EELGRASS (ZOSTERA MARINA) FIELD SURVEY, IMPACT ASSESSMENT, AND MITIGATION PLAN FOR THE ALAMITOS BAY MARINA RENOVATION PROJECT

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TABLE OF CONTENTS

LIST OF TABLES

Table **Page**

LIST OF FIGURES

Figure **Page**

LIST OF PHOTOGRAPHS

Photograph **Page**

APPENDICES

1.0 INTRODUCTION

1.1 PROJECT BACKGROUND AND PURPOSE

The City of Long Beach is preparing to renovate the Alamitos Bay Marina dock system and conduct dredging in the Alamitos Bay marina basins. The project will be conducted within several marina basins, and phased over a several year period. As part of the environmental review process required by the California Coastal Commission and the U.S. Army Corps of Engineers environmental permit review process, and as a requirement of the Southern California Eelgrass Mitigation Policy (National Marine Fisheries Service 1991 as amended), the City of Long Beach must identify the potential for the project to adversely affect sensitive marine habitats and the potential need to mitigate potentially significant adverse impacts to sensitive habitats.

Coastal Resources Management, Inc. (CRM) was retained by LSA Associates, Inc. and the City of Long Beach to conduct marine biological surveys in Alamitos Bay, Long Beach, California in September 2007. Nearshore Wetland Surveys, Inc. was retained by CRM to conduct side-scan sonar surveys for the project. The purposes of the investigation were to (1) to identify the location, distribution, and abundance of eelgrass (*Zostera marina*) habitat and other sensitive resources within areas proposed for marina renovation (2) identify potential eelgrass mitigation areas in Alamitos Bay; (3) determine the potential environmental effects of proposed marina improvements on eelgrass bed resources and (4) prepare a mitigation plan to avoid, compensate, and reduce potential adverse impacts to marine resources

The project plans include replacing the degraded dock systems within each basin and dredging to depths of between -13 and -15 ft MLLW within Marina Basin 1, and to depths of -10 ft MLLW in Basins 2, 3, 4, 5, and 7. General renovation plans are provided in Figure 2 (existing dock system) and Figure 3 (proposed dock system). An additional dock will be constructed along bulkhead southeast of the Long Beach Yacht Club. The dredge material collected from each marina basin will be transported by barge to a location designated for sediment disposal.

1.2 PROJECT LOCATION

Alamitos Bay is located within the southeast region of the City of Long Beach, California (Figure 1). It is bounded on the northwest by the community of Belmont Shore and the Colorado Lagoon, on the northeast by Pacific Coast Highway and the Cerritos Channel, on the southeast by the San Gabriel River, and on the southwest by the Alamitos Bay Peninsula (Figure 1). Initially the area around Alamitos Bay was a marsh, with the San Gabriel River and the bay sharing a common opening into the ocean (Reish, 1968). Naples Island was developed in 1908-1909, which was followed by the separation of the San Gabriel River

Figure 1.
Alamitos Bay Project Location

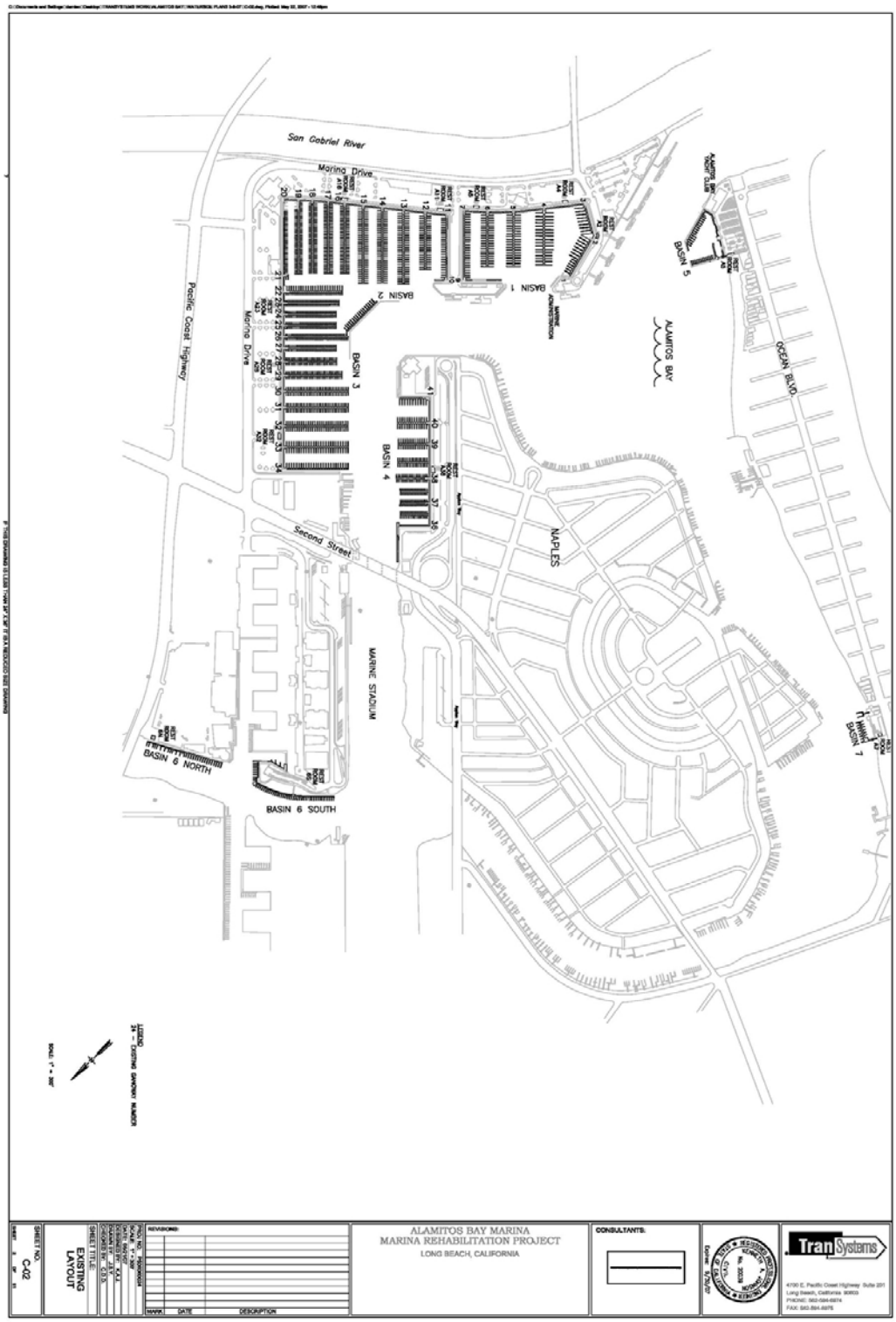


Figure 2. Existing Marina Basin Dock Configurations, Basins 1 through 7

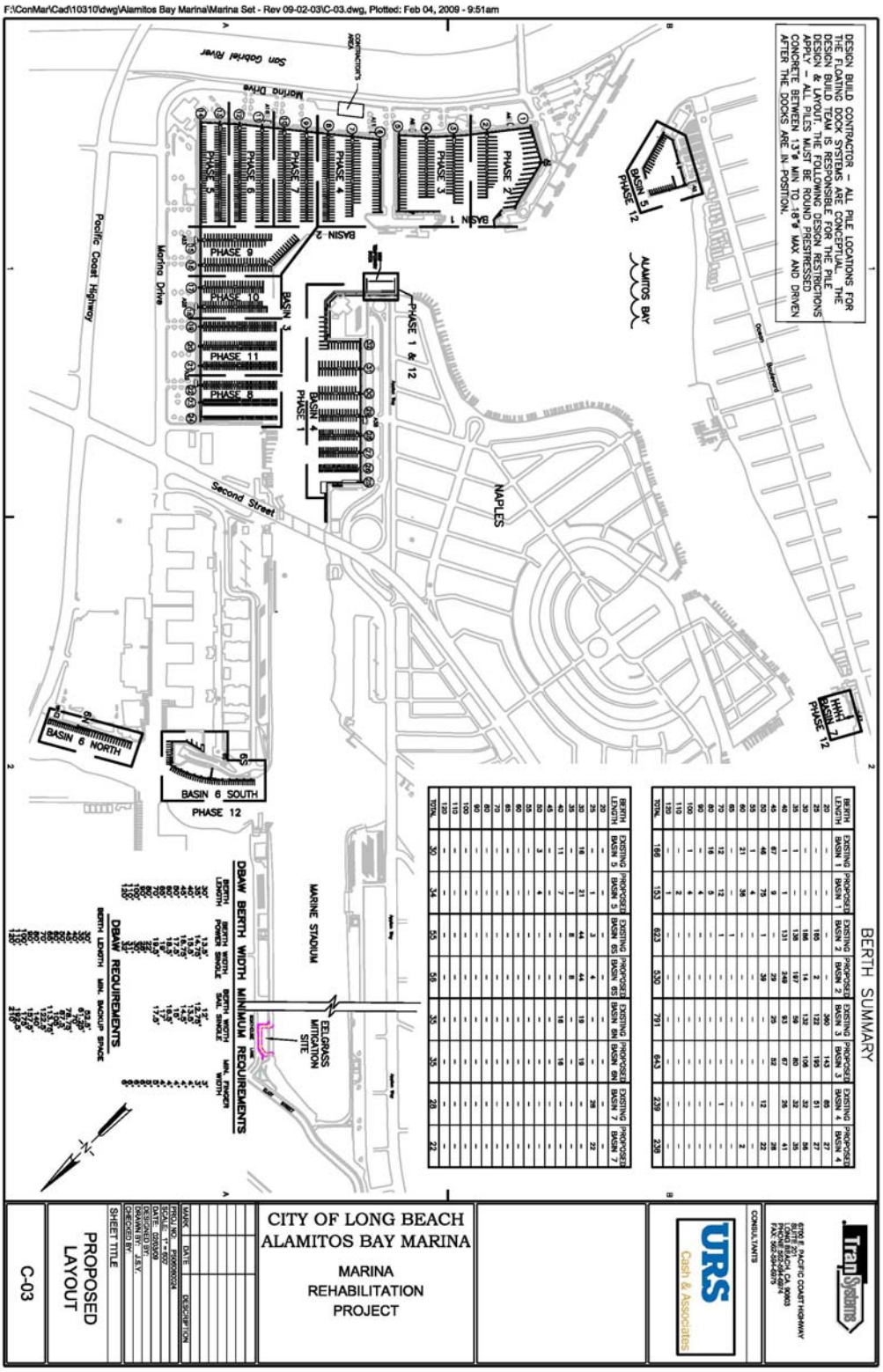


Figure 3. Proposed Marina Basin Dock Configurations, Basins 1 through 7

and the bay with the construction of a rock jetty (early 1920s), the dredging of the Marine Stadium in 1932 for the 1932 Olympics, the construction of the Alamitos Bay Marina Basins between the mid-1950s and the mid 1960s, and the more recent additions of the Marina Pacifica and Spinnaker Cove development. Currently, there are 1,967 slips located in Basins 1-7.

1.3 IMPORTANCE OF EELGRASS

Eelgrass is a marine flowering plant that grows in soft sediments in coastal bays and estuaries. An offshore form (*Zostera pacifica*) is found to depths of 50 feet (ft). In Alamitos Bay, it has been found growing on sand and mud sediments throughout the bay in the Alamitos Bay Jetty entrance channel (Coastal Resources Management, 1994) along Bayshore Ave. and Ocean Blvd (Coastal Resources Management, 1999, Wetlands Support and Coastal Research, 2003), in the Marine Stadium (Coastal Resources Management, 1998, 2002, 2005); Spinnaker Cove and the Cerritos Channel (Coastal Resources Management, 1994, 1996), in the Naples Island Canals (Coastal Resources Management, Inc. 2007, Wetlands Support and Coastal Research, 2003,) and the periphery of Naples and Treasure Islands (Wetlands Support and Coastal Research, 2003, Coastal Resources Management, 2003). Very small patches of eelgrass have also been found in the Colorado Lagoon (Chambers Group, Inc., 2004).

Eelgrass canopy (consisting of shoots and leaves approximately two to three feet long) attracts many marine invertebrates and fishes. The vertical relief of the vegetation enhances the abundance and the diversity of the marine life compared to areas where the sediments are barren. 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). A diverse community of bottom-dwelling invertebrates (i.e., clams, crabs, and worms) live within the soft sediments that cover the root and rhizome mass system. Eelgrass meadows are critical foraging centers for seabirds (such as the endangered California least tern) that seek out 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.

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 in Alamitos Bay and to mitigate any losses by avoiding or reducing, or compensating for any adverse effects on eelgrass habitats and communities.

Photograph 1. Eelgrass, *Zostera marina*

2.0 FIELD SURVEY METHODS

Eelgrass Habitat Surveys Within the Proposed Project Area. Marine biological surveys were conducted for the project September-October 2007, May 2008, July 2008, November 2008, and January 2009. Surveys in September and October 2007 were conducted to map the distribution of eelgrass in the marina basins and to identify potential mitigation sites in the Cerritos Channel and along the Alamitos Bay Peninsula (September 17-21st, September 24th-25tt, and October 2nd, 2007). In May, 2008, CRM conducted water quality and sediment grain size studies on the Alamitos Bay Peninsula to identify physical and chemical conditions within and nearby extensive, healthy eelgrass beds along the Peninsula and at potential mitigation sites. These were followed up by surveys along the Long Beach Coastline between Junipero Avenue and First Street near the Downtown Marina and within portions of the Rainbow Lagoon to assess possible eelgrass mitigation sites in July 2008. A potential mitigation site along the northeast side of the Marine Stadium was also assessed, based upon known eelgrass distribution in the Marine Stadium (CRM 2005).

In November, 2008, CRM conducted follow-up surveys within the marina basins to visually check on the location and relative condition of eelgrass compared to the September and October 2007 surveys, and to collect additional water quality information in each of the marina basins and at a reference site along the Alamitos Bay Peninsula. In January 2009, CRM conducted a reconnaissance survey of the rip rap habitat between Basin 1 and Basin 3 to identify the major macrofaunal species that were living in the rip rap protecting the bulkhead. Project personnel included Mr. Rick Ware (Senior Marine Biologist/Principal Investigator), Mr. Rick Hollar (Senior Oceanographer, Nearshore and Wetlands Surveys

(NWS), Mr. Stephen Whitaker (CRM Marine Biologist) Mr. Thomas Gerlinger (CRM Marine Biologist), and Ms. Robin Kohler (Marine Technician). The areas surveyed for the presence/absence of eelgrass and invasive algae are shown in Figure 4, and described in Table 1.

2.1 PHASE 1 FIELD OPERATIONS

Coastal Resources Management, Inc. (CRM) and Nearshore and Wetlands Surveys (NWS) conducted a combined side scan sonar/remote video survey and underwater mapping surveys using biologist divers to map the eelgrass bed resources within the project area. Survey areas are listed in Table 1 and Figure 4. The techniques developed by CRM and NWS overcome the limitations of using sidescan sonar in shallow water areas and in areas where maneuverability is restricted. The method is based on the use of an Imagenex 881 Sportscan sidescan sonar (Photograph 2). It is light weight and deployed and operated from a small vessel. The electronics are housed in the compact towfish, which is towed with a Kevlar signal cable. The system is powered from a 12-VDC power source. All of the functions of the side scan system are controlled from a computer.

Table 1. Location of Marine Biological Survey Areas*

Region Surveyed	Area (acres)	% Total
Basin 1 (B1)	7.91	17.99
Basin 2 (B2)	11.07	25.18
Basin 3 (B3)	6.15	13.99
Basin 4 (B4)	7.60	17.28
Basin 5 (B5)	1.30	2.96
Basin 6N (B6N)	0.71	1.61
Basin 6S (B6S)	1.49	3.39
Basin 7 (B7)	0.53	1.21
Marina Pacifica	3.73	8.48
Temporary Dock Area 1 (T1)	0.60	1.36
Temporary Dock Area 2 (T2)	2.88	6.55
Peninsula 1 (P1, Laguna to 61st Place)	4.20**	
Peninsula 2 (P2, 63rd to 71st Place)	3.70**	
Cerritos Channel east of PCH Bridge (south side)	1.62**	
Total Surveyed Area	**43.97**	**100**

*Open water areas included only and excludes dock surface areas

**Not included in project area totals; these were surveyed as potential eelgrass mitigation sites

Figure 4. Location of eelgrass surveys in Alamitos Bay. B1-B7 are marina basins; TD=proposed temporary dock during construction; MP=Marina Pacifica eelgrass survey area; DB=Davies Bridge eelgrass survey area

Photograph 2. Imagenex 881 Sportscan Side Scan Sonar

The equipment was installed on the Wetland Surveyor at the Davies Launch Ramp in Alamitos Bay. A Leica 12-channel marine Professional DGPS receiver and side scan sonar were connected to the data acquisition computer, which ran the Hypack Data Acquisition software. The Hypack 6.2b Hydrographic Data Acquisition and Processing Software is an integrated marine survey package. It allows for the collection and processing of data from a wide variety of instrumentation including GPS and side scan sonar. All input data are accurately time-tagged to provide precise correlation between the various instruments. The output signal from the GPS receiver was also output to the remote-video camera system so that the video was annotated with coordinates. The side scan sonar towfish was flown from the port bow of the survey vessel to avoid contamination of the signal with noise from the propeller wash.

The side scan sonar information was linked to a high-resolution underwater color video camera (Ocean Systems, Inc Deep Blue Professional Grade Color Underwater Video Camera) that integrates GPS data and time on the underwater video (Photograph 3). Field personnel viewed the bayfloor in real-time as the side scan sonar produced bottom-profile information. The real-time information was simultaneously recorded on a Digital Video Recorder (DVR) that was used in the office/laboratory to verify the sidescan sonar locations of eelgrass, and additional information of the types of fish and marine life present within the marina basins and potential eelgrass mitigation sites. After the equipment had been installed, integrated, and tested, the data collection began. Position, side scan, and video data were collected simultaneously while steering the survey vessel down each finger and fairway of each basin, channel, or temporary dock area. The video camera was lowered from a point immediately astern of the towfish.

Photograph 3. Ocean Systems Deep Blue High-resolution Underwater Video Camera

A minimum of two and typically three non co-linear passes where made down each area to maximize the video coverage. The coverage area of the side scan usually covered each finger in a single pass. However, data was recorded during each pass to assure the each area of interest was located. The data collection was completed in two days.

Many targets were positively identified by plotting video targets on the geo-referenced photo-mosaics. However, many areas of interested, apparent on the mosaics, were not visible in the video record because of the expanded coverage afforded by the side scan sonar system. An additional day in the field was scheduled to locate and identify the side scan sonar targets. The GPS and video camera system was remobilized on board the Nearshore Surveyor and the geo-referenced photo-mosaics were loaded into the Hypack software. Using the Hypack map display, the survey vessel was navigated to a target of interest visible on a mosaic. The video camera was lowered and the area was examined until the target was identified. Each target was located and identified in turn.

2.2 PHASE TWO FIELD OPERATIONS-DIVE SURVEYS

Underwater surveys were conducted by project biologists to (1) ground-truth areas mapped by side scan sonar methods (2) to map eelgrass vegetation in shallow water areas between docks and bulkheads where the side scan sonar was not able to obtain data, e-in Basin 6; and (3) to verify or eliminate selected underwater targets as eelgrass; and (4) determine the biological characteristics of eelgrass beds encountered including eelgrass turion density and characteristic marine flora and fauna.

Eelgrass Survey Protocols

Per National Marine Service Southern California Eelgrass Mitigation Policy (NMFS 1991 as amended, “all mapping efforts must be completed during the active growth phase

for the vegetation (typically March through October) and shall be valid for a period of 60 days with the exception of surveys completed in August - October. Surveys completed after unusual climatic events (i.e., high rainfall) may have modified requirements and surveyors should contact NMFS, CDFG, and USFWS to determine if any modifications to the standard survey procedures will be required. A survey completed in August - October shall be valid until the resumption of active growth (i.e., in most instances, March 1). After project construction, a post-project survey shall be completed within 30 days. The actual area of impact shall be determined from this survey".

Caulerpa taxifolia (Invasive Algae)

Invasive algae *Caulerpa taxifolia* 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. 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, and if so, to eradicate the species prior to conduct of the construction project, using standard agency-approved protocols and by National Marine Fisheries Service/California Department of Fish and Game Certified Field Surveyors, of which Mr. Rick Ware and Mr. Stephen Whitaker, have obtained.

Underwater Habitat Mapping Surveys

Directed underwater habitat mapping surveys were conducted in several areas to either map beds and patches that were unable to be mapped using side scan sonar in Marina Pacifica Channel, and Basins 1, 2, 4, 6N and 6S, and 7, where eelgrass was present in very small beds or patches. In addition, eelgrass between the Davies Bridge and the Cerritos Channel was mapped to compare results with data collected using side scan sonar mapping techniques.

Underwater mapping surveys were conducted by biologist-divers in conjunction with side scan sonar and underwater video methods using GPS (Global Positioning System) technology. A Thales Mobile Mapper Wide-Area Augmentation System (WAAS) GPS/GIS Unit was employed to map eelgrass areas and small eelgrass patches less than two square meters in size. The estimated GPS error of the Thales Mobile Mapper unit, with post-processing correction, is less than 1 meter.

The biologist-diver mapping survey was conducted by using a biologist in a kayak and a diver. The biologist in the kayak was equipped with the GPS and followed the SCUBA-diving biologist around the perimeter of the eelgrass vegetation. To assist in the mapping

process, an Ocean Technology Systems (OTS) surface-to-diver communications system was employed. Eelgrass depth ranges were recorded during this phase of the field operations as well as characteristic marine flora and fauna.

Additional dive surveys were conducted in each location where eelgrass was found to determine eelgrass turion density and the biological characteristics of each eelgrass bed. Turions (eelgrass units consisting of a single shoot with blades) counts were made by biologists within replicated, 0.07 square meter (sq m) quadrats.

In all basins, the narrow trip of bottom habitat between the bulkheads and the docks was observed by biologists walking the shoreline and the dock headwalk at low tide to determine if eelgrass was present. Where it was located, dive surveys were then used to calculate habitat area and turion density.

Mitigation Site Surveys. Figure 5 shows the areas investigated as potential mitigation sites for eelgrass losses as a consequence of the proposed project. Surveys within Alamitos Bay were conducted in October and November 2007 using divers, remote video, and side-scan sonar methodologies. Surveys outside Alamitos Bay were conducted on 21 July and 18 August, 2008 along the downtown shoreline beaches from Junipero Avenue to the Downtown Marina and secondly, within Rainbow Marina. CRM conducted a combination of remote video and diver surveys along the coastline west of Alamitos Bay between Junipero Avenue to First Street, and diver surveys along the east-to-west shoreline along the south border of Rainbow Marina. The purpose of these surveys was to assess the existing biological and physical conditions with these areas as possible eelgrass mitigation sites.

2.3 DATA PROCESSING

Side scan and Remote Video

The side scan sonar data were processing using the Hyscan Processing module of the Hypack software. Geo-referenced photo-mosaics basin, channel or temporary dock area was created by digitally overlaying data from overlapping sonar passes. The location of the video targets were plotted on the appropriate mosaic and compared.

All video data collected were reviewed by observing the recorded data on a laptop computer at 1/3 the speed at which the data were collected. This information was used to ground-truth the side scan sonar data, observed the condition of eelgrass, and obtain targets of interest along with the positions obtained from the GPS annotation on the video. The video surveys were also used to determine if invasive algae (*Caulerpa taxifolia*) was present within each of the survey areas.

Figure 5. Areas surveyed as potential eelgrass mitigation sites

Underwater Habitat Mapping Surveys

GPS data obtained from the biologist-diver underwater mapping surveys were initially entered into the Mobile Mapper Software and then transferred into GPS TRACKER and Arc View 3.2 GIS software. The amount of eelgrass habitat in the project area was calculated using Arc View 3.2 and Mobile Mapper Software. Habitat maps were then processed and produced using Arc View. Eelgrass turion data were reduced in the office, and standardized to 1 square meter counts. Field survey depth data were standardized to Mean Lower Low Water (MLLW) based upon data for the Long Beach Outer Harbor NOAA tide station.

3.0 RESULTS

3.1 UNDERWATER CONDITIONS

Water temperatures during the survey varied between 62 and 67 degrees Fahrenheit. Underwater visibility was generally poor (1-4 ft) within the marina basins, and moderate in the main channel between the Davies Bridge and the Cerritos Channel north of the PCH Bridge (3-6 ft). Sediments were uniformly fine silts in the marina basins, silts to sands along the Alamitos Bay Peninsula, and silts/shell/sand along the south bank of the Cerritos Channel. The range of depths that were surveyed varied between 0.0 and -12 ft MLLW.

3.2 AMOUNT OF HABITAT SURVEYED

The survey area for the project encompassed 43.97 acres of bayfloor. This entire area was covered by side scan sonar survey methods. Of this area, 17.79% (7.82 acres) of the bottom habitat was visually inspected using remote video camera surveys and by diving biologists.

