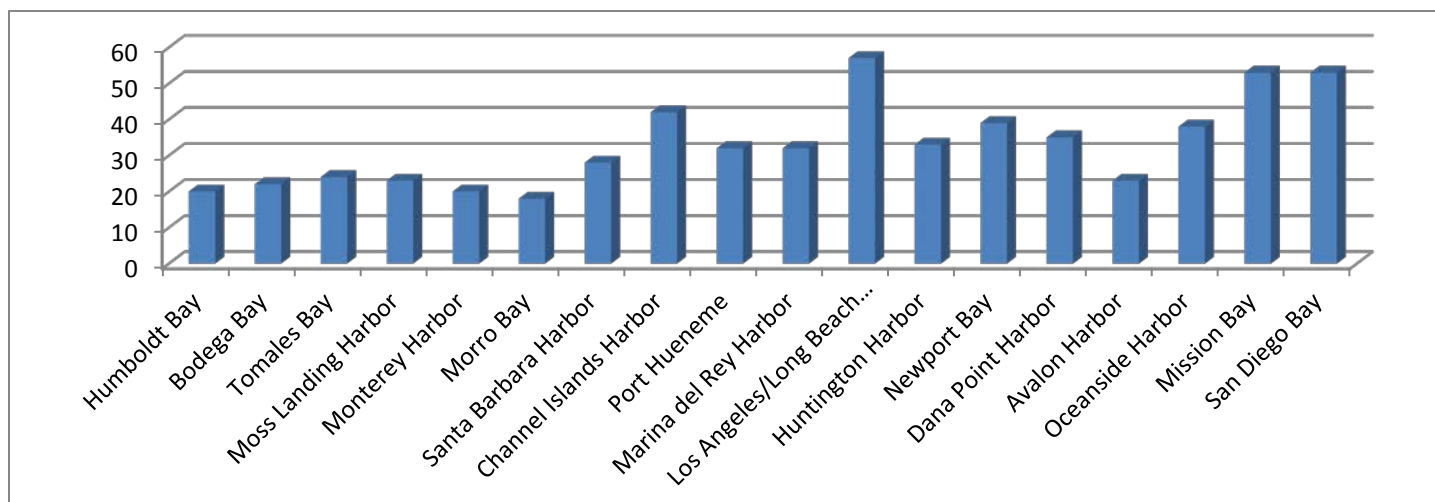


Figure 2. Number of introduced species identified from each bay and harbor surveyed.

Epifaunal samples yielded more total unique species than did infaunal samples (Table 2). Similarly, the number of introduced species from epifaunal samples (91 species) was more than from infaunal samples (51 species), although the percentage of introduced species was similar for the two habitats (11.5% for epifaunal and 9.3% for infaunal).

Table 2. Number and percent of species by introduction status and habitat type (excluding unresolved taxa).

Habitat Type	Total Species	Introduced	Cryptogenic	Native
Epifaunal	788	91 (11.5%)	137 (17.4%)	560 (71.1%)
Infaunal	551	51 (9.3%)	114 (20.7%)	386 (70.1%)

Of the 105 introduced species, 54 were found solely in epifaunal habitat, and 14 were found solely in infaunal habitat. There were also greater numbers of native and cryptogenic taxa found in epifaunal habitat than in infaunal habitat. More introduced species were found in epifaunal samples compared to infaunal samples at all harbors sampled (Appendix D). Arthropods, chordates, and annelids accounted for nearly two-thirds of the introduced species (Table 3). More than half of the cryptogenic species were annelids.

Table 3. Number of taxa per phylum. Epifaunal and infaunal samples are combined.

Phylum	Total Taxa	Introduced	Cryptogenic	Native	Unresolved Complex	Unresolved
Annelida	520	17	105	163	4	231
Arthropoda	394	32	46	226	1	89
Brachiopoda	2			2		
Chlorophyta	3	1		1		1
Chordata	66	18	1	26		21
Ciliphora	1					1
Cnidaria	85	2	10	30	2	41
Echinodermata	26		2	9		15
Echiura	1			1		
Ectoprocta	95	13	8	44		30
Entoprocta	9	1		5		3
Hemichordata	1					1
Heterokontophyta	8	3		4		1
Mollusca	278	10	2	166		100
Nemata	1					1
Nemertea	47		11	17		19
Phoronida	1					1
Platyhelminthes	55			21		34
Porifera	18	3	2	8		5
Protozoa	2					2
Rhodophyta	20	5		15		
Sipuncula	6		2	1		3

Appendix E shows the number of individual introduced species observed in each bay. Presence/absence data is listed for colonial organisms and for identifications made from qualitative visual searches of the site, where individual organisms were not counted. Numbers of individual organisms are shown for identifications made from quantitative samples.

However, the subsampled area among sites has not been standardized, so counts of individuals should only be used for relative comparisons between species.

For some cryptogenic taxa, we judged their likelihood of being native or introduced. Of the 193 cryptogenic species listed, 14 are considered to be “likely introduced” while 38 have been considered “likely native” (Appendix F). As research continues and taxonomy, native ranges, and vectors of introduction are better resolved, our classifications of introduction status will improve.

Three species newly introduced to California were discovered during this survey. The tunicate, *Molgula citrina*, was found at 2 sites in Humboldt Bay. Native to the North Atlantic, it was previously recorded in the Pacific in Alaska in 2008 (Lambert et al. 2010) and Oregon in 2010 (Chapman et al. 2011). Its Atlantic distribution ranges from northeast North America to Great Britain and northern Europe. The most likely vector of introduction for *Molgula citrina* is via ship sea chests (Lambert et al. 2010). Another species not previously found in California waters, *Dynoides saldanai*, was found at Avalon Harbor. It was previously described from Mexico, so this represents a northern range extension, probably through anthropogenic means.

Some introduced species that were previously recorded in California have apparently spread to other parts of the coast in recent years. *Grateloupia turuturu*, a red alga, was previously discovered in California in Santa Barbara Harbor in 2009 and in Half Moon Bay in 2010 (Miller et al. 2011). In 2011, we found this species at 2 sites in Huntington Harbor and 2 sites in Mission Bay. *G. turuturu* is native to Japan and Korea but has spread widely throughout the world (Miller et al. 2011). This is a species of concern because it has multiple reproductive strategies and can grow rapidly. Another red alga from Japan, *Neosiphonia harveyi*, was found at a marina in Mission Bay. It was previously discovered in Monterey Bay in 1994 and in Humboldt Bay in 2006 (Hughey et al. 2009). *Nicolea sp. A Harris*, a polychaete, was found in 4 bays where it had not been previously detected: Marina Del Rey, Port Hueneme, Channel Islands Harbor, and Humboldt Bay. A colonial sea squirt native to Japan and Korea, *Perophora japonica*, was found in San Diego Bay. *P. japonica* was first found in California in Humboldt Bay in 2003, then subsequently discovered in Tomales Bay in 2004.

Other taxa were detected for the first time during MISP surveys, but were not first occurrences for California. An undescribed species of *Branchiommia*, a polychaete worm, was found in 3 different bays: Huntington Harbor, San Diego Bay, and Mission Bay. Although the genus is not native to this coast, it has been seen previously in southern California (L. Harris pers. comm.). The amphipod *Leucothoe nagatai*, the bryozoan *Hippopodina feegeensis*, and the polychaete *Polydora brevipalpa* also were detected for the first time during MISP surveys.

ACKNOWLEDGEMENTS

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APPENDICES

Appendix A – Name, specialty and affiliation of taxonomists identifying specimens in the current survey.

Taxonomist Name	Specialty	Affiliation
Kelvin Barwick	Mollusca - identification of collected specimens	City and County of San Francisco, SFPUC, Natural Resources and Lands Division, SCAMIT
Christopher Brown	Porifera – identification of collected specimens	Independent Consultant
Don Cadien	Arthropoda – identification of collected specimens	Los Angeles County Sanitation Districts Marine Biology Laboratory, SCAMIT
Shannon Carpenter	Mollusca - identification of collected specimens	Santa Barbara Museum of Natural History
Keun-Hyung Choi	Plankton – identification of collected specimens	San Francisco State University - Romberg Tiburon Center
Ken Davis	Grain Size Analysis	Applied Marine Sciences, Inc.
Daniel Geiger	Mollusca - identification of collected specimens	Santa Barbara Museum of Natural History
Nick Haring	Echinodermata - identification of collected specimens	City of San Diego, Environmental Monitoring & Technical Services Laboratory, SCAMIT
Leslie Harris	Polychaeta - identification of collected specimens	Natural History Museum of Los Angeles County, SCAMIT
Gordon Hendler	Ophiuroidea - identification of collected specimens	Natural History Museum of Los Angeles County
Wim Kimmerer	Plankton – identification of collected specimens	San Francisco State University - Romberg Tiburon Center
Gretchen Lambert	Tunicata, Ascidiacea - identification of collected specimens	University of Washington-Friday Harbor Labs, SCAMIT
Welton Lee	Porifera - identification of collected specimens	California Academy of Sciences
John Ljubenkov	Cnidaria - identification of collected specimens	Dancing Coyote Ranch, SCAMIT
Valerie Macdonald	Oligochaeta - identification of collected specimens	Biologica Environmental Services, SCAMIT
Kathy Ann Miller	Marine Algae - identification of collected specimens and visual surveys at some field sites	University of California-Berkeley
Jaya Nolt	Mollusca - identification of collected specimens	Santa Barbara Museum of Natural History

Taxonomist Name	Specialty	Affiliation
Dorothy Norris	Polychaeta - identification of collected specimens	City and County of San Francisco, SFPUC, Natural Resources and Lands Division, SCAMIT
Tony Phillips	Nemertea & Platyhelminthes - identification of collected specimens	City of Los Angeles, Environmental Monitoring Division, SCAMIT
Daniel Pickard	Identification of collected freshwater specimens	California Department of Fish and Game, Aquatic Bioassessment Laboratory, CSU Chico
Veronica Rodriguez	Polychaeta - identification of collected specimens	City of San Diego, Environmental Monitoring & Technical Services Laboratory, EcoMar Consulting Services, SCAMIT
Rick Rowe	Polychaeta - identification of collected specimens	Polychaete Identification Consulting Services, SCAMIT
Greg Schroeder	Bryozoa - identification of collected specimens	Moss Landing Marine Labs
Peter Slattery	Crustacea, Other - identification of collected specimens	Moss Landing Marine Labs, SCAMIT
Paul Valentich-Scott	Mollusca - identification of collected specimens	Santa Barbara Museum of Natural History, SCAMIT
Jared von Schell	Crustacea - identification of collected specimens	Moss Landing Marine Labs

Appendix B – Revisions to introduction statuses.

