# APPENDIX N

# COMMENTS ON MARINE RESOURCES

State of California – Natural Resources Agency
DEPARTMENT OF FISH AND GAME
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***EDMUND G. BROWN, Jr., Governor***
***CHARLTON H. BONHAM, Director***

December 18, 2012

Mr. Jason Ramos
California State Lands Commission
100 Howe Avenue, Suite 100-South
Sacramento, CA 95825

**Subject: Analysis of Impacts to Public Trust Resources for the Broad Beach Restoration Project**

Dear Mr. Ramos:

The Department of Fish and Game (Department) has reviewed the Analysis of Impacts to Public Trust Resources (APTR) for the Broad Beach Restoration Project (Project) prepared for the California State Lands Commission (SLC) by AMEC Environment and Infrastructure, Inc. The Broad Beach Geological Hazard Abatement District (District) is the Project proponent. According to the SLC, the District's implementation of the Project is statutorily exempt from the California Environmental Quality Act (CEQA) because an "[i]mprovement caused to be undertaken…and all activities in furtherance thereof or in connection therewith, shall be deemed to be specific actions necessary to prevent or mitigate an emergency…" (Public Resources Code §§ 26601 & 21080 (b)(4)). The District proposes to address the emergency rip-rap revetment and extensive beach erosion at Broad Beach in the City of Malibu, Los Angeles County, through beach and sand dune restoration. Broad Beach extends laterally for more than 6,700 feet from Lechuza Point to Trancas Creek which is located immediately adjacent to the western parking lot for Zuma Beach County Park. The Project is located in the Point Dume State Marine Conservation Area (SMCA) which is protected under California Code of Regulations Title 14 section 632.

As a trustee for the State fish and wildlife resources, the Department has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants and habitat necessary for biologically sustainable populations (Fish and Game Code, Section 1802). In this capacity, the Department administers the Marine Life Protection Act (MLPA) and other provisions of the California Fish and Game Code and California Code of Regulations Title 14 that afford protection to the fish and wildlife of the State. The Department is a Trustee Agency for purposes of CEQA (14 C.C.R. Section 15386(a)). Under the MLPA, the Department is responsible for marine biodiversity protection in coastal marine waters of California. Pursuant to our statutory authority, the Department submits the following concerns, comments, and recommendations regarding the project.

The proposed Project would include the following beach and dune restoration activities and ongoing maintenance elements:

- An estimated 42 acres of sand dune restoration and beach widening would require approximately 600,000 cubic yards or more of beach and dune compatible sand. The beach restoration would require 500,000 cubic yards and the dune restoration 100,000 cubic yards.

- Burial of the existing emergency revetment from the landward edge of the widened nourished beach by placing imported beach quality sand over the existing revetment to create a restored dune.

- Dredging of beach compatible material at an offshore borrow site or sites and delivery of the dredged material from a holding vessel via dredge discharge pipeline. As an alternative to offshore sources, collect sand from a stockpile adjacent to Calleguas Creek in Ventura County located near the intersection of Los Posas Road and Hueneme Road and transport the sand by truck. The offshore borrow sites identified in the APTR are located offshore of Trancas Canyon (dune restoration sand), offshore of the City of Manhattan Beach, offshore of Dockweiler State Beach, and material from Ventura Harbor. The Manhattan Beach and Dockweiler State Beach borrow sites are located in Santa Monica Bay.

- A reservoir of sand would be established at the eastern end of the Project site to be used for future maintenance of the beach and dune habitat which would also include planting of native dune plant species.

- Back-passing, defined as the grooming and movement of sand, will be conducted from one end of the beach footprint to the other. Approximately 75,000 cubic yards of sand would be moved during back-passing on an annual or bi-annual basis. The back-passing activity would occur over the life of the Project which is identified as at least twenty years.

- The Project also includes one additional beach sand replenishment project on Broad Beach in approximately 8 to 10 years for beach maintenance and erosion control.

**Department Comment Letter on Broad Beach Notice of Preparation**

In April of 2011, the SLC distributed a Notice of Preparation (NOP) for a Draft Environmental Impact Report for the Broad Beach Restoration Project (SCH 2011041052). The Project and several of the alternatives proposed in the current APTR contain almost identical components as the Project described in the NOP. Please be advised the Department commented on the NOP where we identified our concerns, comments and recommendations regarding the proposed Project.

The Department believes that the concerns, comments, and recommendations identified in our May 18, 2011 NOP comment letter are still applicable to the current Project as proposed in the APTR. We recommend that the CSLC adequately address

our concerns, comments and recommendations prior to the finalization of the APTR. We have attached that letter for your convenience.

