Indo-Pacific Lionfish (*Pterois volitans/miles*) Invade the Flower Garden Banks National Marine Sanctuary in the Northwest Gulf of Mexico

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Introduction

Indo-Pacific lionfish (*Pterois volitans and P. miles*), with their venomous spines, insatiable appetites, wide habitat distribution, and prolific reproduction, are a serious threat to native fishes and coral reef communities. Since the introduction of these invasive species into the Western Atlantic in the late 1980s, lionfish have spread and become established throughout the Western Atlantic and Caribbean, and were first recorded in the Gulf of Mexico in 2009. In late 2010, lionfish were observed at Sonnier Bank and nearby oil and gas platforms in the Northwest Gulf of Mexico. By mid 2011, lionfish were observed on all three banks comprising the Flower Garden Banks National Marine Sanctuary (FGBNMS), which harbors the northernmost coral reefs in the continental U.S., approximately 100 miles offshore from the coast of Texas.

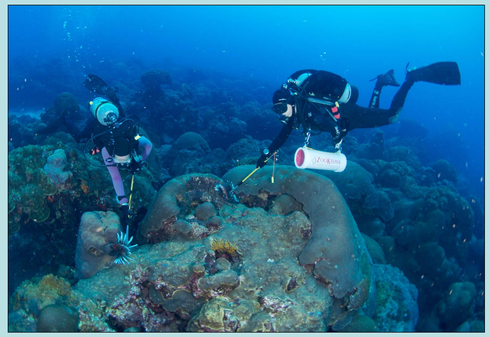
Three lionfish at the East Flower Garden Bank (Photo: NOAA FGBNMS/Marissa Nuttall), with inset of the FGBNMS location and lionfish distribution in the Gulf of Mexico (Map: TNC/Jorge Brenner).

Objectives

- Increase the knowledge of invasive lionfish distribution and predator/prey relationships in coral communities at the FGBNMS to help inform management decisions by
  a) collecting lionfish from the FGBNMS for analysis and
  b) performing gut analysis on specimens removed.
- Reduce the impact of lionfish on reef habitats and native fish populations by removing lionfish from the upper-100 feet of the FGBNMS.

Methods

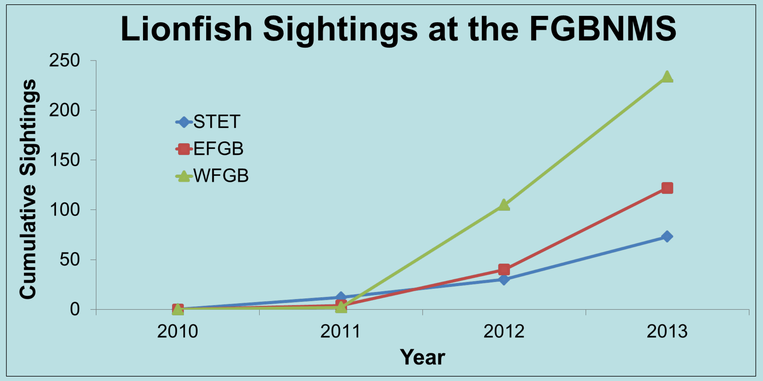
To document the appearance and subsequent spread of lionfish within the FGBNMS, location and abundance of lionfish were recorded by divers before removal. Lionfish were removed using pole spears and Zookeepers® and processed for metrics, including weight, total length, standard length, sex, and gut contents. We analyzed changes in fish communities at the FGBNMS with long-term monitoring visual fish survey data that included annual Bohnsack surveys within two 100mx100m long-term monitoring study sites to capture sighting frequency and biomass estimates of the FGBNMS fish community, as well as abundance, and density estimates of invasive lionfish within the FGBNMS.



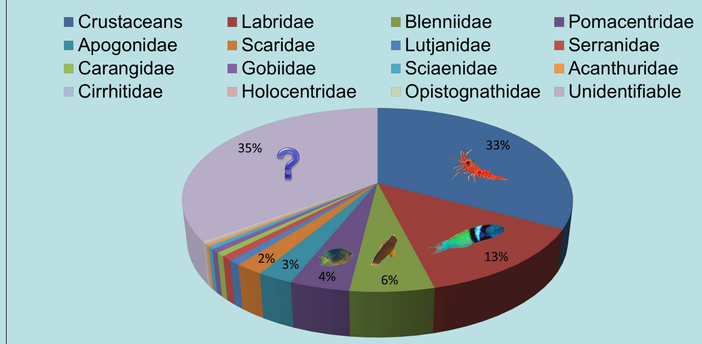
Lionfish removal at the FGBNMS (Photo: NOAA FGBNMS/GP Schmahl).

Results

A total of 622 lionfishes were sighted by divers between 2011 and 2013 at the FGBNMS. Between 2011 and 2012, lionfish sightings increased tenfold within the FGBNMS. Of the 622 lionfish observed, 303 lionfishes were removed by divers between 2011 and 2013. The average lionfish size at the FGBNMS in 2011 was 15cm and in 2013 the average size increased to 30cm. Within 100mx100m long-term monitoring study sites, an average of 50 lionfishes were sighted in 2013.



Lionfish Stomach Contents Composition



Thirty-five percent of the contents observed within the stomachs of lionfish removed from the FGBNMS are unidentifiable, however, the most common identifiable contents include red night shrimp, bluehead wrasse, blennies, damselfish, cardinalfish, and parrotfish. While mean fish biomass (113 g/m^2) and coral cover (above 50%) at the FGBNMS (resulting from long-term monitoring data) remains high, the full invasion is likely still developing and negative impacts on the reef community may not be recognized for several years.

Conclusions

Despite a healthy ecosystem, invasive lionfish have become established at the FGBNMS, but no ecological impacts have been detected to date. Regular removal programs may mitigate the effects of lionfish in marine protected areas, such as the FGBNMS. Important baseline data, such as ongoing long-term monitoring data collected annually at the FGBNMS, will be essential to document ecosystem changes in the food chain and the coral reef community that may result from the invasion.

Acknowledgements

All lionfish removed from the FGBNMS complied with permit number FGBNMS-2009-001. The FGBNMS partners with the Bureau of Ocean Energy Management to collect long-term coral reef monitoring data annually at the FGBNMS.

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