

PATHWAYS TO 30X30 CALIFORNIA

Appendix E

OCEAN PROTECTION COUNCIL:
SCIENCE NEEDS FOR ADVANCING 30X30 IN COASTAL WATERS



OCEAN PROTECTION COUNCIL

Introduction

In October 2020, Governor Gavin Newsom issued [Executive Order N-82-20](#), which sets a goal of conserving 30% of the state’s lands and coastal waters by 2030. Currently, California’s coastal waters (defined as state waters extending from the mean high tide line to three nautical miles offshore, including estuaries, bays, and offshore islands) are a complex mosaic of overlapping marine managed areas that vary widely in terms of level of protection, reason for establishment, managing agency, and potential biodiversity benefits. This has led to significant debate among California’s ocean stakeholder communities about the types of areas that should or should not count toward the 30x30 goal.

Pathways to 30x30: Accelerating Conservation of California’s Nature offers the following definition of conservation for the purposes of 30x30: *“Land and coastal water areas that are durably protected and managed to sustain functional ecosystems, both intact and restored, and the diversity of life that they support.”*

Durably protected areas are defined in *Pathways to 30x30* as encompassing *“areas under government ownership or control, primarily designated to protect species and their habitats; areas under perpetual easements that protect species and their habitats; or areas with species and habitat protection designations that have gone through a formal rulemaking or other enforceable decision-making process not subject to simple reversal.”*

Assessing the second element of the definition of conservation—sustaining functional ecosystems and species—is more complex. An appropriate benchmark for coastal and marine systems is the definition of “healthy oceans” provided in the [Advancing 30x30: Conservation of Coastal Waters Advisory Document](#): *“‘Healthy’ ocean ecosystems are those that are able to independently and sustainably maintain critical organization (species richness, intricacy of interactions, food web complexity, social dynamics) and functions (the energy, productivity, activity, or growth within a system) over time in the face of external stress (resiliency).”*

Based on these parameters, the California Ocean Protection Council (OPC) and its partner agencies have made initial determinations about areas that should currently

be considered conserved, areas that could be considered conserved if biodiversity protections are enhanced, and areas that require further consideration before a determination can be made about their conservation status. OPC initially identified more than 30 types of marine managed areas within state waters. Of these areas, only California's statewide network of 124 [marine protected areas](#) (MPAs) fully meets the definition of conservation:

- Durable protection: MPAs were established for the purposes of conservation. Their boundaries and regulations are codified in [California law](#).
- Sustaining healthy oceans: Evaluation of MPA effectiveness is complex, especially in temperate ecosystems where changes resulting from protection can take years or even decades to detect. However, early monitoring results in California have demonstrated that some older, highly protected MPAs such as [Point Lobos State Marine Reserve](#) and the [Northern Channel Islands MPAs](#) have clear biodiversity benefits, including larger and more abundant sea life. California's [MPA monitoring and evaluation program](#), which includes the upcoming first decadal management review of the network, will continue to assess ocean health, measure progress toward MPA goals, and support adaptive MPA management in the face of climate change.

California's MPA network covers 16% of state waters and includes both no-take state marine reserves and limited-take state marine conservation areas. Despite the fact that regulations vary from MPA to MPA, with only 9% of state waters fully protected by state marine reserves, California's MPAs were designed and are adaptively managed as an ecologically cohesive network intended to help sustain healthy oceans on a statewide scale. Additionally, state marine conservation areas provide an excellent model for balancing biodiversity conservation with sustainable, well-managed commercial and recreational fishing. Therefore, the state currently considers 16% of coastal waters conserved.

However, MPAs are not the only way to achieve conservation in coastal waters, and the state does not consider sustainable commercial or recreational fishing to necessarily be incompatible with conservation of the state's coastal and marine biodiversity. Therefore, the pathway to achieving 30x30 for the coast and ocean will include the 16% of state waters already protected by the state's MPA network and a prioritized focus on strengthening biodiversity protections in [National Marine Sanctuaries](#), which cover 40.6% of state waters. (This percentage will increase if the proposed [Chumash Heritage National Marine Sanctuary](#), which would protect the marine ecosystems, maritime heritage resources, and cultural values of Indigenous communities along the central and southern California coast, is approved by the NOAA Office of National Marine Sanctuaries.)

