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Publication Date

2009-11-01

Fish Populations in and around the San Diego-La Jolla Ecological Reserve

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A kelp bass in the La Jolla Ecological Reserve

SUMMARY

In a series of diver surveys, biologists documented relatively high densities of kelp forest fishes, including kelp bass, within and around the nearly four-decades-old San Diego–La Jolla Ecological Reserve.

Based on the fishes observed during the surveys, scientists recommend expanding the small, 210-hectare, “no-take” reserve to include a greater proportion of nearby rocky reef and submarine canyon habitats. A 100-year archive of fishes collected from the area suggests a larger reserve could benefit more than 200 species.

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METHOD

To evaluate the reserve’s dynamics, scientists counted fishes along set diver transects within the reserve, where fishing is prohibited, and at an adjacent site known to locals as Boomers, where fishing is allowed but limited by the pounding surf (hence the site’s nickname).

Surveys were conducted bimonthly for four years beginning in 2002. The protocol was for divers to swim 50-meter transects at multiple depths and count the numbers of each fish species observed. In all, divers swam 252 transects in the reserve and 248 transects at Boomers. On these, they counted more than 90,000 fishes: 52,520 in the reserve and 41,330 at Boomers.

DIVERSITY AND ABUNDANCE OF CONSPICUOUS FISHES

Fish assemblages and relative fish abundances were extremely similar at the sites, divers found, with 52 species recorded in the reserve, compared to 50 at Boomers. At both sites, the two most abundant species were blacksmith (*Chromis punctipinnis*) and seniorita (*Oxyjulis californica*). The ten most common species were identical at both sites.

Table 1. Mean fish densities (number of fish per square meter) at the two study sites:

Year	Reserve	Boomers
2002	1.56	1.44
2003	1.37	0.98
2004	2.63	1.64
2005	2.24	1.99

During the four-year study, fish densities changed in concert at the sites, reflecting similar recruitment pulses. In general, fish densities were lower in 2002–03 than in 2004–05 (Table 1). Researchers reported similar dynamics for other reef fish communities in the Southern California Bight, reflecting system-wide recruitment dynamics.

Two of the region’s most popular sportfishes, kelp bass (*Paralabrax clathratus*) and California sheephead (*Semicossyphus pulcher*), were commonly observed at both La Jolla sites. Their abundances were also similar in La Jolla and at Santa Catalina Island (Table 2). The two species, however, were three to four times more common in La Jolla than at heavily fished sites off the Palos Verdes peninsula and at King Harbor in Los Angeles. Notably, in 2004, the mean density of kelp bass in the reserve – 0.15 fish per square meter, based on six surveys that year – was the highest reliable density estimate for the species, as recorded from more than 30 comparable quantitative surveys in the bight since the 1960s. The higher fish densities provide a strong argument for expanding protection of the La Jolla reefs, as a tool for preserving kelp forest fish communities characteristic of the bight.

Table 2. Mean density (number per square meter) of kelp bass and California sheephead at sites in Southern California surveyed using similar methods.

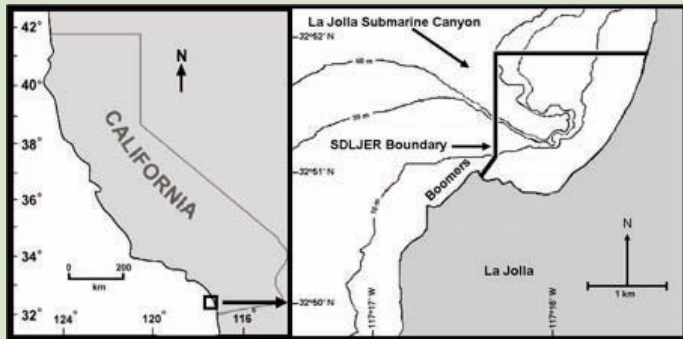
Data sources – Santa Catalina Island: Froeschke et al., 2006; Palos Verdes: Vantuna Research Group; King Harbor: Froesche et al., 2005.

	Kelp Bass	Sheephead
La Jolla		
Reserve (2002–05)	0.121	0.060
Boomer’s (2002–05)	0.083	0.042
Santa Catalina Island		
Protected site (2002–04)	0.097	0.076
Unprotected site (2002–04)	0.101	0.055
Los Angeles		
Palos Verdes (2002–05)	0.030	0.022
King Harbor (2002–03)	0.027	0.013

HISTORICAL RECORDS IN LA JOLLA

In addition to diver-based fish counts, researchers examined fish diversity as captured in the Marine Vertebrate Collection at Scripps Institution of Oceanography in La Jolla. Within the hundred-year archive, biologists identified 240 species from the La Jolla study region, more than quadruple that observed during the diver surveys.

Why the discrepancy? Scientists say the archive includes fishes taken from habitats not sampled during the project such as pelagic



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Map of the reserve

habitats, sandy substrates and benthic areas of the La Jolla Submarine Canyon. A remarkable 105 species were collected from the La Jolla submarine canyon and adjacent deeper waters, including more than 30 species of rockfishes (Sebastes). The archive also includes small cryptic and rare species, which can be overlooked by divers or were absent during the surveys.

CONCLUSIONS

Diver surveys show that, although the no-take reserve in La Jolla is small, it is located in an area of diverse habitats and, as a result, supports a rich and varied ichthyofauna, including high densities of heavily targeted sport fishes such as kelp bass. The archival record further underscores the region's unusually rich biodiversity. Taken together, scientists conclude, "A strong case can be made for expanding the existing marine reserve in La Jolla to include a greater proportion of high-relief rocky reef and submarine canyon habitat."

APPLICATIONS

In 2008, the state of California initiated the process for establishing a network of marine reserves in Southern California, as directed by the Marine Life Protection Act.

Results from this study highlight the value of no-take zones in protecting fish communities and may assist resource managers in selecting appropriate candidate sites for marine reserves in the Southern California Bight.

The results from this project also create a baseline for monitoring future changes in fish assemblages in the study area. Environmental consultants or regulators may also use the data to evaluate the environmental impacts of any proposed development near or within the reserve.

COOPERATING ORGANIZATIONS

Vantuna Research Group, Occidental College

STUDENTS

Matthew Craig, Ph.D.

Brad Erisman, Ph.D.

PUBLICATIONS

Craig, M.T., P.A. Hastings and P.K. Dayton. 2002. The near-shore fish assemblage of the San Diego–La Jolla Ecological Reserve. *Bulletin of the Southern California Academy of Sciences*. 101(S102):36. (Abstract).

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PRESENTATIONS

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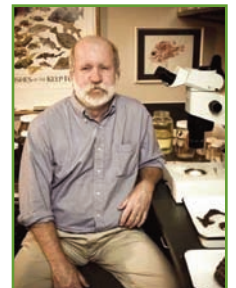
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This publication is sponsored by a grant from the National Sea Grant College Program, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, under grant number NA080AR4170669, Project number C/P-1. The views expressed herein are those of the authors and do not necessarily reflect the views of NOAA or any of its sub-agencies. The U.S. government is authorized to reproduce and distribute for governmental purposes. This document is available in PDF on the California Sea Grant website: www.csgc.ucsd.edu.

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