Data on lionfish juvenile growth patterns from tagged lionfish in the Bahamas, Guam, and Philippines from 2009-2012 (Lionfish Invasion project)

Website: https://www.bco-dmo.org/dataset/4015
Data Type: Other Field Results
Version: 1
Version Date: 2013-09-06

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

Contributors	Affiliation	Role
Hixon, Mark	Oregon State University (OSU)	Lead Principal Investigator
Cure, Katherine	University of Guam Marine Laboratory (UOGML)	Scientist
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Abstract
Data on lionfish juvenile growth patterns from tagged lionfish in the Bahamas, Guam, and Philippines from 2009-2012.

Table of Contents

Coverage

Spatial Extent: **N**:23.81251 **E**:144.800067 **S**:9.06084 **W**:-76.16756
Temporal Extent: 2009-06-14 - 2011-08-09

Dataset Description

Data on lionfish tagged for an assessment of juvenile growth patterns in the native Pacific (Guam and the Philippines) vs. invasive Atlantic (Bahamas and Caymans). Data from the Cayman Islands are in separate dataset: see the comparative lionfish growth - Caymans dataset.

Related Publications:
Cure, et al. (2012); Pusack, et al. (2016)

Acquisition Description

This sub-project aimed to compare native vs. invasive populations of lionfish, in order to assess some of the potential factors responsible for the invasive success of lionfish in the Atlantic. Assessment in the native range included analysis of behaviour and juvenile growth patterns, at two general locations: Guam and the Philippines. To assess growth, juvenile fish found mostly at shallow water sites, were inividually identified with the use of fluorecent elastomer tags (different colors and body positions) and measured to the nearest mm. Individually tagged fish were later relocated and remeasured at 2 week intervals, in order to obtain estimates of in-situ growth. Observations in the native range were then compared to those at invaded locations (Bahamas and Caymans). Data were QA/QCd by spot checking against original field data sheets.

Processing Description

BCO-DMO Processing Notes:
- Changed parameter names to conform with BCO-DMO naming conventions.
- Added lat and lon for each site from the metadata sheet.
- Replaced blanks with 'nd' to indicate 'no data'.
- Replaced commas with semi-colons in the columns containing text.
- Moved comments about site, fish, etc. to a single column ('notes').
- Re-arranged data so that date, day_num, and len_tot are in separate columns.
- 27-Dec-2017: removed embargo on dataset.

[table of contents | back to top]

Related Publications

Cure, K., Benkwitt, C., Kindinger, T., Pickering, E., Pusack, T., McIlwain, J., & Hixon, M. (2012). Comparative behavior of red lionfish Pterois volitans on native Pacific versus invaded Atlantic coral reefs. Marine Ecology Progress Series, 467, 181–192. doi:10.3354/meps09942
Methods

Pusack, T. J., Benkwitt, C. E., Cure, K., & Kindinger, T. L. (2016). Invasive Red Lionfish (Pterois volitans) grow faster in the Atlantic Ocean than in their native Pacific range. Environmental Biology of Fishes, 99(6-7), 571–579. doi:10.1007/s10641-016-0499-4
Methods

[table of contents | back to top]

Related Datasets

IsRelatedTo

Hixon, M., Cure, K. (2013) **Data on lionfish juvenile growth patterns from tagged lionfish in the Cayman Islands from 2010-2011 (Lionfish Invasion project).** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 19 Aug 2013) Version Date 2013-08-19 http://lod.bco-dmo.org/id/dataset/4016 [view at BCO-DMO]

[table of contents | back to top]

Parameters

Parameter	Description	Units
location	Country name.	text
fish_id	Code to identify individuals based on site initials and fish number.	alphanumeric
site	Name of reef site.	alphanumeric
lat	Latitude of the reef site.	decimal degrees
lon	Longitude of the reef site.	decimal degrees
date_found	Date in which lionfish was first observed.	mm/dd/YYYY
date_tagged	Date in which lionfish was first tagged.	mm/dd/YYYY
time_tagged	Time when elastomer tag was applied in 24 hr. format. For some sites only am or pm are designated.	HHMM (or am/pm)
depth_ft	Describes approximate depth at which lionfish was found (estimated or measured with dive computer).	feet
spines_clipped	Describes dorsal spines clipped as a way to double tag inividuals in case elastomer tag failed; for some individuals none were clipped and either specified or left blank.	alphanumeric
tag_code	Describes combination of letters used to identify elsatomer tag placement along body (e.g. L-GM means tag is on the left side with green color and in the mid region).	text
date	Date of recapture.	mm/dd/YYYY
day_num	Number of days since lionfish was tagged (integer; # days on reef= recapture date - tagged date).	integer
len_tot	Total length measured on recapture date (cm) or either P (for present; if lionfish was not recaptured and measured) or A (for absent; if site was visited but lionfish was not found).	centimeters
notes	May refer to data entry related or QA/QC related notes or notes about the particular observation.	text

[table of contents | back to top]

Deployments

Guam_Reef_Surveys_09-10

Website	https://www.bco-dmo.org/deployment/59049
Platform	shoreside Guam
Start Date	2009-09-24
End Date	2010-03-19
Description	Coral reefs were surveyed/studied near Guam from 2009 to 2010 as part of the project "Ecological Release and Resistance at Sea: Invasion of Atlantic Coral Reefs by Pacific Lionfish" (NSF OCE-0851162).

LSI_Reef_Surveys_09-12

Website	https://www.bco-dmo.org/deployment/59019
Platform	Tropical Marine Lab at Lee Stocking Island
Start Date	2009-05-30
End Date	2012-08-18
Description	Locations of coral reef survey dives and sightings, or collections of the invasive red lionfish, Pterois volitans, near Lee Stocking Island, Bahamas for the projects "Ecological Release and Resistance at Sea: Invasion of Atlantic Coral Reefs by Pacific Lionfish" and "Mechanisms and Consequences of Fish Biodiversity Loss on Atlantic Coral Reefs Caused by Invasive Pacific Lionfish" (NSF OCE-0851162 & OCE-1233027). All dives were made from various small vessels (17' to 24' l.o.a., 40 to 275 HP outboard motors, 1 to 7 GRT). Vessel names include, Sampson, Orca, Potcake, Lusca, Lucaya, Zardoz, Parker, and Nuwanda.

Philippines_Reef_Surveys_10-11

Website	https://www.bco-dmo.org/deployment/59050
Platform	shoreside Philippines
Start Date	2010-06-29
End Date	2010-07-16
Description	Coral reefs were surveyed/studied near the Philippines during June and July 2010 and August 2011 as part of the project "Ecological Release and Resistance at Sea: Invasion of Atlantic Coral Reefs by Pacific Lionfish" (NSF OCE-0851162).

[table of contents | back to top]

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.

[table of contents | back to top]

Funding

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

[table of contents | back to top]