

Baseline Highlights from California's South Coast Rocky Intertidal Ecosystems

Monitoring Life at the Interface



About This Snapshot Report

This report highlights some key scientific findings from the rocky intertidal monitoring project, one of ten baseline projects in California's South Coast region¹. Included facts and figures are derived from the project's peer-reviewed technical report², which can be found, along with associated data, at [OceanSpaces.org](https://oceanspaces.org).

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LIFE AT THE INTERFACE

Rocky intertidal ecosystems exist where the rocky shore meets the ocean, and are home to familiar species such as sea stars, limpets, mussels, anemones, snails, crabs, and seagrasses. In the South Coast region, these ecosystems cover approximately one-quarter of the coastline, including rocky cliffs, boulder rubble, and wave-cut platforms.

By occupying the space between land and sea, rocky intertidal ecosystems are vulnerable to a wide range of threats, including sea level rise, increasing water and air temperatures, ocean acidification, oil spills, coastal development, and the impacts of daily visitors. Along with sandy beaches, the rocky intertidal is one of the most easily accessible marine environments for people. These visitors are attracted to the rocky intertidal for a variety of activities such as tidepooling, scientific study, and harvesting organisms. People also pass through the rocky intertidal to pursue recreational activities in other habitats.



Jessie Altstatt

Easily Accessible, Easily Impacted

The large number of visitors to the rocky intertidal inevitably leads to impacts, whether through **physical disturbance or extraction**. Researchers determined that the **species and sizes of individuals present at particular sites were influenced by the degree of human access**. For example, owl limpets were smaller at sites with high human access, regardless of whether the sites were inside or outside marine protected areas (MPAs).



Pt. Fermin Tidepools, San Pedro Photo: Sarah Finstad

Sea Star Wasting Syndrome Outbreak: A Case Study in Readiness



When an outbreak of sea star wasting syndrome was detected on the West Coast in 2013, rocky intertidal researchers were prepared to track its emergence, spread, and severity in the region using the established study sites and recently collected baseline data. Without the baseline dataset, it would have been difficult to quantify sea star losses associated with the outbreak, or track the exact timing and extent of the spread. Read more at www.seastarwasting.org.

