**Introduction**

Lionfish (*Pterois volitans*) are native to the Indo-Pacific Ocean and were introduced into the Atlantic Ocean off the coast of Florida as a result of aquarium trade (Morris and Akins 2008). Broadcast spawning and frequent reproduction coupled with major ocean currents have aided in the rapid geographic spread of lionfish (Fig. 1). Lionfish were first reported in the Bahamas in 2004 (Morris and Akins 2008). Specialized finding techniques, such as herding and directed water jets (Morris and Akins 2009, Albins and Lyons 2012) have enabled lionfish to become efficient predators in their invaded range, thereby adding new stressors to economically and ecologically important native species (Fig. 4). Lionfish do not have any known native predators in areas they have invaded, due to their venomous spines (Morris et al. 2009). The effects of these factors have been seen in 79% decreases in recruitment rates of reef fishes (Fig. 3) and have strongly disrupted the natural food web (Albins and Hison 2008).

A previous study at the Cape Eleuthera Institute (CEI), running since 2009, has focused on the removal of lionfish on patch reefs in South Eleuthera. A new focus is to observe the re-colonization of lionfish from November to April (Fig. 9, p= 0.004). No removal (Fig. 10, p=0.32, r=0.10) or competitor (Fig. 11, p=0.93, r=0.001) densities. Full removal sites show a steady increase in lionfish re-colonization from November to April (Fig. 9, p= 0.004). No removal sites show no significant change in lionfish re-colonization (Fig. 9, p=0.82).

**Purpose and Hypotheses**

The purpose of this project was to study the biotic factors, including prey, competitors, and conspecifics, that influence the re-colonization of lionfish on 12 patch reefs in South Eleuthera. It was predicted that prey, competitors, and conspecifics would all positively influence lionfish re-colonization on patch reefs.

**Methods**

Since November 2011, data has been collected from 12 patch reefs in Rock Sound, Eleuthera (Fig. 5), which have been part of a CEI study since 2009. Using SCUBA (Fig. 6), populations of competitors and prey (Table 1) were surveyed along 8x2m transects, while the total number of lionfish were counted at each site (Fig. 7).

**Results**

Lionfish re-colonization was significantly negatively affected by the initial abundance of conspecifics on a reef (Fig. 8, p<0.005, r=0.68). Lionfish re-colonization was not influenced by prey (Fig. 10, p=0.32, r=0.10) or competitor (Fig. 11, p=0.93, r=0.001) densities. Full removal sites show a steady increase in lionfish re-colonization from November to April (Fig. 9, p= 0.004). No removal sites show no significant change in lionfish re-colonization (Fig. 9, p=0.82).

**Discussion**

Lionfish re-colonization indicated a negative density-dependent relationship, which indicates a possible carryover effect. This could be a reason that lionfish did not re-colonize to the no removal sites (Fig. 5). This shows that a carrying capacity may influence how quickly lionfish colonize other reefs, where there may be limited resources like prey and territory. Also a carrying capacity means there is a limit to the impact lionfish can have on a reef. This study found that only two months after ending removal efforts the abundance of lionfish on the full removal sites was the same as the no removal sites (Fig. 9). Thus, to effectively maintain a minimal level of lionfish, removal is necessary every two months. These data indicate that Lionfish Derbies may not be a particularly effective management strategy as they occur only infrequently. The development of a lionfish fishery could serve as an effective removal strategy as this could lead to a fairly high removal frequency.

**Biotic Factors that Influence Re-colonization of Lionfish (Pterois volitans) on Patch Reefs in South Eleuthera**

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**Literature Cited**