

FIMARINE TAXONOMIC SERVICES, LTD.

Coastal Bluff Stabilization Project at the Inn at Sunset Cliffs: Intertidal Biological Assessment

January 23, 2020 (Revised September 29, 2021)

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Contents

1	Introduction	1
2	Project Description.....	1
3	Methods.....	3
4	Survey Results	3
4-1	Physical Description	3
4-2	Biological Resources.....	6
5	Sensitive Species	8
6	Discussion.....	9
6-1	Potential Impacts	9
6-1.1	Potential Impacts to Sensitive Species.....	9
6-2	Regulatory Setting.....	10
6-3	Mitigation Measures.....	11
7	Literature Cited	11

Appendix

Appendix A – Intertidal Biological Assessment Species Photo Index

List of Figures

Figure 1. Project location and vicinity map for the Inn at Sunset Cliffs Pier Project.	2
Figure 2. Project area at 1200 hours (0' MLLW).	3
Figure 3. Small opening observed along the existing vertical seawall. The vertical limit of marine algae growth along the vertical seawall as shown here marks the +4' MLLW elevation boundary.	4
Figure 4. Tidal zones and rock reef habitat mapped within the marine biological survey area.....	5
Figure 5. Reef ID #2 (90% turf algae/10% surfgrass).	6

List of Tables

Table 1. Rocky reef marine algae composition. Reef ID numbers correspond with habitat delineated above in Figure 4.	6
Table 2. Complete listing of all marine algae and invertebrates observed in the Project area.	7
Table 3. Special Status and Protected Species with the potential to occur within or near the Project area (USFWS 2019 and NMFS 2019a).	8

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1 Introduction

Marine Taxonomic Services, Ltd. (MTS) was contracted by the Inn at Sunset Cliffs in partnership with TerraCosta Consulting Group, Inc. to provide an intertidal biological assessment for the Coastal Bluff Stabilization Project at the Inn at Sunset Cliffs (Project) in Point Loma, California. The purpose for conducting the intertidal biological assessment was to comply with the California Coastal Commission's (CCC's) request that an intertidal marine biological survey be conducted of the intertidal habitats occurring at the toe of the bluff within and immediately adjacent to the Project area prior to the start of Project construction (Figure 1).

The following intertidal biological assessment report provides delineations of biological zones and intertidal habitats occurring at representative intertidal elevations, along with an inventory of the common and sensitive intertidal flora and fauna occurring with the proposed Project area. Findings collected during the marine biological survey are analyzed to evaluate how the proposed Project could potentially impact these habitats and species. Sensitive and habitat forming species observed within the Project area are described within the following report, along with a brief synopsis of the federal and state regulations that were reviewed when determining mitigation measures for identified potential impacts.

2 Project Description

The proposed Project includes the installation of a new overlapping drilled pier (secant pile) wall immediately behind the existing 66-year-old cast-in-place concrete seawall below the Inn at Sunset Cliffs property. The exposed secant pile wall behind the cast-in-place wall will be structurally tied-back and the exposed face will be architecturally treated to blend in with the existing geologic exposures. The existing masonry block wall on top of the cast-in-place wall along the northern half of the property will be removed, along with the recently constructed geobag wall that was placed under Emergency Permit G-6-19-0001 along the southern half of the property. The rock revetment that was placed under the same Emergency Permit and is located directly below the geobag wall will also be removed. Additionally, all of the upper southerly masonry block wall that collapsed in January/February 2019 will be removed. The wall along the southerly edge of the existing failed lower deck will be reconstructed, as will the southerly property line stairway.

