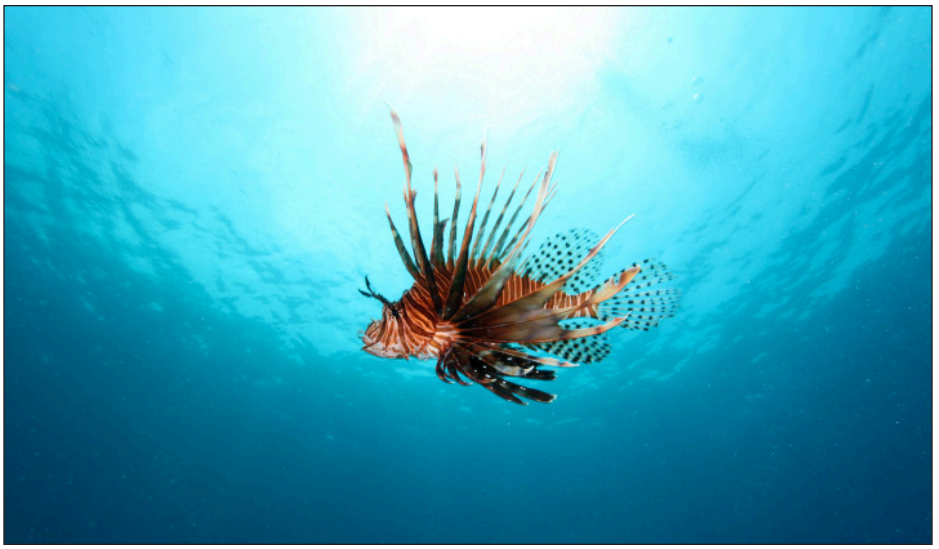
LIONFISH

new explorers of the Caribbean



by PETER ROWE

When we think of journeys of exploration, we tend to think of them in purely human terms. But we are by no means Earth's only wanderers. Arctic Terns, albatross, Monarch butterflies, and gray whales embark on great migrations across the globe. Most fauna, however, have tended to stay put, living generation after generation in a single locale. Today, increasing numbers of normally sedentary animals are now on the move in direct response to human activity—be it the building of canals, the polluting of waters, the warming of environments, or the transportation of species by ship or plane.

Once a species arrives at its new destination, it tends to set off with successive generations of individuals exploring further and further afield—often with dire environmental consequences. As is the case with the lionfish (*Pterois volitans*), a wildly attired venomous fish native to the Indo-Pacific that has exploded in population throughout the Atlantic and Caribbean. Fifteen years ago, there were no lionfish in these waters. Today, there are millions—one study estimates 3,500 per hectare of reef—with a habitat range stretching from New York south to Venezuela.

Lionfish are by no means the only marine creatures off exploring new territory. Jumping Asian carp—a YouTube favorite for their crazy antics—are heading north up the Mississippi. A gray whale recently showed up off Israel, the first to be seen there in 300 years. And the

A LIONFISH 25 METERS BELOW THE SURFACE, CAPE ELEUTHERA, BAHAMAS. PHOTOGRAPH BY PETER ROWE.

melting of Arctic sea ice means that Atlantic and Pacific salmon may soon meet somewhere in the Northwest Passage.

The story of the lionfish, however, is unique both in terms of its explosive growth and the potential for damage to its newly adopted habitat. The danger from the lionfish comes not from its venomous spines—although contact with the spines on their pectoral and dorsal fins is toxic enough to kill a fish or sting a person more strongly than a bee or wasp can. The issue is more the lionfish's ravenous appetite. A single lionfish can eat through 80 percent of a patch reef's inhabitants within five weeks, all but destroying the ecosystem.

This past spring, I led an Explorers Club Flag expedition to several Caribbean destinations to investigate the lionfish and its environmental impact. We began by traveling to Jupiter Inlet, Florida, to dive with Florida International University lionfish researcher Zack Judd and divemaster Randy Jordan. Jordan, like many dive operators in Florida, the Bahamas, and the Caribbean, is obsessed with the lionfish threat and the need to take out as many as possible on a single dive.

