

FACT SHEET

THE FIRST 10 YEARS: MEASURING THE SUCCESS OF CALIFORNIA'S UNDERWATER PARKS

In 2012 California created a groundbreaking network of underwater parks called marine protected areas (MPAs). Today California's network consists of 124 designated areas along the coast that represent important habitats and are linked ecologically by ocean currents.

California's network safeguards 9 percent of state waters in "fully" or "highly" protected areas, but in total, covers 16 percent of state waters.¹ While "lightly" or "minimally" protected areas allow extractive activities and other uses, "fully" or "highly" protected MPAs prohibit all harmful industrial activities within them and are an important solution to help reduce stress on the ocean at a local level.² A thoughtfully designed and well-managed MPA network can scale an MPA's benefits across an entire region.³

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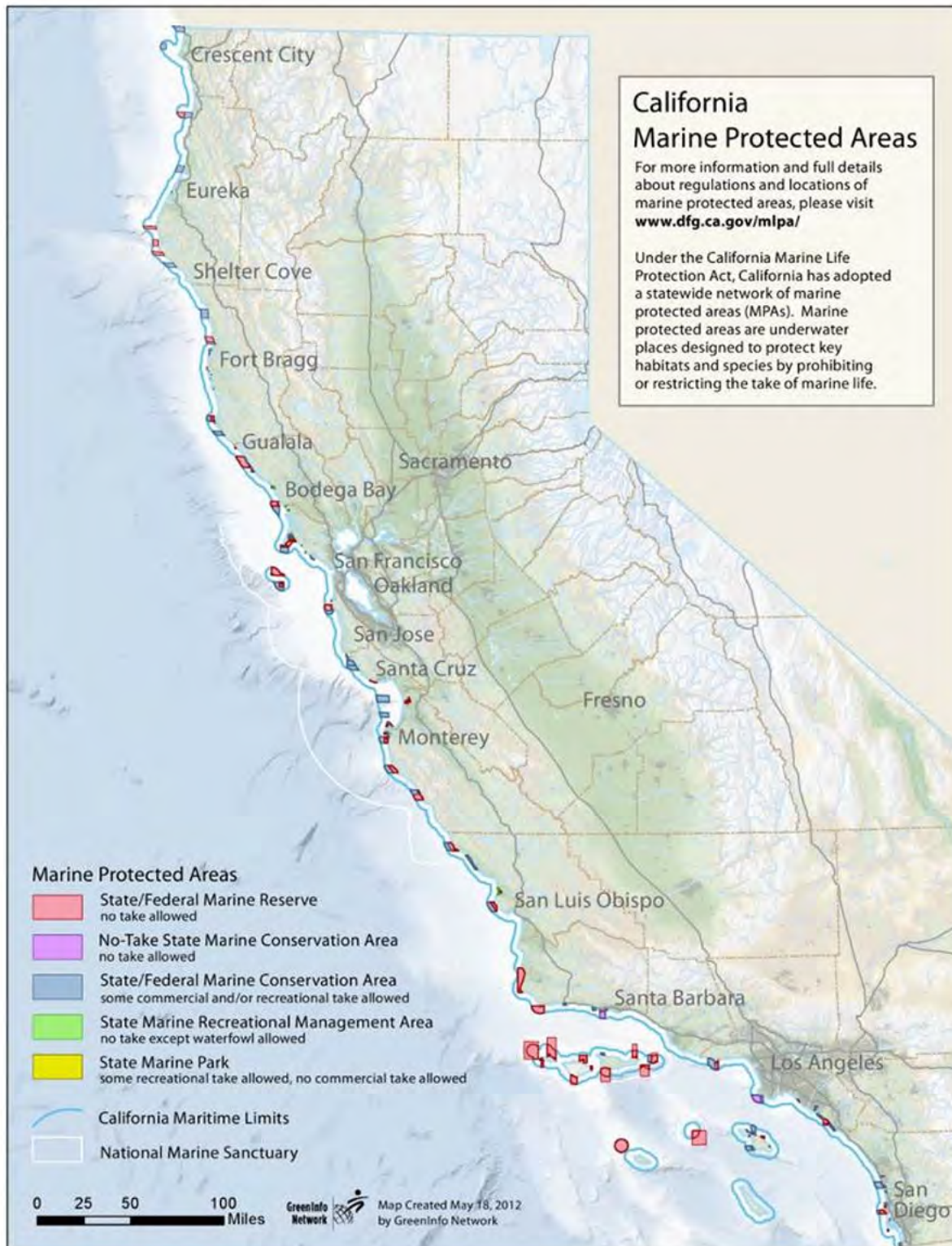


California sea lion in Santa Barbara Island State Marine Reserve.

