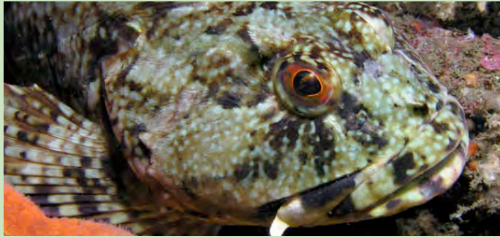


# Population Genetics of Commercially Important Cabezon

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## Summary

Are cabezon a single, genetically homogenous population or are they composed of multiple, genetically distinct populations?

New results of a California Sea Grant and California Department of Fish & Game study strongly suggest that West Coast cabezon are composed of at least eight genetically distinct populations. Six of these are in California in the areas around Fort Bragg, Half Moon Bay, Morro Bay, Santa Barbara/Ventura, the Channel Islands and San Diego. One population was identified in southern Oregon near Coos Bay and one in Puget Sound in Washington.

Cal Poly San Luis Obispo biology professor Francis Villablanca, who led the genetic analysis, bases this conclusion on the frequency distribution of different genotypes along the West Coast. This clearly showed a characteristic clustering of certain genotypes in eight geographic provinces. (See map.)

“What we don’t know is why we see this pattern,” Villablanca said. “We don’t know if certain genotypes have been maintained because they confer some adaptive advantage or whether it is just genetic drift, in which genotypes are lost due to the size of the local breeding population.”

## Method and Data

The study was based on mitochondrial DNA (mtDNA) analyses of tissue samples from 244 cabezon collected along the West Coast from May 1997 to September 2002.

The fish were collected from 14 locations and pooled into eight regional populations: Washington (n=number of fish=36), Oregon (n=37), Fort Bragg (n=36), Half Moon Bay (n=21), Morro Bay (n=35), Santa Barbara (n=20), Channel Islands (n=45) and San Diego (n=14).

The scientists used statistical techniques to test whether geographic barriers, such as Point Conception, could account for population structure.

## Results

Their analysis suggests that there are significant differences in mtDNA haplotype frequencies in the eight regions. The pattern, however, did not fit any recognizable sub-groupings, meaning that geographic barriers and/or geographic separation could not explain the patterns.

“There is only support for the idea that all populations of cabezon are differentiated from all other populations of cabezon,” the scientists wrote in their report to California Sea Grant. A microsatellite survey is underway to independently test the results. The scientists’ full report is publicly available at eScholarship: <http://repositories.cdlib.org/csgc>.

Deb Wilson-Vandenberg, groundfish project supervisor at California Department of Fish & Game, said she was not surprised by cabezon’s genetic structure.

“Cabezon’s larval duration is about a month, and they are very territorial,” she said. “You would not expect a lot of dispersion.” Cabezon also spawn demersal eggs (eggs that sit on the bottom), restricting that initial opportunity for dispersal, she added.

NOAA Fisheries biologist Jason Cope, who was the lead author of the most recent federal stock assessment for cabezon, was also not surprised by the results. Multiple genetic units are expected given cabezon’s life history characteristics and its strong site fidelity. At issue is what managers should do with the information, he said. California currently manages cabezon, a major fishery in Central California, as one stock.

“How do we properly evaluate and manage multiple populations at small spatial scales?” Cope said. “Do we spend money collecting

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data for each sub-population to perform traditional stock assessments; or do we devise simpler, less data-intensive assessment methods? Which way is better?

“Once assessed, we then are faced with the decision on how to allocate the catch between fishery sectors, mainly commercial and recreational fisheries,” Cope said. “This is especially difficult when each fishery may be fishing more than one sub-population. Who gets what, and of which sub-population?”

## Publications

Population Genetic Structure of Cabezon (*Scorpaenichthys marmoratus*): mtDNA Control Region Sequence Analysis. R. T. Olive, R. Nakamura, and F. Villablanca. In prep for *Copeia*.

Variable Microsatellite Loci in Cabezon (*Scorpaenichthys marmoratus*). E. Cline, R. Nakamura, and F. Villablanca. In prep for *Molecular Ecology*.

## Collaborators

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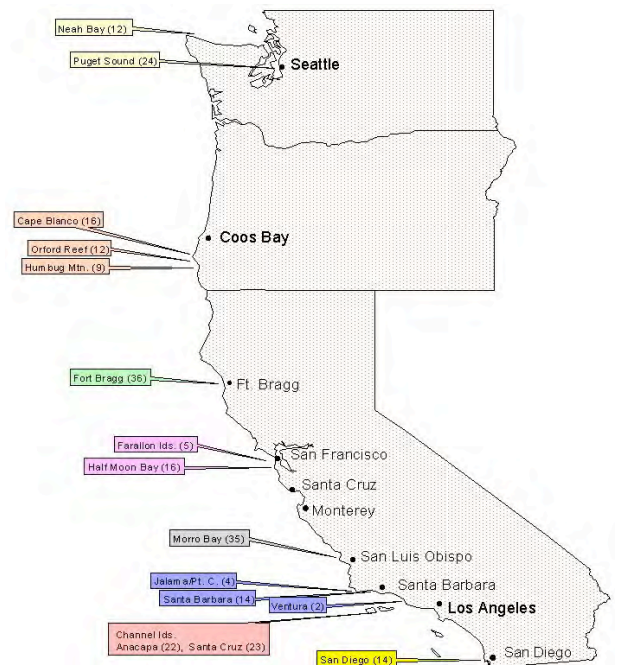


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