3.3 EELGRASS AREAL COVER

Based on the combined mapping effort of the side-scan sonar and underwater diver-mapping surveys, a total of 2.9 acres (126,926 sq ft) of eelgrass was located in Basin 2, Basin 4, Basin 6N and 6S, Basin 7, the Marina Pacifica Channel, the Cerritos Channel extending east of Coast Highway Bridge, the main channel between the Davies Bridge and the Cerritos Channel, and along the Alamitos Bay Peninsula between 56th and 71st Places. It did not occur in Basin 1, Basin 3, Basin 5, and in the vicinity of the proposed temporary dock located on the southeast side of the Long Beach Yacht Club bulkhead at the end of Appian Way. A breakdown of the amount of eelgrass within each area is provided in Table 2, and maps for eelgrass areas are shown in Figures 6-13. The depth range of eelgrass during the study was between 0.0 and -8.5 ft (MLLW).

The areas within the marina basins (B1-B7) accounted for 10.7% (13,572.41 sq ft), of which most occurred behind the docks of Basin 6 South. In Basins 2, 4, 6 North, and 7, eelgrass was extremely patchy, scattered, and accounted for only a small portion of eelgrass within all of the marina basins. The Marina Pacifica Channel accounted for 9.09% (11,543.54 sq

ft); most of this was found at the confluence of the Cerritos Channel, with amounts decreasing with distance into the Marina Pacifica Channel.

The shallow subtidal habitat between the Davies Bridge Launch Ramp and the Cerritos Channel/Marine Stadium confluence accounted for the highest percentage of eelgrass within any one region, 36.25% or 46,007.6 sq ft. The combined total amount of eelgrass located along the Alamitos Bay Peninsula Beach contributed 27.31% to the total amount of eelgrass (34,060.05 sq ft) of which nearly all was located between 63rd and 71st Places. The Upper Cerritos Channel, east of the PCH Bridge was also vegetated with a moderate amount of eelgrass, accounting for 16.66% of the total (21,142.88 sq ft).

Table 2. Acreage of Eelgrass Within the Project Area

Location	Eelgrass Area (sq ft)	% Total
Basin 1	0.00	0.00
Basin 2	1,019.78	0.80
Basin 3	0.00	0.00
Basin 4	123.26	0.10
Basin 5	0.00	0.00
Basin 6 South	11,943.40	9.41
Basin 6 North	230.00	0.18
Basin 7	255.97	0.20
Marina Pacifica Channels	11,543.54	9.09
West of Davies Launch Ramp	46,007.60	36.25
LBYC Long Dock (Proposed Temporary Dock	0.00	0.00
(55th-61st Place)	1,977.64	1.56
Peninsula 2 (63rd-71st Place)	32,682.41	25.75
Upper Cerritos Channel	21,142.88	16.66
Table 2 (continued) SUMMARY	Total Area (sq ft)	% Total
Eelgrass Area (sq ft)	126,926.5	100.00
Eelgrass Area (sq m)	11,796.1	
Eelgrass Area (acres)	2.9	

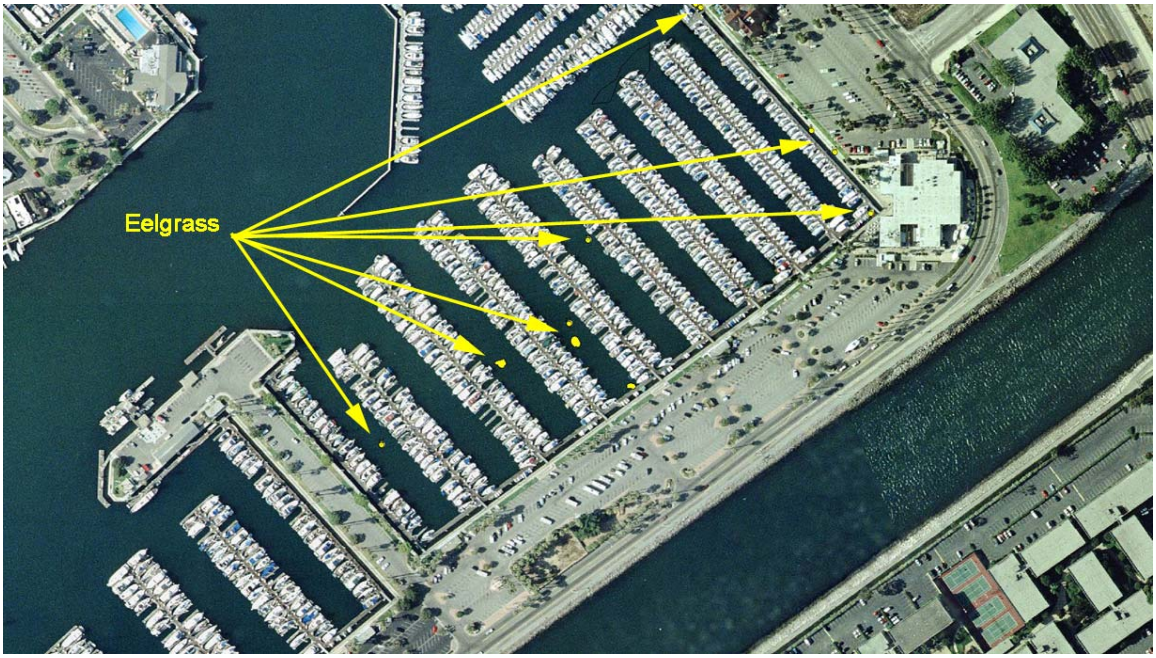


Figure 6. Basin 2 Eelgrass Habitat

Figure 7. Basin 4 Eelgrass Habitat

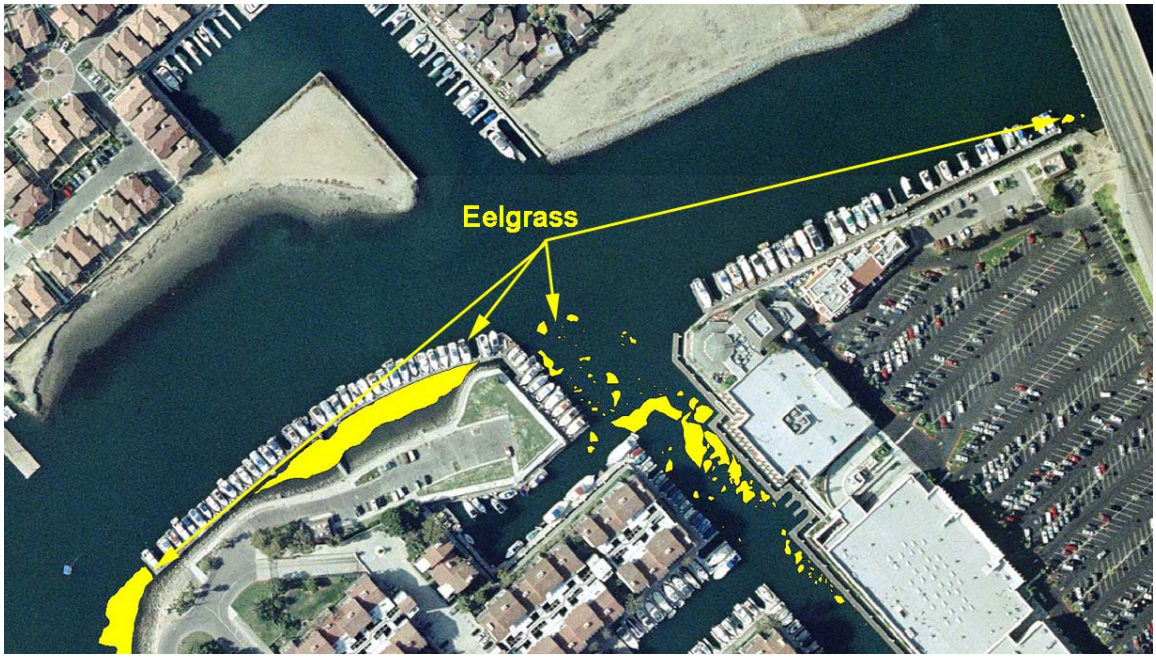


Figure 8. Basin 6 (South and North) and Marina Pacific Channel North Eelgrass Habitat

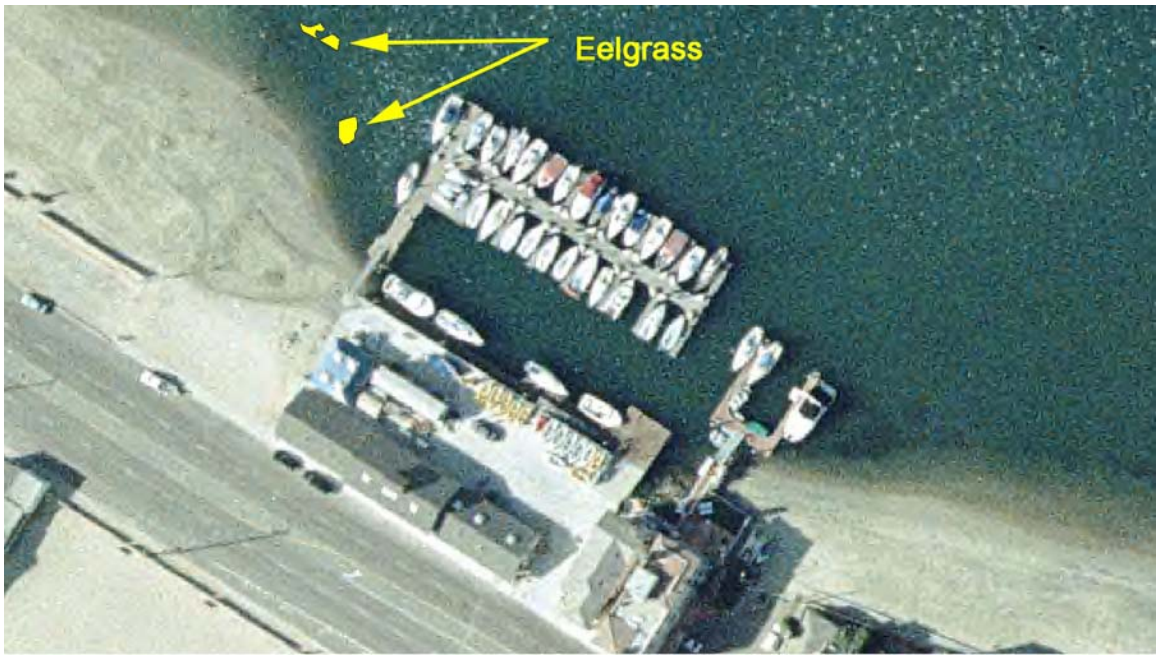


Figure 9. Basin 7 Eelgrass Habitat

Figure 10. Davies Bridge and Marina Pacifica Eelgrass Habitat

Figure 11. 55th Place to 61st Place (Peninsula 1) Eelgrass Habitat

Figure 12. 63rd Place to 71st Place (Peninsula 2) Eelgrass Habitat

Figure 13. Upper Cerritos Channel Eelgrass Habitat

CRM revisited each of the areas in the Marina in October 2008 using divers and remote video and determined that each of the areas mapped in 2007 was still vegetated with eelgrass, there was no observable increase in areal cover within these areas, and that eelgrass had not recolonized other areas of the Marina since the 2007 survey. CRM surveyed the fairways within Basin 3 where the marina docks have been abandoned (due to safety issues) to determine if a lack of vessel activity has resulted in any eelgrass colonization of the bayfloor since the Oct 2007 CRM eelgrass bed survey. The results

indicate that eelgrass has not colonized any of these areas, despite a range of depths (less than 8 ft) where eelgrass can grow, and no light-limiting features due to shading, or turbidity caused by vessel activities.

3.4 EELGRASS TURION DENSITY

Eelgrass turion density values for the survey are provided in Table 3, and historical turion density information for Alamitos Bay is provided in Table 4. Eelgrass turion density for the six sampling areas where eelgrass was located was 111.3 =/-62.2 turions/sq m (n=112 replicates). By area, the lowest density was observed within the Marina Pacifica Channel, 53.8 +/- 25.5 turions/sq m (n=49 replicates), and the highest density occurred in the inlet behind the Basin 6 Docks (194.7 +/- 76.9 turions/sq m (n=14 replicates). In general, moderate-to-high densities occurred in the mid-to-shallow sampling areas (0 to 6 ft depths), while either no eelgrass or eelgrass with very low turion counts was found at depths deeper than 6 ft. The range in mean eelgrass turion density during the October 2007 survey compares favorably with the results of studies conducted throughout Alamitos Bay between 1993 and 2007 which varied from 71 to 299 turions/sq m. Highest density during previous surveys occurred within the Alamitos Bay Entrance Channel during 1993; lowest densities were recorded in several areas along the periphery of Naples Island and/or within the Naples Canals.

Table 3. Eelgrass Density and Depth Range Within Each Survey Area, September 2007

Area	Mean Turion Density Per Sq Meter	Std Dev	N	Mean Depth (ft, MLLW)	Depth Range (ft, MLLW)
Basin 1	-	-	-	-	-
Basin 2	98.6	49.2	10	-6.5	-6.3 to -6.7
Basin 3	-	-	-	-	-
Basin 4	61.4	26.1	10	-7.9	-7.3 to -8.5
Basin 5	-	-	-	-	-
Basin 6 South (behind docks)	194.7	75.9	14	-3.3	-3.1 to -4.1
Basin 6 North PCH Bridge	104.8	41.9	12	-5.3	-1 to -5
Basin 7	-	-	-	-	-
Temp Dock 1 (Davies Bridge/Launch Ramp)	110.7	49.7	49	-3.7	0 to - 8
Temp Dock 2, (LBYC)	-	-	-	-	-
Maria Pacifica, East Channel	53.8	25.5	17	-6.3	-6.3
All Areas	**111.3**	**62.2**	**112.0**	**5.4**	**-0 to 8.5**

Table 4. Comparison of Eelgrass Shoot Density in Alamitos Bay 1993-2007

Location	Date of Survey	Mean Density*	Range*	# of replicates	Reference
5455,5609, 5645 Sorrento	October 2007	89.1	43-142	25	CRM in progress
64 Rivo Alto Canal	August 2007	75	45- 114	5	CRM 2007a
5609 Sorrento	March 2007	147	43-171	10	CRM 2007b
11 Sea Isle Lane	Oct 2005	130.7	71-114	135	CRM 2006
Marine Stadium	May 2005	133.9	29-400	39	CRM 2005
5635 Sorrento	May 2004	147	72-271	13	CRM 2004
2715 Corso di Napoli	Sept 2003	114	-	3	CRM 2003
5615 Sorrento	April 2002	104	86-129	10	CRM 2002a
End Beach Marine Stadium	July 2002	93	57-171	39	CRM 2002b
5474 The Toledo	Sept 2001	71	43-114	7	CRM 2001
Gondola Getaway	July 1999	199		9	CRM 1999
Basin 8 Cerrito Cerritos Channel	May 1996	134	74-288	7	CRM 1996
Mothers' Beach	Sept 1995	75	8-52	26	CRM 1995
Entrance Channel	June 1994	229	52-466	24	CRM 1994a
Jack Dunster Park (Fieldstone Park)	May 1994	162	104-272	24	CRM 1994b
Mother's Beach	June 1993	156	65-272	14	CRM 1993a
Bayshore Ave (between Appian Way and 2nd Street	Sept 1993	152		4	CRM 1993b

* number of shoots per square meter

3.5 INVASIVE ALGAE (*CAULERPA TAXIFOLIA)*

Caulerpa algae was not observed during the remote video or diver surveys within the project area. During the survey, 7.82 acres of bayfloor habitat were directly surveyed out of a possible 43.97 acres bayfloor habitat within the marina basins and the proposed temporary dock areas. This represents a total of 17.9 percent cover. It should be noted that the surveys were not conducted specifically to address pre-construction survey invasive algae conditions which are conducted using more stringent protocols related to areas of coverage. A 20% minimum covered is required in non-infected systems (including Alamitos Bay) when Caulerpa pre-and-post construction surveys are conducted.

3.6 OTHER MARINE LIFE OBSERVED DURING THE 2007 ALAMITOS BAY

A total of 53 taxa of plants, invertebrates, and fish were observed during surveys conducted between October 2007 and November 2008 (Table 5).

Table 5. List of Organisms Observed During Marine Biological Surveys in Alamitos Bay, September 2007-January 2009. Coastal Resources Management, Inc.

Common Name	Scientific Name	Eelgrass Beds and or/Soft Bottom Benthos	Marina Pilings and Bulkhead	All Areas
green algae	*Ulva intestinalis*			x
green algae	*Ulva californica*		x	x
brown algae	*Colpomenia perigrina*		x	x
brown algae	*Sargassum muticum*		x	x
red algae	*Caulacanthus sp.*		x	x
red algae	*Corallina spp.*		x	x
red algae	red turf algae (complex)		x	x
red algae	*Rhodymenia* sp.		x	x
sponge	*Haliclona* sp.	x	x	x
encrusting red algae	*Pseudolithopoma sp.*		x	x
green anemone	*Anthopleura sola*		x	x
hydroid	*Tubularia sp.*		x	x
stinging anemone	*Bunodeopsis sp*	x		x
burrowing anemone	*Pachycerianthus fimbriatus*	x		x
hydroid	*Corymorpha palma*	x		x
barnacle	*Balanus glandula*		x	x
barnacle	*Chthamalus fissus/dalli*		x	x
lined shore crab	*Pachygrapsus crassipes*		x	x
limpets	*MacClintokia (Collisella) spp*		x	x
giant keyhole limpet	*Megathura crenulata*		x	x
file limpet	*Lottia limatula*		x	x
slipper shell	*Crepidula onyx*		x	x
horn snail	*Cerithidea californica*	x		x
reverse chama	*Pseudochama exogyra*		x	x
ringed nudibranch	*Dialula sandiegensis*		x	x
lemon nudibranch	*Anisodoris nobilis*		x	x
sea slug	*Navanax inermis*	x		x
sea hare	*Aplysia vaccaria*	x	x	x
octopus	*Octopus bimaculoides*	x	x	x
carinate snail	*Alia carinata*	x		x
angled unicorn snail	*Acanthina spirata*		x	x
kellet's whelk	*Kelletia kelletii*		x	x
turban snail	*Tegula eiseni*		x	x
oyster	*Ostrea conchicola*		x	x

Table 5 (Continued)	Scientific Name	Eelgrass Beds and or/Soft Bottom Benthos	Marina Pilings and Bulkhead	All Areas
wavy top snail	*Lithopoma undosa*		x	x
Japanese littleneck	*Protothaca staminea*	x		x
wavy chione	*Chione undatella*	x		x
bay mussel	*Mytilus galloprovincialis*		x	x
soft ectoproct	*Zoobotryon verticillatum*	x	x	x
moss animal	*Thalamoporella californica*	x	x	x
ochre sea star	*Pisaster ochraceus*			x
bat star	*Asterina miniata*		x	x
sea cucumber	*Parastichopus parvimensis*		x	x
colonial tunicate	*Botrylloides spp.*			x
solitary tunicate	*Ciona intestinalis*		x	x
solitary tunicate	*Styela plicata*		x	x
round sting ray	*Urolophus halleri*	x		x
topsmelt	*Atherinops affinis*	x	x	x
black surfperch	*Embiotoca jacksoni*	x	x	x
opaleye perch	*Girella nigricans*		x	x
speckled sand dab	*Citharichthys stigmaeus*	x		x
California halibut	*Paralichthys californicus*	x		x
flatfish	unid. flatfish	x		x
	Total Taxa	**18**	**38**	**53**

Epibenthic, Soft-Bottom Benthic Organisms. Eighteen were observed on or in eelgrass-vegetation or uncolonized mud substrates. The most common species observed during diver and remote video surveys of the marina basins and channels included large colonies of the ectoproct *Zoobotryon verticillatum*-a large, tree-like mass colonial species that is commonly found in high abundances during warm winter months attached to boat docks (Coastal Resources Management, Inc. 2007a). However, when it breaks loose, it settles on the bayfloor to form a "bolus' of biofouling debris.

Other species that were observed, but were not abundant during the dive surveys included burrowing anemones (*Pachycerianthus fimbriatus*), octopus (*Octopus bimaculatus*), California horn snail (*Cerithidea californica),* Gould's bubble snails (*Bulla gouldiana*), predatory sea slugs (*Navanax inermis*), and tunicates. Of these, only the ectoproct *Zoobotryon* and burrowing anemones were present to common in the marina basins. A species-poor community of benthic epibiota is not uncommon in unvegetated environments compared to vegetated bayfloors (i.e., eelgrass) where the added structure of eelgrass above and beneath the sediment surface provides habitat and a food sources for many invertebrates.

Hardscape. Man-made substrates (bulkheads, seawalls, docks, pilings, jetties) in Alamitos Bay are not particularly biologically sensitive habitats. However, hard substrate provides surface area for sessile marine animals and plants and mobile macro

invertebrates that would not be present in the absence of these structures. The hardscape of these structures support mussels, barnacles, sponges, and other types of invertebrates and plants that constitute the "biofouling community". The undersides of boat floats and docks are commonly colonized by green algae, barnacles, mussels, limpets, polychaete worms, moss animals (ectoprocts), and sea squirts (tunicates). Bay fishes are attracted to the biofouling habitat because it a constant source of food.

A total of 38 species were identified during dive and remote video surveys and included green algae (*Ulva intestinalis*, and *U. californica)*; brown algae (*Colpomenia perigrinus* and *Sargassum muticum*) *and red algae* (*Corallina* spp., *Caulacanthus* sp, *Rhodymenia* sp. and turf red algae complex); sponges (*Haliclona* sp.); green anemones (*Anthopleura sola*) angled unicorn whelk (*Acanthina spirata),* mussels (*Mytilus galloprovincialis*); barnacles (*Balanus glandula, Chthamalus fissus/dalli*); ectoprocts (*Zoobotryon verticillatum*); sea stars (*Pisaster ochraceus*); and tunicates (*Botryllus/Botrylloides* complex, *Ciona intestinalis*, and *Styela plicata*). The rip rap in the vicinity of Basin 1 and Basin 2 also included numerous, larger macroinvertebrates, such as the nudibranchs *Dialula sandiegensis, Anisodoris nobilis;* sea hares *(Aplysia vaccaria),* octopus *(Octopus bimaculatus),* kellet's whelk *(Kelletia kelletii),* wavy top snails *(Lithopoma undosa*) sea stars *(Pisaster ochraceus), oysters* (*Ostrea conchilcola*); bat stars *(Asterina miniata*), and purple sea urchins *(Strongylocentrotus purpuratus).*

Fishes. The types of fishes which commonly occur in protected marinas and harbors of southern California such as Alamitos Bay are a combination of species that are associated with soft-bottom habitat, hardscape of pilings, docks, cement bulkheads, and jetties. And open water (water column) species. While 46 species are known from Alamitos Bay (Valle et al. 1999), six species were observed during the focused CRM surveys and included topsmelt (*Atherinops affinis*), black perch (*Embiotoca jacksoni*), opaleye perch (*Girella nigricans*), unidentified flatfish, California halibut (Paralichthys californicus), sand dabs (*Citharichthys stigmaeus*), and round sting ray (*Urolophus halleri*).

4.0 IMPACT ASSESSMENT

4.1 CONSTRUCTION DETAILS (Source: LSA Associates, Inc.)

The proposed project would renovate the existing Marina facilities and enhance the existing recreational boating facilities within the harbor. The project encourages boating use by providing upgraded ADA-compliant facilities, upgraded restrooms, and dredged basins to ensure safe navigation. The project will be completed over a sequence of 12 phases. Table 6 summarizes the project components.

Table 6. Alamitos Bay Marina Renovation

Component	Existing Conditions	Proposed Project Improvements
Dock System (Basins 1-7)	Floating docks supported by 808 concrete steel reinforced pipes	Replace existing piles with 620 piles (loss of 188 piles). Average pile diameter 15”
	1,967 boat slips provided by timber floating docks	1,646 boat slips provided by floating concrete docks. Loss of 321 slips.
	Approximately 476,839 square feet of area covered by floating docks	Approximately 474,239 square feet of area covered by floating docks. Loss of 2,600 square feet.
Temporary/Long Dock	N/A	One 565’ x 10’ long dock to be located adjacent to Long Beach Yacht Club (Basin 4). Approx 200’ of this dock is temporary. Approx. 3,150 sq ft. of water area covered permanently and 2,000 sq ft. covered temporarily during construction.
Access	47 ADA gangways (none ADA)	46 gangways (including 9 ADA)
Dredging	N/A	Basin 1 – 53,700 cy Basin 2 – 89,900 cy Basin 3 – 55,900 cy Basin 4 – 65,300 cy Basins 5, 6S, 6N, 7 – 22,320 cy Total: 287,120 cy (with 2 ft over-dredge) Target dredging depth is -13 to -15 MLLW in Basin 1; -10 MLLW in Basins 2-7
Sea Wall Repairs	N/A	Approx. 8,250 lf of repair required
Habitat Mitigation Area	N/A	Site in north east Marine Stadium to be excavated to a depth of -2 to -3 MLLW. Approximately 10,500 sq ft.
Dry Boat Storage	None	23 new spaces for boats under 30’ in Basin 4 parking lot. Loss of 16 spaces at habitat mitigation site. Total gain of 7 dry storage spaces.
Restroom Facilities	13 restroom buildings	Refurbish 3 restroom buildings in place; demolish and rebuild 10 restroom buildings. Total of 13 restroom buildings.
Parking Lots	2,515 parking spaces	2,524 parking spaces provided including ADA spaces. 930,622 sq ft of parking lot areas to be repaved

The Marina Rehabilitation Project would accommodate changes in the boating needs of the public by providing longer average slip lengths. The dock and slip facilities were developed 50+ years ago, when the average length of recreational boating slips was shorter than current boater demand. However, providing longer slips will reduce the total number of slips within the Marinas. There are currently 1,967 existing slips in Marina Basins 1 through 7; the proposed project includes installation of 1,646 slips, resulting in the loss of 321 slips. As of the date of this notice, there are 1,430 customers in the Marina, so there would be a slip for every existing customer once the renovations are complete.

