

**APPENDIX F**

**MARINE BIOLOGICAL RESOURCES REPORTS AND  
FOCUSED SURVEY REPORTS FOR EELGRASS AND  
INVASIVE ALGAE**

**MARINE BIOLOGICAL RESOURCES TECHNICAL APPENDIX  
FOR THE  
DANA POINT HARBOR MARINA IMPROVEMENT PROJECT  
SUBSEQUENT ENVIRONMENTAL IMPACT REPORT  
DANA POINT, ORANGE COUNTY, CALIFORNIA**



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## **1.0 INTRODUCTION**

### **1.1 PROJECT PURPOSE**

The County of Orange proposes to make extensive waterside improvements to Dana Point Harbor as part of Dana Point Harbor Revitalization Plan. Consequently, Coastal Resources Management, Inc. (CRM) was retained by the firm of LSA Associates, Inc. to prepare a marine biological resources impact assessment for Waterside Improvement Draft Subsequent EIR. CRM conducted habitat and species surveys within Dana Point Harbor in February/March, October/November 2007, and June (Coastal Resources Management, Inc. 2010). The purposes of the investigation were to (1) determine if eelgrass (*Zostera marina*) or invasive algae (*Caulerpa taxifolia* or *Undaria pinnatifida*) were present in regions of the Harbor where proposed marina improvements are planned, (2) collect data on the presence/absence of other sensitive and non-sensitive species present in the Harbor on soft-bottom, piling, rip-rap and reef habitats that might be affected by marina improvements and (3) assess the potential environmental effects of construction and long-term operation of the marina on sensitive marine resources.

The results of the Coastal Resources Management, Inc. field surveys are contained in a separate project report (Coastal Resources Management, Inc., 2010) and integrated into this impact evaluation report. This document assesses the potential environmental effects of short-term construction and the long-term operation of Dana Point waterside development activity, including a federally-mandated Essential Fish Habitat (EFH) analysis on marine habitats and marine life within Dana Point Harbor.

### **1.2 PROJECT LOCATION**

Dana Point Harbor (“the Harbor”), constructed between 1966 and 1970, is located in the City of Dana Point, Orange County, California about 40 miles south of Long Beach/Los Angeles Harbors (Figure 1). It lies in the lee (protected side) of Dana Point Headlands within Capistrano Bay and is also protected by a 1.7 mile long and 14 to 18 feet (ft) high breakwater. Harbor channel widths vary from 350 feet in the anchorage areas to 600 feet at the Harbor entrance (Wiegel, 1993) The Harbor is subject to in-filling of sands that migrate through the quarry stone-breakwater requiring periodic maintenance dredging to maintain safe water depths.

The marina within Dana Point Harbor is divided into two basins, the East Basin and West Basin (Figure 2). Each basin operates as a separate marina, with a total capacity of about 2,500 shallow-draft vessels. The boat launch ramp at the northeast corner of the Harbor is newly upgraded as of July 2007. Other facilities within the Harbor include the Dana Point Marine Institute, a dry boat storage hoist, fishing pier, shipyard, marine fuel dock, three yacht clubs, and a commercial sports fishing operation. Swimming is allowed at the west end of the Harbor, at Baby Beach. (<http://www.ocparks.com/danapointharbor/>).





**FIGURE 2.**  
**DANA POINT HARBOR STUDY LOCATIONS**  
 COASTAL RESOURCES MANAGEMENT, INC.

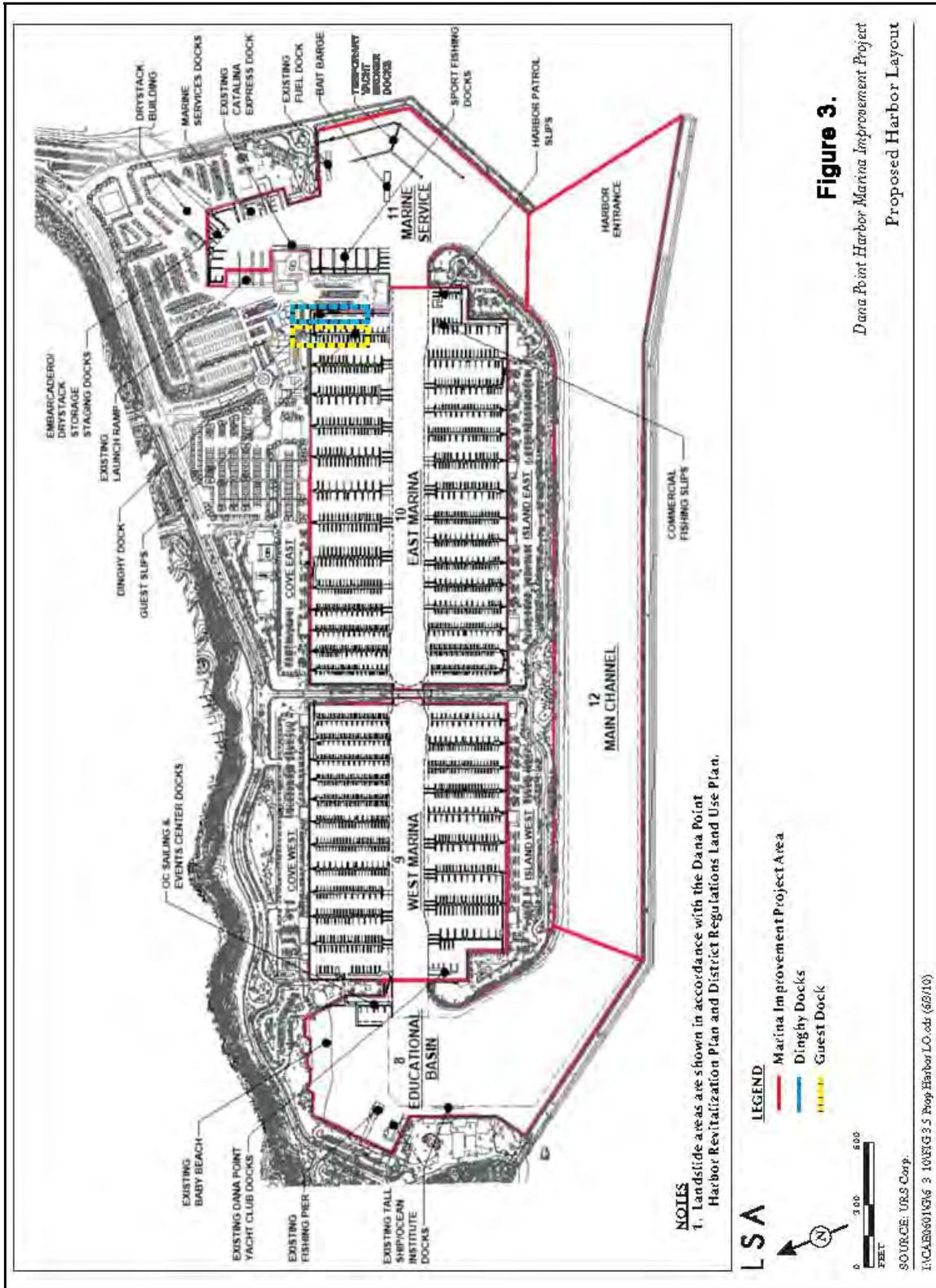
### 1.3 PROPOSED PROJECT COMPONENTS

Table 1 and Figure 3 describe and illustrate the proposed marina improvements, respectively. Waterside upgrades include (1) the renovation and re-orientation of the East and West marina basin dock systems by replacing old and deteriorating docks, slips and gangways with new facilities; (2) dock redesign and improvements for the Youth Sailing Center, the Harbor Patrol facilities, Commercial Fishing Dock, the Sport Fishing dock, the Dry Stack facility, and the Shipyard docks; (3) the construction of for vessels that will be displaced during marina reconstruction.; (4) the addition of handicap access at locations where it currently is not available; (5) upgrading vessel pump out facilities; and (6) upgrading dock utilities.

The number of boat slips within the Harbor will decrease from 2,409 to 2,293 (a loss of 116 slips) although the average slip length will increase from 29.85 feet (ft) to a length not to exceed 32 ft. A total of 1,306 existing piles will be removed and 969 new piles will be emplaced. The total dock surface area will decrease from 492,530 square feet (sq ft) to 459,540 sq ft (a net decrease of 32,990 sq ft) One-thousand three hundred and six, 14-inch diameter pilings with a surface area of 1,396 sq ft will be replaced by 969 piles (851, 16-inch diameter piles and 118, 18-inch diameter piles) with a surface area of 1,395 sq ft.

**Table 1. Proposed Project Components. Source: LSA Associates, Inc.**

<b>Element</b>	<b>Existing Conditions</b>	<b>Proposed Project Improvements</b>
Floating Docks(East/West Marinas and Satellite Areas)	Floating docks supported by 1,306 concrete filled steel pipe piles  2,409 boat slips  Average slip length of 29.85 feet (ft). Majority of West Marina slips oriented west-east. East Marina slips oriented north-south  Approximately 492,530 square feet (sf) of area covered by floating docks  1,306, 14-inch diameter piles (1,396 sq ft)	Remove existing piles and replace with 969 piles  2,293 boat slips (loss of 116 slips)  Average slip length not to exceed 32 ft West Marina slips to be reoriented to a north-south direction. East Marina slips to remain oriented north-south  Approximately 459,540 sf <sup>1</sup> of area covered by floating docks  851, 14-inch diameter and 118, 18-inch diameter piles (1,395 sq ft)
Access	52 existing gangways	59 gangways plus 9 ADA gangways, for a total of 68 gangways
Boat Services	3 sewage pump outs	4 upgraded sewage pump outs
Utilities	electrical service, water service, telephone and cable service	Upgraded electrical service, water service, telephone and cable service
Embarcadero/Dry Stack Storage Staging Docks	Dock Boxes 766 linear feet (lf)	New Dock Boxes 1,300 lf
Marine Services Docks	1,190 lf	896 lf
Sport Fishing Docks	1,350 lf	1,350 lf
Guest Slips	42 existing slips	46 proposed slips
Dinghy Dock	No existing dinghy dock	374 lf
Harbor Patrol Slips	8 existing slips plus 2 emergency side-ties	8 proposed slips plus 2 emergency side-ties
Commercial Fishing Slips	15 existing slips plus 1 end-tie for California Department of Fish and Game boat	15 proposed slips plus 1 end-tie for California Department of Fish and Game boat
OC Sailing and Events Center Docks	890 lf	893 lf
Temporary/Yacht Broker Docks	No existing temporary/yacht broker docks	1 dock located along the breakwater next to Doheny State Beach – approx. 2,590 lf



## 2.0 EXISTING CONDITIONS

The existing marine biological setting within Dana Point Harbor is based upon marine biological field surveys conducted by Coastal Resources Management [CRM], Inc. (2010) between February and October 2007; and June 2010; bird surveys conducted by Keane Biological Consulting (2007) conducted in March 2007, previous studies conducted within the Harbor by RBF and MBC Applied Environmental Sciences, 2003 and MBC Applied Environmental Sciences (2008 and 2009) for the Dana Point Harbor Revitalization EIR, and a literature review of other pertinent data sources.

The CRM surveys were conducted throughout Dana Point Harbor in February/March, 2007, Oct/Nov 2007, and June 2010 (Coastal Resources Management, Inc. 2010) in areas proposed for waterside improvements (Table 1 and Figure 4). Studies were conducted using diver-biologists and Remote Underwater Video (RUV) methods. Other observations were made of bulkhead habitats during low tides. Habitats that were surveyed included subtidal soft benthos (silt and sand sub-habitats), the hardscape of dock pilings, sloped cement bulkheads, small-to-large protective rip rap at the base of bulkheads, breakwater quarry stone, and low-to-moderate relief natural rocky reefs. A total of 329 variable-length underwater transects (15 meters [m] to 258 m in length) were swam using SCUBA. Fourteen dock piles in the Cove East and the Island East marina basins were also surveyed to determine the types and relative abundances of marine organisms that might be affected by marina construction. Underwater Remote Video surveys were also conducted due to the large area of harbor seafloor to be surveyed. Track lines covered 7,899 meters of harbor seafloor (4.91 miles).

**Table 2. Areas Surveyed in Dana Point Harbor\***

Location	Bottom Habitat Survey Area (Acres)	Area of Potential Biological Impact (Acres)	% Total Area Covered*	Depth Range (ft, MLLW)
Baby Beach	1.40	0.75	186.7	-3 to -10
Bridge Abutment Slopes	0.06	0.08	75.3	+3 to -10
Commercial Fishing Docks	0.12	0.58	20.3	+3 to -15.9
Dry Stack/Shipyard Basins	0.30	0.36	83.5	-12.4
Harbor Patrol Basins	0.28	0.13	221.9	+3 to -15.9
Marina Basins	2.98	21.43	13.9	+3 to -11
Sport fishing Dock Basin (inner ½ to bulkhead) and immediately seaward of docks	0.35	0.36	97.6	+3 to -15.4
Temporary Dock Area, East Channel	0.88	2.04	43.0	+3 to -12
Youth Sailing Center	0.12	0.10	110.7	+3 to -12
<b>Total</b>	<b><u>6.28</u></b>	<b><u>25.28</u></b>	<b><u>24.7</u></b>	<b><u>+3 to -15.9</u></b>
<b>Other Regions Surveyed</b>				
West Jetty Channel Slope**	0.42	none**	**	-2 to -12
Main Channel**	1.9	none**	**	+3 to -20.4
* Includes both biologist/diver and remote video survey coverage				
** Not in project area				



The surveys covered 6.28 acres of harbor bottom habitat (Table 1 and Figure 4). Overall, the bottom area surveyed by both diving biologists and remote video averaged 24.7% of the total bottom habitat within the project survey limits, ranging from 13.9% in the East and West Marina basins to over 100% coverage in the at the Youth Sailing Center and the Harbor Patrol basin. Baby Beach areal cover (by divers and video in 2007 and 2010) encompassed 187% of the survey area, and reflected a survey effort concentrated in a region where there was a probability of locating eelgrass since a very small patch of eelgrass (three

turions) was located there in April 2005 (Chambers Group, Inc., 2005). The eelgrass survey area in 2010 was concentrated along the eastern one-third of Baby Beach from depths of -3 to -12 ft MLLW beginning immediately west of the existing Sailing Center Dock and all of the basins at the Embarcadero and Dry Stack/Staging Area north of the launch ramp (Figure 4).

## 2.1 PHYSICAL ENVIRONMENT

### 2.1.1 Water Depths

Dana Point Harbor depths vary between approximately 21 feet (ft) Mean Lower Low Water (MLLW) in the Entrance Channel and Main Channel to intertidal depths in the Turning Basin where Baby Beach provides sandy intertidal habitat (Coastal Resources Management, Inc. 2010). Depths within the marina basins are generally between -8 and -12 ft MLLW.

### 2.1.2 Substrate Types

**Unconsolidated sediments.** Surficial sediments within all the marina and harbor basins were fine sands to extremely fine silts although underlying sediments tend to be sandier (Geotechnical Inc., 2006). Unconsolidated sediments in the Turning Basin and the East Channel near the Youth Sailing Center were sandy silts but visually, increased in sand percentages closer to the Baby Beach shoreline. Sediments were coarsest near the Youth Sailing Center; and on the south side of the bait barge along the base of the East Breakwater (Temporary Dock area). In each of these areas, sediment sized decreased with depth. Significant amounts of trash and debris (cans, bottles, plastic bags, fishing lines, etc.) was also found on the bottom all along the base of the East Breakwater.

**Hard substrate.** Intertidal and subtidal rock quarry stone and smaller rip rap is present in many areas of Dana Point Harbor and serves as protection for bulkheads and shorelines. The breakwaters and the south side of the East and West Island marinas consist of larger quarry stone, whereas the rip rap that protects the bulkheads of the marinas in the vicinity of the Youth Sailing Center and the Sport Fishing Dock consist of small-to moderate-sized rip rap. Sloped, cement quay walls occur around the perimeter of the marina basins and at the bridge abutments. These cement slopes were covered by a light to moderate layer of fine sediments.

Pilings and docks are attachment surfaces for plants and invertebrates. This community of organisms is commonly referred to as the “biofouling community”. These hard surfaces extend between the highest high tide line and the Harbor bottom depths, supporting both an intertidal and subtidal complex of organisms. This habitat type is common throughout the Harbor.

Exposed natural reef is present within many areas of the Harbor, a remnant of the extensive reef habitat that was present prior to the construction of the Harbor. Isolated rock habitat in the marina basin that was observed during the subtidal surveys included three, single rock outcrops in the Island West Basin and one moderate relief (1 meter high) rock outcrop in Cove West Basin. These outcrops were at depths between -8 and -10 ft MLLW. Other outcrops are likely present but not observed during the surveys. Outside of the marina basins, scattered low to medium relief (<1 to 2 meter high) reef outcrops and isolated boulders were located in the Turning Basin west of the Youth Sailing Center docks at depths between -3 and -8 ft MLLW; in the Main Channel and East Channel at depths between -8 and -20 ft MLLW; in the East Channel seaward of the Sport Fishing Docks; and in the Anchorage Area at the north end of the proposed temporary dock at depths of -12 ft MLLW.

### 2.1.3 Underwater Visibility and Water Temperature Conditions During The Surveys

Underwater visibility in the Harbor is highly variable, depending on factors such as plankton blooms, stormwater runoff into the Harbor, wind-generated waves and currents, tidal currents, vessel prop wash, and proximity to the entrance to the Harbor. During surveys conducted by CRM in Feb/March 07, underwater visibility ranged between 1 and 3 ft within the marina basins and 1 to 4 ft in the vicinity of Baby Beach and the Youth Sailing Center (Coastal Resources Management, In. 2010). During the October/November 2007 survey, underwater visibility was still limited within the marina and harbor basins, but was substantially better outside the marina basins where visibility approached 8 to 10 ft in the vicinity of the proposed in the West Channel and on the south side of the bait barge in the vicinity of the proposed temporary dock. In June 2010, underwater visibility was approximately 2-3 feet near Baby Beach, 5-10 ft in the West Main Channel, and 2 feet in the East Channel near the bait barge and the dry stack storage area.

Comparatively, underwater visibility averaged about 3 ft near the boat launch ramp in August 2006 (Chambers Group, Inc 2006) and 8 feet at depths of 0.0 to -10 ft MLLW at Baby Beach in April 2005 (Chambers Group, Inc., 2005).

## 2.2 MARINE BIOLOGICAL ENVIRONMENT

Dana Point Harbor intertidal habitats extend from the extreme low to extreme high water mark (-1.2 to +7.0 ft MLLW). The types of habitats in this zone include sandy intertidal, quarry stone (rip rap), dock piles, and sloping cement bulkheads. Portions of, or all of these shoreline types are exposed to both air and water during the tidal cycle. Habitats below the extreme low tide zone are “subtidal” and are never exposed. Project area subtidal habitats include unconsolidated, soft-bottom (sands and muds) which make up the majority of the Harbor’s benthic (bottom) environment, portions of docks, pilings, bulkheads, isolated reef outcrops, and the water column. These habitats support marine plants, invertebrates, fishes, and birds.

### 2.2.1 Intertidal Sandy Beach

Sand beach habitat is found in the Turning Basin at Baby Beach. This sand beach is a low-energy environment that is affected primarily by wind waves and tidal action within the Harbor. It is in the lee of Dana Headlands and is exposed only to significant winds during easterly and southerly wind events. The sediments consist of a combination of fine-grain sediments mixed with coarse grained sand, imported to form and sustain the beach (Applied Ecological Research [AER], 2000). The high intertidal portion of the County-maintained public beach supports few if any marine organisms because of infrequent tidal exposure and periodic cleaning and grooming. This higher elevation however, provides resting habitat for seabirds (gulls and pelicans). The middle and low intertidal zones provide consistent tidal inundation and therefore support burrowing species of invertebrates (primarily clams, crustaceans, and polychaete worms). These organisms attract shorebirds to the beach that utilize the invertebrates as their food source (Quammen 1980). Core samples analyzed by AER included polychaete worms and snails; the algae *Enteromorpha* was found below the tide line along the beach.

### 2.2.2 Subtidal Environments

The benthic invertebrate community in the Harbor is made up of a complex of species that live on the sediment surface (epibenthic organisms) or in the soft-bottom sediments (infauna). Bottom-dwelling fish that either live in burrows (i.e., gobies), as well as species that are dependent on the bottom sediments for foraging (i.e. sting rays, sand bass, and halibut) are important members of the bottom community within bays and harbors.

**Subtidal Soft-bottom Habitat.** Invertebrates in Dana Point Harbor are found in a range of sediment regimes between fine silts to coarse sands/gravels, and are transitional in their affinities to offshore benthic communities and coastal embayments. While the majority of benthic invertebrates obtain their nutrition by consuming organic detritus, some graze on diatoms and algae or actively prey on other invertebrates. In turn, bottom feeding fishes and resident soft-bottom-dwelling fishes (gobies, juvenile flatfish, and sand bass) rely upon these benthic organisms as food sources (USACOE, 2000; MBC and SCCWRP, 1980).

Common types of benthic infaunal organisms that are associated with bay and harbor sediments include flat worms, amphipod crustaceans, crabs, snails, clams, polychaete worms (capitellids, spionids, cirratulids, and ophelliids), oligochaete worms and brittle stars. Sediment physical and chemical characteristics, water column properties, tidal circulation, proximity to storm water outfalls and other contaminant sources, and harbor configuration all play a role in the types of benthic organisms present in the Harbor as well as where these organisms live.

Benthic surveys in Dana Point Harbor indicate that the infaunal community is dominated by small polychaete annelid and arthropod species, with fewer numbers of clams and nemerteans (Robert Bein, William Frost Associates and MBC Applied Environmental Sciences, 2003). These studies also suggest that the infaunal community makeup and composition is similar to Newport Harbor (State Water Resources Control Board, 1998; Coastal Resources Management, 2003), Alamitos Bay (Coastal Resources Management, 1998), and Marina del Rey Harbor (ABC Laboratories, Inc., 2005).

During benthic surveys conducted in 1994 and 1998 by the State Water Resources Control Board, infaunal species composition and dominance was dominated by a similar group of species that included amphipods (*Grandidierella japonica* and *Corophium* sp.) and annelid worms (*Pseudopolydora paucibranchiata* and *Euchone limnicola*). High abundances at some stations of species tolerant of variable salinities, such as *P. paucibranchiata* and *G. japonica*, suggest that freshwater input from urban runoff may be considerable in some areas of the Harbor. These species are also dominant species within Newport Bay (State Water Resources Control Board 1998; Coastal Resources Management, 2003). Density of infaunal organisms in the Harbor in 1994 ranged from approximately 3,000 organisms per square meter (sq m) in sediments from the south side of the Harbor to almost 20,000 organisms per sq m near the storm drain at Baby Beach. During Southern California Bight Wide regional benthic surveys conducted in 1998, infaunal density in the Harbor ranged from approximately 1,250 to nearly 7,000 organisms per sq m, with the highest densities found in the Baby Beach area. As is typical in southern California harbors, species found during infauna sampling include both native and well-established introduced species.

Coastal Resources Management, Inc. (2010) observed eighty-eight (88) taxa of marine plants, invertebrates, and fishes during field surveys conducted between February 2007 and June 2010 (Table 3 and Appendix 2). Marine plants (algae and seagrass) contributed the highest number of taxa (34.1% of the total). Mollusks (octopus, snails and clams) contributed the second highest number (22.7 % of the total), followed by fish (11.4%), annelid worms (8.0) and arthropods (5.7%).

***Soft-Bottom Epi-Benthos.*** The soft-bottom epibenthic community in Dana Point Harbor during CRM field surveys was species poor (Coastal Resources Management, 2010). Eleven soft-bottom plant and macro-invertebrate taxa were observed in the marina basins and other soft-bottom habitats in Dana Point Harbor (Table 4). Sediments within the east and west basins as well as other areas within and outside the marina basins were lightly coated with a layer of diatoms, and secondarily, spotty cover of the algae *Chaetomorpha aerea* and *Ulva intestinalis*. This was typical in areas of lower tidal current flows. Small beds and patches of Eelgrass (*Zostera marina*) were observed in the shallow subtidal habitat offshore of Baby Beach encompassing 457 square feet of bottom habitat (See Section 2.3).

**Table 3. Number of Marine Taxa Observed During the CRM Dive Surveys, Feb/Mar 07, Oct/Nov 07, and June 2010.**

<b>Taxonomic Group</b>	<b>Total Taxa</b>	<b>% Total</b>
<b>Algae</b>	29	33.0
<b>Seagrasses</b>	1	1.1
<b>Porifera</b>	2	2.3
<b>Cnidaria</b>	6	6.8
<b>Platyhelminthes</b>	1	1.1
<b>Annelida</b>	7	8.0
<b>Arthropoda</b>	5	5.7
<b>Mollusca</b>	20	22.7
<b>Bryozoa</b>	3	3.4
<b>Tunicata</b>	4	4.5
<b>Fish</b>	10	11.4
<b>Total</b>	<b>88</b>	<b>100.0</b>

The most common occurring macro-invertebrate on soft sediments was the predatory snail *Navanax inermis*, which was ubiquitous throughout the Harbor soft-bottom habitats. The burrowing anemone *Pachycerianthus fimbriatus* was common within the West Marina although found in many areas of both marina basins and in the Main Channel. The tube-building polychaete *Diopatra ornata* the bubble snail *Haminoea vesicula* were observed where sediments were sandier in the East Channel near the southern section of the proposed temporary dock. Notably, no marine invertebrates or algae were observed on the soft substrates within the Dry Stack or the Ship Yard basins.

Rocky Intertidal and Subtidal Habitat (Pier Pilings, Rock Rip Rap, Cement Bulkheads, and Natural Reefs).

Most plants and invertebrates were associated with harbor artificial hardscape and natural reef (81 of 88 taxa). Of the various hard-bottom habitat types, 59 were associated with East and West marina hard substrate, and 68 were present on hard substrate in the Main Channel, West Channel, and East Channel on larger quarry stones and natural reefs (Table 4). The most productive areas were reefs and quarry stone in the Main Channel (49 taxa), the hardscape of the Youth Sailing Center reefs (40 taxa), marina pilings (36 taxa), the hardscape of the East Breakwater quarry stone and isolated reefs near the proposed temporary dock (25 taxa), and the hardscape of the Sport Fishing Dock bulkhead and rip rap (25 taxa).

Marina Basin Pilings. Thirty-six taxa were observed on 14 piles scattered throughout the East Marina (Table 4). While the cumulative number of taxa observed on pilings was 36 for all piles, the number of taxa on a single pile varied between five and 11. Species richness decreased with depth. The dominant organisms on the upper three feet of the pilings included a complex of green algae (*Ulva intestinalis*), a turf and filamentous red algae complex, brown algae (*Colpomenia perigrina*, *Dictyota flabellata*, and *Sargassum muticum*), hydroids (*Aglaophenia* sp.), serpulid polychaete worms, barnacles (*Balanus amphitrite* and *B. glandula*), and mussels (*Mytilus galloprovincialis*). The mid-depth piling community (-3 to -7 ft) was dominated by polychaete worms (serpulid worms and the calcareous tube-building *Dodecaceria fewksii*), mussels, solitary tunicates (*Styela plicata*), and ectoprocts (*Bugula neritina* and unid. encrusting ectoprocts). The bottom depth piling community (-7 to -10 ft MLLW) was dominated by tunicates, ectoprocts, and hydroids.

**Table 4. Number of plants, invertebrate, and fish taxa in the Dana Point Harbor Survey Areas- Feb/Mar, Oct/Nov 2007, and June 2010**

<b>Region of Harbor</b>	<b>Total Number of Taxa</b>
Island Way Bridge Abutment (north side)	12
Marina Pilings	36
Marina Quay Walls	18
Youth Sailing Center Rip Rap and Reefs, and Soft-benthos (epibiota)	42
<b>All Areas Within East and West Marina Basins</b>	<b>59</b>
Main Channel Reefs, Rip Rap, and Soft Epi- Benthos	49
Temporary Dock Area (Hard-bottom and Soft-bottom epi-benthos)	28
Sport Fishing Docks (Hard-bottom)	25
<b>All Soft-bottom Substrate in Survey Areas (epibiota)</b>	<b>11</b>
<b>All Hard Substrate in Survey Areas Outside West and East Marina Basins</b>	<b>68</b>
<b>All Hard Substrate in Survey Areas, Dana Point Harbor</b>	<b>81</b>
<b>All Soft and Hard Bottom Substrate in Survey Areas, Dana Point Harbor</b>	<b>88</b>

Basin Quay Walls. The sloping, cement bulkhead around the perimeter of Cove East and West and Island East and West Basins (including the Harbor Patrol Basin) supported 18 species of algae and invertebrates. However, this habitat exhibited a low diversity of taxa and extremely low percent cover of marine life. The most conspicuous species was the calcareous, tube-building polychaete *Dodecaceria fewksii* that formed small colonies on most of the quay walls examined. Other common species included lined-shore crabs (*Pachygrapsus crassipes*), solitary ascidians, and scattered, juvenile mussels. A fine silt layer, approximately 1-2 cm deep, covered the substrate. Other than *Dodecaceria*, most of the flora and fauna were found in the depressions formed by the meeting of adjoining cement sections of quay wall.

Bridge Abutments, Island Way. Twelve taxa were represented on the north bridge abutment at depths between +3 to -10 ft MLLW (Table 4). This site consisted of a low-diversity assemblage of macrophytes and macroinvertebrates due to a lack of sunlight and a coating of sediment over the concrete slope. Four macrophytes were observed-*Corallina pinnatifolia*, *Dictyota binghamiae*, *Dictyopteris undulata*, and *Colpomenia sinuosa*. The dominant invertebrates included acorn barnacles (*Balanus glandula*, *Chthamalus fissus/dalli*), bay mussels (*Mytilus galloprovincialis*), tunicates (*Styela plicata*), sponges (*Leucosolenia* sp.), and hydroids (*Aglaophenia* sp); hydroids exhibited the highest cover.

Breakwater Quarry Stone and Natural Reef, Main Channel. This area is located outside of any harbor improvements. Substrata at depths between the intertidal to -7 ft MLLW was primarily quarry stone rip-

rap. Naturally occurring low-to moderate relief reefs were present throughout the area surveyed in the channel.

The most productive intertidal and subtidal habitats were those associated with large quarry stone and natural reef outcrops. These areas supported a diverse assemblage of macrophytes and invertebrates and fishes (49 taxa) characteristic of communities associated with a greater degree of wave exposure than protected marinas. The common red macrophytes include articulated corallines (*Corallina chilensis*, *C. pinnatifolia*, *Lithothrix aspergillum*, *Amphiroa zonata*, *Bossiella orbigniana*), coarsely branched red algae (*Gelidium purpurascens*), and crustose corallines (*Lithothamnion* spp.), while other less common red macrophytes included *Ceramium/Polysiphonia* spp., *Cryptopleura crispa*, and *Laurencia pacifica*. This habitat also supported a rich brown macrophyte community including Dictyotales (*Dictyota binghamiae*, *Dictyopteris undulata*, *Zonaria farlowii*, *Taonia lennebackerae*), the Fucales (*Sargassum muticum*, *Halidrys dioica*), and one member from both the Laminariales (*Eisenia arborea*) and the Scytosiphonales (*Colpomenia sinuosa*). Giant kelp (*Macrocystis pyrifera*) was also present, in very low abundances. Many of the plants observed had only a few number of thin stipes, and were in poor condition.

The most conspicuous lower-intertidal and subtidal invertebrates included limpets (*Lottia limatula*, *L. gigantea*, *L. scabra*), barnacles (*Balanus glandula*, *Chthamalus fissus/dalli*), scaly tube snail (*Serpulorbis squamigerus*), and trochid snails (*Tegula eiseni*). Larger, but less abundant invertebrates included lobsters (*Panulirus interruptus*), gorgonians (*Muricea californica*), warty sea cucumbers (*Parastichopus parvimensis*), rock scallops (*Crassidoma giganteum*), festive murex snails (*Pteropurpura festiva*), and tunicates (*Styela plicata*). No sensitive or listed species of plants, invertebrates, or fishes were documented from this site.

Breakwater Quarry Stone and Isolated Reefs, East Basin Temporary Dock, Similar to the area surveyed in the Main and West Channel, hardscape in the East Channel near the breakwater supported many plant and invertebrate form in response to adequate tidal exchange and tidal currents, and suitable substrate. The East Breakwater provided the most extensive hard-bottom habitat. Common red macrophytes present in the low intertidal and shallow subtidal zone included articulated corallines (*Corallina chilensis*, *C. pinnatifolia*, *Amphiroa zonata*), and crustose algae (*Lithothamnion* spp., *Peyssonneliaceae/Hildenbrandiaceae*) and secondarily, *Ceramium/Polysiphonia* spp. and *Laurencia pacifica*. Several species of brown macrophytes were also present-*Dictyota binghamiae*, *Dictyopteris undulata*, *Zonaria farlowii*, *Taonia lennebackerae*, *Sargassum muticum*, *Halidrys dioica*, *Eisenia arborea* and *Colpomenia sinuosa*.

A fauna similar to the West Channel quarry stone community was also found at this site and included limpets (*Lottia limatula*, *L. scabra*, *Crepidula onyx*), barnacles (*Balanus glandula*, *Chthamalus fissus/dalli*), and trochid snails (*Tegula eiseni*). The snails *Pteropurpura festiva* and *Acanthina spirata* were also present, but were not as common.

North of the bait barge, a few moderate relief (1.5-2 m high) rocky reefs were located in the general vicinity of the proposed Temporary Dock. These reefs supported fewer macrophytes and macroinvertebrates than the subtidal fauna on the East Breakwater and in the Main Channel. Species that were observed included the red algae complex *Ceramium/Polysiphonia* spp., and *Rhodymenia californica*; brown macrophytes (*Sargassum muticum*, *Dictyopteris undulata*); slipper limpets (*Crepidula onyx*); and gorgonians (*Muricea fructifera*). These features exhibited a higher degree of sedimentation than reefs in the West and Main Channels.

A significant amount of trash was observed while surveying the East Breakwater biological communities. This debris was concentrated at the base of the breakwater lodged in the rocks as well as on the sediments at the base of the breakwater rocks.

Youth Sailing Center Reefs and Rip Rap. Rip rap behind the docks and low relief natural reef in the Turning Basin in front of the Youth Sailing Center docks supported a large number of species-40 taxa of plants and invertebrates similar in nature to those occurring in the marina piling community and the quarry stone/natural reef habitats in the West Channel and Main Channel. Dominants included the southern sea palm algae (*Eisenia arborea*) the brown seaweed *Sargassum muticum*, coralline turf algae, and invertebrates such as sponges, colonial polychaete worms, lobsters (*Panulirus interruptus*), snails (*Kelletia kelletii*), limpets (*Lottia* spp.), slipper limpets (*Crepidula onyx*), and mussels (*Mytilus galloprovincialis*).

Rip rap lined the cement bulkhead on the south side of the Youth Sailing Center,. The most commonly red algal forms included articulated corallines (*Corallina pinnatifolia*, *Amphiroa zonata*), coarsely branched red algae (*Gelidium purpurascens*), and crustose corallines (*Lithothamnion* spp.). Small red turf algae (*Ceramium* and *Polysiphonia* spp.) was less common. The dominant brown macrophytes were *Dictyota binghamiae*, *Dictyopteris undulata*, and *Sargassum muticum*. Barnacles (*Balanus glandula*, *Chthamalus fissus/dalli*), lobsters (*Panulirus interruptus*), slipper limpets (*Crepidula onyx*), and tunicates (*Styela plicata*) were the most common-occurring invertebrates.

Sport Fishing Dock Rip Rap. The variable-sized rip rap in front of the Sport Fishing Docks supported a moderately-diverse community of intertidal and subtidal plants and invertebrates typical of both the inner marina and the outer channels of the Harbor. The most common types of plants were filamentous red algal taxa, coralline turf algae, and macrophytes, particularly *Sargassum muticum* and *Dictyota flabellata*. The most conspicuous macroinvertebrates were limpets (*Lottia* spp.), mussels (*Mytilus galloprovincialis*, sea fans (*Muricea californiensis* and *M. fruticosa*), lobsters (*Panulirus interruptus*), and colonies of the cup coral *Astrangia lajollensis*.

**Comparative Studies.** Coastal Resources Management, Inc. (2009) conducted dive surveys at the Dana Point Marine Institute in July 2009 for proposed dock and improvements. The area surveyed within the project area covered a total of 32,000 sq ft (0.73 acre) from the bulkhead out into the West Channel. Dominant reef algae included *Sargassum muticum*, *Dictyopteris undulata*, and *Corallina* spp. Less common species included individual giant kelp plants (*Macrocystis pyrifera*) on low relief reef, sea palms (*Eisenia arborea*) at the base of the rip rap and the dock, and the brown algae *Taonia lennebackerae* on the rip rap. *Pachycerianthus fimbriatus* (burrowing anemone) was the only epifaunal species observed on soft bottom habitat. Other species observed on bulkhead walls, pilings, and rip rap included sponges (*Haliclona* sp.) barnacles (*Chthamalus fissus/dalli* and *Balanus glandula*), shorecrabs (*Pachygrapsus crassipes*), mussels (*Mytilus galloprovincialis*) and limpets (*Lottia limatula* and *L. scabra*). Scattered colonies of gorgonians (*Muricea californica*) were also present in the rocky subtidal habitat. Fishes observed included unidentified flatfish, kelp bass (*Paralabrax clathratus*), barred sand bass (*P. nebulifer*), opaleye (*Girella nigricans*), and pile perch (*Damalichthys vacca*).

Lambert and Lambert (2003) studied the distribution and abundance of non-indigenous ascidians (tunicates) in southern California marinas between 1994 and 1998, including a site near the Orange County Marine Science Institute floats (Dana Point Marine Institute). As a consequence of low flushing rates in most of the Harbor which is nearly completely enclosed by breakwaters, few ascidians or other marine invertebrates were ever found at sites other than the site near the harbor entrance. The most common ascidian found was *Styela plicata*, which favors a preference for lower tidal flushing rates over *S. clava*. During the CRM field surveys in 2007, two specific types of tunicates were found in the marina basins-*Botrylloides* spp. and *Styela plicata*. *Botrylloides* commonly was found covering mussels and other biological substrate. *Styela* was common on the pilings as well as occasionally present on the quay walls.

MBC Applied Environmental Sciences conducted a brief reconnaissance survey near the Ocean Institute on 22 November 1999 to evaluate the intertidal community on the riprap (Robert Bein, William Frost Associates and MBC Applied Environmental Sciences, 2003). They concluded that in general, the community composition in Dana Point Harbor closely resembles those communities in other southern California harbors. The community was highly degraded with few species and low abundances. At the +3 ft level, only a few slipper shells and limpets were noted. In the high intertidal (+5 ft MLLW), abundance was low, with white acorn barnacle most abundant and bay mussels in crevices. Below that, brown acorn barnacle became more prominent, and overall coverage was greater. Below the +2 ft level, barnacles, limpets, and slipper shells were dominant. At the 0-ft level, some low lying algae was present, and in the subtidal, the brown alga *Sargassum muticum* was noted.