Species Name	Phylum	Previous Introduction Status	Updated Introduction Status	Status Determination Sources or Comments
<i>Bathydrylus cf. parkeri</i>	Oligochaeta	Unresolved Likely Native	Native	Native per Erseus, 1991 & Erseus in Blake and Hilbig, 1994. Described from CA and known only from California, in fine sand, 30m.(Erseus, 1994)
<i>Bowerbankia gracilis complex</i>	Ectoprocta	Unresolved Complex	Introduced	Status was Unresolved Complex for Outercoast 2007 report and updated to Introduced for Bays and Harbors 2011 report. Per Carlton per. comm. 2007 "Global species complex, especially for non harbor populations; not resolvable at this time"
<i>Bugula neritina complex</i>	Ectoprocta	Unresolved Complex	Introduced	Status was Unresolved Complex for Outercoast 2007 report and updated to Introduced for Bays and Harbors 2011 report. "Bugula 'neritina' is a species complex. Both native and introduced forms have been identified by molecular studies in California waters (Davidson and Haygood 1999; McGovern and Hellberg 2003; Mackie et al. 2006).
<i>Candelabrum</i>	Cnidaria	Unresolved	Cryptogenic	Status updated per Ljubenkov. & Goddard pers. comm. 5/1/12 and genetic results.
<i>Caprella scaura complex</i>	Arthropoda	Unresolved Complex	Introduced	Status was Unresolved Complex for Outercoast 2007 report and updated to Introduced for Bays and Harbors 2011 report. Species complex with introduced harbor populations and likely native outercoast populations.
* <i>Colomastix sp. A Cadien</i>	Arthropoda	Unresolved likely Cryptogenic	Cryptogenic	Status updated per Cadien pers. comm. "I am confident that all prior usages of Colomastix pusilla in reference to animals from the North East Pacific can be attributed to the provisional species instead. This is a new species, and not C. pusilla as originally described from elsewhere. Retained as Cryptogenic until further resolution is available. "
<i>Cryptosula pallasiana complex</i>	Ectoprocta	Unresolved Complex	Introduced	Status was Unresolved Complex for Outercoast 2007 report and updated to Introduced for Bays and Harbors 2011 report.
<i>Deutella venenosa</i>	Arthropoda	Native	Cryptogenic	Status updated per Cadien pers. comm. 6/6/12 . Described from Chile however origin of CA populations unknown. (Cadien pers. comm.)
<i>Diplocirrus sp. SD1 SCAMIT</i>	Annelida	Unresolved likely Introduced	Introduced	Status updated per Harris pers. comm. and Ranasinghe et al. 2005. "Found primarily in San Diego Bay and thought likely to be introduced." (Harris pers. comm.)
<i>Diplosoma listerianum</i>	Tunicata	Cryptogenic	Introduced	Status updated per Ruiz et al. 2011 and Haydar & Wolff, 2009
<i>Eobrolgus spinosus</i>	Arthropoda	Cryptogenic	Introduced	Status updated per Foss review 6/8/12 and Ruiz et al. 2011.
<i>Exosphaeroma sp. IS1 Cadien</i>	Arthropoda	Cryptogenic	Native	Status updated per Wetzer. Regina Wetzer believes this is the same as a n.sp. she is describing based on specimens from Pt. Fermin and Catalina currently in MMS.
<i>Halichondria bowerbanki</i>	Porifera	Unresolved Complex	Introduced	Status updated per Geller et al. 2010. Clades of Halichondria found in California can be removed from the cryptogenic category and designated native or introduced, only, at present, by DNA sequencing.(Geller et al, 2010)
<i>Hemicyclops thysanotus</i>	Arthropoda	Cryptogenic likely Native	Native	Status updated per Gooding, 1960 and verification that known hosts are considered Native to the

Species Name	Phylum	Previous Introduction Status	Updated Introduction Status	Status Determination Sources or Comments
				NEP.
<i>Hemiproto sp. A</i> SCAMIT	Arthropoda	Cryptogenic likely Native	Native	Status updated per Cadien pers. comm. and SCAMIT voucher sheet.
<i>Heteromastus filiformis complex</i>	Annelida	Unresolved Complex	Introduced	Status was Unresolved Complex for Outercoast 2007 report and updated to Introduced for Bays and Harbors 2011 report. Per Carlton pers. comm. 2007 "Global species complex, especially for non harbor populations; not resolvable at this time"
<i>Paraconcavus pacificus</i>	Arthropoda	Cryptogenic likely Native	Native	Status updated per Cadien pers. comm. & Galil et al. 2011
<i>Photis sp. A</i> SCAMIT	Arthropoda	Cryptogenic likely Native	Native	Status updated per SCAMIT Voucher sheet and Cadien pers. comm.
* <i>Pleurocope (genus)</i>	Arthropoda	Cryptogenic	Unresolved	Status updated from Cryptogenic (for genus level ID) to Unresolved. Data under the genus ID was a mixture of both unresolved genus level IDs and a previously undescribed provisional. Cadien provided a SCAMIT voucher sheet (2007) for the provisional specimens. All IDs corresponding to Cadien provisional (P. sp. IS1 Cadien) were associated with that ID and Cryptogenic status was retained there. All genus IDs remain as Unresolved.
<i>Salmoneus sp. A</i> Cadien	Arthropoda	Introduced	Cryptogenic likely Native	Status updated per Cadien pers. comm. "Long believed to be introduced, most recent information suggests this is probably an undescribed form native to the NEP (see comments by Sammy de Grave in SCAMIT NL 25(4) 2006." (Cadien pers. comm. Feb 2012)
<i>Scoletoma sp. A</i> Harris	Annelida	Cryptogenic	Unresolved	Status updated per Harris pers. comm. Provisional species.
<i>Scoletoma sp. B</i> Harris	Annelida	Cryptogenic	Unresolved	Status updated per Harris pers. comm. Provisional species.
<i>Spiophanicola spinulosus</i>	Arthropoda	Cryptogenic likely Native	Native	Status updated per Ho, 1984 and Cadien pers. comm. and verification that known hosts are considered Native to California.
<i>Stenothoe valida complex</i>	Arthropoda	Unresolved Complex	Introduced	Status was Unresolved Complex for Outercoast 2007 report and updated to Introduced for Bays and Harbors 2011 report. Carlton pers. Comm. 2007 "Global species complex, especially for non harbor populations; not resolvable at this time"

* Status change was the result of a species name change or change of identification

** Status changed "pending specimen reexamination"

Appendix C - Sampling Site Locations.

