Reports of bleaching and diseases affecting corals have increased steadily over the last several decades (Harvell et al. 2007). Large-scale bleaching and disease outbreaks on reefs dominated by scleractinian corals have resulted mortality and phase shifts from coral to algal dominated reefs (Hughes 1994, Aaronson and Precht 2001, Sutherland et al. 2004). The global increases in bleaching and disease is primarily driven by factors such as thermal stress, eutrophication, and natural disturbances (Peters 1997, Bruno et al. 2007, Jones et al. 2004). Indo-Pacific coral reefs, despite being less prone to detrimental disease outbreaks than other regions around the globe, have experienced a proliferation of diseases and episodes of coral bleaching in the last several years (Willis et al. 2004, Weil et al. 2006, Bahr et al. 2016).

Corals exist in a dynamic equilibrium with a diverse community of microorganisms including bacteria, viruses, fungi, endolithic algae, and *Symbiodinium* (Knowlton and Rohwer 2003). The mutualistic symbiosis between hermatypic scleractinian corals and photosynthetic endosymbiotic dinoflagellates in the genus *Symbiodinium* is essential for coral health and productivity (Muscatine and Porter 1977, Hatcher 1988, Trench 1993). Biotic and abiotic stressors may induce physiological disruptions to this relationship resulting in compromised immunity of the coral host and manifestation of bleaching and disease (Rosenberg and Ben-Haim 2002, Roff et al. 2008). Coral bleaching involves the breakdown of the symbiosis between the coral and its endosymbionts, resulting in the degradation and expulsion of the alga (Brown 1997). Due to the loss of symbionts and/or photosynthetic pigments in the symbionts, the coral tissue exhibits a paled or “bleached” appearance.

Extensive coral bleaching and subsequent mortality results in dramatic shifts in coral community structure (Loya et al. 2001, McClanahan et al. 2007). Research throughout the Indo-Pacific region has shown corals with branched and corymbose growth forms are generally more susceptible to thermal stress than corals with massive and encrusting growth forms (Loya et al. 2001, McClanahan et al. 2007). Species-specific tolerance to thermal stress and bleaching is affected by physiological characteristics of both the coral host the symbiont (Gates & Edmunds 1999). Acclimation and adaptation to the local environment also affects species-specific susceptibility to coral bleaching (Smith-Keune and van Oppen 2006).

The Hawaiian Archipelago experienced unprecedented coral bleaching in consecutive years during periods of elevated sea surface temperatures in 2014 and 2015, with the 2014 event being especially severe in Papahānaumokuākea Marine National Monument (PMNM). Bleaching susceptibility in the PMNM showed strong spatial variability, with certain locations experiencing significantly higher levels of bleaching than others (Couch et al. in review, Figure 1). All locations exhibited stronger levels of coral bleaching in 2014, and Lisianksi experienced the highest levels of bleaching and subsequent coral mortality (Couch et al. in review, Figure 1,2). The coral communities most affected by bleaching were dominated by certain taxa in the families Acroporidae and Pocilloporidae. Montipora spp. were especially affected by bleaching, with 50% of Montipora dilatata bleaching across all study sites and up to 94% at some regions (Couch et al. in review, Figures 2,3). Conversely, *Porites* dominated the less bleaching-susceptible communities with only 4.5% of all *Porites lobata* corals exhibiting signs of bleaching. Unlike other Indo-Pacific reefs where *Acropora* corals are typically the most susceptible to bleaching (Pratchett et al. 2013), a very low bleaching level was apparent in this taxon (Couch et al. in review, Figures 2,3). Investigating community-level bleaching susceptibility will help to develop predictive models, which incorporate other factors such as thermal stress, to identify key community-level and environmental-level drivers of coral bleaching patterns in the Northwestern Hawaiian Islands.

Figures:

