Eelgrass (*Zostera marina*) and *Caulerpa taxifolia* Survey

591 and 575 Embarcadero, Morro Bay, California

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Prepared for:

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Project Description

This report describes the results of an eelgrass (*Zostera marina*) and *Caulerpa taxifolia* survey completed on September 9, 2011 at 591 and 575 Embarcadero; properties that adjoin each other along the Morro Bay, California waterfront (**Figure 1**). The survey was done in response to a request from the City of Morro Bay Planning Department to provide an update and new baseline on how proposed over water improvements at those properties may affect eelgrass. A survey of the same area for the same project was completed over four years prior (April 17, 2007) [1]. Both surveys also included a special search for *Caulerpa*, a highly invasive species that can easily spread and reproduce from fragmentation caused by waterfront construction and demolition projects.

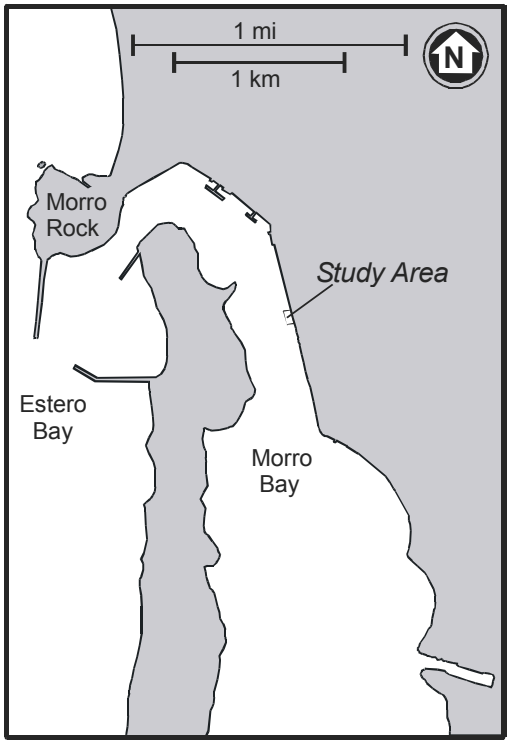

Figure 1. Location of the eelgrass survey at 591 and 575 Embarcadero, Morro Bay, CA.

The proposed improvement project (City of Morro Bay Development Application No. UPO-140) is a joint project of the lessees who lease from the City of Morro Bay the connecting 45 ft wide properties (land and

[1] Tenera Environmental. 2007. Eelgrass (*Zostera marina*) and *Caulerpa taxifolia* Survey, 591 and 575 Embarcadero, Morro Bay, California. Submitted to Mr. Smith Held. P.O. Box 225, Cayucos, CA 93430 and the City of Morro Bay, California. April 25, 2007.

water lease sites 67-67W and 68-68W). The plans for over-water work have changed slightly with time. The current plan is as follows:

- The 591 Embarcadero property currently has a private deck over water that is to be converted to a deck open to public access (**Figures 2 and 3**). The deck is supported by piles embedded into the shore bank revetment and seabed. In the conversion, the deck will be raised approximately 1 ft, increased in length by 2 ft out over the water, and 5 new piles will be installed to help support the new deck. The existing piles will remain.

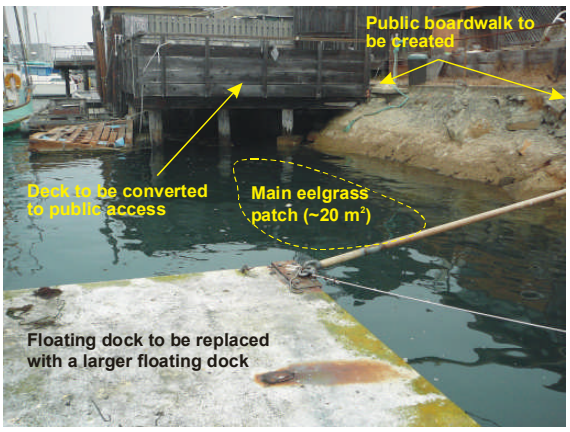

Figure 2. View looking north of deck and dock to be modified and where a portion of the public boardwalk will be installed.

- Another project component is adding a 10 ft wide public access boardwalk along the water's edge of both properties (**Figures 2 and 3**). A breezeway centered on the common boundary of both properties will provide access to the boardwalk from the street. To the north, the boardwalk will connect to the public viewing deck. To the south the boardwalk will connect to the neighboring south restaurant building (presently vacant, but formerly the Hofbrau, then the Pacific Cafe, and most recently DiStasio's). The new boardwalk will extend slightly over revetment along both properties. It will not be over water except when the tide levels are higher than approximately +2 ft mean lower low water (MLLW). At the most southern end of the boardwalk, two new piles will be installed to support the boardwalk where it is to connect to the building that is presently vacant.

