



## **Final Report: Building Capacity for an Aquatic Invasive Species Early Detection System in Hawaii.**

**FWS Agreement #:** 12200-6

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**Period Covered:** 11/30/2006 – 12/31/2016

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### **Accomplishments**

In 2006, the DAR Aquatic Invasive Species team surveyed small portions of the windward coast of Oahu, heading north above Kaneohe Bay. The team primarily surveyed for the early detection of the Kappaphycus/Eucheuma species complex, but also recorded all incidences of any other invasive algae. The areas surveyed were the fringing reef past Kualoa Beach Park, the fringing reef north of Ka'a'awa elementary school, a small area of Punalu'u and the fringing reef of Hau'ula. Only one incidence of Kappaphycus was found on the reef just past Chinaman's hat. This sample was not sent into a lab for analysis to determine the species or clade of Kappaphycus at the time.

In 2007, the AIS team surveyed the fringing reef on either side of Kahana bay, and areas directly outside and south of Ka'a'awa Elementary school. Eleven incidences of Kappaphycus /Eucheuma were observed and recorded directly outside Ka'a'awa elementary school. No samples were sent to a lab for analysis. The fringing reef that extends out to Chinaman's Hat was also surveyed, and three incidences Kappaphycus/ Eucheuma were observed. These were not sent to the lab for analysis either because they were considered a natural extension of the established populations in Kaneohe Bay.

In 2008, the same area outside of Ka'a'awa elementary school was resurveyed due to the large number of Kappaphycus samples found the year before. 48 incidences of Kappaphycus were observed, photographed, removed by hand and disposed of as best as possible. Many of the same areas surveyed were overlapped, but spaces in between points that were missed the year before were found to have Kappaphycus. It is more likely that the increase of incidences was due to missed areas as opposed to algal spread, although the latter has proven to be rapid when unchecked. Two specimens of Kappaphycus species were sent to Alison Sherwood in the Phycology Lab at University of Hawaii. The two specimens were determined to simply be Kappaphycus species. (See Photos 1&2)