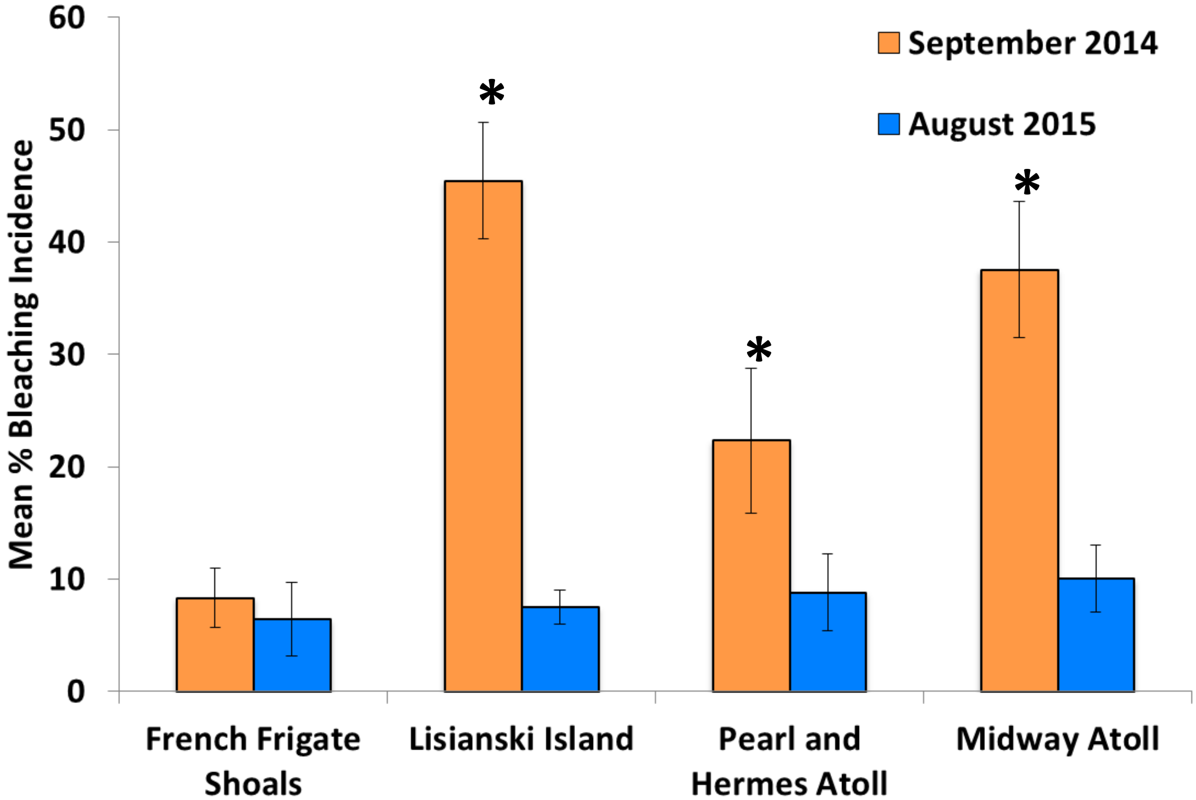

Figure 1. Mean values of bleaching incidence among locations surveyed throughout the NWHI in 2014 and 2015 (Couch et al. in review). * - indicates statistical significance.