The proposed project consists of a number of improvements to the existing Marina and includes the following: (1) dredging the Marina basins down to original design depths; (2) replacing and/or upgrading 13 restrooms along with their associated water and sewer laterals; (3) repairing the sea wall where necessary to reestablish the rock revetment along the slope to the basin floor; (4) complete dock and piling replacement; and (5) replacing the pavement in the Marina's parking lots. The project includes two construction staging areas: one located in a parking lot on Marina Drive near Basin 2; and a second staging area located in a parking lot on Marina Drive near Basin 3, adjacent to the Marina Shipyard.

Based on preliminary analysis, dredging activities would require mitigation for potential impacts to eelgrass. The City has identified a site adjacent to the northeast shore of Marina Stadium to convert to an open space/habitat mitigation site. This mitigation habitat area will therefore be analyzed in the Environmental Impact Report (EIR) as a part of the project. Each of these project components is described in greater detail below.

Dredging. As part of the proposed project, the Marina basins would be dredged to the original design depths. The purpose of this dredging is to remove accumulated materials that prevent safe navigation throughout the Marina basins. The total dredge quantity is approximately 262,000 cy of sediment. The proposed disposal site for dredge materials from Basins 2 through 7 is the United States Environmental Protection Agency (EPA) designated offshore disposal site, known as LA-2, with material discharged via a dump barge. Preliminary testing indicates that a portion of dredge materials from Basin 1 contain elevated levels of metals and would not be acceptable at LA-2. Therefore, approximately 25, 504 cy of material from Basin 1 would be trucked off-site and disposed of at an appropriate landfill, with the remainder being disposed of at LA-2. The dredging work would be phased by basin along with the dock and piling replacement work. Dredge depths for Basins 2,3,4,5, 6 North, 6 South, and 7 will be -10 ff MLLW, and Basin 1 dredge depths will be -13 to -15 ft MLLW.

Restrooms. There are a total of 13 restrooms located throughout the Marina basins that are included as part of this project. Three (3) restroom structures, located in Basin 6-South, Basin 6-North, and Basin 7, respectively, would be remodeled and renovated in place. The remaining 10 restroom buildings would be demolished and replaced with similar structures that contain toilet, shower, and laundry facilities. Six of the 10 structures to be demolished would be relocated to accommodate ADA ramps and

gangways. However, each basin would continue to have the same number of restroom buildings that currently exist, in the same approximate locations.

The restrooms would be constructed in compliance with the ADA guidelines. This portion of the project includes replacement of the existing water and sewer lines with 6-inch (in) lines from all restrooms to the existing water and sewer mains.

Sea Wall Repairs. It is anticipated that 8,250 linear feet (lf) of sea wall repair would be required as part of the proposed project. The repairs are primarily focused on restoring the eroded bearing surface and reestablishing the rock revetment along the slope to the basin floor. Sea wall repairs would be done in phases that correspond with each basin's dock and piling replacement work.

Dock and Piling Replacement. There are 1,967 existing slips in Marina basins 1 through 7 that total approximately 476,839 sf of dock surface area. The proposed project includes installation of 1,646 slips that total approximately 474,239 of new dock surface area. Therefore, the proposed project would result in the loss of approximately 321 slips and a reduction of approximately 2,600 sf of dock surface area. In addition, the proposed project would result in the removal of approximately 808 existing piles and installation of 620 new piles to support the new dock system. The new docks, accessory gangways, and ramps would meet ADA requirements. Upgraded water, electricity, and phone utilities would be provided to the new slip facilities.

Temporary/Long Dock. The project includes one temporary dock that would accommodate displaced boats during each phase of the rehabilitation process. The temporary dock would be located adjacent to the parking lot of the Long Beach Yacht Club. It is anticipated that a portion of the temporary dock would remain in place as a permanent dock at the completion of the Marina rehabilitation.

Parking Lot Replacement. The project includes the replacement of the paved parking lot surfaces adjacent to the Marina slips in Basins 1, 2, 3, 4, 6-North, and 6-South. New asphalt paving would be installed and the lots would be restriped (repaving areas total 930,622 sf). No landscaped islands within the parking lots areas would be removed. In addition, new utility connections including electricity, water, wastewater, and storm drain facilities would be installed in conjunction with the repaving of the parking areas. Concrete ramps meeting ADA requirements and concrete sidewalks and curbs are also included in the parking lot or landside improvement portion of the project.

Open Space/Habitat Mitigation Site. The City has identified a site adjacent to the northeast shore of Marina Stadium to convert to an open space/habitat mitigation site. The open space/habitat mitigation site is located within a City-owned storage area. The fenced storage area is currently used, in part, to store impounded items. The project includes abandoning a portion of the storage yard to create an open space habitat. An area of 218 feet by 105 feet would be excavated to a depth of 2 to 3 feet below MLLW. The rock revetment would be relocated to the eastern boundary of the site to allow the area to fill with water from the adjacent channel. [Alternatively, culverts would be placed in the

rock revetment to allow water to circulate into the planting area. Design is still underway] The new open space area would be planted with eelgrass to mitigate for the project's potential impacts to marine biological resources.

Project Timing. Implementation of the project is anticipated to be accomplished in a 12-phase program, extending over approximately six years. Each basin will be dredged after removal of the docks and slips within that respective basin. Seawall repair will occur as necessary within each phase. Rehabilitation of the restroom facilities and the parking lot replacement will be completed after installation of all dock facilities and related utilities.

The phases and proposed number of slips in each basin are summarized in Table 6.

The limits of eelgrass vegetation within the Marina Basins and temporary dock area are shown in Figures 6-13. Each of these areas will be potentially affected by construction-related impacts due to pile removal and placement, dredging, and the presence of work vessels and barges.

4.2 IMPACTS TO WATER QUALITY

Potential Water Quality Impacts on Marine Habitats. During dredging and pile removal and placement, water turbidity will increase when the piles are removed or driven into the sediments. Turbidity may also increase if vessel propellers impact the bay floor or prop wash stirs up bottom sediments.

To prevent the spread of any turbidity plume out of the area, Best Management Practices (BMPs) should be implemented, when feasible, by installing a siltation curtain around the work zone. Implemented BMPs that will eliminate any disposal of trash and debris at the project site will assist in preventing water quality and eelgrass habitat degradation.

4.3 IMPACTS TO EELGRASS HABITAT

Potential Vessel-Related Impacts on Eelgrass Habitat. Barges, scows, and support vessels have a potential to impact eelgrass through (1) deployment of anchors and anchor chain within eelgrass habitat (2) grounding of the vessels over eelgrass habitat and (3) propeller scarring and prop wash. These activities would create furrows and scars within the eelgrass vegetation and would result in additional, adverse losses of eelgrass habitat.

Eelgrass Vegetation. Areas that will be affected by the proposed project's dredging activities potentially include Basin 2, Basin 4, and Basin 6N. Dredging will be conducted to depths of -10 ft within these basins, removing all eelgrass and deepening the basins to depths beyond the normal depth ranges for eelgrass survival. Losses of eelgrass vegetation are summarized in Table 7. Project-related dredging impacts will result in the loss of 1,373.04 sq ft (0.03 acres) of eelgrass vegetation. Mitigation for these losses will be required per requirements of the Southern California Eelgrass Mitigation Policy (National Marine Fisheries Service, [SCEMP] 1991 as amended).

Table 7. Project Habitat Impacts. Losses of Eelgrass Vegetation

Location	Soft Bottom Habitat-All Marina Basins	Soft Bottom Habitat in Basin Fairways With Eelgrass	Existing Eelgrass Vegetation	Amount of Eelgrass Within Dredging Footprint	Mitigation Requirement: Eelgrass Vegetation: 1.2 to 1
Basin 1	0.0	0.0	0.0	0.0	none
Basin 2	70,956.2	61,181.0	1,019.8	1,019.8	1,223.7
Basin 3	27,274.0		0.0	0.0	none
Basin 4	19,210.4	2,083.0	123.6	123.6	148.3
Basin 5	2,233.0		0.0	0.0	none
Basin 6-S	1,456.0		23,457.0	0.0	none
Basin 6-N	512.0	742.0	230.0	230.0	276.0
Basin 7	1,400.0		0.0	0.0	none
Total (ft)	123,041.6	64,006.0	24,830.4	1,373.4	1,648.0
Total (ac)	2.82	1.47	0.57	0.03	0.04

Potential Eelgrass Habitat. The Southern California Eelgrass Mitigation Policy [SCEMP] (National Marine Fisheries Service, 1991 as amended) defines potential eelgrass habitat as "areas where eelgrass would normally be expected to occur but where no vegetation currently exists. Factors to be considered in delineating potential habitat areas include appropriate circulation, light, sediment, slope, salinity, temperature, dissolved oxygen, depth, proximity to eelgrass, history of eelgrass coverage, etc." It should be noted that there is no conclusive scientific basis for why eelgrass grows in some locations and not in others. It can be attributed to a combination of any of the environmental conditions listed above.

Further, in response to recent concerns regarding the interpretation of the SCEMP, correspondence between Rodney R. McInnis, Regional Administrator for the NMFS and Mr. Jack Peveler, President of the California Association of Harbor Masters and Port Captains, (Appendix 2) clarified that the potential eelgrass clause has been implemented only where "clear and convincing evidence is available that a given area is potential eelgrass habitat (e.g. previous eelgrass surveys documenting presence)."

Abiotic Features of the Project Area. This section summarizes physical and chemical factors of the project area relative to the determination of potential eelgrass habitat. Water circulation within Alamitos Bay, and particularly within the Alamitos Bay Marina is modified by the presence of cooling water intake structures in the Marina (Basin 2) that draws ocean water into Alamitos Bay, and then to the Haynes Generating Station. This creates an artificial net inflow of ocean water into Alamitos Bay, and benefits water quality in the Marina, as well as marine life that lives in the marina. This net inflow of ocean water likely contributes to higher levels of dissolved oxygen, lower levels of organics and suspended sediments in the Bay, and subsequent higher submarine irradiance levels. It also likely enhances the ability for eelgrass to colonize deeper areas of the marina, that in the absence of the net inflow of ocean waters, might not be able colonize.

Abiotic features such as water salinity, temperature, and underwater light levels are within normal ranges for eelgrass in the Alamitos Bay Marina at depths where eelgrass is known to occur (-0.0 to -8.5 ft MLLW). While the marina's initial design depths were below the depth limits known for eelgrass, shoaling in the marina has resulted in depths that will support eelgrass, and where light levels are sufficient to support eelgrass.

The original and/or design depths of the Marina basins ranged from -12 to -15 ft MLLW. Because the current shallower depths within the Marina Basins are a result of shoaling over the past 50 years, and because no maintenance dredging has occurred, there are now depths within the basins which are less than 8 ft deep, or "depth suitable" for eelgrass. Eelgrass vegetation would not normally be expected to occur in these areas as the site has historically and consistently been used as a marina and the basins should have maintained as close as possible to the original and/or design depths (-12 to -15 MLLW). However, over time, shoaling has decreased water depths in 3.39 acres of shaded and unshaded habitat to depths less than 8.0 ft deep (Source: TranSystems, Inc. Alamitos Bay Marina Bathymetric Maps, August 2008). Of these 3.39 acres, 2.82 acres are unshaded, but depth-suitable habitat. However, there is "clear and convincing evidence" that eelgrass has been found in only seven of the of 38 marina fairway channels (Figures 14-16), and the total amount of depth-suitable habitat within these seven marina fairway channels is 1.47 acres (Table 8).

While 1.47 acres of soft bottom habitat within these areas can be classified as "depth-suitable" eelgrass habitat within the seven fairways, the results of CRM's remote video surveys in October 2008 indicated that each of the areas mapped in 2007 was still vegetated with eelgrass, but that there was no observable increase in areal cover, and eelgrass had not colonized in any other areas in the Marina.

Therefore, based on these two (and only available) surveys indicating that eelgrass has not increased in cover or colonized in any other areas, and because eelgrass would not historically been expected to occur in the Marina due to the depths required to maintain navigation, no potential eelgrass habitat is considered to be present within the areas impacted by proposed dredging. Therefore, impacts to potential eelgrass habitat are considered less than significant and no mitigation is required.

Table 8. Determination of Eelgrass Habitat Vegetation Losses

Location	TranSystems Initial Amount Calculated: (sq ft)	Depth-Suitable Unshaded Eelgrass Habitat-All Marina Basins (sq ft)	Depth Suitable, Unshaded Base Minus Fairways or Basins Without Eelgrass (sq ft)	Existing Eelgrass (sq ft)	Impacted Amount of Eelgrass (sq ft)	Amount of Potential Eelgrass Habitat (sq ft)	Mitigation Requirement: Eelgrass Vegetation: 1.2 to 1
Basin 1	0.0	0.0	0.0	0.0	0.0	0.0	none
Basin 2	71,976.0	70,956.2	61,181.0	1,019.78	1,019.78	0.0	1,223.73
Basin 3	27,274.0	27,274.0		0.0	0.0	0.0	none
Basin 4	19,334.0	19,210.4	2,083.0	123.26	123.26	0.0	147.91
Basin 5	2,233.0	2,233.0		0.0	0.0	0.0	none
Basin 6 South	24,913.0	1,456.0		23,457.0	0.0	0.0	none
Basin 6 North	742.0	512.0	742.0	230.0	230.0	0.0	276
Basin 7	1,400.0	1,400.0		0.0	0.0	0.0	none
						0.0	
Total (ft)	147,872.0	123,041.6	64,006.0	24,830.4	1,373.04	0.0	1,647.65
Total (Acres)	3.39	2.82	1.47	0.57	0.03	0..0	0.04

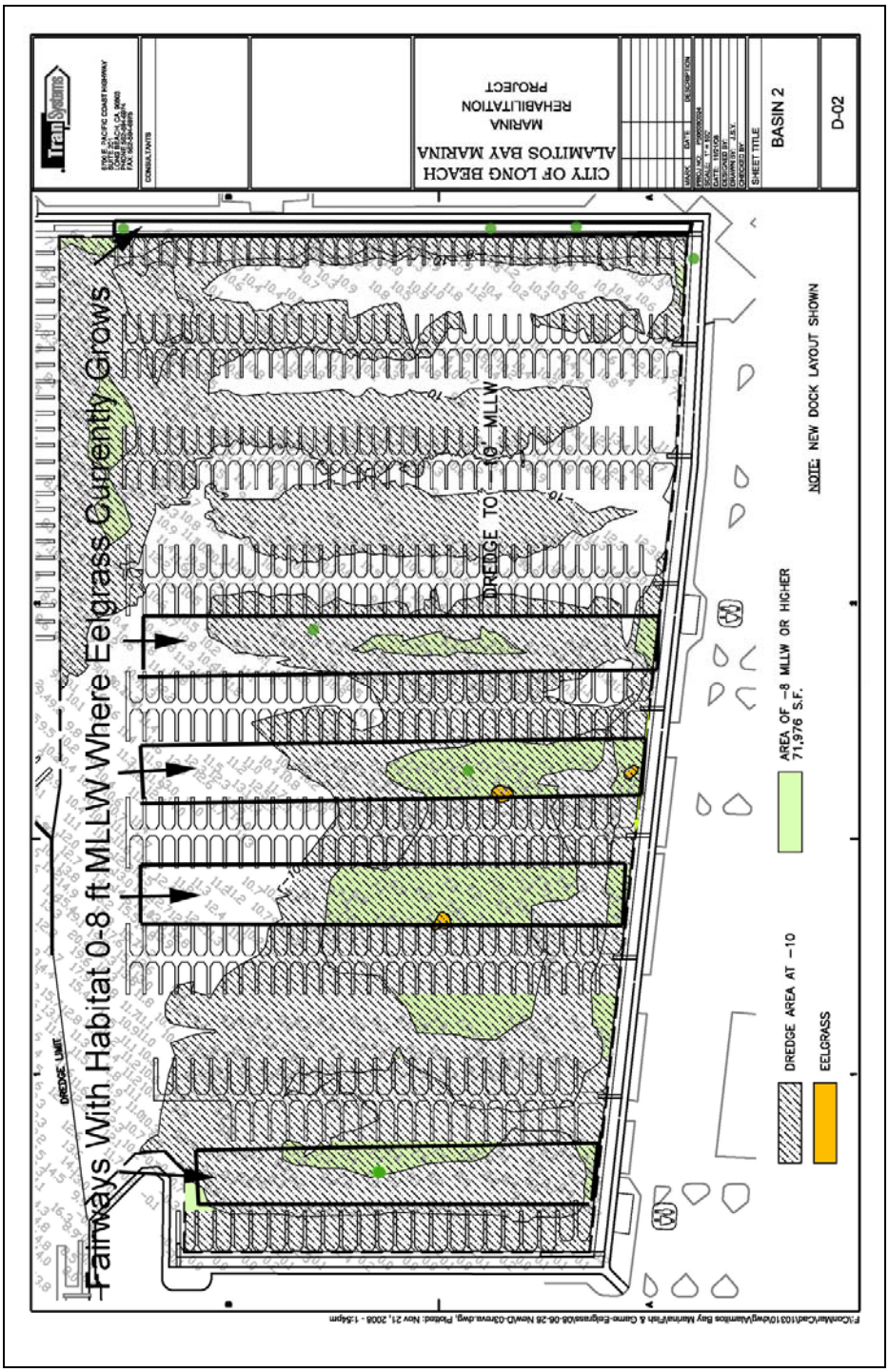


Figure 14. Depth-Suitable Eelgrass Habitat in Basin 2. Note: Area of -8 ft MLLW include both shaded and unshaded habitat. Table 4 includes only the habitat that is unshaded and potentially capable of supporting eelgrass

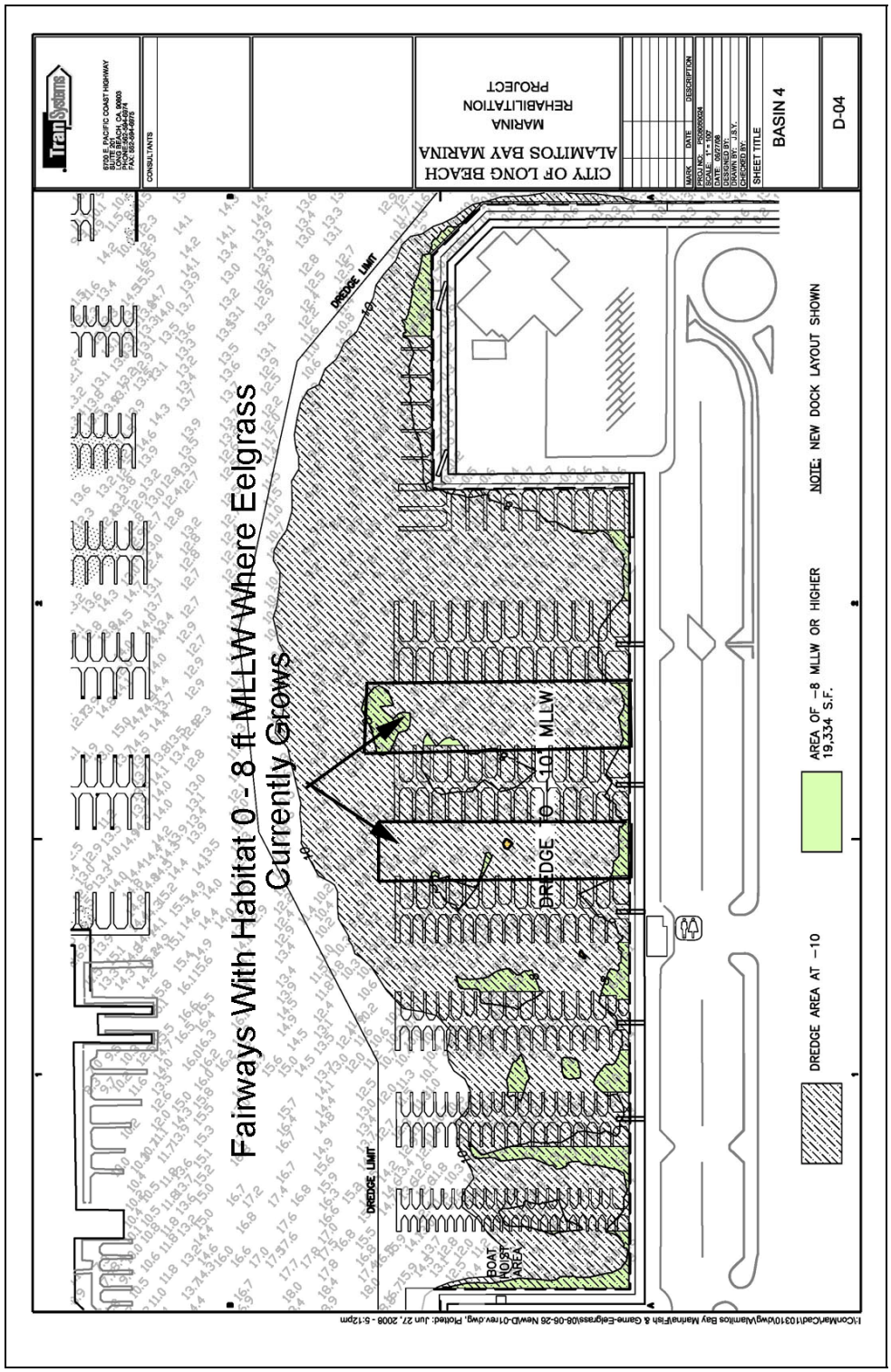


Figure 15. Depth-Suitable Eelgrass Habitat in Basin 4. Note: Area of -8 ft MLLW include both shaded and unshaded habitat. Table 4 includes only the habitat that is unshaded and potentially capable of supporting eelgrass

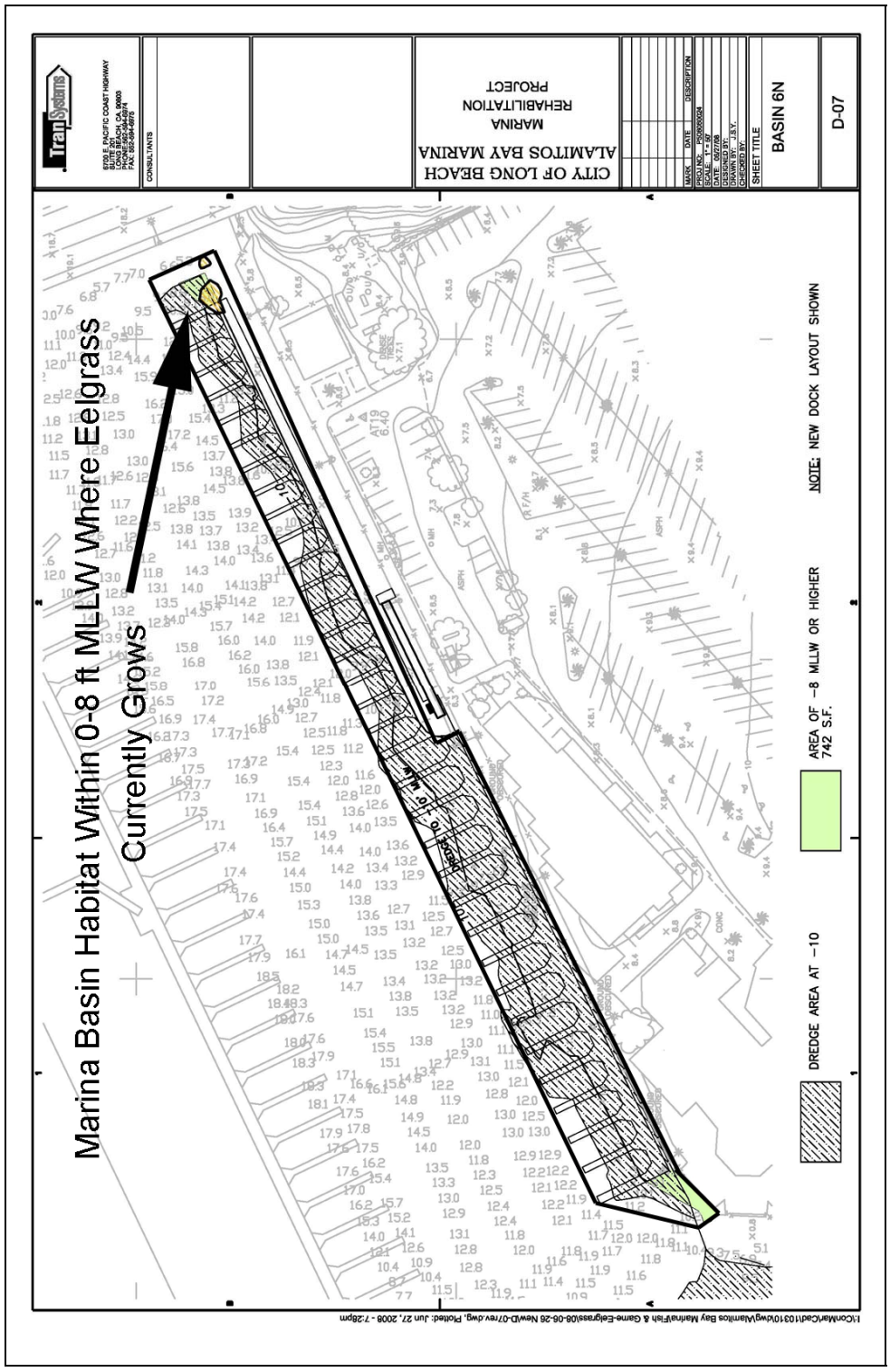


Figure 16. Depth-Suitable Eelgrass Habitat in Basin 6. Note: Area of -8 ft MLLW include both shaded and unshaded habitat. Table 4 includes only the habitat that is unshaded and potentially capable of supporting eelgrass

5.0 MITIGATION MEASURES

5.1 WATER QUALITY

During construction, the following mitigation measures and Best Management Practices (BMPs) are recommended to prevent water quality degradation in Alamitos Bay to reduce potential adverse impacts to eelgrass beds on the periphery of the project area.