The shallow subtidal riprap at Dana Point Harbor was also briefly surveyed by MBC (Robert Bein, William Frost Associates and MBC Applied Environmental Sciences, 2003). At two locations, approximately 50 meters apart, percent cover of dominant organisms was estimated. Results from that survey indicated that the epibiota of the riprap of the shallow subtidal was relatively depauperate compared with that seen in Long Beach Harbor. The probable cause is the decrease in tidal strength and increasing shallowness progressing into the inner portion of the basin, resulting in less water movement for filter feeders and increasing siltation which potentially smothers settling epibiota. The upper subtidal at the innermost site was dominated by *Mytilus* spp. and coralline algae, whereas at the other location, the upper subtidal was dominated by large brown algae, particularly *Sargassum muticum*.

In conclusion, studies of Dana Point Harbor intertidal and subtidal flora and fauna conducted between 1994 and 2010 indicate that the overall biodiversity of pilings, rocky intertidal, and subtidal hardscape varies greatly within different parts of the Harbor. Highest diversity occurs in the Main, West, and East Channel outside the marina basins on large breakwater quarry stone and isolated patch reefs. These areas support a greater diversity of macrophytes and invertebrates than the pilings, docks, quay walls, and bulkheads within the Marina Basins. Giant kelp may be found incidentally within the Main and West Channel although the dominant macrophytes are the sea palm (*Eisenia arborea*) and the invasive *Sargassum muticum*. Primary limiting factors for the varying distribution patterns of plants and invertebrates are related to reduced tidal flushing and water turnover within the Harbor basins and secondly, the accumulation of silts over the surfaces of the rocky habitats as a consequence of the Harbor being nearly completely enclosed by the breakwater. The flora and fauna components of Dana Point Harbor are composed of a mixture of species, both endemic and invasive, that are generally found within other bays and harbors within Southern California.

### 2.2.3 Plankton

Plankton consists of algae (phytoplankton) and animals (zooplankton) small enough to be suspended in the water column and drift through tidal and oceanic currents. Common types of phytoplankton in the Southern California Bight (SCB) include diatoms, dinoflagellates, euglenoids, coccolithophores, and ciliates (Hardy, 1993) while the zooplankton are those animals that spend part (meroplankton) or all (holoplankton) of their life cycle as plankton (Dawson and Pieper, 1993). Fish eggs and larvae (ichthyoplankton) are an important component of the zooplankton community. With the exception of a few fish species (e.g., the Embiotocidae or surf perches that bear live young), most fish that occur in southern California are present as larvae or eggs in the plankton community. Plankton abundances and distributions are directly tied to water temperature, nutrients, upwelling, and current movements, and for zooplankton, the amount of phytoplankton food resources. The planktonic community in Dana Point Harbor is expected to be composed of the same types of organisms common to the nearshore coastal environment offshore of Dana Point, since the plankton are drawn into the Harbor through tidal and wind-driven processes and there is not a significant estuarine influence in the Harbor.

## 2.2.4 Fishes

The types of fishes which commonly occur in protected marinas and harbors of southern California are a combination of species that are associated with both soft-bottom habitat and hardscape of pilings, docks, cement bulkheads, and breakwaters.

Soft-bottom (demersal) species include gobies (*Clevelandia ios*) and flatfish (California halibut, *Paralichthys californicus*; diamond turbot, *Hypsopsetta guttulata*). Water-column species include topsmelt (*Atherinops affinis*), northern anchovy (*Engraulis mordax*), black surfperch (*Embiotoca jacksoni*), shiner surfperch (*Cymatogaster aggregata*), walleye surfperch (*Hyperprosopon argenteum*), white croaker (*Genyonemus lineatus*), queenfish (*Seriphus politus*) and white surfperch (*Phanerodon furcatus*).

Marinas provide additional structure (pilings, docks, and breakwaters) that attract different groups of fish (Coastal Resources Management, 1993). Hard substrate in marinas offer cover, protection, or sources of food for pile perch (*Damalichthys vacca*), pipefish (*Sygnathus* spp.), kelpfish (*Heterostichus* spp.), and opaleye (*Girella nigricans*), while the breakwater riprap protecting the Harbor provides a habitat for barred sand bass (*Paralabrax nebulifer*), kelp bass (*P. clathratus*), sargo (*Anisotremus davidsoni*), halfmoon (*Medialuna californiensis*), and cryptic species (blennies and sculpins).

Water-column species such as topsmelt (*Atherinops affinis*), northern anchovy (*Engraulis mordax*), black surfperch (*Embiotoca jacksoni*), shiner surfperch (*Cymatogaster aggregata*), walleye surfperch (*Hyperprosopon argenteum*), white croaker (*Genyonemus lineatus*), queenfish (*Seriphus politus*) and white surfperch (*Phanerodon furcatus*) are also common within southern California marinas and may be expected to be present in Dana Point Harbor.

### Fishes Observed during CRM Field Investigations

**Soft-Bottom.** Few fish were observed over sedimentary habitats, likely due to low visibility (CRM, 2010). Of the two species observed, only the round sting ray (*Urolophus halleri*) was common. Other unidentified flat fish were seen, but could not be identified. However, there are several other species of fish that occur in other bays and harbors in southern California that are likely to be present in Dana Point Harbor. These include gobies (*Clevelandia ios*), and flatfish (California halibut, *Paralichthys californicus*; diamond turbot, *Hypsopsetta guttulata*).

**Hard-Bottom.** Nine species of fish and one unidentified juvenile were observed in the vicinity of hard-bottom habitat during the dive and remote video surveys. The most common fishes observed included garibaldi (*Hypsypops rubicundus*), kelp bass (*Paralabrax clathratus*), opaleye (*Girella nigricans*), pile surfperch (*Damalichthys vacca*), blacksmith (*Chromis punctipinnis*), señorita (*Oxyjulis californica*), and kelpfish (*Heterostichus rostratus*). Most fish were seen in the vicinity of the Youth Sailing Center Docks, the Sport Fishing Docks, the West Channel, Main Channel, and East Channel.

**Water Column.** Water-column species such as topsmelt (*Atherinops affinis*), northern anchovy (*Engraulis mordax*), black surfperch (*Embiotoca jacksoni*), shiner surfperch (*Cymatogaster aggregata*), walleye surfperch (*Hyperprosopon argenteum*), white croaker (*Genyonemus lineatus*), queenfish (*Seriphus politus*) and white surfperch (*Phanerodon furcatus*) are also common within southern California marinas and are also expected to be present in Dana Point Harbor.

### 2.2.5 Marine Mammals

One of the most important areas of high concentrations of marine mammals in southern California is the waters within a 10-mile radius between San Clemente and Dana Point (Bonnell et al 1981). These waters are known for high seasonal concentrations of common dolphin (*Delphinus delphis*) and the nearshore migratory pathway of California gray whales (*Eschrichtius robustus*) which was delisted as an endangered species in June 1994.

Several species of marine mammals inhabit the local waters (Bonnell et al., 1981; Bonnell and Dailey, 1993; Dohl et al., 1981). These include two pinnipeds (California sea lions [*Zalophus californicus*] and harbor seals [*Phoca vitulina*]) and 12 species of cetaceans (whales and dolphins). Four of the whales are baleen (filter feeding) whales, and eight species are odontocetes (toothed whales). The California gray whale, bottlenose dolphin (*Tursiops truncatus*), common dolphin (*Delphinus delphis*), and Pacific white-sided dolphin (*Lagenorhynchus obliquidens*) are the most commonly occurring species in the waters offshore of Dana Point Harbor.

Whales and dolphins are uncommon visitors to Dana Point Harbor. Recently however, a young, emaciated, gray whale entangled in fishing gear swam into Dana Point Harbor and remained for a few days in mid-May 2010. The net was removed by a team of biologists, and the whale swam out of the harbor. It died offshore of Doheny Beach on May 14<sup>th</sup>, 2010 (Orange County Local News Network, 2010). California sea lions and harbor seals are more frequently observed within the Harbor waters, with sea lions also hauling out on the breakwater. The Harbor is not considered a breeding habitat for pinnipeds but it is a secondary foraging area.

### 2.2.6 Water-Associated Birds

Shorebirds, waterfowl, and seabirds occur along the shoreline throughout the year but concentrations are usually highest during the fall to spring period when seasonal migrants winter over along the southern California shoreline. Common shorebirds include willet (*Catoptrophorus semipalmatus*), whimbrel (*Numenius phaeopus*), marbled godwit (*Limosa fedoa*), and sanderling (*Calidris alba*). The western grebe (*Aechmophorus occidentalis*), various species of cormorants (*Phalacrocorax spp.*) and surf scoter (*Melanitta perspicillata*) are among the water fowl which occupy the nearshore waters of Dana Point Harbor. Sea birds and larger marsh birds such as California brown pelican (*Pelecanus occidentalis*), terns (*Sterna spp*), western and ring-billed gulls (*Larus occidentalis* and *L. delawarensis Larus spp*), great blue herons (*Ardea herodias*) black-crowned night herons (*Nycticorax nycticorax*), and snowy egrets (*Egretta thula*) are expected to either occur in the waters and on the shoreline in the immediate area of Dana Point, or potentially within Dana Point Harbor as foraging and/or resting habitat.

Bird surveys conducted in March 2007 (Keane Biological Consulting, 2007) and March 2003 (MBC Applied Environmental Sciences in: RBF and MBC Applied Environmental Sciences, 2003) indicated that approximately one-half of the species observed were marine water-associated birds. Herons, egrets, and gulls, and pelicans were the most common species observed during both surveys. Other common water-associated bird species present included surf scoter (*Melanitta perspicillata*) and cormorants (*Phalacrocorax spp*). Although not observed, dabbling and wading ducks can also be found in the Harbor. During spring and summer, California least terns (*Sterna antillarum browni*), Forster's terns (*Sterna forsteri*), elegant terns (*Sterna elegans*), Caspian terns (*Sterna caspia*) and black skimmer (*Rynchops niger*) may be seen in local harbors, including Dana Point Harbor.

**Breeding and Nesting Species of Water Birds in Dana Point Harbor.** Fourteen bird species were identified as confirmed breeders in the Dana Point Harbor area during the March 2007 bird survey and an additional eight species are expected to nest in the area (Keane Biological Consulting, 2007). Of these

species, one water bird (black-crowned night heron) was observed nesting. Both snowy egrets and great blue herons were determined to be likely nesters nearby the Harbor.

## 2.3 SENSITIVE SPECIES

### 2.3.1 Eelgrass (*Zostera marina*)

**Importance of Eelgrass.** Eelgrass (Figure 5) is a marine flowering plant that grows in soft sediments in coastal bays and estuaries, and occasionally offshore to depths of 50 feet (ft). Eelgrass canopy (consisting of shoots and leaves) enhances the abundance and the diversity of otherwise barren sediments. Many species of invertebrates (i.e., clams, crabs, and worms) live either on eelgrass or within the soft sediments that cover the root and rhizome mass system. Eelgrass is a nursery habitat for many juvenile fishes, including species of commercial and/or sports fish value (California halibut and barred sand bass). They are also foraging centers for seabirds such as the endangered California least tern that seek out juvenile topsmelt that are attracted to the eelgrass cover. Lastly, eelgrass is an important contributor to the detrital (decaying organic) food web of bays as the decaying plant material is consumed by many benthic invertebrates (such as polychaete worms) and reduced to primary nutrients by bacteria.

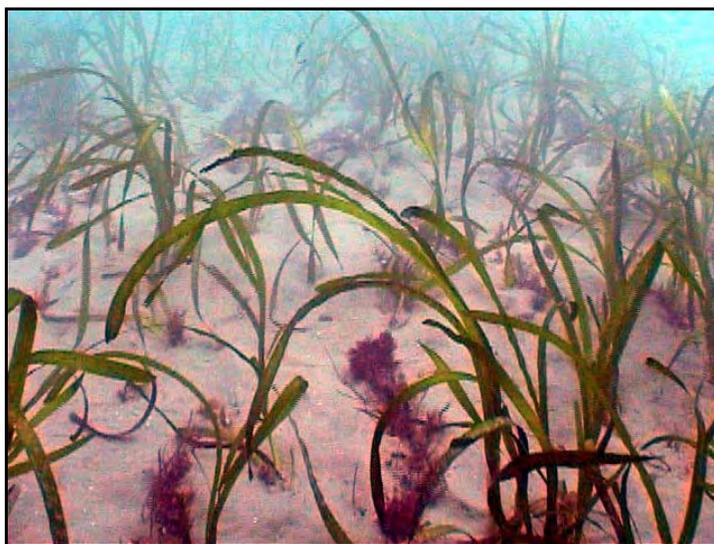


Figure 5. Eelgrass, *Zostera marina*. One “shoot” and the cluster of “blades” arising from the shoot is considered a “turion unit”. (Photo: CRM)

**Eelgrass in Dana Point Harbor.** Studies conducted between 2005 and 2010 have documented the expansion of an eelgrass bed seaward of Baby Beach in the western section of Dana Point Harbor (Figure 6). Most recently, small-to-large patches of eelgrass were located 160 to 412 feet west of the existing bulkhead at the Youth Sailing Center (Figure 6) during surveys conducted by MBC Applied Environmental Sciences (2008 and 2009) and CRM (Coastal Resources Management, Inc. 2010). The results of eelgrass surveys conducted to date in Dana Point Harbor are discussed below.

Chambers Group, Inc. located a single, three-turion plant at the eastern end of Baby Beach in 2005 (Chambers Group, Inc (2005) for the Dana Point Harbor Maintenance Dredging Project. MBC Applied Environmental Sciences conducted eelgrass and invasive algae surveys for the Dana Point Harbor Maintenance Dredging and Pipeline Corridor Project in August 2008 (MBC Applied Environmental Sciences, Inc. 2008 and 2009). A total of 14.5 square meters of eelgrass was located seaward of Baby Beach in 2008, and 70 square meters of eelgrass were located seaward of Baby Beach in 2009. Eelgrass

turion density ranged between about 48 to 56 turions per square meter during the February 2009 survey. None of the eelgrass was impacted by the County dredging project.

Coastal Resources Management, Inc. (2010) did not locate eelgrass within Dana Point Harbor during the February/March 2007 or the October/November 2007 reconnaissance surveys of Baby Beach. On June 8th, 2010, CRM updated the earlier Dana Point Harbor marine biological surveys in the vicinity of Baby Beach and the Sailing Center Docks along the eastern one-third of Baby Beach at depths between -3 and -12 ft MLLW (Figure 6). CRM reported the presence of 457.3 square feet (42.5 square meters) of eelgrass within the survey area at depths between -2.5 and -4.5 ft MLLW in a mixture of silt and scattered boulders (Figure 7). Eelgrass density was extremely low, ranging between 4 and 10 turions per square meter. None of this eelgrass was reported by MBC during the 2009 and 2009 surveys. In addition, turion density was extremely low. These observations suggest that eelgrass recently expanded during the 2009-2010 growing season and will likely continue to increase in areal cover, and increase in density to levels observed by MBC in 2008 and 2009.

CRM could not relocate the eelgrass patch that MBC located in the Dry Stack Storage area docks during the 2010 survey. This location appeared to be located underneath jet ski platforms at the time of the survey.

### 2.3.2 Surfgrass (*Phyllospadix spp.*)

Surfgrass is a sensitive marine resource that occurs in rocky shoreline and rocky subtidal habitats at depths to approximately 20 feet. Its sensitivity is related to its use by invertebrates and fishes as nursery habitat and its susceptibility to long-term damage because it is a very slow growing species. Revegetation occurs very slowly through initial seeding and eventually the spreading of roots and rhizomes over surfaces of rocks.

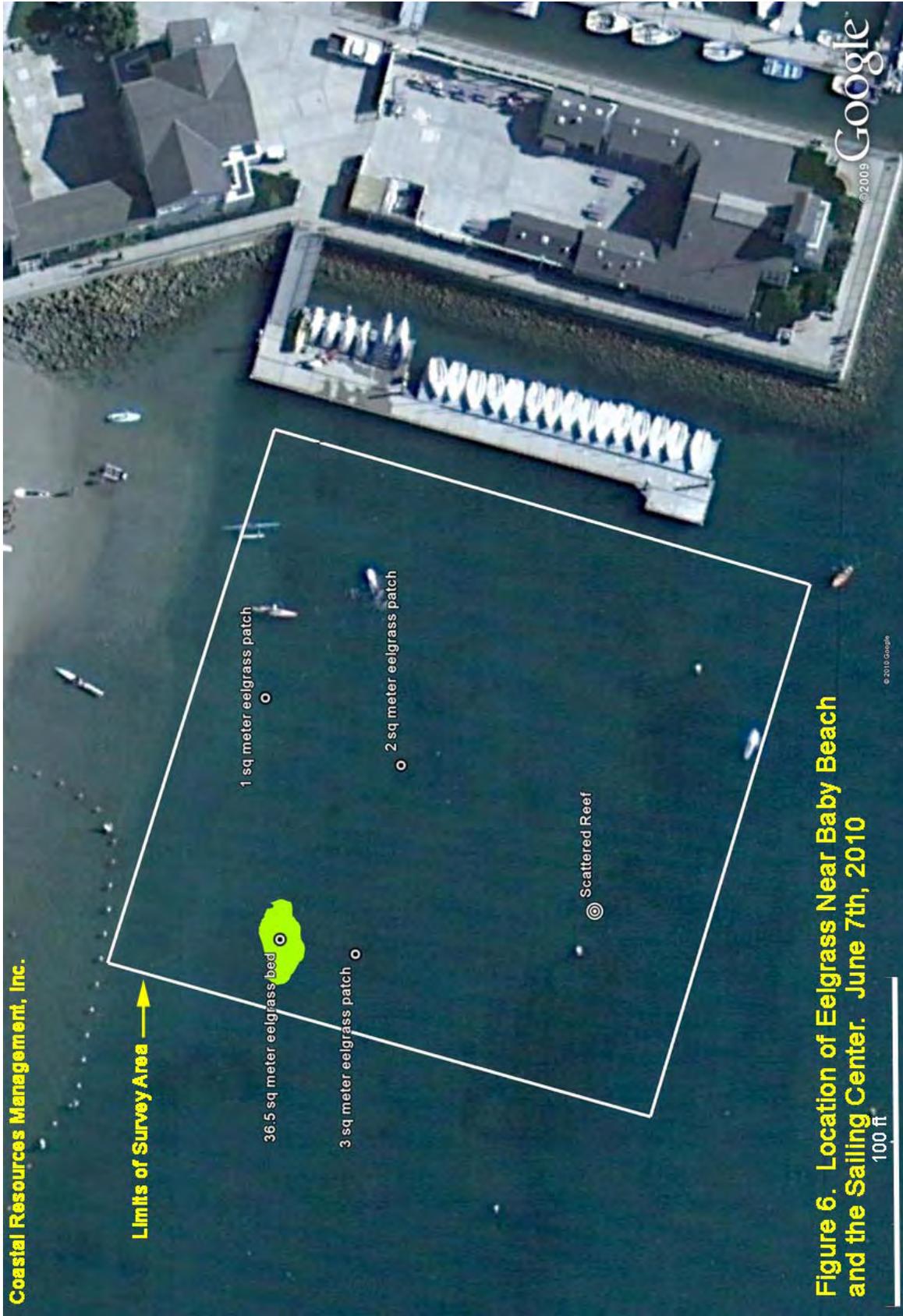
Surfgrass is considered to be Essential Fish Habitat by the National Marine Fisheries Service, and juvenile olive rockfish (*Sebastes serranoides*) which are a Fisheries Management Plan Groundfish species utilize surfgrass beds as nursery habitat. Surfgrass is also an extremely important nursery habitat for juvenile lobsters.

Surfgrass is a dominant feature of the Dana Point State Marine Park and Niguel State Marine Park intertidal and subtidal habitat (Applied Ecological Research 2001, Coastal Resources Management, 1998). Its presence on the inside of the Harbor's breakwater, or within the marina is likely limited because of the lack of wave action and other related requirements. No surfgrass was observed within the Harbor project area during the CRM 2007 field surveys (Coastal Resources Management, Inc., 2010).

### 2.3.3 Abalone

**Abalone (*Haliotis sorenseni*).** The white abalone is one of eight species of abalone that is known from California. Its listing as a federally endangered species in May 2001 is the result of a population reduction related to over fishing. It is unlikely to occur anywhere in Dana Point Harbor because of a lack of suitable rocky habitat and depth.

White abalones are found in open low and high relief rock or boulder habitat that is interspersed with sand channels. Sand channels may be important for the movement and concentration of drift macro-algae, such as *Laminaria farlowii*, *Agarum fimbriatum*, and a variety of red algae, upon which white abalone are known to feed (<http://www.nmfs.noaa.gov/pr/species/invertebrates/whiteabalone.htm>).



White abalone is reported to be most abundant between 25-30 m (80-100 ft) depths, making them the deepest occurring abalone species in California (California Department of Fish and Game 2001). The white abalone depth range is generally believed to be between 60 to 200 ft deep (18 to 60 m) with most occurring at depths greater than 75 ft on reef in exposed areas (California Department of Fish and Game 2001). However, white abalones have been verified at depths as shallow as 28 ft (8.5 meters) in surveys conducted in April and March 2002 in the vicinity of El Capitan State Beach (R. Ware, pers. observation; R. de Wit pers. observation; verified by Ian Tanaguchi, California Dept of Fish and Game in: L.A. de Wit Consultant, 2002). A hybrid white and red abalone was also found at a depth of 22 ft in April 2001 in the same area (R. Ware, pers. observation 2001; L.A. de Wit Consultant, 2001). MBC Applied Environmental Sciences Inc. (2003) noted that “a listing of the white abalone as having previously occurred at Doheny Marine Life Refuge is probably in error. None of the marine life refuge’s area is deeper than 6 to 8 m, which is well outside of the white abalones’ habitat range”. However, due to its confirmed presence at depths as shallow as 22 ft (8.5 m) in Santa Barbara County, there is a potential that this species occurrence in the Marine Life Refuge (State Marine Park) is a valid record, or alternatively, it could be a white/red abalone hybrid since one was observed at these depths along the Santa Barbara County coastline.

**Black Abalone (*Haliotis cracherodii*).** In 1998, the National Oceanographic and Atmospheric Administration’s (NOAA) National Marine Fisheries Service (NMFS) added black abalone to the candidate species list for possible listing under the federal ESA, and on January 14<sup>th</sup>, 2009, NMFS listed black abalone as an endangered species (Federal Register / Vol. 74, No. 9 / Wednesday, January 14<sup>th</sup>, 2009 /Rules and Regulations). Black abalones usually inhabit surf-battered rocks and crevices from the intertidal zone to shallow subtidal zone down to 20 ft (6 m). It is a long-lived species, attaining an age of 25 years or more. Now a rare species, the black abalone was abundant in California until the mid-1980’s. It once occurred in such high concentrations that individuals were observed stacked on top of one another. Density studies conducted at the Channel Islands indicate significant declines attributed to Withering Syndrome. According to NMFS, no effort has been made to assess effects of withering syndrome at Santa Catalina Island, though the Island historically supported black abalone populations (NMFS, 2008b). This species is potentially present within the Dana Point Marine Refuge and on the outer side of the Dana Point Harbor breakwater but in highly reduced numbers. It does not occur within Dana Point Harbor.

**Red Abalone (*Haliotis rufescens*).** Red abalone is listed as a species of special concern by the NMFS. In southern California, they are exclusively subtidal, restricted to areas of upwelling along the mainland and the northwestern Channel Islands. In central and southern California, red abalone had declined the least of all five species by the time the fishery was closed in 1997. A successful red abalone sport fishery continues in northern California, where SCUBA and commercial take have been prohibited. It does not occur within the Dana Point Harbor project area.

**Green Abalone (*Haliotis fulgens*).** Green abalone is listed as a species of special concern by the NMFS. It prefers shallow water from the low tide zone down to 25 feet (8 m). Green abalone may occupy a particular site, called a home site or scar, and abalone larger than one inch seldom leave their home scar to forage, relying solely on drift algae. Smaller individuals actively forage but return to their home scar in the day. Now rare, the green abalone was once a common species in southern California. It does not occur within the Dana Point Harbor project area.

**Pink Abalone (*Haliotis corrugata*).** This NMFS species of special concern occurs in a depth range from the lower intertidal zone to almost 200 feet (60 meters), but most are found from 20 to 80 feet (6 to

24 m). It has the broadest distribution of the southern California abalones. In the early 1950's, pink abalone comprised the largest segment of the abalone fishery, about 75 percent (California Department of Fish and Game, 2001). By the early 1980's, the commercial pink abalone fishery had expanded throughout its range and the landings dwindled to virtually nothing. Surveys at San Clemente, Santa Catalina, and Santa Barbara Islands in 1996 and 1997 indicated that there were few remaining abalone on these islands (California Department of Fish and Game, 2001).

#### 2.3.4 Fishes

**California Grunion (*Leuresthes tenuis*).** This fish species is not a formally listed species but is considered sensitive because of its beach spawning activity and potential impacts from beach disturbances such as beach cleaning and beach nourishment. It uses the high intertidal sandy beach habitat of many southern California beaches as spawning habitat. Grunion lay their eggs in the wet beach sands during the highest spring tides between late February or early March to as late as early September (Walker 1952). Dana Strands beach is a grunion spawning habitat which has been used by grunion on a regular basis. Doheny (Capistrano Beach) is also a historical spawning grounds for this particular species (Walker 1952 and H. Helling, pers. comm.). It does not occur within the Dana Point marina project area.

**Steelhead Trout (*Onchorynchus mykiss*).** Steelhead are a unique form of rainbow trout. Like salmon, they spent most of their adult lives in the ocean, but spawn in freshwater streams and rivers. It lives approximately two to four years of its life (but this period varies greatly) in the open ocean prior to returning to the stream where it was spawned. It is dependent on small, clear-flowing but not rapid, streams with gravel beds to complete its spawning cycle. The area must also have protective cover and an adequate food source. Steelhead populations are declining because of impacts on habitat such as dams, turbidity, and other habitat incursions (RBF Engineering and MBC Applied Environmental Sciences, Inc. 2003).

Although steelhead probably once existed in most of the California rivers and creeks with outlets to the ocean, recent records of this species are few, until the mid-1990s. Historically, a few fish were known to enter most of the waterways south of the Los Angeles Basin; however, spawning success may have been sporadic. The last published data indicated that anglers caught large numbers of juvenile rainbow fish in coastal lagoons in the 1930s (RBF Engineering and MBC Applied Environmental Sciences, 2003).

Colonization events of steelhead were documented during 1996-2002 in Topanga and San Mateo Creeks. These colonization events were represented by a few spawning adults or the observation of a single individual, when some fry suspected to be juvenile steelhead were discovered in San Mateo Creek in 1999. [http://ecos.fws.gov/docs/federal\\_register/fr3542.pdf](http://ecos.fws.gov/docs/federal_register/fr3542.pdf).

Except for the colonization of the small population in San Mateo Creek in northern San Diego County, steelhead appear to have been completely extirpated from nearly all systems in the southern portion of the range of the Distinct Population Segment (DPS) from Malibu Creek to the Mexican border. <http://www.nmfs.noaa.gov/pr/species>.

A steelhead trout was caught in the Harbor as recently as December 30, 2002 (RBF Engineering and MBC Applied Environmental Sciences, 2003). However, it is unlikely that this species would naturally occur in the Harbor.

In 1994, the National Marine Fisheries Service (NMFS) received a petition to list steelhead throughout its range in California, Oregon, Washington, and Idaho under the Endangered Species Act (ESA). On January 5, 2006, NMFS listed nine Distinct Population Segments (DPSs) including the west coast steelhead as threatened and one as endangered. Some of them had been previously listed between 1996

and 1998, but, because of legal and other issues, all listings were reaffirmed and/or revised in 2006 (National Oceanographic and Atmospheric Administration, 2006).

**Tidewater Goby (*Eucyclogobius newberryi*).** The tidewater goby is a Federally-listed endangered species that has been expatriated from many southern California creek mouths (U.S. Fish and Wildlife Service, 2000; Swift et al., 1989). It is currently found in shallow marine areas and lower reaches of streams between San Diego northward to Humboldt County waters where salinity is less than 10 ppt. The population of Tidewater Goby is depleted due to reduced or eliminated flows in the lower reaches of coastal streams, pollution, and the filling in, channelization, and other physical alterations of their habitats. The population disappeared from about 74 percent of the coastal lagoons from Morro Bay southward to San Diego (U.S. Fish and Wildlife Service, 1995).

Historically, the tidewater goby inhabited San Juan Creek from the mouth to 2.5 miles inland of the ocean. A search of the California Department of Fish and Game Natural Diversity Data Base (indicated the tidewater goby is extirpated from the creek and was last observed in 1984. The U.S. Army Corps of Engineers (1997) reported that habitats at the mouth of both San Juan Creek and Aliso Creek were poor in habitat and water quality and unlikely to support populations of this endangered species. Habitat conducive to tidewater gobies is absent from Dana Point Harbor.

**California Halibut (*Paralichthys californicus*).** Although it does not have a formal special status, the California halibut is considered a sensitive species by resource agencies because of its commercial value and a continued region-wide reduction of its nursery habitat in bays and wetlands. California halibut spawn at sea and its larval stages are planktonic. After several months, larval fish settle to the bottom and migrate into shallow coastal waters. Young-of-the-Year fish (YOTY) prefer shallow waters between about -1.5 feet and -3.5 feet MLLW, whereas juveniles prefer deeper channel bottoms to a maximum depth of approximately -15 feet MLLW. After spending nearly nine months in coastal embayments, juveniles move out into the open coastal environment. The species uses inshore waters of bays, harbors, and estuaries as a nursery habitat. Halibut may occasionally be found particularly in the outer channels of Dana Point Harbor, but are much more common in the open coastal environment. Their occurrence within the marina basins is likely rare.

### 2.3.5 Reptiles

**Sea Turtles.** Several species of federally-listed threatened and endangered sea turtles could potentially occur in the nearshore open water habitats surrounding Dana Point Harbor. There are no known nesting beaches for these species in the United States, but they have been observed off the coast of southern California. These include the threatened population of green sea turtle (*Chelonia mydas*), the endangered leatherback sea turtle (*Dermochelys coriacea*), the threatened but federally-proposed endangered, North Pacific Distinct Population Segment loggerhead sea turtle (*Caretta caretta*), and the endangered olive ridley sea turtle (*Lepidochelys olivacea*). Sightings are extremely rare and it is unlikely that they would be affected by project activities.

The green sea turtle, Federally-listed as endangered have been sighted from Baja California to southern Alaska, but most commonly occur from San Diego south (<http://www.nmfs.noaa.gov/pr/species/turtles/green.htm>). Green sea turtles, have been sighted offshore of Dana Point Harbor (RBF Engineering and MBC Applied Environmental Sciences 2003) although the nearest place they are frequently seen is in and near the mouth of the San Gabriel River and Alamitos Bay (Fullerton 1985 in RBF Engineering and MBC Applied Environmental Sciences, 2003). A 21-inch juvenile green sea turtle (estimated to be between three to five years old) was found by fishermen casting lines in the channel at the intersection of Pacific Coast Highway and the San Gabriel River on 29 August, 2008 (Aquarium of the Pacific, 2008), stranded within the intake channel, and was reported to have been

harassed by several unknown individuals. It was removed and transferred to the Long Beach Aquarium for rehabilitation from minor injuries. This species would be considered uncommon to rare as it is more common in tropical and subtropical waters.

### 2.3.6 Marine Mammals

**California Gray Whale (*Eschrichtius robustus*).** Two distinct populations of gray whales occur in the North Pacific Ocean, a western and an eastern stock. The eastern stock occurs along the eastern Pacific coastline and is known as the California gray whale. In June 1994, the eastern Pacific population was removed from the Federal Endangered Species List, due to recovery of population numbers to near the estimated sustainable population size.

The California gray whale migrates through the SCB twice each year, traveling between its feeding grounds in Alaska and its breeding grounds in Baja California. The southern migration through the SCB occurs from December through February, with pregnant females moving through the area first. The northward migration begins in February and lasts through May, peaking in March (Poole, 1984; Dailey and Bonnell, 1993). Solitary animals generally lead the northbound migration with cow-calf pairs following 1 to 2 months later (Poole, 1984). Gray whales migrate within 125 miles (200 km) of the shoreline and many are sighted within 9 miles (15 km) of shore (Dailey et al. Bonnell and Dailey, 1993). On the northbound migration, cow-calf pairs are believed to more closely follow the shoreline rather than the offshore route (Dailey and Bonnell, 1993). Gray whales are observed commonly in the nearshore waters of the project area, but rarely do individual whales enter Dana Point Harbor.

### 2.3.7 Water-Associated Bird Species

A bird survey focusing on nesting species was conducted by Keane Biological Consulting (2007). This section focuses on marine-associated sensitive species of birds, including observations from that survey, and a 2003 survey conducted by MBC Applied Environmental Sciences (2003).

**California Gull (*Larus californicus*).** The California Gull is a Species of Special Concern. It nests in alkali and freshwater lacustrine habitats east of the Sierra Nevada, and not locally. It is abundant in the project area during its non-breeding season (August-March) (Zeiner et al., 1990). This species would roost on the breakwater and docks of Dana Point Harbor during the non-breeding season.

**Double-Crested Cormorant. (*Phalacrocorax auritus*).** A Species of Special Concern, this species is vulnerable to reduced nesting success from persistent pesticides in the water (Zeiner et al., 1990). This species is the most widespread of all cormorants in North America but in California, they are the least abundant of the various species of cormorants (Sowls et al., 1980) and uncommon in southern California. In California, they nest offshore on rocks and islands, on abandon wharves and power poles, and most of the breeding colony sites are in central to northern California. They can be found in nearshore waters and roost on the breakwater and docks of Dana Point Harbor. Cormorants are diving birds that forage on fish.

**California brown pelican (*Pelicanus occidentalis californicus*).** The California brown pelican is federally- and state-listed as an endangered species. It is observed primarily in the open ocean and beaches but is also common in estuaries, tidal rivers, rocky coasts, breakwaters, and islands. Breeding locations along the west coast of California are limited to the Channel Islands. During the late 1960's and early 1970's, the brown pelican population suffered a widespread and dramatic decline linked to egg shell thinning due to DDT, first noted in 1962, which resulted in listing the subspecies as endangered. The population is now recovering well. Brown pelicans do not breed on the mainland but are frequent inhabitants of southern California estuaries and harbors.

The Dana Point harbor breakwater provides roosting habitat for pelicans, and the Dana Wharf region and bait barge attract large numbers of pelicans. However, no nesting habitat for pelicans is present on the California mainland.

**California least tern (*Sterna antillarum browni*).** The California least tern is federally- and state-listed as endangered. A migratory species, it nests from April through August along the coast of California from San Francisco south to Baja California. It presumably winters in Central America or northern South America, although the specific location of its wintering range is unknown. In 2006, the California least tern breeding population was estimated at over 7,000 pairs, more than a ten-fold increase from estimated numbers when it was listed in the early 1970's. Least terns breed on sparsely vegetated sandy beaches, salt flats, and dredge spoil in colonies of few to several hundred nesting pairs. This species relies on sight for foraging and usually requires relatively clear water to locate its preferred baitfish food sources, northern anchovy (*Engraulis mordax*), topsmelt (*Atherinops affinis*), and jacksmelt (*Atherinopsis californicus*). The majority of foraging occurs in open ocean (Atwood and Minsky 1983, Minsky 1984, Keane Biological Consulting, 2002). California least terns are expected to forage occasionally among the docks of the project site, particularly during years when offshore prey (small baitfish) are limited in availability.

There are no nesting sites in the immediate vicinity of Dana Point Harbor. The nearest nesting site to the south of Dana Point is Red Beach on the Pendleton Marine Corps Facility, approximately 20 miles south of Dana Point. In 2006, there were 27 least tern nest with 16 fledglings (Kathy Keane, per. com. with R. Ware, 3 July, 2007). The nearest breeding site to the north west of Dana Point is in Upper Newport Bay. In 2006, only 18 of 61 eggs (36 nests) hatched and only 2 of those chicks survived to fledging. In 2007 to date, there have been 35 nests built but hatching success appears to be much higher than in 2006, with a minimum of about of 20 fledglings (Kathy Keane, pers. com. with R. Ware, 3 July, 2007). Other nesting sites for this species are located at the Santa Ana River mouth, Bolsa Chica, and in the Port of Los Angeles.

**Western Snowy Plover (*Charadrius alexandrinus nivosus*).** The western snowy plover is a federally and state-listed threatened shorebird that nests on sand spits, dune-backed beaches, river/creek mouth beaches, and on salt pannes in lagoons and estuaries. Its current breeding range extends between southern Washington to Baja California. Breeding occurs from early March to late September. Individuals of the wintering population can be expected to be present along south Orange County beaches and forage along the shoreline between November and February.

Small numbers of migrant or wintering snowy plovers are occasionally reported from the nearby San Mateo Creek area, but no nesting has been documented at Dana Point Harbor (RBF Engineering and MBC Applied Environmental Sciences 2003). Population declines are attributed to human disturbance and raking of beaches. Their occurrence in the Harbor is limited by the small amount of available sandy beach and mudflat. Snowy plovers prefer the same type of nesting habitat as least terns, so little potential exists for them to nest at the beaches of Dana Point Harbor.

**Great Blue Heron.** The great blue heron has no listing status, and although it is a common wading bird in southern California estuaries its nesting sites in California are uncommon. It is one of the most widespread and adaptable wading birds in North America (Butler 1992). The range of the great blue heron extends from Southeast Alaska and north British Columbia to south Quebec and south to Florida, Texas, Baja California, and Central America, at least to Belize and Guatemala. Along the Pacific coast, its range extends from southeast Alaska to Mexico (Butler 1992), and they are known to be common in coastal California (Kathy Keane, Keane Biological Consulting, personal observation). They can be found in shallow estuary systems and fresh and saline emergent wetlands all year throughout most of the state. Great blue herons usually arrive on breeding grounds by early February (Butler 1992). Courtship and nest-building begin shortly thereafter, and eggs are laid in late February or March. They usually nest

in colonies, sometimes with five or more pairs, but often with fewer (Butler 1992). This species is sensitive to human disturbances and probably to pesticides and herbicides in nesting and foraging areas (Zeiner et al 1990).

Great blue herons are believed to nest nearby the Dana Point project vicinity (Keane Biological Consulting 2007).

## 2.4 REEFS AND KELP BEDS

Subtidal reefs are considered Essential Fish Habitat for groundfish species. Kelp forests associated with reefs provide protection and cover for many marine invertebrates and fishes (Foster and Schiel, 1985). Kelp (*Macrocystis pyrifera*) grows on rock and cobble habitat offshore of Dana Point northwest through Corona del Mar at depths between 20 and 45 feet. California Department of Fish and Game Kelp Bed #9 extends between Emerald Bay and Dana Point Harbor. Kelp canopy has historically persisted in two regions of Orange County; between Heisler Park and Cactus Point in Laguna Beach and between Mussel Cove (South Laguna) and Dana Point, including the waters offshore of Dana Strand and the Dana Headlands. Kelp beds located between the Dana Point Harbor breakwater and San Mateo Creek are located at distances between approximately 1,600 and 5,000 feet from shore and are identified as California Department of Fish and Game Kelp Bed #8.

