

# Serious Decline in Central California Black Abalone Populations: Outlook for Recovery and Community Structure Implications

## Introduction

Populations of black abalone (*Haliotis cracherodii*) have been steadily declining in the southern portion of the species' range due to a fatal disease called "withering syndrome". Withering Syndrome (WS) is caused by a



Withered black abalone

bacterium *Candidatus Xenohaliotis californiensis*, which attacks the lining of the digestive track and results in reduced body mass, weakness, and

the eventual withering of the abalone's foot until it can no longer cling to the substratum. Declines have been so severe throughout southern and central California that the species is now a candidate for protection under the USA Endangered Species Act. MARINE researchers have documented the northward progression of WS along the California coast.

## Methods

At each site, black abalone are counted and measured within 3 permanently marked plots. These data allow us to document both population declines (indicated by decreases across all abalone size classes) and recruitment events (indicated by increases in the number of abalone < 50mm in length). Sampling occurs twice a year, conditions permitting.



Researchers sampling black abalone

## Results

Our monitoring has revealed several intriguing patterns regarding black abalone populations. First, the northward progression of WS



Healthy abalone and crustose coralline algae

Appears to be more rapid during El Niño events. The WS causing bacterium may divide and spread more rapidly during these warm water periods. Second, we see little or no recruitment of black abalone into sites that have been devastated by WS, even when healthy populations are present tens of kilometers to the north. This suggests that recruitment is localized. Finally, we have observed changes in habitat after the abalone have disappeared from an area, which indicates that they play a key role in structuring their surrounding habitat. In their absence, the community changes from one dominated by crustose coralline algae and bare rock to one with increased cover of invertebrates and erect algae. This reduction in favorable habitat, in combination with recruitment limitations, may severely hinder the recovery of black abalone in areas impacted by WS.

