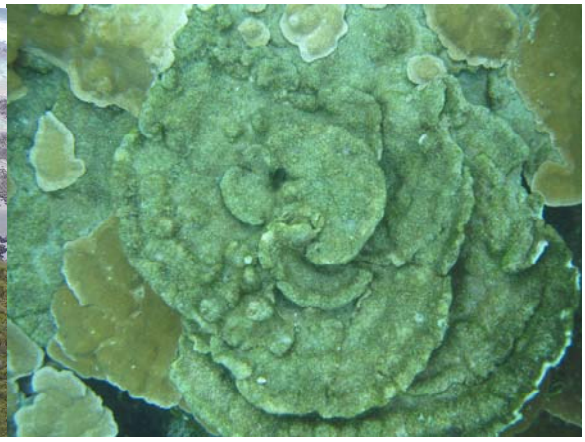
An Initial Survey of a *Montipora capitata* Mortality Event at the Wai Opae Marine Life Conservation District

By: The Hilo Division of Aquatic Resources, Aquatic Invasive Species Team

Pic. 1:

The affected lagoon is bordered by six houses to the north

Pic. 2:



Dead *Montipora capitata* colonized by a veneer of turf algae

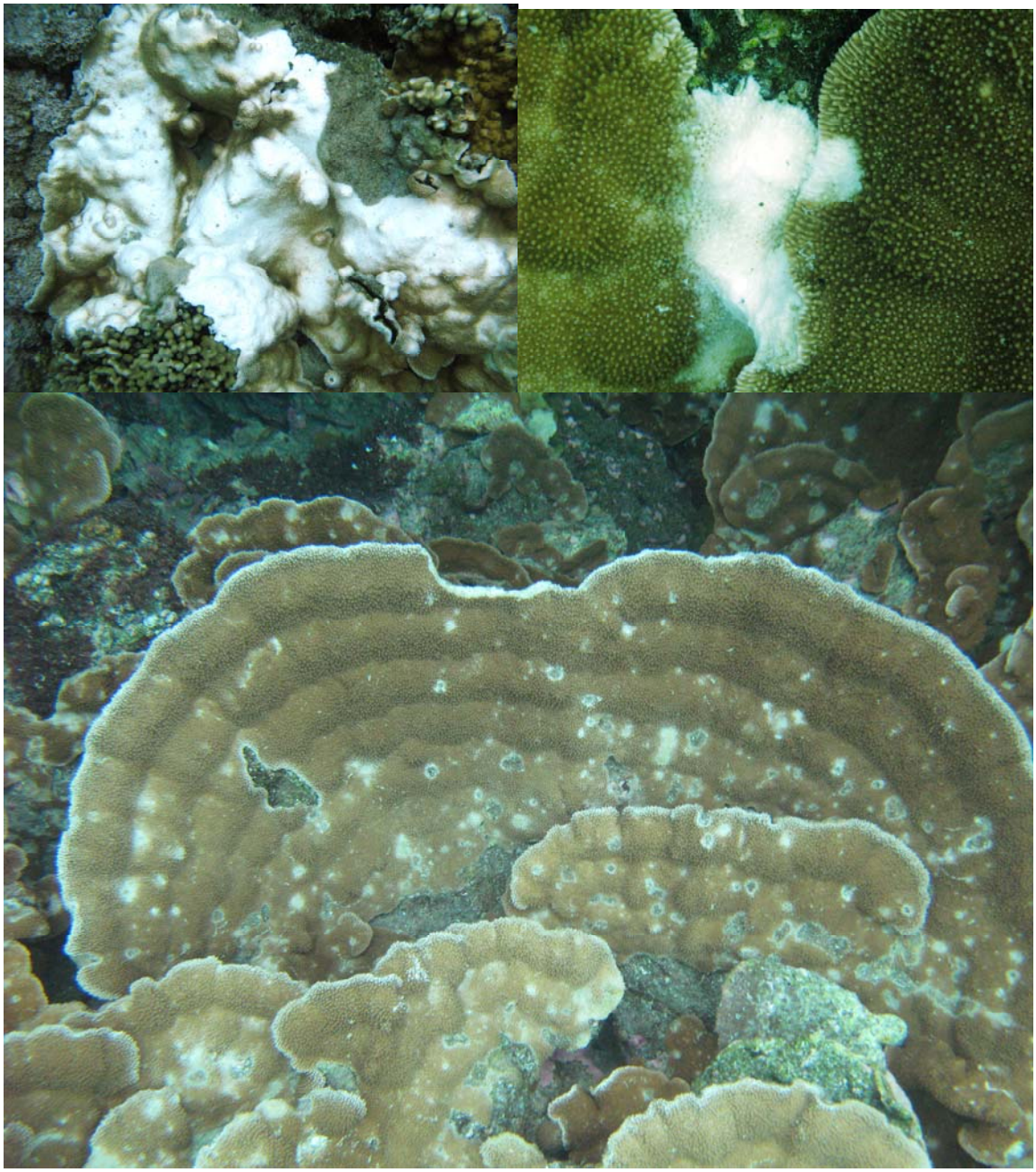
Introduction

Early December 2008, the Hilo AIS team was alerted by a NOAA representative that a coral mortality event had occurred in a lagoon (N19.48860 W154.82052) at the Wai Opae Marine Life Conservation District (MLCD), Kapoho, Hawaii Island. The AIS team responded and conducted a visual assessment for unhealthy coral colonies within the Wai Opae MLCD on December, 5th, 2008. The AIS team observed that *Montipora capitata* colonies within a particular lagoon (Pic.1) of the MLCD had experienced an extensive coral mortality event. The mortality event affected colonies at the most inland portion of the lagoon and continued out to about three quarters of the lagoon. The affected *M. capitata* colonies were