

Lionfish Field Research off North Carolina

This study is supported by NOAA's Undersea Research Center in Wilmington and is designed to

- Increase our understanding of the number of lionfish in North Carolina habitats
- Characterize their ecological role
 - what are they eating,
 - how and where are they reproducing
- Determine if temperature is a limiting factor in their distribution.

This information will allow us to assess and possibly predict the risk these invaders pose to their new Atlantic communities. lionfish collection

Date and Location of Field Operations:

August 2 - August 6, 2004, Onslow Bay, North Carolina

August 9 - August 12, 2004, Onslow Bay, North Carolina

August 16 - August 19, 2004, Onslow Bay, North Carolina

Make up days scheduled *Aug 26, 27 and Sept 1- 3, 2004.*

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NOAA/NOS

Center for Fisheries and Habitat Research

Mission Coordinator: Doug Kesling,

NOAA

NURC in Wilmington



We will conduct surveys in hard bottom habitats within the coastal offshore waters of North Carolina in water depths of 115 to 150 feet. Preliminary research and observations suggest that lionfish will be limited in their inshore distribution by winter bottom water temperatures. Their

existing distribution for the past 4 years adds support to this theory. In North Carolina the farther offshore you travel the closer you are to the warm, clear waters of the Gulf Stream. We expect that lionfish will be able to over-winter in water depths greater than 120 ft. During each leg of the mission NOAA and NURC divers aboard the RV Cape Fear research vessel will venture out Masonboro Inlet near the NURC/UNCW facility and travel anywhere from 35 to 100 miles within Onslow Bay, NC (see NC map) to reach habitat that may be colonized by lionfish. Weather permitting the RV Cape Fear will stay offshore each week for 5 days. Some of the sites are known to harbor lionfish. But most of the sites are relatively unexplored by SCUBA divers and known only to fishermen.

Mission Log: Week 1 August 2 - 6 2004

During the first week (we actually made it offshore 2 days), We split up into two dive teams. Each dive team had separate tasks to accomplish and dove the same site. A total of 18 lionfish were collected in 2 days.

Dive team 1 (*lionfish observer group*) Christine Addison, Glen Taylor, Paula Whitfield

Dive team 2 (*hunter/gatherer group*) Doug Kesling and Jay Styron

Safety Diver: Lance Horne

RV Cape Fear Crew: Captain Chuck Ruch, Michael Rodaway and Ken Johns

Day 1 and 2, August 2 and 3, 2004: "Blown out" courtesy of Hurricane Alex!

Day 3, August 4 2004: It was a beautiful morning so the RV Cape Fear headed out to the City the Houston a shipwreck located approximately 45 miles from Masonboro Inlet in 100 ft of water. Dive team 1 (observer group) spotted 2 lionfish on this shipwreck during their underwater observations and deployed a temperature logger. Winter bottom water temperatures are likely the main limiting factor in controlling lionfish population therefore we will be deploying several bottom water temperature sensors at several areas throughout Onslow Bay.



Doug Kesling
and Jay Styron
(NOAA Photo by Christine Addison)

The Hunter gatherer group successfully collected 4 lionfish specimens on the City of Houston. After each site is completed lionfish specimens were examined and processed for future analysis of stomach contents, reproductive status and sex, genetics, age and growth studies and stable isotope analyses.

Although these fish are beautiful they appear to be voracious predators, the stomach contents of all 18 fish collected appeared to be full of small fishes. Future analyses will reveal which species of fish are being impacted by the lionfish presence in the Atlantic. Below is a belted sandfish found undigested in the stomach of a lionfish (NURC photos by Doug Kesling).



belted sandfish
found in stomach of lionfish

Day 4, August 5 2004: The lionfish research team aboard the The RV Cape Fear headed up to the Naeco stern and Naeco bow shipwrecks located approximately 65 miles from Masonboro Inlet in northeastern Onslow Bay in 135 ft of water.

The observer team deployed a temperature logger on the stern of the Naeco and spotted 8 lionfish along their observer transect in two successive dives. The hunter gatherer team fared much better and collected a total of 14 lionfish in two separate dives.



