California MLPA Master Plan Science Advisory Team
Draft Background Information for Discussion of Projects and Artificial Structures that Affect Habitats in the MLPA South Coast Study Region

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There are numerous projects in the MLPA South Coast Study Region that affect and impact habitats. Three prevalent types of such projects are (1) artificial structures, (2) wetland restoration, (3) beach nourishment, and (4) beach grooming. Other types of projects include eelgrass and kelp restoration projects.

The protection of natural diversity and abundance of marine life, and the structure, function, and integrity of marine ecosystems is one of six goals of the Marine Life Protection Act (MLPA)[1]. In addition, specific goals for designating marine protected areas under the Marine Managed Areas Improvement Act are to protect **or** restore marine species, habitats, and ecosystems[2]. The Master Plan Science Advisory Team (SAT) is tasked with providing critical scientific information about how these projects impact the surrounding ecosystem, and whether these projects provide habitat similar to natural habitat in promoting the goals of the MLPA.

Artificial Structures

An artificial reef can be defined as "any material or matter deliberately placed in an area of the marine environment where that structure does not exist under natural circumstances for the purpose of protecting, regenerating, concentrating or increasing populations of living marine resources, or for enhanced recreational use of the area"[3]. There are many types of artificial reefs that were originated for vastly different reasons in the south coast study region, and they are designed and constructed in a variety of different ways. For example, the Los Angeles Federal Breakwater was not designed to mimic natural reefs, but it functions as an artificial reef and is the largest [artificial] reef in the Southern California Bight[4]. Conversely, the San Onofre Nuclear Generating Station (SONGS) reef, which is a large, continuous kelp reef spanning 150 acres, was designed specifically to mimic natural reefs[5].

Quarry rock is generally the preferred material to build artificial reefs in California because of its environmental acceptability, and there appears to be almost no difference between rock, concrete, and natural reefs[6]. Many of these features are newly constructed and the degree to which they provide habitat that is similar to natural features may not be known for several

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[1] California Fish and Game Code, Section 2853.
[2] Marine Managed Areas Improvement Act, Section 36700.
[3] Policy statement of the National Marine Sanctuary Program: Artificial Reef Permitting Guidelines. http://www.sanctuaries.nos.noaa.gov/library/national/arpolicy071503.pdf, p.45.
[4] Froeschke, J. T., L. G. Allen, and D. J. Pondella. 2005. The reef fish assemblage of the outer Los Angeles Federal Breakwater, 2002-2003. Bull. Southern California Acad. Sci. 104(2):64-74.
[5] Reed, D. C., Schroeter, S. C., Huang, D., Anderson, T. W., and R. F. Ambrose. 2006. Quantitative assessment of different artificial reef designs in mitigating losses to kelp forest fishes. Bulletin of Marine Science 78(1):133-150.
[6] Pondella, D. J., L. G. Allen, M. T. Craig, and B. Gintert. 2006. Evaluation of eelgrass mitigation and fishery enhancement structures in San Diego Bay, California. Bulletin of Marine Science 78:115-131.

years. Other artificial structures, such as oil and gas platforms or shipwrecks, provide habitat and may create productive though specific communities, however they were not designed to be permanent features[7]. In addition, seawalls and other coastal armoring structures can become artificial rocky intertidal habitat, particularly on urbanized coasts as sea level rises.

Wetland Restoration

Wetland restoration encompasses the following efforts: (1) to reduce the impacts of activities in or near wetlands, (2) compensate for additional losses, (3) restore or replace wetlands already degraded or destroyed, and (4) serve various new functions such as wastewater treatment, aquaculture, and waterfowl habitat[8]. Wetland restoration efforts occur in a variety of different settings in the south coast study region, such as estuaries, salt marshes, lagoons, and mudflats. Much of the original wetland habitat along the southern California coast has been lost or altered due to the immense and continually growing human population[9]. Wetland restoration efforts are therefore extensive throughout the south coast study region. The general goal of wetland restoration is to bring the environment back to a natural, or pre-disturbance, condition. However, in practice, the outcomes of wetland restoration projects are generally unpredictable and may require occasional maintenance.

Beach Nourishment

Beach nourishment (i.e., replenishment) is the term used to describe the introduction of sand onto a beach to supplement a diminished supply of natural sediment, for the purpose of beach restoration, enhancement or maintenance[10]. Beach nourishment is commonly used to combat shoreline retreat, particularly for beaches of high recreational value, and involves sediments from at least one dredge site or a terrestrial source[11]. The disturbance created by beach nourishment efforts can cause ecological damage to the associated sandy beach habitats and biota[11].

Beach Grooming

Beach grooming (i.e., manicuring) refers to removing debris (natural and unnatural) from sandy beaches, and takes many different forms. Beach grooming represents a widespread impact to sandy beach habitats in the south coast study region. For example, over 45% of sandy

[7] Emery, B. M., L. Washburn, M. S. Love, M. M. Nishimoto, and J. C. Ohlmann. Do oil and gas platforms off California reduce recruitment of boccacio (*Sebastes paucispinis*) to natural habitat? An analysis based on trajectories derived from high-frequency radar. Fishery Bulletin 104:391-400.
[8] Kusler, J. A. and M. E. Kentula. 1989. Wetland creation and restoration: the status of the science. EPA/600/3-89/038. U. S. Environmental Protection Agency, Environmental Research Laboratory, Corvallis, Oregon, USA.
[9] Zedler, J. B. 2001. Handbook for Restoring Tidal Wetlands. CRC press, Boca Raton, Florida.
[10] California Department of Boating and Waterways and State Coastal Conservancy. 2002. California Beach Restoration Study. Sacramento, California.
[11] Peterson, C. H. and M. J. Bishop. 2005. Assessing the environmental impacts of beach nourishment. Bioscience 55(10):887-896.

beaches along the southern California coastline are subject to regular grooming with heavy equipment[12]. Beach grooming has major impacts on the associated marine communities. For example, the removal of beach wrack (primarily giant kelp and surfgrass in southern California) by grooming is associated with decreased species richness, abundance, and biomass of intertidal macroinvertebrates and reduced prey resources for shorebirds and fish[12].

[12] Dugan, J. E., D. M. Hubbard, M. D. McCrary, and M. O. Pierson. 2003. The response of macrofauna communities and shorebirds to macrophyte wrack subsidies on exposed sandy beaches of southern California. Estuarine, Coastal and Shelf Sciences 58S:25-40.