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Oahu's invasive algae

Non-native species can spread pathogens, alter ecological conditions and physical characteristics of marine ecosystems, create discord and imbalance, change successional patterns, compete for resources and displace native species.

Since 1950, at least 18 species of macroalgae have been introduced and became established on the island of O'ahu in the Hawaiian archipelago.

Commercial, experimental and accidental introductions, have resulted in the establishment of alien species from several South Pacific locations, as well as Florida, California and Japan.

Gracilaria salicornia, Kappaphycus alvaresii, and Kappaphycus striatum are among those that have become particularly successful.

K. alvaresii lacks a sexual reproductive cycle, reproducing through vegetative fragmentation, thus it was hypothesized that this biological limitation would prevent dispersal into new areas. Between 1970 and 1978 these species were introduced to various Oahu locations, including Kaneohe Bay located on the island's northwest coastline. Kaneohe Bay measures 13 km. in length, and 4.5 km. in width.

Three reef types typify the bay: an outer barrier reef, a fringing reef and 79 lagoonal patch reefs. In 1996 a survey of all accessible areas in Kaneohe Bay was undertaken to assess broad scale changes in these three alien macroalgae. The second phase involved detailed transect surveys of 14 sites representing all reef types within the bay. Physical factors were measured at all sites to correlate with algal distribution. Surveys found that all three species have spread throughout the Bay.

These species exhibit high growth rates, effective propagation, high

surface-to-volume ratio and morphological plasticity. These traits have accelerated their spread.

Water motion was the most important factor associated with algal distribution. There were no correlations between the distribution of algae and nutrients or PAR extinction at one and three meters. Light saturation occurred at low irradiance levels and therefore was not important to algal distribution. Oxygen, salinity, temperature and turbidity did not fluctuate greatly between sites.

The highest abundance of K. alvaresii and K. striatum occurred at the patch reef sites at less than one meter depth. Highest abundance of G. salicornia was found on the fringing reef sites at less than one meter depth.

K. alvaresii fragments were found on the beach two kilometers from its furthest documented distribution. The closest sheltered bay, Kahana Bay, is located 3.2 km. northwest of Kaneohe Bay and might be the next area colonized by these species.

These invasive aliens occurred adjacent to indigenous species and are potential competitors of native algae.

Ecological invasions can spread rapidly and have negative effects on marine ecosystems. Knowledge of the effects these species have on the environment, how they spread, and the physical, biological and chemical factors that influence their distribution, will assist in predicting the impact invasive species have on indigenous species. This will aid in the conservation and management of our reefs.

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