Christine Addison

Parting shot: week 1



Tiger shark
(NOAA photo by Paula Whitfield).



Lionfish
(NOAA photo by Paula Whitfield).



Glen Taylor
(NOAA photo Paula Whitfield)



Christine Addison
searching for lionfish on
hard bottom
(NOAA photo Paula Whitfield)

Mission Log: Week 2 August 10 - 13, 2004

This week we were weathered out 2 days but we made up for lost time on the first day of diving by collecting 23 lionfish. Although the overall abundance and density of lionfish is quite variable we observed and collected lionfish from all 5 sites we visited this week (see map). A total of 33 lionfish were collected this week (1 alive). They varied in length from 5 to 45 cm long (2 to 18 in), these lengths are probably indicative of a range of lionfish ages. But this is still to be determined. The NURC/NOAA dive teams and crew this week switched around a bit within the different tasks and teams as designated below.

Dive team 1(*lionfish observer group*) Christine Addison, Glen Taylor/Tom Potts, Paula Whitfield

Dive team 2(*hunter/gatherer group*) Doug Kesling, Jay Styron, Tom Potts

Safety Diver: Doug Kesling and Glen Taylor took turns as safety diver

RV Cape Fear Crew: Captain Chuck Ruch, Michael Rodaway and Gerry Compeau

Day 1, Tuesday August 10 2004: After being blown out on Monday we headed out on Tuesday morning to dive two separate hardbottom locations that were approximately 50 miles southeast of Masonboro Inlet in 130 ft of water (HB1 and HB2). Visibility was exceptional at both of these dive sites and both the visual observer team and the hunter/gatherer team spotted lionfish at both locations. On this one day alone 23 lionfish were collected in day 1 alone. This was a single day record for the most lionfish collected.



Lionfish and squirrel fish
(NURC photo - Doug Kesling)

Day 2, Wednesday August 11 2004: On day 2 we started the day diving in a location that is approximately 60 miles southeast of Masonboro Inlet. This site was our farthest location so far and was in approximately 130 ft of water (HB3). Due to the location we placed a temperature sensor to monitor winter bottom water temperatures. Even though we expected to see more lionfish only 1 was collected from this particular location.

The second dive of the day we traveled closer to shore about 7 miles but ended up in deeper water (138 ft) at this site we observed the smallest lionfish any of us has seen off North Carolina (HB4). It was approximately 2 inches long Glen Taylor, Christine Addison and Paula Whitfield were able to bring it up alive and the lionfish will be displayed at the NOAA Beaufort Laboratory Aquarium. The hunter/gatherer team Tom Potts and Jay Styron collected 6 lionfish at this location as well.



Juvenile lionfish
(NOAA photo Christine Addison)

Juveniles such as this one are not a common site off North Carolina but they have been present every fall for the last 3 years off the coast of Long Island NY. They may be difficult to see in the hardbottom and wreck habitats.

Day 3, Thursday August 12 2004: On day 3 the remnants of Bonnie were bearing down on us, so we were able to hit 1 more hardbottom site before heading into shore (HB5). At this particular location 2 more lionfish were collected. This makes a total of 33 lionfish collected at 5 very different hardbottom locations during week 2



Divers
(NURC photo - Doug
Kesling)
Click to enlarge



Jay Styron
(NURC photo - Doug Kesling)
Click to enlarge

Mission Log: Week 3 August 16 - 20 2004

After Hurricane Charley, visibility conditions underwater were marginal but we actually completed 5 days of research diving offshore North Carolina. On Tuesday we invited the press to the RV Cape Fear to witness some of our research and diving activities first hand. We finished the week by collecting the most lionfish yet from any 1 location or dive. Five more lionfish were also collected alive in order to conduct laboratory spawning and reproductive studies. Many of the Lionfish collected so far appeared to be spawning off the coast of North Carolina. Lionfish also appear to primarily targeting small fishes of a variety of species as their main source of food. Much research remains in order to determine just how lionfish are affecting their new habitat.