**Marine Fish and Wildlife and Habitat Impacts**

The Department does not support the preferred Project and similar alternatives as identified in the APTR since it will result in substantial adverse (long term and/or temporary) impacts to fish and wildlife resources and their habitats within the Point Dume SMCA. The APTR, beginning at Page 3.3.-50, identifies significant environmental impacts to the Point Dume State Marine Conservation Area, including the direct burial of approximately 2 acres of rocky intertidal habitat," resulting in "100% mortality to the intertidal and subtidal organisms." The mitigation proposed for this impact, construction of a low-relief artificial reef, is speculative.

The APTR indicates that the initial beach restoration portion of the project will bury (under approximately 10 to 12 feet of sand) existing tidepools, intertidal and subtidal reefs, surf grass, and eelgrass habitat that is located at the western end of the Project footprint. Impacts would also include permanent or temporary sedimentation, scour and crushing of reefs, tide pools, surfgrass, eelgrass, seaweed, and kelp beds that will in turn have adverse impacts to the associated marine life communities that utilize these habitats. Potential indirect post-construction adverse impacts may include reef and rock burial from sediment transport and sand scouring. In addition, the beach restoration and back-passing will impact existing sandy beach habitat. These habitats are unique and critical to the preservation and maintenance of the vast array of fish and wildlife resources that utilize these areas of the Point Dume SMCA. The Department recognizes that the APTR includes minimization measures that partially address these impacts. However, the Department does not believe these minimization measures are sufficient to protect the various habitats that occur in the Project footprint.

Point Dume SMCA/Point Dume SMR are an important cluster of MPAs that provide moderate or greater levels of key hard bottom habitats, including rocky shores, nearshore reefs ((0-30meters(m)), 30m and deeper reefs, as well as biogenic habitats that are support by nearshore reef habitats including kelp and surfgrass. Moreover, the kelp and shallow 0-30m hard bottom habitats within these two MPAs facilitate dispersal and connectivity along the mainland between the Campus Point SMR and the cluster of MPAs off Palos Verdes (Point Vicente No Take SMCA and Abalone Cove SMCA). These two habitats in particular exhibit patchy distribution along the mainland of the Santa Barbara Channel, and therefore crucial to the fabric of the regional south coast MPA network which was carefully crafted by a wide range of ocean users and informed by scientific input during the planning process for the south coast MPAs. The primary distribution of these habitats in the Point Dume SMCA is the western portion of the MPA, in between Lachuza Point and Trancas Creek, directly conflicting with the proposed project. In fact, the size of this MPA was created deliberately large enough to encompass this particular area containing these key habitats. Removal of any of this habitat may jeopardize the size and spacing requirements set forth by the MLPA South Coast Science Advisory Team, which in turn, may create a less effective South Coast network and may fail to meet the goals of the MLPA.

The regulations that were established for the Point Dume SMCA do not have provisions to allow for significant or adverse impacts that would require compensatory mitigation within this area. In order to protect marine resources within the Point Dume SMCA and to comply with the specific laws and regulations pertinent to the Point Dume SMCA, the Department recommends that the intertidal and subtidal habitat impacts from the Project or any other chosen alternatives be avoided. In addition we recommend that SLC convene a technical advisory committee consisting of both state and federal resource agencies (the Department, U.S. Fish and Wildlife Service, NOAA Fisheries) as well as the U.S. Army Corp of Engineers, U.S. Environmental Protection Agency, California Coastal Commission and the Los Angeles Regional Water Quality Control Board to assist in the development of alternatives that would avoid or effectively minimize the impacts associated with the Broad Beach Restoration Project.

In addition to the new alternatives development, it should be noted that a comprehensive biological baseline study would need to be developed and implemented prior to any restoration activities. The Project proponent will also need to develop and implement a comprehensive monitoring plan to determine the extent of any impacts that may occur because of the Project. Finally, the Project proponent will need to develop a comprehensive mitigation plan to address all adverse impacts. The Department recommends that the final APTR be amended to include a requirement for such studies and plans as indicated above. Lastly, the Department also recommends that the technical advisory committee be allowed to review and approve any such studies and plans prior to finalization.

It is stated in the APTR that the Project proponent has indicated that they would mitigate for hard substrate impacts by constructing an artificial reef as compensation for the loss of natural reefs within the Point Dume SMCA. The APTR also indicates that the preference would be to locate such a reef within the Point Dume SMCA if feasible. If infeasible, then the secondary location would be a site somewhere in Santa Monica Bay. The MLPA laws and regulations do not include provisions for the construction of artificial reefs as mitigation for impacts to habitats located within an MPA [Need to site the Code Section regarding the required habitats for each region (FGC Section 2857(c)] The Department recommends that the APTR be amended to reflect that the construction of an artificial reef for mitigation will not be allowed in the Point Dume SCMA.

Thank you for the opportunity to review and comment upon the APTR. As always, Department personnel are available to discuss our concerns, comments, and recommendations. Please contact Ms. Loni Adams, Environmental Scientist, at (858) 627-3985 or ladams@dfg.ca.gov if you have any questions.