- 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 Alamitos Bay will be prohibited; and
- Silt curtains will be deployed around work barges and scows, and around the pile removal and placement zones where feasible to minimize the spread of turbid waters outside the project area.

5.2 EELGRASS PROTECTION PLAN FOR CONSTRUCTION IMPACTS

The following mitigation measures will be implemented during prior to and during construction to avoid and reduce additional adverse impacts to eelgrass.

- The project marine biologist shall provide the project engineer with the coordinates of eelgrass beds within each project construction zone (California Zone V, NAD 83, feet). prior to the initiation of any dredging to avoid unnecessary damage to eelgrass beds outside the construction zones;
- The project marine biologist shall meet with the dredging crew project manager prior to dredging to review areas of eelgrass to avoid.
- Support vessels and barges operators will not maneuver or work over eelgrass beds outside the project area to prevent grounding within eelgrass beds, damage to eelgrass from propellers, and to limit water turbidity; and
- Workers shall avoid placing anchor chain or anchors in eelgrass beds.

5.3 MITIGATION FOR EELGRASS HABITAT LOSSES

Eelgrass Mitigation Requirements

- Eelgrass vegetation losses shall be mitigated at a 1.2 to 1 ratio (mitigation to impact ratio) such that the loss of 1,373.04 sq ft of eelgrass will be mitigated with the successful transplant of 1,647.65 sq ft of eelgrass vegetation, according to the *Southern California Eelgrass Mitigation Policy* (National Marine Fisheries Service, 1991 as amended).

Mitigation Site Siting Alternatives. Agencies require that mitigation be conducted "in kind" (i.e., mitigation of eelgrass), and "on site" (i.e., within the same system- Alamitos Bay). If this cannot be achieved, than offsite mitigation areas can be evaluated. However, off-site mitigation is extremely difficult to achieve because agencies prefer that mitigation is conducted in the system that was affected by the project impacts. The following sites were evaluated between November 2007 and July 2008 as potential eelgrass mitigation sites. The preferred project alternative is **#6 (Marine Stadium, Northeast Corner Tidal Basin).**

1. **Alamitos Bay Peninsula Between Balboa and 56th Place-Rejected Site**
    - Eelgrass grows in small patches along this section of bay shoreline, but there are open areas of bare sediments that potentially could serve as a mitigation site.
    - Water quality is not limiting; good tidal current flushing. Water quality (temperature, salinity, pH, underwater light-levels) and depth are not limiting to eelgrass growth.
    - However, beach and subtidal profiles indicate a steep slope and a narrow intertidal to shallow subtidal bench to depths of -5 feet Mean Lower Low Water (MLLW) is likely limiting eelgrass distribution. It is extremely abundant between 64th Place and 71st Place where the beach and subtidal profiles indicate a wide, gradual slope into the eelgrass zone.
    - Public use (swimming, and sports fishing activity along shoreline and fishing from kayak/inter tube fishermen may also be limiting to eelgrass growth along this side of beach (according to the California Department of Fish and Game).
    - California Department of Fish and Game does not approve of this site as an eelgrass mitigation site because of high public use.

2. **Cerritos Channel (north of Pacific Coast Highway)-Rejected Site**
    - Eelgrass is abundant along the south bank east of PCH Bridge, leading to the Cerritos Wetlands. No opportunity along this bank.
    - Potential, long-term opportunity to include eelgrass mitigation for future restoration of the Cerritos Wetlands, but these plans are not far enough along, nor is funding currently available for implementing any eelgrass mitigation for the resource agencies and regulatory agencies to approve this site as a mitigation area.

3. **Basin 6-Cerritos Channel (south of Pacific Coast Highway-Rejected Site**
    - Initial eelgrass mitigation potential site evaluation was feasible from a biological standpoint. Preliminary designs for the mitigation site were prepared by Coastal Resources Management, Inc. However, the site was rejected by the Marine Bureau due to a substantial reduction in the number of boat slips and future income for the marina.

4. **Long Beach Shoreline between Junipero Ave to 1st Street (Downtown Marina)-<u>Rejected Site</u>**
    - This site was investigated because eelgrass is known to occur immediately offshore of the surf zone along this stretch of protected beach. The specific site investigated was the shallow water shoal that has been formed at the junction of the Downtown Marina and the shoreline, and the shallow waters immediately outside the surf zone. Sediments tend to consist of silty sand, and water depths are between -2 and -8 ft MLLW. It actively competes with the red algae *Gracilariopsis* for light and space throughout this stretch of nearshore shallow water habitat.
    - However, based on CRM diver surveys of the site in May 2008, eelgrass has colonized this shoal and grows extensively throughout the area which precludes this as a mitigation site.

5. **Rainbow Marina, Along the South Jetty/Breakwall)-<u>Rejected Site</u>**
    - Dive surveys were conducted by CRM in May 2008 at depths between 0.0 and -15 ft MLLW. The area investigated was a narrow sandy beach/quarry rock shoreline. The quarry rock shoreline extends subtidally to a depth of -15 ft Mean Lower Low Water in front of the Long Beach Aquarium dock facilities and other commercial vessels in the marina. In order for this area to be used as an eelgrass mitigation site, the waterway would have to be narrowed and filled in with appropriate sandy sediments to depths of -2 to -5 ft MLLW between the end of the docks at the western end of the site, east to the entrance to the marina. Biologically, the subtidal rip rap is highly productive, and it would be unlikely from an agency standpoint that the loss of the subtidal, "artificial structure" and associated marine life would be approved by the resource and regulatory agencies. From a navigable waterway standpoint the narrowing of the channel could be a navigational hazard.

6. **Marine Stadium, Northeast Corner Tidal Basin-<u>High Potential Eelgrass Mitigation Site</u>**
    - The Marine Stadium supports one of the most productive eelgrass beds in Alamitos Bay based on detailed eelgrass mapping of the Bay (Coastal Resources Management, 2005).
    - Modification of the Marine Stadium boundary to include an "eelgrass mitigation basin" at the northeast end near End Beach has a high potential for eelgrass mitigation success if site conditions mimic those of the Marine Stadium (tidal influence and circulation, sediment types, water depth, temperature, salinity, and pH).
    - This can be accomplished by constructing a tidal basin at the site which is currently a parking lot and City boat storage area. Direct connection to the Marine Stadium is required to achieve the water quality objectives needed to support eelgrass.
    - A tidal hydraulic analysis was conducted to provide water circulation information needed to evaluate existing hydrodynamic conditions, project-

related differences in hydrodynamic conditions, and sedimentation rate differences within the mitigation site. (Everest International Consultants, Inc. 2009). The results of the study indicated that conditions within the proposed tidal basin would be similar to conditions within the Marine Stadium. Therefore, water quality objectives based upon tidal hydraulics can be met with the open tidal basin alternative. Secondly, the results of sediment borings and sediment chemistry analyses (Terra Costa Consulting Group 2009; Positive Lab Service, 2009) indicate alluvial deposits at depths of -2 to -3 ft MLLW (depths to which mitigation area sediments will be exposed) consist of clays, silts, and sands, and they are not toxic according to EPA standards for pesticides, PCBS, and metals. This will promote eelgrass transplant success. Tidal flushing rates and current velocities within the proposed site will be similar to those found within the Marine Stadium. Therefore, this is the preferred alternative for the project.

7. **Marine Stadium, Northeast Corner-Muted Tidal Basin-<u>Low Potential for Eelgrass Mitigation Site Success. Rejected</u>**
    - This alternative assumes that the shoreline quarry rock rip rap must remain in place to comply with the historic design of the Marine Stadium. It should be noted however, that the historic design of the Marine Stadium has been modified for at least one City mitigation project. The End Beach Mitigation Project (construction of a sandy beach and extension of the shoreline to create the Marine Reserve) was implemented in 1995-1996 by the City Public Works Department to mitigate for the loss of sandy beach habitat associated with the construction of the Alamitos Bay Sailing Center on the Alamitos Bay Peninsula.
    - The muted-tidal basin alternative would require that a tidal basin be constructed behind the existing shoreline, and one-or-more tidal culverts be installed along the length of the tidal basin to allow for tidal exchange. This would in itself, modify the existing historic shoreline because the entire shoreline would have to be first removed, and then put back in once the tidal culverts are installed.
    - This process would likely result in the loss of a significant amount of eelgrass at the base of rip rap during construction due to the footprint of the tidal culverts, which would increase the need for mitigation of vegetation and "potential" eelgrass habitat.
    - Long tidal residence times and poor water quality for eelgrass growth within the muted tidal basin are likely to be limiting factors for a successful eelgrass mitigation project.
    - This alternative would not achieve eelgrass mitigation goals for eelgrass vegetation and due to (1) long tidal residence periods that would elevate water temperatures and decrease dissolved oxygen levels (2) an accretion of fine sediments within the muted tidal basin that would remain in suspension, and (3) lower underwater light levels that would inhibit eelgrass growth.

- Computer modeling of this is currently being conducted to determine how many culverts would be required and if this alternative is actually feasible from an engineering standpoint. Based upon the issues associated with biofouling of the Colorado Lagoon tidal culvert, it is likely that long-term maintenance of the tidal culverts would be required.
- The costs associated with this alternative are considerably greater than the preferred alternative, due to the requirement that the shoreline be restored to its initial line, and the need for long-term and constant maintenance of tidal culverts.

8. **Off Site Mitigation-Huntington Beach Wetlands Restoration Project, Huntington Beach, California. –Rejected**
    - The Huntington Beach Wetlands Conservancy, with local and state funding has renovated wetland habitat along Pacific Coast Highway for fishery habitat, and is planning to do additional work set aside for specific wetland mitigation projects. The Conservancy has indicated willingness to accommodate the City's need for eelgrass habitat mitigation through the direct compensation of the costs required to create subtidal channel habitat to depths of -4 ft MLLW. The City however, has rejected this due to the off-site nature of the project, and believes the mitigation should be accomplished within the city's sphere of influence and not in Orange County.

The presence of large eelgrass beds in the Cerritos Channel east of the PCH Bridge, between 63rd and 71st Places along the Alamitos Bay Peninsula, and along the shoreline between Junipero Avenue and the Downtown Marina preclude these sites as project area mitigation sites. The presence of small, scattered eelgrass beds between Balboa Place to 61st Place along the Peninsula indicate that these areas, while they support limited amounts of eelgrass, are also not candidate sites for eelgrass transplants because the intertidal to shallow subtidal bottom slopes are steep and cannot support extensive amounts of eelgrass between their depth limits. In addition, public use of this part of the shoreline is high and recreational fishing in the area may be contributing to reduced eelgrass abundance (California Department of Fish and Game, pers. com, May 2008) which reduces their functional value as fishery habitat.

5.4 TRANSPLANT ELEMENTS

5.4.1 Permission to transplant within tideland areas.

Permission will be required to transplant within tidelands that are under the City of Long jurisdiction. The appropriate agency will be contacted and permission to transplant obtained once the transplant site is selected. Contacts to obtain permission include Mr. Mark Sandoval, City of Long Beach Marine Bureau.

5.4.2 Permission to collect eelgrass donor material

State of California Scientific Collecting Permits will be required for staff involved with the actual collecting of donor material for the transplant. In addition, special permission will be required from the California Department of Fish and Game to collect eelgrass donor material. The CDF&G contact is Bill Paznokas (wpaznokas@dfg.gov.ca)

5.4.3 Responsible Parties

The Applicant, The City of Long Beach will be the responsible party for this project. The California Department of Fish and Game, National Marine Fisheries Service, the California Coastal Commission, and the U.S Army Corps of Engineers will be responsible for reviewing the project's monitoring program results and for determining if the project meets or does not meet criteria as a successful eelgrass mitigation project.

5.4.4 Selection and Construction of a Transplant (Receiver) Mitigation Area

Based upon site surveys of where eelgrass occurs and does not occur in Alamitos Bay and on historical eelgrass survey information for Alamitos Bay, the preferred eelgrass mitigation site is the northeast corner of the Marine Stadium (Figure 17). The site, currently a parking lot and boat storage area will be demolished. Proposed site plans are provided in Figure 18 and include (1) a rock revetment along three sides of the site (2) removal of all surficial material to expose pre-site fill sediments to a depth of -2 to -3 ft MLLW, an approximate 70 wide by 218 ft-long area for eelgrass transplants, and a wave attenuator to reduce the effects of wind waves within the transplant site. The approximately 10,500 sq will be used as an eelgrass mitigation site for City of Long Beach use that will include the transplant of 1,647.65 sq ft of eelgrass vegetation for the Alamitos Bay Marina Project.

5.4.5 Eelgrass Transplant

The following program will be implemented to mitigate the loss of eelgrass associated with the Alamitos Bay Marina Renovation Project following the construction of the Marine Stadium eelgrass mitigation area (MSEMA). The eelgrass transplant will involve several steps; collecting stock material from the donor site(s), preparing the material for transplanting, replanting the eelgrass in the mitigation area receiver site, following up the transplant with monitoring surveys, and evaluating the success of the transplant.

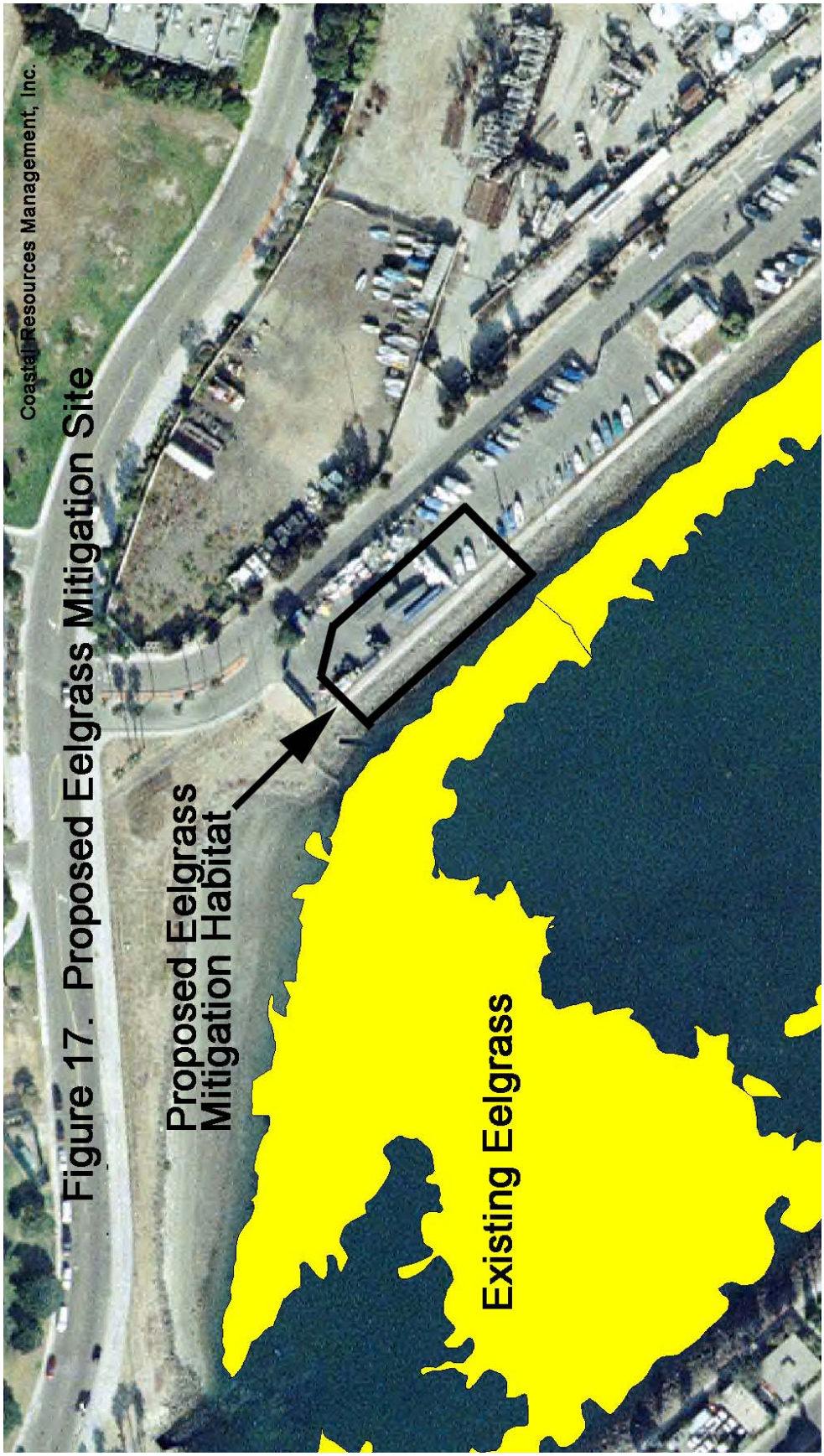
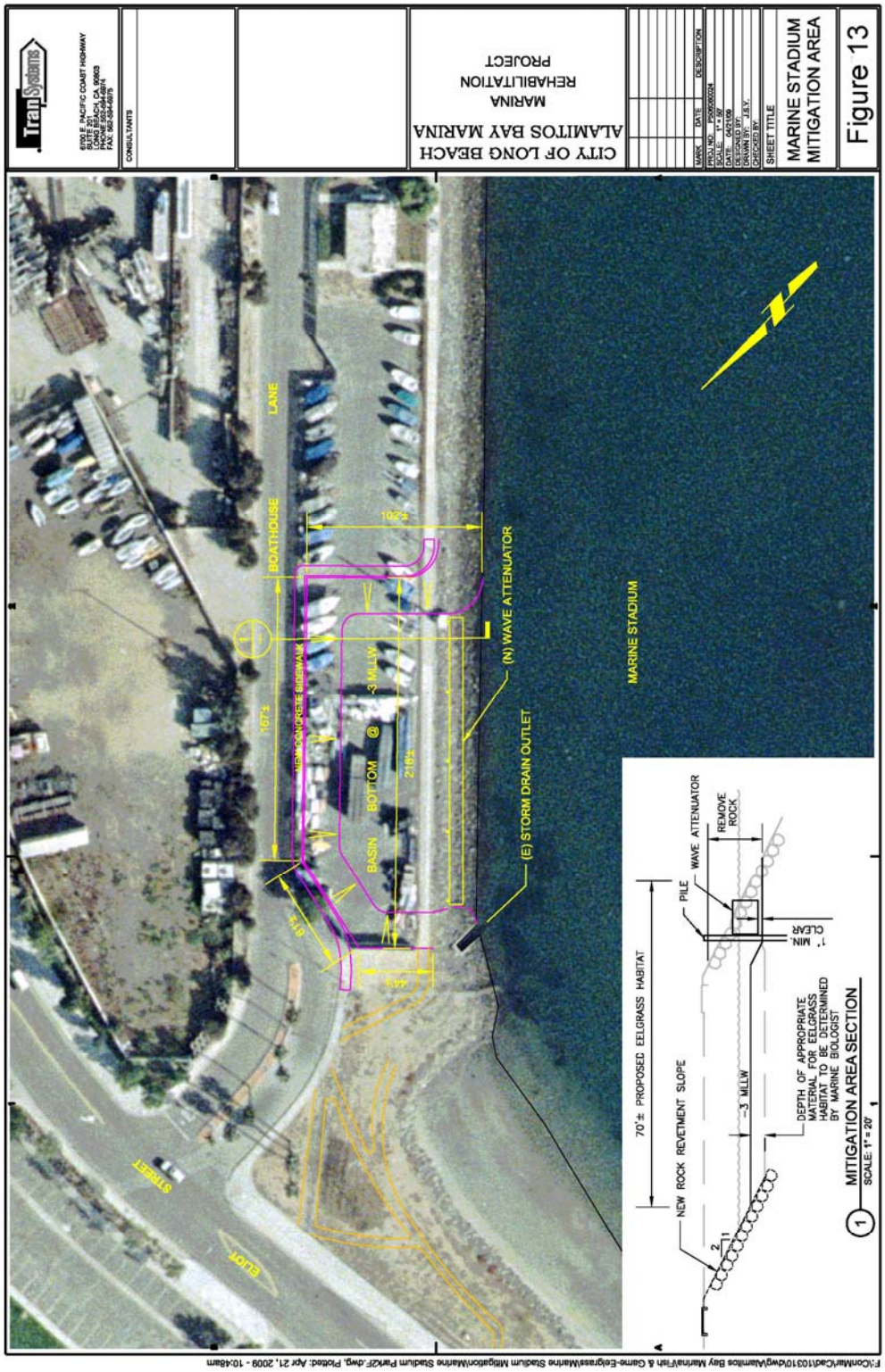


Figure 17. Proposed Eelgrass Mitigation Site


MARINE STADIUM MITIGATION AREA
Figure 13
CITY OF LONG BEACH
ALAMITOS BAY MARINA
MARINA REHABILITATION PROJECT
MARINE STADIUM
(N) WAVE ATTENUATOR
(E) STORM DRAIN OUTLET
BOATHOUSE
LANE
BASIN BOTTOM @ -3 MLLW
MITIGATION AREA SECTION
70'± PROPOSED EELGRASS HABITAT
NEW ROCK REVETMENT SLOPE
WAVE ATTENUATOR
REMOVE ROCK
PILE
DEPTH OF APPROPRIATE MATERIAL FOR EELGRASS HABITAT TO BE DETERMINED BY MARINE BIOLOGIST
-3 MLLW

Collection and Preparation of Donor Eelgrass Material. Material will be harvested by diver-biologists from the shallow subtidal at a minimum of three sites in Alamitos Bay to increase genetic diversity in the transplanted material and to minimize disturbances within donor beds. Proposed donor sites include (1) Cerritos Channel eelgrass beds, Marine Stadium eelgrass Beds, and eelgrass in the vicinity of the Davies Launch Ramp north of the Davies Bridge. The preferred transplant method is the bundle method (Fonseca et al. 1982) in which eelgrass is collected by divers from the donor site, transferred to shore, separated into planting units, and replanted by divers along a pre-determined grid. The donor material from each area will be mixed together and then integrated into planting units consisting of about 10 shoots and associated substrate and root mass. Shoots will be bundled and tied together with biodegradable line and a sediment anchoring device.

The bundles will be transferred to the divers who will then replant the eelgrass bundles in spacing units of 1 unit per 1 sq meter. The preliminary number of eelgrass bundles and eelgrass shoots required for the transplant is calculated in Table 9.

Table 9. Estimated Amount of Eelgrass Vegetation Required for the Alamitos Bay Marina Renovation Project

MINIMUM TOTAL NUMBER OF PLANTING UNITS (P.U.)

Total eelgrass surface area/(P.U. Density)^2

$\frac{153\ m^2}{1\ m^{(2)}}$ (1,647.65 sq ft)

= 153 P.U.

Estimated Additional Material Required (20%)
=30 P.U.
Total Planting Units
= **183**

TOTAL NUMBER OF SHOOTS

Total number of P.U. x 12 shoots/P.U.
12 shoots/P.U. x 183 P.U.
= 2,196 shoots

Transplant timing. The transplants will occur during the early active growing period for eelgrass (March-June). It is anticipated that the transplants will be conducted over a three-day period. Mitigation will be conducted for losses associated with all marina renovations at the same time, regardless of marina renovation phase.

