

Lionfish Cruise 2008: Overview

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Sampling fish and prey fish communities and habitat
(credit: Doug Kesling, NURC)

Cruise title: Assessment of Fishery and Ecosystem Impacts of the Indo–Pacific Lionfish within North Carolina Hardbottom Habitats

Cruise dates: April 23–27, 2008

Area of Operation: Onslow Bay, NC. Water depths 75 to 240 feet; on the [NOAA Ship NANCY FOSTER](#).

Background: The Indo–Pacific lionfish is a non–native predatory fish first reported off the North Carolina coast in 2000. Since then, the number and geographic distribution of lionfish within the northwestern Atlantic has increased dramatically. Lionfish now inhabit coral reef, hardbottom, and artificial

structures from south Florida to Cape Lionfish that reside off North Carolina are thought to be at their northern limit for overwintering survival, due to the cold winter bottom–water temperatures that occur to the north. During winter, there is a dramatic difference in bottom–water temperatures off the north Carolina coast

Personnel

[NOAA Ocean Service](#), Beaufort, NC

- Paula Whitfield
(Chief Scientist)
- Brian Degan
- Wilson Freshwater
- Brett Harrison
- Roger Mays
- Christine Addison

[NOAA Fisheries Service](#), Beaufort, NC

- Roldan Muñoz

[NOAA Teacher at Sea](#) participant

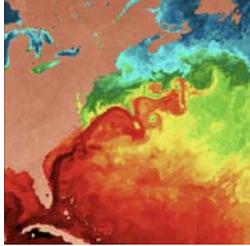
- Tara Treichel
Coastal Studies for Girls, Freeport, Maine

[NOAA's Undersea Research Center](#)

- Doug Kesling
- Thor Dunmire

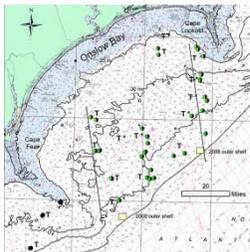


between the inshore (<100 feet) and offshore waters (>100 feet). The warm Gulf Stream current flows year-round and moderates bottom water temperatures in the deeper water depths, increasing the likelihood for lionfish survival in these areas.



SST image of the Gulf Stream

Since complete eradication of lionfish from the Atlantic Ocean is not possible, our research goals are to examine and assess potential ecosystem and fishery impacts that may be caused by the Indo-Pacific lionfish. To accomplish this, we will examine both shallow (75–100 feet) and deep water (115–250 feet) hardbottom habitats using a variety of underwater survey, assessment and specimen collection methods. In addition, we will be incorporating advanced technical SCUBA diving technologies to conduct our impact assessment research in deep water areas up to 250 feet.



Site map showing the research study site area within Onslow Bay, NC.

Lionfish Cruise 2008: Day 2, Thursday, April 24, 2008



Preparing to deploy.
(Credit: Tara Treichel)

After leaving the port of Morehead City, the NANCY FOSTER steamed southward to survey some of our deepest natural hardbottom sites within Onslow Bay, NC. We plan to highlight a specific aspect of our research each day of our cruise log. To acquire a better understanding of how lionfish may be impacting native Atlantic fish communities, it is important to use a variety of approaches. We will achieve this objective by using three different sampling techniques:

1. **Fish survey:** Divers identify and count conspicuous fishes along a 50-meter transect;
2. **Habitat survey:** Using still and video cameras, images are collected for later habitat community analysis at the lab; and
3. **Prey survey:** Divers survey 1m² areas to identify and count all small potential prey species.

Today we started out with rough weather, but managed to survey two sites. The first was located in 125 feet of water; the second in 150 feet, our deepest site location. At both, we used each survey method to count and measure various aspects of the diverse marine community. The

water temperature is still springlike and varying between 64 and 73 degrees Fahrenheit. From our previous work, we know that these water temperatures do not hamper lionfish survival. The number of lionfish observed has increased from earlier surveys at these research locations.



Yellowmouth grouper
(Credit: Wilson
Freshwater)



Hardbottom community
(Credit: Wilson
Freshwater)

Lionfish Cruise 2008: Day 3, Friday, April 25, 2008



Dense school
(Credit: Doug Kesling)

Today we completed one dive on a reef site in 130 feet of water. This site is located on a ledge that has a depth change of nearly 10 feet. Ledges like this provide important structure for many different fish and invertebrates. Today's fish surveyors recorded a record number of fish species. Highlights included lionfish, hogfish, lobster, graysby, red grouper, scamp, a loggerhead turtle, and many tropicals, such as angelfish and butterflyfish.