Sincerely,

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Acting Regional Manager
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cc: Department of Fish and Game
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**UNITED STATES DEPARTMENT OF COMMERCE**
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**March 31, 2014**

Bonnie L. Rogers
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Regulatory Program
Los Angeles District
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Dear Ms. Rogers:

NOAA's National Marine Fisheries Service (NMFS) is writing this letter to facilitate an expected interagency consultation between our agencies for the Broad Beach Geological Abatement Hazard District's (BBGHAD) proposed beach and dune restoration project. NMFS previously submitted comments to the California State Lands Commission (SLC) on the Analysis of Impacts to Public Trust Resources and Values (APTR) for the proposed Broad Beach Restoration Project (Project) in Malibu, California. NMFS offered the comments pursuant to section 305(b)(4)(A) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA).

At the request of BBGHAD's representatives, NMFS met to discuss the proposed project and issues of concern on January 15, 2014. At this meeting, we summarized our concerns and provided preliminary feedback regarding the adequacy of existing information and issues regarding monitoring and impact assessment. The BBGHAD provided twenty-two exhibits to NMFS and requested that we review in detail and indicate any additional data we would be requesting for our consultation with your agency. NMFS does not have a statutory or regulatory mandate to meet directly with project applicants or their representatives, nor are we obligated to review information prior to our interagency consultation. However, we do recognize that pre-consultation meetings and technical assistance often facilitate subsequent environmental review processes.

NMFS anticipates that we may provide comments pursuant to our responsibilities under the Magnuson-Stevens Fishery Conservation and Management Act (MSA), Endangered Species Act (ESA), Fish and Wildlife Coordination Act, and/or the National Environmental Policy Act upon receipt of documents associated with the Corps' environmental review process and interagency consultation. The proposed project occurs within essential fish habitat (EFH) for various federally managed fish species within Coastal Pelagic Species, Pacific Coast Groundfish and Highly Migratory Species Fishery Management Plans (FMPs). Moreover, the project occurs within the vicinity of surfgrass, eelgrass, rocky reef and kelp canopy habitats, which are designated as habitat areas of particular concern (HAPC) for various federally managed fish species within the Pacific Coast Groundfish FMP. The rocky reef and kelp habitat in the project vicinity has the potential to support the federally endangered black abalone and other ESA species of concern (pink and green abalone, bocaccio). In addition to species directly managed

under MSA and ESA, a number of sensitive and valuable living marine resources may be subject to adverse impacts. For example, California halibut and spiny lobster are two important recreational and commercial species that utilize the project area.

Given the potential for significant impacts to living marine resources, the clear threat to property and public health from coastal erosion, and the associated controversy regarding some shoreline protection projects, NMFS is taking this opportunity to provide our preliminary perspectives on the existing information provided by BBGHAD representatives and issues regarding monitoring and impact assessment. We summarize our preliminary concerns and recommendations below and are attaching a more detailed account for your review.

NMFS believes the modeling effort used to analyze impacts to sensitive resources has limitations that inherently make impact predictions uncertain. This uncertainty should be more explicitly evaluated and described; perhaps by using procedures that describe parameter estimates and confidence regions that are better understood by the decision-making agencies. There has not been a field assessment that comprehensively and quantitatively describes the distribution of sensitive habitats (e.g., rocky reef habitat) and associated physical and biological characteristics. In the absence of this information, any modeling effort, however sophisticated, is not capable of predicting impacts with any certainty. Little to no information is explicitly provided regarding the field impact assessment methodology, *a priori* power analyses, or the proposed statistical approaches for analyzing what limited amount of quantitative information was provided. Therefore, impacts to sensitive living marine resources are highly uncertain with an apparent high degree of risk.

The Draft APTR and BBGHAD's responses to the California Coastal Commission provide impact estimates for surfgrass and rocky reef habitat. They conclude that initial project construction may result in direct burial of approximately 2 acres of rocky intertidal habitat. Approximately 1 acre of surfgrass supported by lower intertidal rocky habitat may be directly or indirectly impacted by sand placement in Lechuza Cove. In addition, approximately 3.8 acres of shallow subtidal reef habitat would be buried by the additional sand at depths and durations greater than the existing condition.

Given the high likelihood of direct and indirect impacts to EFH, HAPC, special aquatic sites (SAS), difficult-to-replace resources (DTR), a State designated area of special biological significance (ASBS), and a State Marine Conservation Area (SMCA), all feasible alternatives to avoid or minimize impacts to living marine resources should be thoroughly evaluated. Although the proposed project identifies multiple objectives, the primary purpose appears to be protection of property and public health. Therefore, NMFS encourages the Corps to evaluate a wider range of alternatives than recommended by the Coastal Engineering Report (Exhibit L to Coastal Development Permit). In addition, recommendations provided by regional experts, such as Dr. Gary Griggs, should be analyzed in greater detail.