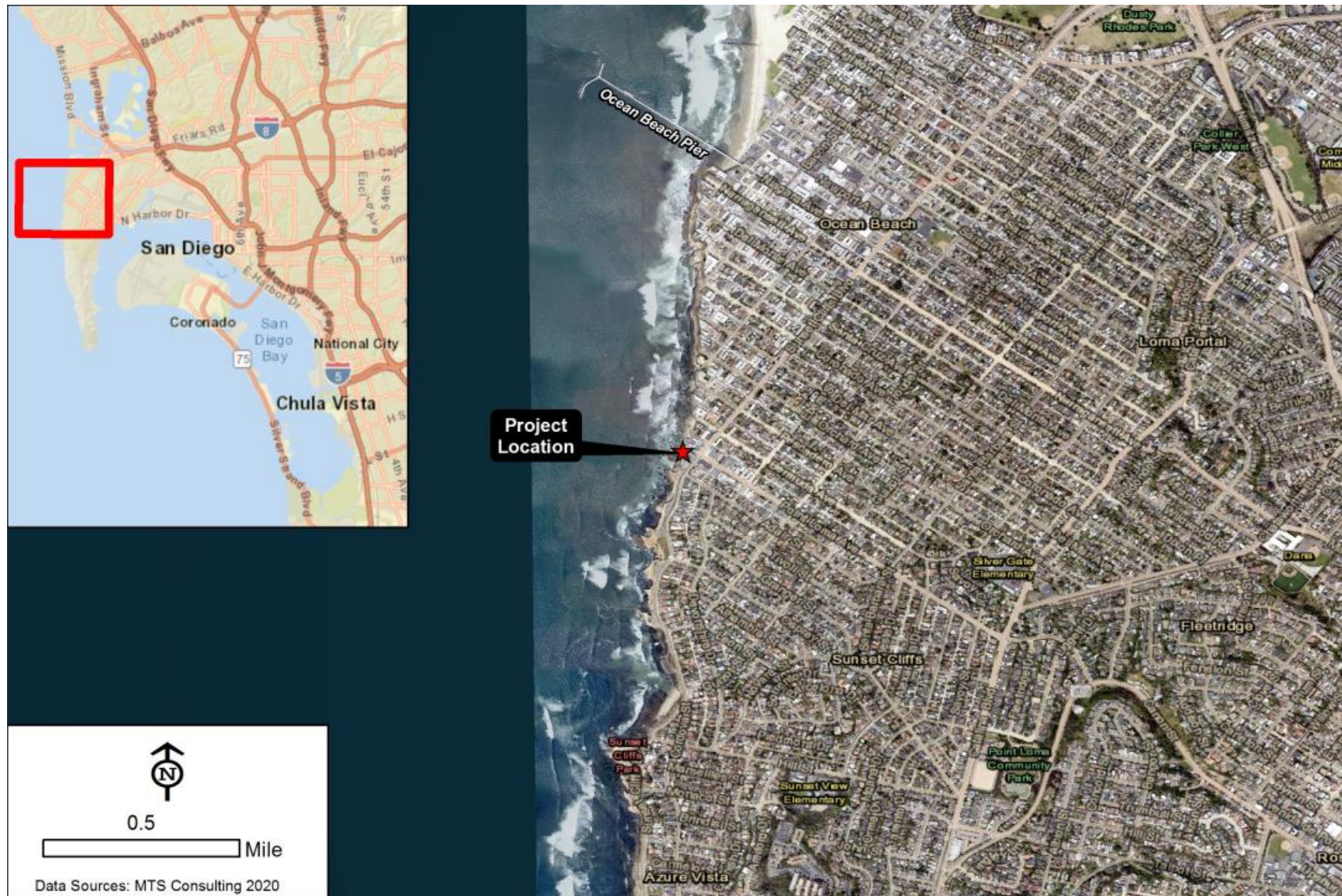


Figure 1. Project location and vicinity map for the Inn at Sunset Cliffs Pier Project.

A new lower concrete viewing deck will be constructed, having the same approximate dimensions and footprint as the existing viewing deck. All drilling activities required for installing the proposed secant pile wall will occur behind the existing 66-year-old cast-in-place concrete seawall. Drilling into intertidal bedrock, removing the existing riprap revetment, and other bluff-stabilizing activities may have adverse impacts on rocky intertidal species and habitat immediately below and offshore of the Inn at Sunset Cliffs property. As a result, MTS biologists completed an intertidal biological survey within the proposed Project area, so that any potentially adverse impacts could be identified, and mitigation measures could be recommended that best suit habitats and species observed during the survey.

3 Methods

MTS biologists Robert Mooney, Jonathan Schram, and Hannah Joss conducted a marine biological survey at the Inn at Sunset Cliffs on December 23, 2019 between the hours of 1000 and 1400 during a period of low tides (2.0 feet mean lower low water (MLLW) at 1030 and -0.75 feet MLLW at 1400). The 0' MLLW boundary and the toe of the riprap revetment at the foot of the vertical seawall were mapped utilizing a differential global positioning device (dGPS). Rocky reef habitat identified below the toe of the riprap revetment, along with the shoreward extent of marine algal growth was also surveyed. A species list was compiled for the entire survey area (Appendix A), along with an analysis of marine algae and surfgrass distribution across all surveyed rocky reef habitat. The results of this survey are provided below in section 4 of this report. All elevations were estimated relative to tidal elevations at the time of the survey based on the NOAA tidal elevation monitoring station 9410230 at Scripps Pier in La Jolla, CA.