5.5 FIELD MONITORING

5.5.1 Pre-Construction Survey

An updated pre-construction eelgrass habitat mapping survey for this project will be completed within 120 days of the each of the proposed start dates of each project phase in accordance with the Southern California Eelgrass Mitigation Policy (NMFS 1991 as amended) to amend, if required, the amount of eelgrass that will likely be affected by dredging activity. The results of this survey will be integrated into a Final Eelgrass Mitigation Plan and used to calculate the amount of eelgrass to be mitigated.

5.5.2 Post-Construction Survey

A post-dredging project eelgrass survey will be completed within 30 days of the completion of dredging within each project phase in accordance with the Southern California Eelgrass Mitigation Policy (NMFS 1991 as amended). Each report will be presented to the resource agencies and the Executive Director of the California Coastal Commission within 30 days after the completion of each of the surveys. If any eelgrass has been impacted in excess of that determined in the pre-dredge survey, then any additional impacted eelgrass will be mitigated at a ratio of 1.2:1 (mitigation to impact).

5.5.3 Transplant Monitoring Surveys

A series of seven monitoring surveys will be required to evaluate transplant success over a period of five years. Furthermore, if the initial transplant fails to conform with required performance standards, a supplemental transplant area and monitoring program in conformance with the *Southern California Eelgrass Mitigation Policy* will be required (See Section 5.7).

Post-transplant monitoring surveys will be conducted during the active vegetative growth periods of eelgrass (March through October) at intervals of 3 months, 6 months, 1 year, 2 years, 3 years, 4 years, and 5 years after the transplant to determine the health of the transplanted vegetation and to evaluate transplant success based on established criteria (NMFS 1991 as amended). Eelgrass areal cover, percent cover and shoot density of eelgrass will be determined during each monitoring survey. Undisturbed areas of the eelgrass meadows in the vicinity of the transplant site will be used a control area when assessing the results of the transplant. If yearly criteria are not met, then a replant will be conducted. The amount to be replanted is based upon a formula that takes into account area and/or density deficiencies (NMFS 1991 as amended).

5.6 REPORTING

Transplant survey monitoring reports will be submitted to the resource agencies and the Executive Director of the California Coastal Commission in report format within 30 days of the pre-and post-project monitoring surveys, and seven post-transplant monitoring surveys. The reports will present eelgrass area and density data, an assessment of the functional

quality of the area, a qualitative assessment of invertebrate and fish use of the area, determination if mitigation success criteria have been met, and recommended remedial measures if the transplant is not meeting mitigation success criteria. Reporting summaries will also be included per NMFS 1991 Eelgrass Mitigation Policy Guidelines (NMFS 1991, as amended, see Appendix 2).

5.6.1 Mitigation Success Criteria (NMFS 1991 as amended, Revision 11)

Criteria for determination of transplant success shall be based upon a comparison of vegetation coverage (area) and density (turions per square meter) between the project adjusted impact area (i.e., original impact area multiplied by 1.2, or the amount of eelgrass habitat to be successfully mitigated at the end of five years) and mitigation site(s). Extent of vegetated cover is defined as that area where eelgrass is present and where gaps in coverage are less than one meter between individual turion clusters. Density of shoots is defined by the number of turions per area present in representative samples within the original impact area, control or transplant bed.

Specific criteria are as follows:

a. the mitigation site shall achieve a minimum of 70 percent area of eelgrass and 30 percent density as compared to the adjusted project impact area after the first year.

b. the mitigation site shall achieve a minimum of 85 percent area of eelgrass and 70 percent density as compared to the adjusted project impact area after the second year.

c. the mitigation site shall achieve a sustained 100 percent area of eelgrass bed and at least 85 percent density as compared to the adjusted project impact area for the third, fourth and fifth years.

Should the required eelgrass transplant fail to meet any of the established criteria, then a Supplementary Transplant Area (STA) shall be constructed, if necessary, and planted. The size of this STA shall be determined by the following formula:

$$STA = MTA \times (|A_t + D_t| - |A_c + D_c|)$$

MTA = mitigation transplant area.
A_t = transplant deficiency or excess in area of coverage criterion (%).
D_t = transplant deficiency in density criterion (%).
A_c = natural decline in area of control (%).
D_c = natural decline in density of control (%).

The STA formula shall be applied to actions that result in the degradation of habitat (i.e., either loss of areal extent or reduction in density).

Five conditions apply:

1) For years 2-5, an excess of only up to 30% in area of coverage over the stated criterion with a density of at least 60% as compared to the project area may be used to offset any deficiencies in the density criterion.
2) Only excesses in area criterion equal to or less than the deficiencies in density shall be entered into the STA formula.
3) Densities which exceed any of the stated criteria shall not be used to offset any deficiencies in area of coverage.
4) Any required STA must be initiated within 120 days following the monitoring event that identifies a deficiency in meeting the success criteria. Any delays beyond 120 days in the implementation of the STA shall be subject to the penalties as described in Section 8 of the Southern California Eelgrass Mitigation Policy.
5) Annual monitoring will be required of the STA for five years following the implementation and all performance standards apply to the STA.

5.7 REMEDIATION AND CONTINGENCY PLANS FOR UNSUCCESSFUL EELGRASS MITIGATION

If the initial transplant is unsuccessful, then one additional replanting at the primary on-site mitigation area will occur. The amount to be transplanted will be based upon the guidelines in the *Southern California Eelgrass Mitigation Policy* (NMFS 1991 as amended). If remedial transplants at the project site are unsuccessful, then eelgrass mitigation should be pursued at the secondary eelgrass transplant location on the Alamitos Bay Peninsula.

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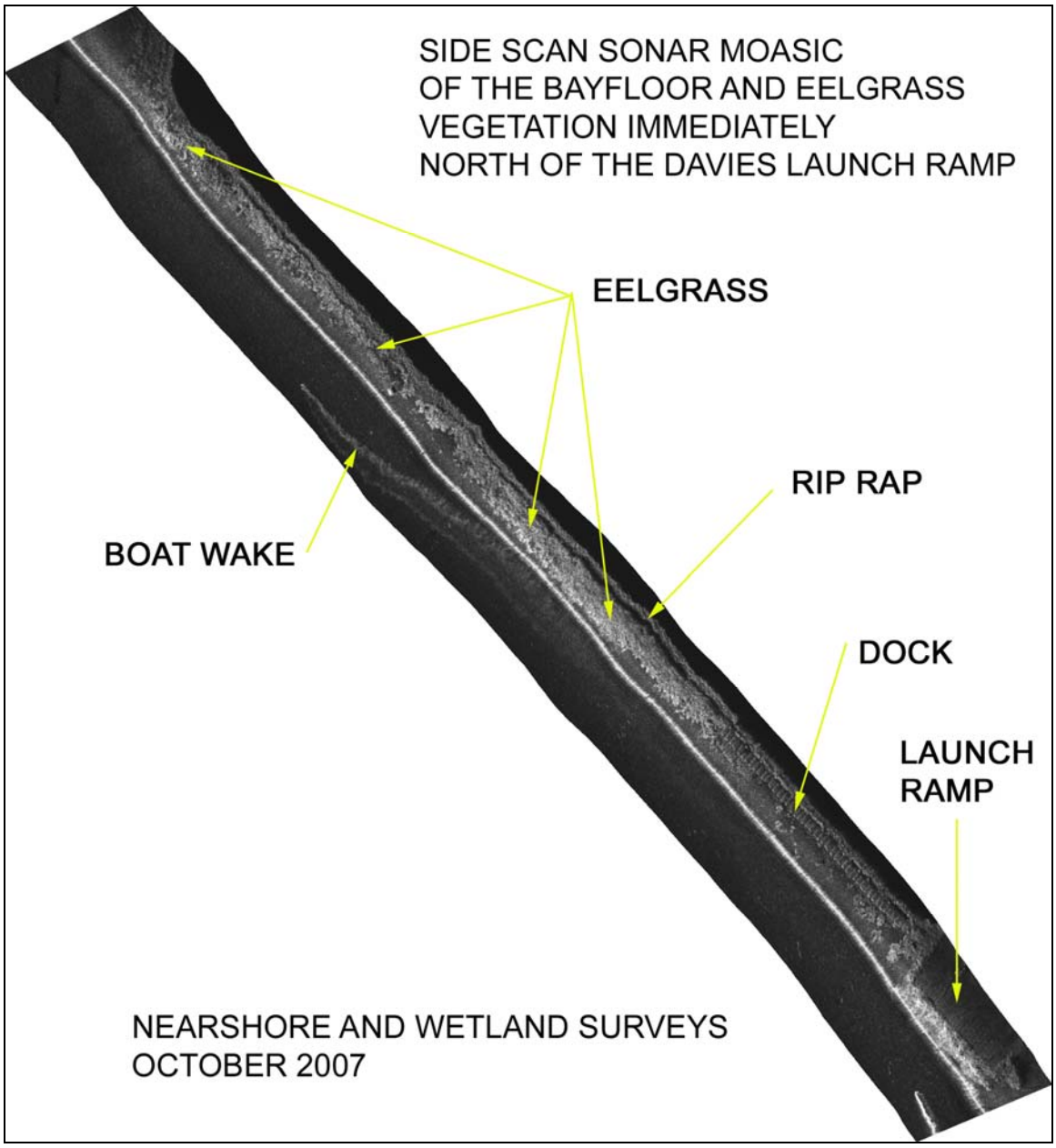
APPENDIX 1. EXAMPLE OF SIDE SCAN SONAR RECORDS FOR THE AREA NEAR THE DAVIES LAUNCH RAMP

COASTAL RESOURCES MANAGEMENT, IN.C AND NEARSHORE AND WETLAND SURVEYS, INC.


SIDE SCAN SONAR MOASIC
OF THE BAYFLOOR AND EELGRASS
VEGETATION IMMEDIATELY
NORTH OF THE DAVIES LAUNCH RAMP
EELGRASS
RIP RAP
BOAT WAKE
DOCK
LAUNCH
RAMP
NEARSHORE AND WETLAND SURVEYS
OCTOBER 2007

APPENDIX 2
NATIONAL MARINE FISHERIES SERVICE LETTER TO THE CALIFORNIA ASSOCIATION OF HARBOR MASTERS AND PORT CAPTAINS

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802- 4213

JAN 26 2009

Mr. Jack Peveler
President
California Association of Harbor Masters and Port Captains
P.O. Box 510
Sonoma, California 95476

Dear Mr. Peveler:

NOAA's National Marine Fisheries Service (NMFS) has reviewed your letter dated December 9, 2008, regarding the application of the Southern California Eelgrass Mitigation Policy. We appreciate your interest and constructive criticism of our efforts to protect and conserve eelgrass habitat within California.

As a result of the recognized ecosystem functions, eelgrass beds and other submerged aquatic beds, are given special status under the Clean Water Act, 1972 (as amended), Section 404(b)(1), "Guidelines for Specification of Disposal Sites for Dredged or Fill Material," Subpart E, "Potential Impacts on Special Aquatic Sites." This special status and high resource value has led to more stringent regulatory protections of this habitat and requirements for avoidance, minimization, and mitigation of unavoidable impacts.

As a furtherance of efforts to curb losses and reduce the negative trends in seagrass habitat, resource and regulatory agencies around the nation have been working on development of resource management plans and resource protection policies addressing seagrass. In southern California, the Southern California Eelgrass Mitigation Policy (SCEMP) (1991, as revised) was developed by NMFS, U.S. Fish and Wildlife Service, and California Department of Fish and Game to provide further guidance on the necessary steps to compensate for unavoidable impacts to eelgrass resources through regulatory programs. NMFS recognizes that the SCEMP is not part of official NOAA regulations. Rather, it is a coordinated, multiple-agency approach that is intended to provide guidance and consistency for all entities that impact this sensitive resource.

NMFS also recognizes that, as currently written, the potential eelgrass habitat clause could be interpreted more broadly than intended. To date, we have only implemented this clause when clear and convincing evidence is available that a given area is potential eelgrass habitat (e.g. previous eelgrass surveys documenting presence). We intend to clarify this aspect of the SCEMP in future revisions and will solicit your organization's input prior to doing so. Similarly, we also believe the SCEMP should be based upon the

best scientific information available and will incorporate such information in future revisions as it becomes available. We welcome any scientific information you can provide that could further refine the SCEMP.

Lastly, one of your last statements regarding shoaling of marinas implies that harbor/marina design depths are the appropriate baseline for environmental effect determinations. When evaluating effects to habitat, NMFS considers the current habitat condition. If NMFS' effects analysis indicates that there would be a reduction in quality and/or quantity of habitat, NMFS will provide conservation recommendations to avoid, minimize or offset such effects. If compensatory mitigation is recommended for a continuing operation (e.g. maintenance dredging), we believe it necessary to do so only once. For example, impacts to eelgrass habitat in Agua Hedionda Lagoon associated with maintenance dredging were mitigated according to the SCEMP, but, assuming future maintenance dredging remains in the same footprint, no additional compensation would be recommended if eelgrass recolonized the area at a later date.

Thank you for your interest in this matter. NMFS encourages your participation in future developments related to eelgrass conservation efforts and will keep you updated accordingly. If you have any questions about these comments or the application of SCEMP, please contact Bryant Chesney at Bryant.Chesney@noaa.gov or 562-980-4037.

Sincerely,

Rodney R McInnis

Rodney R. McInnis
Regional Administrator

APPENDIX 3.
SOUTHERN CALIFORNIA EELGRASS MITIGATION POLICY

SOUTHERN CALIFORNIA EELGRASS MITIGATION POLICY

(Adopted July 31, 1991)

Eelgrass (Zostera marina) vegetated areas are recognized as important ecological communities in shallow bays and estuaries because of their multiple biological and physical values. Eelgrass habitat functions as an important structural environment for resident bay and estuarine species, offering both predation refuge and a food source. Eelgrass functions as a nursery area for many commercially and recreational important finfish and shellfish species, including those that are resident within bays and estuaries, as well as oceanic species that enter estuaries to breed or spawn. Eelgrass also provides a unique habitat that supports a high diversity of non-commercially important species whose ecological roles are less well understood.

Eelgrass is a major food source in nearshore marine systems, contributing to the system at multiple trophic levels. Eelgrass provides the greatest amount of primary production of any nearshore marine ecosystem, forming the base of detrital-based food webs and as well as providing a food source for organisms that feed directly on eelgrass leaves, such as migrating waterfowl. Eelgrass is also a source of secondary production, supporting epiphytic plants, animals, and microbial organisms that in turn are grazed upon by other invertebrates, larval and juvenile fish, and birds.

In addition to habitat and resource attributes, eelgrass serves beneficial physical roles in bays and estuaries. Eelgrass beds dampen wave and current action, trap suspended particulates, and reduce erosion by stabilizing the sediment. They also improve water clarity, cycle nutrients, and generate oxygen during daylight hours.

In order to standardize and maintain a consistent policy regarding mitigating adverse impacts to eelgrass resources, the following policy has been developed by the Federal and State resource agencies (National Marine Fisheries Service, U.S. Fish and Wildlife Service, and the California Department of Fish and Game). While the intent of this Policy is to provide a basis for consistent recommendations for projects that may impact existing eelgrass resources, there may be circumstances (e.g., climatic events) where flexibility in the application of this Policy is warranted. As a consequence, deviations from the stated Policy may be allowed on a case-by-case basis. This policy should be cited as the Southern California Eelgrass Mitigation Policy (revision 11).

For clarity, the following definitions apply. "Project" refers to work performed on-site to accomplish the applicant's purpose. "Mitigation" refers to work performed to compensate for any adverse impacts caused by the "project". "Resource agencies" refers to National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), and the California Department of Fish and Game (CDFG).

1. **Mitigation Need.** Eelgrass transplants shall be considered only after the normal provisions and policies regarding avoidance and minimization, as addressed in the Section 404 Mitigation Memorandum of Agreement between the Corps of Engineers and

Environmental Protection Agency, have been pursued to the fullest extent possible prior to the development of any mitigation program. Mitigation will be required for the loss of existing vegetated areas, loss of potential eelgrass habitat, and/or degradation of existing/potential eelgrass habitat. Mitigation for boat docks and/or related work is addressed in section 2.

2. **Boat Docks and Related Structures**. Boat docks, ramps, gangways and similar structures should avoid eelgrass vegetated or potential eelgrass vegetated areas to the maximum extent feasible. If avoidance of eelgrass or potential eelgrass areas is infeasible, impacts should be minimized by utilizing, to the maximum extent feasible, construction materials that allow for greater light penetration (e.g., grating, translucent panels, etc.). For projects where the impact cannot be determined until after project completion (i.e., vessel shading, vessel traffic) a determination regarding the amount of mitigation shall be made based upon two annual monitoring surveys conducted during the time period of August to October which document the changes in the bed (areal extent and density) in the vicinity of the footprint of the boat dock, moored vessel(s), and/or related structures. Any impacts determined by these monitoring surveys shall be mitigated per sections 3-12 of this policy. Projects subject to this section must include a statement from the applicant indicating their understanding of the potential mitigation obligation which may follow the initial two-year monitoring.

3. **Mitigation Map.** The project applicant shall map thoroughly the area, distribution, density and relationship to depth contours of any eelgrass beds likely to be impacted by project construction. This includes areas immediately adjacent to the project site which have the potential to be indirectly or inadvertently impacted as well as potential eelgrass habitat areas. Potential habitat is defined as areas where eelgrass would normally be expected to occur but where no vegetation currently exists. Factors to be considered in delineating potential habitat areas include appropriate circulation, light, sediment, slope, salinity, temperature, dissolved oxygen, depth, proximity to eelgrass, history of eelgrass coverage, etc.

Protocol for mapping shall consist of the following format:

1) Bounding Coordinates

Horizontal datum - Universal Transverse Mercator (UTM), NAD 83, Zone 11 is the preferred projection and datum. If another projection or datum is used, the map and spatial data must include metadata that accurately defines the projection and datum.

Vertical datum - Mean Lower Low Water (MLLW), depth in feet.

2) Units

Transects and grids in meters.

Area measurements in square meters/hectares.

3) File format

A spatial data layer compatible with readily available geographic information system software must be sent to NMFS and any other interested resource agency when the area mapped has greater than 10 square meters of eelgrass. For those areas with less than 10 square meters, a table must be provided giving the bounding x,y coordinates of the eelgrass areas. In addition to a spatial layer or table, a hard-copy map should be included within the survey report. The projection and datum should be clearly defined in the metadata and/or an associated text file.

All mapping efforts must be completed during the active growth phase for the vegetation (typically March through October) and shall be valid for a period of 60 days with the exception of surveys completed in August - October. Surveys completed after unusual climatic events (i.e., high rainfall) may have modified requirements and surveyors should contact NMFS, CDFG, and USFWS to determine if any modifications to the standard survey procedures will be required. A survey completed in August - October shall be valid until the resumption of active growth (i.e., in most instances, March 1). After project construction, a post-project survey shall be completed within 30 days. The actual area of impact shall be determined from this survey.

4. **Mitigation Site.** The location of eelgrass transplant mitigation shall be in areas similar to those where the initial impact occurs. Factors such as, distance from project, depth, sediment type, distance from ocean connection, water quality, and currents are among those that should be considered in evaluating potential sites.

5. **Mitigation Size.** In the case of transplant mitigation activities that occur concurrent to the project that results in damage to the existing eelgrass resource, a ratio of 1.2 to 1 shall apply. That is, for each square meter adversely impacted, 1.2 square meters of new suitable habitat, vegetated with eelgrass, must be created. The rationale for this ratio is based on, 1) the time (i.e., generally three years) necessary for a mitigation site to reach full fishery utilization and 2) the need to offset any productivity losses during this recovery period within five years. An exception to the 1.2 to 1 requirement shall be allowed when the impact is temporary and the total area of impact is less than 100 square meters. Mitigation on a one-for-one basis shall be acceptable for projects that meet these requirements (see section 11 for projects impacting less than 10 square meters).

Transplant mitigation completed three years in advance of the impact (i.e., mitigation banks) will not incur the additional 20 percent requirement and, therefore, can be constructed on a one-for-one basis. However, all other annual monitoring requirements (see sections 8-9) remain the same irrespective of when the transplant is completed.

Project applicants should consider increasing the size of the required mitigation area by 20-30 percent to provide greater assurance that the success criteria, as specified in Section 10, will be met. In addition, alternative contingent mitigation must be specified,

and included in any required permits, to address situation where performance standards (see section 10) are not likely to be met.

For potential eelgrass habitat, a ratio of 1 to 1 of equivalent habitat shall be created.

Degradation of existing eelgrass vegetated habitat that results in a reduction of density greater than 25 percent shall be mitigated on a one-for-one basis. For example, a 25 percent reduction in density of a 100 square meter (100 turions/meter) eelgrass bed to 75 turions/meter would require the establishment of 25 square meters of new eelgrass with a density at or greater than the pre-impact density. All other provisions of the Policy would apply.

6. **Mitigation Technique.** Techniques for the construction and planting of the eelgrass mitigation site shall be consistent with the best available technology at the time of the project. Donor material shall be taken from the area of direct impact whenever possible, but also should include a minimum of two additional distinct sites to better ensure genetic diversity of the donor plants. No more than 10 percent of an existing bed shall be harvested for transplanting purposes. Plants harvested shall be taken in a manner to thin an existing bed without leaving any noticeable bare areas. Written permission to harvest donor plants must be obtained from the California Department of Fish and Game.

Plantings should consist of bare-root bundles consisting of 8-12 individual turions. Specific spacing of transplant units shall be at the discretion of the project applicant. However, it is understood that whatever techniques are employed, they must comply with the stated requirements and criteria.

7. Mitigation Timing. For off-site mitigation, transplanting should be started prior to or concurrent with the initiation of in-water construction resulting in the impact to the eelgrass bed. Any off-site mitigation project which fails to initiate transplanting work within 135 days following the initiation of the in-water construction resulting in impact to the eelgrass bed will be subject to additional mitigation requirements as specified in section 8. For on-site mitigation, transplanting should be postponed when construction work is likely to impact the mitigation. However, transplanting of on-site mitigation should be started no later than 135 days after initiation of in-water construction activities. A construction schedule which includes specific starting and ending dates for all work including mitigation activities shall be provided to the resource agencies for approval at least 30 days prior to initiating in-water construction.

8. **Mitigation Delay.** If, according to the construction schedule or because of any delays, mitigation cannot be started within 135 days of initiating in-water construction, the eelgrass replacement mitigation obligation shall increase at a rate of seven percent for each month of delay. This increase is necessary to ensure that all productivity losses incurred during this period are sufficiently offset within five years.

9. **Mitigation Monitoring.** Monitoring the success of eelgrass mitigation shall be required for a period of five years for most projects. Monitoring activities shall

determine the area of eelgrass and density of plants at the transplant site and shall be conducted at initial planting, 6, 12, 24, 36, 48, and 60 months after completion of the transplant. All monitoring work must be conducted during the active vegetative growth period and shall avoid the winter months of November through February. Sufficient flexibility in the scheduling of the 6 month surveys shall be allowed in order to ensure the work is completed during this active growth period. Additional monitoring beyond the 60 month period may be required in those instances where stability of the proposed transplant site is questionable or where other factors may influence the long-term success of transplant.

The monitoring of an adjacent or other acceptable control area (subject to the approval of the resource agencies) to account for any natural changes or fluctuations in bed width or density must be included as an element of the overall program.

A monitoring schedule that indicates when each of the required monitoring events will be completed shall be provided to the resource agencies prior to or concurrent with the initiation of the mitigation (see attached monitoring and compliance summary form).

Monitoring reports shall be provided to the resource agencies within 30 days after the completion of each required monitoring period and shall include the summary sheet included at the end of this policy.

10. **Mitigation Success.** Criteria for determination of transplant success shall be based upon a comparison of vegetation coverage (area) and density (turions per square meter) between the **adjusted project impact area** (i.e., original impact area multiplied by 1.2) and **mitigation site(s)**. Extent of vegetated cover is defined as that area where eelgrass is present and where gaps in coverage are less than one meter between individual turion clusters. Density of shoots is defined by the number of turions per area present in representative samples within the original impact area, control or transplant bed. Specific criteria are as follows:

> a. the mitigation site shall achieve a minimum of 70 percent area of eelgrass and 30 percent density as compared to the adjusted project impact area after the first year.
>
> b. the mitigation site shall achieve a minimum of 85 percent area of eelgrass and 70 percent density as compared to the adjusted project impact area after the second year.
>
> c. the mitigation site shall achieve a sustained 100 percent area of eelgrass bed and at least 85 percent density as compared to the adjusted project impact area for the third, fourth and fifth years.

Should the required eelgrass transplant fail to meet any of the established criteria, then a Supplementary Transplant Area (STA) shall be constructed, if necessary, and planted. The size of this STA shall be determined by the following formula:

$$STA = MTA \times (|A_t + D_t| - |A_c + D_c|)$$

MTA = mitigation transplant area.
A_t = transplant deficiency or excess in area of coverage criterion (%).
D_t = transplant deficiency in density criterion (%).
A_c = natural decline in area of control (%).
D_c = natural decline in density of control (%).

