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 m^2 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 (*Salmoneus* 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).

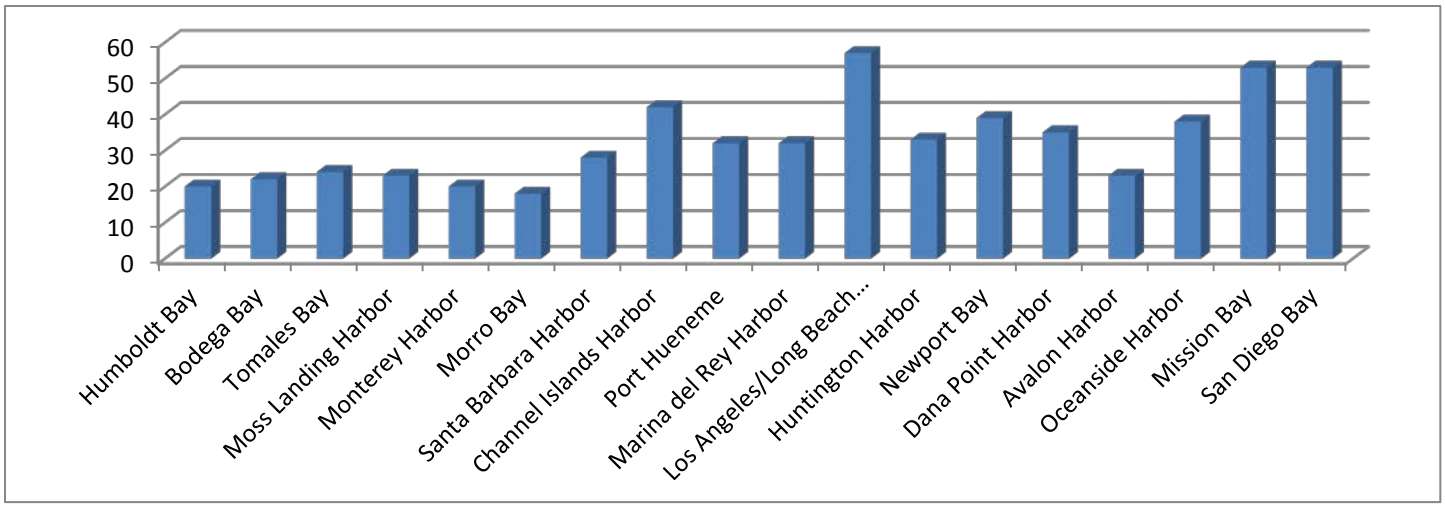

Figure 2. Number of introduced species identified from each bay and harbor surveyed.

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 *Branchiomma*, 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.

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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
Bathydrilus cf. *parkeri*	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)
Bowerbankia gracilis complex	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"
Bugula neritina complex	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).
Candelabrum	Cnidaria	Unresolved	Cryptogenic	Status updated per Ljubenkov. & Goddard pers. comm. 5/1/12 and genetic results.
Caprella scaura complex	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.
**Colomastix sp. A Cadien*	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 futher resolution is available. "
Cryptosula pallasiana complex	Ectoprocta	Unresolved Complex	Introduced	Status was Unresolved Complex for Outercoast 2007 report and updated to Introduced for Bays and Harbors 2011 report.
Deutella venenosa	Arthropoda	Native	Cryptogenic	Status updated per Cadien pers. comm. 6/6/12 . Described from Chile however origin of CA populations unknown. (Cadien pers. comm.)
Diplocirrus sp. SD1 SCAMIT	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.)
Diplosoma listerianum	Tunicata	Cryptogenic	Introduced	Status updated per Ruiz et al. 2011 and Haydar & Wolff, 2009
Eobrolgus spinosus	Arthropoda	Cryptogenic	Introduced	Status updated per Foss review 6/8/12 and Ruiz et al. 2011.
Exosphaeroma sp. IS1 Cadien	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.