"They are the perfect predator," he tells us, while steering his dive boat out into the Gulf Stream. "They have no parasites, no diseases, no predators. Left unattended they will eat every other fish and, within 5 to 10 years, there won't be anything else down there other than lionfish."

Jordan is the inventor of the "Lion Tamer," a short speargun specifically designed to shoot lionfish. He leads us on a hunt for the fish at a depth of 30 meters. They are not hard to find and are not hard to hunt. As long as one avoids getting stung by the venomous spines, it is pretty easy to shoot 4 or 5 on every dive. But as a means of preventing the spread of lionfish, such efforts are futile. The reefs and shorelines stretch for thousands of kilometers. Shooting a few individuals will never stem the tide and experts now seem unanimous that eradication is all but impossible.

The fish can live in waters that range from mere centimeters to 300 meters in depth and, apparently, in water of any quality. Judd has found specimens swimming up the murky Loxihatchee River through brackish and ultimately fresh water. During our visit, we attended the Loxahatchee River Center's annual Lionfish Fundraiser, where locals in this swanky corner of Florida spend a Saturday night hearing about the problem newcomer to their state while dining on the delicious, buttery white meat the fish produces—once one gets past the venomous spines!

From Florida we moved on to the Bahamas to dive with lionfish specialist Skylar Miller of the Island Institute at the southern tip of Eleuthera. Also joining us were lionfish researchers Lad Atkins of the Key Largo-based Reef Environmental Education Foundation (REEF) and Stephanie Green of Simon Frazer University in British Columbia, as well as Explorers Club student member Brianna Rowe.

We dove to depths of about 30 meters on the reefs and walls off Cape Eleuthera, finding abundant lionfish on every dive. The research team tagged many of the fish to measure their growth (they grow about 20 centimeters per year) and found that individuals tend to stake out particular areas of the reef for long periods of time.

The two questions that most interested our team were: where did the fish come from and how did these relatively small fish manage to fight against the powerful Gulf Stream to spread throughout the Caribbean?

In answer to the first question, DNA sampling of the fish suggests that they all come from a very small gene pool—possibly as few as 6 individuals that may have originated in Miami. With regard to the second, the massive current has a flow

THE AUTHOR WITH LIONFISH AND EXPLORERS CLUB FLAG #46, AT 29 METERS DEPTH. PHOTOGRAPH BY BRIANNA ROWE.

200 times that of all the rivers that flow into the Atlantic combined (including the Mississippi, the St. Lawrence, the Congo, and the Amazon). Off Florida, where its speed is greatest, it is hard enough to cross it in a sailboat–let alone as a relatively tiny fish, with only a tailfin for propulsion.

Given the challenge of swimming against the Gulf Stream, other theories about the origins of the lionfish have been put forth. On the docks and beaches of the Bahamas, it is rumored that the first of the fish were released as eggs from the waste outflow of the huge aquariums at the Atlantis Resort on Paradise Island. Geographically, the theory makes more sense as those eggs could easily have been swept down the Tongue of the Ocean into the Caribbean, and it offers a nice conspiratorial tale with a big bad Atlantis villain. Yet, it would seem not to be the case. The researchers on our Eleuthera team have looked at the seawater waste systems at the Atlantis aquariums and are convinced that the filtration systems would have prevented eggs or fry from being washed into the ocean.

Instead, they are convinced the invasion did begin in the Miami area–perhaps with a couple of fish being released into the ocean from broken aquariums at Miami Seaquarium during Hurricane Andrew or else by aquarists who had grown tired of the voracious appetites of their spiny pets.