The STA formula shall be applied to actions that result in the degradation of habitat (i.e., either loss of areal extent or reduction in density).

Five conditions apply:

1) For years 2-5, an excess of only up to 30% in area of coverage over the stated criterion with a density of at least 60% as compared to the project area may be used to offset any deficiencies in the density criterion.
2) Only excesses in area criterion equal to or less than the deficiencies in density shall be entered into the STA formula.
3) Densities which exceed any of the stated criteria shall not be used to offset any deficiencies in area of coverage.
4) Any required STA must be initiated within 120 days following the monitoring event that identifies a deficiency in meeting the success criteria. Any delays beyond 120 days in the implementation of the STA shall be subject to the penalties as described in Section 8.
5) Annual monitoring will be required of the STA for five years following the implementation and all performance standards apply to the STA.

11. **Mitigation Bank.** Any mitigation transplant success that, after five years, exceeds the mitigation requirements, as defined in section 10, may be considered as credit in a "mitigation bank". Establishment of any "mitigation bank" and use of any credits accrued from such a bank must be with the approval of the resource agencies and be consistent with the provisions stated in this policy. Monitoring of any approved mitigation bank shall be conducted on an annual basis until all credits are exhausted.

12. **Exclusions.**

1) Placement of a single pipeline, cable, or other similar utility line across an existing eelgrass bed with an impact corridor of no more than 1 meter wide may be excluded from the provisions of this policy with concurrence of the resource agencies. After project construction, a post-project survey shall be completed within 30 days and the results shall be sent to the resource agencies. The actual area of impact shall be determined from this survey. An additional survey shall be completed after 12 months to insure that the project or impacts attributable to the project have not exceeded the allowed

1 meter corridor width. Should the post-project or 12 month survey demonstrate a loss of eelgrass greater than the 1 meter wide corridor, then mitigation pursuant to sections 1-11 of this policy shall be required.

2) Projects impacting less than 10 square meters. For these projects, an exemption may be requested by a project applicant from the mitigation requirements as stated in this policy, provided suitable out-of-kind mitigation is proposed. A case-by-case evaluation and determination regarding the applicability of the requested exemption shall be made by the resource agencies.

(last revised 08/30/05)

Southern California Eelgrass Mitigation Policy
Monitoring and Compliance Reporting Summary

PERMIT DATA:

Permit (Type, Number)	Issuance Date	Expiration Date	Agency Contact
ACOE:_____			
CDP:_____			
Other:_____			

EELGRASS IMPACT AND MITIGATION REQUIREMENTS SUMMARY:

Permitted Eelgrass Impact Estimate	(m^2)	
Actual Eelgrass Impact,	(m^2)	(post-const. survey date)
Eelgrass Mitigation Requirement	(m^2)	(mitigation plan ref.)
Impact Site Location	(location)	
Impact Site Center Coordinates	(define projection and datum)	
Mitigation Site Location	(location)	
Mitigation Site Center Coordinates	(define projection and datum)	

PERMITTEE CONTACT INFORMATION:

Project Name	(same as permit ref.)
Permittee Information	(permittee name)
	(mailing address)
	(city, state, zip)
	(permittee contact)
	(phone, fax., e-mail)
Mitigation Consultant	(consultant contact)
	(phone, fax., e-mail)

PROJECT ACTIVITY DATA:

Activity	Start Date	End Date	Reference Info.
Eelgrass Impact			
Installation of Eelgrass Mitigation			
Initiation of Mitigation Monitoring			

MITIGATION STATUS DATA:

Mitigation Milestone	Scheduled Survey	Survey Date	Area (m^2)	Density (turions/m^2)	Reference Info.
Requirement					
0-month					
6-month					
12-month					
24-month					
36-month					
48-month					
60-month					

FINAL ASSESSMENT:

Was mitigation met?	
Were mitigation and monitoring performed timely?	
Was delay penalty required or were supplemental mitigation programs necessary?	

ANALYSIS OF POTENTIAL EELGRASS HABITAT BIOTIC AND ABIOTIC CHARACTERISTICS IN ALAMITOS BAY MARINA, LONG BEACH, CALIFORNIA

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October 1st, 2009

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1.0 INTRODUCTION

The purpose of this analysis is to identify the biotic and abiotic characteristics of potential eelgrass habitat as defined by the Southern California Eelgrass Mitigation Policy (NMFS, 1991 (revision 11) which states "potential eelgrass habitat" is defined as "areas where eelgrass would normally be expected to occur but where no vegetation currently exists. Factors to be considered in delineating potential habitat areas include appropriate circulation, light, sediment, slope, salinity, temperature, dissolved oxygen, depth, proximity to eelgrass, history of eelgrass coverage, etc." This document identifies both the existing amount of eelgrass identified in the project area, the amount of existing eelgrass potentially affected by project-related dredging, and the amount of potential eelgrass habitat within the project area, relative to both biological and abiological features of the Marina's environment.

For the purpose of this analysis, "potential eelgrass habitat" is defined as unshaded, unvegetated soft bottom sediments within Marina Basins 2, 4, and 6 within the depth range known to support eelgrass in Alamitos Bay Marina, associated abiotic factors (i.e., water temperature, light, salinity) within Marina Basins 2, 4, and 6 are conducive to supporting eelgrass, and there is clear and convincing evidence that past surveys have documented the presence of eelgrass.

1.1 Marina Development. In 1946, the Long Beach City Council directed the City Planning Commission to undertake and report on the development of a proposed Alamitos Bay Marina (Intersea Research Corporation, 1981). Their 1947 report recommend extension of the existing rock jetties at the ocean entrance channel to Alamitos Bay, dredging the entrance channel to -15 ft Mean Lower Low Water, dredging an undeveloped land area bounded by the San Gabriel River Flood Control Channel, the exiting bay, an old San Gabriel River channel, and developing areas for berthing and repair of privately owned small craft. A comprehensive study of various marina configurations was made in 1954 by Moffatt & Nichol and collaborators (Moffatt & Nichol, Inc. et al, 1954). A design recommended in their report (Plan D) was implemented and marina construction was completed in 1960. When the marina was initially dredged, the as-built depth was -10 ft MLLW (Intersea Research Corporation field investigations (Intersea Research Corporation, 1981, Plate A, "Alamitos Bay Bathymetry"). although Basin 1 depths were as deep as -15 ft "during 1978 Intersea Research Corporation field investigations (Intersea Research Corporation, 1981, Plate A, "Alamitos Bay Bathymetry").

2.0 HISTORY OF EELGRASS COVERAGE IN THE PROJECT AREA

While eelgrass is known to occur throughout many regions of Alamitos Bay and has been surveyed in many areas (i.e., CRM 1993, 1994 a and b, and 2005), Wetland Support and Coastal Resources Management, Inc., 2002) eelgrass surveys were not conducted within the City of Long Beach Alamitos Bay Marina Basins 1-7 until Coastal Resources Management, Inc (2007) mapped the distribution of eelgrass for the Alamitos Bay Marina Rehabilitation Project.

Locations of eelgrass mapped during the CRM 2007 are shown in Figures 1-8. The amount of eelgrass within the marina basins, eelgrass density, and the depth range of eelgrass for each area surveyed is shown in Tables 1 to 3. A total of 2.9 acres of eelgrass was mapped in Alamitos Bay for the project. Of this, of 0.57 acres of eelgrass was located in the general vicinity of the Alamitos Bay Marina, of which 1,373.04 sq ft (0.03 sq ft) of eelgrass vegetation will be impacted by the marina renovation project associated with channel dredging.

Within the Alamitos Bay Marina project area, these areas include small patches in seven marina fairways within Basin 2, 4, and 6. Eelgrass grows within the fairways between -6.3 to -8.5 ft, and between 0.0 to -2 ft MLLW along the southeast bulkhead of Basin 2. Most eelgrass within the marina basins (Basins 2, 4, and 6) grows on slowly-evolving shoals at or near the maximum depth limit for eelgrass where submarine light levels are low, and near their limiting levels. The amount of eelgrass growing in these basins range from < 1 sq ft to 1,019 sq ft; these areas occur as a low density patches. Biologically, the value of these beds is very low. There is inadequate cover for cryptic species and invertebrates and very limited cover, or food items for fishes that may utilize the eelgrass patches. There are no known species of Fisheries Management Plan species of fish present within these marina basins that would utilize either the vegetated or unvegetated sections of the marina basins seafloor.

The least-dense and lowest amount of eelgrass in Alamitos Bay grows within Basins 2, 4, and 6 which are side-basins to the main channels of Alamitos Bay.

Eelgrass also grows nearby the marina along the shoreline of the Davies Launch Ramp, the Marina Pacifica Side Channel, the west side of the Cerritos Channel south of PCH Bridge, and in the Cerritos Channel north of PCH Bridge. Other region in Alamitos Bay that exhibit greater eelgrass cover and density than the marina basins in Alamitos Bay include the Marina Stadium, Mothers Beach, and along the Alamitos Bay Peninsula. Eelgrass also grows along the seaward side of the Alamitos Bay Peninsula, between Cherry Avenue and the Downtown Marina (R. Ware, pers. obs, May 2008).

Tables 2 and 3 compare eelgrass turion density within the marina and between the marina and other areas of Alamitos Bay. The mean turion density within the various marina basins ranged from 52.8 to 105 turions per sq meter at depths between -1 and -8.5 ft MLLW. Comparatively, these values are for the most part, at the low-end of the density range compared to other areas of Alamitos Bay. The patchy, low density nature of the vegetation is likely related to the presence of eelgrass near its maximum depth range.

Highest eelgrass turion density in Alamitos Bay is found in the main channels of the bay along the Alamitos Bay Peninsula sandy beach. Moderate turion density is found in the Marine Stadium and the Cerritos Channel. Vegetated habitats in these areas are characterized by wide, lush, and dense eelgrass vegetation.

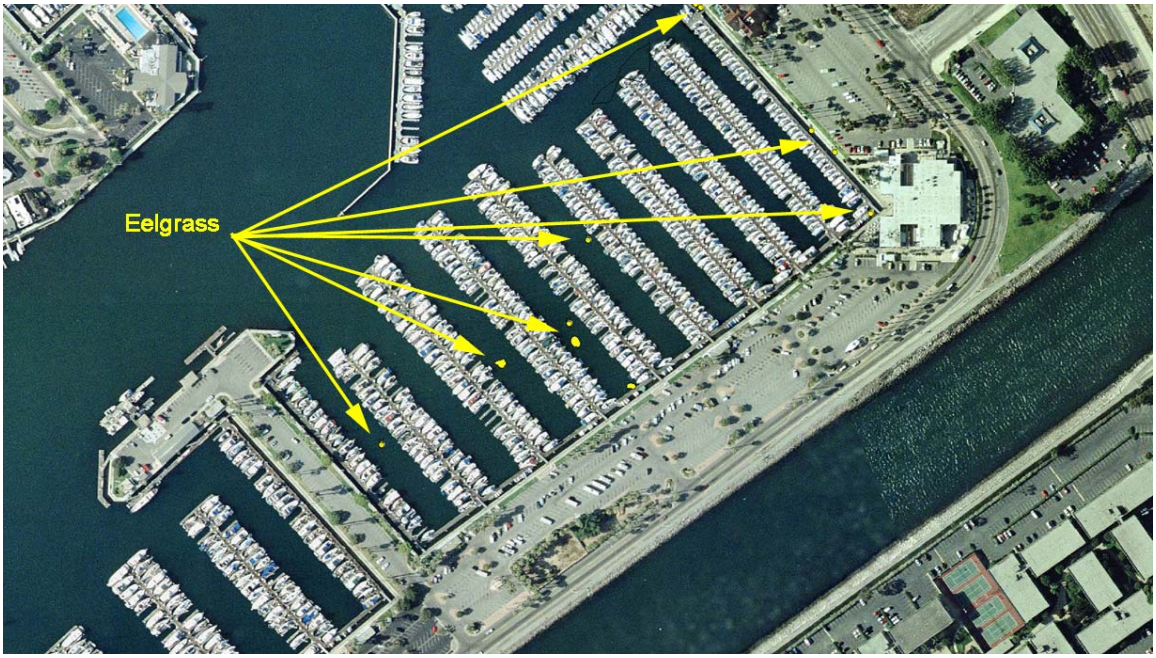

Figure 1. Basin 2 Eelgrass Habitat

Figure 2. Basin 4 Eelgrass Habitat

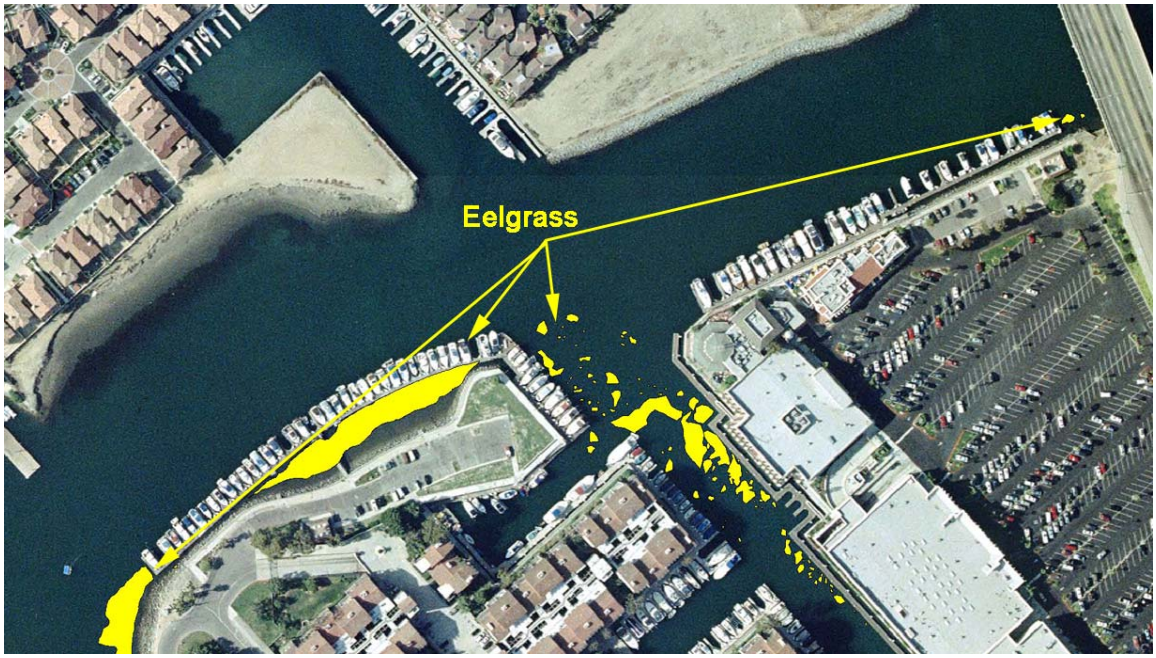

Figure 3. Basin 6 (South and North) and Marina Pacific Channel North Eelgrass Habitat

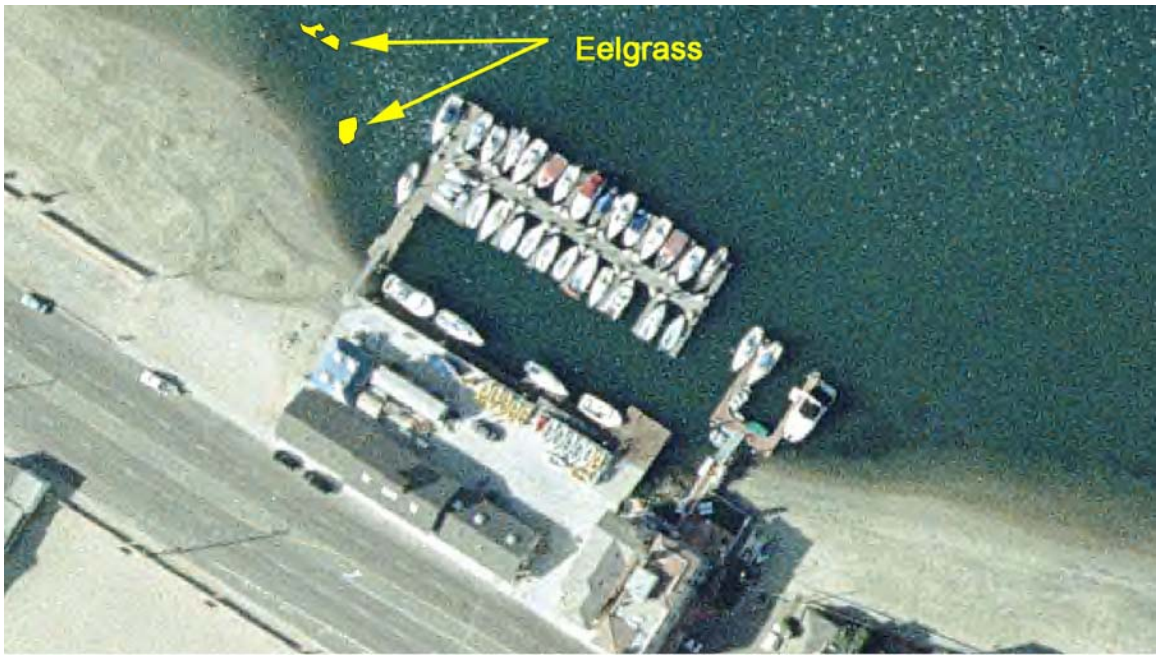

Figure 4. Basin 7 Eelgrass Habitat

Figure 5 Davies Bridge and Marina Pacifica Eelgrass Habitat

Figure 6. 55th Place to 61st Place (Peninsula 1) Eelgrass Habitat

Figure 7. 63rd Place to 71st Place (Peninsula 2) Eelgrass Habitat

Figure 8. Upper Cerritos Channel Eelgrass Habitat

Table 1. Eelgrass Habitat Surveyed, September-October 2007.
Source: CRM, Inc. 2007

Area Surveyed	Amount of Eelgrass (sq ft)	Mean Turion Density (sq m)	Std Dev	N	Mean Depth (ft, MLLW)	Depth Range (ft, MLLW)
Basin 1*	0.00	-	-	-	-	-
Basin 2*	1,019.78	98.6	49.2	10	-6.5	-6.3 to -6.7 in fairways; 0.0 to -2 near bulkheads
Basin 3*	0.00	-	-	-	-	-
Basin 4*	123.26	61.4	26.1	10	-7.9	-7.3 to -8.5
Basin 5*	0.00	-	-	-	-	-
Basin 6 South	11,943.40	194.7	75.9	14	-3.3	-3.1 to -4.1
Basin 6-Marina Pacifica	11,543.54	53.8	25.5	17	-6.3	-6.3
Basin 6 North*	230.00	104.8	41.9	12	-5.3	-1 to -5
Basin 7*	55.97					-3 to -7.3
Main Channel, North of Davies Launch Ramp	46,007.60	110.7	49.7	49	-3.7	0 to - 8
Temporary Dock Area, LBYC	0 -					
Peninsula 1 (55th-61st Place)	1,977.64	ND				
Peninsula 2 (63rd-71st Place)	32,682.41	ND				
Upper Cerritos Channel	21,142.88	ND				
Eelgrass Area (sq ft)	126,926.5				5.4	-0 to 8.5
Eelgrass Area (sq m)	11,796.1	111.3	62.2	112.0		
Eelgrass Area (acres)	2.9					

* Areas to be dredged

Table 2. Turion Density, Alamitos Bay. Oct 2007

Area	Mean Turion Density Per Sq Meter	Std Dev	N	Mean Depth (ft, MLLW)	Depth Range (ft, MLLW)
Basin 1	-	-	-	-	-
Basin 2	98.6	49.2	10	-6.5	-6.3 to -6.7
Basin 3	no eelgrass	-	-	-	-
Basin 4	61.4	26.1	10	-7.9	-7.3 to -8.5
Basin 5	-	-	-	-	-
Basin 6 Marine Reserve (Behind Docks)	194.7	75.9	14	-3.3	-3.1 to -4.1
Basin 6 North PCH Bridge	104.8	41.9	12	-5.3	-1 to -5
Basin 7	-	-	-	-	-
Davies Bridge/Launch Ramp)	110.7	49.7	49	-3.7	0 to - 8
Temp Dock (LBYC)	-	-	-	-	-
Maria Pacifica, East Channel	53.8	25.5	17	-6.3	-6.3
All Areas	**111.3**	**62.2**	**112.0**	**5.4**	**-0 to 8.5**

Table 3. Comparison of Eelgrass Shoot Density in Alamitos Bay 1993-2007

Location	Date of Survey	Mean Density*	Range*	# of replicates	Reference
5455,5609, 5645 Sorrento	October 2007	89.1	43-142	25	CRM in progress
64 Rivo Alto Canal	August 2007	75	45- 114	5	CRM 2007a
5609 Sorrento	March 2007	147	43-171	10	CRM 2007b
11 Sea Isle Lane	Oct 2005	130.7	71-114	135	CRM 2006
Marine Stadium	May 2005	133.9	29-400	39	CRM 2005
5635 Sorrento	May 2004	147	72-271	13	CRM 2004
2715 Corso di Napoli	Sept 2003	114	-	3	CRM 2003
5615 Sorrento	April 2002	104	86-129	10	CRM 2002a
End Beach Marine Stadium	July 2002	93	57-171	39	CRM 2002b
5474 The Toledo	Sept 2001	71	43-114	7	CRM 2001
Gondola Getaway	July 1999	199		9	CRM 1999
Basin 8 Cerrito Cerritos Channel	May 1996	134	74-288	7	CRM 1996
Mothers' Beach	Sept 1995	75	8-52	26	CRM 1995
Alamitos Bay Entrance Channel	June 1994	229	52-466	24	CRM 1994a
Jack Dunster Park (Fieldstone Park)	May 1994	162	104-272	24	CRM 1994b
Mother's Beach	June 1993	156	65-272	14	CRM 1993a
Bayshore Ave (between Appian Way and 2nd Street	Sept 1993	152		4	CRM 1993b

* number of shoots per square meter

CRM revisited each of the areas in the Marina in October 2008 using remote video and determined that each of the areas mapped in 2007 was still vegetated with eelgrass but there was no observable increase in areal cover, nor other areas in the Marina where eelgrass had colonized. In addition, CRM surveyed the fairways within Basin 3 where the marina docks have been abandoned (due to safety issues) to determine if a lack of vessel activity has resulted in any eelgrass colonization of the bayfloor since the Oct 2007 CRM eelgrass bed survey. The results indicate that eelgrass has not colonized any of these areas, despite a range of depths (less than 8 ft) where eelgrass can grow, no limitations of light due to shading, or turbidity caused by vessel activities.

3.0 ABIOTIC FEATURES OF THE PROJECT AREA

3.1 Water Circulation. There are no creeks or rivers that drain to Alamitos Bay, although the San Gabriel River mouth discharges into San Pedro Bay immediately east of the Alamitos Bay Entrance Channel. Tidal flows enter the Bay through the Alamitos Bay Entrance Channel. However, water circulation patterns within the bay are modified as consequent of the entrainment of ocean water through Alamitos Bay for use as cooling waters for the Haynes Generation Station (Intersea Research Corporation, 1981). This creates a constant influx of ocean water into Alamitos Bay, and the net inflow currents

are stronger than outflow currents as would be the case in normal estuarine tidal action (Intersea Research Corporation, 1981).

This process of drawing water into Alamitos Bay contributes to better water circulation in the Marina than would be expected in the absence of the cooling water drawn into the Haynes facilities. The cooling water intakes for the Haynes Generating Station are located at the southeast corner of the Alamitos Bay Marina, in Basin 2. Rather than forming a tidal current eddy within the Basin 2 Marina, the constant influx of ocean water suppresses the formation of an eddy gyre, resulting in better water quality in the Marina. This process removes organic and inorganic wastes, and the constant inflow current ventilates the bay with a consistent draw of dissolved oxygen (Intersea Research Corporation, 1981). This consistent inflow of ocean water also results in the establishment of an intertidal community of marine invertebrates in the Marina not often associated with inner-sections of marinas. Observed species in Basin 1 and Basin 2 included numerous, larger macro-invertebrates, such as sea hares *(Aplysia vaccaria),* octopus *(Octopus bimaculatus),* kellet's whelk *(Kelletia kelletii),* wavy top snails *(Lithopoma undosa*) sea stars *(Pisaster ochraceus),* bat stars *(Asterina miniata*), and purple sea urchins *(Strongylocentrotus purpuratus*) not commonly found within the inland-portions of other embayments outside the entrance channels (Coastal Resources Management Inc., 2009).

Mean daily-averaged currents velocities within the Bay in 1978 ranged from a low 3.3 cm/sec (Basin 2) within the Long Beach Marina to 32.9 cm/sec in narrow constrictions at the PCH Bridge (Intersea Research Corporation, 1981). Within Basin 2, the mean daily-averaged current velocities ranged between 3.3 to 4.2 cm/sec. At the Long Beach Yacht Club (Basin 4), the current velocity was 4.1cm/sec.