Halichondria bowerbanki	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)
Hemicyclops thysanotus	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.
Hemiproto sp. A SCAMIT	Arthropoda	Cryptogenic likely Native	Native	Status updated per Cadien pers. comm. and SCAMIT voucher sheet.
Heteromastus filiformis complex	Annelida	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"
Paraconcavus pacificus	Arthropoda	Cryptogenic likely Native	Native	Status updated per Cadien pers. comm. & Galil et al. 2011
Photis sp. A SCAMIT	Arthropoda	Cryptogenic likely Native	Native	Status updated per SCAMIT Voucher sheet and Cadien pers. comm.
**Pleurocope (genus)*	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.
Salmoneus sp. A 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)
Scoletoma sp. A Harris	Annelida	Cryptogenic	Unresolved	Status updated per Harris pers. comm. Provisional species.
Scoletoma sp. B Harris	Annelida	Cryptogenic	Unresolved	Status updated per Harris pers. comm. Provisional species.
Spiophanicola spinulosus	Arthropoda	Cryptogenic likely Native	Native	Status updated per Ho, 1984 and Cadien pers. comm. and verification that known hosts are considered Native to California.
Stenothoe valida complex	Arthropoda	Unresolved Complex	Introduced	Status was Unresolved Complex for Outercoast 2007 report and updated to Introduced for Bays and Harbors 2011 report. Carlton per. 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	Tomales Bay	Moss Landing Harbor	Monterey Harbor	Morro Bay	Santa Barbara Harbor	Channel Islands Harbor	Port Hueneme
Ampelisca abdita	Infauna	Arthropoda	**1**			136						
Amphibalanus amphitrite	Epifauna	Arthropoda	**1**									
Amphibalanus improvisus	Epifauna	Arthropoda	**3**		144		12				1	
Amphibalanus improvisus	Infauna	Arthropoda	**1**				181					
Ampithoe valida	Epifauna	Arthropoda	**14**	4	16	32	34		5	1	13	
Anguinella palmata	Epifauna	Ectoprocta	**2**									
Anguinella palmata	Infauna	Ectoprocta	**1**									
Aoroides secundus	Epifauna	Arthropoda	**10**							76	395	31
Aoroides secundus	Infauna	Arthropoda	**2**								8	
Ascidia zara	Epifauna	Chordata	**10**							4	20	
Barentsia benedeni	Epifauna	Entoprocta	**1**									
Botrylloides perspicuum	Epifauna	Chordata	**2**									
Botrylloides violaceus	Epifauna	Chordata	**18**	P	P	P	P	P	P	P	P	P
Botryllus schlosseri	Epifauna	Chordata	**11**		P			P		P	P	P
Botryllus sp. A Lambert	Epifauna	Chordata	**12**		P		P	P		P	P	
Bowerbankia gracilis complex	Epifauna	Ectoprocta	**18**	P	P	P	P	P	P	P	P	P
Bowerbankia gracilis complex	Infauna	Ectoprocta	**5**					P		P		
Branchiomma sp. LH1	Epifauna	Annelida	**3**									
Bryopsis sp. 1 Miller	Epifauna	Chlorophyta	**2**						P			
Bugula neritina complex	Epifauna	Ectoprocta	**18**	P	P	P	P	P	P	P	P	P
Bugula neritina complex	Infauna	Ectoprocta	**9**				P	P	P	P		
Caprella drepanochir	Epifauna	Arthropoda	**1**	34								
Caprella drepanochir	Infauna	Arthropoda	**1**									