National Marine Sanctuaries offer durable protection, but generally only regulate alteration of the seafloor, and the extent to which these restrictions help sustain healthy oceans is not well studied and remains unclear. Given these considerations and the fact that sanctuaries include many areas of exceptionally high biodiversity (for example, Channel Islands, Monterey Submarine Canyon, Farallon Islands) within

their boundaries, these areas offer a natural place to focus conservation efforts and provide a pathway for the state to meet or exceed the 30x30 target while ensuring that access and sustainable use is maintained. Additionally, partnership with National Marine Sanctuaries provides an opportunity to leverage the federal government's [America the Beautiful initiative](#) to conserve 30% of U.S. lands and coastal waters by 2030. Strengthened biodiversity protections within sanctuaries need not be “one size fits all” and should be developed and implemented in partnership with California Native American tribes, state and federal agencies, scientists, and coastal stakeholders, including fishing and environmental communities.

California's coastal waters also include complementary conservation measures, including marine managed areas that can be considered [other effective area-based conservation measures](#) (OECMs). Such areas, which include “de facto” MPAs (places where human activity is restricted by law for reasons other than conservation or natural resource management) as well as closures and restricted areas established for the purposes of fisheries management, have the potential to contribute to the state's 30x30 goal, but their durability and biodiversity benefits require further study and potentially case-by-case assessment before determinations can be made about their conservation status.

The [Conservation of Coastal Waters Report](#), one of a series of reports released in 2021 to help inform the development of Pathways to 30x30, emphasizes that the state must take a science-based approach to implementing the 30x30 goal for the coast and ocean, and highlights the need for flexible, adaptive, precautionary, and “climate-ready” management of coastal and marine ecosystems informed by comprehensive scientific monitoring as well as Traditional Knowledges. To achieve this goal, strengthen biodiversity protections in National Marine Sanctuaries, explore the conservation status of complementary conservation measures, and work with all Californians to effectively conserve 30% of our coastal waters by 2030, the state requires an enhanced scientific understanding of: (1) areas to prioritize for conservation, (2) threats to coastal and ocean biodiversity, especially in the face of changing ocean conditions, (3) types of protections that could be implemented to address those threats, (4) potential biodiversity benefits offered by complementary conservation measures, and (5) approaches for monitoring and evaluating ocean health.

Priority Information Needs and Research Directions

1. Areas to prioritize for conservation

The first step toward conserving 30% of California's coastal waters by 2030 is to identify areas that should be prioritized for strengthened biodiversity protections. Many coastal and marine areas of high biodiversity are already protected by the state's MPA network, which was designed through a science-based and stakeholder-driven process. However, there may be areas outside of the MPA network that would benefit from some form of biodiversity protection, especially as ocean conditions change. Additionally, the MPA network only restricts fishing, which is just one of a multitude of threats and stressors faced by coastal and ocean ecosystems. Effective implementation of the 30x30 goal will require identifying areas in California's coastal waters that are important for biodiversity (climate refugia, rare habitat, areas of high genetic diversity, spawning grounds, etc.), with a focus on National Marine Sanctuaries, as well as an improved understanding of how the distribution of such areas may shift as a result of climate change.