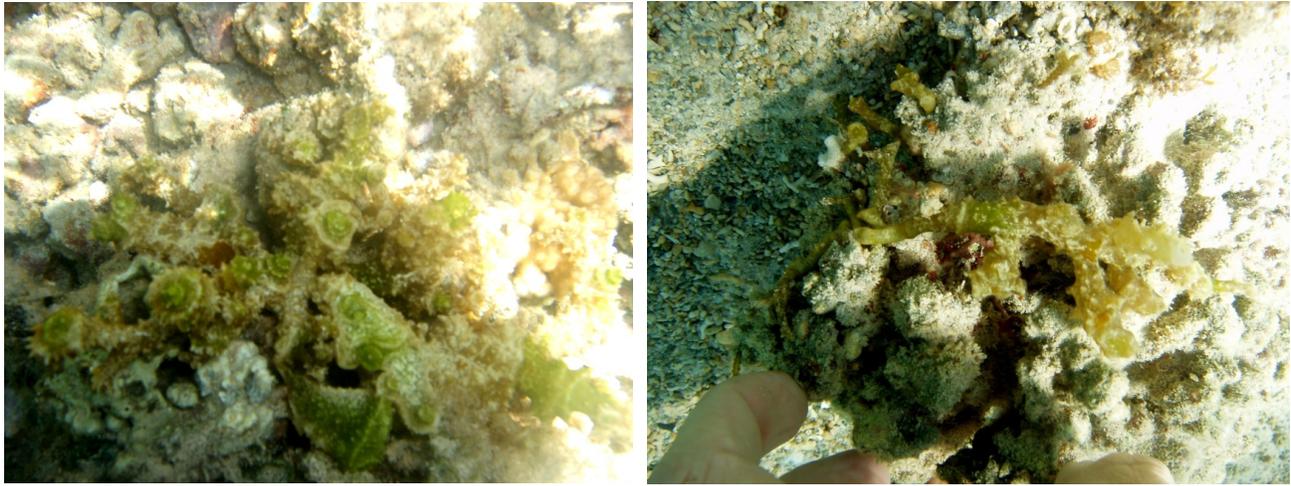


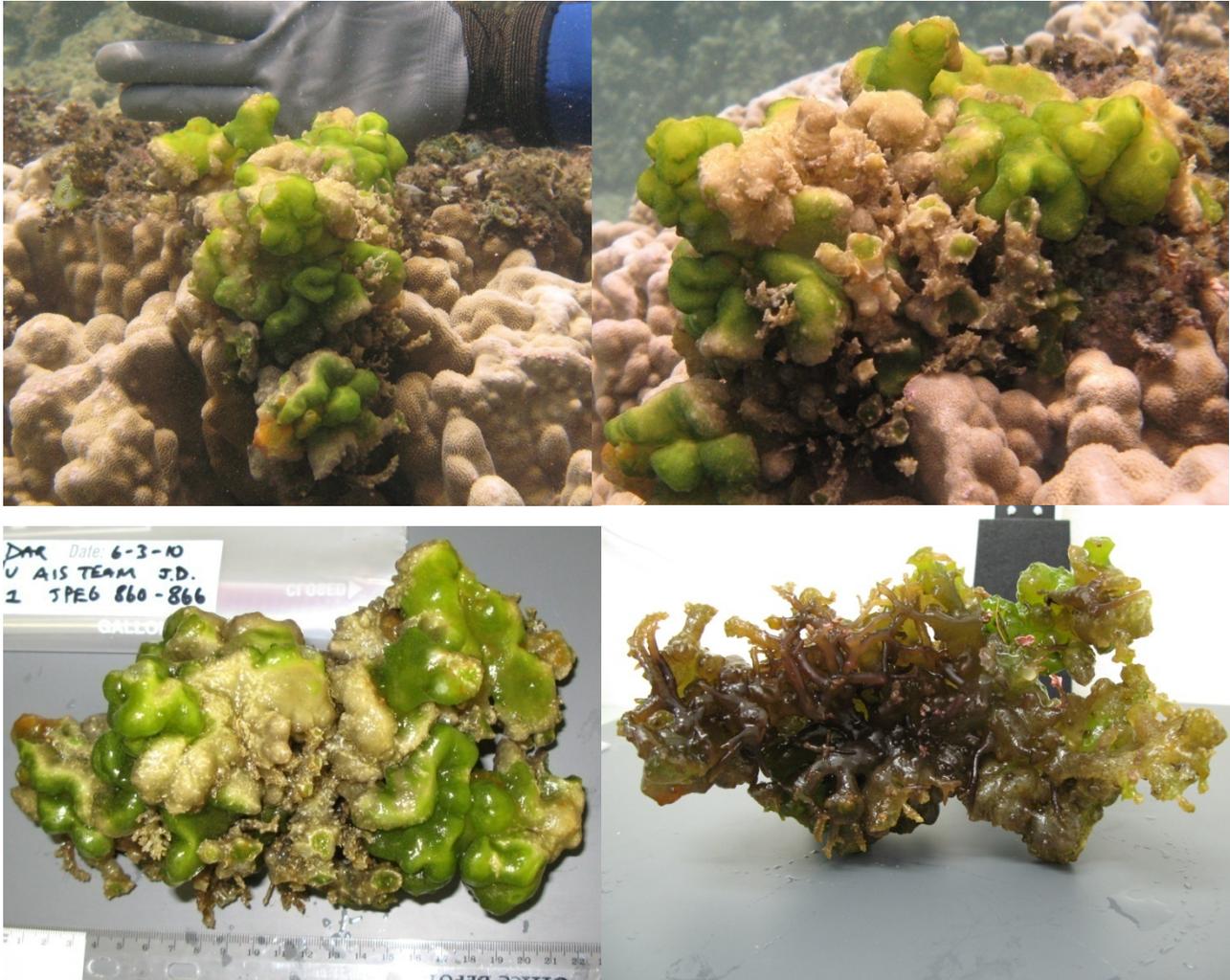
Photo 1 & 2: Kappaphycus species photographed and indentified from Ka'a'awa in 2008.

Again in 2009, the area outside Ka'a'awa elementary school was surveyed. 31 incidences of Kappaphycus were observed, photographed, removed by hand and disposed of again. Areas north of Ka'a'awa were also surveyed, such as the fringing reef north and south of Kahana Bay. Two incidences of Kappaphycus were observed. Portions of the fringing reef outside Hau'ula and Punalu'u were surveyed as well. One incidence of Kappaphycus was observed just south of Punalu'u. No samples were sent to a lab for analysis, although some photographs were taken. (See Photos 3 & 4)



Photo 3 & 4: Samples of Kappaphycus collected from Hau'ula and Punalu'u.

In 2010, most areas outside of Punalu'u and north to Lai'e Point were surveyed. Seven incidences of Kappaphycus were observed on the fringing reef outside of Punalu'u. Three of these samples were sent to the Phycology Lab at University of Hawaii, and two of the samples were identified as Kappaphycus Clade B. (See Photos 5-8 and Photos 9 & 10) The third sample was unusable.



Photos 5-8: Kappaphycus Clade B photographed and indentified from Punulu'u in 2010. Note the bubble-like morphology on the top of the clump similar in characteristics to Dictosphaeria cavernosa. The underside clearly displays Kappaphycus morphology.



Photo 9 & 10: Kappaphycus Clade B photographed and indentified in Punulu'u in 2010.