A comprehensive, field assessment should be developed and implemented prior to any restoration activities to serve as a benchmark for impact assessment purposes. In the absence of such an assessment, it is difficult to determine the extent of potential impacts with any certainty. Thus, it would be difficult to predict the potential significance of impacts associated with the proposed project. A comprehensive monitoring plan should also be developed that is capable of determining the accuracy of impact predictions and the actual extent of impacts. The sampling

design and statistical analyses should be clearly described and should be based upon fundamental principles of statistical inference.

Lastly, given the high likelihood of direct and indirect impacts to aquatic resources, a compensatory mitigation plan appears necessary to offset expected reductions in function and account for impact uncertainty. Such a plan should contain performance standards that are based on attributes that are objective, verifiable, and can be measured with a reasonable amount of effort. In addition, there should be sufficient financial assurances to ensure a high level of confidence that a compensatory mitigation project would be completed in accordance with its performance standards.

If you have any questions about our comments, please contact Bryant Chesney at 562-980-4037 or Bryant.Chesney@noaa.gov. Thank you for considering our preliminary input.

Sincerely,

Chris Yates
Assistant Regional Administrator
for Protected Resources

Enclosure

cc: Jason Ramos (State Lands Commission)
Melissa Ahrens (California Coastal Commission)
Becky Ota (California Department of Fish and Wildlife)
LB Nye (Los Angeles Regional Water Quality Control Board)
Allan Ota (Environmental Protection Agency)
Administrative File: 150316SWR2012HC_L20.02

**Enclosure - NMFS Preliminary Review/Recommendations re: Broad Beach Restoration**

Action Area and Associated Living Marine Resources

The proposed project occurs within essential fish habitat (EFH) for various federally managed fish species within Coastal Pelagic Species, Pacific Coast Groundfish and Highly Migratory Species Fishery Management Plans (FMPs). In addition, the project occurs within the vicinity of surfgrass, eelgrass, rocky reef and kelp canopy habitats, which are designated as habitat areas of particular concern (HAPC) for various federally managed fish species within the Pacific Coast Groundfish FMP. HAPC are described in the regulations as subsets of EFH which are rare, particularly susceptible to human-induced degradation, especially ecologically important, and/or located in an environmentally stressed area. Designated HAPC are not afforded any additional regulatory protection under MSA; however, projects with potential adverse impacts to HAPC will be more carefully scrutinized during the consultation process. Of primary concern to NMFS are the potential impacts associated with the sediment disposal to sensitive nearshore resources (e.g., seagrass, rocky reef, and kelp habitat).

According to Subpart E Section 230.43 of the Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (404(b)(1) Guidelines), vegetated shallows are considered special aquatic sites (SAS). SAS are geographic areas, large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values. These areas are generally recognized as significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region. This status provides special consideration when evaluating actions involving dredged or fill material pursuant to Section 404 of the Clean Water Act. Vegetated shallows are defined as permanently inundated areas that under normal circumstances support communities of rooted aquatic vegetation. NMFS believes surfgrass and eelgrass should be considered SAS and receive special consideration when evaluating actions involving discharge of dredged or fill material.

In addition to providing habitat for federally managed fish species, the rocky reef and kelp habitat has the potential to support the federally endangered black abalone and other ESA species of concern (pink and green abalone, bocaccio). Abalone were present historically in the rocky intertidal and subtidal areas adjacent to Broad Beach (State Water Resources Control Board, 1979). According to Noelle Davis's dive notes from the early 1970s, red, pink, and Siebold's abalone were observed and/or harvested. The Siebold's abalone observation may be a misidentification as we are unaware of any other confirmed sightings of this non-native abalone species (Tanaguchi, I., pers comm). During a NMFS reconnaissance survey of the rocky intertidal, no living black abalone were found , but one shell fragment from a black abalone was observed. The shell appeared weathered and the animal likely did not recently die (i.e., within the last 12 months). The project area also has the potential to support bocaccio, an ESA species of concern. Although bocaccio are typically found in deeper waters, juveniles and young-of-the-year frequently settle out over rocky areas associated with algae or on to sandy areas with eelgrass or drift algae (Love et al. 2002). Young-of-the-year are most often found in shallow coastal waters over rocky bottoms associated with algae (Sakuma and Ralston 1995).

In addition to species directly managed under MSA and ESA, a number of sensitive and valuable living marine resources may be subject to adverse impacts. California halibut and spiny lobster are two important recreational and commercial species that utilize the project area. The project also occurs within a newly established marine protected area pursuant to the California Marine Life Protection Act of 1999. Specifically, the project is within the boundary of the Point Dume State Marine Conservation Area (SMCA), which extends from Encinal Canyon in the north to Westward beach in the south. In addition, the project area occurs within an area of special biological significance (ASBS) designated by the State Water Resources Control Board. The purpose of ASBS is to protect species or biological communities from undesirable alterations in natural water quality. Specific organisms which were considered especially unique components of the ASBS at the time of its incorporation include: giant kelp, surfgrass, sand dollars, Pismo Clams, tube worms, sea urchins, and California halibut. Given the importance of this area to living marine resources and the various Federal and State area designations, the Corps should evaluate whether this area should be considered an Aquatic Resource of National Importance.