Kelp grows on the breakwater of Dana Point Harbor, the hard substrate of the SERRA outfall downcoast of Dana Point Harbor at depths less than 40 ft, intermittently for about 1 mile south of the outfall on low relief cobble and boulder, and immediately downcoast of the Capistrano Beach County Park at distances between 600 and 1,500 feet offshore (ECOSCAN 1990). Inshore kelp beds are patchy, and not always present due to their shallow nature and greater susceptibility to damage from storms. Hard-Bottom features and kelp beds are more common farther offshore at depths between 40 and 55 ft between Doheny Beach Marine Life Refuge and San Mateo Point.

Inside Dana Point Harbor, giant kelp is very sparse. Individual giant kelp plants, in extremely low density and in poor condition were found on isolated rock outcrops and quarry stone in the vicinity of the in the Main Channel during Oct/Nov 2007 field surveys (Coastal Resources Management, Inc. 2010). However, there was no observable surface canopy.

## 2.5 PROTECTED MARINE AREAS

### 2.5.1 Current Marine Protected Areas in the Vicinity of Dana Point Harbor

Currently protected Marine Areas nearby Dana Point Harbor are listed in Table 5 and their locations are shown in Figures 6a-6d. Upcoast of Dana Point Harbor, intertidal and subtidal habitats receive local and state environmental protection status as part of the *Niguel Marine Park* and the *Dana Point Marine State Park* located at the base of the Headlands. The Niguel State Marine Park boundaries extend 1,200 feet offshore and 2.1 mi along the shoreline. It encompasses an area of 315.2 acres. Dana Strands Beach and the waters offshore of the beach are located within the boundaries of this State Marine Park. The Dana Point State Marine Park boundaries extend 0.7 mi offshore and 1,200 ft of shoreline between the headlands and Dana Point Harbor. This covers an area of 124.8 acres.

Downcoast of Dana Point Harbor, *Doheny Beach State Marine Conservation Area* is also an underwater park. This area overlaps with the *Doheny Beach State Marine Park*. The Marine Park extends 600 feet offshore, whereas the State Marine Conservation Area extends 1,500 ft offshore. Most of the shoreline is sandy habitat, although there is some rocky intertidal habitat at the northern edge of the Marine Park. Offshore, the seafloor is a mixture of both sand bottom and low-to-high relief reef. Lagoon wetland

habitat in located at the mouth of San Juan Creek. The County of Orange-maintained *Capistrano Beach County Park* is located at the southern end of Doheny State Marine Park.

**Table 5. State Designated Marine Life Areas in the Vicinity of Dana Point**

<i>Name/Area<sup>1</sup></i>	<i>Approximate Boundaries</i>	<i>Overlapping Designation</i>	<i>Area Covered</i>	<i>Managing Agency (ies)</i>
<i>Niguel State Marine Park</i>	SE point of Mussel Cove to NW tip of Dana Point	None	2.1 mi of coastline and 1,200 ft offshore	CDF&G; County of Orange
<i>Dana Point State Marine Park</i>	NW tip of Dana Point Headland to Eastern tip of headland	None	0.7 mi of coastline and 1,200 ft offshore	CDF&G; County of Orange
<i>Doheny Beach State Marine Conservation Area</i>	Dana Point Harbor to Palisades Drive	County of Orange Capistrano County Park	1.2 mi of coastline and 1,500 ft offshore	California Department of Parks and Recreation; CDF&G; County of Orange
<i>Doheny Beach State Marine Park</i>	Dana Harbor south to Palisades Drive	Doheny State Marine Conservation Area	1.2 mi of coastline and 600 ft offshore	California Department of Fish and Game (CDF&G); County of Orange

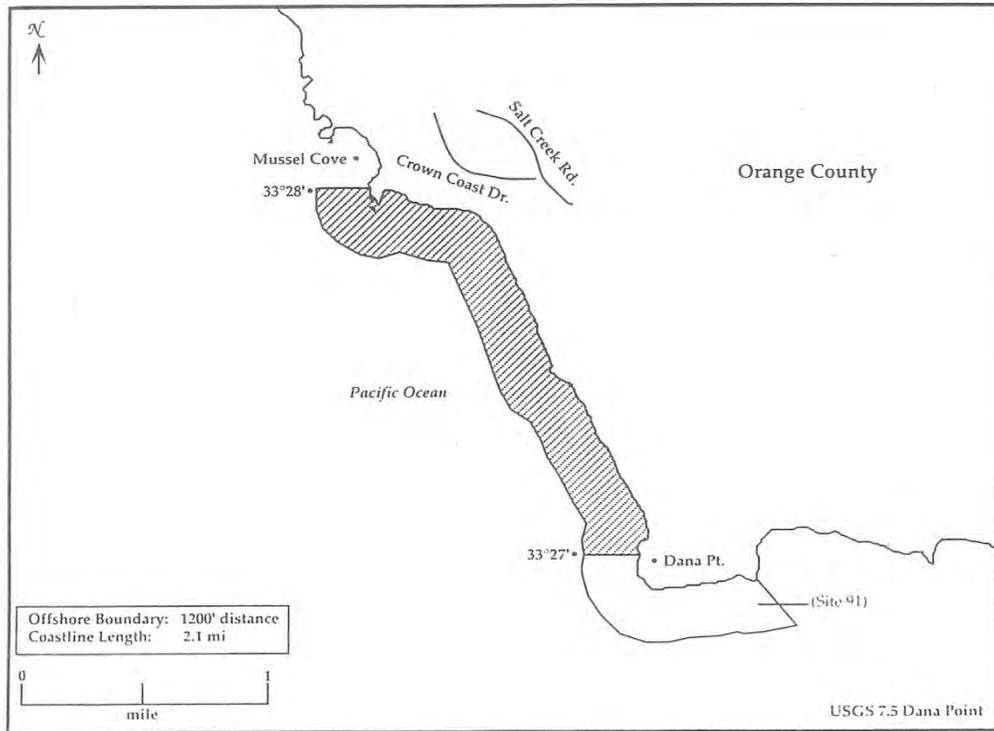


Figure 7a. Niguel State Marine Park

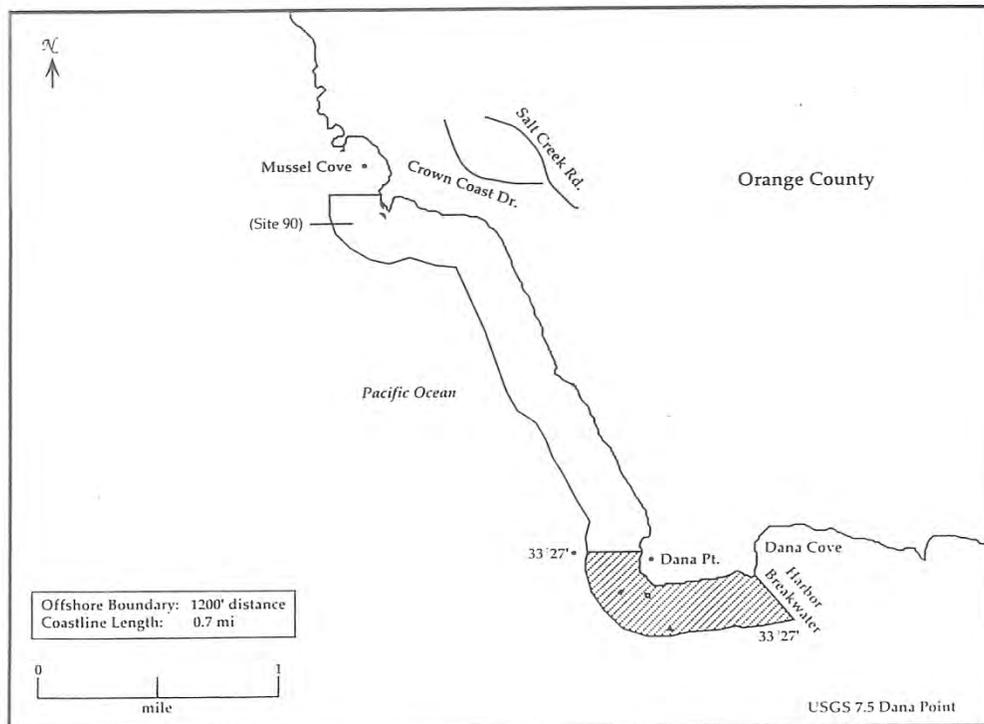


Figure 7b. Dana Point State Marine Park

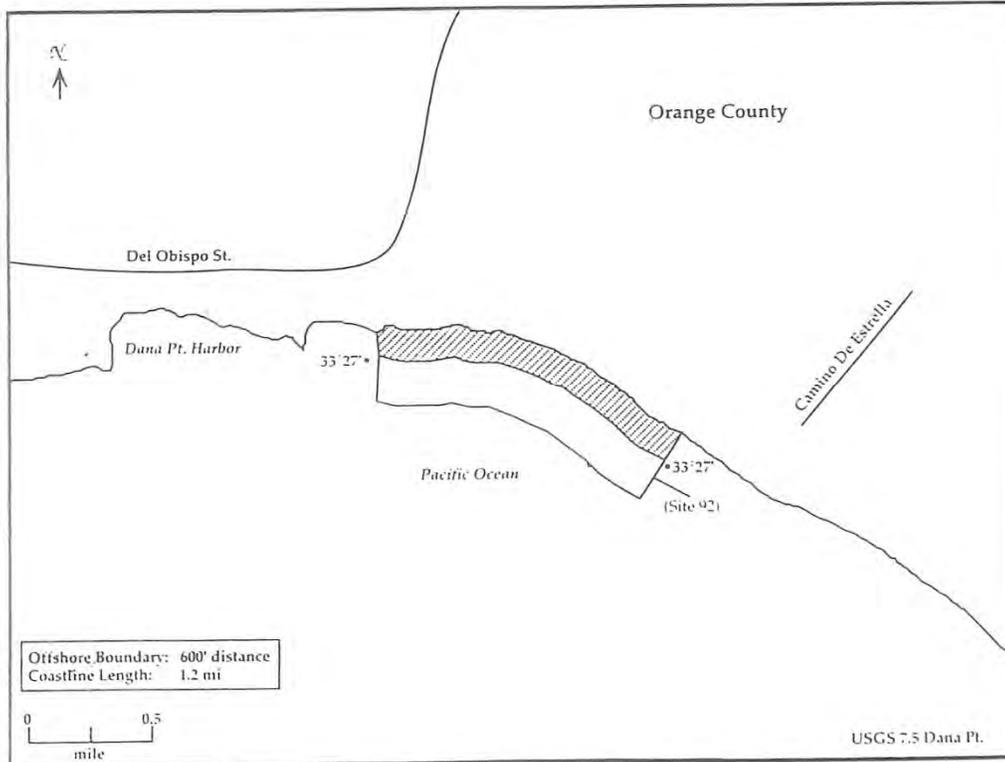


Figure 7c. Doheny Beach State Marine Park

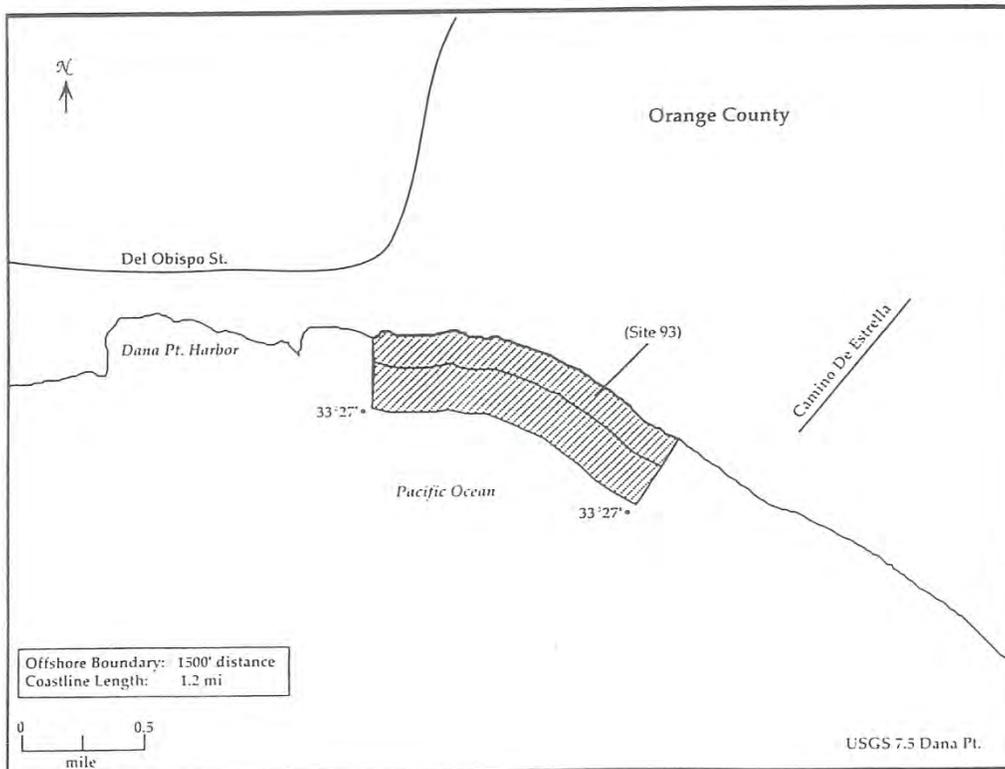


Figure 7d. Doheny Beach State Marine Conservation Area

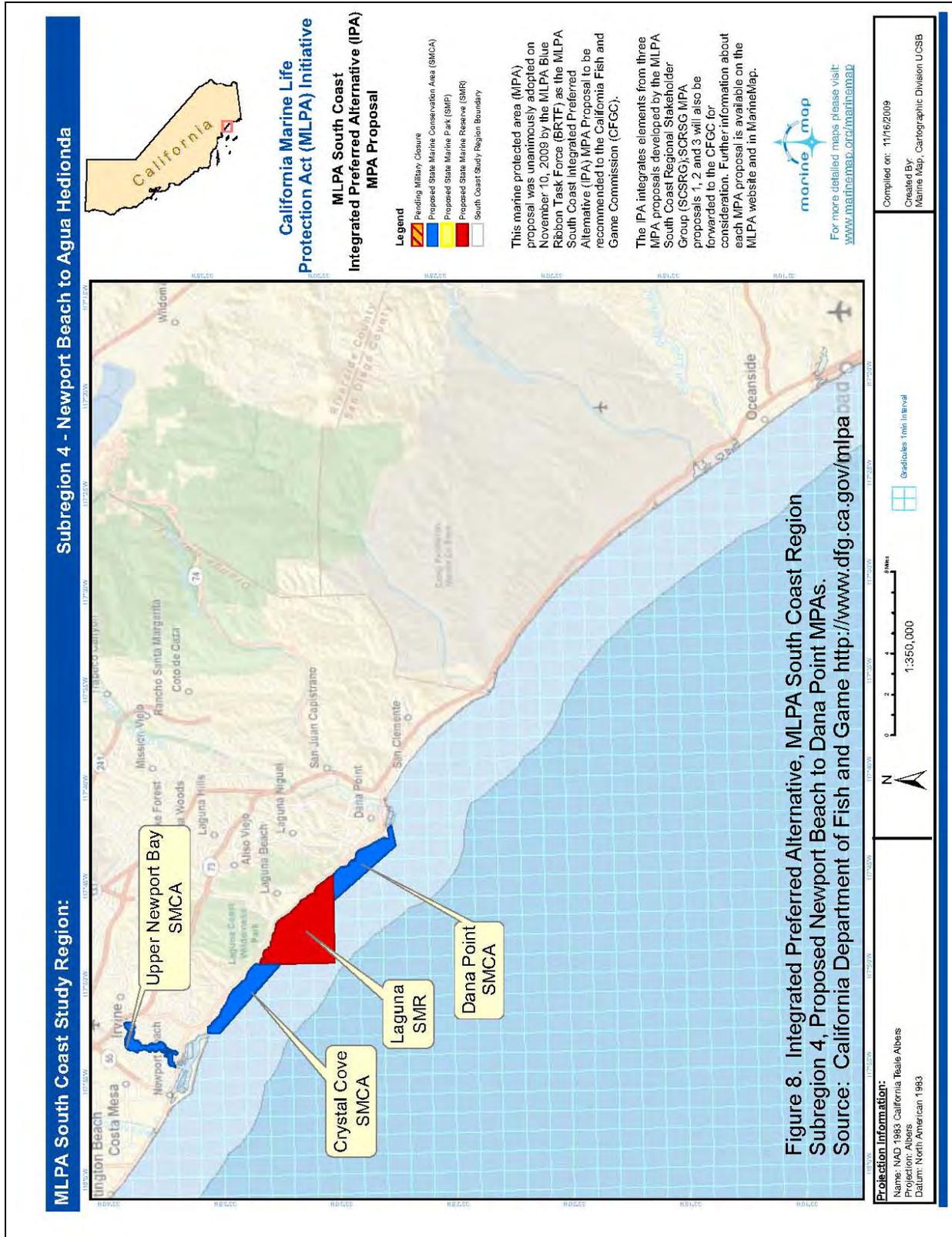
## 2.5.2 Proposed Marine Protected Areas

The 1999 Marine Life Protection Act (MLPA) mandated that the State of California design and manage an improved network of marine protected areas to protect marine life and habitats, marine ecosystems, and marine natural heritage. Marine protected areas include marine reserves, marine parks and marine conservation areas. Intertidal and subtidal habitats that were previously listed as State of California Marine Ecological Reserves and Marine Life Refuge have been reclassified. This re-classification was the result of a state-wide simplification of existing state-protected areas into six classifications, and replaced 18 classifications that were previously used to categorize state Marine Managed Areas (MMAs). Marine Protected Areas (MPAs) are a subset of MMAs and include conservation areas, marine reserves, state marine parks, and state marine conservation areas. The MLPA requires that the Department of Fish and Game (Department) prepare and present to the Fish and Game Commission (Commission) a master plan that will guide the adoption and implementation of a Marine Life Protection Program, which includes a statewide network of marine protected areas (MPAs). Other recent related legislation includes the Marine Life Management Act of 1998 (MLMA; Stats. 1998, Chapter 1052), Marine Managed Areas Improvement Act of 2000 (MMAIA; Stats. 2000, Chapter 385), and California Ocean Protection Act of 2004 (COPA; Stats. 2004, Chapter 719).

In August 2004, the California Resources Agency, California Department of Fish and Game, and Resources Legacy Fund Foundation launched an effort to implement the MLPA, after two unsuccessful earlier attempts. On April 13, 2007, the California Fish and Game Commission adopted regulations to create a new suite of marine protected areas (MPAs) designed for the Central Coast of California, the first region considered for the State. This move effectively launched the state's Marine Life Protection Act (MLPA) Program. Southern California MPAs (Point Conception to the Mexican Border) and Northern California MPAs are currently undergoing reviews.

For Southern California, a marine protected area (MPA) proposal was unanimously adopted on November 10, 2009 by the MLPA Blue Ribbon Task Force (BRTF) as the MLPA South Coast Integrated Preferred Alternative (IPA) MPA Proposal to be recommended to the California Fish and Game Commission (CFGC). The IPA integrates elements from three MPA proposals developed by the MLPA South Coast Regional Stakeholder Group (SCSRG); the BRTF also adopted a motion to forward SCSRG MPA proposals 1, 2 and 3 to the CFGC for consideration. The IPA recommends 50 marine protected areas (MPAs) in state waters in the MLPA South Coast Study Region, which extends from Point Conception in Santa Barbara County to the California/Mexico border in San Diego County (<http://www.dfg.ca.gov/mlpa/southcoastipa.asp>).

The proposed Sub region 4 MPAs in the vicinity of Dana Point Harbor are shown in Figure 8. These include the Crystal Cove State Marine Conservation Area, the Laguna Marine Life Reserve, and the Dana Point State Marine Conservation Area. Local



## 2.6 FISH MANAGEMENT PLAN SPECIES

This assessment of Essential Fish Habitat (EFH) for the Dana Point Harbor Waterside Improvement Project is being provided in conformance with the 1996 amendments to the Magnuson-Stevens Fishery Management and Conservation Act (FR 62, 244, December 19, 1997). The 1996 amendments to the Magnuson-Stevens Act set forth a number of new mandates for the National Marine Fisheries Service, eight regional fishery management councils, and other federal agencies to identify and protect important marine and anadromous fish habitat. The councils, with the assistance from NMFS are required to delineate EFH for all managed species. Federal action agencies which fund, permit, or carry out activities that may adversely impact EFH are required to consult with NMFS regarding the potential effects of their actions on EFH, and respond in writing to the NMFS recommendations.

The Dana Point Harbor Waterside Improvement Project area is located in an area designated as EFH in the Coastal Pelagics Fisheries Management Plan (FMP) and the Pacific Groundfish FMP. The Coastal Pelagics FMP includes four finfish (Pacific sardine, chub mackerel, northern anchovy, and jack mackerel) as well as market squid (Pacific Fisheries Management Council, 1998). The Pacific Groundfish FMP includes 83 species, many of which are rockfish (Pacific Fisheries Management Council, 2008).

### 2.6.1 Coastal Pelagic FMP

Coastal Pelagic FMP Species that are likely to be present within and outside of Dana Point Harbor include northern anchovy and Pacific sardine. Outside the Harbor, jack mackerel and chub mackerel are known to occur; these however, would only be present within the Harbor, on rare occasions.

Of these species, the northern anchovy is the most likely species to be within the Dana Point Harbor Waterside Improvement Project Area.

**Northern Anchovy-*Engraulis mordax*:** The central subpopulation ranges from approximately San Francisco, California, to Punta Baja, Baja California. The bulk of the central subpopulation is located in the Southern California Bight, a 20,000-square-nautical-mile area bounded by Point Conception, California, in the north and Point Descanso, Mexico, (about 40 miles south of the U.S.-Mexico boarder) in the south. Northern anchovy in the central subpopulation are typically found in waters that range from 12° C to 21.5° C. All life stages are found in the surface waters of the EEZ. Eggs and larvae are found near the surface, generally at depths of less than 50 meters and in the same areas as spawning adults. Anchovy eggs are most abundant at about 14° C. Nearshore habitat areas <90 meters) between Pt. Conception, California and Pt. Banda, Baja California represented 23% of the available habitat for central stock juvenile northern anchovy (Pacific Fishery Management Council, 1998).

Northern anchovy comprise a significant portion of nearshore otter trawl catches and contribute moderately to the nearshore fish biomass of the nearshore area of San Pedro Bay (MBC Applied Environmental Sciences, 1997) and accounts for about 80% of all fishes caught within 3 km of the coast in the Southern California Bight (Cross and Allen 1993). Along the coast of northern Orange County and Long-Beach to LA Harbors, this species ranked highest in abundance during 6 of the 11 monitoring surveys between 1972 and 1997 offshore of the San Gabriel River and was never ranked lower than the 5<sup>th</sup> most abundant species. The northern anchovy is also the most abundant species in Los Angeles Harbor, representing over 80% of the fish caught (MEC Analytical Systems, 1988, 1999), and larvae of the species are also a common component of the ichthyoplankton (MEC Analytical Systems, 1988). In Los Angeles Harbor, Northern Anchovy appear to prefer deeper waters of the Harbor. There is a

commercial bait fishery for northern anchovy offshore of Dana Point Harbor, and a commercial bait barge is located within Dana Point Harbor. Larvae of northern anchovy are also part of the Dana Point ichthyofauna and ichthyoplankton community.

### 2.6.2 Pacific Groundfish FMP

The Pacific Groundfish FMP species that are likely present within Dana Point Harbor or immediately outside Dana Point Harbor rocky habitats include the California scorpion fish (*Scorpaena guttata*) that is associated rocky habitats on the breakwaters, and potentially, juvenile Olive rockfish (*Sebastes serranoides*). While both may be associated with rocky habitats along the breakwaters and to a lesser extent the quarry stone lining the Island Marina shoreline in the outer section of the Harbor, populations of these species are expected to be low.

**California scorpion fish -*Scorpaena guttata*.** California scorpionfish are benthic and found intertidally as deep as 183 m. They are commonly found in both sandy and rocky areas, in association with rocky reefs, often lodged in crevices. Although it is commonly a solitary species, it aggregates near prominent features and can be associated with anthropogenic features including pipes and wrecks. Juveniles settle on rocky bottom. Very young scorpionfish live in shallow water hidden away in habitats with dense algae and bottom-encrusting organisms McCain (2003). The Dana Point breakwaters and the quarry stone protecting the marinas is likely habitat for this species.

**Olive rockfish-*Sebastes serranoides*.** Olive rockfish occur from surface/intertidal waters to 174 m deep but most commonly they occur in waters less than 30 m. Adult olive rockfish are a midwater fish, almost always lining over hard, high relief (such as reefs, wrecks, oil platforms or pipes), Young-of-the-year and adults are primarily found hovering off the bottom, Sometimes olive rockfish are observed well off the bottom, in or near kelp or over rocky reefs, Olive rockfish prefer clear-water areas of dense kelp and are rarely caught or seen over sandy substrate, Olive rockfish distribution is fairly even over all rocky substrata, although significant selection is exhibited toward low rock substratum, The larval stage of olive rockfish is planktonic, When young-of-the-year olive rockfish settle out of the plankton they are most commonly found in and around kelp beds, oil platforms, surfgrass, and other structures at depths as shallow as 3 m, Young olive rockfish also are found under drifting kelp mats McCain et al (2003). In Los Angeles Harbor, olive rockfish has been found largely as juveniles associated with the kelp growing along the inner edge of the federal breakwater (MEC Analytical Systems, 1988). One unidentified rockfish was observed nearby eelgrass patches and low-relief reef seaward of Baby Beach in June 2010 (CRM, Inc., 2010)

### 2.6.3 Habitats of Particular Concern

Eelgrass (*Zostera marina*) is identified as HAPC for ESH groundfish species. Eelgrass meadows form a basis of primary production that supports ecologically and economically important species. Eelgrass is an important habitat for invertebrates which use eelgrass beds as a source of food and attachment. Marine fishes seek the shelter of the beds for protection, and forage on invertebrates that colonize the eelgrass blades and sediments in and around eelgrass vegetation. The vegetation also serves a nursery function for many juvenile fishes, including species of commercial and/or sports fish value (California halibut and barred sand bass) and federal Fishery Management Plan (FMP) groundfish species (i.e., lingcod (*Ophiodon elongatus*), and Bocaccio rockfish (*Sebastes paucispinis*)).

As discussed in Section 2.3.1, eelgrass is found in Dana Point Harbor, although it is not abundant and its density is low. Its distribution is primarily limited to the region near Baby Beach (Chambers Group, Inc. 2005; BC Applied Environmental Sciences 2008, 2009; Coastal Resources Management, Inc., 2010). A single patch was also located in the boat basin north of the launch ramp in 2009 (MBC Applied

Environmental Sciences, 2009) but it was not relocated in 2010 (Coastal Resources Management, Inc. 2010).

## 2.7 INVASIVE ALGAE

### 2.7.1 *Caulerpa taxifolia*

*Caulerpa* (Figure 9) has a potential to cause ecosystem-level impacts on California's bays and nearshore systems due to its extreme ability to out-compete other algae and seagrasses. *Caulerpa taxifolia* grows as a dense smothering blanket, covering and killing all native aquatic vegetation in its path when introduced in a non-native marine habitat. Fish, invertebrates, marine mammals, and sea birds that are dependent on native marine vegetation are displaced or die off from the areas where they once thrived. It is a tropical-subtropical species that is used in aquariums. It was introduced into southern California in 2000 (Agua Hedionda Lagoon and Huntington Harbour) by way of individuals likely dumping their aquaria waters into storm drains, or directly into the lagoons. While outbreaks have been contained, the Water Resources Board, through the National Marine Fisheries Service and the California Department of Fish and Game require that projects that have potential to spread this species through dredging, and bottom-disturbing activities conduct pre-construction surveys to determine if this species



Figure 9. The invasive algae, *Caulerpa taxifolia*. Source: NOAA/NMFS

is present using standard agency-approved protocols and by National Marine Fisheries Service/California Department of Fish and Game Certified Field Surveyors.

### **Focused Surveys for Invasive Algae**

*Caulerpa* was not observed within the regions proposed for waterside improvements during surveys conducted for this project in Feb/March 2007, Oct/Nov 2007, and June, 2010 (Coastal Resources Management, Inc., 2010), or for the Dana Point Harbor Maintenance Dredging and Beach Nourishment Project (Chambers Group, Inc. 2005, 2006; MBC Applied Environmental Sciences, 2008). The CRM invasive algae survey covered 6.28 acres of harbor bottom habitat (Table 2 and Figure 4). Overall, the bottom area surveyed by both diving biologists and remote underwater video averaged 24.7% of the total

bottom habitat within the project survey limits, ranging from 13.9% in the East and West Marina basins to over 100% coverage in the at the Youth Sailing Center and the Harbor Patrol Basin. Baby Beach areal cover (by divers and video in 2007 and 2010) covered 100% of the survey area, and reflected a survey effort concentrated in a region where there was the highest probability of locating either *Caulerpa* algae or eelgrass.

### 2.7.2 *Undaria pinnatifida*

*Undaria pinnatifida* (Figure 10) is a golden-brown kelp native to the Japan Sea. It has been introduced in Australia, New Zealand, and Europe and has now spread to the California coastline. It has been found in Santa Barbara Harbor, Long Beach Harbor, Anaheim Bay, San Diego Bay, and offshore of Catalina Island.

In Japan it is known as wakame and is extensively cultivated as a fresh and dried food plant. However, it has the potential to become a major pest in our coastal waters. *Undaria* grows to between 3 to 7 feet (1 and 2 m) tall and is found in sheltered harbor waters on rocks, breakwaters, and marine debris from the low-tide mark to 50 feet (15 m). A mature plant has a distinctive, spiraled (frilly), spore-producing structure at its base. It also has an obvious central stem to 4 inches (10 cm) wide that extends for the length of the plant (Figure 7). The blade may be up to 3.1 feet (1 m) wide and extends from the tip of the plant for half the length of the plant.

#### Focused Survey for *Undaria*

*Undaria* was not observed during dive surveys or remote video surveys in Dana Point Harbor between February 2007 and June 2010 (Coastal Resources Management, Inc. 2010).



Figure 10. *Undaria pinnatifida*. Source Photo: CRM

**2.7.3 *Zostera japonica*.** Dwarf eelgrass is native to Asia and threatens to upset the natural balance of California's wetlands. It has been found in Humboldt Bay (<http://www.dfg.ca.gov/invasives/dwarfeelgrass>; Foss et al., 2007). It has not been found in Dana Point Harbor.

### **3.0 MARINE RESOURCES IMPACT ASSESSMENT**

#### **3.1 PROPOSED PROJECT**

Proposed waterside upgrades to Dana Point Harbor include (1) the renovation and re-orientation of the East and West marina basin dock systems by replacing old and deteriorating docks, slips and gangways with new facilities; (2) dock redesign and improvements for the Youth Sailing Center, the Harbor Patrol facilities, Commercial Fishing Dock, the Sport Fishing Dock, the Dry Stack Docks, and the Embarcadero Docks; (3) the construction of a temporary dock facility for vessels that would be displaced during marina reconstruction.; (4) the addition of handicap access at locations where it currently is not available; (5) upgrading vessel pump out facilities; and (6) upgrading dock utilities.

The number of boat slips within the Harbor will decrease from 2,409 to 2,223 (a loss of 116 slips) although the average slip length will increase from 29.85 feet (ft) to a length not to exceed 32 ft. A total of 1,306 existing piles will be removed and 969 new piles will be emplaced. The total dock surface area will decrease from 492,530 square feet (sq ft) to 459,540 sq ft (a net decrease of 32,990 sq ft) One-thousand three hundred and six, 14-inch diameter pilings with a surface area of 1,396 sq ft will be replaced by 969 piles (851, 16-inch diameter piles and 118, 18-inch diameter piles) with a surface area of 1,395 sq ft.

In order to accommodate boaters during the dock and slip renovations, the project also includes a set of temporary docks along the breakwater adjacent to Doheny State Beach that will have a surface area of 2,590 square feet. Once renovations to all dock areas are completed, the temporary docks may become docks for some yacht brokers who currently have docks in the East and West Basins. An ADA gangway is included in the plans for the temporary/yacht broker docks. The relocation of some yacht broker slips to this new location will allow for more slips to be made available to the general public. The number of yacht broker slips is not being increased with the proposed project. The placement of these docks near the breakwater would require the nearby relocation of the existing bait barge.

#### **3.2 PROPOSED CONSTRUCTION METHODS**

Improvements are anticipated to occur over a period of about eight years. Within each area, the construction phases will include the removal of the existing dock and piles, and the installation of the new dock and piles. Piles will be removed by vibratory extraction equipment mounted to a crane operating from a barge. However, if piles break off at the mudline, they will be manually cut two to three feet below the mudline. The old piles and floating docks will be lifted from the water using a crane and then trucked off-site.

New floating docks systems will consist of prefabricated, lightweight aggregate concrete modules. No creosote treated wood products will be included in the new concrete dock system.

The last phase for each area would be the placement of the piles and prefabricated docks. It is anticipated that piles will be pre-drilled into rock. Pre-stressed concrete piles will then be set into these holes and then grouted with cement or sand. A Seaflex anchoring system for the temporary docks is currently being considered as an alternative to the standard dock and pile design. If a Seaflex system is used, anchors will still have to be anchored, to perhaps drilled-in piles, since the typical helix anchors would not be able to penetrate the rock substrate (Randy Mason, URS Corporation, pers. com with R. Ware 1/10/08). However, this analysis assumes that a Seaflex system will not be employed.

### 3.3 SHORT-TERM WATER QUALITY CONSTRUCTION IMPACTS

#### 3.3.1 Pile Replacement and Dock Construction

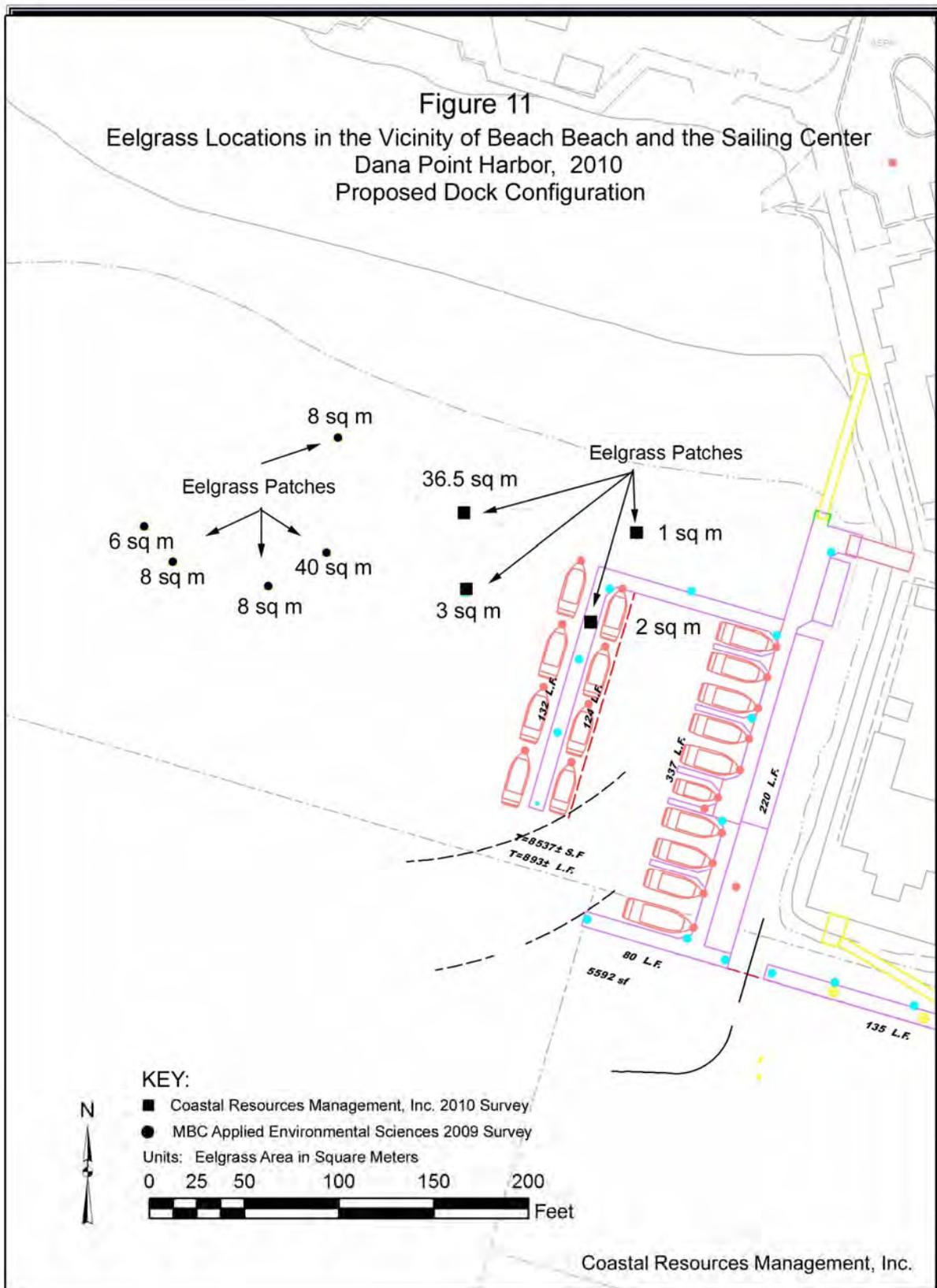
**Marina Basins, Dry Stack Dock, and Ship Yard Docks.** New piles will be removed, cut off at the water-line, and new ones placed into pre-drilled holes in rock substrate. These activities could increase the levels of water turbidity as each phase of the project is being conducted. Higher turbidity is expected to be limited to the specific area of dock improvements and the turbidity plume would dissipate as a function of tidal exchange within the basins. While the impact is expected to be short-term and have a less-than-significant impact on water quality within each specific phase, the project will be conducted over a period of several years. Thus, site-specific turbidity levels have a potential to be above-ambient with a portion of the Harbor for an extended period. Best Management Practices and Mitigation Measures to limit the spread of the turbidity plume outside the work area are provided in Section 4, Mitigation Measures.

Pile replacement activities would also have a potential to release detectable levels of sediment-bound contaminants into the water column that would be redistributed through the tidally-induced movement of the turbidity plume. Organically enriched sediments resuspended into the water column during pile replacement would also cause a slight decrease in dissolved oxygen levels. Tidal currents would slowly dissipate the oxygen-poor water mass and replenish ambient oxygen levels within one-to-several tidal exchanges.

Sediment testing for the Dana Point Harbor Dredge Material Evaluation (Kinnetic Laboratories and Moffatt & Nichol, 2007) indicated that fine sediments in one particular zone near the 60 inch storm drain in the East Basin contain elevated levels of copper and total DDTs compared to other sites tested. Consequently, pile removal and replacement in the vicinity of this one zone may result in the resuspension of material that could degrade water quality. This has a potential to result in a short-term adverse, significant impact to water quality within the East Basin. Mitigation measures to reduce the level of impact to less-than-significant is provided in Section 4, Mitigation Measures.

