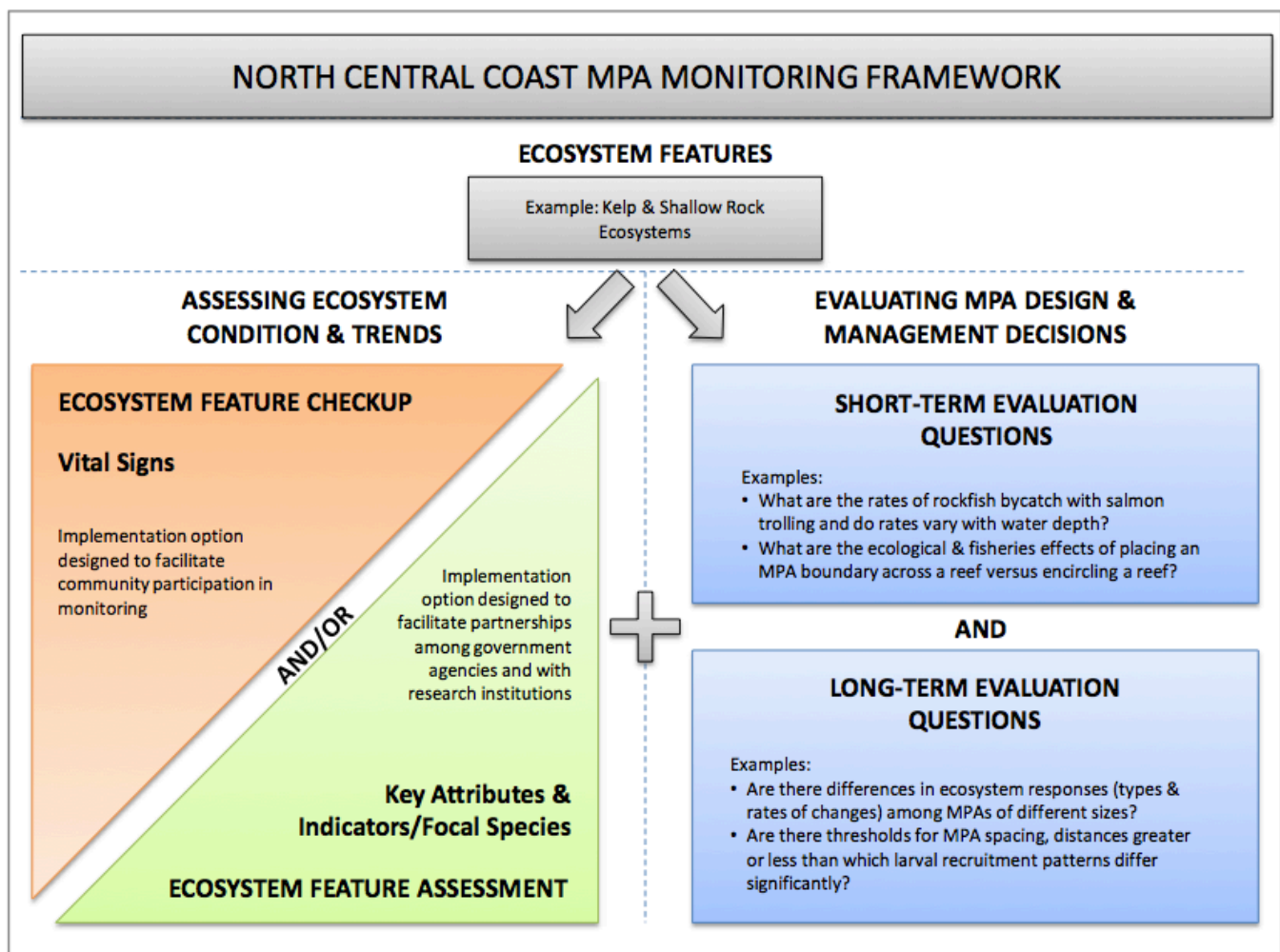


MPA Monitoring Metrics: Mid-Depth (30-100M) Rock Ecosystems in the North Central Coast Region

As a step towards implementation of the 1999 California Marine Life Protection Act, the California Fish and Game Commission adopted a MPA network for the North Central Coast region on August 5, 2009. MPA monitoring in this region is guided by the [North Central Coast MPA Monitoring Plan](#). The plan has been developed by the MPA Monitoring Enterprise, in close collaboration with the California Department of Fish and Game, and through consultations with stakeholders and scientists. It was adopted by the California Fish and Game Commission on April 7, 2010 for inclusion in the MLPA Master Plan for Marine Protected Areas, thus formally establishing it as part of the policy guiding MLPA implementation.

MPA MONITORING FRAMEWORK – AN ECOSYSTEMS APPROACH

MPA monitoring is implemented under a framework (below) that is designed to efficiently take the pulse of ocean ecosystems and, over time, understand how conditions are changing and the role that MPAs play in bringing about those changes.