Caprella mutica	Infauna	Arthropoda	**2**	2						4		
Caprella mutica	Epifauna	Arthropoda	**10**	7327	777	3	2648	371	1	143	5	33
Caprella scaura complex	Epifauna	Arthropoda	**4**					92	1			
Caprella scaura complex	Infauna	Arthropoda	**1**									
Caprella simia	Infauna	Arthropoda	**6**							5		
Caprella simia	Epifauna	Arthropoda	**10**							94	6	246
Caulacanthus okamurae	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
Ampelisca abdita	Infauna	Arthropoda	**1**									
Amphibalanus amphitrite	Epifauna	Arthropoda	**1**				21					
Amphibalanus improvisus	Epifauna	Arthropoda	**3**									
Amphibalanus improvisus	Infauna	Arthropoda	**1**									
Ampithoe valida	Epifauna	Arthropoda	**14**		4	100	265		24	20	496	212
Anguinella palmata	Epifauna	Ectoprocta	**2**		P	P						
Anguinella palmata	Infauna	Ectoprocta	**1**		P							
Aoroides secundus	Epifauna	Arthropoda	**10**	700	312		2353	533		1624	356	540
Aoroides secundus	Infauna	Arthropoda	**2**		3							
Ascidia zara	Epifauna	Chordata	**10**	127	81	1	10	71		4	32	21
Barentsia benedeni	Epifauna	Entoprocta	**1**								P	
Botrylloides perspicuum	Epifauna	Chordata	**2**								P	P
Botrylloides violaceus	Epifauna	Chordata	**18**	P	P	P	P	P	P	P	P	P
Botryllus schlosseri	Epifauna	Chordata	**11**	P				P	P	P	P	P
Botryllus sp. A Lambert	Epifauna	Chordata	**12**	P	P			P	P	P	P	P
Bowerbankia gracilis complex	Epifauna	Ectoprocta	**18**	P	P	P	P	P	P	P	P	P
Bowerbankia gracilis complex	Infauna	Ectoprocta	**5**	P	P						P	
Branchiomma sp. LH1	Epifauna	Annelida	**3**			8					84	176
Bryopsis sp. 1 Miller	Epifauna	Chlorophyta	**2**		P							
Bugula neritina complex	Epifauna	Ectoprocta	**18**	P	P	P	P	P	P	P	P	P
Bugula neritina complex	Infauna	Ectoprocta	**9**	P	P	P	P		P			
Caprella drepanochir	Epifauna	Arthropoda	**1**									
Caprella drepanochir	Infauna	Arthropoda	**1**							2		
Caprella mutica	Infauna	Arthropoda	**2**									
Caprella mutica	Epifauna	Arthropoda	**10**								136	
Caprella scaura complex	Epifauna	Arthropoda	**4**				345			36		
Caprella scaura complex	Infauna	Arthropoda	**1**							1		
Caprella simia	Infauna	Arthropoda	**6**		7	7		4			5	6
Caprella simia	Epifauna	Arthropoda	**10**		3088	160	426	12	2		6240	1474
Caulacanthus okamurae	Epifauna	Rhodophyta	**1**									

Species Name	Habitat Type	Phylum	Total Harbors Observed	Humboldt Bay	Bodega Bay	Tomales Bay	Moss Landing Harbor	Monterey Harbor	Morro Bay	Santa Barbara Harbor	Channel Islands Harbor	Port Hueneme
Chalinula loosanoffi	Epifauna	Porifera	**8**		P				P		P	
Ciona intestinalis	Epifauna	Chordata	**8**		4			4			4	
Ciona savignyi	Epifauna	Chordata	**13**		P			13		95	16	84
Conopeum tenuissimum	Epifauna	Ectoprocta	**1**									
Crassostrea gigas	Epifauna	Mollusca	**2**									
Crassostrea virginica	Epifauna	Mollusca	**1**									
Crepidula plana	Infauna	Mollusca	**1**									
Cryptosula pallasiana complex	Infauna	Ectoprocta	**16**		P	P	P	P	P	P	P	P