Adequacy of Impact Assessment

Environmental impact assessments are generally comprised of two scientific processes. First, the project should predict the potential array of impacts and indicate the associated risk and uncertainty of these predictions. Second, the project should assess the field conditions to measure the actual effects. These processes should be done in tandem and neither should substitute for the other. In order to predict the effects of sand burial, a numerical model named Generalized Model for Simulating Shoreline Change (GENESIS) was utilized. Also, a variety of biological information was provided regarding conditions in the field, but much of it was qualitative and there was no explicit description regarding impact assessment methodology.

NMFS reviewed the Coastal Engineering Report (Exhibit L to Coastal Development Permit) and borrowed heavily from that document in many of the statements below. As described in the Coastal Engineering Report, numerical modeling of shoreline morphology is inherently imprecise because of the complexity of coastal processes. Although coastal processes are becoming increasingly better understood, no comprehensive numerical model exists that accounts for the natural processes of coupled longshore and cross-shore sediment transport. GENESIS models only longshore sediment transport and assumes that cross-shore sediment movement is mainly seasonal and averages out over the long-term. The report indicates that the model is incapable of predicting shoreline change due to cross-shore movement of sand. NMFS notes, however, that these cross-shore movements of sand are important determinants of reef burial.

GENESIS is intended to provide a generalized long-term trend in shoreline response from a specific action or actions. The results can anticipate general areas of accretion or erosion over large-scales and relative differences between proposed nourishment volumes and shapes, rather than predicting very precise, site-specific increments of shoreline movement over very small scales. It generally indicates whether erosion, accretion, or no effect will occur from an action. NMFS notes that many of the processes affecting biological community structure in the rocky intertidal and shallow subtidal occur at relatively fine scales.

According to the Coastal Engineering Report, the GENESIS modeling predicted an alongshore transport rate of 58,000 cubic yards (cy) towards the southeast for Zuma Beach and 133,000 cy

towards the northwest for Point Dume Beach. These results were unexpected in that predicted alongshore transport rates were opposite in direction for adjacent beaches. If these results were realized, there would be a vast accumulation of sand between Zuma Beach and Point Dume since the net transport for the adjacent beaches are directed toward one another. In reality, this accumulation of sand is non-existent and the results help illustrate the limitations of numerically modeling shoreline change and sediment transport rates, especially on curved shorelines. These findings suggest the model may be limited in its ability to accurately predict shoreline change along this hook-shaped stretch of coast between Point Lechuza and Point Dume.

To overcome these limitations, the model was calibrated to best predict measured shoreline position and net longshore sediment transport rates in the vicinity of Broad Beach. The result is a model that produces somewhat reliable predictions for Broad Beach but less reliable predictions for the remainder of the model domain. The most recent estimate for net longshore sediment transport along Broad Beach, prepared by Everts Coastal as part of their historic shoreline assessment, ranges from 20,000 to 40,000 cy toward the east. The calibrated GENESIS model predicts longshore sediment transport rates of 50,000 to 100,000 cy toward the east along Broad Beach. The model-predicted longshore sediment transport is higher than the estimated historic longshore sediment transport, but was considered appropriate and conservative for modeling the effects of beach nourishment.

As described in the GENESIS beach nourishment modeling section, the model limitations discussed previously must be kept in mind when evaluating shoreline change predictions resulting from the proposed project. Moreover, a fundamental complication occurs when taking historical wave climate parameters and projecting them in the future. The order and frequency of large storms, changes in large-scale oceanic conditions, and potential changes in "storminess" due to climate change are all unknown. Based upon the modeling results, the rate of beach loss is greatest at the west end of Broad Beach and indicates the nourished beach may last only 3 to 5 years near Point Lechuza. In contrast, the model results suggest beach nourishment may last up to 7 or 8 years at the east end of Broad Beach.

Beach profiles were analyzed to estimate the potential for burial of sensitive nearshore resources from adjustments in the beach profile after the project. The method involves estimation of a post-nourishment equilibrium profile and use of the GENESIS modeling results to estimate changes in post-nourishment beach width. In the westernmost section of the project in which the majority of sensitive resources currently exist, the initial increase in depth of cover would be about 2 to 4 feet one year after nourishment and less than 1 foot three years after nourishment. By year five, there would be little or no increase in depth of cover as modeling results suggest most of the material would move downcoast. Note, however, that this analysis does not simulate backpassing events. Moreover, if the model proves incorrect and longshore sediment transport is closer to Everts Coastal estimates, the placed sediment may take longer to move alongshore and hence increase the period of time for which rocky reef habitat may be buried. Proposed backpassing may further increase burial time.