Dive team 1 (*lionfish observer group*) Christine Addison, Glen Taylor, Paula Whitfield

Dive team 2 (*hunter/gatherer group*) Doug Kesling and Jay Styron

Safety Diver: Morgan Bailey

RV Cape Fear Crew: Captain Dan Aspenleiter, Chuck Ruch, Michael Rodaway

Day 1, Monday August 16 2004: A beautiful glassy day to begin the week. On our first dive site (HB6) we went to was one of the closest sites of our research mission and we did not observe or collect any lionfish at this location. This is only the second site (out of 15) that we have not observed lionfish throughout the course of the mission.

At our second dive site of the day our goal was to collect live lionfish for reproductive studies and for demonstration purposes on press day (Tuesday). Three lionfish were collected alive combined with 9 others for a total of 12 lionfish (HB7).



Lionfish
(NURC photo - Doug Kesling)

Day 2, Tuesday August 17 2004: Our good weather continues for Press Day. Various members of the press meet us near site HB8 which is approximately 45 miles southeast of Masonboro Inlet. Although dive team 1 did not observe any lionfish on this dive, The hunter gatherer team collected 2 more live lionfish at this location. The NURC and NOAA researchers describe the status of the research to members of the press and answer their questions.

On our second dive of the day we travel much farther offshore and experience an apparent Gulf Stream Upwelling event HB9. Gulf Stream upwelling is a natural phenomenon that occurs in the summer when the deep, cold, nutrient rich waters flowing under the gulf stream slide up the continental shelf creating a very noticeable cold water thermocline. Although the water on the surface was almost 80 degrees F on the bottom it was 65 degrees. Any lionfish residing along the southeast region of the United States will have to endure these kinds of intermittent cold water events. One lionfish was collected at this site.



Deploying divers
(NOAA photo - Christine Addison)



Divers in dingy
(NOAA photo - Christine Addison)

Day 3, Wednesday August 18 2004: Since weather was holding out we headed much farther northeast about 25 miles offshore of Cape Lookout (HB10). We set out to explore a charted wreck, but it turned out to be our deepest and smallest hardbottom site yet. Within 30 seconds of descending to 148 ft of water we saw our first lionfish and ended up seeing nine different lionfish at this relatively isolated location. The hunter/gatherer team of Jay Styron and Doug Kesling collected 13 lionfish and at this point that was the most lionfish collected at any one location.



Diver Jay Styron
(NURC photo - Doug Kesling)

At the second site we decided to check out a very obscure area (HB11) that had very little relief when viewed on the Fathometer, but it yielded yet another surprise. When we arrived at the bottom in 145 ft of water there was no hard bottom except one rock and only sand in sight. Then as we explored further we came across a very limited area of intermittent bed rock chunks just breaking through the surface of sand. This area was no bigger than 75 square feet and there were lots of Trigger fishes and you guessed it...Lionfish! To see lionfish at such minimal structure as this was pretty amazing. The hunter/gatherer team ended up collecting 2 lionfish from this small location.



Lionfish samples
(NOAA photo - Christine Addison)

Day 4, Thursday August 19 2004: Overnight we traveled almost 70 miles South to the 18 Fathom wreck where many lionfish reports had been made. At this point we expected to see a lot of lionfish at this site and we were not disappointed. The observer team saw at least 15 lionfish and the ever efficient hunters (Jay Styron and Doug Kesling) collected 28 lionfish during 1 dive alone!

We decided to dive this wreck again and we ended up collecting 25 more lionfish. Next year we will be interested to see how many new lionfish recruit to this wreck. Throughout our research in August a total of 137 lionfish were collected at 13 different locations. But, if we include preliminary sampling in June the total comes to 145 lionfish at 15 different locations. This far surpasses our original expectations and we now realize more than ever that the lionfish is actually thriving in water depths greater than 120 ft in North Carolina.

Parting Shot: Week 3



Dolphins
(NURC photo - Doug Kesling)



Dolphins with Diver
(NURC photo - Doug Kesling)

Resources:

To see dive operation plan go to NURC website