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Biodiversity: Sea Star Wasting Disease in Santa Monica Bay

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3.3. Sea Star Wasting Disease in Santa Monica Bay

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Sea stars (commonly called starfish) are conspicuous members of the rocky intertidal community. Their bright colors (often orange or purple), large size and slow movement make them favorites of many visitors to rocky intertidal habitats along the Pacific Coast. They are also critically important predators whose activities can strongly influence the nature of intertidal communities. In fact, studies of sea stars off the coast of Washington formed the basis for the important ecological concept of keystone predator. By consuming mussels, sea stars prevent mussels from outcompeting other species and dominating the area, thereby maintaining a high diversity of intertidal organisms (Paine 1966).

Sea stars, like other echinoderms such as sea urchins, have periodically experienced disease outbreaks in Southern California and elsewhere (Dungan et al. 1982). Over the past few decades in Southern California, these disease outbreaks were typically associated with warm water occurring during El Niño conditions. Most times, one or two sea star species were affected in a limited geographic area. Typically, diseased sea stars develop lesions (Figure 3.3-1) and appear to "dissolve" in a pile of white goo.

Starting in June 2013, however, sea stars along the west coast of North America have been affected by an unprecedented disease epidemic that has led to the death of millions of sea stars. Like previous epidemics, sea stars affected by the disease disintegrate, often over a period of only a few days. Unlike previous epidemics, the current outbreak has affected at least 20 different sea star species in subtidal and intertidal habitats along the entire coastline, from Baja California to Alaska. The effects on local populations are also more severe than during some past outbreaks, with all sea stars in some areas disappearing in a matter of weeks after the first diseased individual is discovered.

Information about the sea star wasting disease has come from many sources, but critical data has come from the Multi-Agency Rocky Intertidal Network (MARINe), which established a network of long-term monitoring sites throughout California and the entire west coast of North America. Repeated sampling at MARINe sites and elsewhere has enabled researchers to follow the occurrence of the disease over time. MARINe data have been used to track the development of another disease epidemic, the withering syndrome affecting black abalone, which showed a clear progression northward along the California coastline from its first occurrence on the mainland near Point Conception (Altstatt et al. 1996, Raimondi et al. 2002). In contrast, the current epidemic of sea star wasting disease spread quickly across the entire west coast but did not affect every population; over the next year or so, however, the disease spread more evenly through each local area. MARINe maintains a website, www.pacificrockyintertidal.org, with a

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compilation of data on the sea star disease, a map of locations that have been sampled, and a way for individuals to submit their own observations.

The cause of the sea star wasting disease is not fully understood. A recent paper combined field samples with laboratory experiments to identify a type of virus, specifically a densovirus, as the organism that is most likely causing the disease (Hewson et al. 2014). However, the authors also sampled preserved sea stars in museum collections and determined that the densovirus has been present along the west coast of North America for at least 72 years. It is not known why the outbreak is occurring now rather than at other times. While there are many possible triggers for the disease, including a variety of natural and anthropogenic stressors, at this point there is no evidence indicating which factor(s) may be responsible.