Daunting as crossing the Gulf Stream may seem, oceanographers have noted that there are reverse eddies within it, and a reverse current flows beneath it. It is entirely possible that some small percentage of lionfish or lionfish eggs were swept south down into the islands. The odds of such a scenario are certainly in their favor. A female lionfish produces a gelatinous matrix of 30,000 eggs twice a week. By comparison, a female grouper produces the same 30,000 eggs once a year.

However it started, by 2000, the invasion was well under way. By 2002 the fish were established in Georgia, the Carolinas, and Bermuda. By 2004, they had established a beachhead on Long Island, New York, and by 2006 another on Long Island in the Bahamas. By 2008 they were in Cuba, Hispaniola, Puerto Rico, Jamaica and the Cayman Islands, and a year later they were in the Yucatán Peninsula, Central America, and Venezuela. Ironically, it took the lionfish ten years to make their way 65 kilometers south of Miami to the Florida Keys. Unable to swim directly into the fast-moving Gulf Stream, they journeyed hundreds of kilometers out into the Caribbean and eventually their offspring made their way back north to the Florida Keys. By August 2010 they had made their way north to Tampa, and within a month were living about the oil platforms off the coast of Alabama and Louisiana. By 2013, researchers

LIONFISH RESEARCHERS STEPHANIE GREEN AND LAD ATKINS, CAPE ELEUTHERA, BAHAMAS. PHOTOGRAPH BY PETER ROWE.

believe they will have expanded south of Brazil to Uruguay. Only the cooler waters north of Cape Hatteras and south of Uruguay will prevent the fish from moving even further afield. Yet, as the Atlantic continues to warm, who knows how far north and south the fish can get.

It took the original native human population thousands of years to spread through this vast area. Even with sailing ships, it took European explorers and settlers more than 100 years to discover it all. It will take lionfish only 15 years to "conquer" the territory. And conquer it they will. Researchers are convinced that with their hearty appetites, ability to live in degraded conditions, and lack of predators, they will continue to massively reduce the populations of other reef fish, and in the process, the overall biodiversity of the Caribbean and Bahamian reefs.

So are there any solutions in sight to the lionfish invasion? The tropical Atlantic and Caribbean is such a vast area and the lionfish such a hardy animal, eradication seems impossible. Although hunting the fish with spearguns is growing in popularity, it presents more of an opportunity for "sport" than a rational attempt to protect reef biodiversity. Underwater enthusiasts have proposed some interesting solutions. In Honduras, for example, there is an effort to try to train sharks to eat lionfish. In the Caymans, they are attempting to encourage grouper to do the same.

A more likely scenario is to try to convince humans to eat them. At current rates, they might become as plentiful as cod once were and we had no trouble decimating that population. Perhaps it is time for humans to turn to lionfish to replace the dwindling harvest of other fish that we have rapaciously removed from the sea. So far, neither groupers, nor sharks, nor humans seem very interested, but stranger things have happened.

BIOGRAPHY

A Fellow of The Explorers Club since 2008, Peter Rowe is a filmmaker. His recent series *Angry Planet* explores extreme forces of nature, and his latest show, *Alien Invaders!* looks at invasive animal species around the world. This is his second flag expedition, following a 2009 expedition to Mexico's Crystal Cave.

INFORMATION
LIONFISH, THE NEW TASTE TREAT

The Reef Environmental Education Foundation (REEF) has recently published the *Lionfish Cookbook*. The volume provides a unique blend of tantalizing recipes, background on the lionfish invasion and its environmental impact, as well as information on how to safely catch, handle, and prepare the fish. Proceeds from the sale of the book support REEF's marine conservation and lionfish research and removal programs. www.reef.org/catalog/cookbook.

A MAP SHOWS EXPECTED LIONFISH RANGE BY THE END OF 2012, LEFT. CHART COURTESY NOAA. DIVEMASTER NEAL WATSON JR. CLEANING LIONFISH, CAPE ELEUTHERA, BAHAMAS. PHOTOGRAPH BY PETER ROWE.