Waterbody	Station Name	Habitat Type	Sample Date	Latitude DD	Longitude DD	Datum
Humboldt Bay	110HUMB02	Subtidal Fouling	29/Jun/2011	40.8283	-124.16484	NAD83
Humboldt Bay	110HUMB02	Subtidal Infauna	29/Jun/2011	40.8283	-124.16484	NAD83
Humboldt Bay	110HUMB06	Subtidal Fouling	29/Jun/2011	40.72904	-124.21973	NAD83
Humboldt Bay	110HUMB06	Subtidal Infauna	29/Jun/2011	40.72904	-124.21973	NAD83
Humboldt Bay	110HUMB08	Subtidal Fouling	29/Jun/2011	40.80393	-124.17658	NAD83
Humboldt Bay	110HUMB08	Subtidal Infauna	29/Jun/2011	40.80393	-124.17658	NAD83
Humboldt Bay	110HUMB09	Subtidal Fouling	29/Jun/2011	40.74324	-124.22769	NAD83
Humboldt Bay	110HUMB09	Subtidal Infauna	29/Jun/2011	40.74324	-124.22769	NAD83
Bodega Bay	115BDGA03	Subtidal Fouling	03/Jun/2011	38.33398	-123.05073	NAD83
Bodega Bay	115BDGA03	Subtidal Infauna	03/Jun/2011	38.33398	-123.05073	NAD83
Bodega Bay	115BDGA04	Subtidal Fouling	03/Jun/2011	38.325572	-123.04101	NAD83
Bodega Bay	115BDGA04	Subtidal Infauna	03/Jun/2011	38.325572	-123.04101	NAD83
Tomales Bay	201TMLS02	Subtidal Fouling	02/Jun/2011	38.10769	-122.86235	NAD83
Tomales Bay	201TMLS02	Subtidal Infauna	02/Jun/2011	38.10769	-122.86235	NAD83
Tomales Bay	201TMLS04	Subtidal Fouling	02/Jun/2011	38.19903	-122.92178	NAD83
Tomales Bay	201TMLS04	Subtidal Infauna	02/Jun/2011	38.19903	-122.92178	NAD83
Moss Landing Harbor	309MOSS02	Subtidal Fouling	21/Jun/2011	36.80273	-121.78502	NAD83
Moss Landing Harbor	309MOSS02	Subtidal Infauna	21/Jun/2011	36.80273	-121.78502	NAD83
Moss Landing Harbor	309MOSS04	Subtidal Fouling	21/Jun/2011	36.8111	-121.77927	NAD83
Moss Landing Harbor	309MOSS04	Subtidal Infauna	21/Jun/2011	36.8111	-121.77927	NAD83
Moss Landing Harbor	306MOSS05	Subtidal Fouling	21/Jun/2011	36.81268	-121.7879	NAD83
Moss Landing Harbor	306MOSS05	Subtidal Infauna	21/Jun/2011	36.81268	-121.7879	NAD83
Monterey Harbor	309MTRY01	Subtidal Fouling	16/May/2011	36.60236	-121.89075	NAD83
Monterey Harbor	309MTRY01	Subtidal Infauna	16/May/2011	36.60236	-121.89075	NAD83
Monterey Harbor	309MTRY03	Subtidal Fouling	16/May/2011	36.60394	-121.88949	NAD83
Monterey Harbor	309MTRY03	Subtidal Infauna	16/May/2011	36.60394	-121.88949	NAD83
Monterey Harbor	309MTRY05	Subtidal Fouling	16/May/2011	36.60895	-121.89359	NAD83
Monterey Harbor	309MTRY05	Subtidal Infauna	16/May/2011	36.60895	-121.89359	NAD83
Morro Bay	310MORR01	Subtidal Fouling	05/Apr/2011	35.37078	-120.85868	NAD83
Morro Bay	310MORR01	Subtidal Infauna	05/Apr/2011	35.37078	-120.85868	NAD83
Morro Bay	310MORR03	Subtidal Fouling	05/Apr/2011	35.35685	-120.84942	NAD83
Morro Bay	310MORR03	Subtidal Infauna	05/Apr/2011	35.35685	-120.84942	NAD83
Morro Bay	310MORR04	Subtidal Fouling	05/Apr/2011	35.35773	-120.85088	NAD83
Morro Bay	310MORR04	Subtidal Infauna	05/Apr/2011	35.35773	-120.85088	NAD83
Santa Barbara Harbor	315SBHB03	Subtidal Fouling	06/Apr/2011	34.40467	-119.69373	NAD83
Santa Barbara Harbor	315SBHB03	Subtidal Infauna	06/Apr/2011	34.40467	-119.69373	NAD83
Santa Barbara Harbor	315SBHB04	Subtidal Fouling	06/Apr/2011	34.40669	-119.69135	NAD83
Santa Barbara Harbor	315SBHB04	Subtidal Infauna	06/Apr/2011	34.40669	-119.69135	NAD83
Channel Islands Harbor	410CHNL02	Subtidal Fouling	07/Apr/2011	34.1642	-119.22533	NAD83
Channel Islands Harbor	410CHNL02	Subtidal Infauna	07/Apr/2011	34.1642	-119.22533	NAD83
Channel Islands Harbor	410CHNL03	Subtidal Fouling	07/Apr/2011	34.16953	-119.22832	NAD83
Channel Islands Harbor	410CHNL03	Subtidal Infauna	07/Apr/2011	34.16953	-119.22832	NAD83
Channel Islands Harbor	410CHNL04	Subtidal Fouling	07/Apr/2011	34.17973	-119.22969	NAD83
Channel Islands Harbor	410CHNL04	Subtidal Infauna	07/Apr/2011	34.17973	-119.22969	NAD83
Port Hueneme	410HNME03	Subtidal Fouling	08/Apr/2011	34.14828	-119.20206	NAD83
Port Hueneme	410HNME03	Subtidal Infauna	08/Apr/2011	34.14828	-119.20206	NAD83
Port Hueneme	410HNME04	Subtidal Fouling	08/Apr/2011	34.1499	-119.21	NAD83
Port Hueneme	410HNME04	Subtidal Infauna	08/Apr/2011	34.1499	-119.21	NAD83
Marina del Rey Harbor	404MDLR01	Subtidal Fouling	22/Apr/2011	33.97029	-118.44971	NAD83
Marina del Rey Harbor	404MDLR01	Subtidal Infauna	22/Apr/2011	33.97029	-118.44971	NAD83
Marina del Rey Harbor	404MDLR02	Subtidal Fouling	22/Apr/2011	33.98303	-118.45641	NAD83
Marina del Rey Harbor	404MDLR02	Subtidal Infauna	22/Apr/2011	33.98303	-118.45641	NAD83
Los Angeles Harbor	411LALB02	Subtidal Fouling	20/Apr/2011	33.74083	-118.27472	NAD83

Waterbody	Station Name	Habitat Type	Sample Date	Latitude DD	Longitude DD	Datum
Los Angeles Harbor	411LALB02	Subtidal Infauna	20/Apr/2011	33.74083	-118.27472	NAD83
Los Angeles Harbor	411LALB04	Subtidal Fouling	20/Apr/2011	33.7166	-118.27917	NAD83
Los Angeles Harbor	411LALB04	Subtidal Infauna	20/Apr/2011	33.7166	-118.27917	NAD83
Los Angeles Harbor	411LALB05	Subtidal Fouling	20/Apr/2011	33.74387	-118.23934	NAD83
Los Angeles Harbor	411LALB05	Subtidal Infauna	20/Apr/2011	33.74387	-118.23934	NAD83
Los Angeles Harbor	411LALB06	Subtidal Fouling	20/Apr/2011	33.72318	-118.26846	NAD83
Los Angeles Harbor	411LALB06	Subtidal Infauna	20/Apr/2011	33.72318	-118.26846	NAD83
Los Angeles Harbor	411LALB08	Subtidal Fouling	21/Apr/2011	33.76677	-118.27698	NAD83
Los Angeles Harbor	411LALB08	Subtidal Infauna	21/Apr/2011	33.76677	-118.27698	NAD83
Los Angeles Harbor	411LALB10	Subtidal Fouling	21/Apr/2011	33.76441	-118.24281	NAD83
Los Angeles Harbor	411LALB10	Subtidal Infauna	21/Apr/2011	33.76441	-118.24281	NAD83
Long Beach Harbor	411LALB12	Subtidal Fouling	21/Apr/2011	33.75835	-118.18597	NAD83
Long Beach Harbor	411LALB12	Subtidal Infauna	21/Apr/2011	33.75835	-118.18597	NAD83
Long Beach Harbor	411LALB14	Subtidal Fouling	21/Apr/2011	33.77081	-118.21132	NAD83
Long Beach Harbor	411LALB14	Subtidal Infauna	21/Apr/2011	33.77081	-118.21132	NAD83
Huntington Harbor	801HUNT02	Subtidal Fouling	19/Apr/2011	33.7128	-118.05426	NAD83
Huntington Harbor	801HUNT02	Subtidal Infauna	19/Apr/2011	33.7128	-118.05426	NAD83
Huntington Harbor	801HUNT05	Subtidal Fouling	19/Apr/2011	33.72796	-118.07864	NAD83
Huntington Harbor	801HUNT05	Subtidal Infauna	19/Apr/2011	33.72796	-118.07864	NAD83
Newport Bay	801NEWP01	Subtidal Fouling	19/Apr/2011	33.61933	-117.89346	NAD83
Newport Bay	801NEWP01	Subtidal Infauna	19/Apr/2011	33.61933	-117.89346	NAD83
Newport Bay	801NEWP03	Subtidal Fouling	19/Apr/2011	33.5975	-117.87973	NAD83
Newport Bay	801NEWP03	Subtidal Infauna	19/Apr/2011	33.5975	-117.87973	NAD83
Newport Bay	801NEWP05	Subtidal Fouling	19/Apr/2011	33.62127	-117.93636	NAD83
Newport Bay	801NEWP05	Subtidal Infauna	19/Apr/2011	33.62127	-117.93636	NAD83
Dana Point Harbor	901DANA01	Subtidal Fouling	05/May/2011	33.45962	-117.6938	NAD83
Dana Point Harbor	901DANA01	Subtidal Infauna	05/May/2011	33.45962	-117.6938	NAD83
Dana Point Harbor	901DANA04	Subtidal Fouling	05/May/2011	33.46224	-117.70583	NAD83
Dana Point Harbor	901DANA04	Subtidal Infauna	05/May/2011	33.46224	-117.70583	NAD83
Avalon Harbor	406AVAL02	Subtidal Fouling	06/May/2011	33.34407	-118.32248	NAD83
Avalon Harbor	406AVAL02	Subtidal Infauna	06/May/2011	33.34407	-118.32248	NAD83
Avalon Harbor	406AVAL04	Subtidal Fouling	06/May/2011	33.34602	-118.32681	NAD83
Avalon Harbor	406AVAL04	Subtidal Infauna	06/May/2011	33.34602	-118.32681	NAD83
Oceanside Harbor	902OCEA01	Subtidal Fouling	05/May/2011	33.20597	-117.38972	NAD83
Oceanside Harbor	902OCEA01	Subtidal Infauna	05/May/2011	33.20597	-117.38972	NAD83
Oceanside Harbor	902OCEA03	Subtidal Fouling	05/May/2011	33.2106	-117.39584	NAD83
Oceanside Harbor	902OCEA03	Subtidal Infauna	05/May/2011	33.2106	-117.39584	NAD83
Mission Bay	906MISS01	Subtidal Fouling	04/May/2011	32.76719	-117.23611	NAD83
Mission Bay	906MISS01	Subtidal Infauna	04/May/2011	32.76719	-117.23611	NAD83
Mission Bay	906MISS02	Subtidal Fouling	04/May/2011	32.76245	-117.23627	NAD83
Mission Bay	906MISS02	Subtidal Infauna	04/May/2011	32.76245	-117.23627	NAD83
Mission Bay	906MISS04	Subtidal Fouling	04/May/2011	32.79391	-117.22318	NAD83
Mission Bay	906MISS04	Subtidal Infauna	04/May/2011	32.79391	-117.22318	NAD83
Mission Bay	906MISS05	Subtidal Fouling	04/May/2011	32.77901	-117.21278	NAD83
Mission Bay	906MISS05	Subtidal Infauna	04/May/2011	32.77901	-117.21278	NAD83
San Diego Bay	SDE03	Subtidal Fouling	03/May/2011	32.65831	-117.11905	NAD83
San Diego Bay	SDE03	Subtidal Infauna	03/May/2011	32.65831	-117.11905	NAD83

Waterbody	Station Name	Habitat Type	Sample Date	Latitude DD	Longitude DD	Datum
San Diego Bay	SDE08	Subtidal Fouling	03/May/2011	32.71549	-117.17477	NAD83
San Diego Bay	SDE08	Subtidal Infauna	03/May/2011	32.71549	-117.17477	NAD83
San Diego Bay	SDE12	Subtidal Fouling	03/May/2011	32.72429	-117.22408	NAD83
San Diego Bay	SDE12	Subtidal Infauna	03/May/2011	32.72429	-117.22408	NAD83

Appendix D – Number of species and percentage of total taxa for each station and habitat type sampled.