3.2 Sediment Types. Sediments within the marina fairways are silts, easily disturbed by vessel-related bottom disturbances (R. Ware, pers. obs). However, eelgrass is capable of colonizing a range of sediment types and grain sizes. Studies along the Alamitos Bay Peninsula, conducted by CRM in May 2008 indicate that intertidal and shallow subtidal eelgrass (0.0 to -5 ft MLLW) grows primarily in sediments with between 69 to 95% fine sands and from 5 to 31% silts. (Figures 9 and 10). Comparatively, in Sunset Bay (Huntington Harbour) eelgrass grows in sediments ranging from fine silts to extremely coarse sand/shell hash in high current areas (R. Ware, pers. obs). The presence of eelgrass will also alter sediment characteristics and enhance the settlement of finer sediments by interrupting and altering water current flow and velocities.

3.3 Bottom Slopes. There is no observable bottom slope within the Marina except along the edges of the bulkhead and rip rap, that grade down from the intertidal to depths of approximately -7 ft MLLW. The fairways exhibit some change in local topography due to sediment accretion, but the seafloor is generally featureless without steep slopes.

3.4 Salinity. Salinity in Alamitos Bay is stable and within values normally observed for coastal embayments, between 30-33 parts per thousand. Measured salinity in Alamitos Bay in May 2008 ranged from 32.4 to 32.6 parts per thousand (CRM, unpublished data).

During winter, surface salinity may decrease to below 30 parts per thousand, depending on the duration and intensity of storms and runoff into the Bay. There are no creeks or rivers that drain to Alamitos Bay, although the San Gabriel River mouth discharges into San Pedro Bay immediately east of the Alamitos Bay Entrance Channel. During winter runoff periods, and during incoming tides, lower-salinity water may be entrained into Alamitos Bay.

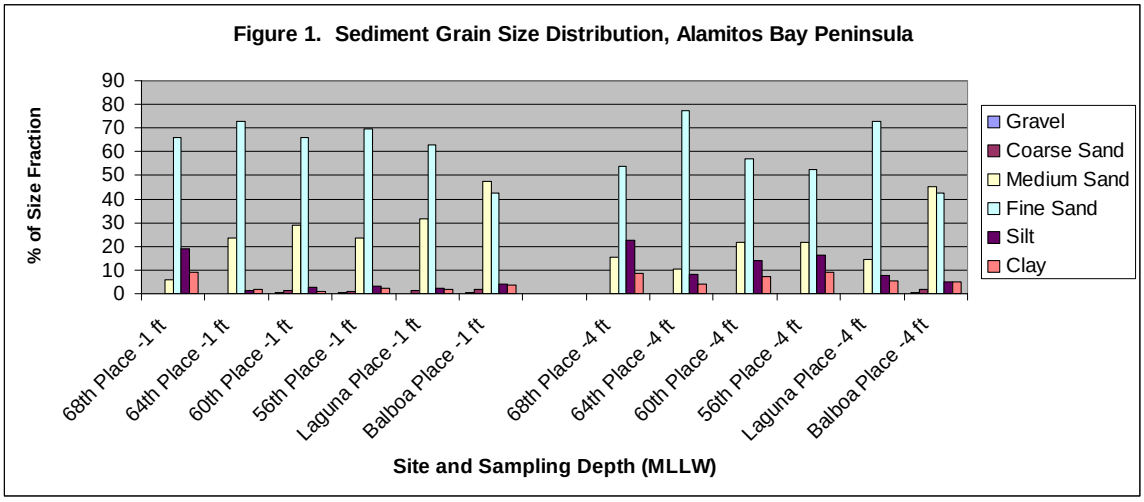

Figure 9. Sediment Grain Size Analysis in Eelgrass Beds along the Alamitos Bay Peninsula. May 2008.

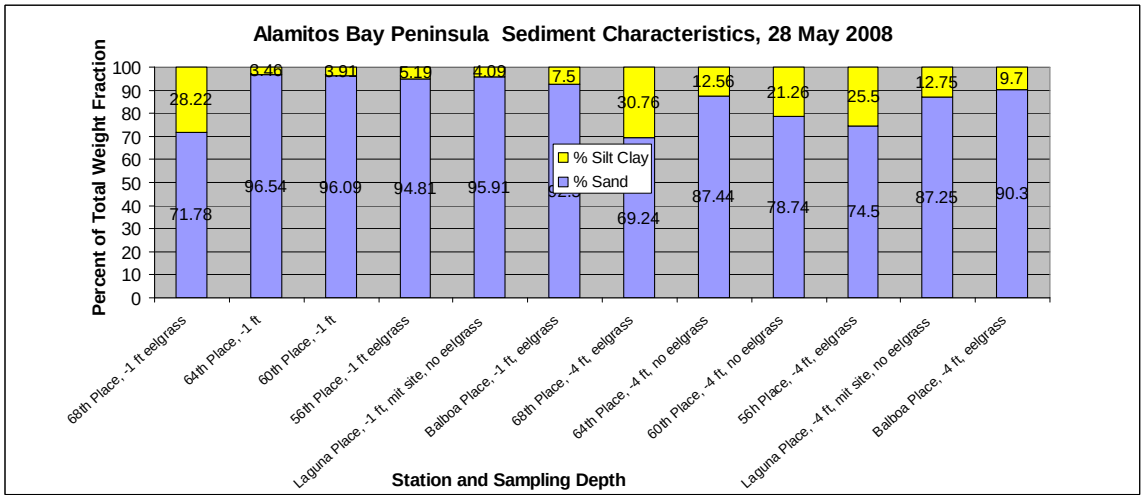

Figure 10. Sand and Silt Proportions in Eelgrass Beds Along the Alamitos Bay Peninsula, May 2008

3.5 Water Temperature. Natural surface water temperatures in the waters immediately offshore of Alamitos Bay in San Pedro Bay range from 12.5 to 25.3 degrees C (54.5 to 77.5 degrees F) (MBC 2006). Temperatures in the bay will exceed these minima and maxima values, although temperature changes may be muted because of the net inflow of

ocean waters. On May 28th, 2008, water temperatures varied between 66.1 to 69.9 degrees F in the Bay, along the Alamitos Bay Peninsula (CRM, unpublished data).

3.6 Dissolved Oxygen. Dissolved oxygen concentrations in San Pedro Bay range from approximately 5 to 14 milligrams/liter (mg) (MBC, 2006). Measured dissolved oxygen concentrations in Alamitos Bay on 28th May 2008 varied from 7.6 to 10.2 mg/l along the Alamitos Bay Peninsula (CRM, unpublished data). Concentrations of 8 mg/l are not uncommon in many parts of the bay, due to the effects of the constant inflow of ocean water for the Haynes cooling system (Intersea Research Corporation, 1981). Concentrations of 5 mg/l and below are considered "low", and below the State's Water Quality Criteria for bays and estuaries.

3.7 Light Penetration and Irradiance Levels. Light is the factor which often controls the depth, distribution, density, and productivity of seagrass meadows (Backman and Barilotti, 1976; Zimmerman et al., 1991, Duarte, 1991). Light penetration is affected by parameters such as time of day and year, tidal condition, suspended organics and sediment input from dry-season runoff, winter storms, plankton blooms, shading from docks and boats, and in-bay activities such as dredging and boating.

Light penetration is better during the incoming tides compared to outgoing tides. Zimmerman et al. (1991) estimated that eelgrass in San Francisco Bay required between three and five hours a day of irradiance to maintain carbon balance and growth, and suggested that eelgrass is adapted to extremely low light availability. Eelgrass requires a minimum of 10-20% of ambient light levels (Duarte 1991, Dennison et al., 1993) or daytime light levels above 300 micromol/m^2/s (Thom and Shreffler, 1996) to saturate photosynthesis. The amount of light required to support eelgrass is about twice that to support macroalgae growth (Lobban et al., 1985).

Underwater irradiance was measured by CRM in November 2008 in the fairways of Alamitos Bay Marina Basins 1, 2, 4, and 6 in the presence and absence of eelgrass and at an eelgrass reference site along the Alamitos Bay Peninsula. An Apogee Quantum Meter was used to measure the amount of light available for photosynthesis (photosynthetic photon flux [PPF]) at wavelengths between 500-700 nannometers. Table 4 summarizes the results of the one-day survey. Data graphics are presented in Appendix 1.

The results indicate at depths of 4.3-6.3 feet (ft) Mean Lower Low Water (MLLW), measured light levels (250-700 micromol/m^2/s) were mostly above the minimum levels required to saturate photosynthesis (Note: cloudy conditions at Basin B4 and B6 were noted during the early afternoon survey and reduced underwater light levels compared to the other stations surveyed earlier, under clear skies). However, mid-depth to ambient air light ratios (34.5-51.4%) exceeded minimum levels (11%) required for eelgrass survival. These depths represent bottom depths at many sites in Alamitos Bay where eelgrass can be found.

Measurements were also made at bottom depths between -7 and -12.7 ft MLLW. In Alamitos Bay, the maximum depth limit of eelgrass is about -8.0 ft MLLW except in the

entrance channel where its depth range exceeds 8 ft. Bottom-water irradiance values at these depths (221-463 micromol/m^2/s) mostly exceeded minimum levels to saturate photosynthesis, but all ratios of bottom-to ambient air values (11-34%) exceeded the observed minimum required 10-20% ambient light levels.

At depths below 8.5 feet where eelgrass was not found (-9 to -12.8 ft MLLW) light levels (179-223 micromol/m^2/s) were below the 300 lower threshold limit, although the ambient air light ratios (11-16.7%) were still at the lower end of the minimum ratio (11-20%).

Light extinction (secchi disk) readings were also recorded for each station. Extinction depth values varied between 7 ft to 12.7 feet. In several instances within the marina, the secchi disk extinction depth value was also the bottom depth, indicative of good water clarity.

Long-term light data are required to provide a better indication of minimum light requirements for eelgrass in Alamitos Bay Marina. However, initial data analyses indicate that light is not a limiting factor for eelgrass growth at depths at which eelgrass is known to occur (-1 to -8.5 ft MLLW) in the Alamitos Bay Marina. However, light levels below these depths in the Marina are at or below minimum light limits for eelgrass growth. Since shoaling has occurred to create eelgrass habitat at -8.5 ft MLLW, it has allowed levels of light to be within ranges required to support photosynthesis, and the growth, and establishment of eelgrass.

3.8 Summary. Water quality and sediment data within the project area are not limiting to support eelgrass at the depth ranges where it occurs. Depth is the over-riding influence on the distribution of eelgrass within the marina. Shoaling activity is responsible for the advancement of eelgrass into the marina system.

Table 4. Irradiance Measurements, Alamitos Bay. November 8th, 2008.
Coastal Resources Management, Inc.

	Ambient In-Air Irradiance (micro mol/m^2/s)	**Mid Depth (ft, MLLW)**	Irradiance (micro mol/m^2/s	Percent of Air Values	**Bottom Depth (ft)**	Irradiance (micro mol/m^2/s	Percent of Air Value
68th Place Eelgrass Reference	1355	**5.5**	457	33.7	**11 (offshore of eelgrass bed**	293	21.6
Basin 1 FW 1	1342	**5**	420	31.3	**10**	149	11.1
Basin 2 FW 1 **Eelgrass**	1335	**4.3**	460	34.5	**8.5**	229	17.2
Basin 2 FW 2	1336	**4.25**	450	33.7	**8.5**	345	25.8
Basin 2 FW 3 **Eelgrass**	1362	**3.5**	700	51.4	**7**	463	34.0
Basin 2 FW 4 Eelgrass	1240	**3.9**	548	44.2	**7.7**	346	27.9
Basin 2 FW 5 **Eelgrass**	1333	**4.3**	671	50.3	**8.5**	268	20.1
Basin 2 FW 6	1254	**5**	521	41.5	**10**	210	16.7
Basin 2 FW 7	1288	**5**	502	39.0	**10**	213	16.5
Basin 2 FW 8	1287	**5.5**	552	42.9	**11**	223	17.3
Basin 2 FW 9	1290	**6.4**	478	37.1	**12.7**	179	13.9
*Basin 4 FW 4 EG ***Eelgrass**	562	**4.5**	250	44.5	**9**	133	23.7
*Basin 4 FW 3 EG **Eelgrass**	701	**4.3**	261	37.2	**8.5**	140	20.0
*Basin 6 N **Eelgrass**	830	**4.3**	354	42.7	**8.5**	91	11.0

* measurements under overcast conditions; other measurements were mid-day, clear skies.

4.0 AMOUNT OF POTENTIAL EELGRASS HABITAT AFFECTED BY THE PROJECT

The Southern California Eelgrass Mitigation Policy (National Marine Fisheries Service, 1991 as amended) defines potential eelgrass habitat as "areas where eelgrass would normally be expected to occur but where no vegetation currently exists. Factors to be considered in delineating potential habitat areas include appropriate circulation, light, sediment, slope, salinity, temperature, dissolved oxygen, depth, proximity to eelgrass, history of eelgrass coverage, etc." It should be noted that there is no conclusive scientific basis for why eelgrass grows in some locations and not in others. It can be attributed to a combination of any of the environmental conditions listed above.

Further, in response to recent concerns regarding the interpretation of the SCEMP, correspondence between Rodney R. McInnis, Regional Administrator for the NMFS and Mr. Jack Peveler, President of the California Association of Harbor Masters and Port Captains, (Appendix 2) clarified that the potential eelgrass clause has been implemented only where "clear and convincing evidence is available that a given area is potential eelgrass habitat (e.g. previous eelgrass surveys documenting presence)."

The original and/or design depths of the Marina basins ranged from -12 to -15 ft MLLW. Because the current shallower depths within the Marina Basins are a result of shoaling over the past 50 years, and because no maintenance dredging has occurred, there are now depths within the basins which are less than 8 ft deep. Eelgrass vegetation would not normally be expected to occur in these areas as the site has historically and consistently been used as a marina and the basins should have maintained as close as possible to the original and/or design depths (-12 to -15 MLLW). However, over time, shoaling has decreased water depths in 3.39 acres of shaded and unshaded habitat to depths less than 8.0 ft deep (Source: TranSystems, Inc. Alamitos Bay Marina Bathymetric Maps, August 2008). Of these 3.39 acres, 2.82 acres are unshaded, but depth-suitable habitat. However, there is "clear and convincing evidence" that eelgrass has been found in only seven of the of 38 marina fairway channels (Figures 9, 10, and 11), and the total amount of depth-suitable habitat within these seven marina fairway channels is 1.47 acres (Table 5).

While 1.47 acres of soft bottom habitat within these areas can be classified as "depth-suitable" eelgrass habitat within the seven fairways, the results of CRM's remote video surveys in October 2008 indicate that each of the areas mapped in 2007 was still vegetated with eelgrass, but that there was no observable increase in areal cover, and eelgrass had not colonized in any other areas in the Marina.

Therefore, based on these two (and only available) surveys indicating that eelgrass has not increased in cover or colonized in any other areas, and because eelgrass would not historically been expected to occur in the Marina due to the depths required to maintain navigation, no potential eelgrass habitat is considered to be present within the areas impacted by proposed dredging. Therefore, impacts to potential eelgrass habitat are considered less than significant and no mitigation is required.

Table 5. Determination of Eelgrass Habitat Vegetation Losses

Location	TranSystems Initial Amount Calculated: (sq ft)	Depth-Suitable Unshaded Eelgrass Habitat-All Marina Basins (sq ft)	Depth Suitable, Unshaded Base Minus Fairways or Basins Without Eelgrass (sq ft)	Existing Eelgrass (sq ft)	Impacted Amount of Eelgrass (sq ft)	Amount of Potential Eelgrass Habitat (sq ft)	Mitigation Requirement: Eelgrass Vegetation: 1.2 to 1
Basin 1	0.0	0.0	0.0	0.0	0.0	0.0	none
Basin 2	71,976.0	70,956.2	61,181.0	1,019.78	1,019.78	0.0	1,223.73
Basin 3	27,274.0	27,274.0		0.0	0.0	0.0	none
Basin 4	19,334.0	19,210.4	2,083.0	123.26	123.26	0.0	147.91
Basin 5	2,233.0	2,233.0		0.0	0.0	0.0	none
Basin 6 South	24,913.0	1,456.0		23,457.0	0.0	0.0	none
Basin 6 North	742.0	512.0	742.0	230.0	230.0	0.0	276
Basin 7	1,400.0	1,400.0		0.0	0.0	0.0	none
						0.0	
Total (ft)	147,872.0	123,041.6	64,006.0	24,830.4	1,373.04	0.0	1,647.65
Total (Acres)	3.39	2.82	1.47	0.57	0.03	0..0	0.04

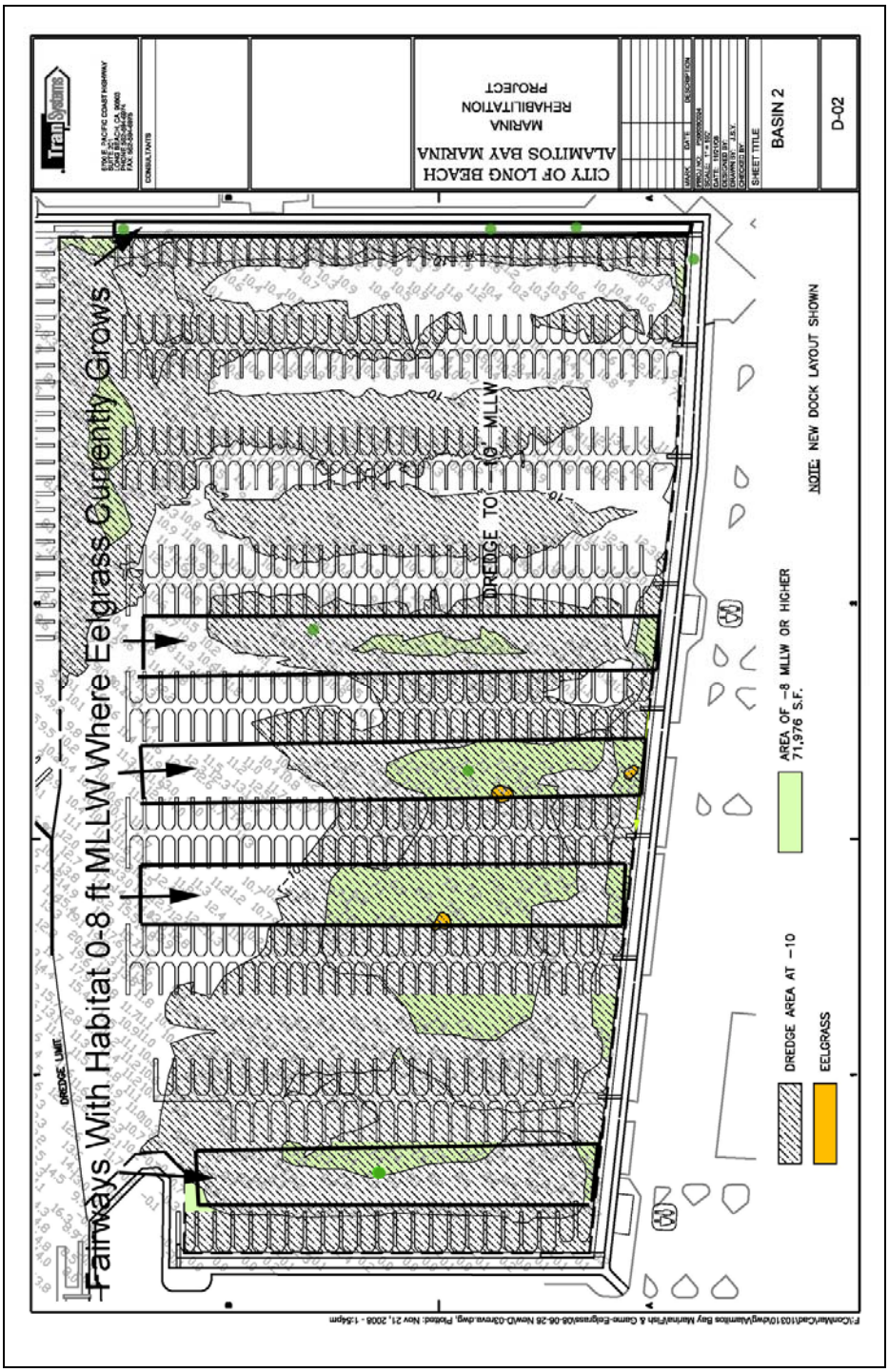

Figure 11. Depth-Suitable Eelgrass Habitat in Basin 2. Note: Area of -8 ft MLLW include both shaded and unshaded habitat. Table 4 includes only the habitat that is unshaded and potentially capable of supporting eelgrass

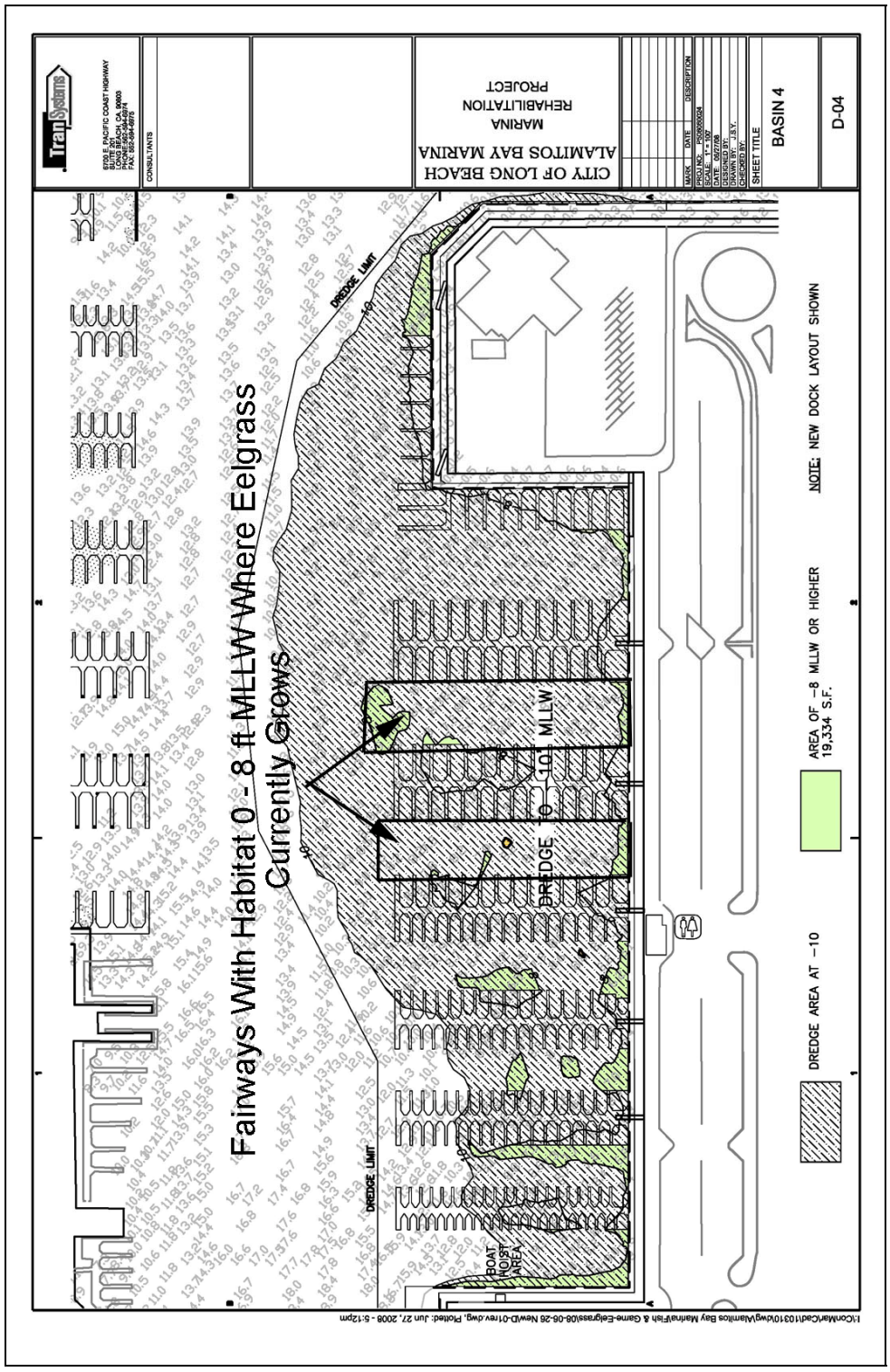

Figure 12. Depth-Suitable Eelgrass Habitat in Basin 4. Note: Area of -8 ft MLLW include both shaded and unshaded habitat. Table 4 includes only the habitat that is unshaded and potentially capable of supporting eelgrass