Ten years after implementation, California’s MPA network is undergoing its first Decadal Management Review to evaluate progress toward meeting the management and ecological goals set forth in the state’s Marine Life Protection Act, which called for establishing the parks.⁴ Understanding the

effects of the MPAs is more important now than ever, as climate change further complicates our understanding of (and confidence in) resource-specific management actions and impacts on ecosystem health.

Figure I: Map of California’s Marine Protected Area network



Source: GreenInfo Network, “Marine Protected Areas Education Maps, <https://www.greeninfo.org/work/project/mpa-education-maps>.

THE MARINE LIFE PROTECTION ACT

Between September 2007 and December 2012, California undertook a science-based and stakeholder-driven process to designate a network of marine protected areas (MPAs). This effort was catalyzed by the passage of the Marine Life Protection Act in 1999.⁵ The act's goals are to:

1. Protect the natural diversity and abundance of marine life, and the structure, function and integrity of marine ecosystems.
2. Help sustain, conserve and protect marine life populations, including those of economic value, and rebuild those that are depleted.
3. Improve recreational, educational and study opportunities provided by marine ecosystems that are subject to minimal human disturbance, and to manage these uses in a manner consistent with protecting biodiversity.
4. Protect marine natural heritage, including protection of representative and unique marine life habitats in CA waters for their intrinsic values.
5. Ensure California's MPAs have clearly defined objectives, effective management measures and adequate enforcement and are based on sound scientific guidelines.
6. Ensure the State's MPAs are designed and managed, to the extent possible, as a network.

Scientists, decision makers, and MPA managers evaluate the impacts of protected areas by conducting long-term monitoring and research inside key MPA habitats and, for comparison, in “reference sites” which are adjacent areas outside the MPAs with similar conditions.⁹ The data they collect sheds light on whether fished species are seeing immediate benefits from protection and how unfished species are impacted, which can provide important insights into disturbances in environmental conditions and overall ecosystem health.¹⁰

SCIENTISTS ARE SEEING HEALTHIER ECOSYSTEMS IN CALIFORNIA'S MPAS

While trends vary by species and by region, at this early stage scientists are observing positive signs that California's MPA network is promoting ecosystem health by supporting biodiversity; providing refuge for more, bigger, and older fish; and even showing attributes of climate resilience.

High-level findings of the long-term MPA monitoring reports include the following:

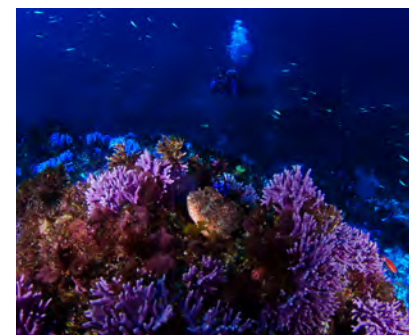
- A study program that allowed catch-and-release fishing for research purposes inside MPAs indicates that fish are larger and more abundant inside the MPAs than in reference sites statewide.¹¹
- Of the 20 MPAs analyzed by scuba surveys, 16 had, on average, greater biomass for targeted species inside MPAs when compared with reference sites.¹²
- The greatest increases in species density, size, and biomass were observed in the Northern Channel Islands and South Coast Region, which would be expected since these MPAs have been protected the longest and had moderate to high fishing pressure prior to being designated as MPAs.¹³
- Generally, high-resolution modeling of connectivity along the Central California coast—which examined the ability of protected areas to transport and receive larvae and spores—showed connectivity and spillover across the network, which indicates the presence of populations healthy enough to expand beyond an individual MPA.¹⁴
- Compared with state waters overall, modeling studies showed that California's MPA network overlapped considerably with potential “climate refugia,” i.e., areas that stay relatively stable over time and therefore serve as a refuge for species in a changing world.¹⁵
- Structure-forming invertebrates such as corals and sponges, which are critical to biodiversity and healthy ecosystems, were found at greater densities within MPAs than in associated reference sites.¹⁶



Researcher performs rockfish survey in Asilomar State Marine Reserve.

