Results of lab experiments to determine if groupers (Cephalopholis sp.) eat cleaner gobies (Elacatinus sp.); conducted at Lee Stocking Island, Bahamas and Cayman Islands in 2011 (Lionfish Invasion project)

Website: https://www.bco-dmo.org/dataset/3932
Data Type: Other Field Results
Version: 30 April 2013
Version Date: 2013-04-30

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: **N**:23.773461 **E**:-76.105208 **S**:19.69548 **W**:-80.06091
Temporal Extent: 2011-07-01 - 2011-08-17

Dataset Description

This dataset contains results from experiments conducted in the Bahamas and the Cayman Islands. Experiments examined whether or not two species of groupers, *Cephalopholis fulva* and *Cephalopholis cruentata*, (ecologically similar to invasive lionfish) ate cleaner gobies of the genus Elacatinus. Data include the number of gobies eaten, the number of strikes made against the goby and the time it took to strike, and the time passed before predation occurred.

Related Datasets from sub-project "Lionfish Cleaner lab expt 2011":
lionfish-goby lab expt

Methods & Sampling

The investigator conducted laboratory experiments in the Bahamas and the Cayman Islands to determine whether or not lionfish, Pterois volitans (PTVO), eat cleaner gobies, Elacatinus genie (ELGE), and whether or not a lionfish eating a cleaner goby affected the odds of the same lionfish subsequently eating a non-cleaner goby, Coryphopterus glaucofraenum (COGL). The same experiment was conducted with two ecologically similar native predators, the coney grouper, Cephalopholis fulva (CEFU), and the graysby grouper,

Cephalopholis cruentata (CECR).

Experiments at Lee Stocking Island took place at the Lobster Lab at the Perry Institute of Marine Science.
Experiments at the Cayman Islands took place at the Wet Lab at the Central Caribbean Marine Institute.
Experiments tooks place from 22 June 2011 to 23 August 2011.

Data Processing Description

BCO-DMO Processing Notes:
- Modified parameter names to conform with BCO-DMO naming conventions.
- Added lat and lon from the metadata provided.
- Replaced blanks, 'info not available' and 'n/a' with 'nd' ('no data')
- Separated 'Goby species & ID' column into separate columns for species code and id.
- 09-Jan-2018: removed emargo on dataset.

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Data Files

File	
grouper_goby_lab_expt.csv	(Comma Separated Values (.csv), 8.81 KB) MD5:f7278835ac432d1033cdabd334610f48
Primary data file for dataset ID 3932	

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Parameters

Parameter	Description	Units
site	Corresponds to geographical location where replicate was conducted (either Lee Stocking Island or Little Cayman).	text
lat	Latitude of the site.	decimal degrees
lon	Longitude of the site.	decimal degrees
fish_id	Code unique to each individual grouper (CEFU=Cephalopholis fulva; CECR=Cephalopholis cruentata).	code
len_tot	Total length of grouper in centimeters.	cm
goby1_species_code	Code identifying the species of Goby 1. (Note: Goby 1 and goby 2 were determined randomly by the rolling of a dice.) COGL = Coryphopterus glaucofraenum; ELGE = Elacatinus genie.	code
goby1_len_tot	Total length of first goby in centimeters.	cm
date	Date on which trial was run.	mm/dd/YYYY
goby1_eaten	Whether or not the first goby was eaten in the 10 minute trial.	yes or no
num_strikes_goby1	How many strikes the grouper made against the first goby.	integer
time_to_pred_goby1	How much time passed (in minutes and seconds) before first goby was consumed.	MM:SS
time_to_strike1_goby1	How much time passed (in minutes and seconds) before first strike was made (if applicable).	MM:SS
time_to_strike2_goby1	How much time passed (in minutes and seconds) before second strike was made (if applicable).	MM:SS
goby2_species_code	Code identifying the species of Goby 2. (Note: Goby 1 and goby 2 were determined randomly by the rolling of a dice.) COGL = Coryphopterus glaucofraenum; ELGE = Elacatinus genie.	code
goby2_len_tot	Total length of second goby in centimeters.	cm
goby2_eaten	Whether or not the second goby was eaten in the 10 minute trial.	yes or no
num_strikes_goby2	How many strikes the grouper made against the second goby.	integer
time_to_pred_goby2	How much time passed (in minutes and seconds) before second goby was consumed.	MM:SS
time_to_strike1_goby2	How much time passed (in minutes and seconds) before first strike was made (if applicable).	MM:SS
time_to_strike2_goby2	How much time passed (in minutes and seconds) before second strike was made (if applicable).	MM:SS
time_to_strike3_goby2	How much time passed (in minutes and seconds) before third strike was made (if applicable).	MM:SS
notes	Notes; other things to consider.	text

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Deployments

PIMS_Hixon

Website	https://www.bco-dmo.org/deployment/59038
Platform	Tropical Marine Lab at Lee Stocking Island
Start Date	2009-05-30
End Date	2012-08-18
Description	Various lab experiments were conducted between 2009 and 2012 at the facilities at the Perry Institute for Marine Science Tropical Marine Lab (at Lee Stocking Island, Bahamas) for the project "Ecological Release and Resistance at Sea: Invasion of Atlantic Coral Reefs by Pacific Lionfish".

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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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