4 Survey Results

4-1 Physical Description

The Project area consists of intertidal habitat made up of rocky reefs, scattered sandstone formations, and a riprap revetment leading up to the existing cast-in-place concrete seawall (Figure 2). Submerged rocky reefs were surrounded by coarse sand, characteristic of other nearby San Diego beaches. A previous survey conducted by Merkel & Associates Inc. (2005) had revealed a small cave and several other openings within the vicinity of the vertical seawall within the proposed Project area. The previously surveyed cave, plus nearly all of the previously documented openings in the vicinity of the vertical seawall were no longer present as they were filled as part of previous bluff stabilization efforts. The only exception observed by MTS

biologists was a small, partially filled opening located along the northwest facing section of the existing vertical seawall (32.441166°N, -117.152045°W) (Figure 3).

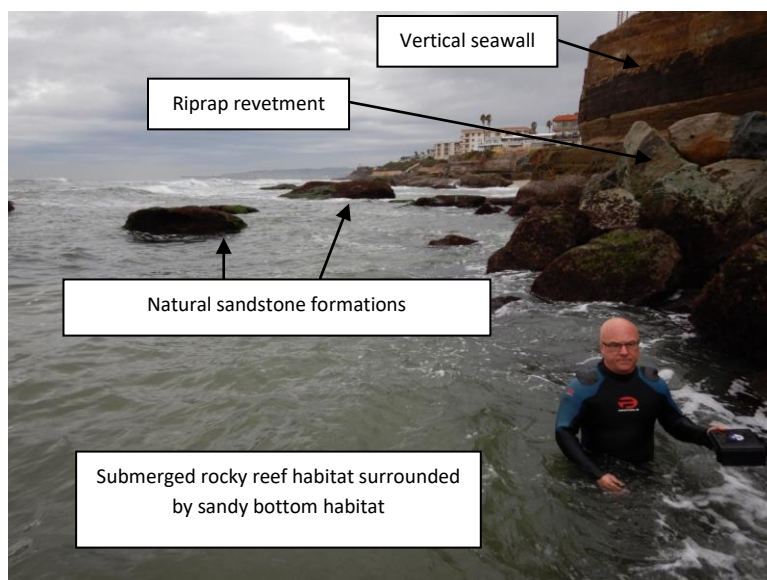


Figure 2. Project area at 1200 hours (0' MLLW).



Figure 3. Small opening observed along the existing vertical seawall. The vertical limit of marine algae growth along the vertical seawall as shown here marks the +4' MLLW elevation boundary. Elevations are approximate and based on rough measurements to the water line and observed tidal elevations at Scripps Pier (NOAA Tidal Station 9410230).

Submerged areas surrounding the riprap revetment consisted primarily of coarse sand with wave-cut bedrock lying underneath. The riprap revetment itself contained numerous crevices within which small marine invertebrates could seek refuge. Occurring just offshore from the toe of rocky revetment was a small system of rocky reefs that stretched the full length of the survey area (Figure 4). In all, 54 square meters of rocky reef habitat was surveyed between 15 distinct rocky reef “microhabitats”. These rocky reefs consisted of gently sloping wave-cut sandstone and were exposed to high wave energy and ocean swells. Each rocky reef microhabitat supported turf forming algae species, surfgrass, or a mixture of turf and surfgrass. The limits of each rocky reef microhabitat surveyed, along with the relative composition turf algae and surfgrass within each of these rocky reef microhabitats is listed in Table 2.



Figure 4. Tidal zones and rock reef habitat mapped within the marine biological survey area.

Table 1. Rocky reef marine algae composition. Reef ID numbers correspond with habitat delineated above in Figure 4.