dead or found to have very little live tissue. Turf algae has colonized the dead *M. capitata* colonies (Pic. 2). This coral mortality event has been estimated to have occurred from six months to a year ago. The etiology of this *M. capitata* die-off has not been determined. The suggestion of an *Acanthaster planci* feeding frenzy has been eliminated because these sea stars are rarely documented within this lagoon.

Although the majority of the damage has occurred in a single lagoon, there is evidence of stress on *M. capitata* colonies in other areas of the MLCD. In shallow water habitats, such tide pools *M. capitata* colonies show signs of patchy bleaching (Pic. 3). It is clear that some corals have lost tissue within portions of their colony, but they seemed

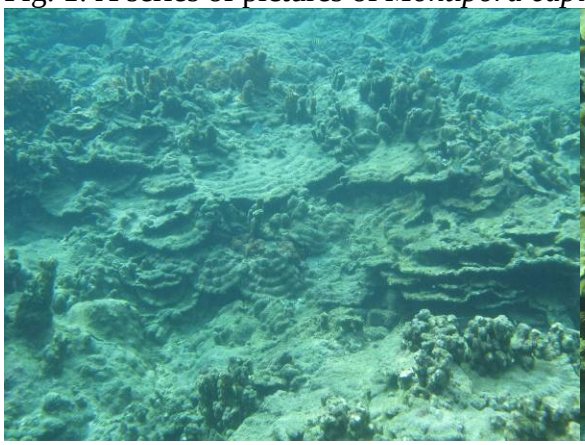
to have been stressed differently from those within the lagoon of interest. *M. capitata* colonies in the MLCD are represented in a series of pictures in figure 1.

Pic. 3:

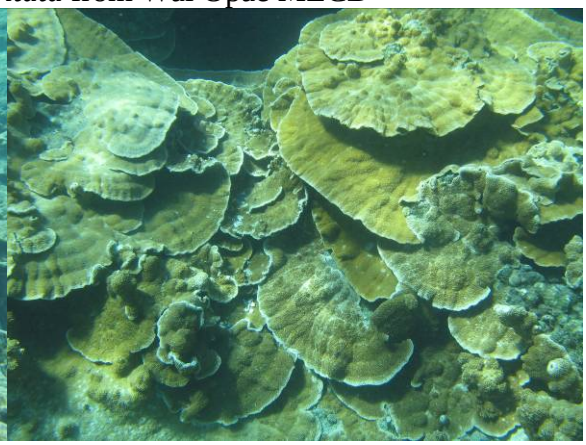


Montipora capitata within Wai opae MLCD. Patchy bleaching patterns were found on some colonies.