**Temporary Dock, Youth Sailing Center Docks, and Sport Fishing Docks.** Turbidity associated with pile driving and/or boring activity in the vicinity of hard-bottom habitat and reefs will potentially result in a short-term reduction of light and an increase of suspended material. Bottom sediments may also be disturbed during the process that could increase turbidity in the vicinity of eelgrass near the proposed Sailing Center docks. Eelgrass surveys conducted in the vicinity of the proposed dock improvements (Coastal Resources Management, Inc. 2010) indicate that as of June 2010, one or two small patches of low-density eelgrass may be affected by turbidity generated from pile driving activity. However, there is a potential for more eelgrass expanding into the proposed dock footprint in the next several years.

Turbidity plumes would dissipate and disperse out of the area over the course of daily tidal changes. Some suspended sediment may settle on eelgrass blades. The loss or reduction of eelgrass areal cover and density as a result of increased turbidity would be a local but significant impact to the expanding eelgrass bed in the vicinity of Baby Beach. Pre-and-post dock construction eelgrass surveys will be required per the provisions of the Southern California Eelgrass Mitigation Policy (National Marine Fisheries Service, 1991 as amended). Based upon these surveys, a determination will be made if mitigation is required, and a mitigation plan to offset eelgrass habitat losses will be developed if eelgrass losses occur. Best Management Practices to reduce the potential for eelgrass habitat losses during construction are presented in Section 4.



**3.3.2 Oil and Fuel Discharges.** Accidental oil or fuel spills that could potentially occur during the Harbor renovation project could significantly affect water quality and marine biological resources within and nearby the Harbor. Such events are likely to be localized spills of lighter, refined diesel fuels, gasoline, and lubricating oils that are highly toxic to marine life. The potential for the occurrence of petroleum-product leaks or spills would be low-to-moderate but the potential for significant, long-term effect on marine resources would be moderate-to-high in the event of a spill. Best Management Measures (BMPs) to avoid oil spills, water quality degradation, and adverse impacts on fish and wildlife are provided in Section 4. With the inclusion of BMPs, the expected impact on fish and wildlife would be less-than-significant. The inclusion and implementation of a Marina Construction Management Plan for the project will assist in preventing accidental spills and provide the necessary guidelines to follow in case of an oil or fuel spill. Such an action will assist in reducing a potentially significant oiling event to less-than-significant.

### 3.4 SHORT-TERM CONSTRUCTION IMPACTS ON MARINE BIOLOGICAL RESOURCES

#### 3.4.1 Soft and Hard-bottom Associated Benthic Communities

**Dock and Pile Replacement.** The removal of 1,306 piles and subsequent placement with 969 support piles for the new dock systems in Dana Point Harbor will result in minor disturbances to soft-bottom benthic invertebrates within a zone of disturbance around the piles to be removed related to sediment resuspension and sediment disturbances from machinery. This would constitute a less-than-significant impact on soft-bottom infauna. Once disturbances end, larvae will settle on the sediments and begin the process of recolonization. Long-term impacts of removal of soft bottom habitat and replacement with piles are discussed in Section 3.6.

Marina Basins. The removal of docks and dock pilings within the marina basins, the Youth Sailing Center, the Sport Fishing Dock, Dry Stack Dock, and the Ship Yard Dock will result in an initial loss of biofouling (pile-dwelling) associated flora and fauna on each of the 1,306 piles. Because the marina redevelopment will occur during several phases over an eight-year period, losses will be site-specific and will not occur throughout the Harbor at the same time. Some of the biofouling cover will be dislodged during the pile removal process, creating a zone of organic debris on the Harbor bottom in the immediate vicinity of the docks.

Most of the biofouling organisms would be removed and transported offsite to a proper disposal area eliminating a significant localized impact related to an accumulation of decaying organic material on the harbor seafloor. The removal of the pilings is unlikely to result in the release of a significant amount of contaminants; most contaminants present on the pilings would be bound up within the tissues of the organisms being removed. None of the species that would be removed are considered sensitive or unique.

#### Youth Sailing Docks, and Sport Fishing Docks-Hard Substrate Impacts

Construction of piling and dock systems for the Youth Sailing Center and the Sport Fishing Dock would potentially affect hard-bottom macroflora and fauna living on or among the subtidal hardscape within these areas. Losses would be associated with the direct effects of pile driving and secondary turbidity plumes. Mortality of individual plants and invertebrates might occur. These initial losses would be offset since additional pile substrata and surface area would be added. Plants and invertebrates would begin to colonize the new hard substrate upon completion of construction. Mobile *macroinvertebrates* (i.e., octopus and lobsters) would likely move out of the impact zone. The losses of plants and invertebrates from pile driving would not result in any population level impacts to *macrobiota* within the surrounding region. Therefore, the construction of docks and the addition of the piles would have an unavoidable,

short-term less-than-significant, on hard-bottom associated plants and invertebrates within these areas of Dana Point Harbor.

Temporary Dock System. The majority of habitat potentially affected the construction of the proposed temporary dock system in the East Channel (and permanent broker docks) is sand to silty bottom in the lee of the East Breakwater. Remnants of low-reef outcrops may be present but these are mostly buried and exhibit low biological productivity. The loss of biomass would be offset by the addition of piles that would function as additional hard bottom habitat for invertebrates and algae.

Dumping of trash, debris, hazardous materials, and organic wastes from vessels or from visitors to the Temporary Dock area could degrade water quality, habitat values, and marine life. This would result in a potentially significant, localized impact on the quality of the bottom habitats. BMPs to reduce this impact to less-than-significant are discussed in Section 4.

### 3.4.2 Water Column Biota

**Piling Replacement Activities.** The project area water column habitat supports species of plankton and fish common to bays and harbors of southern California. These organisms live with constant sources of turbidity from runoff and other sources have acclimated to some degree to turbid conditions that might arise from pile removal and replacement. In addition, fishes have the ability to swim away from disturbances such as noise, vibrations, and excess turbidity, while plankton move with the currents and do not remain in one location for an extended period of time. These behavioral mechanisms help preclude construction impacts from occurring on water column organisms.

Construction activities would cause a temporary reduction in submarine light levels and a very localized, short-term reduction of plankton productivity due to increased turbidity. Because plankton drift with the currents there would be only be short-term, less-than-significant construction impacts to the plankton community.

There would be no direct loss of open water (schooling) fishes from pile removal and replacement. Water column fishes would avoid the immediate work area due to either increased turbidity, or a potential increase in underwater pressure and noise levels from work equipment. However, the removal of pilings may also attract some fish to biofouling debris that is removed from piles that settles on the harbor floor. No mortality of bottom-dwelling species such as gobies is anticipated due to the mobile nature of fishes.

Secondary impacts of increased water turbidity on fishes would be a short-term, less-than-significant construction impact. A greater-than ambient suspended sediment load related to higher turbidity may temporarily reduce the ability of both visual-foraging fishes to feed (i.e., surfperch and halibut) and planktivores (i.e., topsmelt, anchovy, juvenile surfperch, and juvenile sciaenids). Because the Harbor Waterside Improvement project would proceed incrementally over months-to-years, fish living within the marina basins would be able to move to nearby areas without any negative impacts to their habitat or food sources.

Water column dissolved oxygen concentrations may decrease due to the resuspension of organically-enriched sediments. The resuspension of potentially toxic levels of copper and DDT may also potentially increase, particularly in areas near storm drains. These impacts would physiologically stress the fish in the area; their response would be to swim to less-stressed areas of the harbor. Since fish would likely move away from the immediate zone of turbidity, their exposure to elevated levels of contaminants is expected to be minimal. Turbidity would return to ambient levels upon cessation of pile removal and replacement activities through tidal flushing, which would allow fish to return to the area. In summary, the potential

impacts arising from pile and dock removal and replacement in Dana Point Harbor would have potentially less-than-significant, localized, and temporary impacts to the plankton and fish community.

### 3.4.3 Seabirds (See Section 3.4.5)

### 3.4.4 Marine Mammals (See Section 3.4.5)

### 3.4.5 Sensitive Species

**Eelgrass and Surfgrass.** Pile driving will not result in the direct loss of eelgrass based upon the results of 2009 and 2010 field surveys (MBC Applied Environmental Sciences, 2009; Coastal Resources Management, Inc. 2010). Should eelgrass areal cover expand into areas where pile driving will occur, there is a potential for some direct losses of eelgrass. Potential impacts at present are related to secondary turbidity effects (See Section 3.2).

Pre-and-post construction eelgrass monitoring surveys will be conducted to determine if direct loss of eelgrass have occurred as a consequence of pile driving activity. Based upon these surveys, it will be determined if mitigation for eelgrass losses are required, under provisions of the Southern California Eelgrass Mitigation Policy (National Marine Fisheries Service, 1991 as amended). BMPs to reduce eelgrass habitat losses in the general area of Baby Beach are provided in Section 4.0.

Surfgrass does not occur within the confines of Dana Point Harbor Improvement Area. This sensitive marine resource would not be impacted by construction activities.

**Abalone.** White, red, green, and black abalones are not likely to be present within any of the Harbor Waterside Improvement project construction zones. Their distribution is limited to areas outside of the Harbor on the seaward side of the marina breakwaters and in offshore rocky habitats. Consequently, Harbor waterside improvement construction activities are not expected to impact these sensitive mollusks.

**Tidewater Goby.** Tidewater gobies are not known to occur within Dana Point Harbor; no construction-related impacts would occur on this species or its habitat.

**Steelhead Trout.** There are no known populations of this species in the Harbor, although there are rare occasions when individuals may be present. Therefore, construction-related impacts on Steelhead Trout are not expected to occur, nor would its nearest spawning habitat (San Mateo Creek) be affected.

**California Halibut.** Juvenile halibut can be found within Dana Point Harbor. During pile installation, individuals in the immediate area of construction would swim away from bottom disturbances within the construction zone. No mortality or short-term stress on this species is anticipated as a result of construction activities.

**Sea Turtles.** The green sea turtle, Federally-listed as endangered, has been sighted offshore of Dana Point Harbor (RBF Engineering and MBC Applied Environmental Sciences, 2003) but their occurrences would be considered rare. There are no warm water discharges which might attract them to the Harbor, nor is there available suitable seagrass habitat for foraging. Although an occasional green sea turtle may enter the Harbor at the time of waterside improvements, the potential for adverse impacts to an individual is low. If present, marina reconstruction, the construction and abandonment of the temporary dock systems, and vessel movements within the Harbor could induce behavioral modifications to individuals (i.e., changes in swimming behavior) to avoid excessive noise, turbidity, or vessel movements.

No green sea turtle mortality would be expected to occur as a result of the waterside construction activities nor would the project cause any decline in green sea turtle populations. If a sea turtle is present

in the project area during marina renovation the mitigation measures identified in Section 4 would reduce these potentially short-term construction impacts to a less- than- significant level.

**Listed or Otherwise Sensitive Bird Species.** The special-status marine birds most likely to occur in the vicinity of the project area include brown pelican, double-crested cormorant, western snowy plover, California gull, elegant tern, and occasionally, California least tern and common loon. All of these species feed on fish and may, on occasion, forage in Dana Point Harbor. No breeding colonies for any of the sensitive species of seabirds exist in the project area.

Pile driving activity could potentially result in less-than-significant impacts to sensitive bird species related to an increase in localized turbidity plumes and a reduction in foraging habitat. These species rely on sight foraging behavior to catch their prey. In addition, their fish and invertebrate prey base may move out of the turbidity plumes caused by construction activities. Because pile driving activities are within localized areas, other areas of the Harbor would be available as foraging habitat for these species. Exposure to contaminants that could cause acute toxicity or bioaccumulation to sea birds would also be avoided by the implementation of a Marina Construction and Management Plan which would assist in reducing impacts related to contamination to less-than-significant.

Seabirds roosting on docks and jetty areas near the bait barge in the vicinity of the proposed Temporary Dock may be affected by construction. Seabirds would respond by moving to other, nearby roosting habitat, which is available throughout the harbor. This modification of seabird behavior would not have any population level impacts on seabird. Therefore, the impacts are considered to be less-than-significant.

A decrease in the amount of open-water habitat in the vicinity of the Temporary Dock in the East Channel would have a less-than-significant impact on the ability of seabirds to forage in the outer harbor channels. Schooling fishes (including baitfish used by seabirds) would likely aggregate in other areas of the channel. Therefore, foraging terns, gulls, and pelicans would follow their food sources. This modification of forage behaviors would not result in any significant, adverse impacts on seabirds.

**Marine Mammals.** All marine mammals are protected by the Federal Marine Mammal Protection Act of 1972 (MMPA). The MMPA prohibits the intentional taking, import, or export of marine mammals without a permit. Several of the species that occur within the SCB are also protected under the Federal Endangered Species Act of 1973 (ESA). A species that is listed as threatened or endangered under the ESA is categorized as depleted under the MMPA. Unintentional take of a depleted species is allowed by permit only if the activity is determined to have a negligible impact. Intentional take of a depleted species is only allowed under a scientific research permit.

Marine mammals are not anticipated to be in the immediate areas where pile removal and replacement would occur in the Harbor and would not suffer any direct mortality resulting from pile removal or pile replacement.

Vessel traffic coming in and going out of Dana Point Harbor (barges, tugs, work vessels) would be transiting to-and-from offshore waters where California sea lion, Pacific harbor seal, California gray whale, bottlenose dolphin, and other marine mammals are found. Transiting vessels have a low potential to collide with marine mammals, or exposure these resource groups to contaminants, or interfere with foraging activity. Marine mammals are generally capable of avoiding boat traffic (Richardson et al., 1983) especially at the speeds the vessels will likely be transiting at. Marine mammals in the local waters have also likely habituated to vessel traffic since large fishing vessels, excursion vessels, and work vessels commonly transit in-and-out of Dana Point Harbor. Vessel operators are also trained to recognize the presence of marine mammals which reduces the potential for adverse impacts. Therefore, impacts to

marine mammals should be less than significant. In the event a pinniped or cetacean is injured or killed as consequence of a collision, the impact would be a locally significant impact, but it would not result in a population-level impact. Should this occur, the vessel operator and the County of Orange will immediately notify the National Marine Fisheries Service (Southwest Division) and will submit a written, follow up report within 24 hours of the incident.

Marine mammals are not anticipated to be in the immediate areas where pile removal and replacement will occur in the marina and will not suffer any direct mortality resulting from pile removal or pile replacement.

**Noise Production from Pile Extraction and Pile Driving.** Marine mammals are capable of hearing over long distances, and even though they may not be in immediate vicinity, there is a low potential for marine mammals to be affected by pile driving activity. The duration of such noise would be intermittent and the work at each site would be in different locations and at different times.

One-thousand three hundred and six, 14-inch diameter pilings will be replaced by 969 piles (851, 16-inch diameter piles and 118, 18-inch diameter piles). The use of concrete piles is an environmentally superior method- acoustically speaking- to the use of steel piles since because it produces less noise from individual pile strikes (ICF Jones & Stokes and Illingworth and Rodkin, Inc. 2009). However, pile extraction and pile driving will still result in the production of some underwater noise and vibrations within Dana Point Harbor that marine mammals may be capable of sensing. Overall however, moving sound sources from vessels and aircraft seem to be more disturbing than stationary sources such as drilling rigs and drill ships (Richardson et al., 1983). The initiation of these pile driving could potentially result in a minor startle response from nearby marine mammals and they would be expected to either move away from, or avoid the immediate vicinity. A minor startled response by a marine mammal (most likely a sea lion) would include swimming away from the source of dredging, from either the physical presence of the dredge equipment or sound/vibration detected by the animal that was produced from dredge equipment. No deleterious impacts would result from a minor startled response. Over time, marine mammals would acclimate to the noise. Most pile driving would occur within the East and West Marina Basins, where marine mammals are least likely to be. and although they would likely able to “sense” pile driving noise, the magnitude and intensity of the source sounds are unlikely to result in any significant changes in behavior. Such types of sounds and their intensity levels are common throughout the range in which these marine mammals live.

Pile driving in the air and water could cause seal lions to temporarily move farther away from these activities, although the sea lions are anticipated to adapt to noise. Breeding would not be affected because sea lions do not breed in Dana Point Harbor (Bonnell and Dailey, 1993)

The following information is extracted the Port of Los Angeles (2008), Pacific L.A. Marine Terminal LLC Crude Oil Terminal Final SEIS/SEIR 3.3-23 and 3.3 24 in response to the National Marine Fisheries Service’s comments regarding the effects of noise on pinnipeds relative to pile driving in L.A. Harbor.

“Pinnipeds appear to have greater tolerance to noise levels than cetaceans. Kastelein et al. (2006) demonstrated that captive seals avoid zones where the sound pressure levels were louder than 107 dBrms (re 1  $\mu$ Pa), but noted that it is possible that in the wild, seals may tolerate higher levels, in order to get food, escape predators, or stay with a pup. Finneran et al. (2003) found no measurable Temporary Threshold Shift (TTS) at sound pressure levels up to 178 to 183 dB (re 1  $\mu$ Pa) for California sea lions, a sea lion, harbor seal, and northern elephant seal at sound pressure levels over periods of 25 to 50 minutes. Increasing the exposure duration from 25 to 50 minutes had a greater effect on threshold shifts than increasing the exposure level from 80 dB original sound source level (SL) (137 to 159 dBrms re 1  $\mu$ Pa) to 95 dB SL (152 to 174 dBrms re 1  $\mu$ Pa); SELs resulting in TTS onset ranged from about 183 to 206 dB (re

1  $\mu\text{Pa}^2$  s). Kastak and Schusterman (1996) reported TTS in California sea lions exposed to airborne noise from nearby construction.

Pile driving produces noise levels of 175 to 205 dBrms 177 to 220 dB (re 1  $\mu\text{Pa}$ ) at 33 ft (10 m) depending on the material and size of the piles (Caltrans 2007). Caltrans (2007) data indicate the sound level for the proposed steel piles could be as high as 195 dBrms at 33 ft (10m). In comparison, an underwater sound level of 180 190 dBrms (re 1  $\mu\text{Pa}$ ) has been designated as the level A harassment level for pinnipeds (Federal Register 2005), representing a potential effect level for marine mammals occurring close to construction noise in the Outer Harbor.

Observations during pile driving for the San Francisco-Oakland Bay Bridge East Span seismic safety project showed minimal response in harbor seals while sea lions swam rapidly out of the area (Caltrans 2001). In water, sound transmission loss is between 3 and 6 dB per doubling of distance, with approximately 4.5 dB per doubling of distance in nearshore waters (Vagle 2003). However, at distances of less than about 330 feet (100 m), the transmission loss (rate of attenuation) can be less (Caltrans 2007). For this project, marine mammals such as pinnipeds could experience sound levels approaching Level A harassment levels at around 100 m (330 feet) from the pile driving. This estimate accounts for the size of the largest steel piles, the power of the hammer that would be required to drive them, the lower rate of attenuation close to the pile, and uncertainty in the sound propagation rate that depends on site-specific characteristics (Caltrans 2007). “

Few, if any, individual sea lions or marine mammals would be expected to be present with the Dana Point Harbor during dredging or pile extraction or cement pile driving activities. Any sea lions or other marine mammals present would not be harmed, because they would likely either move out of range of sound produced by pile driving, or they would adapt to expected sound intensities. The effect would be of short duration for each pile. The size of the piles to be driven for the project (average of 14 and 18 inch diameter pilings) are smaller in diameter than those typically used for commercial port shipping operations and the use (cement production piles) will produce less noise. Therefore, the sound intensity produced, and the potential level of impact for the Dana Point Harbor project will be less than that within the Port of Los Angeles for pile driving operations, and a less-than-significant project impact.

Based on the review of data for Los Angeles Harbor, and the fact that smaller concrete production piles will used for this project do not produce as intense sounds as steel piles, the expected level of impact to marine mammals for the project will be less-than-significant. Noise levels are expected to be below that identified as harassment during therefore an application to the NMFS for an Incidental Harassment Authorization, under Section 101 of the Marine Mammal Protection Act will not be necessary. In addition, the County of Orange will add a mitigation measure to the project that requires slowly ramping up pile-driving activities (referred to as a “soft start”) at the start of Dana Point Harbor pile-driving activities (at the beginning of the day and at restarting of construction after lunch breaks or other pile driving interruptions of longer than 15 minutes). See Section 4 for this mitigation measure.

Exposure to contaminants that could cause acute toxicity or bioaccumulation to marine mammals, sea turtles, and sea birds would be avoided by implementing a Marina Construction and Management Plan as part of the County’s marina management program. With the implementation of this BMP, impacts related to contamination would be less than significant. No mitigation would be required.

### 3.4.6 Sensitive Habitats

**Reef Habitat.** Scattered low-to-moderate relief rocky reef habitat is present within the confines of the protected Dana Point Harbor, remnant of the open coastal reefs present prior to the construction of the harbor. While biological diversity of these reefs is less compared to reefs outside the Harbor due to

sedimentation, less wave exposure, and exposure to higher levels of contaminants, Dana Point Harbor reef habitat still supports many types of plants, invertebrates, and fishes.

Within the limits of proposed harbor improvements, the scattered outcrops support characterized by low-diversity biological communities are found in the East and West marina basins; west of the Sailing Center; and in the East Channel in general proximity to the proposed Temporary Dock (Coastal Resources Management, Inc. 2010). Outside the project area (in the Main Channel and West Channel near the protective quarry stone slopes of the Island Marina), biological diversity is considerably higher.

Pile driving has a potential to damage isolated reef outcrops and associated macro-invertebrates and macro algae (i.e., gorgonians, snails, and urchins, and kelp). Because it is not generally known exactly where these reefs are with respect to pile locations, sidescan sonar surveys will be necessary prior to the construction of the temporary docks to pinpoint reef habitat and assess the amount and quality of reef habitat and associated biological resources. However, based upon the results of previous surveys, the reefs in the East Channel are highly impacted, very low relief, and covered in silt (Coastal Resources Management, Inc. 2010). Reefs in the West Channel are outside the footprint of the proposed Sailing Center Dock. If reef habitat is present, pile removal and installation may result in the disturbance of a small percentage of low-relief and associated organism. Based on existing information, is anticipated that the impacts from the construction of the temporary dock in the East Channel will result in less-than-significant on rocky subtidal habitat and biota. Best Management Practices (BMPs) to lessen the potential for adverse impacts to reefs in the vicinity of the temporary dock are provided to further reduce potential impacts on reefs (See Section 4).

**Giant Kelp.** Individual giant kelp (*Macrocystis pyrifera*) plants may be present on either remnant natural reef or quarry stone protecting the marinas, but outside of the proposed construction zones. Short-term turbidity increases from pile emplacement activities in the construction zone will not impact local giant kelp populations within the general Dana Point Harbor region. Consequently, the pile driving will have a not impact giant kelp populations.

### 3.4.7 Marine Protected Areas

No Marine Protected Areas occur in Dana Point Harbor precluding short-term construction related impacts to MPAs.

### 3.4.8 Fisheries Management Plan Species

Project activities that could potentially affect identified Coastal Pelagic FMP species (northern anchovy) and Pacific Groundfish FMP species (scorpion fish and juvenile Olive rockfish) include increased water turbidity caused by the demolition and replacement of docks and bulkheads, increased underwater pressure and noise due to pile driving and pile removal; and direct mortality from habitat destruction. These impacts could potentially result in (1) the movement of schooling anchovies away from the impact zones to more suitable offshore habitat (2) an increase in the suspended sediment load that could potentially introduce this species to harmful levels of contaminants and clog their gill apparatus, resulting in a reduced ability to breathe and/or feed. This is particularly true for northern anchovy, which is a filter feeder that uses their gill structures to filter plankton. Groundfish species are likely to be extremely rare in the project area. However, should they be present, the potential for direct mortality of juveniles, or adults of these species is minimal.

Based upon the life histories and the distribution of these species that favor most of the populations to be distributed in offshore areas rather than the confines of Dana Point Harbor, the potential for short-term

construction impacts on these FMP species is expected to be less-than-significant. There would not be any population-level impacts on Fisheries Management Plan species.

Eelgrass is a Habitat of Particular Concern (HAPC) for FMP groundfish species (rockfish) and is present near Baby Beach and the proposed dock at the Youth Sailing Center. See Section 3.3.1 and 3.4.5 for a discussion of water quality and construction-related impacts to eelgrass.

See Section 3.4.5 for a discussion of project construction impacts on green sea turtles.

### 3.4.9 Invasive Species

***Caulerpa taxifolia.*** *Caulerpa* is not present within Dana Point Harbor which precludes the potential spread of this species during Harbor Waterside improvement construction activities. However, a *Caulerpa* algae survey will be conducted according to the National Marine Fisheries Service Control Protocol prior to construction (National Marine Fisheries Service, 2008). If this species is found, then protocols for the eradication of *Caulerpa* will be implemented to remove this species from the project area. (<http://swr.ucsd.edu/hcd/CaulerpaControlProtocol.htm>).

***Undaria pinnatifida.*** *Undaria pinnatifida* is not currently growing within Dana Point Harbor. Should it be found during pre-construction surveys, then it should be removed prior to marina modifications to prevent its spread during the pile and dock removal process. It should be noted that at this time, there are no defined eradication processes for this species by the National Marine Fisheries Service or the California Department of Fish and Game.

***Zostera japonica.*** This species of eelgrass does not grow in Dana Point Harbor and will not be impacted during Harbor Waterside improvement construction activities.

## 3.5 LONG-TERM OPERATIONAL IMPACTS ON WATER QUALITY

**Marina Operations.** Water quality within Dana Point Harbor will be governed by the practices of the tenants relative to their compliance with ordinances, laws, and guidelines related to discharges, vessel maintenance and marina maintenance. Periodic and/or uncontrolled discharges of various pollutants, oils, greases, and wastes would potentially create significant long-term, adverse effects on water quality with subsequent adverse impacts on local marine life. To prevent long-term impacts on local water quality, a Marina Management Plan should be implemented to provide tenants and boaters with reasonable BMPs, safety guidelines, information on pump out facility use, regulations and steps to take in response to trash and debris disposal, accidental spills, leakages, and fires to reduce the potential for water quality degradation. Implementation of a Marina Management Plan that covers these issues will assist in reducing potential long-term water quality impacts to less-than-significant (Section 4).

**Temporary Dock Operations.** Dumping of trash, debris, hazardous materials, and organic wastes from vessels or from visitors to the Temporary Dock area could degrade water quality, habitat values, and marine life in a region of the Harbor that supports many types of marine life. This would result in a significant, localized impact on the quality of the Main Channel and West Channel bottom habitats. Mitigation measures and BMPs to reduce this impact to less-than-significant are discussed in Section 4.

### **3.6 LONG-TERM OPERATIONAL IMPACTS ON MARINE BIOLOGICAL RESOURCES**

#### **3.6.1 Dock and Pile Surface Area Changes**

The number of boat slips within the Harbor will decrease from 2,409 to 2,293. A total of 1,306 existing piles will be removed and 969 new piles will be emplaced. The total dock surface area will decrease from 492,530 square feet (sq ft) to 459,540 sq ft (a net decrease of 32,990 sq ft. 0.76 acres) One-thousand three hundred and six, 14-inch diameter pilings with a surface area of 1,396 sq ft will be replaced by 969 piles (851, 16-inch diameter piles and 118, 18-inch diameter piles) with a surface area of 1,395 sq ft.

A decrease in dock surface area will result in a long-term, beneficial impact to open water habitat. This will increase waterbird (and endangered species) seabird foraging habitat and reduce shading effects on harbor waters. In the long-term, there will be a net overall benefit to the marine ecosystem related to a decrease in dock surface area. Discussions of long-term impacts by habitat types are discussed below.

#### **3.6.2 Intertidal Sandy Beach**

Waterside improvements within Dana Point Harbor will not affect sandy beaches or sandy beach flora and fauna.

#### **3.6.3 Soft-Bottom Benthos**

The number of piles will decrease although the reduction in surface area of the piles will not substantially decrease (1 sq ft). This will have no adverse or beneficial effects on soft bottom-associated organisms.

#### **3.6.4 Hard Substrate-Pilings, Docks, Rip Rap, and Natural Reefs**

**Docks and Pilings.** The proposed project will result in a net decrease of biofouling organisms because of a decrease in dock surface area (0.76 acres) and 1 sq ft of piling habitat. This will not result in a regional or local loss of any invertebrate or algae species. Once new piles are re-installed in the marina basins, they will be recolonized by similar types of organisms that were initially removed. The process of recolonization would begin immediately upon the structures being placed in the water, but re-establishment of mature biofouling communities would take several years.

#### **3.6.5 Water Column Organisms**

Dana Point Harbor waterside improvements will have a long-term, beneficial effect on water column habitat and associated plankton and fish populations. In the long-term, an additional 0.76 acres of open water habitat will experience direct sunlight as consequent of the reconfiguration of the dock systems. Consequently, there will be a greater surface area of unshaded open water, that will locally increase primary (plankton) plankton production. Additionally, the increase in open water habitat will have a beneficial impact on fishes and foraging seabirds.

#### **3.6.6 Reptiles (See Section 3.6.9)**

No long-term impacts to sea turtles will occur as a result of the Harbor Waterside Improvement Project. The proposed project components will have no effect on sea turtle abundance or distribution.

### 3.6.7 Seabirds (See Section 3.6.9)

### 3.6.8 Marine Mammals (See Section 3.6.9)

### 3.6.9 Sensitive Species

**Eelgrass.** The proposed project has a potential to impact eelgrass in the vicinity of the proposed Sailing Center Dock (Section 3.2) as a consequence of shading from either dock structures or boats tied up to the dock. The level of impact and the mitigation required for any disturbance to eelgrass will be determined during pre-and-post construction surveys for the project according to the provisions of the Southern California Eelgrass Mitigation Policy (NMFS 1991, as amended). Should it be determined that a loss of eelgrass has occurred, appropriate mitigation measures to offset any observed eelgrass losses will be implemented.

**Surfgrass.** No long-term impacts to surfgrass will occur as a result of the Harbor Waterside improvement Project.

**Abalone.** No long-term impacts to abalone will occur as a result of the Harbor Waterside improvement Project.

**Tidewater Goby.** No long-term impacts to the tidewater goby will occur as a result of the Harbor Waterside improvement Project.

**Steelhead Trout.** No long-term adverse related impacts would occur on this species or its habitat. However, assuming this species' inland critical aquatic habitat is restored in the future to levels that would enhance the population of local steelhead trout, better water quality within Dana Point Harbor could potentially create a condition that might allow greater numbers of steelhead trout to transit through the Harbor.

**California Halibut.** No long-term impacts to California halibut will occur as a result of the Harbor Waterside improvement Project.

**Green Sea Turtles.** No long-term impacts to green sea turtles will occur as a result of the Harbor Waterside improvement Project.

**Seabirds.** Seabirds would be beneficially impacted by the increase of open-water foraging habitat. Additionally, there will be an increase of open water foraging habitat for the endangered least tern and the California brown pelican. The long-term waterside improvements within Dana Point Harbor will not result in the mortality of any species of endangered or other sensitive species of seabirds.

**Marine Mammals.** No long-term impacts to marine mammals will occur as a result of the Harbor Waterside Improvement Project.

### 3.6.10 Fishery Management Plan Species

No long-term adverse impacts to either coastal pelagic or groundfish FMP species will occur as a result of the Harbor Waterside improvement Project. Because there will be an increase in the amount of unobstructed open water habitat within Dana Point Harbor, this could potentially result in long-term beneficial effect on northern anchovy .

### 3.6.11 Sensitive Habitats

Reefs and Kelp Beds. No long-term impacts on reef or kelp beds are anticipated.

### 3.6.12 Invasive Species

*Caulerpa* algae is not expected to be present in Dana Point Harbor which precludes the potential for the spread of this species. However, if *Caulerpa* is found following waterside improvements, a *Caulerpa* algae eradication program will be required <http://swr.ucsd.edu/hcd/CaulerpaControlProtocol.html>; (National Marine Fisheries Service 2006).

*Undaria pinnatifida* is not currently growing within the Harbor; however, if it is discovered following waterside improvements to the Harbor then thought should be given to its eradication, based on recommendations from the California Department of Fish and Game and the National Marine Fisheries Service.

*Zostera japonica* does not occur within Dana Point Harbor and will not be impacted by the project.

## **4.0 BEST MANAGEMENT PRACTICES**

### **4.1 CONSTRUCTION**

#### **4.1.1 Water Quality**

Short-term, potentially significant impacts on water quality related to sediment and contaminant resuspension are reduced to a less-than-significant impact through the implementation of the following Best Management Practices.

- No construction materials, equipment, debris, or waste shall be placed or stored where it may be subject to tidal erosion and dispersion.
- Construction materials shall not be stored in contact with the soil. Any construction debris within the temporary cofferdam area shall be removed from the site at the end of each construction day.
- Reasonable and prudent measures shall be taken to prevent all discharge of fuel or oily waste from heavy machinery or construction equipment or power tools into Dana Point Harbor. Such measures include deployed oil booms and a silt curtain around the proposed construction zone at all times to minimize the spread of any accidental fuel spills, turbid construction related water discharge, and debris. Other measures include training construction workers on emergency spill notification procedures, proper storage of fuels and lubricants, and provisions for on-site spill response kits.
- All trash shall be disposed of in the proper trash receptacles at the end of each construction day. Any construction debris shall be removed from the site.
- During construction, floating booms shall be used to assist in containing debris discharged. Any debris discharged shall be removed as soon as possible but no later than the end of each day.
- Remove all construction debris from the seafloor. A post-construction bottom survey shall be conducted if all material has been successfully removed from construction areas.
- The County of Orange shall limit, to the greatest extent possible, the suspension of benthic sediments into the water column. If turbid conditions are generated during construction, a silt curtain shall be utilized to control turbidity.
- Construction methods shall be used that are the least damaging to benthic sediments and organisms.
- Reasonable and prudent measures shall be taken to prevent all discharge of fuel or oily waste from heavy machinery or construction equipment or power tools into Dana Point Harbor. The County of Orange shall have adequate equipment available to contain such spills immediately.
- Construction methods shall be used that are the least damaging to benthic sediments and organisms.

- Federal and State permit conditions related to the maintenance of water quality standards shall be implemented throughout the term of construction; and

#### 4.1.2. Marine Resources

The following Best Management Practices (BMPs) are recommended to reduce potential adverse impacts to marine resources during the renovation of the Dana Point Harbor Marina.

- All BMPs identified in Section 4.1.1 apply to the protection of marine resources during waterside improvement construction activities.

##### Pre-Construction-General

- Prior to construction activities, a pre-construction marine biological survey should be conducted to identify sensitive marine biological resources (i.e., eelgrass, reefs and kelp beds, and seabirds). This survey shall be used to prepare a Marine Biological Impact Reduction Plan (MBIRP) to minimize construction impacts to marine resources. Sensitive biological resources shall be mapped.
- A project marine biologist shall meet with the construction crews prior to construction to review sensitive areas to avoid and to review proper construction techniques.
- Special design and engineering consideration should be given to the type of materials used for the Temporary Dock floats and pier to minimize shading effects on open water habitat. Such features could include the use of translucent materials.

##### During Construction:

- Barges and work vessels should be operated in a manner to ensure that sensitive resources within Dana Point Harbor are not impacted through grounding, propeller damage, or other activities that may disturb the sea floor. Such measures shall include speed restrictions, establishment of off-limit areas, and use of shallow draft vessels.
- Minimize direct pile drilling impacts to rocky intertidal and subtidal habitats in the vicinity of the Temporary Docks.
- The contractor shall be required to use sound abatement techniques to reduce noise and vibrations from pile-driving activities. Recommended sound abatement techniques can include, but not be limited to vibration or hydraulic insertion techniques, drilled or augured holes for cast-in-place piles, bubble curtain technology, and sound aprons depending upon their feasibility for the project.
- At the initiation of each pile-driving event and after breaks of more than 15 minutes, the pile driving shall also employ a “soft-start” in which the hammer is operated at less than full capacity (i.e., approximately 40 to 60 percent energy levels) with no less than a 1-minute interval between each strike for a 5-minute period. The operation of the hammer at 40 to 60 percent energy level during the soft start of pile driving is expected to result in similar levels of noise reduction (40 to 60 percent) underwater.

- The project marine biologist shall monitor the construction process on a regular basis to ensure that all water quality Best Management Practices (BMPs) are implemented, and to assist the project engineer in avoiding and minimizing environmental effects to harbor marine biological resources.

The following BMPs are proposed to avoid potential impacts to existing eelgrass resources in the project area.

- Impacts to eelgrass beds shall be avoided where practical and feasible. A project marine biologist shall mark the positions of eelgrass beds with buoys prior to the initiation of any construction to minimize damage to eelgrass beds outside the construction zone. To assist the construction crew in avoiding unnecessary damage to eelgrass, the project marine biologist shall meet with the construction crews prior to construction to review areas of eelgrass to avoid and to review proper construction techniques.
- Barges and work vessels shall avoid impacts to eelgrass beds located near Baby Beach and the Sailing Center. Barges and work vessels shall be operated in a manner to ensure that eelgrass beds are not impacted through grounding, propeller damage, or other activities that may disturb the seafloor. Such measures shall include speed restrictions, establishment of off-limit areas, and use of shallow draft vessels.
- An eelgrass mitigation plan shall be developed based upon the results of pre-and-post construction surveys. The Plan shall require that any direct losses, if any, to eelgrass vegetation will be mitigated at a ratio of 1.2:1 (mitigation to impact) and potential eelgrass habitat will be mitigated at a ratio of 1:1 according to requirements of the Southern California Eelgrass Mitigation Policy (SCEMP)
- As detailed in the SCEMP, the actual amount of eelgrass to be mitigated shall depend on pre-construction surveys, post-construction surveys.

The following BMPs are proposed to avoid potential impacts to sea turtles and marine mammals in the project area.

- A qualified marine biologist shall be on site during the construction period to monitor the presence of endangered species. The on-site biological monitor shall have the authority to halt construction operations and shall determine when construction operations can proceed. Construction crews and work vessel crews shall be briefed on the potential for this species to be present and will be provided with identification characteristics of sea turtles, since they may occasionally be mistaken for seals or sea lions.
- Vessel operators will be instructed by a qualified marine biologist on the goals of the Marine Mammal Protection Act (1972) and the need to avoid a “take” of a marine mammal. "The term 'take' means to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal. Feeding is prohibited." "The term 'harassment' means any act of pursuit, torment, or annoyance which: injures or has the potential to injure a marine mammal or marine mammal stock in the wild; or disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding or sheltering to a point where such behavior patterns are abandoned or significantly altered." (NOAA website, [www.noaa.gov](http://www.noaa.gov))

- Construction crews and work vessel crews shall be briefed on the potential for turtles and marine mammals to be present and will be provided with identification characteristics of sea turtles, since they may occasionally be mistaken for seals or sea lions.
- In the event that a sea turtle is sighted within 100 meters of the construction zone, all construction activity shall be temporarily stopped until the sea turtle is safely outside the outer perimeter of construction. The on-site biological monitor shall have the authority to halt construction operation and shall determine when construction operations can proceed.
- If a marine mammal is observed within a radius of 1,200 ft (366 meters) from the construction zone, then activities shall not be initiated until the animal has passed out of the project area. If an animal is periodically but not constantly observed during this period, construction activities shall not be initiated for a period of 15 minutes, which is the estimated amount of time for a seal lion or other marine mammals to transit out of the project area.
- The biological monitor shall prepare an incident report of any marine mammal or green sea turtle activity in the project area and shall inform the construction manager to have his/crews be aware of the potential for additional sightings. The report shall be provided within 24 hours to the California Department of Fish and Game (CDFG) and the National Marine Fisheries Service (NMFS).
- In the event of a watercraft collision with a marine mammal or sea turtle the biological monitor shall prepare an incident report of any green sea turtle activity in the project area and shall inform the construction manager to have his/crews be aware of the potential for additional sightings. The report shall be provided within 24 hours to the California Department of Fish and Game (CDFG) and the National Marine Fisheries Service (NMFS).

