Summary and Key Findings

State of the California North Central Coast

A Summary of the Marine Protected Area Monitoring Program 2010-2015

A network of marine protection

California is home to a statewide network of marine protected areas (MPAs) designed to meet the goals of the Marine Life Protection Act (MLPA), including protecting marine habitats and ecosystems, improving sustainable human use of our ocean, and protecting California's marine natural heritage. The MPAs are designed and managed, to the extent possible, as a network. Collectively, they can serve as a living laboratory for understanding and supporting ocean health, and exploring the effects of existing and emerging stressors.

Monitoring, research, and evaluation support adaptive management of MPAs. This document summarizes findings from the North Central Coast MPA Baseline Program (Baseline Program) and other monitoring activities in the region, and is a guide to the numerous resources that inform our understanding of the region, all available on OceanSpaces.org. Results of baseline monitoring provide a rigorous foundation for science-informed decision making by the California Fish and Game Commission and many other state and federal partners.

New partnerships working to achieve MPA network goals

In California, implementing the MPAs has motivated a coordinated approach to ocean resource management, stretching across jurisdictions, communities, academic disciplines, and institutions. Since 2010, university scientists, K-12 students, state and federal agencies, fishermen, volunteer divers, and non-profit organizations, among many others, have collaborated to deepen our knowledge of this region. The result is an unprecedented understanding of the state of the North Central Coast, and a set of relationships that will serve California for years to come.

A changing and dynamic ocean environment

Variability in the ocean environment impacts marine life and coastal communities. The region's ecosystems are particularly shaped by upwelling, freshwater runoff, and Pacific Ocean influences (like the El Niño Southern Oscillation and the Pacific Decadal Oscillation). At the same time, climate change and associated changes in ocean chemistry are impacting the ocean environment, including changes in temperature, sea level, and ocean acidificaton and hypoxia.

Long-term monitoring will be critical to help determine and mitigate the effects of climate change, which will affect the ability of the MPA network to meet the goals of the MLPA.

A comprehensive benchmark

Establishing a benchmark of ocean conditions and human activities against which future changes can be measured is an important time stamp, providing a starting point for a long-term monitoring program.

- Strong upwelling events in 2008 and 2010 led to increases in phytoplankton, a vital resource for marine food webs.
- Researchers documented over half-a-million seabirds; nearly 99% breed adjacent to MPAs, 83% of which breed on the Farallon Islands alone.
- Thousands of invertebrates and fish were observed in mid-depth and deep water ecosystems. Combining biological surveys and seafloor maps revealed important life history patterns and population distributions for many species, including commercially important rockfishes and lingcod.
- Patterns in commercial fisheries are driven by many factors including natural population cycles, policy change, management action, and economics. The Dungeness crab fishery has been particularly important to the North Central Coast in recent years.
- Recreational abalone harvesters contribute significantly to the coastal economy. The number of charter fishing trips decreased by more than half from 2000-2009, then began rebounding.
- Baseline monitoring demonstrated how academic, citizen, and agency scientists can collaborate to survey beaches and surf zones, rocky intertidal ecosystems, and kelp forests, to provide cost-effective, long-term monitoring of these ecosystems.

CALIFORNIA DEPARTMENT OF FISH & WILDLIFE

CALIFORNIA OCEAN SCIENCE TRUST

CALIFORNIA OCEAN PROTECTION COUNCIL

Connections enhance learning and new tools

A suite of projects through the Baseline Program brought together data and partnerships across multiple programs, generating new insights about ecological and human linkages across the region, and piloting new tools to support long-term monitoring.

Long-term monitoring hints at initial changes

It can take many years to see the impacts of MPAs and understand regional trends. However, data from long-term monitoring programs in the region provide us with a glimpse of recent changes.

- Long-term monitoring at Stornetta Ranch revealed that the establishment of the Sea Lion Cove MPA marked the beginning of a sharp increase of red abalone there, which has continued through 2015.
- Remotely operated vehicle (ROV) surveys inside and outside MPAs throughout the region in 2015 found increased abundances of some rockfishes and lingcod. Several hundred brown rockfish were observed in 2015, in contrast to only five individuals seen in 2009 and 2011.
- Surveys in 2014-2015 found shrunken kelp forests, followed by high sea urchin densities surpassing anything seen in the region in the past 10 years, leading researchers to examine the role of changing ocean conditions and the mass sea star die off.

MPA monitoring data inform a range of resource management decisions

MPAs are living laboratories, serving as tools for understanding ocean health in the face of sudden events, long-term trends, and climate change.

- In 2011 a severe invertebrate die-off occurred along the Sonoma Coast, resulting in thousands of dead abalone washing ashore. Rapid response by state agencies, researchers, and citizens, led to nimble management actions and thorough documentation of the event.
- In 2013 a mysterious wasting syndrome caused a mass die-off of sea stars across the west coast. Long-term monitoring programs, state resource managers, and baseline MPA monitoring gave California an early start on tracking the progression of the outbreak.
- MPA monitoring data provides knowledge of changing ecological conditions that is essential to track and respond to the effects of ocean acidification and hypoxia.

Strategic investments build long-term durability

Baseline monitoring generated novel scientific findings, strengthened partnerships, and developed new tools and approaches. Together, we are using this foundation to build scientifically rigorous, partnership-based long-term MPA monitoring in the North Central Coast and statewide.

North Central Coast State of the Region: By the Numbers

Baseline MPA monitoring in the North Central Coast has shown what it means to take a partnerships approach to MPA monitoring. A vast array of partners have come together to produce the data and science that underpin the State of the Region report, and make these resources available to everyone:

$4+ million investment in this region by the State

$1+ million leveraged by monitoring partners

20+ government, academic, private, non-profit, fishing, and citizen science groups forming partnerships, and investing time and resources.

11 baseline monitoring projects and peer reviewed technical reports

800+ monitoring sites

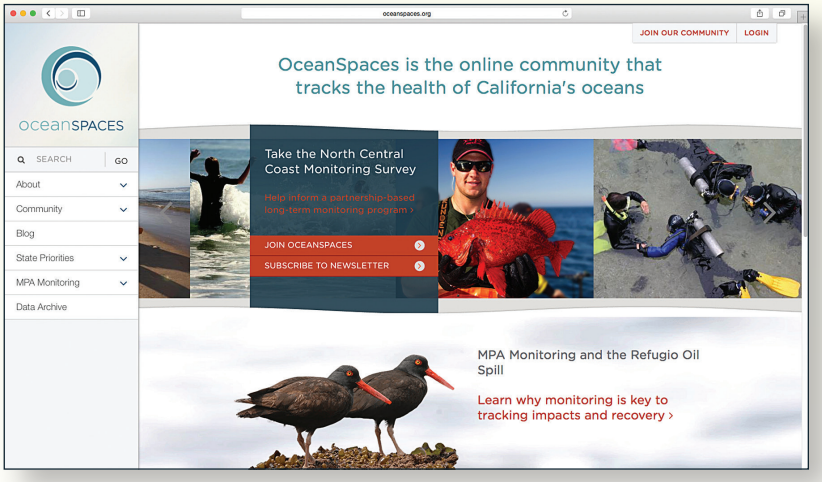
85 data packages

25+ interactive web map layers on MarineBIOS using baseline data

8 reports on monitoring methods development and science integration

6 products describing management and environmental context

30 outreach and education documents



And 1 online platform that brings it all together.

LEARN MORE AT oceanSPACES.org