



Shelter Use, Movement and Home Range of Spiny Lobsters in San Diego County

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Background

The goal of this research was to characterize the shelter preferences, home ranges, site fidelity and movement patterns of spiny lobsters in the Point Loma kelp beds in San Diego. Biologists examined changes in these behaviors for lobsters placed in shelters with and without conspecifics (other lobsters). They also compared movement patterns for lobsters living in areas with relatively low and high risk of predation by large fishes such as sheephead, black sea bass and kelp bass.

This project provides important information for implementation of the Marine Life Protection Act in Southern California, such as the home ranges of exploited mobile invertebrate species like spiny lobsters and baseline information on the abundance, size frequency, population structure and location of nearshore invertebrates.

About 500,000 pounds of lobster, worth an estimated \$5 million, are landed in San Diego County yearly; much of this comes from the Point Loma kelp beds.

Methods

Divers repeatedly surveyed 12 benthic landscapes in the Point Loma kelp forest and along these transects counted the number of lobsters, their sizes, noted the types of shelter they were in and the number of conspecifics in each shelter.

Lobsters were tagged and tracked acoustically to measure their movement patterns at night. (Lobsters are nocturnal.) In the daytime, divers re-assessed the lobsters' habitats, their selection for shelter and the number of conspecifics in the shelter.

Results

Distance Traveled – Lobsters traveled greater distances than expected based on studies of spiny lobsters in other parts of the world, averaging 600 meters a night in 2005 and 250 meters in 2006. They moved farthest on the first day of tracking, suggesting that the stress of being captured and tagged might have influenced the distance traveled.

Superimposing lobster tracks on benthic habitat maps, lobsters were seen to avoid exposed, open sand and soft-bottom habitat. Instead, they moved under the cover of large kelp plants and within surf grass. Most lobsters moved in a straight line (rather than circuitous) from the kelp forest to shallower surf grass habitat at night.

Site Fidelity – Lobsters only occasionally returned to the same shelter. Instead, they seemed to “home” to a group of shelters or area within a kelp forest or nearby surf grass. Their movement patterns were not influenced by the size of the shelter in which they were first observed.

Aggregations and Predator Risk – Lobster behaviors were, however, affected by the presence of other lobsters. Lobsters placed in a shelter with conspecifics moved farther, had larger home ranges and were less likely to return to the original shelter than lobsters placed alone in a shelter (without conspecifics).

These trends were surprising because lobster aggregations deter attacks by predators. The expectation was that lobsters put in aggregations would find value in this added layer of protection and thus make efforts to return to the same shelter by, for example, moving shorter distances at night to make returning easier. None of these patterns were observed in Point Loma.

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In the La Jolla Ecological Reserve, where the scientists conducted a second set of diver surveys, a different pattern was observed. These lobsters were larger, there was a higher density of them, and the lobsters tended to form larger aggregations and to seek out smaller, more protective shelters. These differences were attributed to the relatively high densities of lobster predators in the reserve.

When there is a high risk of predation, lobsters change their behavior to increase their safety.

Conclusions

Spiny lobsters in the Pt. Loma kelp forest do not follow behavioral patterns typical of spiny lobsters in other regions of the world. Shelter fidelity was low; lobsters did not prefer shelters with conspecifics, and they traveled greater distances than expected at night. These atypical behaviors are likely due to the absence of predators in the heavily fished Pt. Loma kelp beds, as lobsters observed in the La Jolla Ecological Reserve, where fishing is prohibited and predator density as a result is much higher, displayed more typical spiny lobster behavior.

Presentations

2007. Western Society of Naturalists Presidential Symposium on Marine Reserves, Ventura, Calif. Spiny lobsters and marine reserves: What can we learn and what do we know?

2007. Bigelow Labs for Ocean Sciences, Boothbay Harbor, Maine. How the other half lives: The behavior of spiny lobsters in Southern California kelp forests.

2006. Center for Environmental Analysis-Centers for Research Excellence in Science and Technology, 7th Annual Conference, CSU Los Angeles. Shelter use and movement of California spiny lobsters in a southern California kelp forest.

2006. Loflen, C.L. and K.A. Hovel. Does the La Jolla ecological reserve protect California spiny lobsters? Western Society of Naturalists 87th annual meeting, Redmond, Wash.

2005. Hovel, K.A. and C.G. Lowe. Shelter use and movement of spiny lobsters in a southern California kelp forest. Oral presentation, 86th Annual Meeting of the Western Society of Naturalists, Monterey, Calif.

Publication

Mai, T.T. and K.A. Hovel. Influence of local-scale and landscape-scale habitat characteristics on California spiny lobster (*Panulirus interruptus*) abundance and survival. Submitted to *Journal of Marine and Freshwater Research*. 2007.

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