California MLPA Master Plan Science Advisory Team
Methods Used to Evaluate MPA Proposals in the North Coast Study Region (DRAFT)
Chapter 4 – Habitat Representation Analyses (Goals 1 and 4)

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Status of this chapter: The SAT has not yet approved any portion of this chapter.

Identification of Key and Unique Habitats for the MLPA North Coast Study Region

The Marine Life Protection Act (MLPA) provides guidance that marine protected areas (MPAs) should encompass a variety of marine habitat types and communities, across a range of depths and environmental conditions. This chapter identifies the key and unique habitats in the MLPA North Coast Study Region, as required by the MLPA. The methods for evaluating MPA proposals with respect to representation of key and unique habitats are described in detail later in the chapter.

Habitats Identified in the MLPA and the Master Plan for MPAs

Subsequent to provisions in the MLPA, the master plan further refines the list of “key” habitats (listed below). The SAT recognizes estuaries as a critical California coastal habitat; consequently, estuaries were added to the list of key habitats in the master plan. The master plan further subdivides habitats identified in the MLPA by substrate type or depth, identifying the following key habitats: sand beach, rocky intertidal, estuary, shallow sand, deep sand, shallow rock, deep rock, kelp, shallow canyon, and deep canyon. Because changes in species composition occur across depth zones, even over the same substratum, the SAT has subsequently refined the habitat definitions to include five depth zones (intertidal, intertidal to 30 meters (m), 30 m to 100 m, 100 m to 200 m, and deeper than 200 m). Key habitat types provide benefits by harboring a particular set of species or life stages, having special physical characteristics, or being used in ways that differ from other habitats. The SAT also recommends the representation in MPAs of oceanographic features that represent specific pelagic habitats, such as upwelling centers, estuary waters, river plumes, fronts, and retention zones.

Key Habitats in the MLPA North Coast Study Region

The set of habitats described in the MLPA and master plan can be expanded or reduced by the SAT to reflect representative habitats for each study region. In addition to the habitat types delineated in the MLPA, the SAT notes that key habitat types such as rocky reefs, intertidal zones, and kelp forests are actually broad categories that include several types of habitat and that special consideration in design planning should be given to habitats that are uniquely productive (e.g. upwelling centers or kelp forests) or aggregative (e.g. fronts) or those that sustain distinct use patterns. All of the key habitats except sea mounts occur in the MLPA North Coast Study Region within state waters, although some, such as pinnacles, are not well mapped.

Considering guidance from the MLPA and master plan, the SAT has Identified the following "key" marine habitats in the MLPA North Coast Study Region (m = meters, * = mapping data limitations, † = habitat is rare within the study region):

- rocky shore
- sandy beach
- surfgrass*
- coastal marsh
- tidal flats*
- estuarine waters
- eelgrass*
- kelp*
- rocky reef 0-30m*
- rocky reef 30-100m
- rocky reef 100-200m†
- rocky reef >200m†
- soft bottom 0-30m*
- soft bottom 30-100m†
- soft bottom 100-200m†
- soft bottom >200m
- submarine canyons*†
- pinnacles*
- upwelling centers*
- retention zones*
- river plumes*
- fronts*

Several of the key habitats indicated above with an asterisk (*) are subject to mapping limitations that may restrict habitat evaluations. Further detail on the methods used to evaluate inclusion of these habitats in MPA proposals is provided below. Other key habitats indicated with a dagger symbol (†) are rare or unevenly distributed within the study region, and thus may be difficult to replicate within MPAs.

Several pelagic habitats are included in the list of key habitats for the MLPA North Coast Study Region: namely upwelling centers, retention zones, river plumes, and oceanographic fronts. These pelagic habitats, are created by water movement, and are necessarily fluid and difficult to demarcate with fixed boundaries. Furthermore, processes like upwelling and terrestrial runoff occur as events in response to winds or rainfall, so features are impermanent, although they may be recurrent. Thus, while it is important to recognize these habitats, they are difficult to map and evaluate for habitat representation and replication. The SAT habitat workgroup will work to develop maps and evaluation methods for these habitats over the coming months. Because these pelagic habitats overlay benthic habitats, their inclusion should be a secondary consideration in MPA siting.

Rocky Intertidal Habitats

Rocky intertidal habitats in the North Coast Study Region occur both on the mainland and on numerous offshore rocks, sea stacks and small islands. These offshore rocks are especially abundant in the study region and are formed through the erosive action of waves that buffet the shore and whittle away the coastal cliffs, leaving isolated stands of the most resistant rock. Offshore rocks vary in size from just a few square yards to several acres and may occur as far as several miles from the mainland coast. Due to their relative isolation from human disturbance, offshore rocks provide important breeding and resting sites for a wide variety of

seabirds and marine mammals. Offshore rocks also support a variety of marine algae and invertebrates, especially those adapted to a high-energy wave environment. Offshore rocks may also contribute to the availability of shallow water rocky reef habitat (0-30m depth) in the study region. To adequately represent the habitat contribution of offshore rocks, both the intertidal length and the nearshore subtidal habitat, especially for those rocks that occur in depths greater than 30 meters, must be considered. For the purpose of evaluating MPA proposals, the shoreline length of all mapped offshore rocks will be considered as a subset of rocky shores. In evaluating habitat representation, the SAT will assess representation of mainland rocky shores and offshore rocks separately. In contrast, the SAT will use the combined coastline length of both mainland offshore rocky shores to evaluate habitat replication and spacing. For offshore rocks that occur in depths greater than 30 meters, the SAT will explore development of a nearshore substrate proxy line to allow easy integration with the measurements used for nearshore substrate along the mainland coast.