According to the Draft Coast of California Storm and Tidal Waves Study cited in the Coastal Engineering Report, the advanced beach berm position in 1970 was probably a direct consequence of the major flood event of 1969, during which substantial fluvial sediment supply came from the Trancas Creek watershed. After an initial gain between 1951 and 1962, the subject beach has continuously eroded since the 1960s, particularly during the latest period from

1970 to 2005. A total of 381,000 cy was lost in the shore zone with the subaerial loss of 237,000 cy during 1970-2005 period. According to Everts 2009 analysis of sediment transport in the Zuma Littoral Cell, approximately 600,000 cy of sand was lost at Broad Beach between 1974 and 2009. Based upon Coastal Frontiers Corporation's analysis, the total volume of sand loss along Broad Beach from October 2009 to May 2013 was estimated to be about 225,000 cy.

It is noteworthy to compare the proposed placement of 600,000 cy of material within a single season against the loss of this same volume over a period of thirty-five years. Between 1974 and late 2007, Broad Beach annual losses averaged over 21,000 cy of sand. Thus, the proposed sediment placement is more than an order of magnitude greater than the losses observed within an average year and likely exceeds the natural variation in intertidal and subtidal rocky reef burial.

The draft APTR indicated that initial project construction was estimated to result in direct burial of approximately 2 acres of rocky intertidal habitat. This would consist of areas of contiguous rocky intertidal habitat in Lechuza Cove to isolated areas of rock outcrops and boulder fields further east. Approximately 1 acre of surfgrass supported by lower intertidal rocky habitat may be directly or indirectly impacted by sand placement in Lechuza Cove. According to Chambers Group's response to California Coastal Commission's February 8, 2013, letter, approximately 0.98 acre of surfgrass habitat and 3.8 acres of shallow subtidal reef habitat would be buried by the additional sand at depths and durations greater than the existing condition. Specifically, in the first several months to a year following beach nourishment, sand levels in the intertidal and shallow subtidal areas are predicted to be about 2 to 3 feet deeper than average seasonal levels, with some areas receiving as much as 5 feet of total burial. Increased sand cover is predicted to occur out to a depth of -18 feet. Recruitment of shallow inshore kelp that occurs in some years at depths of -13 to -19 feet may be affected. In addition, a habitat impact summary table was provided. However, neither approach explicitly described how the predicted impacts were quantified.

Much qualitative information and limited quantitative information was provided regarding habitat conditions in the field. Shallow subtidal information appears to be based upon a qualitative, reconnaissance survey. An aerial kelp survey and historical kelp distribution is provided via map exhibits, but, given the disparate nature of data presentation, it is difficult to quantify the kelp canopy areas. The rocky intertidal and intertidal surfgrass were mapped using a submeter GPS and a tablet with Nautilus, a GIS based mapping software application. However, like the kelp canopy data, it is difficult to quantify the actual area of these habitats based upon the information provided. The most comprehensively mapped resource appears to be eelgrass, which is based upon the acoustic survey method utilized by Coastal Resources Management. However, there is no explicit description as to how it will be used for field assessment purposes. The acoustic mapping also provided limited indication of hard bottom resources. Although it is difficult to determine with certainty, hard bottom areas appear to extend beyond the kelp canopy area delineated by the aerial survey.

In summary, there is not a comprehensive, field assessment of sensitive habitat distribution and its physical and biological characteristics. In the absence of this information, any modeling effort, however sophisticated, is not capable of predicting impacts with any certainty. Little to no information is explicitly provided regarding the field impact assessment methodology, *a*

*priori* power analyses, or the proposed statistical approaches for analyzing what limited amount of quantitative information was clearly explained. In addition, as explained above, the predictive component of the numerical modeling was described to have clear limitations. Therefore, impacts to sensitive living marine resources are highly uncertain with an apparent high degree of risk.

During the environmental review of similar, recently proposed projects, NMFS has conveyed concerns regarding the adequacy of analysis and conclusions drawn from previous studies. Peterson and Bishop (2005) reviewed 46 beach monitoring studies and showed that 1) only 11 percent of the studies controlled for both natural spatial and temporal variation in their analyses; 2) 56 percent reached conclusions that were not adequately supported; and 3) 49 percent failed to meet publication standards for citation and synthesis of related work. They opined that regulatory and resource agency practices are in urgent need of reform as the risk of cumulative impacts grows in the face of sea level rise, climate change, and increased coastal development. NMFS notes that, with the exception of one project from the 1970s, all the studies that were reviewed were on the Atlantic or Gulf coastlines. Thus, their results may not be directly applicable to projects implemented in Southern California. However, NMFS shares the concerns expressed by the authors that the presumption that nourishment projects are ecologically benign may be based upon an incomplete and flawed body of science. If previous monitoring results in Southern California are to be used as support for conclusions that impacts to biological resources are minor and/or insignificant, NMFS believes a more rigorous examination of their sampling design, statistical analyses, and conclusions are necessary.