In each of California’s MLPA regions a set of ecosystems and human uses are identified that collectively encompass and represent the species that inhabit state waters and the human activities that occur in and around the MPAs. These

ecosystem and human use categories, called Ecosystem Features, are the top level of the monitoring framework and provide the focus for two core monitoring elements: 1) Assessing Ecosystem Condition & Trends; and 2) Evaluating MPA Design & Management Decisions.

ASSESSING ECOSYSTEM CONDITION & TRENDS

Ecosystem Features provide the basis for assessing the condition of regional ecosystems, and how conditions change over time. Through consultations with stakeholders, scientists and managers in each MPA region, a limited set of monitoring metrics – or things that are measured – is identified to take the pulse of each Ecosystem Feature. There are two options for taking the pulse of Ecosystem Features: Ecosystem Feature Checkups and Ecosystem Feature Assessments.

ECOSYSTEM FEATURE CHECKUPS

Ecosystem Feature Checkups are designed to be carried out by community and citizen-scientist groups using relatively simple monitoring methods and protocols. These metrics are called Vital Signs, and all of the Vital Signs in a particular Ecosystem Feature are designed to be measured together.

ECOSYSTEM FEATURE ASSESSMENTS

Ecosystem Feature Assessments are more detailed and technically demanding than Checkups, and so are likely to be conducted by government agencies and research institutions. Assessments involve measuring a set of Indicators or Focal Species that together tell us about the condition of a Key Attribute of the Ecosystem Feature. By measuring all of its Indicators, we get a sense of the condition of a Key Attribute and how it is changing over time. By monitoring all of the Key Attributes, we can take the pulse of the Ecosystem Feature.

MPA MONITORING METRICS

Monitoring metrics for the Mid-Depth (30-100M) Rock Ecosystem Feature in the North Central Coast region are provided on the next page. A summary list of the monitoring metrics is provided, including the metrics for the Ecosystem Feature Checkup (orange) and Assessment (green) options.

Additional information about these and other metrics is available in the [North Central Coast MPA Monitoring Plan](#).

MPAs aren't the only thing that can impact an ecosystem or human activity. Additional information about other influencing factors, such as water quality and oceanography, will help us interpret MPA monitoring data. This contextual information will be drawn from other, existing monitoring programs, and the North Central Coast MPA Monitoring Plan provides a more complete discussion of types of contextual information that may be important to consider.

MID-DEPTH (30-100M) ROCK ECOSYSTEMS*

ECOSYSTEM FEATURE CHECKUP

Vital Signs

- Rock crab abundances & size frequency
- Rockfish average & maximum size
- Lingcod abundance & size frequency
- Dwarf rockfish abundance & size frequency

ECOSYSTEM FEATURE ASSESSMENT

Key Attribute	Focal Species/Indicators
Biogenic Habitat: Sessile invertebrates	Cover and density of structure forming invertebrates
Trophic Structure: Mobile invertebrates	Density of focal species: Rock crabs (<i>Cancer spp.</i>) Sheep (spider) crabs (<i>Loxorhynchus grandis</i>) Box crabs (<i>Lopholithodes foraminatusi</i>)
Predators: Piscivorous fishes	Density & size structure of focal species Bocaccio (<i>Sebastes paucispinis</i>) ¹ Yelloweye rockfish (<i>Sebastes ruberrimus</i>) ¹ Vermilion rockfish (<i>Sebastes miniatus</i>) ¹ Lingcod (<i>Ophiodon elongatus</i>)
Community Structure: Dwarf rockfish	Total dwarf rockfish abundance (multiple species)

¹ Size structure includes young-of-the-year rockfish where feasible.

OPTIONAL ADD-ONS FOR ECOSYSTEM FEATURE ASSESSMENT

This set of information includes supplemental metrics, some or all of which can be added as methods & resources permit.

Key Attribute	Focal Species/Indicators
Biogenic Habitat: Sessile invertebrates	Cover of encrusting invertebrates
	<i>Metridium</i> spp. bed cover
	Hydrocoral density
Trophic Structure: Omnivorous fishes	Diversity of habitat-forming species
	Density & size structure of focal species
	China rockfish (<i>Sebastes nebulosus</i>) ¹
	Gopher rockfish (<i>Sebastes carnatus</i>) ¹
Community Structure: <i>Sebastomus</i> spp.	Canary rockfish (<i>Sebastes pinniger</i>) ¹
	Copper rockfish (<i>Sebastes caurinus</i>) ¹
Diversity	<i>Sebastomus</i> spp. rockfish diversity
	Species richness (fish & invertebrates)
	Species diversity (functional groups of fish & invertebrates)

¹ Size structure includes young-of-the-year rockfish where feasible.

*formerly Deep Ecosystems