# Results of experimental field studies, in the Bahamas, Cayman Islands, and Philippines, assessing susceptibility of red lionfish (Pterois volitans) to parasitic gnathiid isopods in both native and introduced ranges in 2009-2011

**Website**: https://www.bco-dmo.org/dataset/3889
**Data Type**: Other Field Results
**Version**: 1
**Version Date**: 2013-03-14

**Project**
» Ecological Release and Resistance at Sea: Invasion of Atlantic Coral Reefs by Pacific Lionfish (Lionfish Invasion)



| Contributors | Affiliation | Role |
|---|---|---|
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**Abstract**
Results of experimental field studies, in the Bahamas, Cayman Islands, and Philippines, assessing susceptibility of red lionfish (Pterois volitans) to parasitic gnathiid isopods in both native and introduced ranges in 2009-2011.

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## Coverage

**Spatial Extent**: **N**:23.77266 **E**:-80.06049 **S**:9.32747 **W**:123.31718
**Temporal Extent**: 2009-06-19 - 2010-08-26

## Dataset Description

Results of experimental field studies assessing the susceptibility of red lionfish (*Pterois volitans*) to parasitic gnathiid isopods in both the native Pacific and introduced Atlantic ranges. Experiments were conducted at Lee Stocking Island, Bahamas; Little Cayman, Cayman Island; and Negros Islands, Philippines from 2009 to 2011.

**Related Publications:**

Sikkel, P.C., L.J. Tuttle, K. Cure, A.M. Coile, and M.A. Hixon. In preparation. Low susceptibility of invasive red lionfish (Pterois volitans) to a generalist ectoparasite. (To be submitted to Proceedings of the Royal Society-B).


### Acquisition Description

Experimental field studies were conducted during which red lionfish and other common reef fishes were caged and exposed to parasitic gnathiid isopods at shallow water reefs.

### Processing Description

BCO-DMO Processing Notes:
-Modified parameter names to conform with BCO-DMO naming conventions.
-Added lat and lon for each site from the metadata provided.
- Replaced blanks with 'nd' to indicate 'no data'.
- 09-Jan-2018: removed embargo on dataset.


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## Parameters

| Parameter | Description | Units |
|---|---|---|
| location | Regional location where trial was conducted (Lee Stocking Island, Little Cayman, or the Philippines). Originally named 'Locality'. | text |
| site | Name of reef on which census was conducted. | text |
| lat | Latitude of the experiment site. | decimal degrees |
| lon | Longitude of the experiment site. | decimal degrees |
| host_species | Species of host placed in individual cage. | text |
| block_no | Number of block, corresponding to day on which trial was conducted. | integer |
| date | Date on which trial was conducted. | mm/dd/YYYY |
| gnathiids_fed | The total number of gnathiid isopods that appear to have a full belly, identifiable by red blood in the gut of the isopod. | number |
| gnathiids_unfed | The total number of gnathiid isopods that do not appear to have a full belly (no red blood in the gut of the isopod). | number |
| gnathiids_tot | Number of gnathiid isopods present on host individual. | number |
| gnathiid_present | Whether or not any gnathiid isopod was found on the host individual. | y/n |
| len_fork | Fork length in centimeters of the host. | cm |
| len_tot | Total length in centimeters of the host. | cm |
| area_skin | Species-specific calculation of estimated surface area of the host's skin (in square centimeters), with consideration of host length. | cm^2 |

| | | |
|---|---|---|
| gnathiid_density | Gnathiid density; Total number of gnathiids (gnathiids_tot) divided by estimated skin surface area (area_skin). | tot. num. gnathiids per cm^2 |
| rel_gnathiid_density | Gnathiid density among lionfish relative to density among all other families; lionfish gnathiid density (gnathiid_density) divided by family-wide mean calculation of gnathiid density. | |
| avg_gnathiid_density_on_Haemulid | Mean gnathiid density on Haemulid fishes at a given locality. | |
| lionfish_to_Haemulid_gnathiid_density | Relative gnathiid (gnathiid density on lionfish/gnathiid density on Haemulids); Gnathiid density on lionfish ('density_gnathiid') divided by mean gnathiid density on Haemulid fishes at a given locality ('avg_gnathiid_density_on_Haemulid'). | |