Cryptosula pallasiana complex	Epifauna	Ectoprocta	**8**				P		P		P	
Didemnum vexillum	Infauna	Chordata	**1**				P					
Didemnum vexillum	Epifauna	Chordata	**7**	P	P	P	P		P			P
Diplocirrus sp. SD1 SCAMIT	Infauna	Annelida	**2**									
Diplosoma listerianum	Epifauna	Chordata	**9**				P	P		P		
Diplosoma listerianum	Infauna	Chordata	**1**									
Dynoides saldanai	Epifauna	Arthropoda	**1**									
Elasmopus rapax	Epifauna	Arthropoda	**6**								4	
Elasmopus rapax	Infauna	Arthropoda	**1**									
Eobrolgus spinosus	Infauna	Arthropoda	**1**									
Eochelidium sp. A SCAMIT	Epifauna	Arthropoda	**1**									
Eochelidium sp. A SCAMIT	Infauna	Arthropoda	**4**									
Eusarsiella zostericola	Infauna	Arthropoda	**1**	4								
Ficopomatus enigmaticus	Epifauna	Annelida	**2**				4					
Garveia franciscana	Epifauna	Cnidaria	**2**									
Geukensia demissa	Epifauna	Mollusca	**1**									
Grandidierella japonica	Epifauna	Arthropoda	**8**						3			
Grandidierella japonica	Infauna	Arthropoda	**11**	4		48				30	138	
Grateloupia lanceolata	Epifauna	Rhodophyta	**5**							P	P	P
Grateloupia turuturu	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
Chalinula loosanoffi	Epifauna	Porifera	**8**	P	P		P			
Ciona intestinalis	Epifauna	Chordata	**8**	472	8	16				
Ciona savignyi	Epifauna	Chordata	**13**	2	252	1	21	9		137
Conopeum tenuissimum	Epifauna	Ectoprocta	**1**						P	
Crassostrea gigas	Epifauna	Mollusca	**2**		20		1			
Crassostrea virginica	Epifauna	Mollusca	**1**			8				
Crepidula plana	Infauna	Mollusca	**1**		1					
Cryptosula pallasiana complex	Infauna	Ectoprocta	**16**	P	P	P	P	P		P
Cryptosula pallasiana complex	Epifauna	Ectoprocta	**8**	P	P	P	P			
Didemnum vexillum	Infauna	Chordata	**1**							
Didemnum vexillum	Epifauna	Chordata	**7**							
Diplocirrus sp. SD1 SCAMIT	Infauna	Annelida	**2**							
Diplosoma listerianum	Epifauna	Chordata	**9**	P	P				P	P
Diplosoma listerianum	Infauna	Chordata	**1**							
Dynoides saldanai	Epifauna	Arthropoda	**1**						10	
Elasmopus rapax	Epifauna	Arthropoda	**6**	20					P	108
Elasmopus rapax	Infauna	Arthropoda	**1**						4	
Eobrolgus spinosus	Infauna	Arthropoda	**1**					1		
Eochelidium sp. A SCAMIT	Epifauna	Arthropoda	**1**				1			
Eochelidium sp. A SCAMIT	Infauna	Arthropoda	**4**		1	44	4	1		
Eusarsiella zostericola	Infauna	Arthropoda	**1**							
Ficopomatus enigmaticus	Epifauna	Annelida	**2**				86			
Garveia franciscana	Epifauna	Cnidaria	**2**				P			
Geukensia demissa	Epifauna	Mollusca	**1**						7	
Grandidierella japonica	Epifauna	Arthropoda	**8**		156	4	48	12		72
Grandidierella japonica	Infauna	Arthropoda	**11**		11	5	121	21		2
Grateloupia lanceolata	Epifauna	Rhodophyta	**5**		P					
Grateloupia turuturu	Epifauna	Rhodophyta	**2**			P				

Species Name	Habitat Type	Phylum	Total Harbors Observed	Humboldt Bay	Bodega Bay	Tomales Bay	Moss Landing Harbor	Monterey Harbor	Morro Bay	Santa Barbara Harbor	Channel Islands Harbor	Port Hueneme