Station Code	Station Name	Location Code	Total Taxa	Introduced	Cryptogenic	Native	Unresolved Complex	Unresolved
110HUMB02	Aquaculture Floats	Sub_Fouling	169	14	26	58	1	70
110HUMB02	Aquaculture Floats	Sub_Infauna	87	3	14	33		37
110HUMB06	Dilapidated Dock Area	Sub_Fouling	64	6	8	20		30
110HUMB06	Dilapidated Dock Area	Sub_Infauna	28	1	7	14		6
110HUMB08	Eureka Boat Launch	Sub_Fouling	184	13	28	64	1	78
110HUMB08	Eureka Boat Launch	Sub_Infauna	26	2	8	5		11
110HUMB09	Most Exposed Site/Channel Marker	Sub_Fouling	110	4	18	30	1	57
110HUMB09	Most Exposed Site/Channel Marker	Sub_Infauna	44		14	16		14
115BDGA03	NE Corner of Bay	Sub_Fouling	123	16	18	36	2	51
115BDGA03	NE Corner of Bay	Sub_Infauna	11	2	3	2		4
115BDGA04	SE Side of Bay	Sub_Fouling	79	11	13	26	2	27
115BDGA04	SE Side of Bay	Sub_Infauna	32	3	6	9		14
201TMLS02	Golden Hinde Small Marina	Sub_Fouling	44	10	5	12	1	16
201TMLS02	Golden Hinde Small Marina	Sub_Infauna	37	7	5	13		12
201TMLS04	Tomales Bay Boat Launch	Sub_Fouling	94	14	16	36	1	27
201TMLS04	Tomales Bay Boat Launch	Sub_Infauna	43	4	10	16	3	10
306MOSS04	Middle of the Slough	Sub_Fouling	181	12	26	79	1	63
306MOSS04	Middle of the Slough	Sub_Infauna	101	6	21	44		30
306MOSS05	North Harbor/Boat Launch	Sub_Fouling	129	14	19	37	1	58
306MOSS05	North Harbor/Boat Launch	Sub_Infauna	41	3	6	18		14
309MOSS02	B-Dock	Sub_Fouling	115	14	19	36	1	45
309MOSS02	B-Dock	Sub_Infauna	28	4	2	7	1	14
309MTRY01	Harbormaster Launch Ramp	Sub_Fouling	151	16	17	61		57
309MTRY01	Harbormaster Launch Ramp	Sub_Infauna	53		9	23		21
309MTRY03	Fisherman's Wharf near Monterey Fish Company	Sub_Fouling	200	5	24	92	2	77
309MTRY03	Fisherman's Wharf near Monterey Fish Company	Sub_Infauna	95	3	12	37	1	42
309MTRY05	Breakwater Cove Marina	Sub_Fouling	257	6	29	104	1	117
309MTRY05	Breakwater Cove Marina	Sub_Infauna	28		2	13		13
310MORR01	Coast Guard Pier	Sub_Fouling	152	10	23	59		60
310MORR01	Coast Guard Pier	Sub_Infauna	87	4	13	39		31
310MORR03	Morro Bay Boat Yard	Sub_Fouling	157	12	21	59		65
310MORR03	Morro Bay Boat Yard	Sub_Infauna	62	2	12	29		19
310MORR04	Morro Bay Boat Launch Ramp	Sub_Fouling	97	7	14	35		41
310MORR04	Morro Bay Boat Launch Ramp	Sub_Infauna	85	6	16	29		34
315SBHB03	Radon Corner	Sub_Fouling	168	19	19	52	1	77
315SBHB03	Radon Corner	Sub_Infauna	59	3	16	18	2	20
315SBHB04	Harbor Entrance	Sub_Fouling	220	23	29	78	1	89

Station Code	Station Name	Location Code	Total Taxa	Introduced	Cryptogenic	Native	Unresolved Complex	Unresolved
315SBHB04	Harbor Entrance	Sub_Infauna	90	7	16	34		33
404MDLR01	Marina del Rey Harbor Entrance	Sub_Fouling	225	25	28	75	2	95
404MDLR01	Marina del Rey Harbor Entrance	Sub_Infauna	68	7	14	24		23
404MDLR02	NW Corner of Harbor	Sub_Fouling	127	19	14	27	3	64
404MDLR02	NW Corner of Harbor	Sub_Infauna	34	3	7	8		16
406AVAL02	Ferry Terminal Docks	Sub_Fouling	283	14	35	131	2	101
406AVAL02	Ferry Terminal Docks	Sub_Infauna	156	5	20	74		57
406AVAL04	The Tuna Club	Sub_Fouling	286	14	41	125	1	105
406AVAL04	The Tuna Club	Sub_Infauna	104	1	9	56		38
410CHNL02	CIYC Guest Slip	Sub_Fouling	153	23	19	47	2	62
410CHNL02	CIYC Guest Slip	Sub_Infauna	75	5	18	29		23
410CHNL03	Commercial Fishing Dock	Sub_Fouling	216	23	27	73	2	91
410CHNL03	Commercial Fishing Dock	Sub_Infauna	71	4	18	27		22
410CHNL04	Private Dock	Sub_Fouling	122	21	17	35	1	48
410CHNL04	Private Dock	Sub_Infauna	44	6	9	14		15
410HNME03	Commercial Fishing Fleet Dock	Sub_Fouling	223	22	26	81	2	92
410HNME03	Commercial Fishing Fleet Dock	Sub_Infauna	78	2	19	27		30
410HNME04	Wharf 4	Sub_Fouling	191	12	23	85	1	70
410HNME04	Wharf 4	Sub_Infauna	96	3	26	43		24
411LALB02	Loading Dock at Bumper Pad #51	Sub_Fouling	227	21	31	82	1	92
411LALB02	Loading Dock at Bumper Pad #51	Sub_Infauna	89	5	23	30		31
411LALB04	Slip D-50	Sub_Fouling	173	27	26	49	2	69
411LALB04	Slip D-50	Sub_Infauna	74	6	17	27	1	23
411LALB05	Fuel Depot	Sub_Fouling	218	17	32	75	2	92
411LALB05	Fuel Depot	Sub_Infauna	105	8	19	31	1	46
411LALB06	LA/Long Beach Coast Guard Pier	Sub_Fouling	196	22	24	73	2	75
411LALB06	LA/Long Beach Coast Guard Pier	Sub_Infauna	110	7	23	36	1	43
411LALB08	Backside of Working Container Ship Pier	Sub_Fouling	137	15	20	40	1	61
411LALB08	Backside of Working Container Ship Pier	Sub_Infauna	11		1	3		7
411LALB10	Draw Bridge	Sub_Fouling	181	24	26	60	1	70
411LALB10	Draw Bridge	Sub_Infauna	77	6	14	29		28
411LALB12	Long Beach Downtown Marina - ISS	Sub_Fouling	190	25	33	56	1	75
411LALB12	Long Beach Downtown Marina - ISS	Sub_Infauna	36	3	9	13	1	10
411LALB14	Super Mexico Pier	Sub_Fouling	226	28	29	74	2	93
411LALB14	Super Mexico Pier	Sub_Infauna	58	6	12	17	2	21
801HUNT02	Pump-A-Head Dock	Sub_Fouling	106	17	15	27	1	46
801HUNT02	Pump-A-Head Dock	Sub_Infauna	39	10	7	11	1	10
801HUNT05	Near Huntington Launch Ramp	Sub_Fouling	156	20	25	58	2	51

Station Code	Station Name	Location Code	Total Taxa	Introduced	Cryptogenic	Native	Unresolved Complex	Unresolved
801HUNT05	Near Huntington Launch Ramp	Sub_Infauna	79	8	25	24		22
801NEWP01	Back Bay Marina	Sub_Fouling	81	17	7	16	2	39
801NEWP01	Back Bay Marina	Sub_Infauna	79	9	14	27		29
801NEWP03	Newport Bay Harbor Entrance	Sub_Fouling	178	22	29	61	1	65
801NEWP03	Newport Bay Harbor Entrance	Sub_Infauna	98	7	19	40		32
801NEWP05	Balboa Coves	Sub_Fouling	92	19	11	19	1	42
801NEWP05	Balboa Coves	Sub_Infauna	56	8	13	14	1	20
901DANA01	Dana Point Harbor Mouth Slip	Sub_Fouling	125	20	18	34		53
901DANA01	Dana Point Harbor Mouth Slip	Sub_Infauna	48	3	9	21		15
901DANA04	Ocean Institute Dock	Sub_Fouling	205	27	28	65	1	84
901DANA04	Ocean Institute Dock	Sub_Infauna	111	15	21	42		33
902OCEA01	Oceanside Commercial Fishing Dock	Sub_Fouling	213	27	32	59	2	93
902OCEA01	Oceanside Commercial Fishing Dock	Sub_Infauna	67	4	15	24	1	23
902OCEA03	Middle Harbor Yacht Slip	Sub_Fouling	221	32	33	68	2	86
902OCEA03	Middle Harbor Yacht Slip	Sub_Infauna	84	6	14	26		38
906MISS01	Dana Inn Marina	Sub_Fouling	244	34	35	84	2	89
906MISS01	Dana Inn Marina	Sub_Infauna	50	5	14	19	1	11
906MISS02	Seaforth	Sub_Fouling	213	32	31	66	2	82
906MISS02	Seaforth	Sub_Infauna	94	12	19	30	1	32
906MISS04	Ski Islands Marina	Sub_Fouling	125	25	21	26	1	52
906MISS04	Ski Islands Marina	Sub_Infauna	56	7	12	22	1	14
906MISS05	Hilton Resort Dock	Sub_Fouling	116	16	20	25	2	53
906MISS05	Hilton Resort Dock	Sub_Infauna	46	7	6	17	1	15
SDE03	Marine Terminal (Paco)	Sub_Fouling	210	41	33	55	2	79
SDE03	Marine Terminal (Paco)	Sub_Infauna	95	9	20	30	1	35
SDE08	San Diego Bay Cruise Ship Terminal	Sub_Fouling	256	34	38	85	3	96
SDE08	San Diego Bay Cruise Ship Terminal	Sub_Infauna	64	6	7	28	1	22
SDE12	America's Cup Harbor	Sub_Fouling	206	33	26	64	2	81
SDE12	America's Cup Harbor	Sub_Infauna	41	6	5	19		11

Appendix E – Number of individuals and presence/absence data for introduced species observed at each bay. Count code indicates if observed species was colonial (COL) or observed during qualitative sampling (QUAL).