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## Project Information

**Ecological Release and Resistance at Sea: Invasion of Atlantic Coral Reefs by Pacific Lionfish (Lionfish Invasion)**

**Website**: http://hixon.science.oregonstate.edu/content/highlight-lionfish-invasion

**Coverage**: Bahamas; Cayman Islands; Mariana Islands; Philippines

Invasive species are increasingly introduced by human activities to new regions of the world where those species have never existed previously. In the absence of natural enemies (predators, competitors, and diseases) from their homeland, invasives may have strong negative effects on invaded ecosystems, especially systems with fewer species ("ecological release"), and may even drive native species extinct. However, if native natural enemies can somehow control the invaders ("ecological resistance"), then ecological disruption can be prevented or at least moderated. Most of the many invasive species in the sea have been

seaweeds and invertebrates, and the few documented invasive marine fishes have not caused major problems. However, this situation has recently changed in a stunning and ominous way. In the early 1990s, lionfish (Pterois volitans) from the Pacific Ocean were accidentally or intentionally released from aquaria to the ocean in the vicinity of Florida. Camouflaged by shape and color, protected by venomous spines, consuming native coral-reef fishes voraciously, and reproducing rapidly, lionfish have subsequently undergone a population explosion. They now range from the mid-Atlantic coast of the US to the Caribbean, including the Bahamas. Native Atlantic fishes have never before encountered this spiny, stealthy, efficient predator and seldom take evasive action. In fact, the investigator has documented that a single lionfish is capable of reducing the abundance of small fish on a small coral patch reef by nearly 80% in just 5 weeks. There is great concern that invasive lionfish may severely reduce the abundance of native coral-reef fishes important as food for humans (e.g., grouper and snapper in their juvenile stages) as well as species that normally maintain the integrity of coral reefs (e.g., grazing parrotfishes that can prevent seaweeds from smothering corals). There are far more species of coral-reef fish in the Pacific than the Atlantic, so this invasion may represent a case of extreme ecological release with minor ecological resistance. Dr. Hixon and colleagues will study the mechanisms of ecological release in lionfish, as well as examine potential sources of ecological resistance in the heavily invaded Bahamas. Because very little is known about the ecology and behavior of lionfish in their native Pacific range, he will also conduct comparative studies in both oceans, which may provide clues regarding the extreme success of this invasion. In the Bahamas, the investigator will document the direct and indirect effects on native species of the ecological release of lionfish, both as a predator and as a competitor. These studies will be conducted at various scales of time and space, from short-term experiments on small patch reefs, to long-term experiments and observations on large reefs. Whereas direct effects involve mostly changes in the abundance of native species, indirect effects can be highly variable. For example, lionfish may actually indirectly benefit some native species by either consuming or outcompeting the competitors of those natives. The project will explore possible ecological resistance to the invasion by determining whether any native Bahamian species are effective natural enemies of lionfish, including predators, parasites, and competitors of both juvenile and adult lionfish. Comparative studies of natural enemies, as well as lionfish ecology and behavior, in both the Atlantic and the Pacific may provide clues regarding the explosive spread of lionfish in the Atlantic. Regarding broader impacts, this basic research will provide information valuable to coral-reef and fisheries managers fighting the lionfish invasion in the US, the Bahamas, and the greater Caribbean, especially if sources of native ecological resistance are identified. The study will fund the PhD research of U.S. graduate students, as well as involve assistance and participation by a broad variety of undergraduates and reef/fisheries managers, including women, minorities, native Bahamians, and native Pacific islanders. Participation in this project will promote education in marine ecology and conservation biology directly via Dr. Hixon's and graduate students' teaching and outreach activities, and indirectly via the experiences of undergraduate field

assistants and various associates.

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## Funding


| Funding Source | Award |
| --- | --- |
| NSF Division of Ocean Sciences (NSF OCE) | OCE-0851162 |


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