The following BMPs are proposed to determine the presence of invasive algae in the project area prior to construction and the procedures to be followed if invasive algae is found in the project area.

- A field survey to investigate the presence of the invasive algae *Caulerpa taxifolia* is required 30 to 60 days prior to commencement of construction by qualified divers certified by the California Department of Fish and Game (CDFG) and National Marine Fisheries Service (NMFS) to conduct such surveys. The pre-construction *Caulerpa* surveys will be conducted according to the accepted criteria of the Southern California *Caulerpa* Action Team (SCCAT) for conducting surveys for invasive algae and in accordance with the NMFS and CDFG *Caulerpa* survey protocols. In accordance with the recommendations of the SCCAT, and according to the NMFS *Caulerpa* Control Protocol (Version 4, adopted March 28<sup>th</sup>, 2008 [NMFS 2008]), a survey must be conducted in harbor areas that may be disturbed. In areas that are expected to be free of *Caulerpa*, a 20 percent visual Surveillance Level survey is required prior to any dredging. The survey will also identify any other marine vegetation in the proposed construction area, including eelgrass. Project reports will be transmitted by the County of Orange via *Caulerpa* Survey Reporting Form to NMFS and the CDFG within 48 hours of completion of the survey. If *Caulerpa* is identified in the project area, the County, NMFS, and CDFG will be notified within 24 hours of completion of the survey. In the event that *Caulerpa* is detected, disturbance shall not be conducted until such time as the infestation has been isolated, treated, or the risk of spread from the proposed disturbing activity is eliminated in accordance with Section F of the *Caulerpa* Control Protocol.

## 4.2 LONG-TERM MARINA OPERATIONS

Best Management Practices for marina operation and management should be implemented to reduce the potential for water quality and degradation of Dana Point Harbor marine resources. These BMPs include, but are not limited to:

- The County of Orange should provide each marina tenant with a copy of all applicable regulations regarding vessel discharges of wastes, antifouling paint use, and refuse management (including handling of hazardous wastes) as part of the lease materials;
- The County of Orange should provide each marina tenant with information regarding procedures for notifying appropriate authorities regarding spills of hazardous materials, containment measures, and applicable penalties for violations as a part of lease materials;
- The County of Orange should provide regular cleaning of the marina dock facilities and vacuum sweeping of the parking lots;
- Adequate signs should be posted to identify the location off pump-out stations, and hours of operation;
- The pump-out facility should be user friendly;
- The County of Orange should develop and adhere to a regular inspection and maintenance schedule for the pump-out facility;
- The County of Orange should provide educational information about the pump out station to tenant boaters;
- The County of Orange shall enforce existing local, state and federal regulations pertaining to marine sanitation devices and the illegal discharge of boat sewage; and;
- The County of Orange shall post and make available to boaters a list of other local pump out locations.

To prevent long-term impacts on local water quality, a Marina Management Plan should be developed to provide tenants and boaters with reasonable BMPs, safety guidelines, and steps to take in response to accidental spills, leakages and fires to reduce the potential for water quality degradation. In addition, two pamphlets *The Guide to Clean, Green Boating* (California Department of Fish and Game 1999) and *Clean Boating* (California Department of Boating and Waterways (undated material) should be distributed and made available to both hotel management and marina tenants.

Clean Marinas California Program (2006) has developed a guidebook for to making marinas environmentally clean facilities and to help protect the state's waterways from pollution. This guidebook is available at <http://cleanmarinascalifornia.org>. It is recommended that a copy of this document be kept onsite in the marina operations offices.

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**APPENDIX 1. SPECIES LIST OF ORGANISMS  
OBSERVED IN DANA POINT HARBOR  
FEB/MARCH 2007 AND NOV/DEC 2007  
COASTAL RESOURCES MANAGEMENT SURVEYS**

Common Name	Scientific Name	Epi Benthos	Baby Beach	Marina Hard Scape	Youth Sailing Center Reefs	West Jetty Shoal and Channel Slope	West Main Channel	Temp Dock (South of Bait Barge)	Temp Dock (North of Bait Barge)	Youth Sailing Center Rip Rap	Bridge Bases	Harbor Patrol Basin*	Sportfishing Dock Rip Rap and Reef	Dry Stack and Shipyard Basins	All
sponge	Porifera, Unid.	x		x	x		x				x				x
anemone	<i>Anthopleura sola</i>			x			x						x		x
hard coral	<i>Astrangia lalolenis</i>												x		x
hydroid	<i>Aglaophenia</i> sp.			x			x				x				x
gorgonian	<i>Muricea californica</i>						x						x		x
gorgonian	<i>Muricea fruticosa</i>			x				x					x		x
anemone	<i>Pachycyathus fimbriatus</i>				x					x					x
polychaet flatworm	<i>Pseudoceros</i> sp.										x				x
polychaete	<i>Dioptera ornata</i>							x							x
polychaete	<i>Dodecaeria</i> sp.			x											x
polychaete	<i>Phragmatopoma californica</i>			x											x
polychaete	Sabellidae, unid.			x											x
polychaete	Spionidae, unid.			x									x		x
polychaete	Serpulidae, unid.			x											x
polychaete	Spirorbidae, unid.			x											x
barnacle	<i>Gthamalus fissus/dalli</i>			x			x		x				x		x
barnacle	<i>Balanus amphitrite</i>			x						x					x
barnacle	<i>Balanus glandula</i>			x			x			x			x		x
lined shore crab	<i>Pachygrapsus crassipes</i>			x											x
lobster	<i>Panirus interruptus</i>			x			x			x			x		x
snail	<i>Acanthina spirata</i>								x						x
limpet	<i>Collisella digitalis</i>														x
limpet	<i>Collisella scabra</i>				x		x						x		x
slipper shell	<i>Crepidula onyx</i>				x			x							x
Kelet's whelk	<i>Keletia keletii</i>				x										x
Gould's paper bubble	<i>Haminoea vesicula</i>								x						x
rock scallop	<i>Himantes giganteus</i>			x			x								x
limpet	<i>Lotia gigantea</i>						x								x
limpet	<i>Lotia limatula</i>						x								x
bay mussel	<i>Mytilus edulis</i>										x				x
bay mussel	<i>Mytilus galloprovincialis</i>			x											x
sea slug	<i>Navanax inermis</i>						x		x						x
octopus	<i>Octopus</i> sp.														x
snail	<i>Roperia pouisoni</i>							x					x		x

Common Name	Scientific Name	Epi Benthos		Marina Hard Scape	Youth Sailing Center Reefs	West Jetty		Temp Dock (South of Bait Barge)	Temp Dock (North of Bait Barge)	Youth Sailing Center Rip Rap	Bridge Bases	Harbor Patrol Basin*	Sportfishing		All
		Benthos	Beach			Shoal and Channel Slope	Main Channel						Dock Rap and Reef	Dry Stack and Shipyard Basins	
oyster	<i>Ostrea sp.</i>									x					x
sea cucumber	<i>Parastichopus peruvianensis</i>						x								x
reverse chama	<i>Pseudochama exogyra</i>			x	x								x		x
festive murex snail	<i>Pteropurpura festiva</i>			x				x					x		x
scaled tube worm	<i>Serpulorhis squamigerus</i>	x													x
trochid snail	<i>Tegula eisenii</i>							x							x
soft ectoproct	<i>Anguinella palmata</i>			x											x
ectoproct	<i>Bugula neritina</i>			x											x
ectoproct	Encrusting ectoprocts			x											x
colonial tunicate	<i>Botryllus/Botrylloides</i>			x											x
colonial tunicate	colonial tunicates			x											x
solitary tunicate	Ascideacea, unid.			x	x									x	x
solitary tunicate	<i>Styela plicata</i>			x							x				x
opaleye perch	<i>Girella nigricans</i>				x			x						x	x
ganibaldi	<i>Hypsypops rubicundus</i>				x			x							x
pile perch	<i>Damalichthys vacca</i>				x										x
blacksmith	<i>Chromis punctipinnis</i>				x										x
kelp bass	<i>Paralabrax clathratus</i>				x									x	x
unknown barred fish	juvenile, unid.				x										x
kelp fish	<i>Heterostichus rostratus</i>								x						x
senonita	<i>Oxyulis caifornica</i>				x										x
flatfish	unid. flatfish	x													x
round sting ray	<i>Urolophus halleri</i>	x					x								x
<b>Total</b>		<b>9</b>	<b>3</b>	<b>36</b>	<b>31</b>	<b>5</b>	<b>49</b>	<b>10</b>	<b>25</b>	<b>15</b>	<b>12</b>	<b>6</b>	<b>25</b>	<b>0</b>	<b>88</b>

**MARINE BIOLOGICAL FIELD SURVEY RESULTS  
FEBRUARY-MARCH 2007, OCTOBER-NOVEMBER 2007,  
AND JUNE 2010 SURVEYS**

**DANA POINT HARBOR MARINA IMPROVEMENT PROJECT  
DANA POINT, ORANGE COUNTY, CALIFORNIA**



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## **1.0 INTRODUCTION**

### **1.1 PROJECT PURPOSE**

Coastal Resources Management, Inc. (CRM) conducted marine biological resource surveys in Dana Point Harbor during February/March 2007, October/November 2007, and June 2010. The purposes of the investigation were to (1) determine if eelgrass (*Zostera marina*) or invasive algae (*Caulerpa taxifolia* or *Undaria pinnatifida*) were present in regions of the Harbor where proposed waterside improvement are proposed, (2) collect data on the presence/absence of other sensitive and non-sensitive species present in the Harbor on soft-bottom, piling, rip-rap and reef habitats that might be affected by marina improvements and (3) assess the potential environmental effects of construction and long-term operation of the marina on sensitive marine resources.

This report presents the results of detailed marine biological field surveys conducted by CRM. An environmental evaluation of the potential effects of the Harbor Waterside Improvement Project on marine resources is assessed in Coastal Resources Management, Inc. (2010a).

### **1.2 PROJECT LOCATION**

Dana Point Harbor, constructed between 1966 and 1970, is located in the City of Dana Point, Orange County, California about 40 miles south of Long Beach/Los Angeles Harbors (Figure 1). It lies in the lee (protected side) of Dana Point Headlands within Capistrano Bay and is also protected by a 1.7 mile long and 14 to 18 feet (ft) high breakwater. Harbor channel widths vary from 350 feet in the anchorage areas to 600 feet at the harbor entrance (Wiegel, 1993) The Harbor is subject to in-filling of sands that migrate through the quarry stone-breakwater requiring periodic maintenance dredging to maintain safe water depths.

The marina within Dana Point Harbor (“the Harbor”) is divided into two basins, the East Basin and West Basin (Figure 2). Figure 2 also lists the areas under discussion within this report. Each basin operates as a separate marina, with a total capacity of about 2,500 shallow-draft vessels. The boat launch ramp at the northeast corner of the Harbor is newly upgraded as of July 2007. Other facilities within the Harbor include the Dana Point Marine Institute, a dry boat storage hoist, fishing pier, shipyard, marine fuel dock, three yacht clubs, and a commercial sports fishing operation. Swimming is allowed at the west end of the Harbor, at Baby Beach. (<http://www.ocparks.com/danapointharbor/>).

### **1.3 PROPOSED PROJECT COMPONENTS**

Table 1 and Figure 3 describe and illustrate the proposed marina improvements, respectively. Waterside upgrades include (1) the renovation and re-orientation of the East and West marina basin dock systems by replacing old and deteriorating docks, slips and gangways with new facilities; (2) dock redesign and improvements for the Youth Sailing Center, the Harbor Patrol facilities, Commercial Fishing Dock, the Sport Fishing dock,

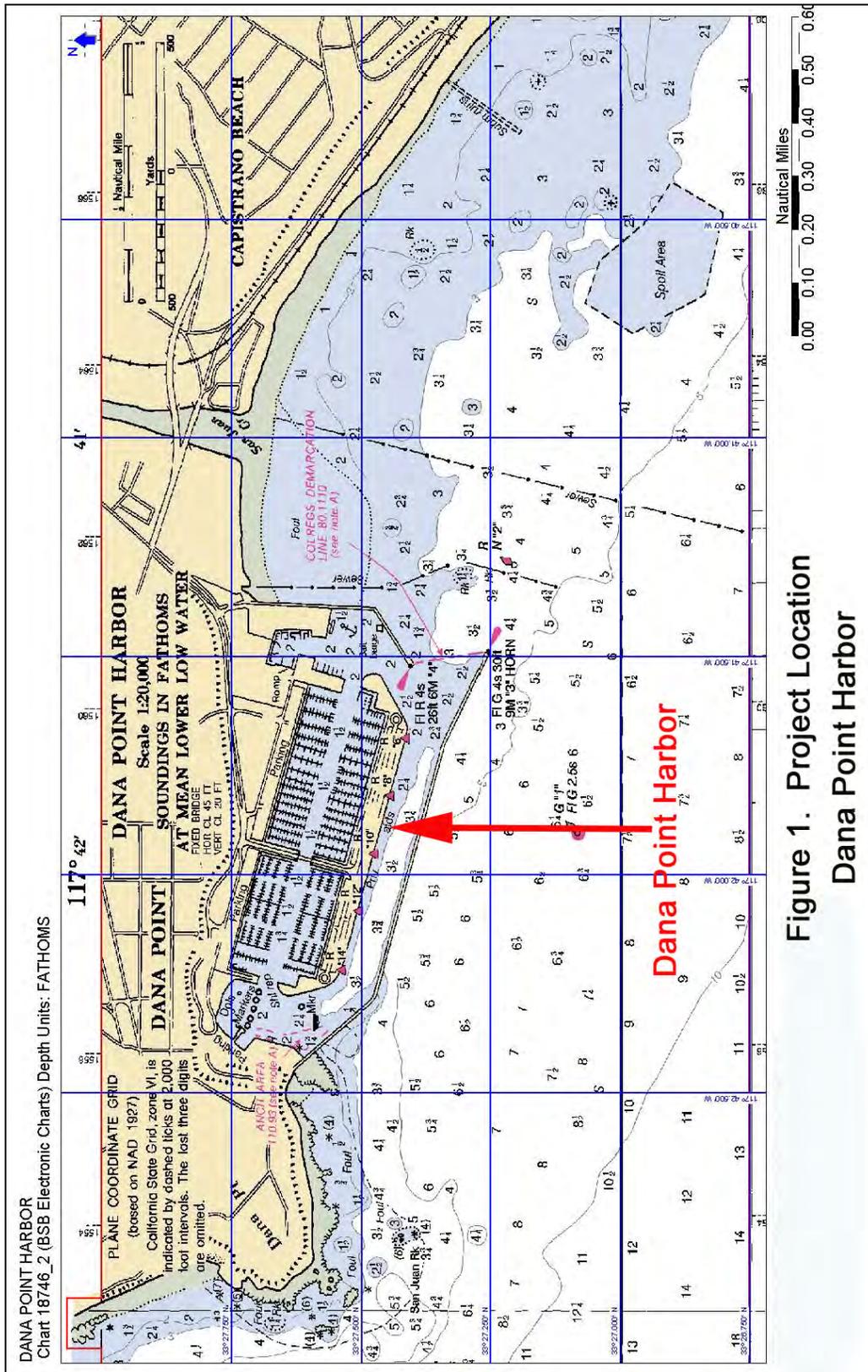


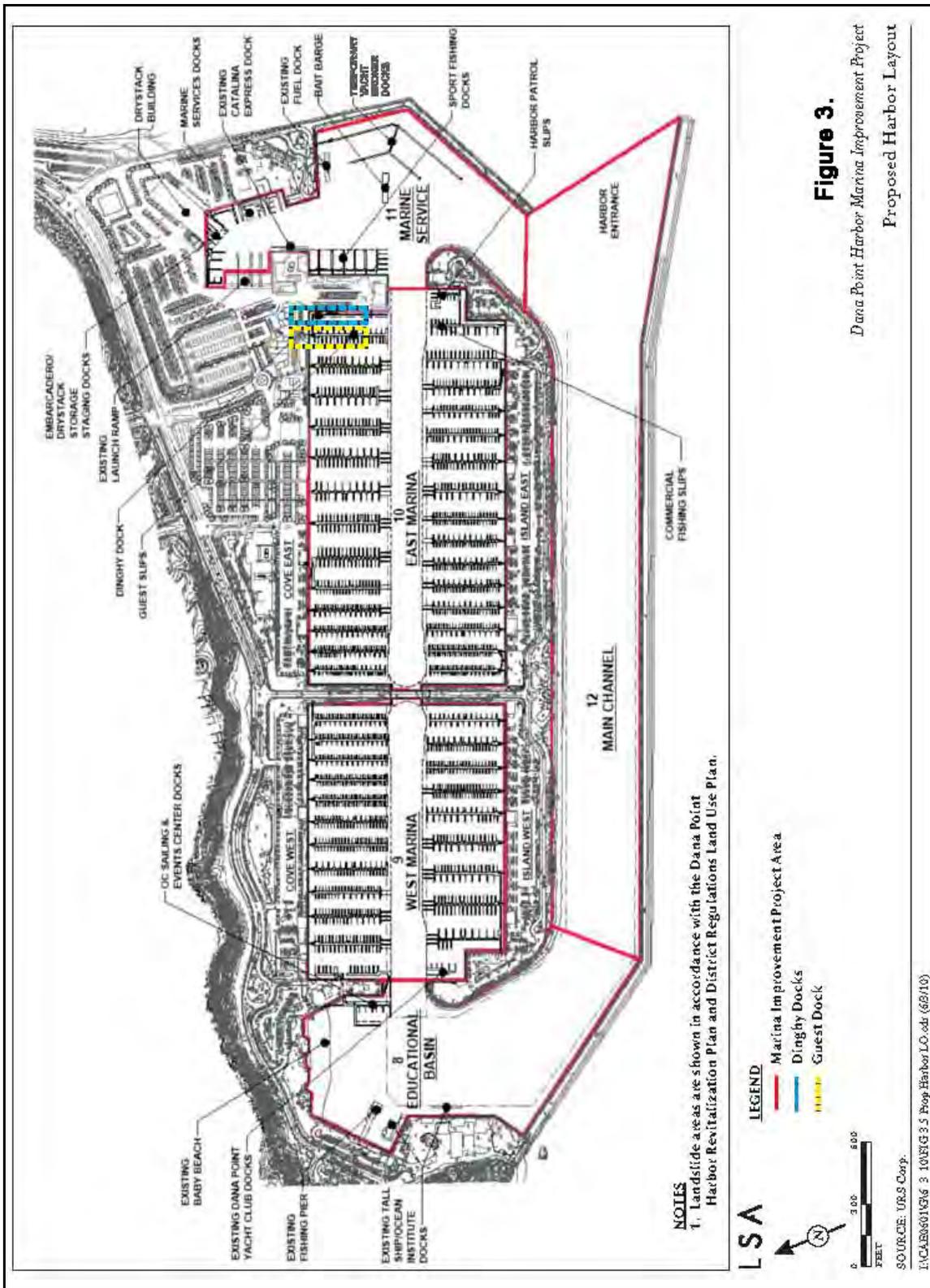
Figure 1. Project Location  
Dana Point Harbor



**FIGURE 2.**  
**DANA POINT HARBOR STUDY LOCATIONS**  
 COASTAL RESOURCES MANAGEMENT, INC.

**Table 1. Proposed Project Components. Source: LSA Associates, Inc.**

<b>Element</b>	<b>Existing Conditions</b>	<b>Proposed Project Improvements</b>
Floating Docks(East/West Marinas and Satellite Areas)	Floating docks supported by 1,306 concrete filled steel pipe piles  2,409 boat slips  Average slip length of 29.85 feet (ft). Majority of West Marina slips oriented west-east. East Marina slips oriented north-south  Approximately 492,530 square feet (sf) of area covered by floating docks	Remove existing piles and replace with 969 piles  2,293 boat slips (loss of 116 slips)  Average slip length not to exceed 32 ft  West Marina slips to be reoriented to a north-south direction. East Marina slips to remain oriented north-south  Approximately 459,540 sf <sup>1</sup> of area covered by floating docks
Access	52 existing gangways	59 gangways plus 9 ADA gangways, for a total of 68 gangways
Boat Services	3 sewage pump outs	4 upgraded sewage pump outs
Utilities	electrical service, water service, telephone and cable service  Dock Boxes	Upgraded electrical service, water service, telephone and cable service  New Dock Boxes
Embarcadero/Dry Stack Storage Staging Docks	766 linear feet (lf)	1,300 lf
Marine Services Docks	1,190 lf	896 lf
Sport Fishing Docks	1,350 lf	1,350 lf
Guest Slips	42 existing slips	46 proposed slips
Dinghy Dock	No existing dinghy dock	374 lf
Harbor Patrol Slips	8 existing slips plus 2 emergency side-ties	8 proposed slips plus 2 emergency side-ties
Commercial Fishing Slips	15 existing slips plus 1 end-tie for California Department of Fish and Game boat	15 proposed slips plus 1 end-tie for California Department of Fish and Game boat
OC Sailing and Events Center Docks	890 lf	893 lf
Temporary/Yacht Broker Docks	No existing temporary/yacht broker docks	1 dock located along the breakwater next to Doheny State Beach – approx. 2,590 lf



**Figure 3.**

Dana Point Harbor Marina Improvement Project  
Proposed Harbor Layout

the Dry Stack facility, and the Shipyard docks; (3) the construction of for vessels that will be displaced during marina reconstruction.; (4) the addition of handicap access at locations where it currently is not available; (5) upgrading vessel pump out facilities; and (6) upgrading electrical service water service.

The number of boat slips within the Harbor will decrease from 2,409 to 2,223 (a loss of 116 slips) although the average slip length will increase from 29.85 ft to a length not to exceed 32 ft. A total of 1,306 existing piles will be removed and 969 new piles will be emplaced.

## **2.0 FIELD SURVEY METHODS**

Underwater marine biological field surveys were conducted by CRM marine biologists Rick Ware, Stephen Whitaker, and Tom Gerlinger on February 20<sup>th</sup>, March 6<sup>th</sup>, March 16<sup>th</sup>, and November 2<sup>nd</sup>, 2007; October 31<sup>st</sup> and November 1<sup>st</sup>, 2007 (remote underwater video surveys to augment the diver-surveys, which allowed for larger areas of the bottom habitat to be covered); and June 7<sup>th</sup> and 8<sup>th</sup>, 2010. The surveys conducted in 2010 were conducted by Mr. Rick Ware and Mr. Mike Anghera, and focused on zones and depths in Dana Point Harbor that had the highest potential for the presence of eelgrass, *Zostera marina*. Surveys were conducted from the CRM vessels RV *Stacy-Ann*, RV *Macsam*, and a 14 ft Achilles inflatable vessel.

Underwater transect surveys were conducted using SCUBA. The surface support individual was in communication with the diving-biologists using an Ocean Technology Systems, Inc. (OTS) communication system due to the potential danger involved while conducting underwater surveys in the active vessel areas. Surveys were conducted in accordance with both the *Southern California Eelgrass Mitigation Policy* (National Marine Fisheries Service 1991 as amended) and the *Caulerpa Control Protocol* (National Marine Fisheries Service, Version 2.1, March 2006).

A total of 329 variable-length underwater transects (5 meters [m] to 258 m in length) were swam using SCUBA throughout Dana Point Harbor where waterside developments are planned (Figures 2 and 4) and in areas where eelgrass potentially can be found in shallow water habitat. Fourteen dock piles in the Cove East and the Island East marina basins were also surveyed to determine the types and relative abundances of marine organisms that might be affected by marina construction.

During the transect swims and the inspection of the dock support piles, divers recorded habitat types, common marine life, and the presence or absence of eelgrass and invasive algae. Depths were standardized to Mean Lower Low Water (ft, MLLW) based upon time of observation and tidal corrections for the NOAA San Clemente tidal survey station.

In addition to diver surveys, CRM also conducted Remote Underwater Video (RUV) surveys to determine the presence of eelgrass, invasive algae, other organisms, and habitat types due to the large area of harbor seafloor in the West Channel that needed to be surveyed. The camera system used for the surveys was an Ocean Systems, Inc. Deep Blue Professional Grade Underwater Video Camera (“Splash Cam”) attached to a

military-grade umbilical cable (Photograph 1). The camera dimensions are 3" diameter wide and 3.5" long. The unit's resolution is 540 TV lines, the CCD is a 1/3" Sony Super HAD, and the focus is fixed 1 inch to focal infinity. The light sensitivity index is extremely low, 0.15. The lens is a 3.6 mm wide angle lens. It is designed to operate in super low light conditions.



Photograph 1. Deep Blue Splash Cam

Real-time observations of the Harbor benthos were collected by conducting a running series of variable-length underwater video transects ranging in length from 0.16 to 1.67 miles long at all sites except for the East and West Marina Basins (Figure 4).

The tow speed of the camera varied from 0.3 knots to 0.9 knots and the camera elevation about the bayfloor varied from approximately 1 to 3 ft above the bottom, with a slightly down-angle field of view. Real-time observations were observed on board the vessel using a color monitor, integrated with a GPSBox Plus GPS Video Overlay Unit. Vessel track lines were recorded with a Thales Mobile Mapper Differential GPS Unit.

When a potential eelgrass, algae, or other significant target was observed on the video monitor, the information was recorded, and a closer inspection of the target was made with the camera. Representative bottom conditions covered during the remote video survey were recorded on a Sony DVD player that provided a summary of bottom habitat conditions throughout the Dana Point Harbors study area. Track lines of the RUV survey are provided in Appendix 1.

Caulerpa Survey Protocols. Dana Point Harbor is considered a “non-infected” system and requires a “surveillance level” monitoring effort for the presence of *Caulerpa*. The following information is extracted from the National Marine Service *Caulerpa Control Protocol* in regards to the level of survey effort required. “*Surveillance Level* – General survey coverage providing a systematic sub-sampling of the entire APE during which at least 20% of the bottom is inspected and widespread occurrences of *Caulerpa* would be expected to be identified if present. Surveys may be accomplished using diver transects, remote cameras, and acoustic surveys with visual ground truthing. Other proposed

methodologies may be approved on a case-by-case basis by NOAA Fisheries and CDFG”.



### 3.0 SURVEY RESULTS

#### 3.1 PROJECT AREA

The surveys covered 6.28 acres of harbor bottom habitat (Table 1 and Figure 4). Overall, the bottom area surveyed by both diving biologists and remote video averaged 24.7% of the total bottom habitat within the project survey limits, ranging from 13.9% in the East and West Marina basins to over 100% coverage in the at the Youth Sailing Center and the Harbor Patrol basin. Baby Beach areal cover (by divers and video in 2007 and 2010) encompassed a minimum of 187% of the survey area, and reflected a survey effort concentrated in a region where there was a probability of locating eelgrass since a very small patch of eelgrass (three turions) was located there in April 2005 (Chambers Group, Inc., 2005).

The eelgrass survey area in 2010 was concentrated along the eastern one-third of Baby Beach from depths of -3 to -12 ft MLLW beginning immediately west of the existing Sailing Center Dock and all of the basins at the Embarcadero and Dry Stack/Staging Area s north of the launch ramp (Figure 4).

**Table 2. Areas Surveyed in Dana Point Harbor\***

Location	Bottom Habitat Survey Area (Acres)	Area of Potential Biological Impact (Acres)	% Total Area Covered*	Depth Range (ft, MLLW)
Baby Beach	1.40	0.75	186.7	-3 to -10
Bridge Abutment Slopes	0.06	0.08	75.3	+3 to -10
Commercial Fishing Docks	0.12	0.58	20.3	+3 to -15.9
Dry stack/Shipyard Basins	0.30	0.36	83.5	-12.4
Harbor Patrol Basins	0.28	0.13	221.9	+3 to -15.9
Marina Basins	2.98	21.43	13.9	+3 to -11
Sport fishing Dock Basin (inner ½ to bulkhead) and immediately seaward of docks	0.35	0.36	97.6	+3 to -15.4
Temporary Dock Area, East Channel	0.88	2.04	43.0	+3 to -12
Youth Sailing Center	0.12	0.10	110.7	+3 to -12
<b>Total</b>	<b><u>6.28</u></b>	<b><u>25.28</u></b>	<b><u>24.7</u></b>	<b><u>+3 to -15.9</u></b>
<b>Other Regions Surveyed</b>				
West Jetty Channel Slope**	0.42	none**	**	-2 to -12
Main Channel**	1.9	none**	**	+3 to -20.4
* Includes both biologist/diver and remote video survey coverage				
** Not in project area				

## 3.2 PHYSICAL ENVIRONMENT

### 3.2.1 Survey Depths

The underwater field surveys were conducted throughout harbor at depth ranges between the +3 ft MLLW mid-intertidal (during high tides) to a maximum of -20.4 ft (MLLW) found in the Main Channel and the East Channel. Intertidal observations on bulkheads were at elevations between approximately +1 to +7 ft MLLW.

### 3.2.2 Substrate Types

**Unconsolidated sediments.** Surficial sediments within all the marina and harbor basins were fine sands to extremely fine silts although underlying sediments tend to be sandier (Geotechnical Inc., 2006). Unconsolidated sediments in the Turning Basin and the East Channel near the Youth Sailing Center were sandy silts but visually, increased in sand percentages closer to the Baby Beach shoreline. Sediments were coarsest in the West Basin near the Youth Sailing Center; and on the south side of the bait barge along the base of the East Breakwater (Temporary Dock area). In each of these areas, sediment sized decreased with depth. Significant amounts of trash and debris (cans, bottles, plastic bags, fishing lines, etc.) was also found on the bottom all along the base of the East Breakwater.

**Hard substrate.** Intertidal and subtidal rock quarry stone and smaller rip rap is present in many areas of Dana Point Harbor and serves as protection for bulkheads and shorelines. The breakwaters and the south side of the East and West Island marinas consist of larger quarry stone, whereas the rip rap that protects the bulkheads of the marinas in the vicinity of the Youth Sailing Center and the Sport Fishing Dock consist of small-to moderate-sized rip rap. Sloped, cement quay walls occur around the perimeter of the marina basins and at the bridge abutments. These cement slopes were covered by a light to moderate layer of fine sediments.

Pilings and docks are attachment surfaces for plants and invertebrates. This community of organisms is commonly referred to as the “biofouling community”. These hard surfaces extend between the highest high tide line and the Harbor bottom depths, supporting both an intertidal and subtidal complex of organisms. This habitat type is common throughout the Harbor.

Exposed natural reef is present within many areas of the Harbor, a remnant of the extensive reef habitat that was present prior to the construction of the Harbor. Isolated rock habitat in the marina basin that was observed during the subtidal surveys included three, single rock outcrops in the Island West Basin and one moderate relief (1 meter high) rock outcrop in Cove West Basin. These outcrops were at depths between -8 and -10 ft MLLW. Other outcrops are likely present but not observed during the surveys. Outside of the marina basins, scattered low to medium relief (<1 to 2 meter high) reef outcrops and isolated boulders were located in the Turning Basin west of the Youth Sailing Center docks at depths between -3 and -8 ft MLLW; in the Main Channel and East Channel at depths between -8 and -20 ft MLLW; in the East Channel seaward of the Sport Fishing Docks; and in the

Anchorage Area at the north end of the proposed temporary dock (north of the existing bait barge) at depths of -12 ft MLLW.

### **3.2.3 Underwater Visibility and Water Temperature Conditions During The Surveys**

Low underwater visibility conditions were encountered during the February and March 2007 survey and ranged between 1 and 3 ft within the marina basins and 1 to 4 ft in the vicinity of Baby Beach and the Youth Sailing Center. By comparison underwater visibility averaged about 3 ft near the boat launch ramp in August 2006 (Chambers Group, Inc 2006) and 8 feet at depths of 0.0 to -10 ft MLLW at Baby Beach in April 2005 (Chambers Group, Inc., 2005). During the October/November 2007 survey, underwater visibility was still limited within the marina basins, but was substantially better in the Main and West Channels where visibility approached 8 to 10 ft in the West Main Channel and in the East Channel on the south side of the bait barge in the vicinity of the proposed temporary docks. In June 2010, underwater visibility was approximately 2-3 feet near Baby Beach, 5-10 ft in the West Main Channel, and 2 feet in the East Channel near the bait barge and the dry stack storage area.

Water temperature ranged between 57 and 59 degrees Fahrenheit during the February/March 2007 survey; 62 and 66 degrees Fahrenheit survey during the October/November 2007 survey; and 65 and 67 degrees Fahrenheit during the June 2010 survey.

## **3.3 MARINE BIOLOGICAL RESOURCES**

Eight-seven (88) taxa of marine plants, invertebrates, and fishes were observed during the field surveys (Table 2 and Appendix 2). Marine plants contributed the highest number of taxa (33.3% of the total). Mollusks (octopus, snails and clams) contributed the second highest number (22.7 % of the total), followed by fish (11.5%), annelid worms (8.0) and arthropods (5.7%).

### **3.3.1 Soft-Bottom Benthic Habitat**

The soft-bottom epibenthic community (organisms that live on the sediment surface or protrude from the sediments) exhibited low species richness (10 species) throughout the Harbor (Table 3). Sediments within the East and West basins and other areas were lightly coated with a layer of benthic diatoms, and secondarily, spotty cover of the algae *Chaetomorpha aerea* and *Ulva intestinalis*. This was typical in areas of lower tidal current flows.

The most common occurring macro invertebrate on soft sediments was the predatory snail *Navanax inermis*, which was ubiquitous throughout the Harbor soft-bottom habitats. The burrowing anemone *Pachycerianthus fimbriatus* was common within the West Marina although found in many areas of both marina basins and in the Main Channel.

**Table 3. Number of Marine Taxa Observed During the CRM Dive Surveys, Feb/Mar 07, Oct/Nov 07, and June 2010.**

<b>Taxonomic Group</b>	<b>Total Taxa</b>	<b>% Total</b>
<b>Algae</b>	29	33.0
<b>Seagrasses</b>	1	1.1
<b>Porifera</b>	2	2.3
<b>Cnidaria</b>	6	6.8
<b>Platyhelminthes</b>	1	1.1
<b>Annelida</b>	7	8.0
<b>Arthropoda</b>	5	5.7
<b>Mollusca</b>	20	22.7
<b>Bryozoa</b>	3	3.4
<b>Tunicata</b>	4	4.5
<b>Fish</b>	10	11.4
<b>Total</b>	<b>88</b>	<b>100.0</b>

**Table 4. Number of plants, invertebrate, and fish taxa in the Dana Point Harbor Survey Areas-Feb/Mar, Oct/Nov 2007, and June 2010**

<b>Region of Harbor</b>	<b>Total Number of Taxa</b>
Island Way Bridge Abutment (north side)	12
Marina Pilings	36
Marina Quay Walls	18
Youth Sailing Center Rip Rap and Reefs, and Soft-benthos (epibiota)	41
<b>All Areas Within East and West Marina Basins</b>	<b>59</b>
Main Channel Reefs, Rip Rap, and Soft Epi- Benthos	49
Temporary Dock Area (Hard-bottom and Soft-bottom epi-benthos)	28
Sport Fishing Docks (Hard-bottom)	25
<b>All Soft-bottom Substrate in Survey Areas (epibiota)</b>	<b>11</b>
<b>All Hard Substrate in Survey Areas Outside West and East Marina Basins</b>	<b>68</b>
<b>All Hard Substrate in Survey Areas, Dana Point Harbor</b>	<b>81</b>
<b>All Soft and Hard Bottom Substrate in Survey Areas, Dana Point Harbor</b>	<b>88</b>

The tube-building polychaete *Diopatra ornata* the bubble snail *Haminoea vesicula* were observed where sediments were sandier in the East Channel near the southern section of the proposed temporary dock area. Notably, no marine invertebrates or algae were observed on the soft substrates within the Dry Stack or the Ship Yard basins.

Very few sightings of fish were observed over sedimentary habitats, likely due to low visibility. Of the two species observed, only the round sting ray (*Urolophus halleri*) was common. Other, unidentified flat fish were seen, but could not be identified. However, there are several other species of fish that occur in other bays and harbors in southern California that are likely to be present in Dana Point Harbor. These include gobies (*Clevelandia ios*), and flatfish (California halibut, *Paralichthys californicus*; diamond turbot, *Hypsopsetta guttulata*).

Water-column species such as topsmelt (*Atherinops affinis*), northern anchovy (*Engraulis mordax*), black surfperch (*Embiotoca jacksoni*), shiner surfperch (*Cymatogaster aggregata*), walleye surfperch (*Hyperprosopon argenteum*), white croaker (*Genyonemus lineatus*), queenfish (*Seriphus politus*) and white surfperch (*Phanerodon furcatus*) are also common within southern California marinas and are also expected to be present in Dana Point Harbor.

### 3.3.2 Rocky Intertidal and Subtidal Habitat (Pier Pilings, Rock Rip Rap, Cement Bulkheads, and Natural Reefs)

Most plants and invertebrates were associated with harbor artificial hardscape and natural reef (81 of 88 taxa). Of the various hard-bottom habitat types, 59 were associated with East and West marina hard substrate, and 68 were present on hard substrate in the Main Channel, West Channel, and East Channel on larger quarry stones and natural reefs (Table 3). The most productive areas were reefs and quarry stone in the Main Channel (49), the hardscape of the Youth Sailing Center reefs (40), marina pilings (36), the hardscape of the East Breakwater quarry stone and isolated reefs near the temporary dock (25), and the hardscape of the Sport Fishing Dock bulkhead and rip rap (25).

**East Marina Basin Piling Community.** Thirty-six taxa were observed on 14 piles scattered throughout the East Marina (Table 3). While the cumulative number of taxa observed on pilings was 36 for all piles, the number of taxa on a single pile varied between five and 11. Species richness decreased with depth. The dominant organisms on the upper three feet of the pilings included a complex of green algae (*Ulva intestinalis*), a turf and filamentous red algae complex, brown algae (*Colpomenia perigrina*, *Dictyota flabellata*, and *Sargassum muticum*), hydroids (*Aglaophenia* sp.), serpulid polychaete worms, barnacles (*Balanus amphitrite* and *B. glandula*), and mussels (*Mytilus galloprovincialis*). The mid-depth piling community (-3 to -7 ft) was dominated by polychaete worms (serpulids and the calcareous tube-building *Dodecaceria fewksii*), mussels, solitary tunicates (*Styela plicata*), and ectoprocts (*Bugula neritina* and unid. encrusting ectoprocts). The bottom depth piling community (-7 to -10 ft MLLW) was dominated by tunicates, ectoprocts, and hydroids.

**Marina Basin Quay Walls.** The sloping, cement bulkhead around the perimeter of Cove East and West and Island East and West Basins (including the Harbor Patrol Basin) supported 18 species of algae and invertebrates. However, this habitat exhibited a low diversity of taxa and extremely low percent cover of marine life. The most conspicuous species was the calcareous, tube-building polychaete *Dodecaceria fewksii* that formed small colonies on most of the quay walls examined. Other common species included lined-shore crabs (*Pachygrapsus crassipes*), solitary ascidians, and scattered, juvenile mussels. A fine silt layer, approximately 1-2 cm deep, covered the substrate. Other than *Dodecaceria*, most of the flora and fauna were found in the depressions formed by the meeting of adjoining cement sections of quay wall.

