

Genetics provides new clues about lionfish invasion

April 23 2015

New genetic data suggest the red lionfish invasion in the Caribbean Basin and Western Atlantic started in multiple locations, not just one as previously believed, according to a new study led by the U.S. Geological Survey.

Florida has often been cited as the likely location of the introduction, but the new research suggests multiple introductions occurred, with some potentially coming from the more southern parts of the range. The Caribbean Basin stretches from parts of Florida's Gulf Coast through South America.

Genetically unraveling the progression of the red lionfish invasion and determining if introductions are still occurring could help guide response and control efforts for this and other invasive fishes. The spiny fish is well known as a predatory invasive species that negatively impacts its non-native environment, disrupting marine food webs as they prey in coral reef ecosystems on invertebrates and fish, including game fish juveniles, such as snappers and groupers. Lionfish are native to the Indo-Pacific region, and were likely brought to the United States via the pet trade.

USGS researchers analyzed red lionfish samples from fourteen countries and territories in the Greater Caribbean and Western Atlantic in an effort to better understand the invasive species' population structure and dispersal patterns. While red lionfish can be found in the Gulf, this study did not include any samples from that region.

"The red lionfish can be used to help us understand other non-native populations and their invasion dynamics," said USGS geneticist Margaret Hunter. "The more we know about this species and its progression, the more we can help resource managers and others fighting the invasion be prepared to help control lionfish colonization in new locations. Ultimately, any information gleaned from this species could be applied to managing and assisting with eliminating future [invasive species](#)."

Researchers found that unique regional genetic patterns separated the studied area into northern and southern regions, with the split occurring near the Bahamas. Given the regional genetic differences revealed in this study, the researchers now suspect multiple introductions. One rare genetic strain was found in only a few samples in the southern region, but was pervasive in the north.

"Studying the genetic strains across regions gives us insight into how these fish are spreading. Dispersal against the flow of ocean currents may explain why we see this rare strain in the south, but even if that is the case, additional support for multiple introductions exists; the genetic patterns found in this study support the idea of multiple introductions, and could be due to additional releases in the south," said John Butterfield, a USGS contract biologist and lead author of the publication.

Continued releases would increase the potential for more genetically diverse red lionfish to join the current population, which could counter future removal efforts or allow them to more rapidly expand their range beyond current boundaries.

The broad dispersal of red lionfish may in part be due to their reproductive habits. Females can spawn up to once every four days, which could result in one female releasing up to two million eggs a year. Following spawning, larvae can disperse long distances via ocean

currents, for up to 35 days.

In the United States, federal and state agencies are working together to help combat this invasive fish through the Aquatic Nuisance Species Task Force. This intergovernmental entity has drafted a National Invasive Lionfish Prevention and Management Plan that is in the final stages of approval. The main goals of the plan are to prevent the spread of invasive lionfish; coordinate early detection and rapid response efforts; control and management of the current invasive population; and fully assess the impact that the invasion is having on native species and habitats.

More information: The full study is available online:
[link.springer.com/article/10.1 ... 27-015-2623-y#page-1](https://link.springer.com/article/10.1007/s12237-015-2623-y#page-1)

Provided by United States Geological Survey

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