

# *Ecological and social impacts/implications of marine reserves on Santa Barbara Channel trap fisheries*

A Colloquium presentation by

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Thursday, May 19, 2011

## **Abstract:**

Classical approaches to fisheries stock assessment rely on methods that are expensive, time-consuming, and not conducive to managing data-poor stocks. Moreover, many nearshore rocky reef species exhibit spatial variation in harvest pressure and demographic rates, further limiting traditional stock assessment approaches. Ecologists in the SBC-LTER are working with local spiny lobster and rockfish fishermen, the CA Department of Fish and Game, NOAA, and NGO scientists to develop new management strategies to overcome data limitations, account for spatial variability, and use marine reserves as ecological baselines to gauge exploitation rates and impacts. With implementation of no-take Marine Reserves in the Santa Barbara Channel ecosystem, there is great potential for improving decision-making in management through measurement of spillover from reserves, changes in the distribution of fishing effort, yield, and revenue, as well as refining estimates of key parameters, such as natural and fishing mortality through comparisons of fished populations with those in reserves. Such information is enhancing traditional stock assessments as well as collaborative, small-scale management approaches, including reserve-based Decision-tree frameworks that appear to be more cost-effective and have greater stakeholder buy-in than traditional top-down approaches. Our collaborative fisheries research program has measured the influence of 5 year-old marine reserves on lobster and rockfish populations, the related fisheries yield around reserves, spillover through tag-and-recapture studies, and changes in the distribution, yield, and revenue of fishermen. We have developed self-imposed decision tree catch controls for fishermen, and tested these management scenarios using data collected in the field with fishermen in Management Strategy Evaluation modeling, which compare long-term trends and sustainability of catches under traditional and decision-tree based management. We have also examined whether lobster fishing causes trophic cascades that are hypothesized to reduce kelp abundance on LTER sampled reefs. Short-term future plans include sampling for spillover and fishery responses in the existing Channel Islands reserve network, initiating a baseline sampling program for ecological and fishery responses to a planned network of reserves on the mainland coast, and working with fishermen to optimize their catch around reserves, using experimental fishing practices. This work includes collaboration with UCSB environmental economists and human geographers.

## **Bio:**

Hunter Lenihan is a Professor of applied marine ecology in the Bren School of Environmental Science and Management at UCSB. His primary research interests lie in the fields of applied population and community ecology, especially in connection with fisheries management, ecotoxicology, and restoration. He has collaborated with California fishing communities to design research intended to advance spatial-based fisheries management, including management utilizing marine reserves. He is exploring ecological and oceanographic processes that regulate coral populations, particularly within the long-term coral reef research project in Moorea, French Polynesia (MCR-LTER), with the goal of developing new techniques for coral reef management and restoration. In addition, Professor Lenihan is working with disease physiologists to isolate and cultivate disease-resistant abalone to be used as part of population enhancement efforts. Lenihan is a founding member of the UC Center for the Environmental Implications of Nanotechnology, and leader of their ecotoxicology group. He has conducted research within estuaries, at deep-sea hydrothermal vents, and in polar environments. His overall objective is to generate new ideas and methods marine resource management and train young scientists interested in community-based research and management.