Reef ID	Location	Area (square meters)	% Turf Algae	% Surfgrass
1	32.441206°N, -117.152039°W	0.68	30%	70%
2	32.441203°N, -117.152045°W	4.12	90%	10%
3	32.441199°N, -117.152056°W	6.43	50%	50%
4	32.441191°N, -117.152067°W	8.29	0%	100%
5	32.441182°N, -117.152059°W	2.03	0%	100%
6	32.441178°N, -117.152051°W	5.21	100%	0%
7	32.441176°N, -117.152069°W	1.06	0%	100%
8	32.441170°N, -117.152084°W	1.66	0%	100%
9	32.441159°N, -117.152096°W	7.44	40%	60%
10	32.441150°N, -117.152098°W	3.72	10%	90%
11	32.441141°N, -117.152100°W	6.44	0%	100%
12	32.441137°N, -117.152090°W	0.58	0%	100%
13	32.441105°N, -117.152084°W	4.7	0%	100%
14	32.441094°N, -117.152087°W	1.13	0%	100%
15	32.441183°N, -117.152034°W	0.26	0%	100%

4-2 Biological Resources

Each of the 15 rocky reef microhabitats surveyed within the Project area were completely covered by either turf forming algae (generally *Corallina* spp., *Mastocarpus* spp., *Gelidium* spp., *Lithothrix aspergillum*) or surfgrass (*Phyllospadix torreyi*). While some microhabitats consisted either entirely of seagrass or entirely of turf algae, other microhabitats supported both vegetation types (Figure 5). Algae growth occurring within the upper intertidal (between 0' MLLW and +4' MLLW) consisted predominately of a mix of turf algae and crustose and coralline red algae species, with crustose algae growing along the vertical seawall up to just below +4' MLLW. Mid- to low- intertidal zones were

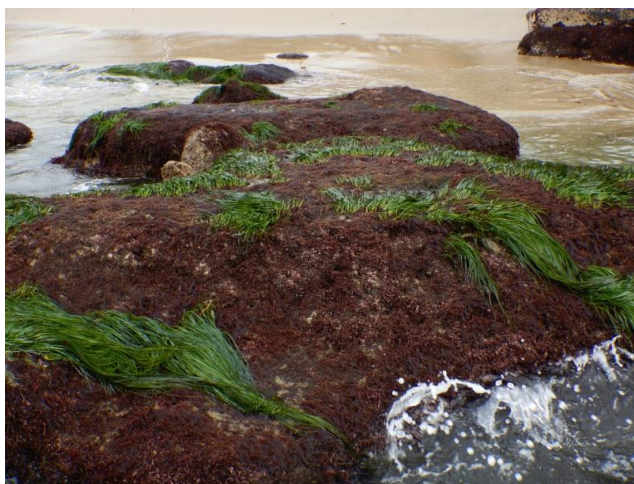


Figure 5. Reef ID #2 (90% turf algae/10% surfgrass).

characterized by the highest diversity of marine algae species, including species of turf algae, seagrass, green algae (*Ulva* spp.) and brown algae (*Dictyopteris undulata*, *Dictyota flabellata*, and *Egregia menziesii*). The observed *E. menziesii* is a kelp species that was rare (2 observations of abraded thalli) in the survey area. There were no other kelp species observed during the intertidal biological survey. All marine algae species that were observed within the Project area, in addition to all marine invertebrates that were identified within the Project area, are listed below in Table 2. Photographs of listed species are provided at the end of this report as Appendix A.

Table 2. Complete listing of all marine vegetation and invertebrates observed in the Project area.

Common Name	Species Name
Marine Vegetation	
Green algae	<i>Ulva</i> spp.
Brown algae	<i>Dictyopteris undulata</i>
Brown algae	<i>Dictyota flabellata</i>
Brown algae – Feather boa kelp	<i>Egregia menziesii</i>
Red algae	<i>Corallina</i> spp.
Red algae	<i>Gelidium</i> spp.
Red algae	<i>Lithothrix aspergillum</i>
Red algae	<i>Mastocarpus</i> spp.
Torrey's surfgrass	<i>Phyllospadix torreyi</i>
Marine Invertebrates	
Chiton	<i>Mopalia</i> spp.
Chiton	<i>Nuttallina</i> spp.
Chiton	<i>Tonicella</i> spp.
Dog whelk	<i>Nucella</i> spp.
Gooseneck barnacle	<i>Pollicipes polymerus</i>
Owl limpet	<i>Lottia gigantea</i>
Limpet	<i>Lottia limatula</i>
Shield limpet	<i>Lottia pelta</i>
Rough limpet	<i>Lottia scabra</i>
Limpet	<i>Lottia scutum</i>
Lined shore crab	<i>Pachygrapsus crassipes</i>
California mussel	<i>Mytilus californianus</i>
Periwinkle	<i>Littorina</i> spp.
Pink acorn barnacle	<i>Tetraclita rubescens</i>
Sand castle worm	<i>Phragmatopoma californica</i>
Black turban snail	<i>Tegula funebris</i>