Species Name	Habitat Type	Phylum	Total Harbors Observed	Humboldt Bay	Bodega Bay	Tomaes Bay	Moss Landing Harbor	Monterey Harbor	Morro Bay	Santa Barbara Harbor	Channel Islands Harbor	Port Hueneme
<i>Ampelisca abdita</i>	Infauna	Arthropoda	1			136						
<i>Amphibalanus amphitrite</i>	Epifauna	Arthropoda	1									
<i>Amphibalanus improvisus</i>	Epifauna	Arthropoda	3		144		12				1	
<i>Amphibalanus improvisus</i>	Infauna	Arthropoda	1				181					
<i>Ampithoe valida</i>	Epifauna	Arthropoda	14	4	16	32	34		5	1	13	
<i>Anguinella palmata</i>	Epifauna	Ectoprocta	2									
<i>Anguinella palmata</i>	Infauna	Ectoprocta	1									
<i>Aoroides secundus</i>	Epifauna	Arthropoda	10							76	395	31
<i>Aoroides secundus</i>	Infauna	Arthropoda	2								8	
<i>Ascidia zara</i>	Epifauna	Chordata	10							4	20	
<i>Barentsia benedeni</i>	Epifauna	Entoprocta	1									
<i>Botrylloides perspicuum</i>	Epifauna	Chordata	2									
<i>Botrylloides violaceus</i>	Epifauna	Chordata	18	P	P	P	P	P	P	P	P	P
<i>Botryllus schlosseri</i>	Epifauna	Chordata	11		P			P		P	P	P
<i>Botryllus sp. A Lambert</i>	Epifauna	Chordata	12		P		P	P		P	P	
<i>Bowerbankia gracilis complex</i>	Epifauna	Ectoprocta	18	P	P	P	P	P	P	P	P	P
<i>Bowerbankia gracilis complex</i>	Infauna	Ectoprocta	5					P		P		
<i>Branchiomma sp. LH1</i>	Epifauna	Annelida	3									
<i>Bryopsis sp. 1 Miller</i>	Epifauna	Chlorophyta	2						P			
<i>Bugula neritina complex</i>	Epifauna	Ectoprocta	18	P	P	P	P	P	P	P	P	P
<i>Bugula neritina complex</i>	Infauna	Ectoprocta	9				P	P	P	P		
<i>Caprella drepanochir</i>	Epifauna	Arthropoda	1	34								
<i>Caprella drepanochir</i>	Infauna	Arthropoda	1									
<i>Caprella mutica</i>	Infauna	Arthropoda	2	2						4		
				732								
<i>Caprella mutica</i>	Epifauna	Arthropoda	10	7	777	3	2648	371	1	143	5	33
<i>Caprella scaura complex</i>	Epifauna	Arthropoda	4					92	1			
<i>Caprella scaura complex</i>	Infauna	Arthropoda	1									
<i>Caprella simia</i>	Infauna	Arthropoda	6							5		
<i>Caprella simia</i>	Epifauna	Arthropoda	10							94	6	246
<i>Caulacanthus okamurae</i>	Epifauna	Rhodophyta	1				P					

Species Name	Habitat Type	Phylum	Total Harbors Observed	Marina del Rey Harbor	LA/Long Beach Harbor	Huntington Harbor	Newport Bay	Dana Point Harbor	Avalon Harbor	Oceanside Harbor	Mission Bay	San Diego Bay
<i>Ampelisca abdita</i>	Infauna	Arthropoda	1									
<i>Amphibalanus amphitrite</i>	Epifauna	Arthropoda	1				21					
<i>Amphibalanus improvisus</i>	Epifauna	Arthropoda	3									
<i>Amphibalanus improvisus</i>	Infauna	Arthropoda	1									
<i>Ampithoe valida</i>	Epifauna	Arthropoda	14		4	100	265		24	20	496	212
<i>Anguinella palmata</i>	Epifauna	Ectoprocta	2		P	P						
<i>Anguinella palmata</i>	Infauna	Ectoprocta	1		P							
<i>Aoroides secundus</i>	Epifauna	Arthropoda	10	700	312		2353	533		162 4	356	540
<i>Aoroides secundus</i>	Infauna	Arthropoda	2		3							
<i>Ascidia zara</i>	Epifauna	Chordata	10	127	81	1	10	71		4	32	21
<i>Barentsia benedeni</i>	Epifauna	Entoprocta	1								P	
<i>Botrylloides perspicuum</i>	Epifauna	Chordata	2								P	P
<i>Botrylloides violaceus</i>	Epifauna	Chordata	18	P	P	P	P	P	P	P	P	P
<i>Botryllus schlosseri</i>	Epifauna	Chordata	11	P				P	P	P	P	P
<i>Botryllus sp. A Lambert</i>	Epifauna	Chordata	12	P	P			P	P	P	P	P
<i>Bowerbankia gracilis complex</i>	Epifauna	Ectoprocta	18	P	P	P	P	P	P	P	P	P
<i>Bowerbankia gracilis complex</i>	Infauna	Ectoprocta	5	P	P						P	
<i>Branchiomma sp. LH1</i>	Epifauna	Annelida	3			8					84	176
<i>Bryopsis sp. 1 Miller</i>	Epifauna	Chlorophyta	2		P							
<i>Bugula neritina complex</i>	Epifauna	Ectoprocta	18	P	P	P	P	P	P	P	P	P
<i>Bugula neritina complex</i>	Infauna	Ectoprocta	9	P	P	P	P		P			
<i>Caprella drepanochir</i>	Epifauna	Arthropoda	1									
<i>Caprella drepanochir</i>	Infauna	Arthropoda	1							2		
<i>Caprella mutica</i>	Infauna	Arthropoda	2									
<i>Caprella mutica</i>	Epifauna	Arthropoda	10								136	
<i>Caprella scaura complex</i>	Epifauna	Arthropoda	4				345			36		
<i>Caprella scaura complex</i>	Infauna	Arthropoda	1							1		
<i>Caprella simia</i>	Infauna	Arthropoda	6		7 308	7		4			5	6 147
<i>Caprella simia</i>	Epifauna	Arthropoda	10		8	160	426	12	2		6240	4
<i>Caulacanthus okamurae</i>	Epifauna	Rhodophyta	1									

Species Name	Habitat Type	Phylum	Total Harbors Observed	Humboldt Bay	Bodega Bay	Tomaes Bay	Moss Landing Harbor	Monterey Harbor	Morro Bay	Santa Barbara Harbor	Channel Islands Harbor	Port Hueneme
<i>Chalinula loosanoffi</i>	Epifauna	Porifera	8		P				P		P	
<i>Ciona intestinalis</i>	Epifauna	Chordata	8		4			4			4	
<i>Ciona savignyi</i>	Epifauna	Chordata	13		P			13		95	16	84
<i>Conopeum tenuissimum</i>	Epifauna	Ectoprocta	1									
<i>Crassostrea gigas</i>	Epifauna	Mollusca	2									
<i>Crassostrea virginica</i>	Epifauna	Mollusca	1									
<i>Crepidula plana</i>	Infauna	Mollusca	1									
<i>Cryptosula pallasiana complex</i>	Infauna	Ectoprocta	16		P	P	P	P	P	P	P	P
<i>Cryptosula pallasiana complex</i>	Epifauna	Ectoprocta	8				P		P		P	
<i>Didemnum vexillum</i>	Infauna	Chordata	1				P					
<i>Didemnum vexillum</i>	Epifauna	Chordata	7	P	P	P	P		P			P
<i>Diplocirrus sp. SD1 SCAMIT</i>	Infauna	Annelida	2									
<i>Diplosoma listerianum</i>	Epifauna	Chordata	9				P	P		P		
<i>Diplosoma listerianum</i>	Infauna	Chordata	1									
<i>Dynoides saldanai</i>	Epifauna	Arthropoda	1									
<i>Elasmopus rapax</i>	Epifauna	Arthropoda	6								4	
<i>Elasmopus rapax</i>	Infauna	Arthropoda	1									
<i>Eobrolgus spinosus</i>	Infauna	Arthropoda	1									
<i>Eochelidium sp. A SCAMIT</i>	Epifauna	Arthropoda	1									
<i>Eochelidium sp. A SCAMIT</i>	Infauna	Arthropoda	4									
<i>Eusarsiella zostericola</i>	Infauna	Arthropoda	1	4								
<i>Ficopomatus enigmaticus</i>	Epifauna	Annelida	2				4					
<i>Garveia franciscana</i>	Epifauna	Cnidaria	2									
<i>Geukensia demissa</i>	Epifauna	Mollusca	1									
<i>Grandidierella japonica</i>	Epifauna	Arthropoda	8						3			
<i>Grandidierella japonica</i>	Infauna	Arthropoda	11	4		48				30	138	
<i>Grateloupia lanceolata</i>	Epifauna	Rhodophyta	5							P	P	P
<i>Grateloupia turuturu</i>	Epifauna	Rhodophyta	2									