**Island Way Bridge Abutments.** Twelve taxa were represented on the north bridge abutment at depths between +3 to -10 ft MLLW. This site consisted of a low-diversity assemblage of macrophytes and invertebrates due to a lack of sunlight and a coating of sediment over the concrete slope. Four macrophytes were observed—*Corallina pinnatifolia*, *Dictyota binghamiae*, *Dictyopteris undulata*, and *Colpomenia sinuosa*. The dominant invertebrates included acorn barnacles (*Balanus glandula*, *Chthamalus fissus/dalli*), bay mussels (*Mytilus galloprovincialis*), tunicates (*Styela plicata*), sponges (*Leucosolenia* sp.), and hydroids (*Aglaophenia* sp.); hydroids exhibited the highest cover.

### **Breakwater Quarry Stone and Natural Reef, Main Channel**

This area is located outside of any harbor improvements. Substrata at depths between the intertidal to -7 ft MLLW was primarily quarry stone rip-rap. Naturally occurring low-to moderate relief reefs were present throughout the area surveyed in the channel.

The most productive intertidal and subtidal habitats were those associated with large quarry stone and natural reef outcrops. These areas supported a diverse assemblage of macrophytes and invertebrates and fishes (49 taxa) characteristic of communities associated with a greater degree of wave exposure than protected marinas. The common red macrophytes include articulated corallines (*Corallina chilensis*, *C. pinnatifolia*, *Lithothrix aspergillum*, *Amphiroa zonata*, *Bossiella orbigniana*), coarsely branched red algae (*Gelidium purpurascens*), and crustose corallines (*Lithothamnion* spp.), while other less common red macrophytes included *Ceramium/Polysiphonia* spp., *Cryptopleura crista*, and *Laurencia pacifica*. This habitat also supported a rich brown macrophyte community including Dictyotales (*Dictyota binghamiae*, *Dictyopteris undulata*, *Zonaria farlowii*, *Taonnia lennebackerae*), the Fucales (*Sargassum muticum*, *Halidrys dioica*), and one member from both the Laminariales (*Eisenia arborea*) and the Scytosiphonales (*Colpomenia sinuosa*). Giant kelp (*Macrocystis pyrifera*) was also present, in very low abundances. Many of the plants observed had only a few number of thin stipes, and were in poor condition.

The most conspicuous lower-intertidal and subtidal invertebrates included limpets (*Lottia limatula*, *L. gigantea*, *L. scabra*), barnacles (*Balanus glandula*, *Chthamalus fissus/dalli*), scaly tube snail (*Serpulorbis squamigerus*), and trochiid snails (*Tegula eiseni*). Larger, but less abundant invertebrates included lobsters (*Panulirus interruptus*), gorgonians (*Muricea californica*), warty sea cucumbers (*Parastichopus parvimensis*), rock scallops

(*Crassedoma giganteum*), festive murex snails (*Pteropurpura festiva*), and tunicates (*Styela plicata*). No sensitive or listed species of plants, invertebrates, or fishes were documented from this site.

**Breakwater Quarry Stone and Isolated Reefs, East Basin Temporary Dock).** Similar to the area surveyed in the Main and West Channel, hardscape in the Anchorage Area near the breakwater supported many plant and invertebrate form in response to adequate tidal exchange and tidal currents, and suitable substrate. The East Breakwater provided the most extensive hard-bottom habitat. Common red macrophytes present in the low intertidal and shallow subtidal zone included articulated corallines (*Corallina chilensis*, *C. pinnatifolia*, *Amphiroa zonata*), crustose algae (*Lithothamnion* spp., *Peyssonneliaceae/Hildenbrandiaceae*) and secondarily, *Ceramium/Polysiphonia* spp. and *Laurencia pacifica*. Several species of brown macrophytes were also present-*Dictyota binghamiae*, *Dictyopteris undulata*, *Zonaria farlowii*, *Taonnia lennebackerae*) *Sargassum muticum*, *Halidrys dioica*, *Eisenia arborea* and *Colpomenia sinuosa*.

A fauna similar to the West Channel quarry stone community was also found at this site and included limpets (*Lottia limatula*, *L. scabra*, *Crepidula onyx*), barnacles (*Balanus glandula*, *Chthamalus fissus/dalli*), and trochiid snails (*Tegula eiseni*). The snails *Pteropurpura festiva* and *Acanthina spirata* were also present, but were not as common.

North of the bait barge, a few moderate relief (1.5-2 m high ) rocky reefs were located. These reefs supported few macrophytes and macro invertebrates than the East Breakwater. Species that were observed included the red algae complex *Ceramium/Polysiphonia* spp., and *Rhodymenia californica*; brown macrophytes (*Sargassum muticum*, *Dictyopteris undulata*); slipper limpets (*Crepidula onyx*); and gorgonians (*Muricea fruticosa*).

A significant amount of trash was observed while surveying the East Breakwater biological communities. This debris was concentrated at the base of the breakwater lodged in the rocks as well as on the sediments at the base of the breakwater rocks.

**Youth Sailing Center Reefs and Rip Rap.** Rip rap behind the docks and low relief natural reef in the Turning Basin in front of the Youth Sailing Center docks supported a large number of species-40 taxa of plants and invertebrates similar in nature to those occurring in the marina piling community and the quarry stone/natural reef habitats in the West Channel and Main Channel. Dominants included the southern sea palm algae (*Eisenia arborea*) the brown seaweed *Sargassum muticum*, coralline turf algae, and invertebrates such as sponges, colonial polychaete worms, lobsters (*Panilurus interruptus*, snails (*Kelletia kelletii*), limpets (*Lottia digitalis*), slipper limpets (*Crepidula onyx*), and mussels (*Mytilus galloprovincialis*).

On the south side of the Youth Sailing Center, rip rap lined the cement bulkhead. The most commonly red algal forms included articulated corallines (*Corallina pinnatifolia*, *Amphiroa zonata*), coarsely branched red algae (*Gelidium purpurascens*), and crustose corallines (*Lithothamnion* spp.). Small, red turf algae (*Ceramium* and *Polysiphonia* spp.) were less common but present. The dominant brown macrophytes were *Dictyota*

*binghamiae*, *Dictyopteris undulata*, and *Sargassum muticum*. Barnacles (*Balanus glandula*, *Chthamalus fissus/dalli*), lobster (*Panulirus interruptus*), slipper limpets (*Crepidula onyx*), and tunicates (*Styela plicata*) were the most common-occurring invertebrates.

**Sport Fishing Dock Rip Rap.** The variable-sized rip rap in front of the Sport Fishing Docks supported a moderately diverse community of intertidal and subtidal plants and invertebrates typical of both the inner marina and the outer channels of the Harbor. The most common types of plants were filamentous red algal taxa, coralline turf algae, and macrophytes, particularly *Sargassum muticum* and *Dicytota flabellata*. The most conspicuous macro invertebrates were limpets (*Lottia* spp.), mussels (*Mytilus galloprovincialis*, sea fans (*Muricea californiensis* and *M. fruticosa*), lobsters (*Panilurus interruptus*), and colonies of the cup coral *Astrangia lajollensis*.

**Hard-Bottom Associated Fishes.** Nine species of fish and one unidentified juvenile were observed in the vicinity of hard-bottom habitat during the dive and remote video surveys. The most common fishes observed included garibaldi (*Hypsypops rubicundus*), kelp bass (*Paralabrax clathratus*), opaleye (*Girella nigricans*), pile surfperch (*Damalichthys vacca*), blacksmith (*Chromis punctipinnus*), señorita (*Oxyjulis californica*), and kelpfish (*Heterostichus rostratus*). Most fish were seen in the vicinity of the Youth Sailing Center Docks, the Sport Fishing Docks, the West Channel, Main Channel, and East Channel.

## 3.4 EELGRASS

### 3.4.1 Importance of Eelgrass

Eelgrass (Figure 5) is a marine flowering plant that grows in soft sediments in coastal bays and estuaries, and occasionally offshore to depths of 50 feet (ft). Eelgrass canopy (consisting of shoots and leaves) enhances the abundance and the diversity of otherwise barren sediments. Many species of invertebrates (i.e., clams, crabs, and worms) live either on eelgrass or within the soft sediments that cover the root and rhizome mass system. Eelgrass is a nursery habitat for many juvenile fishes, including species of commercial and/or sports fish value (California halibut and barred sand bass). They are also foraging centers for seabirds such as the endangered California least tern that seek out juvenile topsmelt that are attracted to the eelgrass cover. Lastly, eelgrass is an important contributor to the detrital (decaying organic) food web of bays as the decaying plant material is consumed by many benthic invertebrates (such as polychaete worms) and reduced to primary nutrients by bacteria.



Figure 5. Eelgrass, *Zostera marina*. One “shoot” and the cluster of “blades” arising from the shoot is considered a “turion unit”.

### 3.4.2 Results of Focused Eelgrass Field Surveys, 2005-2010

Studies conducted between 2005 and 2010 have documented the expansion of an eelgrass bed seaward of Baby Beach in the western section of Dana Point Harbor (Figure 6). Most recently, small-to-large patches of eelgrass were located 160 to 412 feet west of the existing bulkhead at the Youth Sailing Center (Figure 6) during surveys conducted by MBC Applied Environmental Sciences (2008 and 2009) and CRM (Coastal Resources Management, Inc. this document). The results of eelgrass surveys conducted to date in Dana Point Harbor are discussed below.

Chambers Group, Inc. located a single, three-turion plant at the eastern end of Baby Beach in 2005 (Chambers Group, Inc (2005) for the Dana Point Harbor Maintenance Dredging Project. MBC Applied Environmental Sciences conducted eelgrass and invasive algae surveys for the Dana Point Harbor Maintenance Dredging and Pipeline Corridor Project in August 2008 and February 2009 (MBC Applied Environmental Sciences, Inc. 2008) and 2009). A total of 14.5 square meters of eelgrass was located seaward of Baby Beach in 2008, and 70 square meters of eelgrass were located seaward of Baby Beach in 2009. Eelgrass turion density ranged between 48 and 56 turions per square meter during the 2009 survey. The locations of where MBC located eelgrass are shown in Figure 6. In addition to noting the presence of eelgrass at Baby Beach, MBC reported a small, 0.5 square meter patch of eelgrass northeast of the launch ramp in 2008 at the jet ski and kayak rental location.

Coastal Resources Management, Inc. did not located eelgrass within Dana Point Harbor during the February/March 2007 or the October/November 2007 surveys. On June 8th, 2010, CRM conducted diver transect surveys in the vicinity of the Youth Sailing Center Docks along the eastern one-third of Baby Beach at depths between -3 and -12 ft MLLW (Figure 6). A total of 457.3 square feet (42.5 square meters) of eelgrass was mapped by CRM within the survey area at depths between -2.5 and -4.5 ft MLLW in a mixture of silt

and scattered boulders (Figure 6). Eelgrass density was extremely low, ranging between 4 and 10 turions per square meter.

CRM could not relocate the eelgrass patch that MBC located in the Dry Stack Storage area docks during the 2010 survey. This location appeared to be located underneath jet ski platforms at the time of the survey.

### **3.5 INVASIVE ALGAE (*Caulerpa taxifolia*)**

#### **3.5.1 Importance**

Invasive algae (Figure 7) has a potential to cause ecosystem-level impacts on California's bays and nearshore systems due to its extreme ability to out-compete other algae and seagrasses. *Caulerpa taxifolia* grows as a dense smothering blanket, covering and killing all native aquatic vegetation in its path when introduced in a non-native marine habitat. Fish, invertebrates, marine mammals, and sea birds that are dependent on native marine vegetation are displaced or die off from the areas where they once thrived. It is a tropical-subtropical species that is used in aquariums. It was introduced into southern California in 2000 (Agua Hedionda Lagoon and Huntington Harbour) by way of individuals likely dumping their aquaria waters into storm drains, or directly into the lagoons. While outbreaks have been contained, the Water Resources Board, through the National Marine Fisheries Service and the California Department of Fish and Game require that projects that have potential to spread this species through dredging, and bottom-disturbing activities conduct pre-construction surveys to determine if this species is present using standard agency-approved protocols and by National Marine Fisheries Service/California Department of Fish and Game Certified Field Surveyors.

#### **3.5.2 Focused Survey for Invasive Algae**

*Caulerpa* algae was not observed within the 6.7 acre survey area within the areas proposed for harbor revitalization (Table 1 and Figure 4) during surveys conducted in 2007 and 2010. The amount of habitat covered during the survey averaged 25.8%, ranging from 13.9% in the East and West marina basins to over 100% coverage at the Youth Sailing Center and the Harbor Patrol basin. Diver-specific surveys in the vicinity of Baby Beach covered between 58 and 65 % of the total bottom habitat; this effort reflected a concentrated survey effort in a region where there was a greater probability of locating either eelgrass or *Caulerpa*, since a very small patch of eelgrass (three turions) was located there in April 2005 (Chambers Group, Inc., 2005). However, *Caulerpa* was not present in Dana Point Harbor during previous surveys (Chambers Group, Inc. 2005, 2006; MBC Applied Environmental Sciences, 2008).



Figure 6. Location of Eelgrass in the Vicinity of Baby Beach and the Sailing Center. 2008-2010



Figure 7. The invasive algae, *Caulerpa taxifolia*. Source: NOAA/NMFS

The invasive algae reporting form, is provided in Appendix 3. Prior to marina construction, a pre-construction *Caulerpa* survey will need to be conducted that attains a minimum survey intensity level of 20% within each of the renovation areas to meet the standard of the Southern California Caulerpa Action Team (NMFS, 2008).

### 3.5.3 *Undaria pinnatifida*

*Undaria pinnatifida* (Figure 8) is a golden brown kelp native to the Japan Sea. It has been introduced in Australia, New Zealand, and Europe and has now spread to the California coastline. It has been found in several bodies of water including Santa Barbara Harbor, Long Beach Harbor, Anaheim Bay, San Diego Bay, and the waters surrounding Catalina Island.

In Japan it is known as wakame and is extensively cultivated as a fresh and dried food plant. However, it has the potential to become a major pest in our coastal waters. *Undaria* grows to between 3 to 7 feet (1 and 2 m) tall and is found in sheltered harbor waters on rocks, breakwaters, and marine debris from the low-tide mark to 50 feet (15 m). A mature plant has a distinctive, spiraled (frilly), spore-producing structure at its base. It also has an obvious central stem to 4 inches (10 cm) wide that extends for the length of the plant (Figure 8). The blade may be up to 3.1 feet (1 m) wide and extends from the tip of the plant for half the length of the plant.

#### **Focused Survey for *Undaria***

*Undaria* was not observed during dive surveys or remote video surveys in Dana Point Harbor between 2007 and 2010.

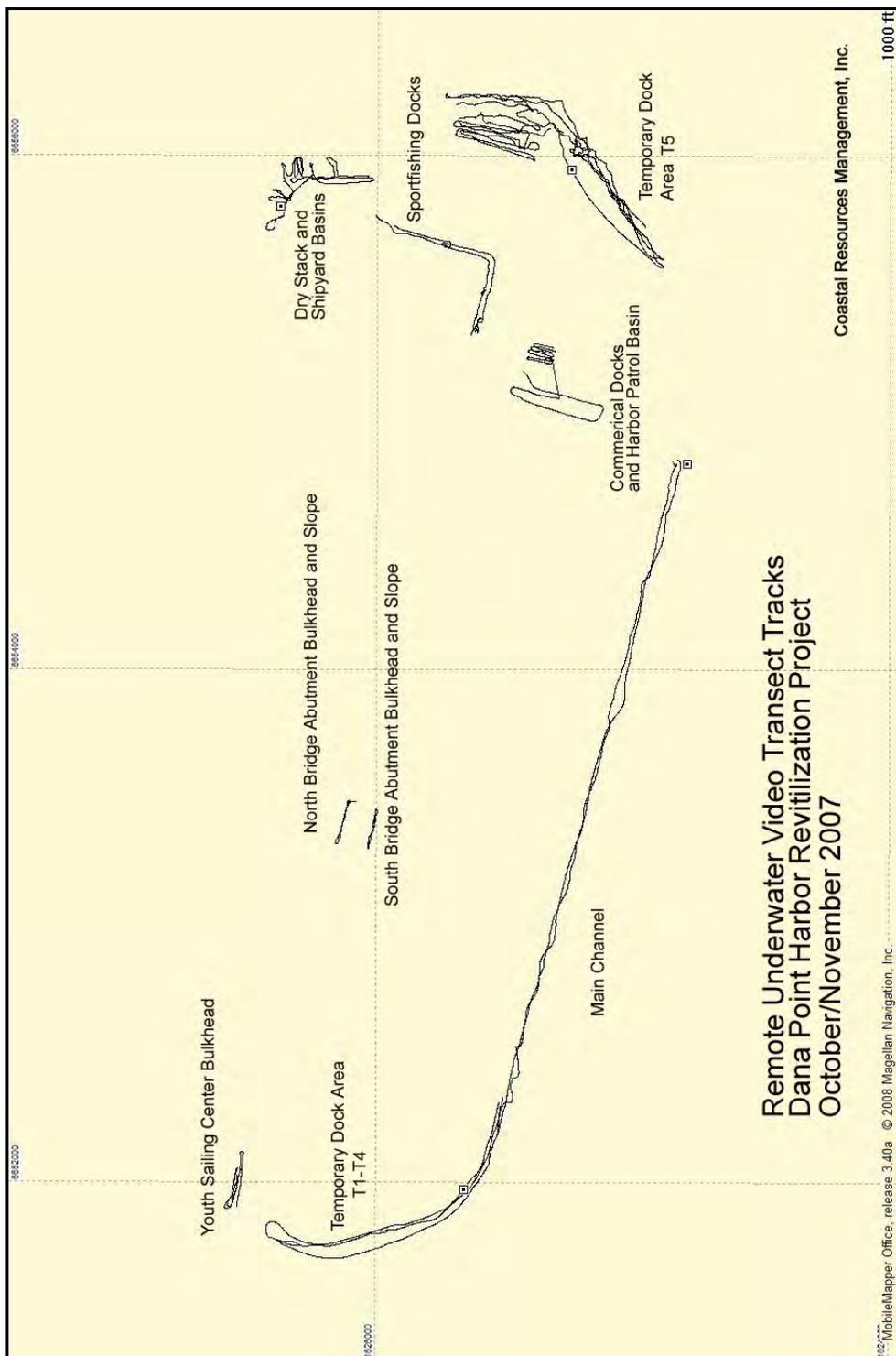


Figure 8. *Undaria pinnatifida*

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### APPENDIX 1. REMOTE UNDERWATER VIDEO SURVEY TRACK LINES OCTOBER/NOVEMBER 2006 SURVEY



**APPENDIX 2.**

**MARINE PLANTS AND ANIMALS OBSERVED  
DURING SURVEYS OF DANA POINT HARBOR**

**FEBRUARY/MARCH 2007  
OCTOBER/NOVEMBER 2007  
JUNE 2010**

Common Name	Scientific Name	Epi Benthos		Baby Beach	Marina Hard Scape	Youth Sailing		West Jetty		Temp Dock (South of Bait Barge)	Temp Dock (North of Bait Barge)	Youth Sailing Center Rip	Bridge Bases	Harbor Patrol Basin*	Sportfishing		All
		Benthos	Benthos			Shoal and Channel Slope	Main Channel	Dock Rap and Reef	Dry Stack and Shipyard Basins								
diatom mat	Bacillariophyceae	x		x	x	x		x									x
green algae	<i>Chaetomorpha linza</i>	x			x												x
green algae	<i>Ulva intestinalis</i>	x		x	x										x		x
brown algae	<i>Colpomenia perigrinus</i>				x												x
brown algae	<i>Colpomenia sinuosa</i>							x									x
brown algae	<i>Dictyopteris undulata</i>				x							x					x
brown algae	<i>Dictyota flabellata</i>				x												x
brown algae	<i>Dictyoneura</i> sp.				x												x
brown algae	<i>Eisenia arborea</i>				x												x
brown algae	<i>Haldys dioica</i>				x												x
brown algae	<i>Macrocystis pyrifera</i>																x
brown algae	<i>Sargassum muticum</i>				x												x
brown algae	<i>Taonia lennebacherae</i>																x
brown algae	<i>Zonaria farlowii</i>																x
red algae	<i>Amphiroa zonata</i>																x
red algae	<i>Bossiella orbigniana</i>																x
red algae	<i>Coralina chilensis</i>																x
red algae	<i>Coralina pinnatifolia</i>																x
red algae	<i>Coralina vancouverensis</i>				x												x
red algae	<i>Cryptopleura crispa</i>																x
red algae	Filamentous red algae				x												x
red algae	<i>Gelidium purpurascens</i>																x
red algae	<i>Laurencia pacifica</i>																x
red algae	<i>Lithothamnion</i> sp.																x
red algae	<i>Lithothrix aspergillum</i>																x
red algae	encrusting red, unid.																x
red algae	<i>Polysiphonia</i> sp.				x												x
red algae	<i>Rhodomenia californica</i>																x
red algae	red turf algae																x
seagrass	<i>Zostera marina</i>																x
sponge	<i>Leucosolenia</i> sp.																x

Common Name	Scientific Name	Epi Benthos	Baby Beach	Marina Hard Scape	Youth Sailing Center Reefs	West Jetty Shoal and Channel Slope	West Main Channel	Temp Dock (South of Bait Barge)	Temp Dock (North of Bait Barge)	Youth Sailing Center Rap	Bridge Bases	Harbor Patrol Basin*	Sportfishing Dock Rap and Reef	Dry Stack and Shipyard Basins	All
sponge	Porifera, Unid.	x		x	x		x				x				x
anemone	<i>Anthopleura sola</i>			x			x						x		x
hard coral	<i>Astrangia lajollensis</i>												x		x
hydroid	<i>Aglaophenia</i> sp.			x			x				x				x
gorgonian	<i>Muricea californica</i>						x						x		x
gorgonian	<i>Muricea fruticosa</i>			x	x			x					x		x
anemone	<i>Pachycerianthus fimbriatus</i>									x					x
polychaet flatworm	<i>Pseudoceros</i> sp.											x			x
polychaete	<i>Diopatra ornata</i>							x							x
polychaete	<i>Dodecaceria</i> sp.			x											x
polychaete	<i>Pirengmatopoma californica</i>			x	x										x
polychaete	Sabellidae, unid.			x											x
polychaete	Spionidae, unid.			x	x								x		x
polychaete	Serpulidae, unid.			x	x										x
polychaete	Spirorbidae, unid.			x	x										x
bamacle	<i>Cthamalus fissus/dalii</i>			x			x		x				x		x
bamacle	<i>Balanus amphitrite</i>			x	x										x
bamacle	<i>Balanus glandula</i>			x	x		x				x				x
lined shore crab	<i>Pachygrapsus crassipes</i>			x	x										x
lobster	<i>Panilurus interruptus</i>			x	x		x						x		x
snail	<i>Acanthina spirata</i>								x						x
limpet	<i>Collisella digitalis</i>														x
limpet	<i>Collisella scabra</i>				x		x		x				x		x
slipper shell	<i>Crepidula onyx</i>				x			x							x
Kellet's whelk	<i>Kelletia kelletii</i>				x										x
Gould's paper bubble	<i>Haminoea vesicula</i>								x						x
rock scallop	<i>Hinnites giganteus</i>			x			x								x
limpet	<i>Lottia gigantea</i>						x								x
limpet	<i>Lottia limatula</i>						x								x
bay mussel	<i>Mytilus edulis</i>								x						x
bay mussel	<i>Mytilus galloprovincialis</i>			x	x						x				x
sea slug	<i>Navanax inermis</i>						x					x			x
octopus	<i>Octopus</i> sp.														x
snail	<i>Roperia pouisoni</i>							x					x		x

Common Name	Scientific Name	Epi Benthos	Baby Beach	Marina Hard Scape	Youth Sailing Center Reefs	West Jetty Shoal and Channel Slope	West Main Channel	Temp Dock (South of Bait Barge)	Temp Dock (North of Bait Barge)	Youth Sailing Center Rip Rap	Bridge Bases	Harbor Patrol Basin*	Sportfishing Dock Rip Rap and Reef	Dry Slack and Shipyard Basins	All
oyster	<i>Ostrea sp.</i>									x					x
sea cucumber	<i>Parastichopus parvimensis</i>					x	x								x
reverse chama	<i>Pseudochama exogyra</i>		x	x									x		x
festive murex snail	<i>Pteropurpura festiva</i>	x					x	x					x		x
scaled tube worm	<i>Serpulorbis squamigerus</i>						x		x						x
trochid snail	<i>Tegula eisenii</i>														x
soft ectoproct	<i>Anguineila palmata</i>			x											x
ectoproct	<i>Bugula neritina</i>			x											x
ectoproct	Encrusting ectoprocts			x											x
colonial tunicate	<i>Botryllus/Botrylloides</i>			x											x
colonial tunicate	colonial tunicates			x											x
solitary tunicate	Ascideacea, unid.			x			x						x		x
solitary tunicate	<i>Styela plicata</i>			x			x						x		x
opaleye perch	<i>Girella nigricans</i>			x			x						x		x
garibaldi	<i>Hypsypops rubicundus</i>			x			x						x		x
pile perch	<i>Damalichthys vacca</i>			x			x								x
blacksmith	<i>Chromis punctipinnis</i>			x			x								x
kelp bass	<i>Paralabrax clathratus</i>			x			x						x		x
unknown barred fish	juvenile, unid.			x			x								x
kelp fish	<i>Heterostichus rostratus</i>			x			x								x
senonita	<i>Oxyjulis californica</i>			x			x								x
flatfish	unid. flatfish	x													x
round sting ray	<i>Urolophus halleri</i>	x													x
<b>Total</b>		<b>9</b>	<b>3</b>	<b>36</b>	<b>31</b>	<b>5</b>	<b>49</b>	<b>10</b>	<b>25</b>	<b>15</b>	<b>12</b>	<b>6</b>	<b>25</b>	<b>0</b>	<b>88</b>

**APPENDIX 3. *CAULERPA TAXIFOLIA* REPORTING FORM  
(PER NATIONAL MARINE FISHERIES SERVICE AND CALIFORNIA  
DEPARTMENT OF FISH AND GAME REQUIREMENTS)**

***Caulerpa taxifolia* Survey Reporting Form**  
**Dana Point Harbor Marina Renovation Project,**  
**Dana Point, CA**

**Prepared for:**  
**LSA Associates, Inc.**  
**20 Executive Park, Suite 200, Irvine, California**  
**Contact: Rob Balen**  
**(949) 533-0666**

**Prepared by:**  
**Coastal Resources Management, Inc.**  
**PMB 327, 3334 E. Coast Highway, Corona del Mar, CA 92625**  
**Contact: Rick Ware, Senior Marine Biologist**  
**(949) 412-9446**

**June 15<sup>th</sup>, 2007**  
**Revised July 8<sup>th</sup>, 2010**



This form is required to be submitted for any surveys conducted for the invasive exotic alga *Caulerpa taxifolia* that are required to be conducted under federal or state permits and authorizations issued by the U.S. Army Corps of Engineers or Regional Water Quality Control Boards (Regions 8 & 9). The form has been designed to assist in controlling the costs of reporting while ensuring that the required information necessary to identify and control any potential impacts of the authorized actions on the spread of *Caulerpa*. Surveys required to be conducted for this species are subject to modification through publication of revisions to the *Caulerpa* survey policy. It is incumbent upon the authorized permittee to ensure that survey work is following the latest protocols. For further information on these protocols, please contact: Robert Hoffman, National Marine Fisheries Service (NOAA Fisheries), (562) 980-4043, or William Paznokas, California Department of Fish & Game, (858) 467-4218).

<b>Report Date:</b>	January 6 <sup>th</sup> , 2007; Revised 8 July 2010
<b>Name of bay, estuary, lagoon, or harbor:</b>	Dana Point Harbor, Dana Point, Orange County, California. See Figure 1.
<b>Specific Location Name:</b>	Dana Point Marina Basins and the vicinity of Baby Beach/Youth Sailing Center. See Figures 2-4.
<b>Site Coordinates:</b> (UTM, Lat./Long., datum, accuracy level, and an electronic survey area map or hard copy of the map <b>must</b> be included).	Center of Marina Basins: 33.45983 ° N; 118.69817 ° W Accuracy: 1 m, WGS 84
<b>Survey Contact:</b> (name, phone, e-mail)	Rick Ware, Senior Marine Biologist, Coastal Resources Management, Inc. , (949) 412-9446, <a href="mailto:rware.crm@earthlink.net">rware.crm@earthlink.net</a>
<b>Personnel Conducting Survey (if other than above): name, phone, email</b>	Mr. Rick Ware (Certified Caulerpa Surveyor) Mr. Stephen Whitaker (Certified Caulerpa Surveyor) Mr. Tom Gerlinger (vessel skipper/dive tender)
<b>Permit Reference:</b> (ACOE Permit No., RWQCB Order or Cert. No.)	Pending.
<b>Is this the first or second survey for this project?</b>	Initial Survey for Dana Point Harbor Revitalization Project.
<b>Was <i>Caulerpa</i> Detected?:</b> (if <i>Caulerpa</i> is found, please immediately contact NOAA Fisheries or CDFG personnel identified above)	<u>    <b>XX</b>    </u> No, <i>Caulerpa</i> was not found at this site.

<p><b>Description of Permitted Work:</b> (describe briefly the work to be conducted at the site under the permits identified above)</p>	<p>Waterside upgrades are proposed for Dana Point Harbor and include (1) the renovation and re-orientation of the East and West marina basin dock systems by replacing old and deteriorating docks, slips and gangways with new facilities; (2) dock redesign and improvements for the Youth Sailing Center, the Harbor Patrol facilities, Commercial Fishing Dock, the Sport Fishing dock, the Dry Stack facility, and the Shipyard docks; (3) the construction of for vessels that will be displaced during marina reconstruction.; (4) the addition of handicap access at locations where it currently is not available; (5) upgrading vessel pump out facilities; and (6) upgrading electrical service water service.</p> <p>The number of boat slips within the Harbor will decrease from 2,409 to 2,223 (a loss of 116 slips) although the average slip length will increase from 29.85 ft to a length not to exceed 32 ft. A total of 1,306 existing piles will be removed and 969 new piles will be emplaced.</p>	
<p><b>Description of Site:</b> (describe the physical and biological conditions within the survey area at the time of the survey and provide insight into variability, if known. Please provide units for all numerical information).</p>	<p><i>Depth range:</i></p>	<p>0.0 ft to -24.2 ft MLLW.</p>
	<p><i>Substrate type:</i></p>	<p>Silt sediments in most part of areas surveyed. Silty sand sediments west of basins near Baby Beach. Reef in the Main Channel, and scattered in the East Channel.</p>
	<p><i>Temperature:</i></p>	<p>57 (Feb 2007) to 67 degrees F (June 2010);</p>
	<p><i>Salinity:</i></p>	<p>25-35 ppt</p>
	<p><i>Dominant flora:</i></p>	<p>Twenty-nine algal taxa were recorded. Dominant algae species on the soft sediments included diatom mat, <i>Chaetomorpha aerea</i> and <i>Ulva intestinalis</i>. Common hard-substrate algal taxa associated with hard substrate on marina rip rap, pilings, docks, bulkheads, jetty quarry rock and natural reef habitats outside of the marina basins. included <i>Colpomenia sinuosa</i>, <i>Dictyopteris undulata</i>, <i>Dictyota flabellata</i>, <i>Eisenia arborea</i>, <i>Sargassum muticum</i>, <i>Corallina</i> spp., and filamentous red algae.</p>
	<p><i>Dominant fauna:</i></p>	<p>Fifty-six taxa of invertebrates, and fishes were observed during the surveys. Of this total, only six were observed by biologists on marina basin sediments. The most common species was <i>Navanax inermis</i>.</p>

	<i>Exotic species encountered (including any other Caulerpa species):</i>	<i>Sargassum muticum</i>
	<i>Other site description notes:</i>	Eelgrass was located near Baby Beach during the June 2010 survey.
<b>Description of Survey Effort:</b>	<i>Survey date and time period:</i>	February 20 <sup>th</sup> , March 6 <sup>th</sup> , and March 16 <sup>th</sup> , 2007; October 31 <sup>st</sup> , November 1 <sup>st</sup> , and November 2 <sup>nd</sup> , 2007; and June 7 <sup>th</sup> -8 <sup>th</sup> , 2010
<b>Description of Survey Effort:</b> please describe the surveys conducted including type of survey (SCUBA, remote video, etc.) and survey methods employed, date of work, and survey density (estimated percentage of the bottom actually viewed).	<i>Horizontal visibility in water:</i>	Visibility was highly variable depending on the area of the harbor being surveyed and ranged between 1 and 10 feet on each side of the center line.
	<i>Survey type and methods:</i>	<p>A total of 329 variable-length underwater transects (5 meters [m] to 258 m in length) were swam using SCUBA throughout Dana Point Harbor where waterside developments are planned and in areas where eelgrass potentially can be found in shallow water habitat. Fourteen dock piles in the Cove East and the Island East marina basins were also surveyed to determine the types and relative abundances of marine organisms that might be affected by marina construction.</p> <p>Remote Underwater Video (RUV) surveys were also conducted to determine the presence of eelgrass, invasive algae, other organisms, and habitat types. The camera system used for the surveys was an Ocean Systems, Inc. Deep Blue Professional Grade Underwater Video Camera (“Splash Cam”) attached to a military-grade umbilical cable. Real-time observations of the harbor benthos were collected by conducting a running series of variable-length underwater video transects ranging in length from 0.16 to 1.67 miles long at all sites except for the East and West Marina Basins.</p> <p>The surveys covered 6.28 acres of harbor bottom habitat. Overall, the bottom area surveyed by both diving biologists and remote video averaged 24.7% of the total bottom habitat within the</p>

		<p>project survey limits, ranging from 13.9% in the East and West Marina basins to over 100% coverage in the at the Youth Sailing Center and the Harbor Patrol basin. Baby Beach areal cover (by divers and video in 2007 and 2010) encompassed a minimum of 187% of the survey area, and reflected a survey effort concentrated in a region where there was a probability of locating eelgrass since a very small patch of eelgrass (three turions) was located there in April 2005 (Chambers Group, Inc., 2005).</p> <p>The total area of open water habitat and water habitat underneath the docks (Area of Potential Effect) in the project area was 25.28 acres.</p> <p>Bottom types, common marine life, and the presence or absence of <i>Caulerpa taxifolia</i> and <i>Zostera marina</i> were noted. Depths were standardized to Mean Lower Low Water (MLLW) based upon time of observation and tidal corrections for the San Clemente Pier tidal survey station.</p>
Describe any limitations encountered during the survey efforts.	<i>Survey personnel:</i>	Rick Ware, Steve Whitaker and Tom Gerlinger, Coastal Resources Management, Inc.
	<i>Survey density:</i>	Underwater Remote Video tracklines covered 7,899 meters of harbor seafloor (4.91 miles). For both survey methods, a total of 6.28 acres of bottom habitat out of a total APE of 25.28 acres were surveyed (24.7% of the total bottom habitat in the survey area).
	<i>Survey limitations:</i>	Vessel movement within the project area.
<b>Other Information:</b> (use this space to provide additional information or references to attached maps, reports, etc.)	<p>Figure 1- Project Location, Regional</p> <p>Figure 2- Proposed Location</p> <p>Figure 3. Project Layout</p>	

# Keane Biological Consulting

2892 N. Bellflower Blvd. #480

Long Beach, CA 90815

PHONE: 562-708-7657

[keanebio@yahoo.com](mailto:keanebio@yahoo.com)



April 16, 2007

Mr. Rick Ware

## COASTAL RESOURCES MANAGEMENT

*PMB 327, 3334 East Coast Highway*

*Corona del Mar, CA 92625*

### **Subject: Dana Point Harbor Bird Survey**

Dear Rick,

On March 24, Robb Hamilton, ornithologist with Keane Biological Consulting, completed a nesting bird survey at Dana Point Harbor in southern Orange County, California. This survey was conducted as a component of mitigation measures specified in the Dana Point Harbor Revitalization Project Program EIR (PEIR) prepared for the County of Orange by Robert Bein, William Frost, and Associates (RBF) in 2006. This letter report describes the methods and provides the results of our survey.

### **Methods**

Before starting the survey, Mr. Hamilton reviewed the relevant sections of the PEIR, including Appendix C, the "Marine Biological and Oceanographic Assessment" prepared by RBF and MBC Applied Environmental Sciences. He also read Section 4.7 of the PEIR, "Biological Resources." The survey extended from 9:15 a.m. to 2:15 p.m. under partly cloudy skies, with temperatures between 66 and 74° F and winds of up to three miles per hour. Mr. Hamilton searched all portions of the harbor, as specified on Exhibit 4.7-1, the "Map of Native Trees and Sensitive Bird Areas" from the PEIR. Mr. Hamilton searched for all types of birds, recorded every bird he encountered, and took note of any indications that a bird may have been nesting at the harbor (e.g., courtship behavior, singing). Mr. Hamilton specifically searched for Black-crowned Night-Herons (*Nycticorax nycticorax*) that are known to nest in eucalyptus trees located at the end of Puerto Place at the harbor's eastern end. He also searched for and Snowy Egrets (*Egretta thula*), which reportedly nest "in trees on the east side of the Harbor" (Page 4.7-33 of the PEIR). He used a GPS unit accurate to approximately 12 feet in order to plot the locations of birds that showed signs of nesting or potential nesting (see Figure 1). A list of all bird species detected during the survey is included at the end of this report.