Similar to marine vegetation species surveyed, the abundance and density of marine invertebrates surveyed within the Project area were dependent upon water level and exposure physical forces such as sunlight and atmospheric exposure and wave energy. The upper intertidal zone was characterized predominately by barnacles (*Pollicipes polymerus* and *Tetraclita rubescens*), mussels (*Mytilus californianus*), chitons (*Mopalia* spp., *Nuttallina* spp., and *Tonicella* spp.), limpets (*Lottia* spp.), and periwinkles (*Littorina* spp.). Lined shore crab (*Pachygrapsus crassipes*) were observed utilizing the many interstitial spaces and crevices present within the seawall opening and throughout the riprap revetment. Various species of intertidal mollusks, including dog whelk (*Nucella* sp.) and black turban snails (*Tegula funebris*) as well as occasional clusters of sandcastle worm (*Phragmatopoma californica*) were also characteristic of the mid- to low-intertidal zones surveyed.

Sensitive species, including green sea turtles, marine mammals, or abalone (*Haliotis* spp.) were not observed. Despite not being observed at the time of the intertidal biological survey, the Project area does occur within the range of the above mentioned sensitive species and are discussed in further detail below in section 5.

Other common marine intertidal or shallow subtidal invertebrate species known to occur in intertidal and subtidal waters of Southern California, including green sea anemones (*Anthopleura xanthogrammica*), purple sea urchins (*Strongylocentrotus purpuratus*), sea hares (*Aplysia* spp.), and sea stars (*Pisaster* spp.) were not observed by MTS biologists during the intertidal biological survey.

5 Sensitive Species

In addition to accounting for all marine species identified during the Project's intertidal biological survey described above, an assessment was also conducted to determine other sensitive species holding special or protected status that may occur within, or adjacent to the designated Project area. Based on species lists provided by the US Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) (USFWS 2019 and NMFS 2019a), an analysis of the range and habitat preferences of sensitive species that have a potential to occur within or nearby the Project area was completed, and summarized in Table 3 below.

Table 3. Special Status and Protected Species with the potential to occur within or near the Project area (USFWS 2019 and NMFS 2019a).

Common Name	Scientific Name	Conservation Status	Likelihood to Occur
Sea Turtles			
Green sea turtle	<i>Chelonia mydas</i>	Endangered	Possible
Leatherback sea turtle	<i>Dermochelys coriacea</i>	Vulnerable	Possible
Loggerhead sea turtle	<i>Caretta caretta</i>	Threatened	Possible
Olive Ridley sea turtle	<i>Lepidochelys olivacea</i>	Vulnerable	Rare
Marine Mammals			
Blue Whale	<i>Balaenoptera musculus</i>	Endangered	Unlikely to Occur
Bryde's Whale	<i>Balaenoptera brydei</i>	Endangered	Unlikely to Occur
Bottlenose dolphin	<i>Tursiops truncatus</i>	Protected	Likely to Occur
California sea lion	<i>Zalophus californianus</i>	Protected	Likely to Occur
Dall's porpoise	<i>Phocoenoides dalli</i>	Protected	Unlikely to Occur
Fin whale	<i>Balaenoptera physalus</i>	Endangered	Unlikely to Occur
Gray whale	<i>Eschrichtius robustus</i>	Protected	Unlikely to Occur
Guadalupe fur seal	<i>Arctocephalus townsendi</i>	Vulnerable	Unlikely to Occur
Humpback whale	<i>Megaptera novaeangliae</i>	Protected	Unlikely to Occur
Minke whale	<i>Balaenoptera acutorostrata</i>	Protected	Unlikely to Occur
Northern elephant seal	<i>Mirounga angustirostris</i>	Protected	Unlikely to Occur
Pacific harbor seal	<i>Phoca vitulina</i>	Protected	Likely to Occur
Risso's dolphin	<i>Grampus griseus</i>	Protected	Unlikely to Occur
Short-beaked common dolphin	<i>Delphinus delphis</i>	Protected	Likely to Occur
Sperm whale	<i>Physeter macrocephalus</i>	Vulnerable	Unlikely to Occur
Striped dolphin	<i>Stenella coerulescens</i>	Protected	Unlikely to Occur
Marine Invertebrates			
Black Abalone	<i>Haliotis cracherodii</i>	Endangered	Possible
Green Abalone	<i>Haliotis fulgens</i>	Vulnerable	Likely to Occur
Pink Abalone	<i>Haliotis corrugata</i>	Vulnerable	Possible
Pinto (threaded) Abalone	<i>Haliotis kamtschatkana</i>	Vulnerable	Possible
Red Abalone	<i>Haliotis rufescens</i>	Vulnerable	Possible
White Abalone	<i>Haliotis sorenseni</i>	Endangered	Possible

