Alien species and a changing world: will kelp forests ever be the same?

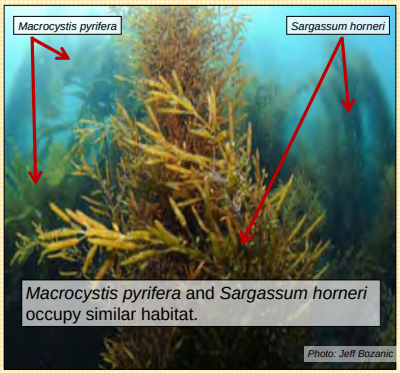
David J. Kushner and Kelly J. Moore
Channel islands National Park's Kelp Forest Monitoring Program

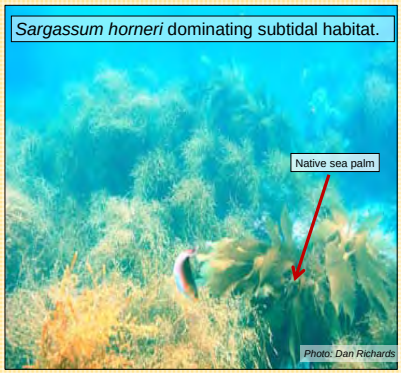
Overview

Alien species are increasingly invading marine ecosystems worldwide. In most cases the effects of non-native introductions on native species are unclear since baseline data prior to their arrival are often lacking. Such data may provide unique opportunities to assess changes resulting from these invasions.

Though non-native species are not new to kelp forests in California, there has been little documentation of their effects on these ecosystems in the past. The recent invasion of *Sargassum horneri*, a brown alga native to northeast Asia, into southern California has been tracked as this non-native rapidly becomes established. First observed at Long Beach Harbor in 2003, *S. horneri* has since spread throughout kelp forests at five of the eight Channel Islands.

Observations of this species suggest that it will have a much greater impact on California kelp forests than any previous algal introduction since extensive habitat is now dominated by dense patches of this alien and it continues to spread. Furthermore, it is unlikely that eradication or effective control of *S. horneri* is possible in open coast kelp forests. Recent attempts to control another invasive brown alga, *Undaria pinnatifida*, in California harbors have failed and eradication or control attempts in open coast systems would be exponentially more difficult with equally poor results.





The role of long-term monitoring

Channel Islands National Park's long-term kelp forest monitoring program (KFMP) has 28 years of baseline data prior to the first observation of *Sargassum horneri* in the park in 2009. The KFMP's 33 permanent monitoring sites are at ideal depths and habitats to monitor the alga's spread and possibly detect its ecological impacts on kelp forest communities. In 2010, we incorporated *S. horneri* into our annual sampling protocols and plan to continue to monitor the abundance and spread of this alien within the park.

Timeline of *Sargassum horneri* invasion of southern California

Management Actions

Although most experts agree that eradication of *Sargassum horneri* is likely impossible, small-scale removal experiments may be an effective way to improve our understanding of this alga's affects on kelp forest communities. In addition, the KFMP is designed to observe differences between areas inside and adjacent to marine reserves. Removal plots situated inside and outside marine reserves may demonstrate whether reserves provide increased resilience to invasive species. Unfortunately, without the likelihood of having a long-term positive management action such as eradication or control of this alga, funding for such a study is unlikely. Nonetheless, Channel Islands National Park's long term KFMP will provide the best available data on the impact of this newly invasive alga that will likely alter these kelp forests forever.