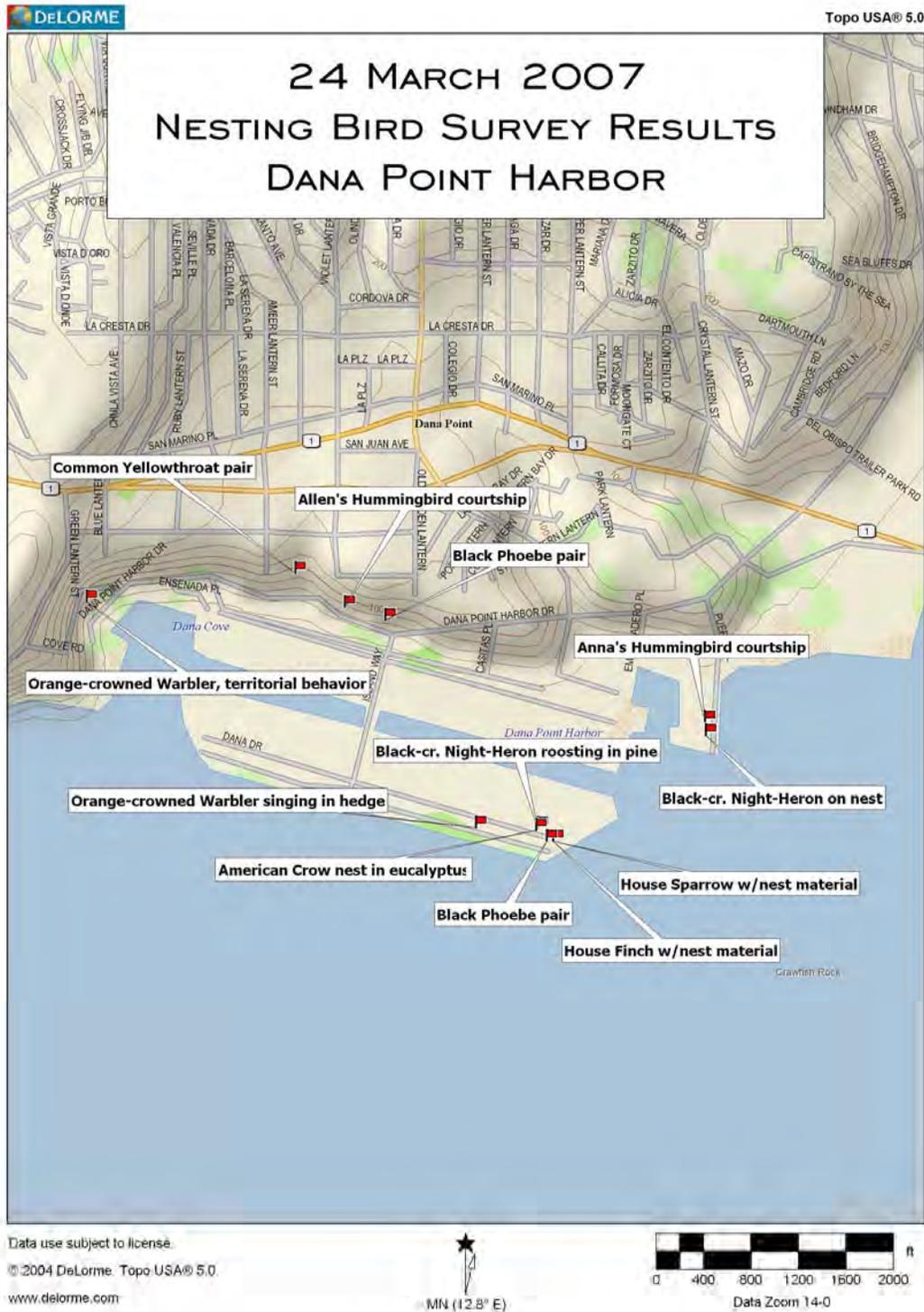


Figure 1. Evidence of definite or potential bird nesting (and heron roosting) detected during the March 24 survey (each point was mapped with a GPS unit accurate to approximately 12 feet)

## Results

As detailed below and in the attached species list, Mr. Hamilton detected 34 native and three non-native bird species during the survey. The following discussions are not meant to identify all species that potentially nest within the harbor study area, but only to provide basic information on the known or likely nesting status of each species that he observed during the one-day survey. Within the study area, Mr. Hamilton considered 14 of the observed species to be known or likely breeders, eight to be potential breeders, and the remaining 15 species to be non-breeding winter visitors or migrants passing through the area.

### Species Known or Likely to Nest in the Harbor Study Area

In eucalyptus trees at the end of Puerto Place, Mr. Hamilton observed approximately 20 nests of **Black-crowned Night-Herons** and/or **Snowy Egrets** (see Figure 1). Page 4.7-33 of the PEIR states that Snowy Egrets nest “in trees on the east side of the Harbor” and are “subject to construction disturbance that may disrupt nesting,” although Page 4.7-14 of the same document states, with reference to this species, “There is no suitable nesting habitat present in the Harbor or Off-Site areas.” Mr. Hamilton’s survey was not intended to conclusively answer the question of whether both species nest in these trees, but only to record the species that were nesting within the study area at the time of his survey. Mr. Hamilton saw two adult Black-crowned Night-Herons in one of the trees—one on a nest and the other calling from beside a nest—suggesting that at least the Black-crowned Night-Herons had initiated nesting at this location. In his opinion, these trees provide potentially suitable habitat for Snowy Egrets, as well, and some of the unoccupied nests may have belonged to Snowy Egrets. If it is important to determine whether Snowy Egrets nest at this location, Mr. Hamilton recommends that a follow-up survey be conducted between late May and the end of June. In a parking lot off Dana Drive, one adult Black-crowned Night-Heron was observed roosting in a 20-foot tall pine tree (see Figure 1).

Mr. Hamilton observed courtship flights by males of both **Anna’s** and **Allen’s Hummingbirds** (*Calypte anna*, *Selasphorus sasin*), and it is to be expected that both of these species nest in the harbor study area, with Allen’s Hummingbird being about three times more numerous. Most of the Allen’s Hummingbirds were along Dana Point Harbor Drive, where coastal scrub on the adjacent hillside to the north provides appropriate nesting habitat.

Mr. Hamilton observed two pairs of **Black Phoebes** (*Sayornis nigricans*), one near the eastern end of Dana Drive and the other along Dana Point Harbor Drive (see Figure 1). This is a very adaptable species, and Mr. Hamilton assumes that both pairs will nest within the study area. They often choose locations under bridges, in culverts, or under the eaves of structures, typically close to water.

Mr. Hamilton found **American Crows** (*Corvus brachyrhynchos*) to be common in the harbor, including about 20 birds in and around the eucalyptus trees at the end of Puerto Place, where the herons are nesting. Mr. Hamilton expects that many crows nest in the harbor’s various tall trees but observed only one pair at a nest, in a eucalyptus tree growing in a parking lot toward the eastern end of Dana Drive (see Figure 1).

The **Barn Swallow** (*Petrochelidon rustica*) tends to nest in areas comparable to those described above for the Black Phoebe, usually near the coast. Mr. Hamilton observed eight of these birds foraging low over the study area during the survey and expects that this species routinely nests at the harbor.

**Bushtits** (*Psaltriparius minimus*) are abundant residents of the region that nest in a variety of dense trees and shrubs, often in developed areas. Mr. Hamilton observed approximately 16 of these birds along Dana Point Harbor Drive, and expects that several pairs nest in this part of the study area.

The non-native **European Starling** (*Sturnus vulgaris*) is an abundant and ubiquitous species in Orange County. They nest in a great variety of cavities, often in artificial situations such as traffic signals, telephone poles, and in structures. Mr. Hamilton made a rough count of 60 of these birds during our survey and assumes that many nest within the harbor study area.

The **Common Yellowthroat** (*Geothlypis trichas*) is found commonly in the local area, often in wet areas with dense understory. The harbor study area includes only one such area—the hidden dripping spring located north of Dana Point Harbor Drive (see Figure 1). Mr. Hamilton saw a pair of these birds at this spring and presumes that they nest there.

Toward the end of the survey Mr. Hamilton observed a single male **Hooded Oriole** (*Icterus cucullatus*), a migratory species that starts arriving back in southern California around mid-March. This species nests most commonly in palm trees, but will also use sycamores and eucalyptus, both of which occur in the harbor study area.

The **House Finch** (*Carpodacus mexicanus*) is one of southern California's commonest and most human-tolerant native species. Mr. Hamilton made an approximate count of 80 of these birds during the survey, including a pair that was carrying nesting material at the Beach House restaurant near the eastern end of Dana Drive (see Figure 1). Mr. Hamilton expects that this is among the most abundant breeding species within the harbor study area.

Another common resident is the **Lesser Goldfinch** (*Carduelis psaltria*). Mr. Hamilton observed approximately 16 birds in tall pine and eucalyptus trees along Dana Point Harbor Drive, and the birds almost certainly nest in these trees.

Mr. Hamilton found eight non-native **House Sparrows** (*Passer domesticus*) during the survey, which is a modest number for this ubiquitous species. A pair of them was building a nest at the Beach House restaurant near the eastern end of Dana Drive (see Figure 1).

### **Other Species that Potentially Nest in the Harbor Study Area**

The non-native **Rock Pigeon** (*Columba livia*) occurs commonly throughout developed portions of Orange County, including cities and agricultural areas. These birds nest on natural cliffs, under bridges, and in buildings. Mr. Hamilton estimated a count of roughly 25 Rock Pigeons in the harbor study area. He did not see any obvious nesting sites during his survey, but these pigeons are very adaptable and there is potential for them to nest in the study area.

**Nuttall's Woodpecker** (*Picoides nuttallii*) is a non-migratory species that usually occupies native oak and willow-riparian woodlands. Mr. Hamilton heard a single bird calling from non-native trees along Dana Point Harbor Drive. It seems unlikely, but not impossible, that the harbor supports a breeding pair of this species.

Mr. Hamilton observed a single **Cassin's Kingbird** (*Tyrannus vociferans*) in eucalyptus trees in the pay parking lot adjacent to Doheny State Beach. Mr. Hamilton expects that this species nests in tall trees either within the harbor study area or at Doheny State Beach.

In a parking lot near the western end of Dana Point Harbor Drive, Mr. Hamilton observed single individuals of the following resident species: **Western Scrub-Jay** (*Aphelocoma californica*), **Northern Mockingbird** (*Mimus polyglottos*), and **California Towhee** (*Pipilo crissalis*). It is likely these birds nest in scrubby habitat just west of there, outside of the harbor study area.

Mr. Hamilton observed one **Common Raven** (*Corvus corax*) flying over the study area. This species prefers to nest on cliffs or tall structures, or in tall trees. They tend to be found in more open areas, but some nest in urban settings and may breed in the harbor area.

The "Dusky" subspecies of the **Orange-crowned Warbler** (*Vermivora celata sordida*) breeds in low vegetation on the Channel Islands and along the adjacent coast of southern California. Other subspecies occur as regular migrants and winter visitors along the coast. Mr. Hamilton observed seven Orange-crowned Warblers during the survey, at least a two of which appeared to be the local breeders. As shown on Figure 1, one of these birds was singing and another exhibited territorial behavior, chipping excitedly and aggressively flying out toward Mr. Hamilton when he "pished" in its direction. Either of these birds may have been on breeding territories, as both were in the type of low, dense vegetation preferred by this species. This species can, however, sing and respond aggressively to pishing even during migration or on the wintering grounds.

**Brewer's Blackbirds** (*Euphagus cyanocephalus*) nest in dense shrubbery, often close to water and sometimes in urban or suburban settings. Mr. Hamilton observed two males of this species during the survey and considers it possible that they nest in the harbor study area.

### **Additional Comments**

During the course of the survey, Mr. Hamilton observed a few scattered bulky stick nests built high in eucalyptus trees. These may have been old nests of American Crows or possibly Black-crowned Night-Herons, but Mr. Hamilton did not see any birds currently associated with them.

Mr. Hamilton observed a single Great Blue Heron (*Ardea herodias*) foraging within the harbor study area. Page 9 of PEIR Appendix C states, "Although nesting seems likely, great blue heron (*Ardea herodias*) nests have not been observed in the area." From the end of Puerto Place Mr. Hamilton could see a large, flat-topped pine tree a short distance inland to the northwest where it appears that a few pairs of this species do currently nest (see Figure 2). He did not go off site to inspect this tree but believes it is located at the northwestern end of Heritage Park, at the end of Old Golden Lantern. Great Blue Herons in coastal southern California utilize a great variety of nesting substrates, including many exotic tree species and man-made structures. Proximity to human activity does not seem to deter these

birds once they decide to nest in a certain area. Although Mr. Hamilton did not observe any nests of this species during his survey, and it appeared to him that the species had chosen to nest in the nearby pine tree shown in Figure 2, he concluded that the harbor study area includes numerous tall trees that constitute potentially suitable habitat for Great Blue Herons.

## **Conclusion**

Attachment A to this letter lists all bird species detected during the survey, including breeders, non-breeding winter visitors, and migrants. Please note that Mr. Hamilton's single-day survey was not intended to identify all bird species that potentially nest within the harbor study area, and that additional species not detected during Mr. Hamilton's survey could nest there.

During his survey, Mr. Hamilton confirmed nesting by three native and one non-native bird species in the Dana Point Harbor study area:

Black-crowned Night-Heron  
American Crow  
House Finch  
House Sparrow (non-native)

Mr. Hamilton observed an additional nine native and one non-native species that he considers likely to nest in the harbor study area:

Snowy Egret  
Anna's Hummingbird  
Allen's Hummingbird  
Black Phoebe  
Barn Swallow  
Bushtit  
European Starling (non-native)  
Common Yellowthroat  
Hooded Oriole  
Lesser Goldfinch

Another ten native and one non-native species observed during Mr. Hamilton's survey could potentially nest in the harbor study area, because this area lies within their ranges and potentially suitable nesting habitat exists there, but he considered the likelihood of nesting to be less than 50%:

Great Blue Heron  
Rock Pigeon (non-native)  
Nuttall's Woodpecker  
Cassin's Kingbird  
Western Scrub-Jay  
Northern Mockingbird  
California Towhee  
Common Raven

Orange-crowned Warbler  
Brewer's Blackbird

The remaining bird species observed during Mr. Hamilton's survey, such as the Brown Pelican (*Pelecanus occidentalis*), Double-crested Cormorant (*Phalacrocorax auratus*), Western Gull (*Larus occidentalis*), Ruby-crowned Kinglet (*Regulus calendula*), and White-crowned Sparrow (*Zonotrichia leucophrys*), do not include Dana Point within their breeding ranges and/or require nesting habitat that is absent from the harbor study area. Thus, they are considered very unlikely to nest within the harbor study area.

### **Recommendations**

- 1) Depending on project timing, construction may destroy one or more nests of native birds, thus violating the MBTA and/or related provisions of the California Fish and Game Code. Limiting project grubbing and other construction activities to the non-breeding season for most birds (approximately September 1 through March 1) would avoid this impact. If grubbing and grading cannot be limited to this period, a survey of the construction zone by a qualified ornithologist prior to the initiation of grubbing/grading activity shall be conducted. If the ornithologist detects any occupied nests of native birds within the construction zone, a minimum buffer of 100 feet between the nest and limits of construction shall be established, and the construction crew shall be instructed to avoid all activities in this zone until the nest(s) is/are no longer occupied, per a subsequent survey by the qualified ornithologist.
- 2) In order to avoid potential removal of, disturbance to, or abandonment of, heron or egret nests, if any project construction activities are to occur during the period from January 1 through July 30, a survey of the project site and areas within 100 feet shall be conducted by a qualified ornithologist to determine if active heron or egret nests are present within 100 feet of the construction zone. If any heron or egret nests are present within the construction zone, a buffer of 100 feet around the nest shall be flagged and maintained until construction is complete or until the nest is no longer active, per a subsequent survey by the qualified ornithologist. If any heron or egret nests are located outside the project site but within 100 feet of the project site, and any construction activities will occur within 100 feet of the nest(s), a qualified ornithologist shall monitor the nest(s) for 2 hours per day while construction activities are within 100 feet of the nest, following a "control" period of monitoring a minimum of two hours when no construction is occurring within 100 feet of the nest(s). If after five days of monitoring, no observable differences between heron or egret behavior before and during construction are noted, monitoring of the nest(s) need not continue.

Thank you for requesting the services of Keane Biological Consulting. If we can be of further assistance in this matter, please do not hesitate to call.

Sincerely,

**KEANE BIOLOGICAL CONSULTING**



Kathleen M. Keane



Figure 2. View from the end of Puerto Place, facing northwest. Several Great Blue Herons appeared to be nesting in the top of the tall, flat-topped pine in the background of this image.

## Attachment A BIRD SPECIES DETECTED

Mr. Hamilton detected the following birds at Dana Point Harbor on 24 March 2007. Presence may be noted if a species is seen or heard. The number of individuals detected, or a general indication of abundance, is denoted in parentheses after the common name.

\*Introduced species

### Aves

#### Podicipedidae

*Aechmophorus occidentalis*

#### Pelecanidae

*Pelecanus occidentalis*

#### Phalacrocoracidae

*Phalacrocorax auritus*

#### Ardeidae

*Ardea herodias*

*Egretta thula*

*Nycticorax nycticorax*

#### Rallidae

*Fulica americana*

#### Laridae

*Larus heermanni*

*Larus delawarensis*

*Larus californicus*

*Larus occidentalis*

#### Columbidae

\* *Columba livia*

#### Trochilidae

*Calypte anna*

*Selasphorus sasin*

#### Picidae

*Picoides nuttallii*

#### Tyrannidae

*Sayornis nigricans*

*Tyrannus vociferans*

### Birds

#### Grebes

Western Grebe (1)

#### Pelicans

Brown Pelican (69)

#### Cormorants

Double-crested Cormorant (7)

#### Hérons

Great Blue Heron (1)

Snowy Egret (3)

Black-crowned Night-Heron (3)

#### Rails, Gallinules

American Coot (1)

#### Gulls, Terns

Heermann's Gull (1)

Ring-billed Gull (many flying over)

California Gull (many flying over)

Western Gull (many flying over)

#### Pigeons, Doves

Rock Pigeon (~25)

#### Hummingbirds

Anna's Hummingbird (5)

Allen's Hummingbird (17)

#### Woodpeckers

Nuttall's Woodpecker (1)

#### Tyrant Flycatchers

Black Phoebe (4)

Cassin's Kingbird (1)

**Corvidae**

*Aphelocoma californica*  
*Corvus brachyrhynchos*  
*Corvus corax*

**Hirundinidae**

*Petrochelidon rustica*

**Aegithalidae**

*Psaltriparus minimus*

**Regulidae**

*Regulus calendula*

**Mimidae**

*Mimus polyglottos*

**Sturnidae**

\* *Sturnus vulgaris*

**Parulidae**

*Vermivora celata*  
*Dendroica petechia*  
*Dendroica coronata*  
*Geothlypis trichas*

**Emberizidae**

*Pipilo crissalis*  
*Zonotrichia leucophrys*  
*Junco hyemalis*

**Icteridae**

*Euphagus cyanocephalus*  
*Icterus cucullatus*

**Fringillidae**

*Carpodacus mexicanus*  
*Carduelis psaltria*

**Passeridae**

\* *Passer domesticus*

**Jays, Crows**

Western Scrub-Jay (1)  
 American Crow (~40)  
 Common Raven (1)

**Swallows**

Barn Swallow (8)

**Bushtits**

Bushtit (~16)

**Kinglets, Gnatcatchers, Thrushes, Babblers**

Ruby-crowned Kinglet (2)

**Thrashers**

Northern Mockingbird (1)

**Starlings**

European Starling (~60)

**Wood Warblers**

Orange-crowned Warbler (7)  
 Yellow Warbler (1)  
 Yellow-rumped Warbler (~50)  
 Common Yellowthroat (2)

**Sparrows and Buntings**

California Towhee (1)  
 White-crowned Sparrow (15)  
 Dark-eyed Junco (1)

**Meadowlarks, Blackbirds and Orioles**

Brewer's Blackbird (2)  
 Hooded Oriole (1)

**Finches**

House Finch (~80)  
 Lesser Goldfinch (~14)

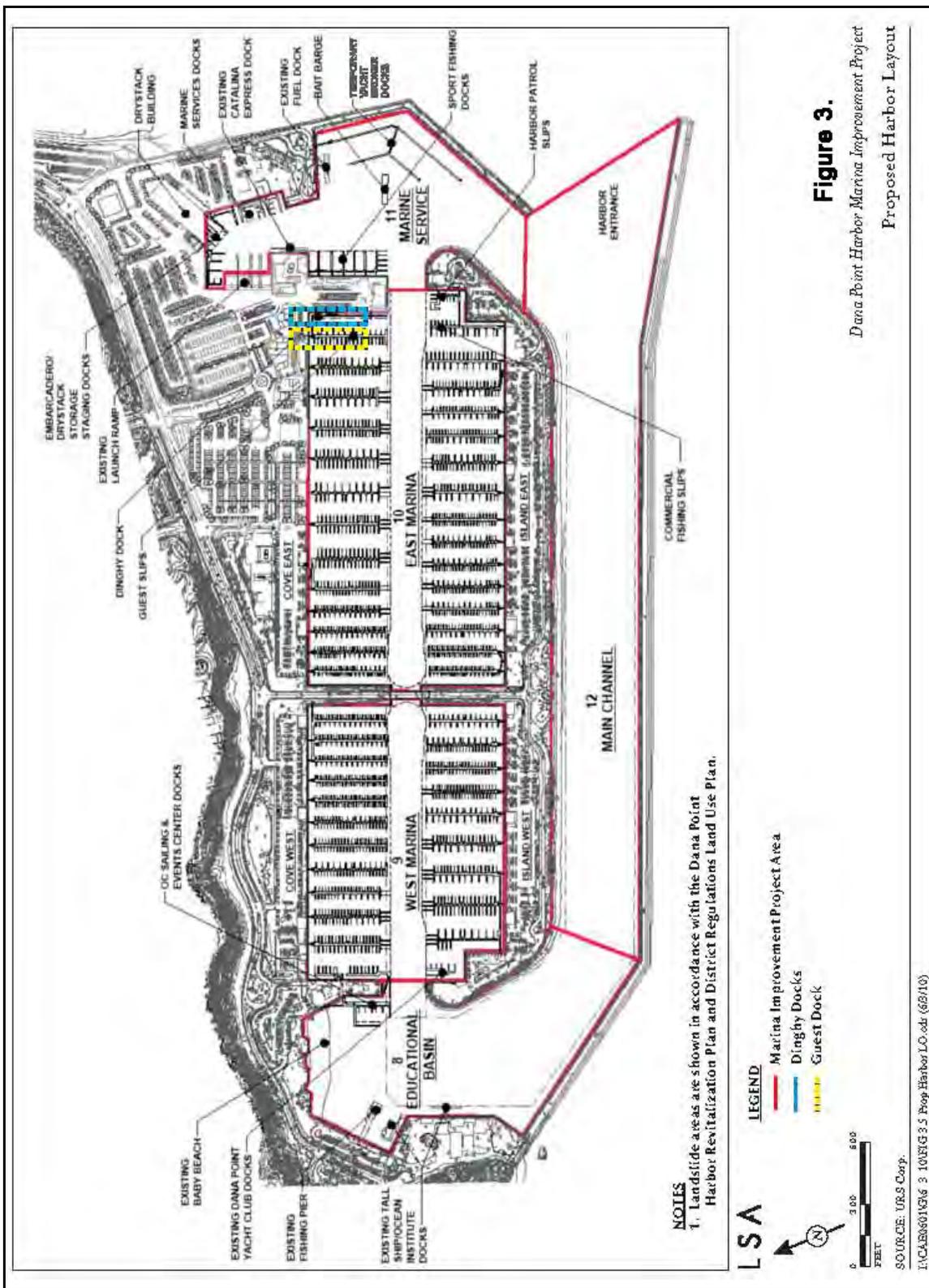
**Old World Sparrows**

House Sparrow (8)

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American Ornithologists' Union. 1998. *Check-list of North American Birds*. Seventh ed. Washington, D.C. plus supplements.





**MARINE BIOLOGICAL RESOURCES: FOCUSED SURVEY REPORT  
FOR EELGRASS (*ZOSTERA MARINA*) AND  
INVASIVE ALGAE (*CAULERPA TAXIFOLIA* AND *UNDARIA PINNATIFIDA*)  
FEBRUARY-MARCH 2007 SURVEYS  
DANA POINT HARBOR MARINA RENOVATION PROJECT  
DANA POINT, CALIFORNIA**



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**July 3<sup>rd</sup>, 2007**



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## **1.0 INTRODUCTION**

### **1.1 PROJECT PURPOSE**

Coastal Resources Management, Inc. (CRM) conducted marine biological resource surveys in Dana Point Harbor on February 20<sup>th</sup>, March 6<sup>th</sup>, and March 16<sup>th</sup>, 2007. The purposes of the investigation were to (1) determine if eelgrass (*Zostera marina*) or invasive algae (*Caulerpa taxifolia* or *Undaria pinnatifida*) were present in regions of the harbor where proposed marina improvements are planned, (2) to collect data on the presence/absence of other species present in the Harbor on piling, rip-rap and low-relief habitats that might be affected by marina improvements and (3) assess the potential environmental effects of construction and long-term operation of the marina on sensitive marine resources.

### **1.2 PROJECT LOCATION**

Dana Point Harbor, constructed between 1966 and 1970, is located in the City of Dana Point, Orange County, California about 40 miles south of Long Beach/Los Angeles Harbors (Figure 1). It lies in the lee (protected side) of Dana Point Headlands within Capistrano Bay and is also protected by a 1.7 mile long and 14 to 18 feet high breakwater. Harbor channel widths vary from 350 feet in the anchorage areas to 600 feet at the harbor entrance (Wiegel, 1993) The harbor is subject to in-filling of sands that migrate through the quarry rock-breakwater requiring periodic maintenance dredging to maintain safe water depths.

The marina within Dana Point Harbor is divided into two basins, the East Basin and West Basin (Figure 2). Each basin operates as a separate marina, with a total capacity of about 2,500 shallow-draft vessels. The boat launch ramp at the northeast corner of the harbor is newly upgraded as of July 2007. Other facilities within the harbor include the Dana Point Marine Institute, a dry boat storage hoist, fishing pier, shipyard, marine fuel dock, three yacht clubs, and a commercial sports fishing operation. Swimming is allowed at the west end of the Harbor, at Baby Beach. (<http://www.ocparks.com/danapointharbor/>)

### **1.3 PROPOSED PROJECT COMPONENTS**

The County of Orange proposes upgrade landside and waterside facilities within Dana Point Harbor. Waterside-upgrades include the renovation of the marina basin dock systems by replacing old and deteriorating docks, slips and gangways with new facilities (Figure 3). The number of boat slips will decrease to 2,009 (Marina Layout 2 with channel encroachment). A total of 1,163 existing piles will be removed and approximately 933 new piles will be emplaced. In addition, the proposed project includes adding handicap access at locations that is currently not available; Bulkheads will not be affected by the project. This report only addresses the waterside upgrade of the marina dock systems





## **2.0 FIELD SURVEY METHODS**

Underwater marine biological field surveys were conducted by CRM marine biologists Rick Ware, Stephen Whitaker, and Tom Gerlinger on February 20<sup>th</sup>, March 6<sup>th</sup>, and March 16<sup>th</sup>, 2007 between 0800 and 1430 hours. Surveys were conducted from the RV *Stacy Ann* and a 14 ft Achilles Inflatable vessel.

Underwater surveys were conducted using SCUBA. The surface support individual was in communication with the diving-biologists using an Ocean Technology Systems, Inc. (OTS) communication system due to the potential danger involved while conducting underwater surveys in the active vessel areas. Surveys were conducted in accordance with both the *Southern California Eelgrass Mitigation Policy* (National Marine Fisheries Service 1991 as amended) and the *Caulerpa Control Protocol* (National Marine Fisheries Service, Version 2.1, March 2006).

A total of 70, variable-length underwater transects (15 meters [m] to 153 m in length) were swam using SCUBA in the Cove East and West and the Island East and West marina basins (Figure 4). In addition, 43 transects varying in length between 50 m and 100 m long were swam in front of the sailing center and Baby Beach. Fourteen dock piles in the Cove East and the Island East marina basins were also surveyed to determine the types and relative abundances of marine organisms that might be affected by marina construction.

During the transect swims and the inspection of the dock support piles, divers recorded habitat types, common marine life, and the presence or absence of eelgrass and invasive algae. Depths were standardized to Mean Lower Low Water (ft, MLLW) based upon time of observation and tidal corrections for the NOAA San Clemente tidal survey station.

Caulerpa Survey Protocols. Dana Point Harbor is considered a “non-infected” system and requires a “surveillance level” monitoring effort for the presence of *Caulerpa*. The following information is extracted from the National Marine Service *Caulerpa Control Protocol* in regards to the level of survey effort required.

- 1) *Surveillance Level* – General survey coverage providing a systematic sub-sampling of the entire APE during which at least 20% of the bottom is inspected and widespread occurrences of *Caulerpa* would be expected to be identified if present. Surveys may be accomplished using diver transects, remote cameras, and acoustic surveys with visual ground truthing. Other proposed methodologies may be approved on a case-by-case basis by NOAA Fisheries and CDFG.

The results of the *Caulerpa* Survey are provided in Appendix 1 of this report.





## **3.0 SURVEY RESULTS**

### **3.1 PROJECT AREA**

The dive surveys covered a total of 12,228 sq m (3 acres) of bayfloor habitat within the east and west marina basins and a total of 6,650 sq m (1.64 acres) in the vicinity of Baby Beach and the Youth Sailing Center (Figure 4). Overall, the bottom area of cover surveyed by biologist was 14% in the marina basins and between 58% and 65% at Baby Beach and the Youth Sailing Center. The higher intensity surveys within Baby Beach and the Youth Sailing Center reflected a survey effort concentrated in a region where there was a greater probability of locating either eelgrass or *Caulerpa*, since a very small patch of eelgrass (three turions) was located there in April 2005 (Chambers Group, Inc., 2005).

### **3.2 PHYSICAL ENVIRONMENT**

#### **3.2.1 Survey Depths**

The survey within the marina basins was conducted at depths between +1 ft to - 8 ft on the along the bulkhead retaining walls and at depths between -8 and -11 ft MLLW within the fairways of each of the marina basins. Depths surveyed at Baby Beach ranged between 0.0 and -10 ft MLLW, while depths in the vicinity of the Youth Sailing Center varied between -2 ft MLLW near the bulkhead to depths of -12 ft MLLW, 50 meters west of the dock.

#### **3.2.2 Substrate Types**

Surficial substrate types within the marina basins and in the marina channel were generally silty, although deeper sediments tend to be sandier (Geotechnical Inc., 2006). Isolated rock outcrops were also present. The isolated rock patches include three, single rock outcrops in the Island West Basin and one moderate (1 meter high) relief rock outcrop in Cove West Basin. These outcrops were at depths between -8 and -10 ft MLLW. More extensive low-to-medium reef outcrops were located within 50 meters of the Youth Sailing Center Docks at depths between -3 and -8 ft MLLW. Unconsolidated sediments in the vicinity of Baby Beach and the Youth Sailing Center were predominantly sandy silts but increased in sand percentages with a decrease in depth. Sloped, cement bulkheads around the perimeter of the marina basins were covered with a fine sediment layer.

#### **3.2.3 Underwater Visibility and Water Temperature**

Underwater visibility was generally limited throughout the three day survey and ranged between 1-3 ft on each side of the underwater transect line within the marina basins and 1-4 ft in the vicinity of Baby Beach and the Youth Sailing Center. By comparison underwater visibility averaged about 3 ft near the boat launch ramp in August 2006 (Chambers Group, Inc 2006) and eight feet at depths of 0.0 to -10 ft MLLW at Baby Beach in April 2005 (Chambers Group, Inc., 2005). Water temperature during the February and March 2007 surveys ranged between 57 and 59 degrees Fahrenheit.

### **3.3 EELGRASS**

#### **3.3.1 Importance of Eelgrass**

Eelgrass (Figure 5) is a marine flowering plant that grows in soft sediments in coastal bays and estuaries, and occasionally offshore to depths of 50 feet (ft). Eelgrass canopy (consisting of shoots and leaves added vegetation and the vertical relief it provides enhances the abundance and the

diversity approximately two to three ft long attracts many marine invertebrates and fishes and the of the marine life compared to areas where the sediments are barren. A diverse community of bottom-dwelling invertebrates (i.e., clams, crabs, and worms) live on eelgrass or within the soft sediments that cover the root and rhizome mass system. The vegetation also serves a nursery function for many juvenile fishes, including species of commercial and/or sports fish value (California halibut and barred sand bass). Eelgrass meadows are critical foraging centers for seabirds (such as the endangered California least tern) that seek out baitfish (i.e., juvenile topsmelt) attracted to the eelgrass cover. Lastly, eelgrass is an important contributor to the detrital (decaying organic) food web of bays as the decaying plant material is consumed by many benthic invertebrates (such as polychaete worms) and reduced to primary nutrients by bacteria.

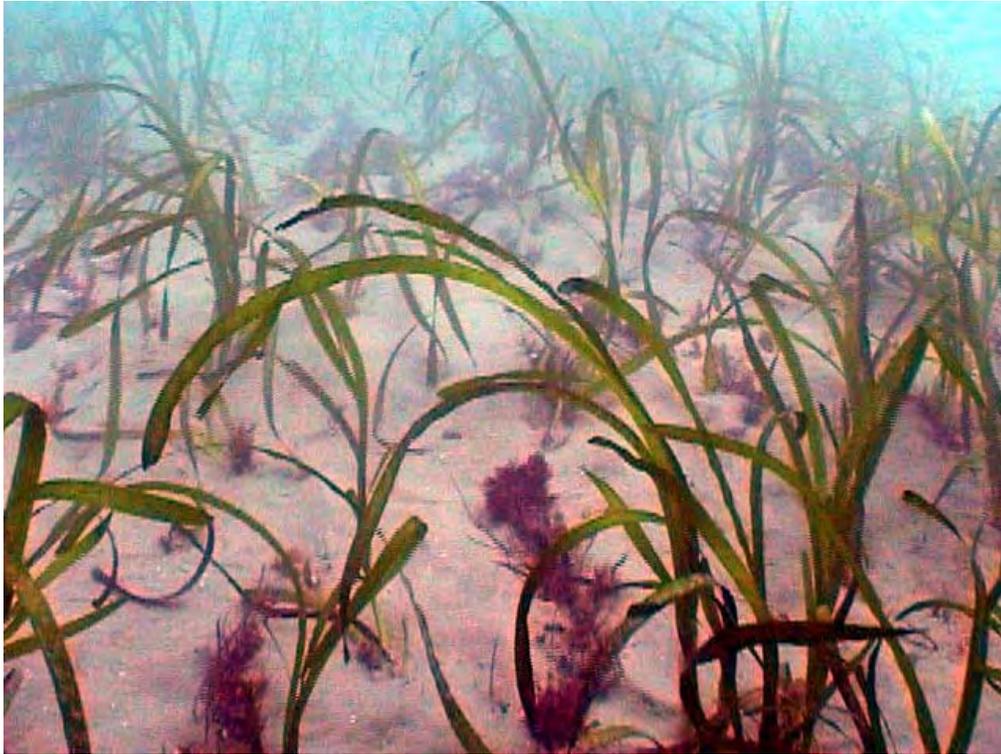


Figure 5. Eelgrass, *Zostera marina*. One “shoot” and the cluster of “blades” arising from the shoot is considered a “turion unit”.

Because of the high ecological value of eelgrass meadows, it is important to document the location and amount of eelgrass in areas of proposed waterside developments and to mitigate any losses by avoiding, reducing, or compensating for any adverse effects on eelgrass habitats and communities.

### **3.3.2 Results of the February/March 2007 Eelgrass Field Survey**

No eelgrass was observed during the underwater biological investigations within the marina basins of Dana Point Harbor or at Baby Beach. In a previous survey, Chambers Group, Inc (2005) found a single, three-turion plant at the eastern end of Baby Beach in April 2005.

## **3.4 INVASIVE ALGAE (*CAULERPA TAXIFOLIA*)**

### **3.4.1 Importance of *Caulerpa taxifolia***

Invasive algae (Figure 6) has a potential to cause ecosystem-level impacts on California's bays and nearshore systems due to its extreme ability to out-compete other algae and seagrasses. *Caulerpa taxifolia* grows as a dense smothering blanket, covering and killing all native aquatic vegetation in its path when introduced in a non-native marine habitat. Fish, invertebrates, marine mammals, and sea birds that are dependent on native marine vegetation are displaced or die off from the areas where they once thrived. It is a tropical-subtropical species that is used in aquariums. It was introduced into southern California in 2000 (Agua Hedionda Lagoon) and (Huntington Harbour) by way of individuals likely dumping their aquaria waters into storm drains, or directly into the lagoons. While outbreaks have been contained, the Water Resources Board, through the National Marine Fisheries Service and the California Department of Fish and Game require that projects that have potential to spread this species through dredging, and bottom-disturbing activities conduct pre-construction surveys to determine if this species is present using standard agency-approved protocols and by National Marine Fisheries Service/California Department of Fish and Game Certified Field Surveyors.

### 3.4.2 Focused Survey for Invasive Algae

No *Caulerpa* was found within the Dana Point marina basins or in the vicinity of Baby Beach. It has not been reported to have been present in Dana Point Harbor in previous surveys (Chambers Group, Inc. 2005, 2006). As noted in Section 3.1, the combined *Caulerpa*-eelgrass dive surveys covered a total of 12,228 sq m (3 acres) of bayfloor habitat within the east and west marina basins and a total of 6,650 sq m (1.64 acres) in the vicinity of Baby Beach and the Youth Sailing Center. Overall, the bottom area of cover surveyed by biologist was 14% in the marina basins and between 58% and 65% at Baby Beach and the Youth Sailing Center. The higher intensity surveys were conducted at Baby Beach and the Youth Sailing Center because the area had a greater probability of locating either eelgrass or *Caulerpa*, since a very small patch of eelgrass (three turions) was located there in April 2005 by Chambers Group, Inc. (Chambers Group, Inc. 2005). The invasive algae reporting form, submitted to the National Marine Fisheries Service and the California Department of Fish and Game is provided in Appendix A. Prior to marina construction, a pre-construction *Caulerpa* survey will need to be conducted that attains a minimum survey intensity level of 20% to meet the standard of the Southern California *Caulerpa* Action Team (NMFS 2006).



Figure 6. The invasive algae, *Caulerpa taxifolia*. Source: NOAA/NMFS

### 3.4.3 *Undaria pinnatifida*

*Undaria pinnatifida* (Figure 7) is a golden brown kelp native to the Japan Sea. It has been introduced in Australia, New Zealand, and Europe and has now spread to the California coastline. It has been found in Santa Barbara Harbor, Long Beach Harbor, Anaheim Bay, San Diego Bay, and on Catalina Island. *Undaria* was not observed during dive surveys in Dana Point Harbor in February or March, 2007.



Figure 7. *Undaria pinnatifida*

In Japan it is known as wakame and is extensively cultivated as a fresh and dried food plant. However, it has the potential to become a major pest in our coastal waters. *Undaria* grows to between 3 to 7 feet (1 and 2 m) tall and is found in sheltered harbor waters on rocks, breakwaters, and marine debris from the low-tide mark to 50 feet (15 m). A mature plant has a distinctive, spiraled (frilly), spore-producing structure at its base. It also has an obvious central stem to 4 inches (10 cm) wide that extends for the length of the plant (Figure 7). The blade may be up to 3.1 feet (1 m) wide and extends from the tip of the plant for half the length of the plant.

## 3.5 OTHER MARINE ORGANISMS OBSERVED DURING THE SURVEY

A total of 46 taxa of marine plants, invertebrates, and fishes were observed by biologists during the February and March 2006 field surveys (Table 1 and Table 2). Habitats that were surveyed included subtidal soft benthos (silt and sand sub-habitats), the hardscape of dock pilings, sloped cement bulkheads, and low-to-moderate relief rocky reefs. Limited underwater visibility, which ranged from 1-3 ft was a factor that likely resulted in the under-quantification of the faunal constituents in the harbor, particularly for the fish community.

Overall, marine plants contributed the highest number of taxa (28.3% of the total). Mollusks (snails and clams) were the second most abundant phyla (21.7% of the total), followed by annelid

worms (10.9%) and crustacean arthropods (8.7%). A discussion of the flora and fauna constituents, by habitat, is provided below.