Of the sea turtle and marine mammal species listed above, green sea turtle (*Chelonia mydas*), California sea lion (*Zalophus californianus*), and Pacific harbor seal (*Phoca vitulina*), are the most likely species to utilize habitats falling immediately within the proposed Project area. Other sensitive species of sea turtles and marine mammals such as dolphins and whales that may be present during Project construction would likely occur further offshore from the Project area. Further evaluation of potential Project impacts to these species are discussed in section 6 of this report.

All species of abalone listed in Table 3 have the potential for occurring within the Project survey area (Ian Taniguchi [CDFW Senior Environmental Scientist] personal comm.). Green abalone (*Haliotis fulgens*) in particular thrive in the shallow subtidal rocky reef habitat such as those microhabitats surveyed within the Project area (Parnell et al. 2005). Abalone species in California vary in status from populations

bordering on extinction (white abalone) to recovering, yet still at risk (northern California red abalone) (CDFW 2005). The ultimate goal of current abalone recovery efforts is to move all historical commercial abalone species from a position of vulnerability to a position where a sustainable fishery for these species can be established and monitored under a long-term management plan (CDFW 2005). As such, an analysis of the Project's construction activity impacts to abalone habitat within the survey area is discussed in further detail below in section 6 of this report.

6 Discussion

6-1 Potential Impacts

Based on the Project description, the proposed coastal bluff stabilization project will have no significant impact on surveyed rocky reef habitats adjacent to the toe of the riprap revetment, the riprap revetment itself, or the existing vertical seawall. Although the rocky reef habitats surveyed were found to support a diverse assemblage of marine species, no rocky reefs would occur within areas where construction activity would occur. Furthermore, the existing rock riprap revetment surveyed was not found to support a unique intertidal community. Because the proposed secant pile wall will be installed behind the existing vertical seawall, none of the marine algae or invertebrates surveyed on both the seawall and inside of the small opening within the seawall would be impacted during installation. Moreover, the demolition of the cast in place wall and block wall in front of the secant pile wall will not impact sessile intertidal communities because those features are above the high tide line. Turbidity impacts would not occur as a result of the installation of the proposed secant pile wall as all drilling would be contained behind the existing cast-in-place concrete wall.

The only potential impacts to surveyed habitats and species observed on site that may occur as a result of the proposed project would be limited to the proposed removal of the existing riprap revetment. The toe of the riprap revetment is located below 0' MLLW and was partially submerged during the intertidal biological survey. There were minor amounts of algae, sessile invertebrates, and motile marine invertebrates such as lined shore crab, limpets, chitons, and snails observed utilizing attached to or finding refuge in the interstitial spaces created between riprap boulders. Therefore, many of the marine invertebrates and algae utilizing the riprap revetment will be displaced, crushed, or injured during the riprap removal process. However, removal of the riprap will restore the native rocky community behind the riprap to the pre-project condition prior to the emergency placement of riprap. That area is anticipated to rapidly recolonize with a similar suite of native organisms such that the impact of riprap removal is considered temporary and less than significant.

Any unanticipated damage or loss of rocky intertidal habitat mapped in Figure 4 of this report would be considered a significant impact and would require mitigation. Mitigation measures are provided below that would reduce the impacts to less than significant (refer to Section 6.3).