Halichondria "panicea" Clade IIA	Epifauna	Porifera	**4**		P							P
Halichondria "panicea" Clade IIB	Epifauna	Porifera	**6**			P	P				P	
Heteromastus filiformis complex	Infauna	Annelida	**2**									
Hippopodina feegeensis	Infauna	Ectoprocta	**1**									
Hippopodina feegeensis	Epifauna	Ectoprocta	**1**									
Hydroides elegans	Infauna	Annelida	**1**									
Hydroides elegans	Epifauna	Annelida	**3**							10		
Incisocalliope derzhavini	Infauna	Arthropoda	**1**									
Incisocalliope derzhavini	Epifauna	Arthropoda	**1**									
Jassa marmorata	Epifauna	Arthropoda	**1**					1				
Leucothoe nagatai	Infauna	Arthropoda	**2**									
Leucothoe nagatai	Epifauna	Arthropoda	**8**							35		16
Limnoria tripunctata	Epifauna	Arthropoda	**3**								1	
Lomentaria hakodatensis	Epifauna	Rhodophyta	**3**								P	
Macoma petalum	Infauna	Mollusca	**1**						5			
Melita rylovae	Epifauna	Arthropoda	**2**									
Microcosmus squamiger	Epifauna	Chordata	**9**								15	
Microcosmus squamiger	Infauna	Chordata	**1**									
Molgula citrina	Epifauna	Chordata	**1**	1364								
Molgula ficus	Epifauna	Chordata	**5**								16	
Molgula manhattensis	Epifauna	Chordata	**3**									
Monocorophium acherusicum	Epifauna	Arthropoda	**17**	8173	49	4525	3059	13	2088	15	16	32
Monocorophium acherusicum	Infauna	Arthropoda	**11**			8	9		4		1	
Monocorophium insidiosum	Infauna	Arthropoda	**4**				1		1			
Monocorophium insidiosum	Epifauna	Arthropoda	**13**	120	310	3285	5920		285		54	1
Musculista senhousia	Infauna	Mollusca	**5**			1						
Musculista senhousia	Epifauna	Mollusca	**5**			12						
Myrianida convoluta	Epifauna	Annelida	**1**									
Myrianida pachycera	Epifauna	Annelida	**1**									
Myrianida pentadentata	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
Halichondria "panicea" Clade IIA	Epifauna	Porifera	**4**		P						P
Halichondria "panicea" Clade IIB	Epifauna	Porifera	**6**		P	P					P
Heteromastus filiformis complex	Infauna	Annelida	**2**		1						10
Hippopodina feegeensis	Infauna	Ectoprocta	**1**								
Hippopodina feegeensis	Epifauna	Ectoprocta	**1**								
Hydroides elegans	Infauna	Annelida	**1**					1			
Hydroides elegans	Epifauna	Annelida	**3**					1569			296
Incisocalliope derzhavini	Infauna	Arthropoda	**1**								
Incisocalliope derzhavini	Epifauna	Arthropoda	**1**				133				
Jassa marmorata	Epifauna	Arthropoda	**1**								
Leucothoe nagatai	Infauna	Arthropoda	**2**					2	1		
Leucothoe nagatai	Epifauna	Arthropoda	**8**	8	201			63		282	272
Limnoria tripunctata	Epifauna	Arthropoda	**3**		284			1			
Lomentaria hakodatensis	Epifauna	Rhodophyta	**3**		P						
Macoma petalum	Infauna	Mollusca	**1**								
Melita rylovae	Epifauna	Arthropoda	**2**			128					280
Microcosmus squamiger	Epifauna	Chordata	**9**	26	62	88	12	P		32	80
Microcosmus squamiger	Infauna	Chordata	**1**			2					
Molgula citrina	Epifauna	Chordata	**1**								
Molgula ficus	Epifauna	Chordata	**5**		29			P		40	