MONITORING CALIFORNIA'S MPAS

Since the creation of California's marine protected areas, the state has been committed to regularly monitoring the effects of the MPA network on the marine ecosystem, including on ecosystem health.⁶ Measures of ecosystem health are often used to inform management actions and decision making for MPAs and underscore the goals of the Marine Life Protection Act. A healthy ecosystem is defined as “the condition of a system that is self-maintaining, vigorous, resilient to externally imposed pressures, and able to sustain services to humans.”⁷ It contains healthy organisms and populations, and all the types of organisms (predators, herbivores, filter feeders, etc.) are present in numbers appropriate for that habitat type.⁸



Purple hydrocoral in Farnsworth State Marine Conservation Area.

- In the rocky intertidal and sandy surf zones, MPAs showed characteristics of enhanced resilience, such as greater biodiversity and increased stability over time.¹⁷ In underwater video surveys of the outer surf zone, species richness and fish abundance were significantly greater in MPAs than in reference sites. This finding did not hold when using beach seine nets in the shallow surf zone, but the surveys showed that fish biomass was greater in MPAs than in reference sites. In the rocky intertidal zone, the community of invertebrates and algae was both more diverse and more stable over time, particularly in the Central and South Coast regions.¹⁸

Monitoring data were not universally positive in all the California MPAs scientists studied. This could be due to a variety of factors including, but not limited to, sample size, interannual and regional variability, length of protection, MPA size, habitat quality, fishing history, compliance with regulations, and impacts of environmental perturbations like marine heat waves. Overall, however, it is clear that California's MPAs support healthier marine areas, which ultimately provide better access to nature for recreation, research, and enjoyment.¹⁹ They also supply valuable information on how climate impacts vary across a coastline and show that protected areas may be more resilient to some of those impacts.²⁰ Further, MPAs are increasing the size and abundance of many highly prized, targeted species for fishing like rockfishes and lobster, especially in areas that had high levels of fishing pressure before protection.²¹



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Researchers seining in the shallow surf zone.

LIMITS TO MPA MONITORING

California's MPAs do not exist in a lab, of course. Real-world data gathered on site is inevitably limited, and these limitations impact our understanding of MPA effects. For one thing, California's MPAs are still young relative to the life span of some of the species that live in them. For example, many nearshore rockfish live more than 20 years, and bocaccio and black rockfish around 50 years.²² It is very early in the life of California's MPA network, but the Decadal Management Review is an important opportunity to assess the vast amount of information and learning we have gained so far about California's coastal ecosystem.

Also, evaluating how an MPA is performing requires collecting representative samples from each part of the natural community or ecological niche to look at the effects of protection across the entire ecosystem. Scientists use a wide range of techniques to collect data on marine species and habitats, and each technique captures a different type of information depending on the species or habitat in which it is used. Scientists take into account the limitations of each method and often use multiple approaches to capture information on a broad swath of species or make statistical adjustments when interpreting the data to account for the limitations. For example, hook and line fishing may be the best method to collect data on some fish species, but other species of fish in the same area may only be observed by scuba divers or underwater drones.

Further, when an MPA experiences large disturbances in environmental conditions, such as a marine heat wave or impacts from human use like poaching in an MPA, these factors can decrease or even eliminate the MPA's beneficial effects. Historical human use patterns are also important. For instance, areas that had high fishing pressure before they became an MPA are often shown to have a more rapid and stronger positive response to protection.²³