A comprehensive, field assessment should be developed and implemented prior to any restoration activities to serve as a benchmark for impact assessment purposes. In the absence of such an assessment, it is difficult to determine the extent of potential impacts with any certainty. Thus, it would be difficult to predict the potential significance of impacts associated with the proposed project. A comprehensive monitoring plan should also be developed that is capable of determining the accuracy of impact predictions and the actual extent of impacts. The sampling design and statistical analyses should be clearly described and should be based upon fundamental principles of statistical inference. In addition, the final monitoring plan should avoid the problems identified in Peterson and Bishop (2005).

Information and concerns regarding impacts of beach nourishment

Despite the uncertainty and risk, it appears likely that permanent impacts to rocky reef and surfgrass habitat will occur. Short-term burial at depths of 0.8 feet exhibited a statistically significant decline in surfgrass shoot count within a laboratory setting (Craig et al, 2008). Thus, surfgrass habitat is likely to be impacted by beach nourishment and shoreline protection projects that place sand either directly or indirectly onto surf grass beds (Craig et al 2008). Both the ATPR and BBGHAD's response to the Coastal Commission acknowledge an expected impact to surfgrass.

Galst and Anderson (2008) have suggested that surfgrass is important for nearshore fish communities and reductions in surfgrass could negatively affect recruitment patterns. Specifically, experimental reductions in coverage of seagrass (ranging from 7 to 180 square meters) resulted in significant decreases in the density of newly recruited fish species. Similarly, NMFS expects reductions in coverage and/or density may reduce other

ecological services provided by surfgrass, such as shelter, foraging, primary productivity, substrate for epibiota, and wave energy dissipation. Surfgrass also serves as an important nursery habitat for a variety of invertebrates, such as California spiny lobster (Engle 1979, as cited in MPLA Initiative 2009), and as habitat for algae (Stewart and Myers 1980, as cited in MLPA Initiative 2009). Shaw (1986) suggests that the importance of surfgrass as a nursery for juvenile lobsters in Southern California is clearly apparent and the disturbance or destruction of this habitat could seriously decrease lobster abundance.

As described in the 404(b)(1) Guidelines, the discharge of dredged or fill material may reduce the value of vegetated shallows as nesting, spawning, nursery, cover, and forage areas, as well as their value in protecting shorelines from erosion and wave actions. In addition, the primary productivity of the system would be reduced if impacts were to occur. Surfgrasses exhibit late successional traits, recover very slowly from disturbance, require facilitation from algae before settling, and are strong competitors (Turner 1985). Removal of surfgrass from a rocky reef community has profound impacts to community structure (Turner 1985). Thus, surfgrass habitat is largely determined by patterns of disturbance. Repeated beach nourishment and/or backpassing efforts likely will increase this rate of disturbance to these systems. Slow recovery times suggest that disturbances to these communities may be ecologically significant. Given that algal turf community facilitates surfgrass and abalone settlement (Rogers-Bennett et al. 2011), consideration should also be given to reefs containing turf algae. It is unclear whether such reefs are accounted for in the impact analysis.

Given the high ecological values associated with surfgrass, NMFS believes unavoidable impacts to surfgrass should be addressed via compensatory mitigation and should comply with the 2008 mitigation rule promulgated by the U.S. Army Corps of Engineers and the Environmental Protection Agency. According to the rule, compensatory mitigation is defined as the restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved. The rule suggests that compensation for unavoidable impacts to difficult to replace (DTR) resources should be provided through in-kind rehabilitation, enhancement or preservation. Given the slow recovery time and the difficulties associated with restoring this habitat, NMFS believes that surfgrass should be considered a DTR resource.

The importance of rocky reefs to algal, invertebrate, and fishery species is well established. Rocky reefs are one of the least abundant benthic habitats, yet they are among the most important habitats for groundfish. Of the habitats associated with the rocky substrate on the continental shelf, kelp forests and associated algal communities are of primary importance to the ecosystem and serve as important groundfish habitat. These subtidal communities provide vertically-structured habitat throughout the water column. Kelp stands provide nurseries, feeding grounds, and shelter to a variety of groundfish species and their prey (Ebeling et al. 1980; Feder et al. 1974). Giant kelp communities are highly productive relative to other habitats, including wetlands, shallow and deep sand bottoms, and rock-bottom artificial reefs (Bond et al. 1999). Their net primary production is an important component to the energy flow within food webs. Foster and Schiel (1985) reported that the net primary productivity of kelp beds may be the highest of any marine community.