Specific information needs:

- Characteristics of climate refugia for important species and species groups
- Locations (current and predicted) of potential climate refugia
- Locations (current and predicted) of areas of high genetic diversity
- Improved habitat mapping, especially for areas where there are currently gaps such as rocky intertidal zones
- Improved and finer-scale habitat suitability modeling
- Locations of spawning grounds for various species, especially important fisheries species
- Locations of migratory corridors, haul-out zones, and seabird nesting sites
- Predictive modeling to understand how habitat distribution and species ranges will shift as a result of climate change
- Spatial distribution and overlap of various current and planned human uses of the ocean (aquaculture, offshore wind, etc.)
- Improved understanding of land-sea connections
- Carbon sequestration potential of various habitats
- Economic valuation studies
- Areas subject to impaired water quality
- Areas of cultural importance to tribes

2. Threats to coastal and ocean biodiversity

California's coastal and marine ecosystems currently face a multitude of threats, including more frequent and more intense disturbance (marine heatwaves, storms, etc.), sea level rise, ocean acidification, marine disease, invasive species, pollution, and, in some cases, overharvest of marine resources. To effectively conserve 30% of coastal waters by 2030, the state requires an improved understanding of how these threats are currently impacting biodiversity and how their intensity and distribution may change in the future (especially the climate vulnerability of specific habitats, species, and cultural resources), as well as how these threats and stressors vary by ecoregion, habitat, and social-cultural setting. Identification of top threats to biodiversity within National Marine Sanctuaries should be prioritized.

Specific information needs:

- Impacts of climate change on oceanographic processes such as upwelling, and potential consequences for ecological processes (for example, larval dispersal)
- Improved understanding of habitat loss/compression expected as a result of climate change, (for example, oxygen shoaling, sea level rise vulnerability of sandy beaches and rocky intertidal zones)
- Sea level rise impacts, including coastal erosion and sedimentation
- Predicting the occurrence of marine heatwaves and associated impacts on habitats and species
- Ocean acidification and hypoxia trends and hot spots, and associated species and ecosystem-level impacts
- Location and type of threats to water quality (runoff, plastic pollution, etc.)
- Impacts of wildfire on coastal ecosystems, (for example, debris flow into rocky intertidal)
- Major threats to marine mammals
- Current and predicted impact of fishing on coastal and marine ecosystems, including changes in fishing effort due to climate shifts, offshore wind development, etc.
- Ecosystem-level impacts of various types of fishing gear, methods, and intensity, and potential increases in bycatch with species range shifts
- Emergence of marine diseases
- Spread of invasive species
- Impacts of nearshore/offshore development
- Risks posed by increasing vessel traffic (ship strikes, anchoring, oil spills, entanglement, noise, etc.)
- Economic assessments of various threats and associated disruption of ecosystem services (for example, loss of income to fishermen or ocean businesses, change in value of commercial fishing permits)

- Effects of increased underwater sound
- Effects of increased coastal lighting

3. Strengthening biodiversity protections

In addition to a spatially explicit catalog of various threats to marine biodiversity, implementation of the 30x30 goal in California's coastal waters will require robust exploration of potential new measures and initiatives that could be implemented to address these threats, with a prioritized focus on National Marine Sanctuaries.

Specific information needs:

- Improved understanding of realistic baselines and future potential for ecosystem structure, function, and services
- Assessment of current biodiversity protections, including a gap analysis
- Improved understanding of best practices for various types of nature-based solutions to address climate impacts such as living shorelines, restoration of degraded habitats
- In partnership with tribes and stakeholders, identification of biodiversity hotspots that may benefit from additional restrictions on extractive or non-extractive use, such as pinnacles or seamounts (fishing), highly impacted rocky intertidal habitats (trampling)
- Pilot testing new fishing gear and methods (for example, ropeless gear, small-diameter bottom trawl nets, descending devices on sport fishing boats)
- Feasibility of mandatory vessel speed reductions to protect whales from ship strikes
- Enhanced human dimensions studies and exploration of the role of human communities in integrated social-ecological systems
- Ways to strengthen aquatic invasive species protections
- Early detection of, and response to, emerging marine diseases
- Best practices for identifying and protecting tribal cultural resources along the coast
- Approaches for restoring and revitalizing indigenous stewardship
- Improved watershed protection and management for estuarine and coastal biodiversity conservation
- Exploration of land-based protections that can reduce threats to coastal and ocean biodiversity (for example, stricter emissions standards, bans on single-use plastic within sanctuary watersheds)

