Embracing Invasive Species Management

Lionfish control along the Mesoamerican Reef

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The invasive lionfish (*Pterois volitans*) is one of the more pugnacious threats to Caribbean coral reefs and fisheries. Along the Mesoamerican Reef, lionfish have become such a common sight that it is difficult to dive without encountering multiple individuals.

Many of the Caribbean's fish stocks are already heavily exploited; the combination of overfishing and predator limited recruitment by lionfish could have devastating long-term impacts on the region's fisheries and cause damaging, cascading effects to coral reefs (e.g., loss of herbivores driving algal domination).[1, 2]

To protect the Caribbean's remarkable coral reefs, the Coral Reef Alliance (CORAL) engages communities along the Mesoamerican Reef to develop enduring solutions for protecting the marine environment. Among other projects, CORAL leverages tourism as a tool for lionfish control, building market demand for lionfish and relieving pressure on native species.

Approach

In 2009, the Coral Reef Alliance began working with partners in Mexico, Belize, and Honduras to suppress lionfish abundance at local scales. We leverage the marine tourism industry to raise awareness and educate both tourists and local communities about the threats lionfish pose to local economies. In each country, we've been able to gain support for lionfish removal and create a market for lionfish.

Belize

- Hosted six annual lionfish tournaments where more than 3,600 fish were removed.
- Provided more than fifty spears for MPA managers and the dive industry.
- Designed and distributed a sustainable seafood guide which encourages restaurants to serve lionfish.

Mexico

- Held four annual lionfish tournaments, removing 3,500 lionfish.
- Sponsored the development of a lionfish cookbook, which includes nationally published recipes.
- Established a 'lionfish safari' in Cozumel to promote the removal of lionfish from specific reefs.
- Designed and distributed a sustainable seafood guide which encourages restaurants to serve lionfish.

Honduras

- Held four annual lionfish tournaments, removing 2,600 lionfish.
- Provided 200 spears to permitted tourists, locals, and dive operators between 2008 and 2012.
- Designed and distributed a sustainable seafood guide which encourages restaurants to serve lionfish.
- Trained dive masters and instructors—representing all of Utila's dive shops—to capture lionfish at ninety-six dive sites on Utila's fringing reef.

Building Demand

Lionfish, like many invasive species, thrive in new environments without their native predators. One strategy for controlling their abundance is to cultivate new predators—humans. Increasing human demand for lionfish as a food choice provides an incentive for population control and protects the coral reef ecosystem they inhabit. Below are market data from two active CORAL project sites, demonstrating the current popularity of lionfish as a seafood choice along the Mesoamerican Reef.

Market Demand in Honduras

In Honduras, the price of lionfish on the menu equals the price of other reef fish—like snapper and grouper—and is nearly equal to lobster. There is a greater price difference for lionfish sold at the fish markets.

	Wholesale (in market)	Retail (in restaurant)
Lionfish	65 lps ($3.34 USD) per lb	120 lps ($6.17 USD) per plate
Grouper	100 lps ($5.14 USD) per lb	120 lps ($6.17 USD) per plate
Lobster	120 lps ($6.17 USD) per lb	150 lps ($7.72 USD) per plate

Market Demand in Cozumel, Mexico

Consumer demand for lionfish is significant; Cozumel's fishing cooperatives have provided restaurants with four tons of lionfish thus far in 2012 and a limited export market is developing. Demand for lionfish as a new seafood choice has encouraged many restaurants to remove more sensitive species—like queen conch—from their menus.

	Wholesale (in market)	Retail (in restaurant)
Lionfish	54.4 pesos ($3.96 USD) per lb	130 pesos ($9.35 USD) per plate
Grouper	63.5 pesos ($4.62 USD) per lb	203 pesos ($14.76 USD) per plate
Lobster	140.6 pesos ($10.23 USD) per lb	453 pesos ($32.95 USD) per plate

Recommendations

Plan for the future.

Focus lionfish-control programs on discrete areas over long time periods. Simulations of lionfish control suggest that despite removal over several decades, lionfish populations can recover to their unfished biomass in just six years.[3]

Build on existing fishery management measures.

Focus on areas that are designed to limit fishing pressure—like marine protected areas—to capitalize on management efforts and complement fishery controls for other key species.

Select resilient reefs.

As resilient reefs are much more likely to thrive further into the future, reducing lionfish populations in these areas, while simultaneously restricting fishing of native species, will provide a stronger return on investment and better reinforce overall ecosystem health.

Engage the community.

Leverage locally available resources, especially those from the tourism industry, and use these resources to patrol, monitor, and maintain focused control efforts.

Citations

1. Ablins, M. A., and M. A. Hixon. (2008) "Invasive Indo-Pacific lionfish *Pterois volitans* reduce recruitment of Atlantic coral-reef fishes." *Marine Ecology Progress Series* 367: 233-238, doi:10.3354/meps07620.
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3. Barbour, A.B., Allen, M.S., Frazer, T.K., and K.D. Sherman. (2011) "Evaluating the Potential Efficacy of Invasive Lionfish (*Pterois volitans*) Removals." *PLoS ONE* 6(5): e19666, doi:10.1371/journal.pone.0019666.

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