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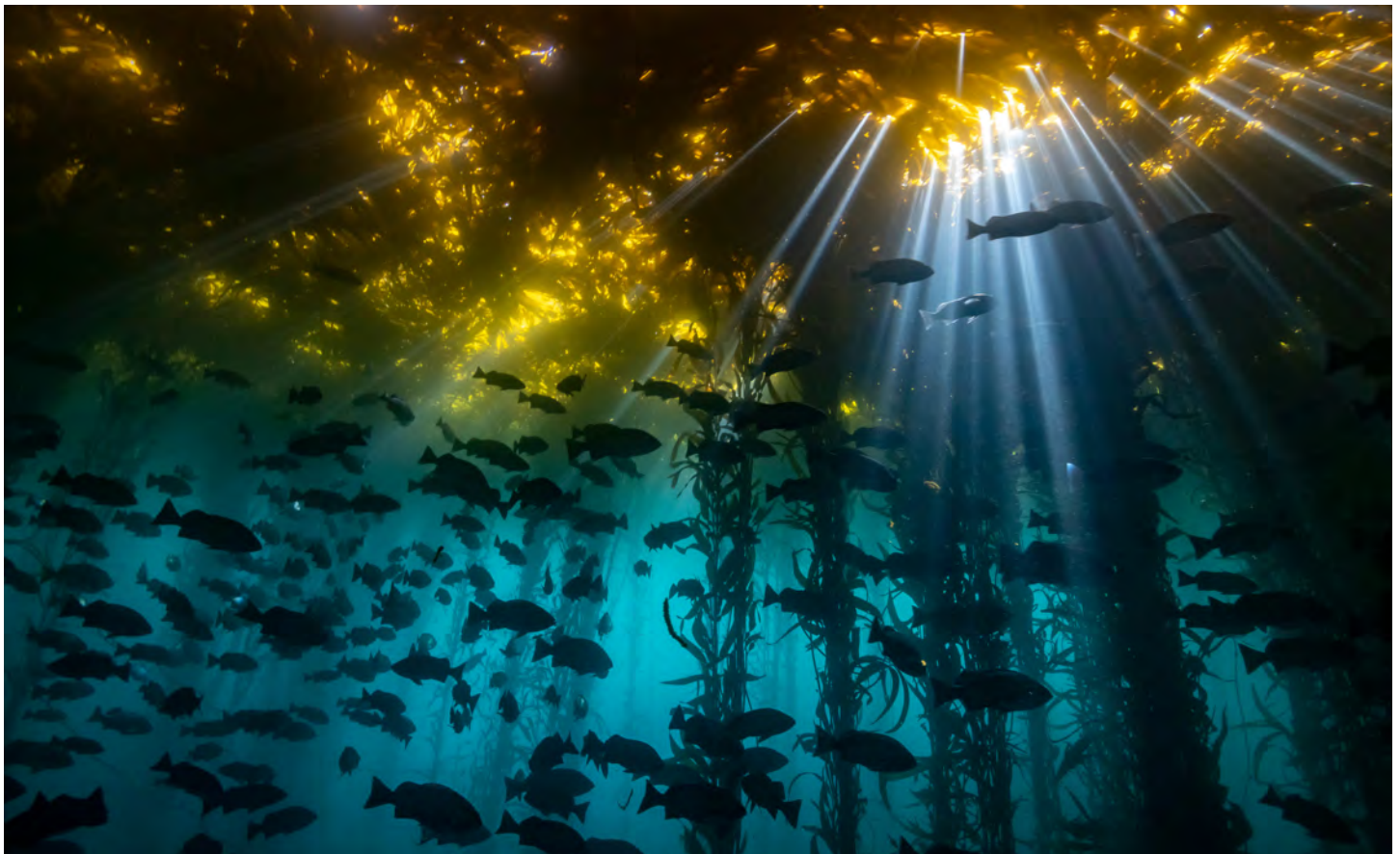
California spiny lobster at Long Point State Marine Reserve.

RECOMMENDATIONS FOR THE FUTURE OF CALIFORNIA'S MPA NETWORK

The Decadal Management Review of California's MPA network provides important information about the current and potential future impacts of well-governed MPAs. To effectively manage California's MPA network going forward we must:

- **Give it time.** Ecosystem recovery can take decades.²⁴ California's and South Australia's MPA networks are the only ones of their size and level of protection in a nearshore temperate ecosystem.²⁵ To enhance our understanding of MPAs globally and better realize the impacts of California's MPA network on the state's marine ecosystems, the network must be given more time.
- **Keep the MPAs strongly protected.** A strong, prudent approach to marine management that maintains and strengthens the network of protected areas is well supported by the current science, including the initial findings of California's long-term monitoring reports.²⁶ Such an approach is important particularly because the ocean ecosystem is becoming less predictable and less hospitable to marine life as the climate changes.²⁷
- **Actively monitor.** Continued long-term monitoring of California's MPA network provides accountability for meeting the Marine Life Protection Act's goals and increases our understanding of nearshore ecosystems.²⁸
- **Adaptively manage.** Long-term monitoring helps identify emerging threats to California's MPA network and coastal ecosystems. Managers must respond to this incoming information and take regular actions to ensure that the network continues to support ecosystem resilience as circumstances change.

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Rockfish in a Monterey-area kelp forest.

ENDNOTES

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