Species Name	Habitat Type	Phylum	Total Harbors Observed	Marina del Rey Harbor	LA/Long Beach Harbor	Huntington Harbor	Newport Bay	Dana Point Harbor	Avalon Harbor	Oceanside Harbor
<i>Chalinula loosanoffi</i>	Epifauna	Porifera	8	P	P		P			
<i>Ciona intestinalis</i>	Epifauna	Chordata	8	472	8	16				
<i>Ciona savignyi</i>	Epifauna	Chordata	13	2	252	1	21	9		137
<i>Conopeum tenuissimum</i>	Epifauna	Ectoprocta	1						P	
<i>Crassostrea gigas</i>	Epifauna	Mollusca	2		20		1			
<i>Crassostrea virginica</i>	Epifauna	Mollusca	1			8				
<i>Crepidula plana</i>	Infauna	Mollusca	1		1					
<i>Cryptosula pallasiana complex</i>	Infauna	Ectoprocta	16	P	P	P	P	P		P
<i>Cryptosula pallasiana complex</i>	Epifauna	Ectoprocta	8	P	P	P	P			
<i>Didemnum vexillum</i>	Infauna	Chordata	1							
<i>Didemnum vexillum</i>	Epifauna	Chordata	7							
<i>Diplocirrus sp. SD1 SCAMIT</i>	Infauna	Annelida	2							
<i>Diplosoma listerianum</i>	Epifauna	Chordata	9	P	P				P	P
<i>Diplosoma listerianum</i>	Infauna	Chordata	1							
<i>Dynoides saldanai</i>	Epifauna	Arthropoda	1						10	
<i>Elasmopus rapax</i>	Epifauna	Arthropoda	6	20					P	108
<i>Elasmopus rapax</i>	Infauna	Arthropoda	1						4	
<i>Eobrolgus spinosus</i>	Infauna	Arthropoda	1					1		
<i>Eochelidium sp. A SCAMIT</i>	Epifauna	Arthropoda	1				1			
<i>Eochelidium sp. A SCAMIT</i>	Infauna	Arthropoda	4		1	44	4	1		
<i>Eusarsiella zostericola</i>	Infauna	Arthropoda	1							
<i>Ficopomatus enigmaticus</i>	Epifauna	Annelida	2				86			
<i>Garveia franciscana</i>	Epifauna	Cnidaria	2				P			
<i>Geukensia demissa</i>	Epifauna	Mollusca	1						7	
<i>Grandidierella japonica</i>	Epifauna	Arthropoda	8		156	4	48	12		72
<i>Grandidierella japonica</i>	Infauna	Arthropoda	11		11	5	121	21		2
<i>Grateloupia lanceolata</i>	Epifauna	Rhodophyta	5		P					
<i>Grateloupia turuturu</i>	Epifauna	Rhodophyta	2			P				

Species Name	Habitat Type	Phylum	Total Harbors Observed	Humboldt Bay	Bodega Bay	Tomaes Bay	Moss Landing Harbor	Monterey Harbor	Morro Bay	Santa Barbara Harbor	Channel Islands Harbor	Port Hueneme
<i>Halichondria "panicea" Clade IIA</i>	Epifauna	Porifera	4		P							P
<i>Halichondria "panicea" Clade IIB</i>	Epifauna	Porifera	6			P	P				P	
<i>Heteromastus filiformis complex</i>	Infauna	Annelida	2									
<i>Hippopodina feegeensis</i>	Infauna	Ectoprocta	1									
<i>Hippopodina feegeensis</i>	Epifauna	Ectoprocta	1									
<i>Hydroides elegans</i>	Infauna	Annelida	1									
<i>Hydroides elegans</i>	Epifauna	Annelida	3							10		
<i>Incisocalliope derzhavini</i>	Infauna	Arthropoda	1									
<i>Incisocalliope derzhavini</i>	Epifauna	Arthropoda	1									
<i>Jassa marmorata</i>	Epifauna	Arthropoda	1					1				
<i>Leucothoe nagatai</i>	Infauna	Arthropoda	2									
<i>Leucothoe nagatai</i>	Epifauna	Arthropoda	8							35		16
<i>Limnoria tripunctata</i>	Epifauna	Arthropoda	3								1	
<i>Lomentaria hakodatensis</i>	Epifauna	Rhodophyta	3								P	
<i>Macoma petalum</i>	Infauna	Mollusca	1						5			
<i>Melita rylovae</i>	Epifauna	Arthropoda	2									
<i>Microcosmus squamiger</i>	Epifauna	Chordata	9								15	
<i>Microcosmus squamiger</i>	Infauna	Chordata	1									
<i>Molgula citrina</i>	Epifauna	Chordata	1	1364								
<i>Molgula ficus</i>	Epifauna	Chordata	5								16	
<i>Molgula manhattensis</i>	Epifauna	Chordata	3									
<i>Monocorophium acherusicum</i>	Epifauna	Arthropoda	17	8173	49	4525	3059	13	2088	15	16	32
<i>Monocorophium acherusicum</i>	Infauna	Arthropoda	11			8	9		4		1	
<i>Monocorophium insidiosum</i>	Infauna	Arthropoda	4				1		1			
<i>Monocorophium insidiosum</i>	Epifauna	Arthropoda	13	120	310	3285	5920		285		54	1
<i>Musculista senhousia</i>	Infauna	Mollusca	5			1						
<i>Musculista senhousia</i>	Epifauna	Mollusca	5			12						
<i>Myrianida convoluta</i>	Epifauna	Annelida	1									
<i>Myrianida pachycera</i>	Epifauna	Annelida	1									
<i>Myrianida pentadentata</i>	Epifauna	Annelida	3									7

Species Name	Habitat Type	Phylum	Total Harbors Observed	Marina del Rey Harbor	LA/Long Beach Harbor	Huntington Harbor	Newport Bay	Dana Point Harbor	Avalon Harbor	Oceanside Harbor	Mission Bay
<i>Halichondria "panicea" Clade IIA</i>	Epifauna	Porifera	4		P						P
<i>Halichondria "panicea" Clade IIB</i>	Epifauna	Porifera	6		P	P					P
<i>Heteromastus filiformis complex</i>	Infauna	Annelida	2		1						10
<i>Hippopodina feegeensis</i>	Infauna	Ectoprocta	1								
<i>Hippopodina feegeensis</i>	Epifauna	Ectoprocta	1								
<i>Hydroides elegans</i>	Infauna	Annelida	1					1			
<i>Hydroides elegans</i>	Epifauna	Annelida	3					1569			296
<i>Incisocalloipe derzhavini</i>	Infauna	Arthropoda	1								
<i>Incisocalloipe derzhavini</i>	Epifauna	Arthropoda	1				133				
<i>Jassa marmorata</i>	Epifauna	Arthropoda	1								
<i>Leucothoe nagatai</i>	Infauna	Arthropoda	2					2	1		
<i>Leucothoe nagatai</i>	Epifauna	Arthropoda	8	8	201			63		282	272
<i>Limnoria tripunctata</i>	Epifauna	Arthropoda	3		284			1			
<i>Lomentaria hakodatensis</i>	Epifauna	Rhodophyta	3		P						
<i>Macoma petalum</i>	Infauna	Mollusca	1								
<i>Melita rylovae</i>	Epifauna	Arthropoda	2			128					280
<i>Microcosmus squamiger</i>	Epifauna	Chordata	9	26	62	88	12	P		32	80
<i>Microcosmus squamiger</i>	Infauna	Chordata	1			2					
<i>Molgula citrina</i>	Epifauna	Chordata	1								
<i>Molgula ficus</i>	Epifauna	Chordata	5		29			P		40	
<i>Molgula manhattensis</i>	Epifauna	Chordata	3	56	11		16				
<i>Monocorophium acherusicum</i>	Epifauna	Arthropoda	17	8	37	1050	152352	50		288	21128
<i>Monocorophium acherusicum</i>	Infauna	Arthropoda	11		1	2	9	162	76	5	67
<i>Monocorophium insidiosum</i>	Infauna	Arthropoda	4				3	269			
<i>Monocorophium insidiosum</i>	Epifauna	Arthropoda	13	163	8	43	520	832			3088
<i>Musculista senhousia</i>	Infauna	Mollusca	5			3	45				3
<i>Musculista senhousia</i>	Epifauna	Mollusca	5			1	161				76
<i>Myrianida convoluta</i>	Epifauna	Annelida	1		4						
<i>Myrianida pachycera</i>	Epifauna	Annelida	1		4						
<i>Myrianida pentadentata</i>	Epifauna	Annelida	3		40			60			