Molgula manhattensis	Epifauna	Chordata	**3**	56	11		16				
Monocorophium acherusicum	Epifauna	Arthropoda	**17**	8	37	1050	152352	50		288	21128
Monocorophium acherusicum	Infauna	Arthropoda	**11**		1	2	9	162	76	5	67
Monocorophium insidiosum	Infauna	Arthropoda	**4**				3	269			
Monocorophium insidiosum	Epifauna	Arthropoda	**13**	163	8	43	520	832			3088
Musculista senhousia	Infauna	Mollusca	**5**			3	45				3
Musculista senhousia	Epifauna	Mollusca	**5**			1	161				76
Myrianida convoluta	Epifauna	Annelida	**1**		4						
Myrianida pachycera	Epifauna	Annelida	**1**		4						
Myrianida pentadentata	Epifauna	Annelida	**3**		40			60			

Species Name	Habitat Type	Phylum	Total Harbors Observed	Humboldt Bay	Bodega Bay	Tomales Bay	Moss Landing Harbor	Monterey Harbor	Morro Bay	Santa Barbara Harbor	Channel Islands Harbor	Port Hueneme
Neodexiospira brasiliensis	Epifauna	Annelida	**12**			4		4			1429	
Neodexiospira brasiliensis	Infauna	Annelida	**1**									
Neosiphonia harveyi	Epifauna	Rhodophyta	**1**									
Nicolea sp. A Harris	Epifauna	Annelida	**11**	208							2	70
Nicolea sp. A Harris	Infauna	Annelida	**2**									
Nippoleucon hinumensis	Infauna	Arthropoda	**2**		15	16						
Nippoleucon hinumensis	Epifauna	Arthropoda	**1**			2						
Ostrea edulis	Epifauna	Mollusca	**8**	16		4						
Ostrea edulis	Infauna	Mollusca	**1**									
Palaemon macrodactylus	Epifauna	Arthropoda	**1**									
Paracorophium lucasi	Infauna	Arthropoda	**4**	12		2114	1		3			
Paracorophium lucasi	Epifauna	Arthropoda	**1**			141						
Paradexamine sp. SD1 SCAMIT	Epifauna	Arthropoda	**9**								11	5
Paradexamine sp. SD1 SCAMIT	Infauna	Arthropoda	**3**									
Parasabella fullo	Epifauna	Annelida	**12**					16		23	3	2
Perophora japonica	Epifauna	Chordata	**1**									
Philine auriformis	Infauna	Mollusca	**6**									4
Phtisica marina	Infauna	Arthropoda	**3**									88
Pinauay crocea	Epifauna	Cnidaria	**2**					P				
Polyandrocarpa zorritensis	Epifauna	Chordata	**7**									P
Polyandrocarpa zorritensis	Infauna	Chordata	**1**									
Polydora brevipalpa	Epifauna	Annelida	**4**					2		1		
Pseudosphaeroma sp. (of Bruce and Wetzer 2008)	Epifauna	Arthropoda	**2**	705		235						
Sargassum horneri	Epifauna	Heterokontophyta	**3**									P
Sargassum muticum	Epifauna	Heterokontophyta	**8**	P			P					P
Schizoporella errata	Infauna	Ectoprocta	**1**									
Scolelepis texana	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
Neodexiospira brasiliensis	Epifauna	Annelida	**12**	335	216	426	670	26	29	132	236	1386
Neodexiospira brasiliensis	Infauna	Annelida	**1**						4			
Neosiphonia harveyi	Epifauna	Rhodophyta	**1**								P	
Nicolea sp. A Harris	Epifauna	Annelida	**11**	9	455	52	1	162		24	4	298
Nicolea sp. A Harris	Infauna	Annelida	**2**		1			1				
Nippoleucon hinumensis	Infauna	Arthropoda	**2**									
Nippoleucon hinumensis	Epifauna	Arthropoda	**1**									
Ostrea edulis	Epifauna	Mollusca	**8**	P	54		44	2		4	16	208