**280 MILES OF
ROCKY INTERTIDAL
IN THE SOUTH COAST**

**654
SPECIES
OR SPECIES GROUPS
OBSERVED**

3 SPECIES'
GEOGRAPHIC
RANGES
LARGER
THAN EXPECTED

**58
STUDY
SITES**

**NON-NATIVE 5
SPECIES DETECTED**

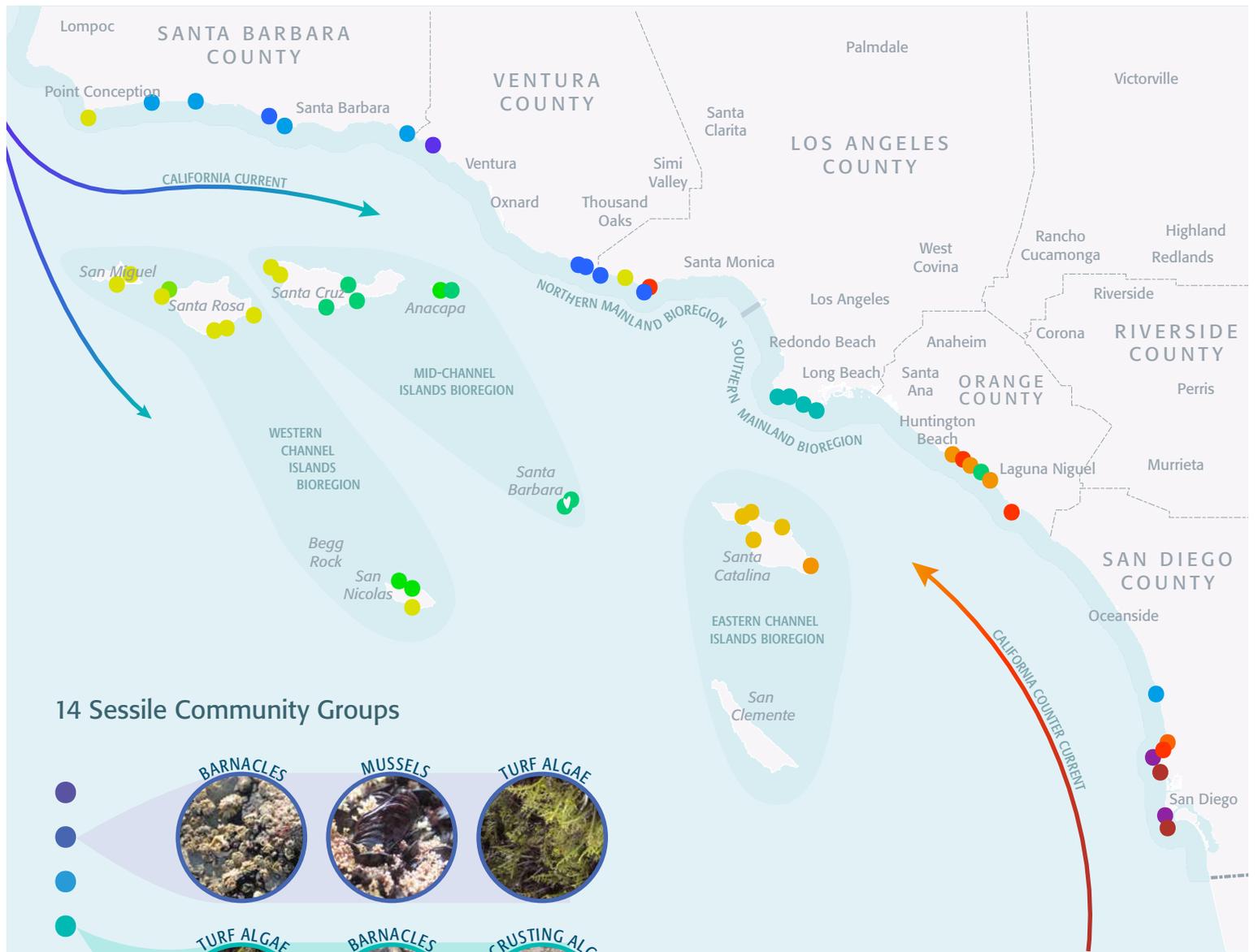


Building on Existing Programs to Create a Robust Baseline

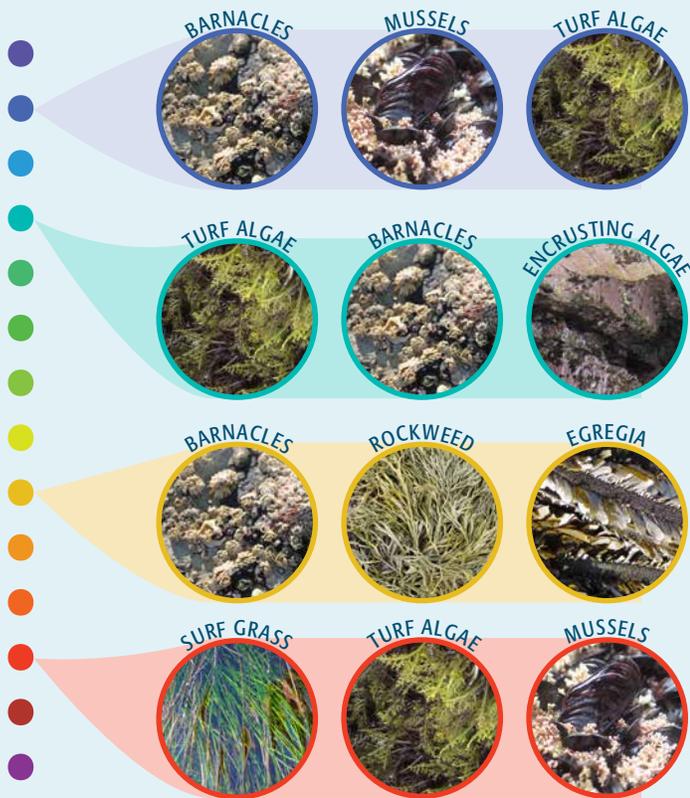
Since rocky intertidal ecosystems are so easy to access, they are also easy places to study. The rocky intertidal baseline project **amplified pre-existing rocky intertidal monitoring programs** (MARINE³ and PISCO⁴) that have been monitoring sites from Alaska to Mexico for over three decades.

This project had excellent spatial coverage, including study sites from Point Conception south to San Diego, as well as the Channel Islands. Monitoring sites were located inside and outside MPAs, including “old” MPAs that were designated prior to 2012.

Results show that paired sites inside and outside MPAs differed only by protection status, and are therefore **ideally suited for tracking effects of MPA implementation**. The robust baseline dataset generated by this work will also be **valuable in assessing future changes and events**.