Species Name	Habitat Type	Phylum	Total Harbors Observed	Humboldt Bay	Bodega Bay	Tomaes Bay	Moss Landing Harbor	Monterey Harbor	Morro Bay	Santa Barbara Harbor	Channel Islands Harbor	Port Hueneme
<i>Neodexiospira brasiliensis</i>	Epifauna	Annelida	12			4		4			1429	
<i>Neodexiospira brasiliensis</i>	Infauna	Annelida	1									
<i>Neosiphonia harveyi</i>	Epifauna	Rhodophyta	1									
<i>Nicolea sp. A Harris</i>	Epifauna	Annelida	11	208							2	70
<i>Nicolea sp. A Harris</i>	Infauna	Annelida	2									
<i>Nippoleucon hinumensis</i>	Infauna	Arthropoda	2		15	16						
<i>Nippoleucon hinumensis</i>	Epifauna	Arthropoda	1			2						
<i>Ostrea edulis</i>	Epifauna	Mollusca	8	16		4						
<i>Ostrea edulis</i>	Infauna	Mollusca	1									
<i>Palaemon macrodactylus</i>	Epifauna	Arthropoda	1									
<i>Paracorophium lucasi</i>	Infauna	Arthropoda	4	12		2114	1		3			
<i>Paracorophium lucasi</i>	Epifauna	Arthropoda	1			141						
<i>Paradexamine sp. SD1 SCAMIT</i>	Epifauna	Arthropoda	9								11	5
<i>Paradexamine sp. SD1 SCAMIT</i>	Infauna	Arthropoda	3									
<i>Parasabella fullo</i>	Epifauna	Annelida	12					16		23	3	2
<i>Perophora japonica</i>	Epifauna	Chordata	1									
<i>Philine auriformis</i>	Infauna	Mollusca	6									4
<i>Phtisica marina</i>	Infauna	Arthropoda	3									88
<i>Pinauay crocea</i>	Epifauna	Cnidaria	2					P				
<i>Polyandrocarpa zorritensis</i>	Epifauna	Chordata	7									P
<i>Polyandrocarpa zorritensis</i>	Infauna	Chordata	1									
<i>Polydora brevipalpa</i>	Epifauna	Annelida	4					2		1		
<i>Pseudosphaeroma sp. (of Bruce and Wetzer 2008)</i>	Epifauna	Arthropoda	2	705		235						
<i>Sargassum horneri</i>	Epifauna	Heterokontophyta	3									P
<i>Sargassum muticum</i>	Epifauna	Heterokontophyta	8	P			P					P
<i>Schizoporella errata</i>	Infauna	Ectoprocta	1									
<i>Scolelepis texana</i>	Infauna	Annelida	4								2	

Species Name	Habitat Type	Phylum	Total Harbors Observed	Marina del Rey Harbor	LA/Long Beach Harbor	Huntington Harbor	Newport Bay	Dana Point Harbor	Avalon Harbor	Oceanside Harbor	Mission Bay	San Diego Bay
<i>Neodexiospira brasiliensis</i>	Epifauna	Annelida	12	335	216	426	670	26	29	132	236	1386
<i>Neodexiospira brasiliensis</i>	Infafauna	Annelida	1						4			
<i>Neosiphonia harveyi</i>	Epifauna	Rhodophyta	1								P	
<i>Nicolea sp. A Harris</i>	Epifauna	Annelida	11	9	455	52	1	162		24	4	298
<i>Nicolea sp. A Harris</i>	Infafauna	Annelida	2		1			1				
<i>Nippoleucon hinumensis</i>	Infafauna	Arthropoda	2									
<i>Nippoleucon hinumensis</i>	Epifauna	Arthropoda	1									
<i>Ostrea edulis</i>	Epifauna	Mollusca	8	P	54		44	2		4	16	208
<i>Ostrea edulis</i>	Infafauna	Mollusca	1		1							
<i>Palaemon macrodactylus</i>	Epifauna	Arthropoda	1									4
<i>Paracorophium lucasi</i>	Infafauna	Arthropoda	4									
<i>Paracorophium lucasi</i>	Epifauna	Arthropoda	1									
<i>Paradexamine sp. SD1 SCAMIT</i>	Epifauna	Arthropoda	9		101	81	237	63		1	92	457
<i>Paradexamine sp. SD1 SCAMIT</i>	Infafauna	Arthropoda	3				1	3				1
<i>Parasabella fullo</i>	Epifauna	Annelida	12	25	1	16	2	7		15	20	32
<i>Perophora japonica</i>	Epifauna	Chordata	1									P
<i>Philine auriformis</i>	Infafauna	Mollusca	6	12	10	5					2	1
<i>Phtisica marina</i>	Infafauna	Arthropoda	3		21							31
<i>Pinauay crocea</i>	Epifauna	Cnidaria	2		P							
<i>Polyandrocarpa zorritensis</i>	Epifauna	Chordata	7	P	P			P		P	P	P
<i>Polyandrocarpa zorritensis</i>	Infafauna	Chordata	1								P	
<i>Polydora brevipalpa</i>	Epifauna	Annelida	4		8					1		
<i>Pseudosphaeroma sp. (of Bruce and Wetzer 2008)</i>	Epifauna	Arthropoda	2									
<i>Sargassum horneri</i>	Epifauna	Heterokontophyta	3						P			P
<i>Sargassum muticum</i>	Epifauna	Heterokontophyta	8				P		P	P	P	P
<i>Schizoporella errata</i>	Infafauna	Ectoprocta	1								P	
<i>Scolecipis texana</i>	Infafauna	Annelida	4	4		7	2					

Species Name	Habitat Type	Phylum	Total Harbors Observed	Humboldt Bay	Bodega Bay	Tomaes Bay	Moss Landing Harbor	Monterey Harbor	Morro Bay	Santa Barbara Harbor	Channel Islands Harbor	Port Hueneme
<i>Sinelobus sp. (of Cohen 2007)</i>	Epifauna	Arthropoda	1				448					
<i>Sinocorophium alienense</i>	Epifauna	Arthropoda	1			8						
<i>Sphaeroma quoyanum</i>	Epifauna	Arthropoda	1				29					
<i>Stenothoe valida complex</i>	Epifauna	Arthropoda	9	16				12			10	
<i>Streblospio benedicti</i>	Epifauna	Annelida	2				8					
<i>Streblospio benedicti</i>	Infauna	Annelida	7		9	7	23		9			
<i>Styela clava</i>	Epifauna	Chordata	13	P	P					5	7	16
<i>Styela plicata</i>	Infauna	Chordata	1									
<i>Styela plicata</i>	Epifauna	Chordata	10							4	5	
<i>Syllis nipponica</i>	Infauna	Annelida	10							8	10	6
<i>Syllis nipponica</i>	Epifauna	Annelida	11		20					148	499	20
<i>Symplegma reptans</i>	Epifauna	Chordata	2									
<i>Theora lubrica</i>	Infauna	Mollusca	8								2	1
<i>Tubificoides brownae</i>	Infauna	Annelida	7		20	16					180	
<i>Tubificoides wasselli</i>	Infauna	Annelida	2			14						
<i>Undaria pinnatifida</i>	Epifauna	Heterokontophyta	7					P		P	P	P
<i>Venerupis philippinarum</i>	Infauna	Mollusca	3								4	
<i>Venerupis philippinarum</i>	Epifauna	Mollusca	1							1		
<i>Watersipora arcuata</i>	Epifauna	Ectoprocta	9							P		P
<i>Watersipora arcuata</i>	Infauna	Ectoprocta	3									
<i>Watersipora sp. (of Mackie et al. 2006)</i>	Epifauna	Ectoprocta	6				P		P	P	P	P
<i>Watersipora subtorquata Clade A</i>	Epifauna	Ectoprocta	11			P	P				P	P
<i>Watersipora subtorquata Clade B</i>	Epifauna	Ectoprocta	4								P	
<i>Watersipora subtorquata complex</i>	Epifauna	Ectoprocta	18	P	P	P	P	P	P	P	P	P
<i>Watersipora subtorquata complex</i>	Infauna	Ectoprocta	16	P		P	P	P	P	P	P	P
<i>Zoobotryon verticillatum</i>	Epifauna	Ectoprocta	4									
<i>Zoobotryon verticillatum</i>	Infauna	Ectoprocta	2									

Species Name	Habitat Type	Phylum	Total Harbors Observed	Marina del Rey Harbor	LA/Long Beach Harbor	Huntington Harbor	Newport Bay	Dana Point Harbor	Avalon Harbor	Oceanside Harbor	Mission Bay	San Diego Bay
<i>Sinelobus</i> sp. (of Cohen 2007)	Epifauna	Arthropoda	1									
<i>Sinocorophium alienense</i>	Epifauna	Arthropoda	1									
<i>Sphaeroma quoyanum</i>	Epifauna	Arthropoda	1									
<i>Stenothoe valida</i> complex	Epifauna	Arthropoda	9		183		17		80	8	24	165
<i>Streblospio benedicti</i>	Epifauna	Annelida	2				32					
<i>Streblospio benedicti</i>	Infauna	Annelida	7	24		43	10					
<i>Styela clava</i>	Epifauna	Chordata	13	4	72	24	16	P		53	28	29
<i>Styela plicata</i>	Infauna	Chordata	1					1				
<i>Styela plicata</i>	Epifauna	Chordata	10	28	8		17	27	P	25	32	18
<i>Syllis nipponica</i>	Infauna	Annelida	10	56		5	50	33		10	25	1
<i>Syllis nipponica</i>	Epifauna	Annelida	11	45	22	926	793	7			128	4
<i>Symplegma reptans</i>	Epifauna	Chordata	2								P	P
<i>Theora lubrica</i>	Infauna	Mollusca	8		17	5	5	1			11	18
<i>Tubificoides brownae</i>	Infauna	Annelida	7		5		2	40	9			
<i>Tubificoides wasselli</i>	Infauna	Annelida	2			1						
<i>Undaria pinnatifida</i>	Epifauna	Heterokontophyta	7		P					P		P
<i>Venerupis philippinarum</i>	Infauna	Mollusca	3				1			1		
<i>Venerupis philippinarum</i>	Epifauna	Mollusca	1									
<i>Watersipora arcuata</i>	Epifauna	Ectoprocta	9	P	P			P	P	P	P	P
<i>Watersipora arcuata</i>	Infauna	Ectoprocta	3	P	P						P	
<i>Watersipora</i> sp. (of Mackie et al. 2006)	Epifauna	Ectoprocta	6		P							
<i>Watersipora subtorquata</i> Clade A	Epifauna	Ectoprocta	11	P	P			P	P	P	P	P
<i>Watersipora subtorquata</i> Clade B	Epifauna	Ectoprocta	4		P					P	P	
<i>Watersipora subtorquata</i> complex	Epifauna	Ectoprocta	18	P	P	P	P	P	P	P	P	P
<i>Watersipora subtorquata</i> complex	Infauna	Ectoprocta	16	P	P	P	P	P		P	P	P
<i>Zoobotryon verticillatum</i>	Epifauna	Ectoprocta	4		P					P	P	P
<i>Zoobotryon verticillatum</i>	Infauna	Ectoprocta	2							P		P

Appendix F – Cryptogenic taxa observed. “Likely Introduced or Native” column is the professional taxonomist’s opinion on the species’ likely status as introduced or native.