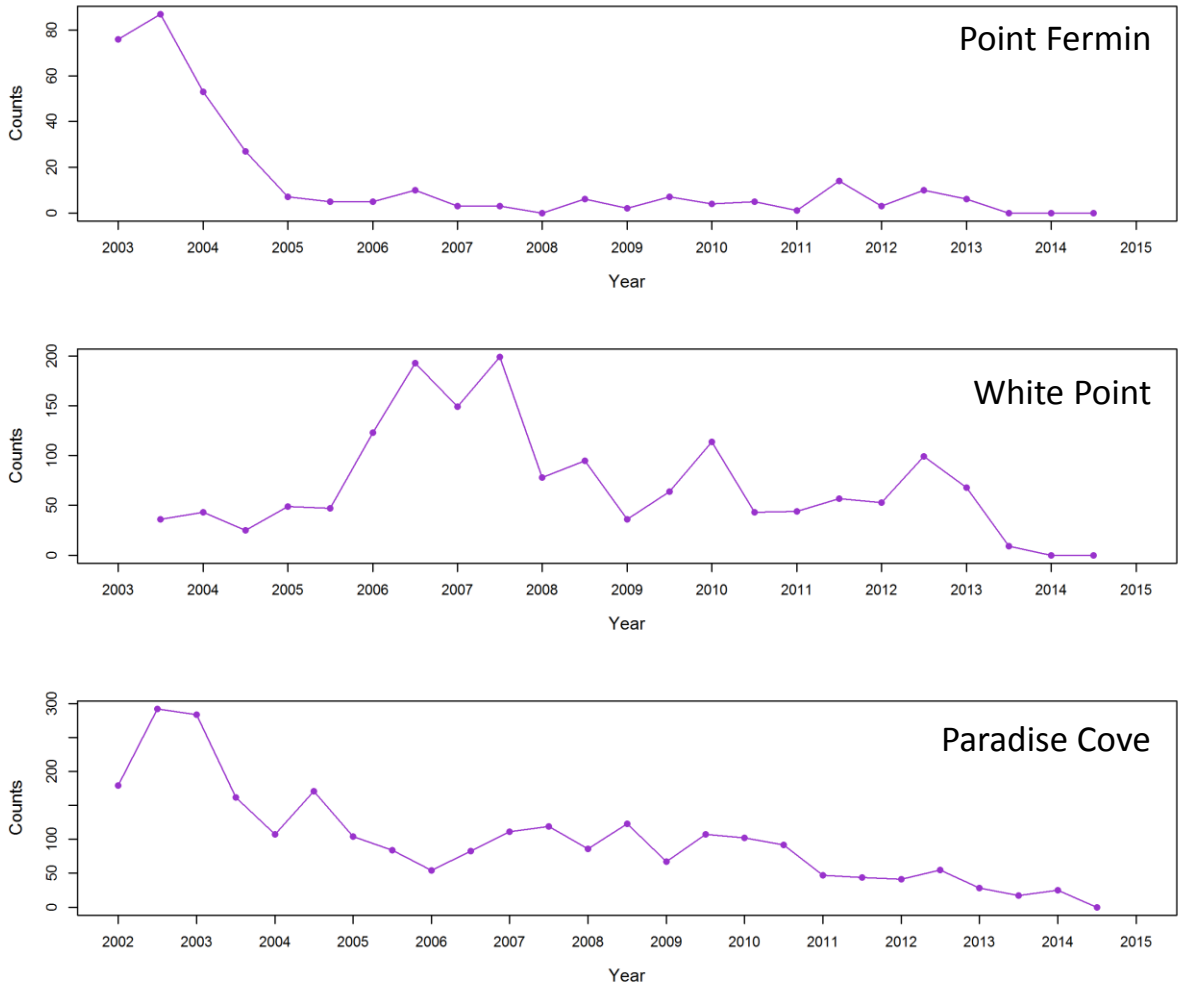
Figure 3.3-1. Diseased ochre sea star (*Pisaster ochraceus*) from White Point from November 2013. *Photo Credit: R.F. Ambrose.*

The sea stars of Santa Monica Bay have been hard-hit by the wasting disease. The disease has been reported from both intertidal and subtidal habitats. There are no quantitative subtidal data available to assess the impacts of the disease there, but there are three long-term MARINe rocky intertidal monitoring sites in the Bay, at Point Fermin and White Point on the Palos Verdes Peninsula, and Paradise Cove in Malibu. Although sea star abundances vary naturally at all sites,

sea stars were absent from both Palos Verdes sites by 2014 (Figure 3.3-2). Once sea star abundances became very low, the entire site (not just the fixed plots) was searched thoroughly, and no sea stars were found at either site through fall 2014. Sea stars had low abundance at Paradise Cove in 2013, and had disappeared completely from the site by the fall 2014 survey.

At this point, there is little sign of recovery at the Santa Monica Bay sites. In the spring 2015 survey, two sea stars were found outside of the fixed plots at Point Fermin, two were found outside the fixed plots at White Point, and no sea stars were found at Paradise Cove. At some other sites in California, unusually high recruitment of sea stars has been reported, with many very small juvenile sea stars, but there is no evidence of that in Santa Monica Bay. Sites in Ventura and Santa Barbara Counties had increasing numbers of sea stars during the spring 2015 survey with significant recruitment at some sites, but that has not been seen in Santa Monica Bay.

Figure 3.3-2. Sea star abundances in plots at long-term monitoring sites in Santa Monica Bay. Sea stars are counted in fixed plots at each site. *Figures adapted from* www.pacificrockyintertidal.org.



The future prospects for sea stars and the rocky intertidal communities in Santa Monica Bay are uncertain. In some previous disease outbreaks, the population declines were less severe and widespread, so ecological impacts were not noted. In other past outbreaks, one species of sea star was severely impacted, and recovery of that species took years to a decade or more. The presence of young sea stars could lead to faster recovery of a population, though even the sites with high recruitment might not benefit if the young sea stars also become infected and die. In Santa Monica Bay, however, researchers have not recorded any young sea stars, so it could be many years before sea star populations recover. Because sea stars play such an important role in rocky reef habitats, especially in the intertidal zones, there may be significant changes in intertidal communities. Scientists will continue monitoring these habitats to determine any changes to intertidal communities as well as recovery of sea star populations.

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