- The 575 Embarcadero property currently has a floating dock (8 ft x 32 ft) that is to be replaced by a larger floating dock (8 ft x 70 ft), which will span both water lease sites (**Figures 2 and 3**). The new dock will be stabilized by struts attached to the shore, a system similar to what stabilizes the existing dock. This is to avoid having to install piles to stabilize the new dock and to avoid disturbing the seabed.

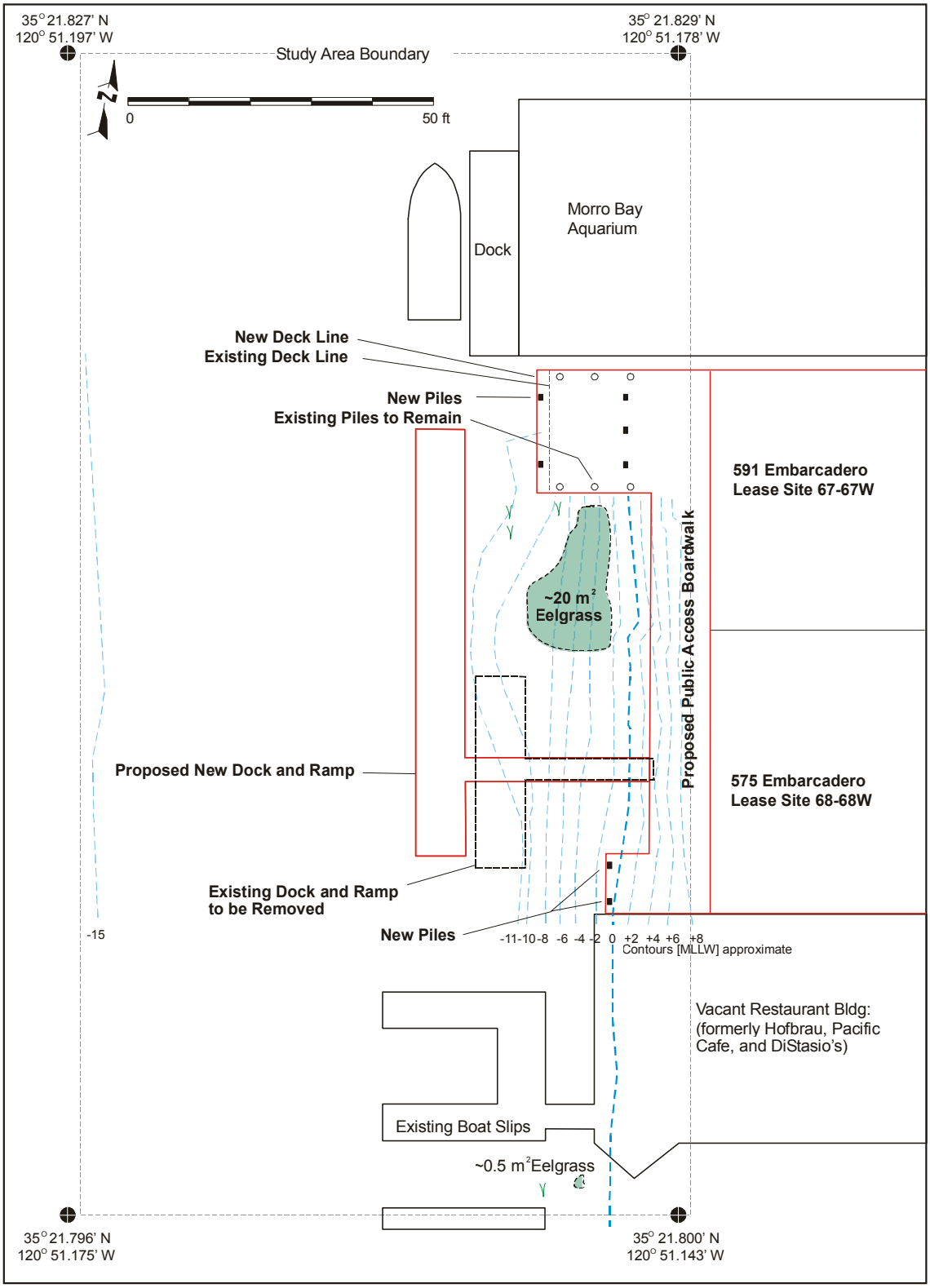

Figure 3. Proposed changes over water at 591 and 575 Embarcadero, Morro Bay, California and results of the eelgrass mapping survey on September 9, 2011.