14 Sessile Community Groups

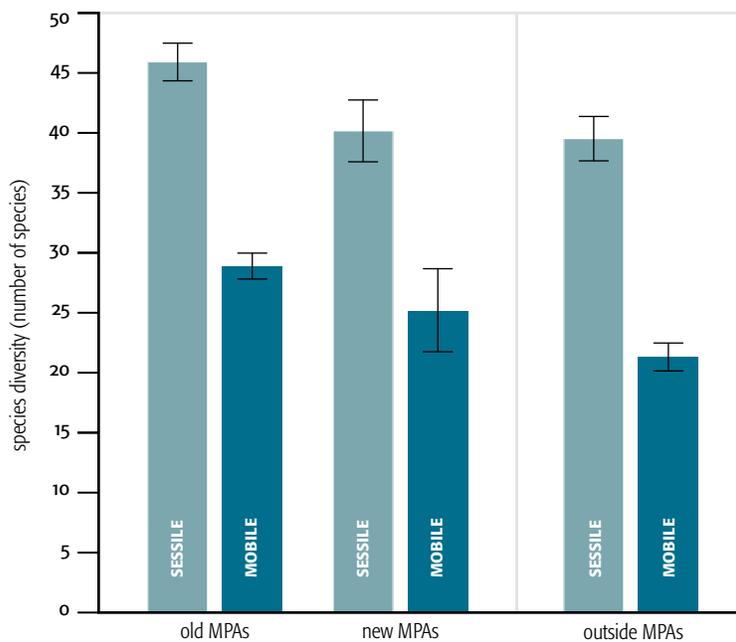


A Series of Distinct Communities

Previous research identified five ecologically and geographically distinct regions in the South Coast, called bioregions – baseline monitoring results are consistent with these. Within the bioregions, further analysis revealed **14 distinct sessile (non-mobile) community groups** and **9 distinct mobile community groups**. This detailed understanding of rocky intertidal communities can inform the selection of long-term monitoring sites.

The strong **water temperature gradient** in the South Coast, driven by the convergence of warm and cool currents, is a well-known driver of species distributions, including those in the rocky intertidal. Typical in many parts of the world, **latitude and longitude** were also found to be important predictors of community composition. On a local scale, **the type and slope of substrate and surrounding habitat** were also influential.

Map of the South Coast region, including the five bioregions (shaded and labeled), major warm and cool currents (red and blue arrows, respectively), and sessile community groups (colored dots). Each color represents a different sessile community group. Some prevalent and ecologically important sessile species are shown for a few selected communities. Photos: Nate Fletcher, Dave Lohse, Sarah Finstad, Jessie Altstatt



Old Marine Protected Areas are More Diverse

Species diversity was highest at sites within old MPAs, and lowest at sites outside of MPAs. Sites within new MPAs, which were established or expanded in 2012, had intermediate and variable diversity levels. These findings suggest that MPAs may conserve or promote high levels of diversity in South Coast rocky intertidal ecosystems, but that changes associated with MPAs may be difficult to identify over short time scales.

Mean values of observed species diversity (richness) for sessile and mobile species at sites inside old and new MPAs, as well as sites outside MPAs. Both sessile and mobile diversity was significantly greater inside old MPAs than inside new MPAs or outside MPAs. This figure was adapted from figures found in the technical report². Error bars represent ± 1 standard error.

An Ideal Habitat Type for Citizen Science Programs

The researchers for this project worked with LiMPETS⁵, a citizen science group that focuses on monitoring rocky intertidal and sandy beach ecosystems, primarily with middle and high school students. Researchers compared the results of MARINE surveys with LiMPETS surveys and recommended updates to the LiMPETS protocol that would produce more scientifically rigorous data while still being appropriate for students with little or no data collection experience or knowledge of intertidal species.



Sarah Finstad



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About South Coast MPA Baseline Monitoring

California Ocean Science Trust, California Department of Fish and Wildlife (CDFW), California Ocean Protection Council, and California Sea Grant coordinated and collaborated to design and implement baseline monitoring. Results from this work will inform the California Fish and Game Commission's five-year management review of marine protected areas (MPAs) in the South Coast region, anticipated in 2017. Results from this work will inform CDFW management recommendations to the California Fish and Game Commission from the first five years of MPA implementation in the region. Monitoring results can also inform the management of fisheries, water quality, coastal development, and climate change.

Footnotes

1. To learn more about the rocky intertidal baseline monitoring project, visit <http://oceanspaces.org/sc-rocky-intertidal>
2. Citation: Carol A. Blanchette, Peter T. Raimondi, Rani Gaddam, Jennifer Burnaford, Jayson Smith, David M. Hubbard, Jenifer E. Dugan, Jessica Altstatt, and Julie Bursek. 2015. Baseline Characterization of the Rocky Intertidal Ecosystems of the South Coast Study Region. California Sea Grant. San Diego, CA. 124pp. <http://bit.ly/107Mp67>
3. Multi Agency Rocky Intertidal Network <http://oceanspaces.org/marine>
4. Partnership for Interdisciplinary Study of Coastal Oceans <http://oceanspaces.org/pisco>
5. Long-term Monitoring Program and Experiential Training for Students <http://oceanspaces.org/limpets>