Rivers and estuaries

The study region contains a number of large rivers and smaller streams that provide important spawning habitat for anadromous fish including five species of salmonids and two species of sturgeon. The lower reaches of these streams provide estuarine nursery habitat for a variety of marine fishes and are contained within the North Coast Study Region. Many rivers along the north coast have dynamic mouths characterized by shifting sand bar and beach habitat such that the location of the river's outflow may change from year to year. The dynamic beaches and sand bars provide important haul-out sites for marine mammals and nesting sites for shorebirds including the endangered snowy plover. In cases where MPAs are located on the open coast near the outflows of these dynamic rivers, the SAT recommends that MPAs encompass the full range of historical river outflow locations to ensure that connectivity between the MPA and adjacent estuarine habitat is not lost to future shifts in the river mouth location.

Several of the rivers in Mendocino County are characterized by narrow channels surrounded by the steep Mendocino Range and extensive zones of tidal and marine influence. Due to their steep sides, these drowned river canyons do not contain extensive areas of coastal marsh, tidal flats, or eelgrass, however, they provide estuarine habitats in close association with one another and support a variety of marine life. The drowned river canyons in the North Coast Study Region include the estuarine portions of the following rivers:

- Noyo River
- Big River
- Albion River
- Navarro River

Summary of Guidelines and Evaluation Methods: Habitat Representation

The master plan guidelines with respect to habitat protection are as follows:

1. "For an objective of protecting the diversity of species that live in different habitats and those that move among different habitats over their lifetime, every 'key' marine habitat should be represented in the MPA network."

2. "'Key' marine habitats (defined above) should be replicated in multiple MPAs across large environmental and geographic gradients to protect the greater diversity of species and communities that occur across such gradients, and to protect species from local year-to-year fluctuations in larval production and recruitment."

Guidance in the MLPA closely mirrors these guidelines in the master plan with one key difference: the MLPA specifically indicates that state marine reserves (SMRs) are an important component of habitat protection.

To assess how the key and unique habitats defined here are represented across a range of environmental conditions, the SAT has identified two distinct bioregions within the MLPA North Coast Study Region (see Chapter 2). Because the key habitats within these bioregions support different marine life communities, the SAT recommends that MPA proposals represent key habitats across both bioregions.

In evaluating habitat representation the SAT considers:

- the quality of habitat maps,
- the availability of habitats across the entire study region,
- the availability of habitats within the two bioregions defined by the SAT,
- the percentage of available habitat protected in MPAs across all six levels of protection, and
- the distribution of habitat protection across the two bioregions in the MLPA North Coast Study Region.

Several of the key and unique habitats named above have limited distribution in the study region or are poorly mapped (see below for more detailed discussion of habitat map quality). In consideration of data limitations, the SAT conducts a full evaluation of habitat representation (including area and percent of habitat protected) only for habitats that are adequately mapped. For habitats that are not comprehensively mapped, the SAT will conduct simplified evaluations of habitat representation.

Consideration of Habitat Map Quality

The quality of habitat mapping influences the way in which habitat representation can be assessed. For habitats that are comprehensively mapped, it is possible to accurately assess both the amount of habitat encompassed by a proposed MPA and the percent of available habitat protected. Unfortunately, many of the habitat maps are subject to one or more of the following limitations: 1) mapping is not of consistent quality across the entire study region, 2) mapped data does not allow assessment of the extent of habitat protected (aerial or linear extent), or 3) mapping does not accurately reflect presence or absence of habitats.

Table 4-1 Habitat mapping quality. This table summarizes the limitations of habitat maps and recommendations for use of habitat data in habitat evaluations. The table will be filled in as the SAT and staff complete habitat data reviews.

Habitat	Source	Potential Reviewers	Review Summary	Recommended Method of Habitat Assessment
Key Habitats				
rocky shore	NOAA Environmental Sensitivity Index (ESI) shoreline - 1994	K. Nielsen		
sandy beach	NOAA ESI shoreline - 1994	K. Nielsen		
surfgrass	*no current data available in digital format*	*None*		
coastal marsh	NOAA Coastal Change Assessment Program (CCAP) 2007	S. Rumrill, R. LeValley, D. Hankin		
tidal flats	NOAA ESI shoreline - 1994	S. Rumrill, R. LeValley, D. Hankin		
estuaries	National Wetlands Inventory (NWI)	S. Rumrill, R. LeValley, D. Hankin		
eelgrass	PSMFC, SeaGrant, local studies and reports	S. Rumrill, R. LeValley, D. Hankin		
kelp	DFG aerial surveys (from 1989, 1999, 2002-05, and 2008)			
rocky reef 0-30m	CSUMB Seafloor mapping, DFG aerial kelp surveys			
rocky reef 30-100m	CSUMB Seafloor mapping			
rocky reef 100-200m	CSUMB Seafloor mapping			
rocky reef >200m	CSUMB Seafloor mapping			
soft bottom 0-30m	CSUMB Seafloor mapping			

Habitat	Source	Potential Reviewers	Review Summary	Recommended Method of Habitat Assessment
soft bottom 30-100m	CSUMB Seafloor mapping			
soft bottom 100-200m	CSUMB Seafloor mapping			
soft bottom >200m	CSUMB Seafloor mapping			
submarine canyons	G. Green			
pinnacles	*unmapped*	*None*		
upwelling centers	*currently unmapped*			
retention areas	*currently unmapped*			
river plumes	*currently unmapped*			
oceanographic fronts	*currently unmapped*			
~~Unique Habitats~~				