**Project Status Report (7/26/16): Spatial Variability of Symbiodinium in *Montipora capitata* in Kane’ohe Bay, Hawai’i**

*Sample Collection*

To understand the spatial distribution of *Symbiodinium* clades in *Montipora capitata* across Kane’ohe Bay, Hawaii, samples were collected from 14 patch reef and 6 fringing reef sites (Figure 1). Patch reefs in Kane’ohe Bay are relatively well studied, yet the fringing reef is a unique habitat that has been poorly studied and differences among these habitats will be analyzed. A total of 540 colonies were randomly sampled in a depth range of ~0m-7m. Each colony was tagged, photographed for visual assessment of color morph and fragmented (~4cm) from a branch on the top of the colony. A small tissue biopsy was taken from each sample fragment and stored in DNA buffer with 1% SDS for genetic analysis. The remaining fragment was then frozen in liquid nitrogen to be stored at -80°C as an archive for future work and collaborative projects pertaining to energetics and biogeochemistry in Kane’ohe Bay.

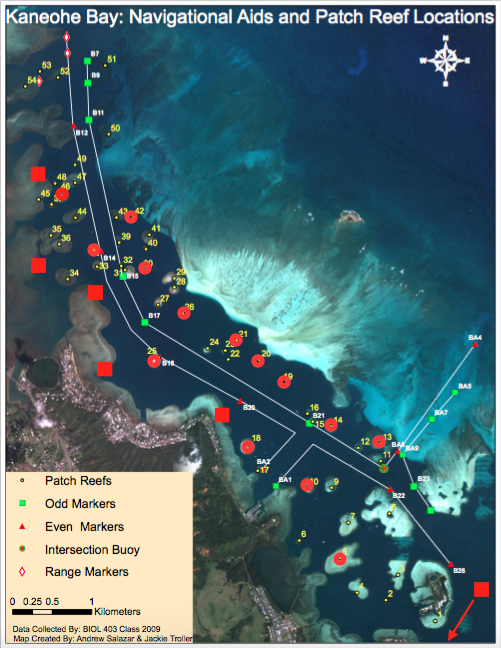


Figure 1. Tagged reefs to date; Circles indicate patch reefs, squares indicate fringing reefs

*Analysis*

Each colony was categorized as either the brown or orange color morph using the *in situ* photographs. A significant trend was found among color morph and reef area. The sloping areas of the reefs from the reef crest to 7.32m had equal distributions of the brown and orange color morphs: 48% and 52% respectively. The top portions of reefs were dominated by the orange color morph, with 77% of colonies exhibiting this coloration (Figure 2, p<0.001). Preliminary genetic analysis via quantitative PCR for 348 samples showed the top portions of reefs were dominated by clade D *Symbiodinium* (69% of colonies), whereas the sloping portions of reefs were dominated by clade C *Symbiodinium* (73% of colonies) (Figure 3, p<0.001). Given that the tops of reefs showed a dominance of both the orange color morph and clade D *Symbiodinium*, the relationship between color morph and dominant symbiont clade was tested. The results showed 87% of brown colonies contained clade C as the dominant symbiont and 61% of orange colonies contained clade D as the dominant symbiont (Figure 4, p<0.001).

Colonies were tagged at random depths to test for significant effects of depth on spatial distribution of *Symbiodinium* clades. A logistic regression showed that as depth increased, the dominant symbiont shifted from clade D to clade C (Figure 5, p<0.001). A logistic regression also showed that as depth increased, the dominant color morph present shifted from orange to brown (Figure 6, p<0.001). These data suggest interesting patterns that could help to further understand bleaching susceptibility and recovery. By having a large sample size tagged, we can revisit colonies at different areas of the bay for future sampling and analysis during bleaching events in Kane’ohe Bay.



Figure 2. Proportion of color morph per reef area (n=540)



Figure 3. Proportion of dominant symbiont clade per reef area (n=348)



Figure 4. Proportion of dominant symbiont clade per color morph (n=348)



Figure 5. Proportion of dominant symbiont clade as a function of depth (n=348)



Figure 6. Proportion of color morph as a function of depth (n=540)