4. Complementary conservation measures

As noted above, California's coastal waters contain marine managed areas that can be considered complementary conservation measures, including other effective area-based conservation measures (OECMs), defined by the United Nations as “a geographically defined area other than a Protected Area, which is governed and managed in ways that achieve positive and sustained long-term outcomes for the in situ conservation of biodiversity, with associated ecosystem functions and services and where applicable, cultural, spiritual, socio-economic, and other locally relevant values.” This includes closures and restricted areas that regulate human activity for the purposes of fisheries management. Some of these areas may meet the definition of conservation, but they require further consideration before a determination can be made about their conservation status. Other OECMs that could be considered “de facto MPAs,” including military closures and marine renewable energy installations, may also have the potential to contribute to the state's 30x30 goal, but as these areas are generally not established for conservation or natural resource management purposes, their stewardship, durability, and outcomes for biodiversity must be assessed on a case-by-case basis.

Specific information needs:

- Comprehensive, up-to-date inventory of fisheries management areas, “de facto” marine protected areas, and other OECMs in California state waters
- Biodiversity benefits of various types of OECMs, and ways to enhance the durability/longevity of OECMs that support healthy oceans
- Improved understanding of how OECMs interact with formal spatial management measures such as state MPAs (for example, by serving as sources or sinks of larval organisms)

5. Monitoring and evaluation

Conserving 30% of California's coastal waters by 2030 requires more than simply designating areas as “conserved” on a map. To ensure continued successful outcomes for biodiversity and ecosystem health, especially given the dynamic nature of the marine environment and the significant threats posed by climate change, the state must invest in regular monitoring and evaluation of these areas. As noted by the Coastal Waters Advisory Panel, California is home to several long-term coastal and ocean monitoring programs that are tracking physical and biological metrics of ocean health. These programs should be expanded and data gaps should be filled to facilitate ongoing assessment of the biodiversity benefits of conserved areas and their adaptive management in a changing ocean. Regular monitoring is essential for dynamic ocean management and for evaluating the success of biodiversity protections to support successful outcomes for biodiversity conservation.

Specific information needs:

- Best practices for considering traditional knowledge in coastal and ocean management

- Information to inform the development of a model coast and ocean monitoring program for the state, including the development of indicators for coastal and ocean health
- Development of a centralized hub for California coastal and ocean data
- Development of metrics of success for new biodiversity protections, such as restoration projects
- Modernizing data collection in fisheries management, for example by transitioning away from paper logbooks for commercial fishermen
- Identification of spatial/temporal monitoring gaps
- Approaches for scaling up existing monitoring programs, including identification of sustainable funding sources
- Improved data accessibility, compatibility, and sharing between monitoring programs
- Pilot testing more cost-effective monitoring systems and technologies (for example, remote sensing techniques)
- Leveraging monitoring data streams to inform multiple management priorities
- Ways to streamline monitoring efforts and prioritize certain areas, methods, or indicators to maximize capabilities and resources
- How monitoring data can inform predictive modeling, and how modeling can in turn inform proactive, climate-ready management

Conclusion

As Californians move forward together to implement the 30x30 goal, OPC looks forward to partnering with the research community, other state and federal agencies, tribes and tribal governments, and coastal stakeholders—including both environmental groups and commercial and recreational fishermen—to identify areas that are important for biodiversity in California’s coastal waters, assess major threats to these special and vulnerable places, and explore protections that could be implemented to secure our state’s unique marine habitats and ecosystems in the face of a changing ocean.

OPC’s vision for the future is clear: by 2030, 30% of coastal waters are durably conserved to sustain healthy oceans. Coastal communities and California fisheries are thriving. Management is flexible, adaptive, and climate-ready. And Californians of all backgrounds are coming together to safeguard our coastal and marine resources for future generations.

The path toward that vision is not an easy one, but filling the research needs described here is a critical first step. We look forward to the work ahead.

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