Ostrea edulis	Infauna	Mollusca	**1**		1							
Palaemon macrodactylus	Epifauna	Arthropoda	**1**									4
Paracorophium lucasi	Infauna	Arthropoda	**4**									
Paracorophium lucasi	Epifauna	Arthropoda	**1**									
Paradexamine sp. SD1 SCAMIT	Epifauna	Arthropoda	**9**		101	81	237	63		1	92	457
Paradexamine sp. SD1 SCAMIT	Infauna	Arthropoda	**3**				1	3				1
Parasabella fullo	Epifauna	Annelida	**12**	25	1	16	2	7		15	20	32
Perophora japonica	Epifauna	Chordata	**1**									P
Philine auriformis	Infauna	Mollusca	**6**	12	10	5					2	1
Phtisica marina	Infauna	Arthropoda	**3**		21							31
Pinauay crocea	Epifauna	Cnidaria	**2**		P							
Polyandrocarpa zorritensis	Epifauna	Chordata	**7**	P	P			P		P	P	P
Polyandrocarpa zorritensis	Infauna	Chordata	**1**								P	
Polydora brevipalpa	Epifauna	Annelida	**4**		8					1		
Pseudosphaeroma sp. (of Bruce and Wetzer 2008)	Epifauna	Arthropoda	**2**									
Sargassum horneri	Epifauna	Heterokontophyta	**3**						P			P
Sargassum muticum	Epifauna	Heterokontophyta	**8**				P		P	P	P	P
Schizoporella errata	Infauna	Ectoprocta	**1**								P	
Scolelepis texana	Infauna	Annelida	**4**	4		7	2					

Species Name	Habitat Type	Phylum	Total Harbors Observed	Humboldt Bay	Bodega Bay	Tomales Bay	Moss Landing Harbor	Monterey Harbor	Morro Bay	Santa Barbara Harbor	Channel Islands Harbor	Port Hueneme
Sinelobus sp. (of Cohen 2007)	Epifauna	Arthropoda	**1**				448					
Sinocorophium alienense	Epifauna	Arthropoda	**1**			8						
Sphaeroma quoyanum	Epifauna	Arthropoda	**1**				29					
Stenothoe valida complex	Epifauna	Arthropoda	**9**	16				12			10	
Streblospio benedicti	Epifauna	Annelida	**2**				8					
Streblospio benedicti	Infauna	Annelida	**7**		9	7	23		9			
Styela clava	Epifauna	Chordata	**13**	P	P					5	7	16
Styela plicata	Infauna	Chordata	**1**									
Styela plicata	Epifauna	Chordata	**10**							4	5	
Syllis nipponica	Infauna	Annelida	**10**							8	10	6
Syllis nipponica	Epifauna	Annelida	**11**		20					148	499	20
Symplegma reptans	Epifauna	Chordata	**2**									
Theora lubrica	Infauna	Mollusca	**8**								2	1
Tubificoides brownae	Infauna	Annelida	**7**		20	16					180	
Tubificoides wasselli	Infauna	Annelida	**2**			14						
Undaria pinnatifida	Epifauna	Heterokontophyta	**7**					P		P	P	P
Venerupis philippinarum	Infauna	Mollusca	**3**								4	
Venerupis philippinarum	Epifauna	Mollusca	**1**							1		
Watersipora arcuata	Epifauna	Ectoprocta	**9**							P		P
Watersipora arcuata	Infauna	Ectoprocta	**3**									
Watersipora sp. (of Mackie et al. 2006)	Epifauna	Ectoprocta	**6**				P		P	P	P	P
Watersipora subtorquata Clade A	Epifauna	Ectoprocta	**11**			P	P				P	P
Watersipora subtorquata Clade B	Epifauna	Ectoprocta	**4**								P	
Watersipora subtorquata complex	Epifauna	Ectoprocta	**18**	P	P	P	P	P	P	P	P	P
Watersipora subtorquata complex	Infauna	Ectoprocta	**16**	P		P	P	P	P	P	P	P
Zoobotryon verticillatum	Epifauna	Ectoprocta	**4**									
