Lionfish expedition: Down deep is where the big, scary ones live

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This submersible, the Antipodes, was used to study the lionfish invasion off Florida. Credit: Oregon State University

Last month, the first expedition to use a deep-diving submersible to study the Atlantic Ocean lionfish invasion found something very disturbing – at 300 feet deep, there were still significant populations of these predatory fish, and they were big.

Big fish in many species can reproduce much more efficiently than their younger, smaller counterparts, and lionfish are known to travel considerable distances and move to various depths. This raises significant new concerns in the effort to control this invasive species that

is devastating native fish populations on the Atlantic Coast and in the Caribbean Sea.

"We expected some populations of lionfish at that depth, but their numbers and size were a surprise," said Stephanie Green, the David H. Smith Conservation Research Fellow in the College of Science at Oregon State University, who participated in the dives. OSU has been one of the early leaders in the study of the lionfish invasion.

"This was kind of an 'Ah hah!' moment," she said. "It was immediately clear that this is a new frontier in the lionfish crisis, and that something is going to have to be done about it. Seeing it up-close really brought home the nature of the problem."

OSU participated in this expedition with researchers from a number of other universities, in work supported by Nova Southeastern University, the Guy Harvey Foundation, NOAA, and other agencies. The five-person submersible "Antipodes" was provided by OceanGate, Inc., and it dove about 300 feet deep off the coast of Ft. Lauderdale, Fla., near the "Bill Boyd" cargo ship that was intentionally sunk there in 1986 to create an artificial reef for marine life.

That ship has, in fact, attracted a great deal of marine life, and now, a great number of lionfish. And for that species, they are growing to an unusually large size – as much as 16 inches.

Lionfish are visible near the door of this sunken ship off the Florida coast. Credit: Oregon State University

Lionfish are a predatory fish that's native to the Pacific Ocean and were accidentally introduced to Atlantic Ocean waters in the early 1990s, and there became a voracious predator with no natural controls on its population. An OSU study in 2008 showed that lionfish in the Atlantic have been known to reduce native fish populations by up to 80 percent.

Eradication appears impossible, and they threaten everything from coral reef ecosystems to local economies that are based on fishing and tourism.

Whatever is keeping them in check in the Pacific – and researchers around the world are trying to find out what that is – is missing here. In

the Caribbean, they are found at different depths, in various terrain, are largely ignored by other local predators and parasites, and are rapidly eating their way through entire ecosystems. They will attack many other species and appear to eat constantly.

And, unfortunately, the big fish just discovered at greater depths pose that much more of a predatory threat, not to mention appetite.

"A lionfish will eat almost any fish smaller than it is," Green said. "Regarding the large fish we observed in the submersible dives, a real concern is that they could migrate to shallower depths as well and eat many of the fish there. And the control measures we're using at shallower depths – catch them and let people eat them – are not as practical at great depth."

Size does more than just increase predation. In many fish species, a large, mature adult can produce far more offspring that small, younger fish. A large, mature female in some species can produce up to 10 times as many offspring as a fish that's able to reproduce, but half the size.

Lionfish have become an invasive species of enormous concern off the Atlantic Coast and in the Caribbean Sea. Credit: Oregon State University

Trapping is a possibility for removing fish at greater depth, Green said, and could be especially effective if a method were developed to selectively trap lionfish and not other species. Work on control technologies and cost effectiveness of various approaches will continue at OSU, she said.

When attacking another fish, a lionfish uses its large, fan-like fins to herd smaller fish into a corner and then swallow them in a rapid strike. Because of their natural defense mechanisms they are afraid of almost no other marine life, and will consume dozens of species of the tropical fish and invertebrates that typically congregate in coral reefs and other areas. The venom released by their sharp spines can cause extremely

painful stings to humans.

Aside from the rapid and immediate mortality of marine life, the loss of herbivorous fish will also set the stage for seaweed to potentially overwhelm the coral reefs and disrupt the delicate ecological balance in which they exist.

This newest threat follows on the heels of overfishing, sediment deposition, nitrate pollution in some areas, coral bleaching caused by global warming, and increasing ocean acidity caused by carbon emissions. Lionfish may be the final straw that breaks the back of Western Atlantic and Caribbean coral reefs, some researchers believe.

Provided by Oregon State University