



MLA-033-Lionfish Project-World's Oceans

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Lionfish Project

The unsolved disaster resulting from the infestation of lionfish in the western Atlantic begs for new ideas and a new approach. To be effective the solution needs to be widely deployable and be economically self-sustaining. It needs to be able to reach large lionfish populations at depths down to 1,000 feet, as well as guard reefs from infestation.

The operators must be non-professionals who can deploy and maintain the solution without extensive training. All these requirements can be met by properly designed, manufactured, and deployed underwater robots.

The complete robot is a collection of component systems. These include the ROV platform, capture mechanism, control system, vision system, user interface, and more. Luckily each one of these components exists today in some form but they have never been assembled specifically as a device to hunt lionfish, nor designed to be produced in large numbers at low cost and operated by a non-professional. Nonetheless the experience learned from these existing components and efforts will allow for the rapid development of the RISE robot and gives confidence that it can be done.

RISE will also create and implement educational outreach programs to expand the understanding of environmental challenges by local communities, how technology can help mitigate these challenges, and to stimulate and support STEM education and interest for young people in those communities.

Lionfish are native to the Indian and Pacific Oceans and live there in a balanced ecosystem. In 1985 lionfish were spotted off the east coast of Florida, most likely introduced there by aquarium owners discarding these beautiful fish into the ocean. Since then lionfish have relentlessly invaded the western Atlantic, with scientists estimating well over a million fish devastating reefs and fisheries in all warm water regions, especially around Florida, throughout the Caribbean, and Bermuda. Moreover the population continues to expand rapidly without check.

Lionfish are indiscriminate and voracious predators that do not stop feeding. They gorge on at least 70 different species of reef fish and crustaceans and are capable of eating prey up to half the size of their own body. They are



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The World Federation for Coral Reef Conservation 281.971.7703 P.O. Box 311117 Houston Texas 77231 sexually mature at 12 months and spawn approximately 30,000 eggs every 4–5 days. A single lionfish can reduce the fish biomass on a reef by 80% in just one month. Lionfish are armed with 18 venomous spines making them an unattractive food source for other marine creatures. This perfect predator has no natural predators of its own in the Atlantic. With no apparent limit to their population growth, other than water temperature, lionfish pose a huge threat to the fish stock of the western Atlantic Ocean.

Less obvious, but very real, is the threat that lionfish pose to the reef itself. Reefs are already under threat from climate change and ocean acidification. As the lionfish devour herbivores, such as wrasse, the corals become vulnerable to algae overgrowth and eventually are smothered and die.

With no natural predators and a destructive population that is expanding exponentially, this is a problem that demands intervention.

THERE IS NO CURRENT SOLUTION TO THE PROBLEM

On popular tourism reefs, sport divers with spear guns have successfully mitigated lionfish populations in shallow depths. In these locations divers now report that they might spot and kill one lionfish per dive thereby keeping the reef mostly clear. However the same divers report that when going to less popular or more remote reefs they can spear up to 30 lionfish per dive. The majority of reefs are in this category. No type of fishing, trapping, or netting has proven to be effective, especially without creating further damage to reefs and desired species.

Sport divers can only effectively hunt lionfish to depths down to 80 feet, and usually do not travel far from shore. But the numbers of lionfish found in deeper water, sometimes in large colonies, is staggering. Sadly sport divers are very limited in the areas where they go with sufficient frequency and in sufficient numbers to have a meaningful impact.

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The only thing necessary for the triumph of evil is that good men do nothing" ...Edmund Burke