Purpose

An eelgrass (*Zostera marina*) and *Caulerpa taxifolia* survey was conducted on September 9, 2011 at the adjoining properties of 591 and 575 Embarcadero as part of the City of Morro Bay development process (City Application No. UPO-140) (**Figure 3**). This was done to update the baseline needed for waterfront construction at those properties.

Eelgrass beds are known to occur in the general area, and are considered a Special Aquatic Site (SAS) by the U.S. Army Corps of Engineers, California Department of Fish and Game, U.S. Fish and Wildlife Service, and the National Marine Fisheries Service (NMFS). Eelgrass habitat is regulated under Section 404 of the Clean Water Act (CWA), and is also considered Essential Fish Habitat by NMFS. The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) set the Essential Fish Habitat (EFH) provisions to identify and protect important habitats of federally managed marine species. Surveys are required to map the extent and location of eelgrass in projects that may affect eelgrass.

The survey also included a careful search in the project area to determine the presence/absence of *Caulerpa taxifolia*, a highly invasive green algal species that has been introduced into California. *Caulerpa* reproduces largely by fragmentation, and is therefore susceptible to spreading from waterfront construction projects that disturb the seabed.

Methods

Eelgrass was mapped according to specifications of the Southern California Eelgrass Mitigation Policy (Revision 8), adopted by the National Marine Fisheries Service, U.S. Fish and Wildlife Service, and the California Department of Fish and Game.

Two biologists equipped with SCUBA completed the survey. The survey was done on September 9, 2011 over a period that extended approximately 1.5 hours before and after the 10:00 am high tide. The high tide level at noon was approximately +4 ft MLLW. Underwater horizontal visibility was approximately 8 ft. Depths recorded in the survey area were corrected based on National Oceanic and Atmospheric Administration predicted tides and times for Morro Bay.

The along-shore length of the survey area was 190 ft (58 m) and the offshore distance surveyed was 100 ft (30 m) from the top of revetment. This accounted for a 50 ft (15 m) perimeter surrounding all areas of proposed construction (**Figure 3**). Meter tapes were deployed underwater at appropriate locations to map the locations of eelgrass and to ensure the entire area was evenly searched. Patch sizes were estimated using a quadrat as a measuring device. Meter tapes were used to estimate the coverage of the larger eelgrass patches.

Eelgrass was also sampled for stem (turion) densities and blade lengths. Stem densities were determined in 10-0.25 m^2 (2.7 ft^2) quadrats placed in pure stands of eelgrass. The blade nearest each corner of each quadrat was measured for length to the nearest inch (2.5 cm).

Predominant species in the survey area were also recorded while mapping eelgrass and searching for the presence of *Caulerpa*.

Survey Results

The shore bank along both properties is a cement rock revetment that angles steeply downward from land into Morro Bay (**Figure 2**). The toe of the revetment is at a depth of approximately –9 ft MLLW. The seabed offshore is sand/mudflat.

Eelgrass and *Caulerpa* Mapping

A single dense patch of eelgrass (approximately 20 m^2, 215 ft^2) was present on the revetment between the existing floating dock and overhanging deck (**Figures 2 and 3**). This was the largest patch in the project area, and was sampled for stem densities and blade lengths (**Table 1**).

In addition to this patch, three single plants totaling less than 0.25 m^2 (2.7 ft^2) in area cover were present near the 'main' patch (**Figure 3**). Another patch of eelgrass (approximately 0.5 m^2, 5.4 ft^2) with a single plant nearby were both south and well away from the proposed construction. No other eelgrass was observed.

Table 1. Results of eelgrass stem density and blade measurements from 10-0.25 m^2 quadrats and 40 blade measurements.

	No. Stems / 0.25 m^2	Blade Lengths (cm)
Average	38	88
Max	50	152
Min	27	38

No *Caulerpa* was found. A separate report on the absence of *Caulerpa* was prepared and submitted to the NMFS, Southwest Region, Long Beach, CA.