Given the high likelihood of direct and indirect impacts to HAPC, SAS, DTR, ASBS, and SMCA, a compensatory mitigation plan appears necessary to offset expected reductions in function and account for impact uncertainty. Such a plan should contain performance standards that are based on attributes that are objective, verifiable, and can be measured with a reasonable amount of effort. In addition, there should be sufficient financial assurances to ensure a high level of confidence that a compensatory mitigation project would be completed in accordance with its performance standards.

Beach disposal may also adversely affect the sandy beach ecosystem. Although beach nourishment has the potential to restore ecosystem functions of sandy beach communities, persistent disturbances may preclude natural recovery. Revell et al (2011) evaluated the recovery rate of beach ecological metrics following a major El-Nino event on nearby beaches. Recovery of wrack abundance and shorebirds to pre-El Nino levels took 3 years. Reductions in biomass and mean size of invertebrates were still detected 2 years after the event. The loss of larger and older cohorts of intertidal invertebrates (e.g., sand crabs, Emerita analoga, and pismo clams, Tivela stultorum) may take 1 to 10 years for recovery. For these invertebrate communities to recover, appropriate grain size and beach slopes must be available to allow successful recruitment. It is unclear whether the proposed nourishment and backpassing will truly provide adequate conditions for recovery. In addition, although the coarseness of sand may be similar to beach sands, other physical characteristics, such as angularity, may differ and can affect biological communities. Compound this chronic, anthropogenic placement and movement of sediment with natural impacts associated with major storm events and the result may be a beach in a persistently degraded state.

The benefit of sandy beach habitat to fishery resources is often overlooked because of frequent disturbance, low primary productivity and minimal habitat heterogeneity (Dexter 1992). Energy input is primarily from allocthonous organic material (e.g. macrophytes, phytoplankton) and plankton that supports high densities of filter-feeding, benthic macroinvertebrates (Polis and Hurd 1996, Dugan et al. 2003, Crawley et al. 2006). These invertebrates are a valuable link to upper level predators such as fishes and shorebirds (Leber 1982). One reason for a lack of awareness of this habitat is the lack of data on surf-zone fishes, likely a result of difficulty sampling in the surf zone. However, many recreational fishes including barred surfperch, white seabass, queenfish, spotfin croaker, California halibut, jacksmelt and California grunion utilize this habitat for foraging (Allen and Pondella 2006). In addition, leopard shark (Triakus semifasicata), managed under the Pacific Groundfish FMP, utilize shallow coastal waters as pupping and feeding/rearing grounds. Neonate pups occur in and just beyond the surf zone in areas of southern California.

Beach maintenance activities such as nourishment and bulldozing cause high rates of mortality in benthic macroinvertebrates (Speybroeck et al. 2006). These losses cascade through the food web by decreasing the abundance of prey items available to recreationally and commercially important fishes. For example, the impact to sand crabs (Emerita spp.) and clams from beach maintenance activities has been well documented (Peterson et al. 2000, Peterson et al. 2006). Recreationally important species such as barred surfperch and California corbina (Efford 1965, Barry et al. 1996) consume these macroinvertebrates, as well as many other fishes trophically linked to recreationally and commercially important fishes. Recovery of these

macroinvertebrates can take up to two years if no additional disturbances occur (Dolan and Stewart 2006). For some species, such as Pismo clams, recovery may take even longer (Revell et al. 2011). Therefore, repeated disturbances are likely to have cumulative impacts to prey availability. Changes in the availability of prey resources reduce the quality of habitat and may adversely affect the overall fitness of fishery species in the area.

Adequacy of Alternatives Analysis

Given the high likelihood of direct and indirect impacts to HAPC, SAS, DTR, ASBS, and SMCA, all feasible alternatives to avoid or minimize impacts to living marine resources should be thoroughly evaluated. The Coastal Engineering Report may have prematurely removed alternatives worthy of further analysis. Although the proposed project identifies multiple objectives, the primary purpose appears to be protection of property and public health. Therefore, it seems appropriate to evaluate alternatives that may adequately address this purpose. For example, augmentation of the revetment to adequately protect the homes and leach fields with no beach nourishment or a reduced beach nourishment alternative excluding sediment placement at Little Broad Beach (the western portion of the site) may adequately address protection of property and public health. In addition, it may have been premature to remove sand retention alternatives from the analysis. In Gary Griggs' assessment of the erosion problem at Broad Beach, he indicated it makes no practical or environmental sense not to retain the sand that has been deposited on the beach given all of the effort and expense involved in nourishing Broad Beach with 600,000 cy of sand. Dr. Gary Griggs is a recognized expert whose research is focused on the coastal zone and ranges from coastal evolution and development, through shoreline processes, coastal hazards and coastal engineering, and sea level rise. Dr. Griggs is the Director of Marine Science and Distinguished Professor of Earth Sciences at University of California, Santa Cruz. Therefore, NMFS encourages the Corps to evaluate a wider range of alternatives than recommended by the Coastal Engineering Report.

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