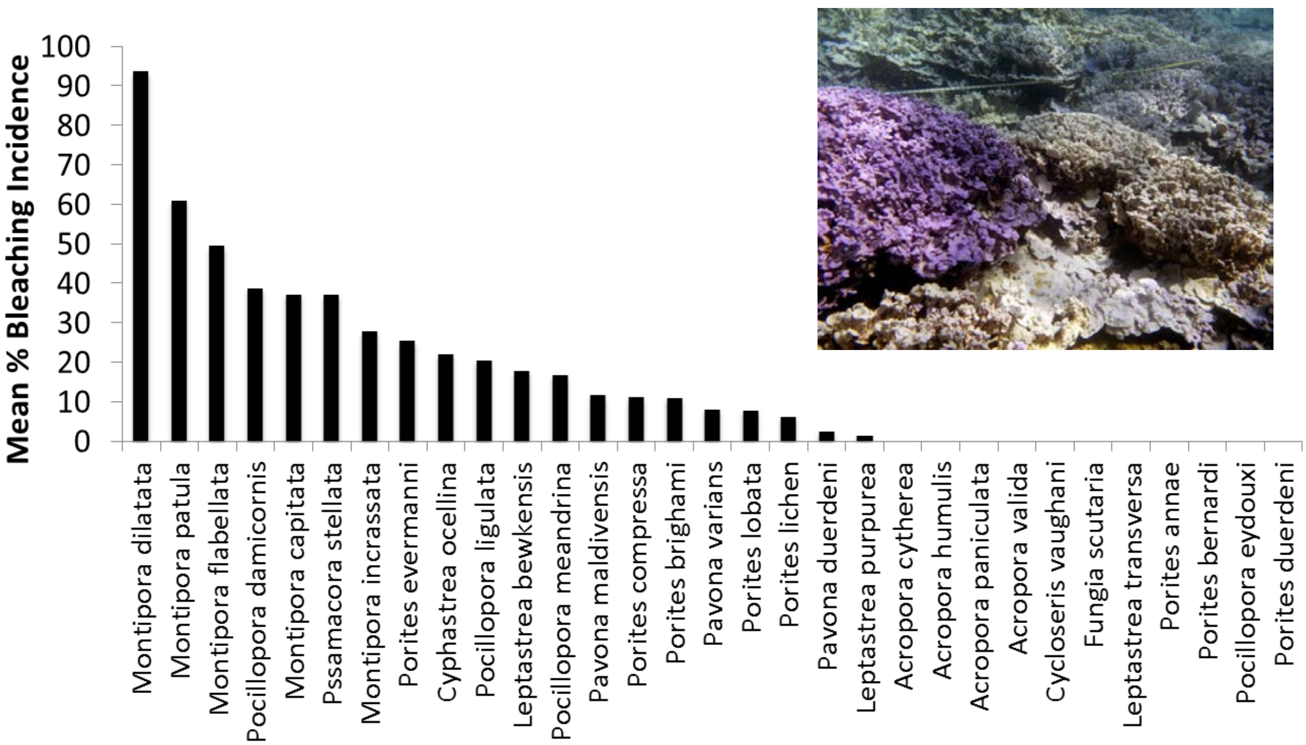

Figure 2. Mean values of bleaching incidence among specific coral species surveyed throughout the NWHI in 2014 and 2015 (Couch et al. in review).

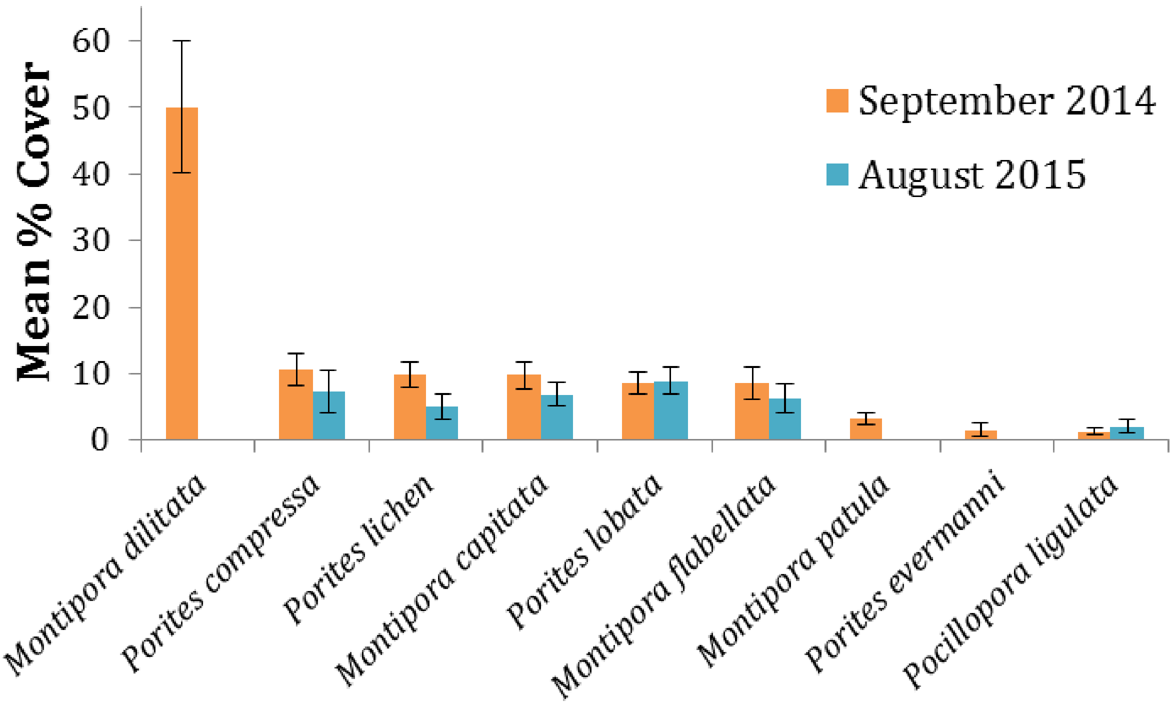

Figure 3. Mean percentage of coral cover among species affect by coral bleaching that were surveyed in 2014 and 2015 (Couch et al. in review).

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