We collected one temperature logger and set out a new logger. The one we collected was deployed in July of 2007 and has been collecting temperature data for the last eight months. The coldest winter temperature of 59 degrees F occurred in February 2008. We have learned that lionfish do not survive in water temperatures lower than 50 degrees. Temperatures in this range are often found as far as ten miles from shore along the NC coast.



Lionfish
(Credit: Thor Dunmire)



Temp logger
(Credit: Thor Dunmire)

Lionfish Cruise 2008: Day 4, Saturday, April 26, 2008

A critical part of determining the lionfish's impacts involves documenting the native species that are being consumed by this invasive predator. Our previous research examining lionfish stomach contents has shown that they mostly eat small bottom-dwelling fishes. Yet, very little is known

about this inconspicuous (or cryptic) fish community. Therefore, we aim to gather baseline data on the cryptic fish community to document the number and different kinds of cryptic species that occur off our coasts that may be consumed by lionfish.



Bank sea bass
(Credit: Christine Addison)



Survey
(Credit: Christine Addison)

Comparisons of prey fishes present in the environment with those present in the stomachs of lionfish also allow us to determine if lionfish are preferentially feeding on a particular prey type. Members of the cryptic fish community include fishes that remain small and well-camouflaged throughout their lives. Some juvenile phases of fishes are temporarily part of this community, then grow larger and become economically important to fishers. To census cryptic prey fishes, we conduct stationary visual surveys. Supplementing these observations, we collect samples, aided by an anesthetic which coaxes the truly reclusive ones out of their hiding places. Only after generating precise estimates of abundance (total number) and species richness (different species present) will we be able to accurately determine the impacts the lionfish invasion has done to the native Atlantic marine community.



Watching the surveyors
(Credit: Christine Addison)



Butterflyfish
(Credit: Roldan Muñoz)



Roldan Muñoz
(Credit: Christine Addison)

Lionfish Cruise 2008: Day 5, Sunday, April 27, 2008

Today is the final day of our yearly cruise. Once completed, we will transit overnight back to Beaufort Inlet—a distance of 69 miles. We completed our surveys and sampling at two natural

hardbottom locations, the first in 140 feet of water, and the second in 118. We found the largest number and diversity of fishes at these locations. The fish observers saw many different species of grouper including red grouper, gag, scamp and yellowmouth. These species of fish are highly prized game fish by the recreational fishing and dive communities. Lionfish were also found in higher numbers than previously recorded at each of these sites.



Jackknife fish
(Credit: Christine Addison)



Assemblage
(Credit: Christine Addison)



Scamp grouper
(Credit: Christine Addison)

We are also very interested in the marine algae community as a potential indicator of overall ecological health, and for detecting climate change impacts. Sampling at different times of the year is essential to understanding natural variability within the environment. On this cruise we have found a large amount of seasonal variation in the algae community even at our deepest sites that remain relatively warm year-round (>60 degrees F). For example, in the summer, the marine algal community on the offshore hardbottom is diverse and abundant. In contrast, the marine algal community in winter is either sparse or non-existent. In the winter, the predominant bottom cover is a mix of attached immobile invertebrates such as *hydroids* and *bryozoans*. During our sampling, however, we were surprised to find two species of algae that were previously reported only during the summer.



summer hardbottom
(Credit: Wilson Freshwater)



winter bottom
(Credit: Wilson Freshwater)

Lionfish Cruise 2008: Teacher-at-Sea (TAS): Tara Treichel

Background



Tara & Paula
(Credit: Christine Addison)

[Tara Treichel](#) grew up in Phillips, a rural town in northern Wisconsin. She studied at the University of Wisconsin–Madison, where she received her Bachelor’s degree in Zoology and a Master’s in Curriculum & Instruction. She also holds a teacher certificate in Biology and has taught in Wisconsin and Washington state. She has always held a strong interest in natural history and is passionate about the marine environment.

Current Position

Tara is the Director of Education at the [Coastal Studies for Girls](#), a Science & Leadership School. The school offers a semester-long marine and environmental science program for tenth grade girls. While living at the school’s residence in Freeport on the coast of Maine, the students participate in a marine science-based curriculum focusing on hands-on environmental research and leadership.

Teacher-at-Sea experience

Tara wanted to participate in the TAS program to gain scientific research experience. While an experienced teacher, Tara felt she was lacking the knowledge of ‘hands on’ scientific research and felt this experience would be valuable to her and her students. Her participation in the 2008 Lionfish mission has truly whetted her appetite for field-based science and she would now love to be able to do SCUBA-based research some day. She looks forward to enabling her students with the excitement of discovery and academic independence that research science conveys.