

California MLPA Master Plan Science Advisory Team
Methods Used to Evaluate MPA Proposals in the
North Coast Study Region (DRAFT)
Chapter 3 – Bioregions
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The *California Marine Life Protection Act Master Plan for Marine Protected Areas* divides the California coast into five study regions. The MLPA North Coast Study Region (NCSR), from the California/Oregon border in Del Norte County to Alder Creek near Point Arena in Mendocino County, is the fourth region to be studied. The MLPA Master Plan Science Advisory Team (SAT) may further divide the study regions into multiple bioregions. Bioregions are regions of distinct biological assemblages distinguished by different community compositions, the presence or absence of certain key species, or disruptions to population connectivity among habitats.

Bioregions should not be confused with biogeographic regions. Bioregions are determined by the SAT to help meet the goals of the MLPA by ensuring the full diversity of communities is represented in California's system of marine protected areas (MPAs). Biogeographic regions are large-scale regions of similar species assemblages. California contains parts of two biogeographic regions: the San Diegan region extends from Point Conception southward, while the Oregonian region extends from Point Conception northward. Biogeographic regions are delineated using broad changes in the presence/absence of species, while bioregions recognize more subtle differences in species assemblages and community structure.

Bioregions play a key role in the MPA design process. The SAT strongly encourages replication of MPAs in each bioregion to ensure the full diversity of a given habitat is represented. For example, in the MLPA South Coast Study Region, an MPA placed at a kelp forest near Santa Barbara would not protect the same suite of species as an MPA placed at a kelp forest near Catalina Island, even though they are both considered kelp forests during SAT evaluations. Due to differences in community composition, the Santa Barbara coastline and Catalina Island are part of different bioregions, thus encouraging the placement of MPAs at kelp forests in both bioregions and representing the full diversity of the habitat type. Additionally, SAT evaluations are conducted for each bioregion, which provides more detail about how alternative MPA proposals differ.

In previous study regions, the SAT has delineated bioregions based primarily on intertidal community data from rocky shores. In the NCSR, these data do not indicate a strong break in bioregions (Blanchette et al. 2008). However, other sources of data suggest there is a break in population connectivity at Cape Mendocino due to the oceanographic and geomorphologic conditions of the area (e.g. Dawson et al. 2001, Cope 2004, Sotka et al. 2004, Field and Ralston 2005, Broitman et al. 2008, Francis et al. 2009, Hyde and Vetter 2009). The oceanography of the area is fairly well studied, and features such as a large eddy off Cape Mendocino and a strong upwelling in the area lend support for a potential barrier to connectivity in the area (e.g. Magnell et al. 1990, Kosro et al. 1991, Largier et al. 1993, Pullen and Allen 2001).

Additionally, nearshore habitats north of the Cape Mendocino area are heavily influenced by terrestrial sediments through runoff from major rivers such as the Eel and Klamath (Nittrouer 1999, Sommerfield and Nittrouer 1999). Habitats south of the Cape Mendocino area, however, experience much lower sedimentation due to less freshwater inflow in that area. This difference in geomorphology and hydrography could lead to differences in community structure.

An important concern in establishing a bioregion break in the Cape Mendocino area is determining the location of the bioregion boundary. There are several prominent features, including False Cape, Cape Mendocino, the mouth of the Mattole River, and Punta Gorda, each of which could serve as a

geographic boundary between bioregions. Studies in the region have not collected data at a small enough spatial scale to resolve the location of a bioregion boundary, so the SAT considered a number of factors to determine where the boundary should be located.

The SAT determined the mouth of the Mattole River as an appropriate boundary between northern and southern bioregions (Figure 1). A major consideration for selecting the boundary is the desire to keep major habitats such as contiguous rocky reefs in single bioregions. The mouth of the Mattole River neatly divides two major rocky reef systems and the branching arms of the submarine Mattole Canyon, making it an ideal candidate for the bioregion boundary. Additionally, a bioregion boundary at the mouth of the Mattole River offers one of few locations in the Cape Mendocino area that is accessible by road (a consideration for monitoring purposes) and there is strong public support for the bioregion boundary at this location.

Though the evidence for bioregions in the NCSR is not as striking as that in other study regions, there is sufficient evidence to suggest that the NCSR should be divided into two bioregions with a boundary at the mouth of the Mattole River. Furthermore, establishing two bioregions will provide more detail during the SAT evaluations of alternative MPA proposals.

Figure 1. Bioregions in the MLPA North Coast Study Region



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