Environmental Studies Program: Ongoing Study

Title	DOI Partnership: Distinguishing Between Human and Natural Causes of Change in Nearshore Ecosystems Using Long-term Data from DOI Monitoring Programs (NSL #PC-11-02)
Administered by	Pacific OCS Region
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Conducting Organizations(s)	University of California, Santa Barbara
Total BOEM Cost	$449,927
Performance Period	FY 2011–2019
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PICOC Summary	
Problem	Monitoring and predicting the potential impacts of OCS oil and gas and alternative energy production on nearshore ecosystems requires an ability to distinguish between changes caused by natural processes verses those caused by human activities.
Intervention	Use existing long-term data to understand the natural range and sources of variability in the kelp forest ecosystem well enough to generate predictions on how it will respond to environmental change.
Comparison	Patterns and trends of variability at sites across the Southern California Bight
Outcome	Trend analyses that will enable scientists and managers to evaluate possible impacts from offshore oil and gas and alternative energy production, and develop options to mitigate these impacts
Context	Southern California

BOEM Information Need(s): Monitoring and predicting the potential impacts of OCS oil and gas and alternative energy production on nearshore ecosystems requires an ability to distinguish between changes caused by natural processes verses those caused by human activities. This is often hampered by the lack of long-term data to describe natural variation. In southern California, two Department of the Interior monitoring programs that focus on kelp forest communities have the potential to provide considerable insight into the patterns and causes of change in kelp forest ecosystems. Analysis of these datasets (which span 25+ years) will enable scientists and managers to evaluate possible impacts from offshore energy activities and develop options to mitigate these impacts. This is especially important to BOEM in light of global climate change and the need to understand the cumulative impacts of multiple projects on the OCS.

Background: Due to the inherent connectivity of the marine environment, a number of activities related to outer continental shelf (OCS) oil and gas and alternative energy

production can adversely affect nearshore habitats. These activities are: (1) alteration of habitat through the installation, maintenance, and/or removal of platforms, pipelines, cables, and other structures; (2) release of contaminants into the marine environment by oil spills and discharges; (3) decreased water quality via sediment disturbance during anchoring, dredging, etc.; and (4) onshore activities that result in erosion or spillage into the nearshore environment.

BOEM requires information about the sensitivity and resilience of biological habitats to disturbance to perform environmental analyses. Understanding the natural dynamics of nearshore ecosystems requires comprehensive long-term data that span a wide range of environmental conditions in areas potentially impacted by OCS energy activities. Such data exist for kelp forest communities that occur at offshore islands in southern California, which are monitored regularly by two Department of the Interior bureaus, U.S. Geological Survey (USGS) and National Park Service (NPS). Unfortunately, a lack of funding and staff for analyses have caused these data to be under-utilized, yet they have an enormous potential to aid in assessing potential impacts of OCS-related activities on sensitive nearshore communities.

Objectives: The ultimate goal is to understand the natural range and sources of variability in the kelp forest ecosystem well enough to generate predictions on how it will respond to environmental change and to enable scientists and managers to evaluate possible impacts from offshore oil and gas and alternative energy production, and develop options to mitigate these impacts. To this end, long-term data on the kelp forest communities of San Nicolas Island and the Channel Islands National Park will be combined and analyzed to determine: (1) the influence of short and long-term climate oscillations on the abundance, species composition, and trophic structure of kelp forest communities; (2) resilience of the community to varying levels of disturbance; and (3) the periodicity (and, if possible, causes) in shifts of community state. Anticipated products from this study include peer-reviewed scientific publications, and compiled data and metadata that are archived in an accessible format that facilitates future syntheses and environmental analyses required under the National Environmental Policy Act.

Methods: Funds will support the analysis of existing data collected by USGS and NPS. USGS has been collecting data on the abundance of macroalgae, benthic invertebrates, and fishes at six kelp forest sites around San Nicolas Island since 1980. NPS has been collecting similar data at 16 sites within the Channel Islands National Park since 1982. These two databases are very compatible in terms of their content, time period, and methods of data collection. The general approach will be to conduct detailed comparative time series analyses. Importantly, both data sets encompass two of the largest El Niño events ever recorded (1982-83 and 1997-98). Moreover, differences in environmental conditions among islands and among sites within islands (owing to different current regimes and exposures) provide a wide range of environmental conditions over which natural changes in kelp forest communities can be assessed.

Current Status: Analysis of data is complete and a manuscript for the first phase of the study has been prepared. Additional subtidal datasets from long-term monitoring programs have been added to the master DOI partnership dataset.

Publications Completed:

Two data papers published in *Ecological Archives.*
Paper presented at 8th California Islands Symposium in 2012.

Affiliated WWW Sites: https://marinecadastre.gov/espis/#/search/study/26950

References: None