Fig. 1: A series of pictures of *Montipora capitata* from Wai Opae MLCD



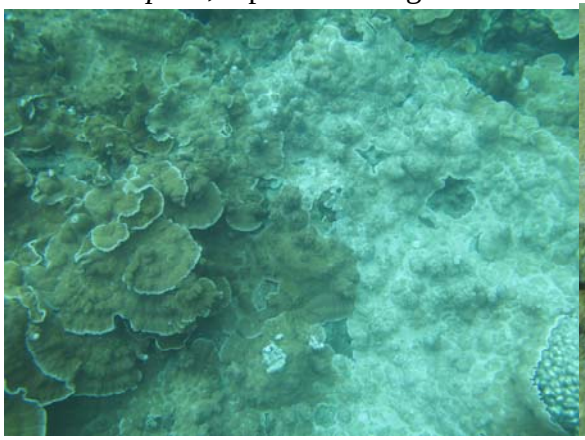
Dead *Montipora* within the affected lagoon



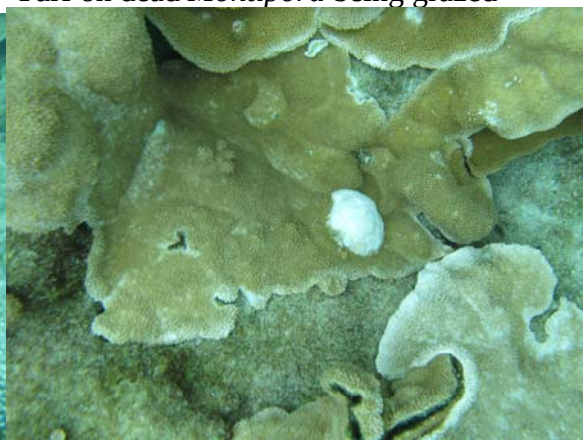
"Healthy" *Montipora* outside the lagoon

Live *Montipora*, top left of image

Turf on dead *Montipora* being grazed



Comparison of live and bleached coral



Unknown white growths on several colonies

Hilo AIS Involvement

This mortality event is of special interest to the Hilo DAR, AIS team. Two years ago (2006) *Acanthophora spicifera*, an alien invasive algae was documented for the first time in Kapoho Bay (less then a mile north of the Wai Opae MLCD) a few month ago

(October 2008) it was documented spreading south and establishing populations at Kapoho Point. At this rate of spread *A. spicifera* should invade the MLCD within a year. Previous to this coral mortality event the Hilo AIS team anticipated that the health herbivore population at the Wai Opae would act as a buffer and prevent this spread, but coral mortality such as the event mentioned above has made the Hilo AIS team fearful. With new substrate for *A. spicifera* to colonize and potential issues of water quality, the setting at Wai Opae may have exceeding a tipping point. Ultimately these factors may facilitate the invasion of alien algae. The Hilo AIS team plans to monitor Wai Opae closely, to detect and address any alien algae invasions within the MLCD.

Factors That May Have Contributed To The Coral Mortality Event

Both Hilo AIS team members have participated in extensive research projects at Wai Opae and are familiar with the threats to the marine life along this coast. A list of environmental factors that may have caused this mortality event is included below.

- Thermal flux
- Salinity flux
- Pollution
- Coral disease
- Ocean acidification
- Resource extraction

This lagoon along with many other coastal habitats of Puna experience fluxes in salinity and temperature due to submarine groundwater discharge. It is likely that the source of this groundwater is from the uplands. This groundwater may be transporting pollutants from upland down to the MLCD. Immediate upland use includes a papaya farm and a residential development that disposes of their waste via cesspools and septic tanks. The range of potential pollutants includes fertilizers, herbicides, human waste, and even chemical drain cleaners. Due to the highly conductive nature of the substrate, groundwater quickly flows through the earth, giving pollutants little time to become inactive or inert before entering the MLCD.

In the past salinity profiles have been conducted in the affected lagoon by a Hilo AIS team member. Results of these profiles show that the groundwater is most prevalent at the most inland section of the lagoon and slowly dissipates towards the ocean. The mortality pattern exhibited by the corals are similar to that of the groundwater influx.

Within the past year, two new homes have been built along the affected lagoon (Pic. 4). These residential additions along with the increase of anthropogenic waste that accompanies them may have pushed this system past its tipping point. Wai Opae has also seen another change in the past year with the attempt to eradicate *Rizophora mangle*, red mangrove from the south side of the MLCD (Pic. 4). This eradication attempt involves the cutting of the *R. mangle* trees. Decomposing biomass has been observed at the eradication site. Other stressors from this eradication effort include the use of systemic

herbicides; *Habitat* and *Aquamaster*. The effects of the residential additions and mangrove eradication within the past year may have altered the balance within this lagoon and lead to this coral mortality event.

Pic. 4:

Locations of additional homes in the area within the past year

Area of mangrove eradication (physical & chemical) removal efforts

At this point in time it would be difficult to determine the cause of this mortality event, but this event does exhibit the importance of water quantity monitoring in the effort to manage Hawaii's near shore resources.