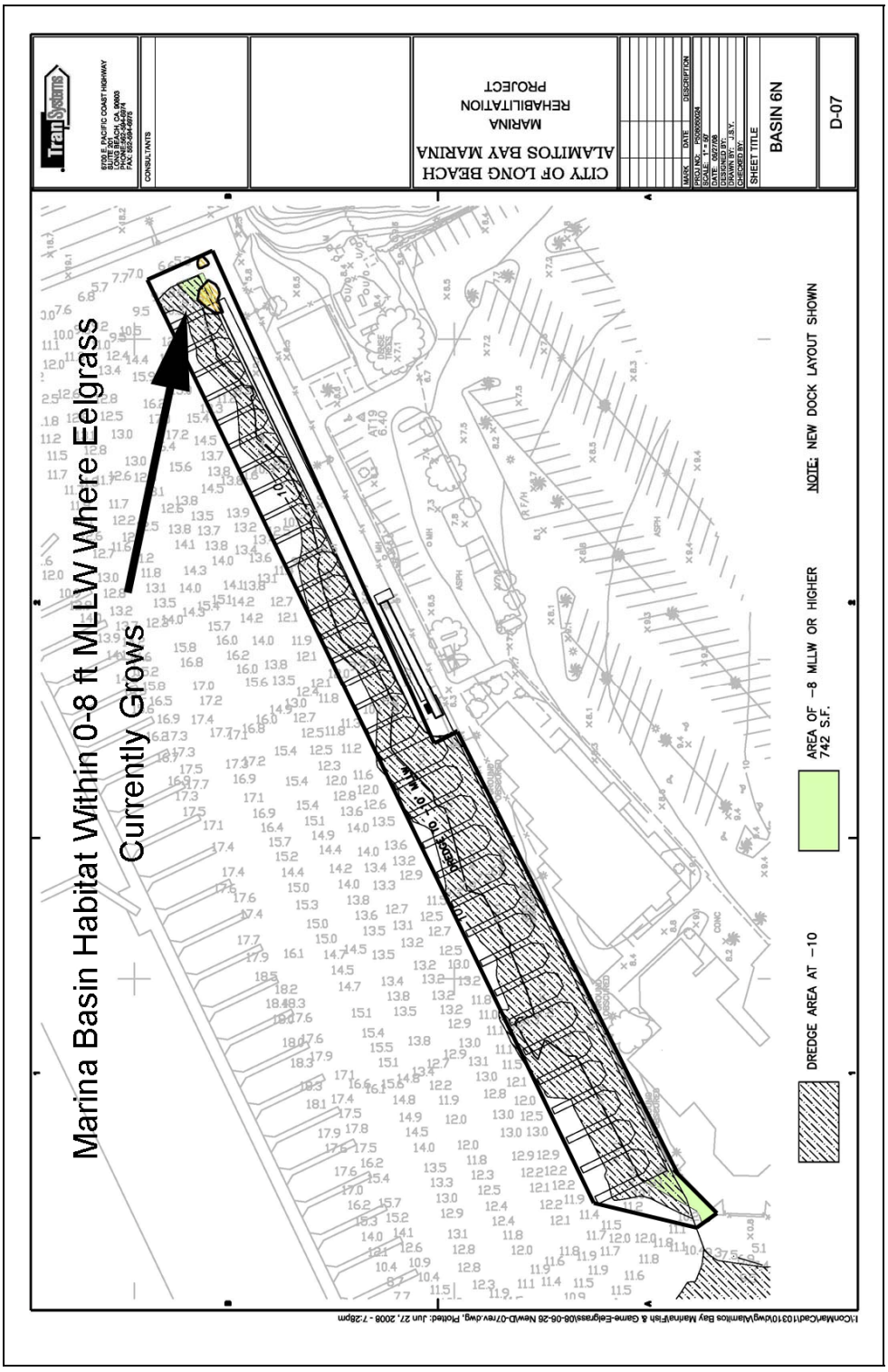

Figure 13. Depth-Suitable Eelgrass Habitat in Basin 6. Note: Area of -8 ft MLLW include both shaded and unshaded habitat. Table 4 includes only the habitat that is unshaded and potentially capable of supporting eelgrass

5.0 CONCLUSIONS

The Southern California Eelgrass Mitigation Policy [SCEMP] (National Marine Fisheries Service, 1991 as amended) defines potential eelgrass habitat as "areas where eelgrass would normally be expected to occur but where no vegetation currently exists. Factors to be considered in delineating potential habitat areas include appropriate circulation, light, sediment, slope, salinity, temperature, dissolved oxygen, depth, proximity to eelgrass, history of eelgrass coverage, etc."

1. Eelgrass is found within seven marina fairways within Basins 2, 4, and 6. The amount of vegetation within these basins is 0.03 acre (1,373.04 sq ft).

2. Eelgrass grows within the marina fairways near its maximum depth limit. Consequently, it is found in scattered, small, low density patches that provide minimal ecological value to marine fishes.

3. Water circulation within Alamitos Bay, and particularly within the Alamitos Bay Marina is modified by the presence of cooling water intake structures in the Marina (Basin 2) that draws ocean water into Alamitos Bay, and then to the Haynes Generating Station. This creates an artificial net inflow of ocean water into Alamitos Bay, and benefits water quality in the Marina, as well as marine life that lives in the marina.

4. This net inflow of ocean water likely contributes to higher levels of dissolved oxygen, lower levels of organics and suspended sediments in the Bay, and subsequent higher submarine irradiance levels. It also likely enhances the ability for eelgrass to colonize deeper areas of the marina, that in the absence of the net inflow of ocean waters, might not be able colonize.

5. Abiotic features such as water salinity, temperature, and underwater light levels are within normal ranges for eelgrass in the Alamitos Bay Marina at depths where eelgrass is known to occur (0.0 feet to -8.5 feet Mean Lower Low Water).

6. While the marina's initial design depths were below the depth limits known for eelgrass, shoaling in the marina has resulted in depths that will support eelgrass, and where light levels are sufficient to support eelgrass. There is no conclusive scientific basis for why eelgrass grows in some locations and not in others. It can be attributed to a combination of any of the environmental conditions listed above.

7. "Depth-suitable" eelgrass habitat less than 8 ft MLLW is limited to seven marina fairways within three marina basins (2, 4, and 6) where eelgrass is currently growing on evolving shoals. This encompasses 1.47 acres of soft bottom habitat.

8. While 1.47 acres of soft bottom habitat within these areas can be classified as "depth-suitable" eelgrass habitat within the seven fairways, the results of CRM's

remote video surveys in October 2008 indicated that each of the areas mapped in 2007 was still vegetated with eelgrass, but that there was no observable increase in areal cover, and eelgrass had not colonized in any other areas in the Marina.

9. Therefore, based on these two (and only available) surveys indicating that eelgrass has not increased in cover or colonized in any other areas, and because eelgrass would not historically been expected to occur in the Marina due to the depths required to maintain navigation, no potential eelgrass habitat is considered to be present within the areas impacted by proposed dredging.

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APPENDIX 1
NATIONAL MARINE FISHERIES SERVICE LETTER TO THE CALIFORNIA ASSOCIATIONS OF HARBOR MASTERS AND PORT CAPTAINS

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802- 4213

JAN 26 2009

Mr. Jack Peveler
President
California Association of Harbor Masters and Port Captains
P.O. Box 510
Sonoma, California 95476

Dear Mr. Peveler:

NOAA's National Marine Fisheries Service (NMFS) has reviewed your letter dated December 9, 2008, regarding the application of the Southern California Eelgrass Mitigation Policy. We appreciate your interest and constructive criticism of our efforts to protect and conserve eelgrass habitat within California.

As a result of the recognized ecosystem functions, eelgrass beds and other submerged aquatic beds, are given special status under the Clean Water Act, 1972 (as amended), Section 404(b)(1), "Guidelines for Specification of Disposal Sites for Dredged or Fill Material," Subpart E, "Potential Impacts on Special Aquatic Sites." This special status and high resource value has led to more stringent regulatory protections of this habitat and requirements for avoidance, minimization, and mitigation of unavoidable impacts.

As a furtherance of efforts to curb losses and reduce the negative trends in seagrass habitat, resource and regulatory agencies around the nation have been working on development of resource management plans and resource protection policies addressing seagrass. In southern California, the Southern California Eelgrass Mitigation Policy (SCEMP) (1991, as revised) was developed by NMFS, U.S. Fish and Wildlife Service, and California Department of Fish and Game to provide further guidance on the necessary steps to compensate for unavoidable impacts to eelgrass resources through regulatory programs. NMFS recognizes that the SCEMP is not part of official NOAA regulations. Rather, it is a coordinated, multiple-agency approach that is intended to provide guidance and consistency for all entities that impact this sensitive resource.

NMFS also recognizes that, as currently written, the potential eelgrass habitat clause could be interpreted more broadly than intended. To date, we have only implemented this clause when clear and convincing evidence is available that a given area is potential eelgrass habitat (e.g. previous eelgrass surveys documenting presence). We intend to clarify this aspect of the SCEMP in future revisions and will solicit your organization's input prior to doing so. Similarly, we also believe the SCEMP should be based upon the

best scientific information available and will incorporate such information in future revisions as it becomes available. We welcome any scientific information you can provide that could further refine the SCEMP.

Lastly, one of your last statements regarding shoaling of marinas implies that harbor/marina design depths are the appropriate baseline for environmental effect determinations. When evaluating effects to habitat, NMFS considers the current habitat condition. If NMFS' effects analysis indicates that there would be a reduction in quality and/or quantity of habitat, NMFS will provide conservation recommendations to avoid, minimize or offset such effects. If compensatory mitigation is recommended for a continuing operation (e.g. maintenance dredging), we believe it necessary to do so only once. For example, impacts to eelgrass habitat in Agua Hedionda Lagoon associated with maintenance dredging were mitigated according to the SCEMP, but, assuming future maintenance dredging remains in the same footprint, no additional compensation would be recommended if eelgrass recolonized the area at a later date.

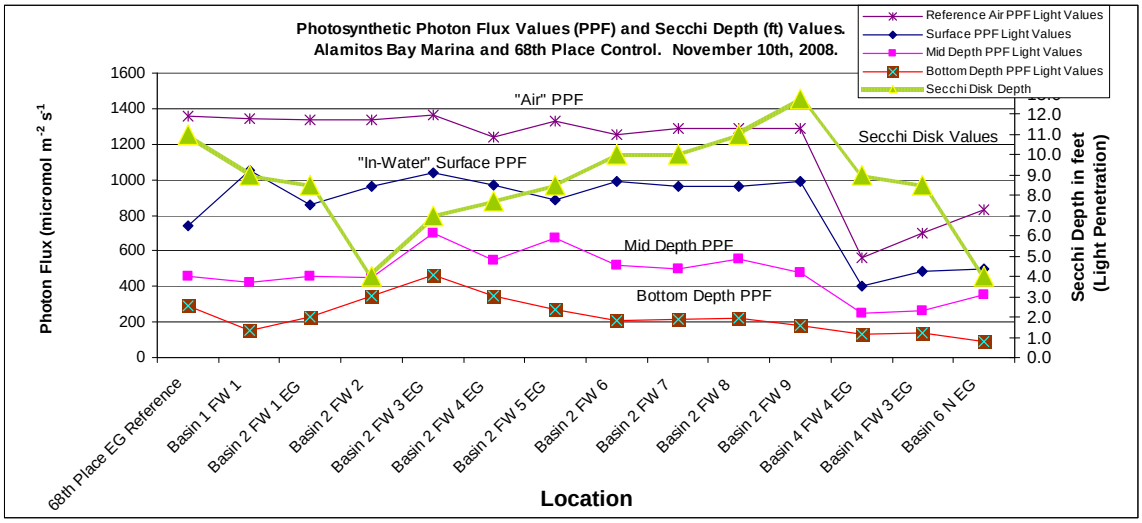
Thank you for your interest in this matter. NMFS encourages your participation in future developments related to eelgrass conservation efforts and will keep you updated accordingly. If you have any questions about these comments or the application of SCEMP, please contact Bryant Chesney at Bryant.Chesney@noaa.gov or 562-980-4037.

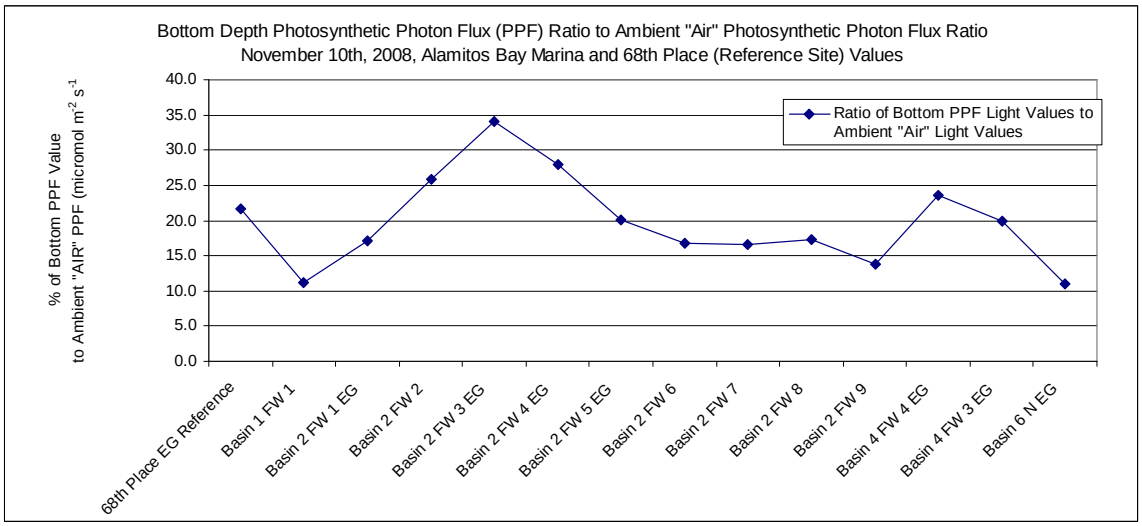
Sincerely,

Rodney R McInnis

Rodney R. McInnis
Regional Administrator

APPENDIX 2
UNDERWATER LIGHT LEVELS AND LIGHT TRANSMITTANCE (SECCHI DISK) DATA NOVEMBER, 2008





BIRD SURVEY MEMOS

LSA

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BERKELEY
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FORT COLLINS
FRESNO
PALM SPRINGS
POINT RICHMOND
RIVERSIDE
ROCKLIN
SAN LUIS OBISPO
S. SAN FRANCISCO

MEMORANDUM

DATE: August 12, 2009

TO: Ashley Davis

FROM: Richard Erickson

SUBJECT: Waterbird Foraging and Roosting at the Alamitos Bay Marina

The great blue heron (*Ardea herodias*) is the only water bird known to nest at the Alamitos Bay Marina. Other species are unlikely to do so, with the possible exception of the great egret (*Ardea alba*), snowy egret (*Egretta thula*), and black-crowned night-heron (*Nycticorax nycticorax*), all of which occasionally nest in association with great blue herons. Were those species to nest at the marina, potential impacts and mitigation measures would likely be similar to those for the great blue heron.

In contrast, many species of waterbirds forage and roost at the marina, including some classified as endangered, of special concern, or special animals (see http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/spanimals.pdf). For most of these species, special status is conferred only at nesting sites or communal roost sites. This is true of the two endangered waterbirds know to frequent the marina, the California brown pelican (*Pelecanus occidentalis californicus*) and Califoria least tern (*Sternula antillarum browni*). The least tern and several other special status species nest within the Seal Beach Naval Weapons Station and probably forage regularly in marina waters and may form small roosting associations on occasion, e.g., on the basin seawalls. The brown pelican does not nest locally, but does forage and roost in the area. Sizable concentrations of foraging birds of various species may develop in response to bait conditions in the marina. To be safe, it may be best to have a qualified biologist assess the roosting (and foraging) behavior of waterbirds at the marina immediately prior to any major disturbance.

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SAN LUIS OBISPO

M E M O R A N D U M

DATE: March 11, 2009

TO: Ashley Davis

FROM: Richard Erickson

SUBJECT: Nesting Bird Survey for the Alamitos Bay Marina

On March 7, 2009 I visited the Alamitos Bay Marina to search for potentially nesting birds. As on June 29, 2007, I surveyed areas scheduled for various construction activities under the Alamitos Bay Marina Improvement Project. My previous findings were summarized in a memo to you dated July 9, 2007.

I drove or walked through most of the project area from 8:50 a.m. to 2:35 p.m. Some areas were visible only from a distance. Conditions were conducive for observations the entire time with partly cloudy skies, temperatures ranging from cool to mild, and light to moderate winds.

The project area now comprises seven Basins and a proposed eelgrass mitigation site. Basins 5 and 7 and the proposed eelgrass mitigation site have essentially no vegetation and appear to offer limited nesting opportunities for birds. The other five Basins have a scattering of ornamental trees and shrubs that may be used by a number of species as small as hummingbirds and as large as the great blue heron. A complete list of vertebrate species observed is shown below, including scientific names. California Special Animals (see http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/SPAnimals.pdf) are denoted with bold type. "Special" status for all of these species is restricted to nesting colonies/sites, communal roosts, and rookery sites.

The first week of March is early in the nesting season for most bird species in Southern California. I found one pair of house finches carrying nesting material to a building in Basin 1 and one pair of American crows carrying nesting material to an unseen location northwest of Basin 6 South. Another pair of crows was acting suspiciously–as if near a nest site–in Basin 2. Within Basins 1 and 2, 17 potential great blue heron nests (i.e., obvious concentrations of sticks) were found in the tops of ornamental fan palms (Figure 1). At least nine nests were occupied, including one where a heron appeared to be incubating. Two pairs were still engaged in nest building. This species is considered a California Special Animal at colonial nesting sites such as this.

Among the native species most likely to nest in vegetation within the project area (in addition to the great blue heron) are the mourning dove, Anna's hummingbird, American crow, northern mockingbird, hooded oriole, and house finch. The hooded oriole is especially prone to nesting in fan palms and may nest in numbers on site. Non-native species likely nesting in the marina's vegetation include the feral pigeon, European starling, and house sparrow. Two native species potentially nesting in the marina, the black phoebe and barn swallow, usually build their nests on structures (including docks and piers), and the pigeon often does so as well.

The improvement project calls for the removal of several trees in the vicinity of restroom buildings, including some trees used by nesting herons. Although the great blue heron is not a State or federally protected species, the following mitigation measure has been recommended to reduce any potential impacts to that species to a less than significant level.

Mitigation Measure

The City shall adhere to the following provisions during construction for the purpose of protecting nesting birds within the study area:

> Tree and vegetation removal shall be restricted to outside the likely active nesting season (January 1–September 1) for those bird species present or potentially occurring within the project area. That time period is inclusive of most other local birds' nesting periods, thus maximizing avoidance of impacts to any nesting birds. If construction must be completed during the season listed above, surveys for nesting birds shall be conducted at least 15 days prior to construction. Should an occupied nest be detected, the City will consult with the California Department of Fish and Game (CDFG) and California Coastal Commission (CCC) to determine an appropriate means for reducing impacts to nesting birds prior to tree removal activities. If nesting birds are observed within the vicinity, a buffer from the nest shall be established. The size of the buffer is dependent on the species and shall be determined by a qualified biologist. The buffer shall be delineated by roping the boundaries of construction and shall remain in place until the nest is abandoned or the young have fledged**.**

* Species not native to the study area
[ ] Species in brackets were observed only in 2007

AVES	BIRDS
Anatidae	**Ducks, Geese, and Swans**
Anas platyrhynchos	Mallard
Melanitta perspicillata	Surf scoter
Mergus serrator	Red-breasted merganser
Podicipedidae	**Grebes**
Podilymbus podiceps	Pied-billed grebe
Podiceps nigricollis	Eared grebe
Aechmophorus occidentalis	Western grebe
Pelecanidae	**Pelicans**
Pelecanus occidentalis	**Brown pelican**
Phalacrocoracidae	**Cormorants**
Phalacrocorax auritus	**Double-crested cormorant**
Ardeidae	**Herons, Bitterns, and Allies**
Ardea herodias	**Great blue heron**
Egretta thula	**Snowy egret**
[*Butorides striatus*	Green heron]
Nycticorax nycticorax	**Black-crowned night-heron**
Accipitridae	**Hawks, Kites, Eagles, and Allies**
Buteo jamaicensis	Red-tailed hawk
Rallidae	**Rails, Gallinules, and Coots**
Fulica americana	American coot
Charadriidae	**Plovers and Lapwings**
[*Charadrius vociferus*	Killdeer]
Scolopacidae	**Sandpipers, Phalaropes, and Allies**
Tringa semipalmata	Willet
[***Numenius americanus***	**Long-billed curlew]**
Limosa fedoa	Marbled godwit
Laridae	**Gulls, Terns, and Skimmers**
Larus heermanni	Heermann's gull
Larus delawarensis	Ring-billed gull
Larus occidentalis	Western gull
Larus californicus	California gull
Larus glaucescens	Glaucous-winged gull
Hydroprogne caspia	**Caspian tern**

[	***Sterna forsteri***	**Forster's tern**	**]**
[	***Thalasseus elegans***	**Elegant tern**	**]**
Columbidae		**Pigeons and Doves**	
*	*Columba livia*	Rock (Feral) pigeon	
[*	*Streptopelia decaocto*	Eurasian collared-dove	]
	Zenaida macroura	Mourning dove	
Trochilidae		**Hummingbirds**	
[	*Calypte anna*	Anna's hummingbird	]
[	***Selasphorus sasin***	**Allen's hummingbird**	**]**
Tyrannidae		**Tyrant Flycatchers**	
	Sayornis nigricans	Black phoebe	
Corvidae		**Crows and Jays**	
	Corvus brachyrhynchos	American crow	
	Corvus corax	Common raven	
Hirundinidae		**Swallows**	
	Stelgidopteryx serripennis	Northern rough-winged swallow	
[	*Petrochelidon pyrrhonota*	Cliff swallow	]
	Hirundo rustica	Barn swallow	
Mimidae		**Mockingbirds and Thrashers**	
	Mimus polyglottos	Northern mockingbird	
Sturnidae		**Starlings**	
*	*Sturnus vulgaris*	European starling	
Parulidae		**Wood Warblers**	
	Dendroica coronata	Yellow-rumped warbler	
Icteridae		**Blackbirds**	
[	*Icterus cucullatus*	Hooded oriole	]
Fringillidae		**Fringilline and Cardueline Finches and Allies**	
	Carpodacus mexicanus	House finch	
	Carduelis tristis	American goldfinch	
Passeridae		**Old World Sparrows**	
*	*Passer domesticus*	House sparrow	
MAMMALIA		**MAMMALS**	
Sciuridae		**Squirrels, Chipmunks, and Marmots**	

*	cf. *Sciurus niger*	Eastern fox squirrel
Phocidae		**Hair Seals**
[	*Phoca vitulina*	Harbor seal]
Otariidae		**Eared Seals**
	Zalophus californianus	California sea lion

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RIVERSIDE
ROCKLIN
SAN LUIS OBISPO

MEMORANDUM

DATE: July 9, 2007

TO: Ashley Davis, Renee Escario

FROM: Richard Erickson

SUBJECT: Nesting Bird Survey for the Alamitos Bay Marina

On June 29, 2007 I visited the Alamitos Bay Marina to search for potentially nesting birds. I surveyed areas scheduled for various construction activities under the Alamitos Bay Marina Improvement Project. I drove or walked through most of the project area from 7:00 a.m. to 11:15 a.m. Some areas were visible only from a distance. Conditions were conducive for observations the entire time with a complete marine layer initially present giving way to clear skies. Temperatures ranged from mild to warm and it was calm the entire morning.

The project area comprises seven Basins, all but two of which have a scattering of ornamental trees and shrubs present. The exceptions were Basins 5 and 7, where no vegetation appeared to offer nesting opportunities for birds. Elsewhere, trees and shrubs may be used by a number of species as small as hummingbirds and as large as the American crow. A complete list of vertebrate species observed is shown below, including scientific names. California Special Animals (see http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/SPAnimals.pdf) are denoted with bold type. "Special" status for all of these species is restricted to nesting colonies/sites, communal roosts, and rookery sites.

The end of June is late in the nesting season for most bird species in Southern California and I found no evidence of active nesting by any species except the great blue heron. Ten active nests of this species in the tops of ornamental fan palms were mapped within Basins 1 and 2. All nests contained large young not yet capable of flight. This species is considered a California Special Animal at colonial nesting sites such as this.

A used nest that had fallen from a tree on the northwest side of Basin 3 appeared to have been built by house finches, and what may have been a used nest built by crows was located high in a eucalyptus on the west end of Basin 6 (south). Among the native species most likely to nest in vegetation within the project area (in addition to the great blue heron) are the mourning dove, Anna's hummingbird, American crow, northern mockingbird, hooded oriole, and house finch. The hooded oriole is especially prone to nesting in fan palms and may nest in numbers on site. Non-native species likely nesting in the marina's vegetation include the feral pigeon, European starling, and house sparrow. Two native species potentially nesting in the marina, the black phoebe and barn swallow, usually build their nests on structures, and the pigeon often does so as well.

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Phocidae		**Hair Seals**
	Phoca vitulina	Harbor seal