6-1.1 Potential Impacts to Sensitive Species

While no sea turtles or marine mammals were observed by MTS biologists during the intertidal biological survey, sea lions and harbor seals are very common throughout San Diego, and no barriers currently exist that would prevent them from utilizing the Project area. Furthermore, sea turtles are known to forage on submerged marine algae, including those species observed on rocky reef habitats mapped within the Project area. Finally, while other marine mammals such as dolphins or whales may be observed offshore from the Project area during Project construction, construction activities required for this Project would not generate noise levels high enough to incur take at the inshore limits where

dolphins or whales might occur; there would be no direct interaction between the Project and these species.

No abalone were observed during the intertidal biological survey; however, it is possible that abalone were present in areas that were submerged and difficult to see in high surf conditions. Any abalone that may have been present would have been in lower subtidal areas below the toe of the riprap revetment, and would be outside of the construction footprint for the proposed Project. No abalone were observed within the riprap revetment or along the existing vertical seawall. Therefore, it is unlikely that the proposed Project would adversely affect any of the species of abalone listed in Table 3 of this report. However, it is possible for abalone species to colonize the area as the habitat is suitable.

6-2 Regulatory Setting

Federal and State regulations that relate to the proposed Project include the Endangered Species Act, the Coastal Zone Management Act, the Migratory Bird Act, the Magnuson-Stevens Fishery Conservation and Management Act, the Marine Mammal Act, the Clean Water Act, and the California Coastal Act (Merkel & Associates, Inc. 2005). The most current versions of all of the listed legislation were reviewed as of January 20, 2020 (CA P.R.C 3000-30900 (2019), 33 U.S.C 1251 et seq. (2002), 16 U.S.C. § 1451 et seq. (2005), 16 U.S.C. §§1531-1544 (1983), 16 U.S.C. 1801 - 1891(d)) (2014), 16 U.S.C. 1361-1383b, 1401-1406, 1411-142 1(h) (2018), 16 U.S.C. §§703-711 (2017)). Based on the proposed Project description, the proposed Project would not violate any known Federal or State regulations. Potential impacts to sensitive species such as marine mammals and sea turtles, and any potential impacts to unlisted species would be avoided by following mitigation measures as outlined in section 6.3 of this report.

The Magnuson-Stevens Fishery Management and Conservation Act (MSA) (Code of Federal Regulations (CFR) Title 50, Chapter VI, Part 600), requires the delineation of essential fish habitat (EFH) for all managed species. Federal action agencies which fund, permit, or carry out activities that may adversely impact the EFH are required to consult with the National Marine Fisheries Service (NMFS) regarding the potential effects of their actions on the EFH and respond in writing to the NMFS's recommendations.

The MSA defines an EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity". For the purpose of interpreting the definition of EFH: "waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle. A healthy ecosystem is defined under the MSA as, "an ecosystem where ecological productive capacity is maintained, diversity of the flora and fauna is preserved, and the ecosystem retains the ability to regulate itself.

Following a thorough review of the latest Fishery Management Plans (FMPs) (PFMC 2019 and 2016a) and by running an analysis of the latest EFH mapping GIS software regularly maintained and updated by NOAA Fisheries (NOAA Fisheries 2019), it was determined that the surveyed area does include designated EFH for Pacific coast groundfish and coastal pelagic species (PFMC 2019 and 2016a). It was also determined that the rocky reef habitats mapped as part of the intertidal biological survey fit NMFS' criteria for a special subset of EFH defined as "habitat areas of particular concern" (HAPCs), which are distinguished by their exceptional ecological value and low tolerance to anthropogenic stressors (PFMC 2019). Based on the proposed Project description however, designated EFH within and adjacent to the Project area will not be impacted, therefore no further EFH assessment beyond a "no effect"

determination should be required. Additionally, mitigation measures as described in Section 6.3 would make any potential impacts to EFH and rocky reefs adjacent to the Project area negligible.

6-3 Mitigation Measures

Intertidal habitats surveyed within the Project area were generally healthy and showed no unique characteristics distinguishing them from other surrounding intertidal habitats common in San Diego County. Sea palms (*Eisenia arborea*), or other kelp species common in waters surrounding the Project area were not observed by MTS biologists during the intertidal biological survey, however this was not unexpected, as shorter photoperiods characteristic of winter months are known to limit kelp growth. Kelp that was noted during the Merkel & Associates, Inc. survey in 2005 was observed in June, when conditions were more favorable for kelp growth. None of the proposed construction activities are expected to adversely impact kelp, or habitat where kelp could grow during favorable periods.