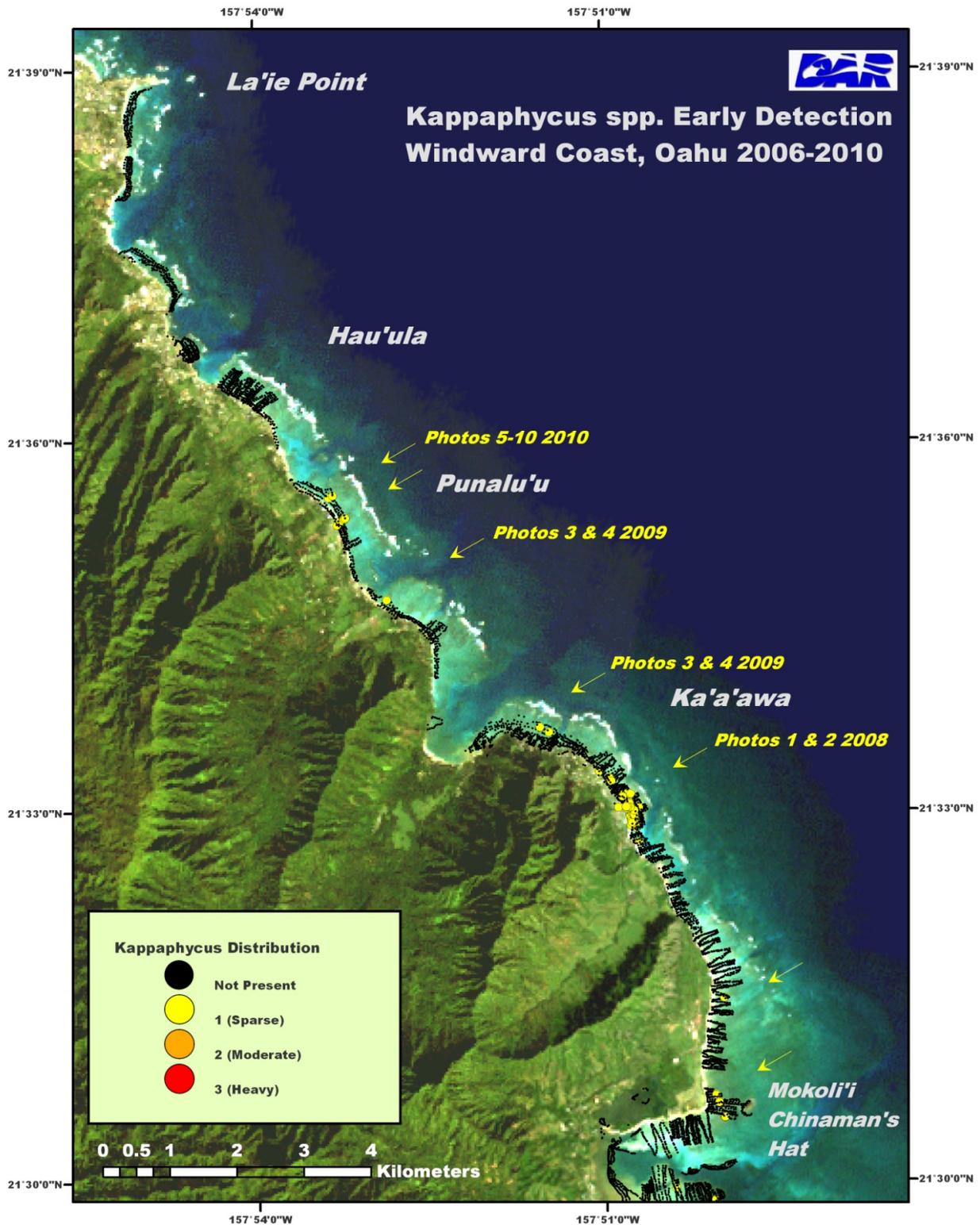


Figure 1: Map of where samples of Kappaphycus/Eucheuma were found and collected.

## **Setbacks**

During 2006-2007, there was not a phycologist or lab established where collected samples could be sent to be properly identified. While it is safe to assume that they were the same species, this cannot be entirely determined without genetic tests completed.

Beach access is also very limited along this portion of the coastline which made surveying certain parts of the coast very difficult. Due to the large area of reef flat in this area, the AIS Team was at limited capacity and therefore had to stretch themselves across the reef flat which caused large gaps in the survey areas where other incidences of *Kappaphycus* were likely to be.

Some of the samples were found relatively far out, which is uncharacteristic for invasive algae. In the past, when fringe reef surveys were conducted, most invasive algae grew close to shore or sometimes half way out. In the Ka'a'awa area, samples were found past some of the breakers. The breakers made it very difficult to survey certain areas, so this would be an area that should be resurveyed during calm periods to determine if there are any other occurrences of invasive algae.