Other Species Noted in the Survey

Revetment: Most of the revetment was covered by loose detritus material, but bladder chain kelp (*Sargassum muticum*) was the most conspicuous algal species, present as scattered individuals. Also present, but not abundant, were the red alga *Mastocarpus papillatus*, green sea lettuce (*Ulva* spp.), and rockweeds (*Fucus distichus*). Red branched algal species (*Sarcodiotheca gaudichaudii*, *Gracilaria sjoestedti*, and *Polysiphonia* spp.) were also present on the revetment. Limpets (*Lottia scabra* and *L. scutum*) and barnacles (*Chthamalus* spp., *Balanus* spp.) were the most conspicuous invertebrates on the revetment. Also, strawberry anemones (*Corynactis californica*), cup corals

(*Balanophyllia elegans*), and light bulb tunicates (*Clavelina huntsmani*) were present in small patches.

Sand/Mudflat: Gaper clams (*Tresus nuttallii*) and ornate tube worms (*Diopatra ornata*) were scarce-common on the seabed. The introduced bryozoan *Watersipora subtorquata* was present on hard structures in various places in the survey area.

Pilings: Pilings were covered mainly with hydroids, bryozoans, barnacles, and sea lettuce.

Discussion

The present survey was completed based on a request from the City of Morro Bay Planning Department to update maps of eelgrass and to search for *Caulerpa* in the project area, as it had been over four years (April 2007) since this was done for the project and a new baseline was needed. The mapping in both surveys (September 2011 and April 2007) found that the only habitat area where eelgrass occurred was on portions of the revetment that were not shaded by structures. Other revetment areas not shaded by structures were covered mostly with loose detritus material. No eelgrass was found offshore of the revetment on the sand/mudflat, possibly due to lower light and currents being too swift for seedlings to take hold.

Estimated Changes to Eelgrass and Eelgrass Habitat from the Project

Effects from the New Deck: No eelgrass or habitat for eelgrass should be affected by the proposed new viewing deck, as it will be nearly identical in footprint as the existing deck. While five new piles are proposed; three underneath the deck and two along the outer edge of the deck on the sand/mudflat, these areas are not considered ideal habitat for eelgrass, due to shading already occurring from the deck and that eelgrass has not been observed offshore of the revetment on the sand/mudflat.

Effects from the New Boardwalk: No eelgrass or habitat for eelgrass should be affected by shading from a newly constructed boardwalk along the water's edge of the two properties. The water's edge of the boardwalk will occur directly over the +2 ft MLLW tide level (approximate). Therefore, the boardwalk will cover the mid- and higher portions of the intertidal zone. Eelgrass does not grow at these elevations.

Effects from the New Dock: No eelgrass or habitat for eelgrass should be affected from the proposed new dock. The new dock is planned to be positioned so that it will not occur directly over the largest patch of eelgrass found in the project area. Also, its position will be over sand/mudflat where eelgrass has not been found.

Changes in Eelgrass Abundance and Distribution Between the April 18, 2007 and September 9, 2011 Surveys

The present survey completed on September 9, 2011 found the largest patch of eelgrass in the project area (on the revetment between the existing dock and overhanging deck) had declined in abundance, from approximately 37 m^2 (400 ft^2) in April 2007 down to approximately 20 m^2 (215 ft^2) in the present survey. The several single isolated plants found to be in close proximity to this patch in the present survey could have been remnant plants of the once larger patch. The apparent overall decrease in eelgrass abundance in the project area is consistent with a Morro Bay-wide net decline in eelgrass abundance that began in 2007 [2], which the decline continued into 2010 (pers. comm. Annie Gillespie, Morro Bay National Estuary Program, Monitoring Projects Manager).

Survey Timing

The National Marine Fisheries Service (NMFS) policy for eelgrass [3] states that: "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… Eelgrass surveys 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." Note that the present survey was completed in September, and therefore the eelgrass results should be valid until next March.

The NMFS survey policy for *Caulerpa* in non-infected systems, as found for the project area in the present survey, is: "Survey work is to be completed not earlier than 90 days prior to the disturbing activity and not later than 30 days prior to the disturbing activity and shall be completed, to the extent feasible, during the high growth period of March 1–October 31 [4]. Surveys outside of the high growth period shall be allowed on a case-by-case basis by the appropriate regulatory agency in consultation with NMFS and California Department of Fish and Game."

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[2] Tenera Environmental. 2010. Eelgrass (*Zostera marina*) Survey Report for the Morro Bay State Park Marina Maintenance Dredging Project. Prepared for Anchor QEA, LLC. Mission Viejo, CA. October 5, 2010.

[3] http://swr.nmfs.noaa.gov/hcd/policies/EELPOLrev11_final.pdf

[4] http://swr.nmfs.noaa.gov/hcd/caulerpa/ccp.pdf