While impacts to marine mammals or sensitive species are unlikely based on occurrence, if they were to occupy the site during construction, impact could occur. Significant impacts could occur to any sea lion, harbor seal, or sea turtle if those species were to occupy the Project area during construction. Any Project actions that result in modification of behavior would be considered Level B harassment of these sensitive species. Injury could result if riprap or other materials were dislodged and allowed to fall toward any of these sensitive species; this would represent Level A harassment (injury or death). These impacts would be considered significant. However, impacts to sea lion, harbor seal, and green sea turtle can be mitigated through monitoring regardless of the potential. During in-water construction activities such as the removal of riprap, a marine biological observer shall be on site to monitor construction activities. The observer shall have the authority to halt or modify construction activities in the event any sensitive species is observed and if the marine biological observer feels the activity has the potential to harm the sensitive species. Note that the previous draft of this report indicated a potential need for marine mammal monitoring due to the potential to produce noises that could disturb marine mammals. After consultation with the engineer relative to construction means and methods, it is the opinion of MTS that the potential for noise impacts to marine mammals because of landside drilling is less than significant.

Additionally, removal of the riprap may result in injury or death of any abalone species that occurs on the riprap or any adjacent surface where riprap could fall during removal. Although abalone were not observed during this survey, the Project area does contain suitable abalone habitat and abalone could colonize the Project area prior to construction. Any impact to abalone species would be considered significant. To avoid impact, the following mitigation measure is proposed. An abalone survey shall be performed within all intertidal and subtidal areas within 5 meters of the proposed in-water work area (riprap removal area). The abalone survey shall be conducted within 7 days of the start of in-water work. The survey shall be considered valid for 30 days and therefore repeated if in-water work takes more than 30 days or is delayed. If abalone are identified, the Project will be delayed until NOAA Fisheries can be consulted and a plan to protect in place or abalone relocation can be performed.

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The Clean Water Act (33 U.S.C 1251 et seq.) (2002).

The Coastal Zone Management Act (16 U.S.C. § 1451 et seq.) (2005).

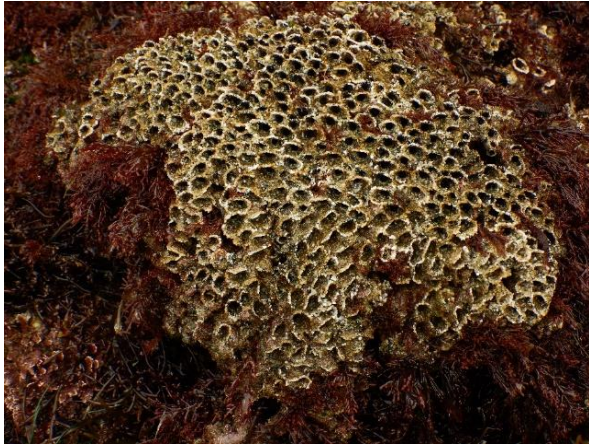
The Endangered Species Act (16 U.S.C. §§1531-1544) (1983).

The Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1801 - 1891(d)) (2014).

The Marine Mammal Protection Act (16 U.S.C. 1361-1383b, 1401-1406, 1411-1421(h)) (2018).

The Migratory Bird Act (16 U.S.C. §§703-711) (2017).

Appendix A – Intertidal Biological Survey Species Photo Index



Sand Castle Worm
(*Phragmatopoma californica*)



Lined shore crab
(*Pachygrapsus crassipes*)



Gooseneck barnacle (*Pollicipes polymerus*) and
California mussel (*Mytilus californianus*)



Pink acorn barnacle
(*Tetraclita rubescens*)



Limpets
(*Lottia limatula*, *L. scabra*, *L. scutum*)



Periwinkle (*Littorina* spp.) and Limpets (*Lottia*
limatula, *L. scabra*, *L. scutum*)



Chiton (*Mopalia* spp.) and
Limpets (*Lottia scabra*, and *L. pelta*)



Owl limpet
(*Lottia gigantea*)



Black turban snail
(*Tegula funebris*)



Dog whelk
(*Nucella* sp.)



Brown algae
(*Egregia menziesii*)



Green algae
(*Ulva* spp.)



Red algae
(*Corallina* spp., *Mastocarpus* spp., *Gelidium* spp., and *Lithothrix asperqillum*)



Torrey's surfgrass
(*Phyllospadix torreyi*)



Red algae
(*Mastocarpus* spp.)