Counts of small reef fishes taken by census at artificial and transplant reefs at Lee Stocking Island, Bahamas in 2010 (Lionfish Invasion project)

Website: https://www.bco-dmo.org/dataset/3954
Data Type: experimental
Version: 29 May 2013
Version Date: 2013-05-29

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
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Coverage

Spatial Extent: **Lat**:23.75047 **Lon**:-76.14035

Dataset Description

The investigators examined the interactions between invasive lionfish and native Nassau grouper using both a manipulative field study and a controlled lab experiment. This dataset, resulting from the field study, contains counts of small reef fishes (< 50 mm) on the artificial and transplant reefs where the abundances of Nassau grouper were controlled.

Related Datasets from sub-project "Interactions between native Nassau grouper and invasive lionfish":
lionfish growth
grouper-lionfish refuge competition expt

Related Publications:

Pusack, TJ. Submitted. Evidence of bioltic resistance: native Nassau grouper (Epinephelus striatus) mitigate predator effects of invasive Pacific red lionfish (Pterois volitans) on Atlantic coral reefs. Ecological Applications.

Raymond WW, MA Albins, and TJ Pusack. In Review. Shelter competition between invasive Pacific red lionfish Pterois volitans) and native Nassau grouper (Epinephelus striatus). Journal of Experimental Marine Biology and Ecology.

Methods & Sampling

During the summer of 2010, the investigators manipulated the abundance of Nassau grouper on 28 near-shore patch reefs and measured the growth and survival of juvenile (20-140 mm) lionfish. They also censused the community of small reef fishes (< 50 mm) to look for evidence of indirect effects that grouper might have mediated through lionfish.

Data Processing Description

BCO-DMO Processing Notes:
- Modified parameter names to conform with BCO-DMO naming conventions.
- Replaced blanks with 'nd' ('no data') in the time_start, time_end, phase, non_fish_abund, and notes column.
- Replaced blanks with zeroes in the size bins.
- Transposed size bins to rows in lowest level of data.
- Added lat and lon from the metadata provided.
- 09-Jan-2018: removed embargo on dataset.

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Data Files

File	
art_and_trans_reef_census.csv	(Comma Separated Values (.csv), 9.21 MB) MD5:88147bcacb03aae5a1af9f60d098a859
Primary data file for dataset ID 3954	

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Parameters

Parameter	Description	Units
site	Name of the site.	text
lat_site	Latitude of the site.	decimal degrees
lon_site	Longitude of the site.	decimal degrees
treatment	Indicates whether the survey was a Baseline (no treatment) or the number of Nassau grouper present on the reef. EPST = Nassau grouper.	dimensionless
location	Indicates the specfic patch reef in the matrix.	text
reef_type	Indicates whether the reef was an artifical reef (ART) 1 m^3 concrete block or a translocated reef (TRANS) 3.5 m^2.	text
day	2-digit day-of-month of survey.	dd (01 to 31)
month	2-digit month of survey.	mm (01 to 12)
year	4-digit year of survey.	YYYY
time_start	Beginning time of the survey; 24-hour time.	HHMM
time_end	Ending time of the survey; 24-hour time.	HHMM
census_type	Indicates whether a full census of all reef fish or a recruit only census of fish	text
person1	Identity of primary observer (TP = Timothy Pusack)	text
person2	Identity of secondary observer (WR = Wendel Raymond; JL = Julia Lawson; CK = Courtney Kewl; TG = Tiffany Gray; KI = Kurt Ingeman)	text
species_code	4-letter genus species code (typically first two letters are the first two of the genus and last two letters are the first two of the species). See the Species list to match the code to the full scientific name.	code
phase	N = juvenile or intermediate or fish without distinct post-settlement life stages; T = terminal phase.	text
non_fish_abund	0 if species is a fish. Otherwise count of specific invertebrate on particular subsample.	integer
notes	Notes associated with a particular observation. May refer to data entry related or QA/QC related notes.	text
lenbin_min	Minimum of length bin range (centimeters).	cm
lenbin_max	Maximum of length bin range (centimeters).	cm
count	Count of a particular species falling into the size bin.	integer

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Deployments

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.

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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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