Phylum	Species Name	Likely Introduced or Native
Annelida	<i>Amaeana occidentalis</i>	
	<i>Ampharete finmarchica</i>	
	<i>Amphicteis scaphobranchiata</i>	
	<i>Aphelochaeta monilaris</i>	
	<i>Apoprionospio pygmaea</i>	
	<i>Aricidea (Acmira) catherinae</i>	
	<i>Axiiothella rubrocincta</i>	
	<i>Boccardia proboscidea</i>	Native
	<i>Boccardia tricuspa</i>	
	<i>Boccardiella hamata</i>	Introduced
	<i>Branchiomaldane simplex</i>	
	<i>Chitinopoma groenlandica</i>	
	<i>Chrysopetalum occidentale</i>	
	<i>Circeis armoricana</i>	
	<i>Clymenura gracilis</i>	
	<i>Cossura candida</i>	
	<i>Cossura pygodactylata</i>	
	<i>Ctenodrilus serratus</i>	Introduced
	<i>Decamastus gracilis</i>	
	<i>Diopatra ornata</i>	
	<i>Dipolydora bidentata</i>	
	<i>Dipolydora giardi</i>	
	<i>Dipolydora socialis</i>	
	<i>Dodecaceria concharum</i>	
	<i>Dodecaceria fewkesi</i>	Native
	<i>Dorvillea (Schistomeringos) annulata</i>	
	<i>Drilonereis longa</i>	
	<i>Eteone aestuarina</i>	
	<i>Eteone alba</i>	
	<i>Eteone fauchaldi</i>	
	<i>Euchone limnicola</i>	
	<i>Eusyllis habei</i>	
	<i>Exogone brevi antennata</i>	Introduced
	<i>Exogone longicornis</i>	Introduced
	<i>Exogone lourei</i>	Native
	<i>Glycera americana</i>	Native
	<i>Glycera macrobranchia</i>	Native
	<i>Glycinde picta</i>	Native

Phylum	Species Name	Likely Introduced or Native
	<i>Goniada brunnea</i>	
	<i>Goniada littorea</i>	
	<i>Gyptis plurisetis</i>	
	<i>Harmothoe hirsuta</i>	
	<i>Hemipodia borealis</i>	
	<i>Hemipodia simplex</i>	
	<i>Heteropodarke heteromorpha</i>	
	<i>Lepidonotus spiculus</i>	
	<i>Levinsenia gracilis</i>	
	<i>Limnodriloides barnardi</i>	
	<i>Lumbrineris cruzensis</i>	
	<i>Lumbrineris inflata</i>	
	<i>Lumbrineris japonica</i>	Native
	<i>Lumbrineris latreilli</i>	Native
	<i>Lumbrineris limicola</i>	
	<i>Lysippe labiata</i>	
	<i>Marphysa disjuncta</i>	
	<i>Mediomastus californiensis</i>	
	<i>Megalomma pigmentum</i>	
	<i>Melinna oculata</i>	
	<i>Metasychis disparidentatus</i>	
	<i>Monticellina sibilina</i>	
	<i>Neanthes acuminata complex</i>	
	<i>Neoamphitrite robusta</i>	
	<i>Neodexiospira nr. pseudocorrugata</i>	
	<i>Nephtys ferruginea</i>	Native
	<i>Nereis grubei</i>	
	<i>Notomastus latericeus</i>	
	<i>Notomastus lineatus</i>	
	<i>Notomastus tenuis</i>	
	<i>Ophiodromus pugettensis</i>	
	<i>Paradialychone ecaudata</i>	
	<i>Paradialychone paramollis</i>	
	<i>Paranaïs litoralis</i>	
	<i>Parasabella ?torulis</i>	
	<i>Phyllodoce longipes</i>	
	<i>Pileolaria berkeleyana</i>	Native
	<i>Pileolaria cf. spinifer</i>	Native
	<i>Pista brevibranchiata</i>	
	<i>Pista wui</i>	
	<i>Platynereis bicanaliculata</i>	

Phylum	Species Name	Likely Introduced or Native
	<i>Polydora cornuta</i>	Introduced
	<i>Polydora heterochaeta</i>	
	<i>Polydora websteri</i>	
	<i>Praxillella pacifica</i>	
	<i>Prionospio heterobranchia</i>	Introduced
	<i>Proceraea okadai</i>	
	<i>Pseudopolydora kemp</i>	
	<i>Pseudopolydora paucibranchiata</i>	
	<i>Pseudopotamilla ocellata</i>	
	<i>Pygospio elegans</i>	
	<i>Salmacina tribranchiata</i>	
	<i>Salvatoria pusilla</i>	
	<i>Schizobranchia insignis</i>	
	<i>Scoelepis tridentata</i>	
	<i>Scoletoma erecta</i>	
	<i>Sphaerosyllis californiensis</i>	
	<i>Spiophanes duplex</i>	
	<i>Spiophanes norrisi</i>	Native
	<i>Sthenelais verruculosa</i>	
	<i>Syllis adamanteus</i>	
	<i>Syllis armillaris</i>	
	<i>Syllis elongata complex</i>	
	<i>Thelepus setosus</i>	
	<i>Thormora johnstoni</i>	
	<i>Tubificoides parapectinatus</i>	Introduced
	<i>Vermiliopsis infundibulum</i>	
Arthropoda	<i>Achelia echinata</i>	
	<i>Aciconula acanthosoma</i>	Native
	<i>Amathimysis trigibba</i>	Introduced
	<i>Ammonothea hilgendorfi</i>	
	<i>Ammonothea menziesi</i>	
	<i>Ammonothea spinifera</i>	
	<i>Ampithoe lacertosa</i>	
	<i>Anurida maritima</i>	
	<i>Aruga holmesi</i>	Native
	<i>Boreosignum sp. IS 1 Cadien</i>	Native
	<i>Caprella californica</i>	Native
	<i>Caprella equilibra</i>	
	<i>Caprella laeviuscula</i>	
	<i>Caprella penantis</i>	
	<i>Colomastix sp. A Cadien</i>	

Phylum	Species Name	Likely Introduced or Native
	<i>Cumella vulgaris</i>	Native
	<i>Deutella venenosa</i>	
	<i>Dyopedos arcticus</i>	Native
	<i>Endeis cf. procera</i>	
	<i>Erichthonius brasiliensis</i>	
	<i>Eudorella pacifica</i>	Native
	<i>Eusiroides</i> sp. A Cadien	Native
	<i>Goodingius subadhaerens</i>	Native
	<i>Hemioniscus balani</i>	
	<i>Ianiropsis tridens</i>	
	<i>Ischyrocerus anguipes</i>	
	<i>Ischyrocerus pelagops</i>	Native
	<i>Jassa slatteryi</i>	
	<i>Laticorophium baconi</i>	
	<i>Leptochelia dubia</i> complex	
	<i>Leucothoe alata</i>	
	<i>Macrocyprina pacifica</i>	Native
	<i>Microjassa litotes</i>	Native
	<i>Munna chromatoccephala</i>	Native
	<i>Munna fernaldi</i>	Introduced
	<i>Neotrypaea gigas</i>	Native
	<i>Paradella diana</i>	Native
	<i>Pleurocope</i> sp. IS1 Cadien	Native
	<i>Podocerus brasiliensis</i>	Native
	<i>Podocerus cristatus</i>	
	<i>Pontogeneia rostrata</i>	
	<i>Pseudotanaeis makrothrix</i>	Native
	<i>Ptilohyale plumulosa</i>	
	<i>Rocinela signata</i>	Native
	<i>Salmonius</i> sp. A Cadien	Native
	<i>Zeuxo normani</i>	
Chordata	<i>Aplidium</i> sp. A Lambert	
Cnidaria	<i>Bougainvillia inaequalis</i>	
	<i>Drillactis</i> sp. SCAMIT	Introduced
	<i>Euphysa ruthae</i>	Introduced
	<i>Gorgonacea</i> sp. A Ljubenkov	Introduced
	<i>Metridium exilis</i>	
	<i>Obelia bidentata</i>	
	<i>Obelia longissima</i>	
	<i>Plumularia setacea</i>	
	<i>Plumularia strictocarpa</i>	Introduced

Phylum	Species Name	Likely Introduced or Native
	<i>Rhizocaulus verticillatus</i>	
Echinodermata	<i>Amphipholis squamata</i>	
	<i>Ophiactis simplex</i>	Native
Ectoprocta	<i>Amathia distans</i>	
	<i>Amathia vidovici</i>	
	<i>Buskia nitens</i>	
	<i>Buskia seriata</i>	
	<i>Cellaria veleronis</i>	Native
	<i>Conopeum</i> cf. <i>reticulum</i>	
	<i>Scruparia ambigua</i>	
	<i>Synnotum aegyptiacum</i>	Introduced
Mollusca	<i>Dendronotus frondosus</i>	
	<i>Sphenia fragilis</i>	
Nemertea	<i>Amphiporus bimaculatus</i>	Native
	<i>Amphiporus imparispinosus</i>	Native
	<i>Baseodiscus delineata</i>	
	<i>Carinomella lactea</i>	Native
	<i>Cerebratulus marginatus</i>	
	<i>Emplectonema gracile</i>	
	<i>Micrura alaskensis</i>	
	<i>Tetrastemma candidum</i>	
	<i>Tetrastemma nigrifrons</i>	Native
	<i>Tubulanus polymorphus</i>	
	<i>Zygonemertes virescens</i>	
Porifera	<i>Halichondria bowerbanki</i>	
	<i>Halichondria panicea</i>	
Sipuncula	<i>Apionsoma misakianum</i>	
	<i>Phascolosoma agassizii</i>	