**Table 1. Number of Marine Taxa Observed During the CRM Dive Surveys, Feb-Mar 2007.**

Group	Number of Taxa	% Total
Algae	13	28.3
Porifera	1	2.2
Cnidaria	2	4.3
Annelida	5	10.9
Arthropoda	4	8.7
Mollusca	10	21.7
Ectoprocta	3	6.5
Tunicata	4	8.7
Fish	4	8.7
<b>Total</b>	<b>46</b>	<b>100</b>

**Table 2. List of Organisms Observed During Subtidal Surveys in Dana Point Harbor, February/March 2007**

Common Name	Scientific Name	Marina Epibenthos	Marina Pilings and Bulkhead	Youth Sailing Center Reefs and Rip Rap	All Areas
diatom mat	Bacillariophyceae	x	x	x	x
green algae	<i>Chaetomorpha aerea</i>	x	x		x
green algae	<i>Ulva intestinalis</i>	x	x	x	x
brown algae	<i>Colpomenia perigrina</i>		x	x	x
brown algae	<i>Dictyopteris undulata</i>		x		x
brown algae	<i>Dictyota flabellata</i>		x		x
brown algae	<i>Dictyoacea</i> , unid.		x	x	x
brown algae	<i>Eisenia arborea</i>		x	x	x
brown algae	<i>Sargassum muticum</i>		x	x	x
red algae	<i>Corallina vancouverensis</i>		x	x	x
red algae	Filamentous Red Algae		x	x	x
red algae	<i>Polysiphonia</i> sp.		x		x
red algae	red turf algae (complex)		x		x
sponge	<i>Haliclona</i> sp.	x	x	x	x
hydroid	<i>Aglaophenia</i> sp.		x		x
white gorgonian	<i>Muricea fructicosa</i>		x	x	x
polychaete	<i>Dodecaceria fewksii</i>		x		x
polychaete	<i>Phragmatopoma californica</i>		x	x	x

polychaete	Sabellidae, unid.		x		x
polychaete	Serpulidae, unid.		x	x	x
polychaete	Spirorbidae, unid.		x	x	x
barnacle	<i>Balanus amphitrite</i>		x	x	x
barnacle	<i>Balanus glandula</i>		x	x	x
lined shore crab	<i>Pachygrapsus crassipes</i>		x	x	x
lobster	<i>Panilurus interruptus</i>			x	x
limpet	<i>Lottia digitalis</i>				x
limpet	<i>MacClintokea (Collisella) scabra</i>			x	x
slipper shell	<i>Crepidula onyx</i>			x	x
Kellet's whelk	<i>Kelletia kelletii</i>			x	x
rock scallop	<i>Crassedoma giganteum</i>		x		x
bay mussel	<i>Mytilus galloprovincialis</i>		x	x	x
sea slug	<i>Navanax inermis</i>	x			x
octopus	<i>Octopus bimaculoides</i>	x			x
reverse chama	<i>Pseudochama exogyra</i>		x	x	x
festive murex snail	<i>Pteropurpura festiva</i>	x	x		x
soft ectoproct	<i>Anguinella palmata</i>		x		x
moss animal	<i>Bugula neritina</i>		x		x
moss animal	encrusting ectoprocts		x		x
colonial tunicate	<i>Botrylloides</i> sp.		x		x
colonial tunicate	colonial tunicates		x		x
<b>Common Name (continued)</b>	<b>Scientific Name</b>	<b>Marina Epibenthos</b>	<b>Marina Pilings and Bulkhead</b>	<b>Youth Sailing Center Reefs and Rip Rap</b>	<b>All Areas</b>
solitary tunicate	Ascideacea, unid.		x	x	x
solitary tunicate	<i>Styela plicata</i>		x		x
opaleye perch	<i>Girella nigricans</i>			x	x
garibaldi	<i>Hypsypops rubicundus</i>			x	x
flatfish	unid. Flatfish	x			x
round sting ray	<i>Urolophus halleri</i>	x			x
	<b>Total Taxa</b>	<b>9</b>	<b>35</b>	<b>25</b>	<b>46</b>

### 3.5.1 Soft-Bottom Benthic Epiflora and Epifauna.

Seven soft-bottom benthic algae and macro-invertebrate taxa were observed by divers in the marina basins (Table 2). Of these, none were common. The basin sediments were lightly coated with a layer of diatoms, and secondarily, spotty cover of the algae *Chaetomorpha aerea* and *Ulva intestinalis*. In addition, the round sting ray (*Urolophus halleri*) and other unidentified flatfish were occasionally observed, but were not common. The lack of an extensive benthic epibiota is not uncommon in unvegetated (i.e., seagrass) environments. Species richness is considerably higher for infaunal-dwelling community that consists of a diverse assemblage of groups such as polychaete worms, micro-crustaceans, mollusks, and echinoderms.

### 3.5.2 Hardscape (Pier Pilings, Cement Bulkheads, and Isolated Rocky Outcrops)

The majority of plants and invertebrates observed by biologists were associated with harbor hardscape (42 of 46 taxa), divided into marina pilings and bulkheads in the marina basins (35 species) and secondarily isolated rocks and rip rap (25 species) in the vicinity of the Youth Sailing Center (Table 2). Of the various habitats surveyed, the piling community exhibited the highest cumulative richness because of the combined intertidal and subtidal nature of the structures although the number of taxa on a single pile only varied between 5 and 11. Species richness decreased with depth. The dominant organisms on the upper three feet of the pilings included a complex of green algae (*Ulva intestinalis*), a turf and filamentous red algae complex, brown algae (*Colpomenia perigrina*, *Dictyota flabellata*, and *Sargassum muticum*), hydroids (*Aglaophenia* sp.), serpulid polychaete worms, barnacles (*Balanus amphitrite* and *B. glandula*), and mussels (*Mytilus galloprovincialis*). The mid-depth piling community (-3 to -7 ft) was dominated by a polychaete worms (serpulids and the calcareous tube-building *Dodecaceria fewksii*), mussels, solitary tunicates (*Styela plicata*), and ectoprocts (*Bugula neritina* and unid. encrusting ectoprocts). The lower-depth piling community (-7 to -10 ft MLLW) was colonized primarily by tunicates, ectoprocts, and hydroids.

The sloping, cement bulkhead around the perimeter of Cove East and West and Island East and West Basins was notable for a very low diversity of marine life. Although not abundant, the calcareous, tube-building polychaete *Dodecaceria fewksii* was one of the most conspicuous species present, along with lined-shore crabs (*Pachygrapsus crassipes*), solitary ascidians, and scattered, small-sized mussels. A fine silt layer, approximately 1-2 cm deep covered the substrate and the cover of algae was low in all areas surveyed. Most of the fauna observed was associated with the depressions formed by the meeting of adjoining cement sections.

Protective rock rip rap lining the cement bulkhead and low relief natural reef (remnant reef prior to the construction of the harbor) in the vicinity of the Youth Sailing Center supported similar types of plants and invertebrates that lived on the pilings, although larger species such as the southern sea palm algae (*Eisenia arborea*), and mobile macro invertebrates such as lobsters (*Panilurus interruptus*, snails (*Kelletia kelletii*), limpets (*Lottia digitalis*), and slipper limpets (*Crepidula onyx*) were present within this western section of the harbor, likely an indication of conducive rock habitat, better tidal circulation, and wind-wave energy motion compared to the enclosed marina basins.

The types of fishes which commonly occur in protected marinas and harbors of southern California are a combination of species that are associated with both soft-bottom habitat and hardscape of pilings, docks, cement bulkheads, and jetties.

Few species of fish were actually observed within the marina or the harbor, partially due to limited underwater visibility. The species observed included unidentified flatfish and round stingray (*Urolophus halleri*) in the marina basins, and opaleye perch (*Girella nigricans*) and garibaldi (*Hypsypops rubicundus*) in the vicinity of the rip rap and reef outcrops near the Youth Sailing Center, west of the marina basins.

Soft bottom associates that are likely to occur in Dana Point Harbor include gobies (*Clevelandia ios*), and flatfish (California halibut, *Paralichthys californicus*; diamond turbot, *Hypsopsetta guttulata*), Water-column species such as topsmelt (*Atherinops affinis*), northern anchovy (*Engraulis mordax*), black surfperch (*Embiotoca jacksoni*), shiner surfperch (*Cymatogaster aggregata*), walleye surfperch (*Hyperprosopon argenteum*), white croaker (*Genyonemus lineatus*), queenfish (*Seriphus politus*) and white surfperch (*Phanerodon furcatus*) are also common within southern California Marinas and expected to be present in Dana Point Harbor.

Marinas provide additional types of habitats (pilings, docks, and jetties) that attract a different groups of fish that prefer hard substrate (Coastal Resources Management 1993). Hard substrate in marinas offer cover, protection, or new sources of food for fishes such as pile perch (*Damalichthys vacca*), pipefish (*Sygnathus* spp.), kelpfish (*Heterostichus* spp.), and opaleye (*Girella nigricans*), while the jetty riprap protecting the harbor provides a habitat for additional species, such as barred sand bass (*Paralabrax nebulifer*), kelp bass (*P. clathratus*), sargo (*Anisotremus davidsoni*), halfmoon (*Medialuna californiensis*), and cryptic species such as blennies and sculpins.

## 4.0 IMPACT ASSESSMENT

### 4.1 PROPOSED CONSTRUCTION METHODS

The proposed Dana Point Marina dock layout is shown in Figure 3. New floating docks systems will consist of prefabricated, lightweight aggregate concrete modules. No creosote treated wood products will be included in the new concrete dock system. Marina improvements would be made over eight phases, in which between 250-350 vessels per phase would be moved to temporary docks. Within each area, the phases will include the removal of the existing dock and piles, and the installation of the new dock and piles. Piles will be removed by vibratory extraction equipment mounted to a crane operating from a barge. However, if piles break off at the mudline, they will be manually cut two to three feet below the mudline. The old piles and floating docks will be lifted from the water using a crane and then trucked off-site.

The last phase would be the placement of the prefabricated docks. Piles will be placed using impact pile driving or jetting techniques, based upon the amount of rock encountered.

### 4.2 CONSTRUCTION IMPACTS

#### 4.2.1 Water Quality

**Pile and Dock Emplacement.** These construction activities have a potential to cause a short-term increase in turbidity and resuspension of fine sediments as the piles are removed and then new piles driven or jetted into the sediments. Pile removal and installation of new piles near the 60 inch storm drain has a potential to resuspend sediments that are higher in organics, copper, and total DDTs than other areas due to elevated levels of contaminants within this zone. This has a potential to result in a potentially short-term adverse, significant impact to water quality within the East Basin. Mitigation measures to reduce the level of impact to less-than-significant is provided in Section 5, Mitigation Measures.

**Oil and Fuel Discharges.** Accidental oil or fuel spills that could potentially occur during the pile removal and dock emplacement operations could result in significant effects on water quality, and subsequently, the fish and wildlife of the harbor depending on the severity of the spill. Such events are likely to be localized spills of lighter, refined diesel fuels, gasoline, and lubricating oils

that are highly toxic to marine life. The potential for the occurrence of petroleum-product leaks or spills would be low but the potential for significant, long-term effect on marine resources would be moderate to high. The inclusion and implementation of a Marina Construction Management Plan for the project will assist in preventing accidental spills and providing the necessary guidelines to follow in case of an oil or fuel spill and reduce the potential for a significant long term impact to less than significant.

Mitigation measures and Best Management Measures (BMPs) to avoid water quality degradation are provided in Section 5. With the inclusion of avoidance/mitigation measures, there will be no adverse environmental impacts on water quality.

The inclusion and implementation of a Marina Construction Management Plan for the project will assist in preventing accidental spills and providing the necessary guidelines to follow in case of an oil or fuel spill and reduce the potential for a significant long term impact to be mitigated to less than significant.

#### **4.2.2 Eelgrass**

There is no eelgrass at the project site, therefore there will be no short-or-long term impacts on eelgrass.

#### **4.2.3 California Halibut**

Juvenile halibut occur likely occur within Dana Point Harbor, although their presence within the Marina Basins is a less likely occurrence. During pile installation, any juveniles in the immediate area of pile driving activity will swim to areas outside the immediate impacted zone. No mortality is anticipated as a result of construction activities.

#### **4.2.4 Invasive Species**

*Caulerpa* algae is not present at the site of the proposed marina which precludes the potential for the spread of this species. However, a *Caulerpa* algae survey will be conducted according to the National Marine Fisheries Service Control Protocol (<http://swr.ucsd.edu/hcd/CaulerpaControlProtocol.htm>) prior to marina construction. If this species is found, then protocols for the eradication of *Caulerpa* will be implemented to remove this species from the project area.

*Undaria pinnatifida* is not currently growing within the marina basins in the vicinity of proposed modifications. Should it be found during pre-construction surveys, then it should be removed prior to marina modifications to prevent its spread during the pile and dock removal process. No eradication process however, is defined by the National Marine Fisheries Service or the California Department of Fish and Game.

### **4.3 LONG TERM IMPACTS ON MARINA OPERATION**

#### **4.3.1 Water Quality**

**Marina Operations.** Water quality within the marina will be governed by the practices of the tenants relative to their compliance with ordinances, laws, and guidelines related to discharges, vessel maintenance and marina maintenance. Periodic and/or uncontrolled discharges of various pollutants, oils, greases, and wastes would potentially in a long-term significant adverse effects

on water quality with subsequent adverse impacts on local marine life. Surface runoff from the marina will be regulated by the NPDES permit for storm water discharges. To prevent long-term impacts on local water quality, a Marina Management Plan should be developed to provide tenants and boaters with reasonable BMPs, safety guidelines, and steps to take in response to accidental spills, leakages and fires to reduce the potential for water quality degradation. Implementation of the creation and the implementation of a Marina Management Plan will reduce potential long-term water quality impacts to less than significant.

Maintenance dredging may be periodically required (at an assumed 10 year interval) to remove trapped sediments during the long-term operation of the marina. Maintenance dredging programs, conducted under a permit from the Army Corps of Engineers would result in the periodic removal of soft bottom benthic organisms, the resuspension of bottom sediments that will increase water column turbidity, and periodic releases of trace metals and organic contaminants into the water column. Dissolved oxygen levels will be reduced slightly because of the resuspension of organic materials in the dredged sediments.

#### **4.3.2 Eelgrass**

There is no eelgrass at the project site, therefore there will be no long term impacts on eelgrass.

#### **4.3.3 California Halibut**

As a consequence of the reconfiguration of the docks and piles within Dana Point Harbor, there will likely be a slight increase (175 sq ft) or slight decrease (84 sq ft) in the amount of soft bottom habitat within the marina basins depending upon the ratio of 14 and 18 inch diameter piles that will be placed. These predicted changes in the amount of benthic soft bottom habitat is not expected to result in a significant impact to halibut nursery habitat, either positive or negative. Most halibut are likely to occur within areas outside of the marina, in the main entrance channel and open areas west of the marina basins.

#### **4.3.4 Invasive Species**

*Caulerpa* algae is not expected to be present in Dana Point Harbor during marina operations which precludes the potential for the spread of this species. However, if *Caulerpa* is found during the long-term operation of the marina, a *Caulerpa* algae eradication program will be required (National Marine Fisheries Service 2006; <http://swr.ucsd.edu/hcd/CaulerpaControlProtocol.htm>).

*Undaria pinnatifida* is not currently growing within the marina basins in the vicinity of proposed modifications; however, if during the operation of the marina it should be present, then thought should be given to its eradication, based on recommendations from the California Department of Fish and Game and the National Marine Fisheries Service.

## **5.0 MITIGATION MEASURES AND BEST MANAGEMENT PRACTICES**

### **5.1 WATER QUALITY**

#### **5.1.1 Construction**

The following mitigation measures and Best Management Practices (BMPs) are recommended to prevent water quality degradation and to reduce potential adverse impacts on marine resources during the renovation of the Dana Point Harbor Marina.

- All debris and trash shall be disposed in suitable trash containers on land or on the work barge at the end of each construction day;
- Discharge of any hazardous materials into Dana Point Harbor will be prohibited; and
- Where feasible, silt curtains should be deployed around the dredge zones, work barges, and the pile removal and placement operations to minimize the spread of turbid waters outside the project area;
- Federal and State permit conditions related to the maintenance of water quality standards shall be implemented throughout the term of construction; and
- Hazardous waste and oil spill contingency plans and spill response equipment should be kept on site or nearby the harbor during marina construction.

### **5.1.2 Marina Operations**

Best Management Practices for marina operation and management should be implemented to reduce the potential for water quality and benthic habitat degradation at the Dana Point Harbor Marina. These BMPs include, but are not limited to:

- The project applicant should provide each marina tenant with a copy of all applicable regulations regarding vessel discharges of wastes, antifouling paint use, and refuse management (including handling of hazardous wastes) as part of the lease materials;
- The project applicant should provide each marina tenant with information regarding procedures for notifying appropriate authorities regarding spills of hazardous materials, containment measures, and applicable penalties for violations as a part of lease materials;
- The project applicant should provide regular cleaning of the marina dock facilities and vacuum sweeping of the parking lots;
- Adequate signs should be posted to identify the location off pump-out stations, and hours of operation;
- The pump-out facility should be user friendly;
- The project applicant should develop and adhere to a regular inspection and maintenance schedule for the pump-out facility;
- The project applicant shall provide educational information about the pump out station to tenant boaters;
- The project applicant shall enforce existing local, state and federal regulations pertaining to marine sanitation devices and the illegal discharge of boat sewage; and;

- The project applicant shall post and make available to boaters a list of other local pump out locations.

To prevent long-term impacts on local water quality, a Marina Management Plan should be developed to provide tenants and boaters with reasonable BMPs, safety guidelines, and steps to take in response to accidental spills, leakages and fires to reduce the potential for water quality degradation. In addition, two pamphlets *The Guide to Clean, Green Boating* (California Department of Fish and Game 1999) and *Clean Boating* (California Department of Boating and Waterways (undated material) should be distributed and made available to both hotel management and marina tenants.

Clean Marinas California Program (2006) has developed a guidebook for to making marinas environmentally clean facilities and to help protect the state's waterways from pollution. This guidebook is available at <http://cleanmarinascalifornia.org>. It is recommended that a copy of this document be kept onsite in the Dana Point Marina Office.

## **5.2 EELGRASS BED RESOURCES**

### **5.2.2 Operation**

Eelgrass does not occur within the project area. No BMPs or mitigation measures required.

## **5.3 INVASIVE SPECIES**

### **5.3.1 Construction**

*Caulerpa* nor *Undaria* occurs within the project area. No BMPs or mitigation measures required. However, pre-construction surveys will be required to document the presence/absence of these species per ACOE permit conditions.

### **5.3.2 Operation**

In the event that *Caulerpa* or *Undaria* are found within the Dana Point Marina, eradication mitigation measures will have to be implemented per agency requirements. It is not known if eradication of *Undaria* will be required in the event it is found.

## **6.0 LITERATURE CITED**

Chambers Group, Inc. 2005. Letter report to the County of Orange RDMD re: the completion of eelgrass surveys at Baby Beach in April 2005. 1 pp.

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Clean Marinas California. 2006. Clean Marinas California Program. <http://cleanmarinascalifornia.org>. Rev. June 2006.

Coastal Resources Management. 1993. *Upper Newport Bay environmental evaluation*. Appendix E, Marine and Estuarine Resources in: Upper Newport Bay Reconnaissance Study. Final Report. Prepared by R. Ware for Coastal Frontiers Corporation and the U.S. Army Corps of Engineers. 202 pp.

Geotechnical Inc., 2006. Appendix B. Particle size testing results. in: Kinnetic Laboratories, Inc. and Moffatt and Nichol, 2007. Dredge material evaluation. Dana Point Harbor maintenance dredging report. Prepared for the Dana Point Harbor Department and the County of Orange.

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National Marine Fisheries Service. 2006. *Caulerpa Control Protocol*. <http://swr.nmfs.noaa.gov/hcd/caulerpa/ccp.pdf>. 7 pp.

National Marine Fisheries Service. 1991 (as amended). *Southern California eelgrass mitigation policy*. 4 pp. Revision 11, 30 August, 2005.

Robert Bein, William Frost Associates and MBC Applied Environmental Sciences 2003. Dana Point Harbor Revitalization Plan EIR. Marine Oceanographic and Biological Assessment. Prepared for the County of Orange Department of Harbors, Beaches, and Parks. (no date).

Wiegel, Robert L. 1993. Dana Point Harbor, California. *Shore and Beach* 61 (3):37-55.

**APPENDIX 1. *CAULERPA TAXIFOLIA* REPORTING FORM  
(PER NATIONAL MARINE FISHERIES SERVICE AND CALIFORNIA DEPARTMENT  
OF FISH AND GAME REQUIREMENTS)**

***Caulerpa taxifolia* Survey Reporting Form**  
**Dana Point Harbor Marina Renovation Project,**  
**Dana Point, CA**

Prepared for:  
**LSA Associates, Inc.**  
**20 Executive Park, Suite 200, Irvine, California**  
**Contact: Rob Balen**  
**(949) 533-0666**

Prepared by:  
**Coastal Resources Management, Inc.**  
**PMB 327, 3334 E. Coast Highway, Corona del Mar, CA 92625**  
**Contact: Rick Ware, Senior Marine Biologist**  
**(949) 412-9446**

**June 15<sup>th</sup>, 2007**



This form is required to be submitted for any surveys conducted for the invasive exotic alga *Caulerpa taxifolia* that are required to be conducted under federal or state permits and authorizations issued by the U.S. Army Corps of Engineers or Regional Water Quality Control Boards (Regions 8 & 9). The form has been designed to assist in controlling the costs of reporting while ensuring that the required information necessary to identify and control any potential impacts of the authorized actions on the spread of *Caulerpa*. Surveys required to be conducted for this species are subject to modification through publication of revisions to the *Caulerpa* survey policy. It is incumbent upon the authorized permittee to ensure that survey work is following the latest protocols. For further information on these protocols, please contact: Robert Hoffman, National Marine Fisheries Service (NOAA Fisheries), (562) 980-4043, or William Paznokas, California Department of Fish & Game, (858) 467-4218).

<b>Report Date:</b>	April 9 <sup>th</sup> , 2007
<b>Name of bay, estuary, lagoon, or harbor:</b>	Dana Point Harbor, Dana Point, Orange County, California. See Figure 1.
<b>Specific Location Name:</b>	Dana Point Marina Basins and the vicinity of Baby Beach/Youth Sailing Center. See Figures 2-4.
<b>Site Coordinates:</b> (UTM, Lat./Long., datum, accuracy level, and an electronic survey area map or hard copy of the map <b>must</b> be included).	Center of Marina Basins: 33.45983 ° N; 118.69817 ° W Accuracy: 1 m, WGS 84
<b>Survey Contact:</b> (name, phone, e-mail)	Rick Ware, Senior Marine Biologist, Coastal Resources Management, Inc. , (949) 412-9446, <a href="mailto:rware.crm@earthlink.net">rware.crm@earthlink.net</a>
<b>Personnel Conducting Survey (if other than above): name, phone, email</b>	Mr. Stephen Whitaker (Certified Caulerpa Surveyor) Mr. Tom Gerlinger (vessel skipper/dive tender)
<b>Permit Reference:</b> (ACOE Permit No., RWQCB Order or Cert. No.)	Pending.
<b>Is this the first or second survey for this project?</b>	Initial Survey for Marina Basins.
<b>Was <i>Caulerpa</i> Detected?:</b> (if <i>Caulerpa</i> is found, please immediately contact NOAA Fisheries or CDFG personnel identified above)	<u>  XX  </u> No, <i>Caulerpa</i> was not found at this site.

<p><b>Description of Permitted Work:</b> (describe briefly the work to be conducted at the site under the permits identified above)</p>	<p>The County of Orange proposes upgrade landside and waterside facilities within Dana Point Harbor. Waterside-upgrades include the renovation of the marina basin dock systems by replacing old and deteriorating docks, slips and gangways with new facilities. The number of boat slips will decrease to 2009 (Marina Layout 2 with channel encroachment). A total of 1,163 existing piles will be removed and approximately 933 new piles will be placed. In addition, the proposed project includes adding handicap access at locations that is currently not available; renovating the Dana Point Harbor Launch Ramp (recently completed), spot-dredging with Cove East Marina, and larger scale dredging in the western (Baby Beach) and southern (jetty) sections of the Harbor (Figures 2 and 3). Bulkheads will not be affected by the project. This report addresses the waterside upgrade of the marina dock systems.</p>	
<p><b>Description of Site:</b> (describe the physical and biological conditions within the survey area at the time of the survey and provide insight into variability, if known. Please provide units for all numerical information).</p>	<p><i>Depth range:</i></p>	<p>0.0 ft to -15 ft MLLW.</p>
	<p><i>Substrate type:</i></p>	<p>Silt sediments in most part of areas surveyed. Silty sand sediments west of basins near Baby Beach.</p>
	<p><i>Temperature:</i></p>	<p>57- 59 degrees F</p>
	<p><i>Salinity:</i></p>	<p>25-35 ppt</p>
	<p><i>Dominant flora:</i></p>	<p>See Table 1 for a list of species observed. Dominant algae species included <i>Chaetomorpha aerea</i> and <i>Ulva intestinalis</i>.</p>
	<p><i>Dominant fauna:</i></p>	<p>Few benthic invertebrates were observed on soft-bottom habitats. Most organisms were observed on dock pilings and isolated rock outcrops near the Youth Sailing Center. The dominants in the upper three feet of the piling community included a complex of green algae (<i>Ulva intestinalis</i>), a turf and filamentous red algae complex, brown algae (<i>Colpomenia perigrina</i>, <i>Dictyota undulata</i>, and <i>Sargassum muticum</i>), hydroids (<i>Aglaophenia</i> sp.), serpulid polychaete worms, barnacles (<i>Balanus amphitrite</i> and <i>B. glandula</i>), and mussels (<i>Mytilus galloprovincialis</i>). The mid-depth piling community (-3 to -7 ft) was dominated by a mixture of polychaete worms (serpulids and the calcareous tube-building <i>Dodecaceria fewksii</i>), mussels, solitary tunicates (<i>Styela plicata</i>), and ectoprocts (<i>Bugula neritina</i> and unid. encrusting forms). The lower-depth piling community (-7 to -10 ft MLLW) was colonized primarily by tunicates, ectoprocts, and hydroids. Fish were not commonly observed during the survey.</p>
	<p><i>Exotic species encountered (including any other Caulerpa species):</i></p>	<p><i>Sargassum muticum</i></p>
	<p><i>Other site description notes:</i></p>	<p>No eelgrass was found.</p>

<b>Description of Survey Effort:</b>	<i>Survey date and time period:</i>	February 20 <sup>th</sup> , March 6 <sup>th</sup> , and March 16 <sup>th</sup> , 2007 0800-1600
<b>Description of Survey Effort:</b> please describe the surveys conducted including type of survey (SCUBA, remote video, etc.) and survey methods employed, date of work, and survey density (estimated percentage of the bottom actually viewed).	<i>Horizontal visibility in water:</i>	Visibility was 3 ft on each side of the center line.
	<i>Survey type and methods:</i>	<p>A total of 70, variable-length underwater transects (15 meters to 153 meters in length) were swam using SCUBA (1) in the Cove East and West and the Island East and West marina basins (Figure 4). In addition, 43 transects varying in length between and 50 m long were swam in front of the sailing center and Baby Beach. Fourteen dock piles in the Cove East and the Island East marina basins were also surveyed to determine the types and relative abundances of marine organisms (Figure 4) that might be affected by marina construction.</p> <p>The dive surveys covered a total of 12,228 sq m (3 acres) of bayfloor habitat within the east and west marina basins and a total of 6,650 sq m (1.64 acres) in the vicinity of Baby Beach and the Youth Sailing Center (Figure 4). Overall, the bottom area of cover surveyed by biologist was 14% in the marina basins and between 58% and 65% at Baby Beach and the Youth Sailing Center. The higher intensity surveys within Baby Beach and the Youth Sailing Center reflected habitat that had a greater probability of locating either eelgrass or Caulerpa, since a very small patch of eelgrass (three turions) was located there in April 2005 (Chambers Group, Inc. 2005).</p> <p>The total area of open water habitat and water habitat underneath the docks (Area of Potential Effect) in the project area was 62,859 sq ft (1.44 acres)</p> <p>Bottom types, common marine life, and the presence or absence of Caulerpa taxifolia and Zostera marina were noted. Depths were standardized to Mean Lower Low Water (MLLW) based upon time of observation and tidal corrections for the San Clemente Pier tidal survey station.</p>
Describe any limitations encountered during the survey efforts.	<i>Survey personnel:</i>	Rick Ware, Steve Whitaker and Tom Gerlinger, Coastal Resources Management, Inc.
	<i>Survey density:</i>	A total of 70, variable-length underwater transects (15 meters to 153 meters in length) were swam using SCUBA (1) in the Cove East and West and the Island East and West marina basins (Figure 4). In addition,

		43 transects varying in length between and 50 m long were swam in front of the sailing center and Baby Beach.
	<i>Survey limitations:</i>	Vessel movement within the project area.
<b>Other Information:</b> (use this space to provide additional information or references to attached maps, reports, etc.)	See attached project maps and tables. Figure 1- Project Location Figure 2-Marina Basin Layout Figure 3- Proposed Dock Layout Plan Figure 4-Transect Locations Table 1- Organisms Observed During the Survey	

Caulerpa Survey Reporting Form (version 1.2, 10/31/04)

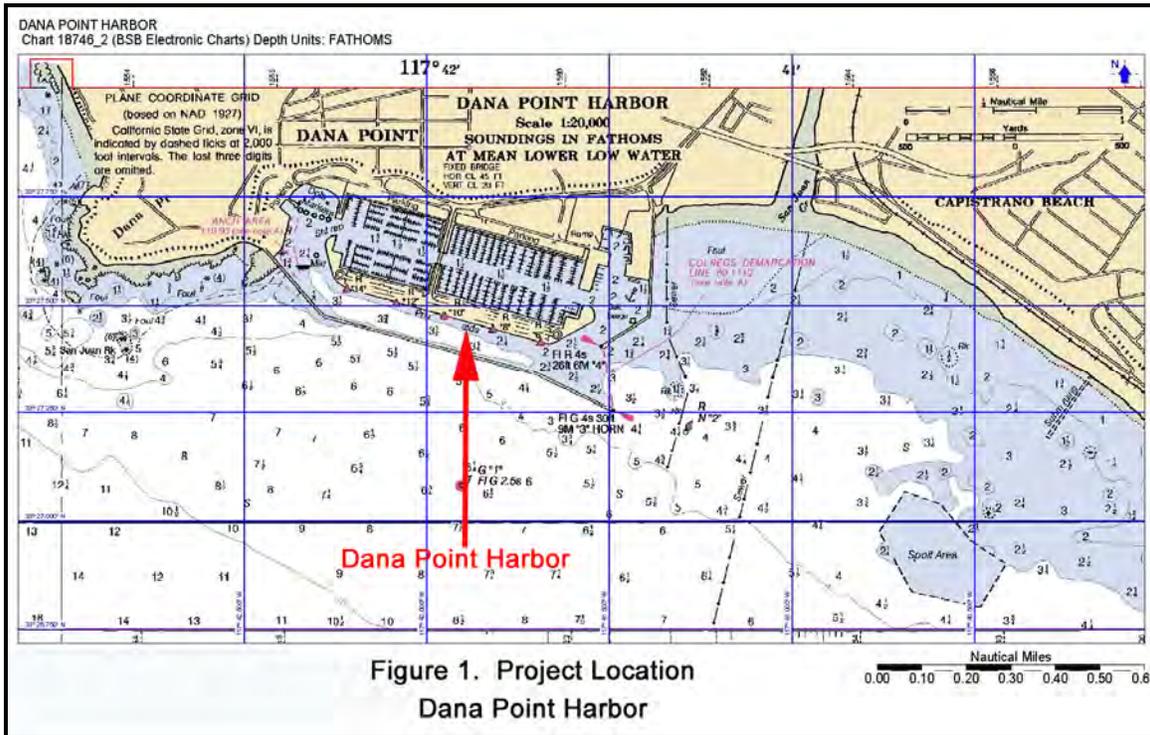


Figure 1. Project Location  
Dana Point Harbor



**Figure 2. Location of Marina Basins and Baby Beach**

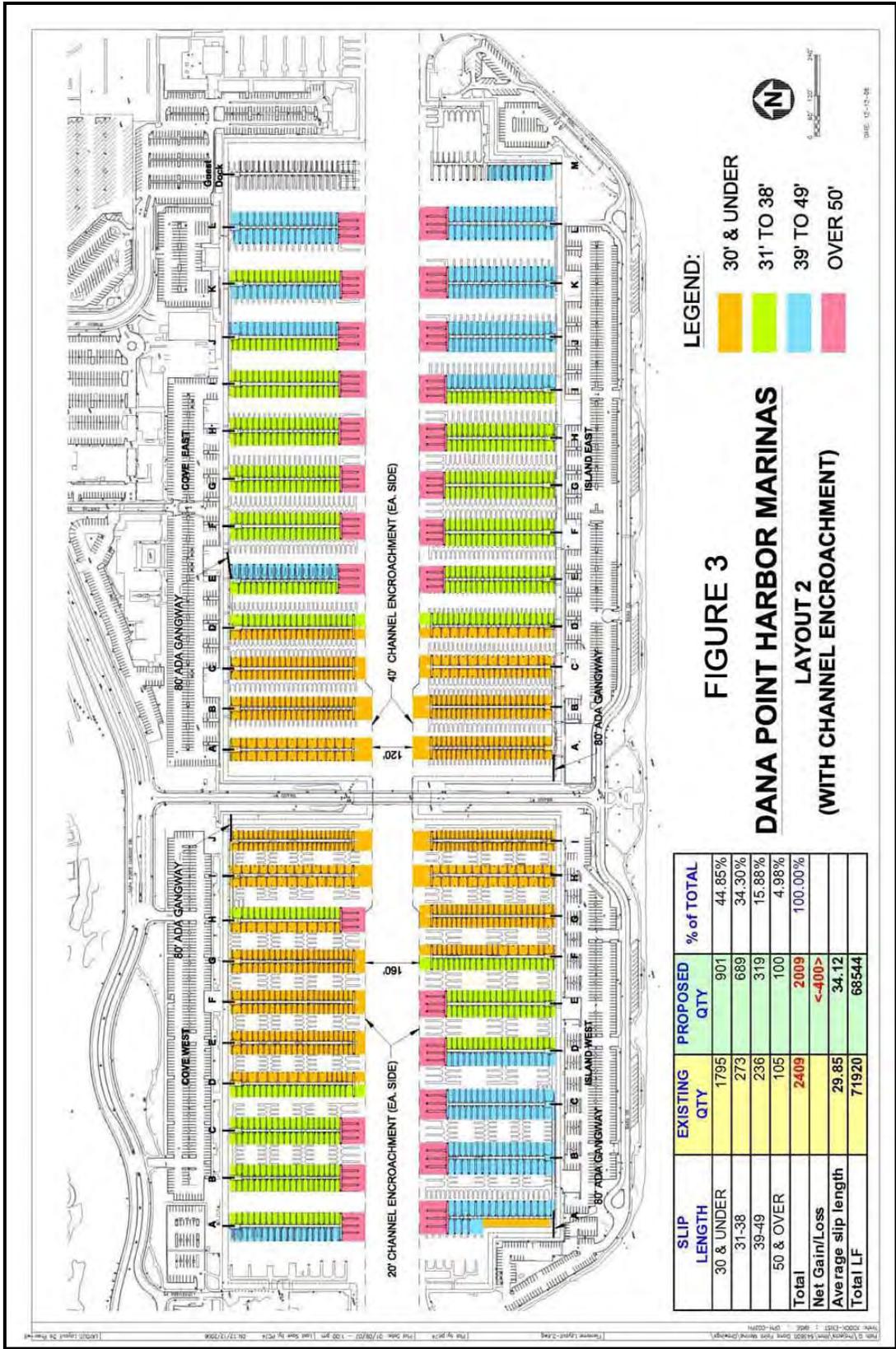




Table 1. List of Organisms Observed During Subtidal Surveys, Feb-Mar 2007

Common Name	Scientific Name	Marina Epibenthos	Marina Pilings and Bulkhead	Youth Sailing Center Reefs and Rip Rap	All Areas
diatom mat	Bacillariophyceae	x	x	x	x
green algae	<i>Chaetomorpha aerea</i>	x	x		x
green algae	<i>Ulva intestinalis</i>	x	x	x	x
brown algae	<i>Colpomenia perigrina</i>		x	x	x
brown algae	<i>Dictyopteris undulata</i>		x		x
brown algae	<i>Dictyota flabellata</i>		x		x
brown algae	<i>Dictyoacea</i> , unid.		x	x	x
brown algae	<i>Eisenia arborea</i>		x	x	x
brown algae	<i>Sargassum muticum</i>		x	x	x
red algae	<i>Corallina vancouverensis</i>		x	x	x
red algae	Filamentous Red Algae		x	x	x
red algae	<i>Polysiphonia</i> sp.		x		x
red algae	red turf algae (complex)		x		x
sponge	<i>Haliclona</i> sp.	x	x	x	x
hydroid	<i>Aglaophenia</i> sp.		x		x
white gorgonian	<i>Muricea fruticosa</i>		x	x	x
polychaete	<i>Dodecaceria fewksii</i>		x		x
polychaete	<i>Phragmatopoma californica</i>		x	x	x
polychaete	Sabellidae, unid.		x		x
polychaete	Serpulidae, unid.		x	x	x
polychaete	Spirorbidae, unid.		x	x	x
barnacle	<i>Balanus amphitrite</i>		x	x	x
barnacle	<i>Balanus glandula</i>		x	x	x
lined shore crab	<i>Pachygrapsus crassipes</i>		x	x	x
lobster	<i>Panilurus interruptus</i>			x	x
limpet	<i>Lottia digitalis</i>				x
limpet	<i>MacClintokea (Collisella) scabra</i>			x	x
slipper shell	<i>Crepidula onyx</i>			x	x
Kellet's whelk	<i>Kelletia kelletii</i>			x	x
rock scallop	<i>Crassedoma giganteum</i>		x		x
bay mussel	<i>Mytilus galloprovincialis</i>		x	x	x
sea slug	<i>Navanax inermis</i>	x			x
octopus	<i>Octopus bimaculoides</i>	x			x
reverse chama	<i>Pseudochama exogyra</i>		x	x	x
festive murex snail	<i>Pteropurpura festiva</i>	x	x		x
soft ectoproct	<i>Anguinella palmata</i>		x		x
moss animal	<i>Bugula neritina</i>		x		x
moss animal	encrusting ectoprocts		x		x
colonial tunicate	<i>Botrylloides</i> sp.		x		x
colonial tunicate	colonial tunicates		x		x

Common Name (continued)	Scientific Name	Marina Epibenthos	Marina Pilings and Bulkhead	Youth Sailing Center Reefs and Rip Rap	All Areas
solitary tunicate	Ascideacea, unid.		x	x	x
solitary tunicate	<i>Styela plicata</i>		x		x
opaleye perch	<i>Girella nigricans</i>			x	x
garibaldi	<i>Hypsypops rubicundus</i>			x	x
flatfish	unid. Flatfish	x			x
round sting ray	<i>Urolophus halleri</i>	x			x
	<b>Total Taxa</b>	<b>9</b>	<b>35</b>	<b>25</b>	<b>46</b>