Zoobotryon verticillatum	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
Sinelobus sp. (of Cohen 2007)	Epifauna	Arthropoda	**1**									
Sinocorophium alienense	Epifauna	Arthropoda	**1**									
Sphaeroma quoyanum	Epifauna	Arthropoda	**1**									
Stenothoe valida complex	Epifauna	Arthropoda	**9**		183		17		80	8	24	165
Streblospio benedicti	Epifauna	Annelida	**2**				32					
Streblospio benedicti	Infauna	Annelida	**7**	24		43	10					
Styela clava	Epifauna	Chordata	**13**	4	72	24	16	P		53	28	29
Styela plicata	Infauna	Chordata	**1**					1				
Styela plicata	Epifauna	Chordata	**10**	28	8		17	27	P	25	32	18
Syllis nipponica	Infauna	Annelida	**10**	56		5	50	33		10	25	1
Syllis nipponica	Epifauna	Annelida	**11**	45	22	926	793	7			128	4
Symplegma reptans	Epifauna	Chordata	**2**								P	P
Theora lubrica	Infauna	Mollusca	**8**		17	5	5	1			11	18
Tubificoides brownae	Infauna	Annelida	**7**		5		2	40	9			
Tubificoides wasselli	Infauna	Annelida	**2**			1						
Undaria pinnatifida	Epifauna	Heterokontophyta	**7**		P					P		P
Venerupis philippinarum	Infauna	Mollusca	**3**				1			1		
Venerupis philippinarum	Epifauna	Mollusca	**1**									
Watersipora arcuata	Epifauna	Ectoprocta	**9**	P	P			P	P	P	P	P
Watersipora arcuata	Infauna	Ectoprocta	**3**	P	P						P	
Watersipora sp. (of Mackie et al. 2006)	Epifauna	Ectoprocta	**6**		P							
Watersipora subtorquata Clade A	Epifauna	Ectoprocta	**11**	P	P			P	P	P	P	P
Watersipora subtorquata Clade B	Epifauna	Ectoprocta	**4**		P					P	P	
Watersipora subtorquata complex	Epifauna	Ectoprocta	**18**	P	P	P	P	P	P	P	P	P
Watersipora subtorquata complex	Infauna	Ectoprocta	**16**	P	P	P	P	P		P	P	P
Zoobotryon verticillatum	Epifauna	Ectoprocta	**4**		P					P	P	P
Zoobotryon verticillatum	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	*Amaeana occidentalis*	
	Ampharete finmarchica	
	Amphicteis scaphobranchiata	
	Aphelochaeta monilaris	
	Apoprionospio pygmaea	
	Aricidea (Acmira) catherinae	
	Axiothella rubrocincta	
	Boccardia proboscidea	Native
	Boccardia tricuspa	
	Boccardiella hamata	Introduced
	Branchiomaldane simplex	
	Chitinopoma groenlandica	
	Chrysopetalum occidentale	
	Circeis armoricana	
	Clymenura gracilis	
	Cossura candida	
	Cossura pygodactylata	
	Ctenodrilus serratus	Introduced
	Decamastus gracilis	
	Diopatra ornata	
	Dipolydora bidentata	
	Dipolydora giardi	
	Dipolydora socialis	
	Dodecaceria concharum	
	Dodecaceria fewkesi	Native
	Dorvillea (Schistomeringos) annulata	
	Drilonereis longa	
	Eteone aestuarina	
	Eteone alba	
	Eteone fauchaldi	
	Euchone limnicola	
	Eusyllis habei	
	Exogone breviantennata	Introduced
	Exogone longicornis	Introduced
	Exogone lourei	Native
	Glycera americana	Native
	Glycera macrobranchia	Native
	Glycinde picta	Native

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

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

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

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