Preferences of E. Lori settlers on sponge habitat in South Water Caye, Belize during 2011 and 2017.

Website: https://www.bco-dmo.org/dataset/728444
Data Type: Other Field Results
Version: 1
Version Date: 2018-02-28

Project
» Collaborative Research: The Role of Larval Orientation Behavior in Determining Population Connectivity (Elacatinus Dispersal II)

Contributors	Affiliation	Role
Buston, Peter	Boston University (BU)	Principal Investigator
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Abstract
Preferences of E. Lori settlers on sponge habitat in South Water Caye, Belize during 2011 and 2017.

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Coverage

Spatial Extent: **Lat**:16.815333 **Lon**:-88.0815
Temporal Extent: 2011 - 2017

Dataset Description

Preferences of *E. lori* settlers for different sponge species and morphologies.

These data were included in Figure 7-9 and Table 3 of:

Majoris, JE; D'Aloia CC, Francis RK, Buston PM (Accepted) Differential persistence favors habitat preferences that determine the distribution of a reef fish. Behav. Ecol.

Methods & Sampling

A circular arena with a 6 m diameter was established in a shallow (< 2 m deep) sand patch on the leeward side of Curlew Caye to test alternative hypotheses concerning the habitat characteristics and social cues that *E. lori* settlers might use to choose sponge habitat. Dye tests were conducted each day to measure current speed, direction, and to observe mixing. For each experiment, two habitat types were placed in alternating positions at 60-degree intervals along the arena's perimeter (e.g. 3 yellow sponges x 3 PVC pipes) and the position of habitat types was rotated 180o midway through each experiment. Following a 2 min acclimation period, individual settlers were released from a glass jar onto the sand in the center of the arena and allowed to

choose from among the habitat types being tested. Settlers that did not move from the center of the arena within 5 minutes of release were excluded from the experiment (n = 82 of 344 fish). Preliminary observations showed that settlers remained on their first habitat choice for >24 hours. Thus, 'preference' was recorded by a snorkeling observer as the first habitat with which a settler made contact. A test ended once the settler made contact with the outer surface of either a sponge or PVC pipe. Data were analyzed using a chi-square goodness of fit test ($P = 0.05$). Following initial trials, sensory cue manipulations were conducted using the arena to determine which sensory cues *E. lori* settlers use when choosing settlement habitat.

Data Processing Description

R version 3.2.3

BCO-DMO Data Processing Notes:

- dates reformatted to yyyy/mm/dd
- periods replaced with underscores in column names
- missing identifier replaced with nd

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Data Files

File	
habitat_preference.csv	(Comma Separated Values (.csv), 12.52 KB) MD5:6ef51f90e2ad5c56f3a7a8c6507b4a60
Primary data file for dataset ID 728444	

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Related Publications

Majoris, J. E., D'Aloia, C. C., Francis, R. K., & Buston, P. M. (2018). Differential persistence favors habitat preferences that determine the distribution of a reef fish. Behavioral Ecology, 29(2), 429–439. doi:10.1093/beheco/arx189
Results

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Parameters

Parameter	Description	Units
Year	Year that trials were completted; YYYY	unitless
Exp	Habitat preference experiment codes (SP= Sponge vs. PVC; YB = Yellow vs. Brown sponges; LS = Large vs. Small yellow sponges; MS = Multi vs. Single tube yellow sponges; and RNR = Resident occupied vs No-Resident yellow sponges).	unitless
Cues	Indicate sensory conditions (All = all cues available no habitat manipulations; Olfactory = Olfactory cues available visual cues manipulated; Visual = visual cues available olfactory cues manipulated)	unitless
Trial_n	Trial number	unitless
Settler_origin	Indicates whether E. lori settlers were collected from yellow (Y) or brown (B) tubes sponges prior to use in habitat preference experiments.	unitless
SL	Standard length of settler	millimeters
Choice_nochoice	Indicates whether settler chose a habitat (1) or exceeded the 5 min maximum time without moving from the center of the arena (0).	unitless
Habitat_choice	Indicates whether settlers chose the predicted (1) or non-predicted (0) habitat in each habitat combination (SP= Sponge (1) vs. PVC (0); YB = Yellow (1) vs. Brown (0) sponges; LS = Large (1) vs. Small (0) yellow sponges; MS = Multi (1) vs. Single (0) tube yellow sponges; and RNR = Resident occupied (1) vs No-Resident (0) yellow sponges)	unitless
Bearing	Indicates compass direction of sponge chosen by each settler	degrees
Current_direction	Indicates the current direction recorded during each trial	degrees
Current_speed	Indicates estimated current speed during each trial	centimeters per second

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Project Information

Collaborative Research: The Role of Larval Orientation Behavior in Determining Population Connectivity (Elacatinus Dispersal II)

Coverage: Belizean Barrier Reef System

Description from NSF award abstract:
Understanding how far young fish move away from their parents is a major goal of marine ecology because

this dispersal can make connections between distinct populations and thus influence population size and dynamics. Understanding the drivers of population dynamics is, in turn, essential for effective fisheries management. Marine ecologists have used two different approaches to understand how fish populations are connected: genetic methods that measure connectivity and oceanographic models that predict connectivity. There is, however, a mismatch between the predictions of oceanographic models and the observations of genetic methods. It is thought that this mismatch is caused by the behavior of the young, or larval, fish. The objective of this research is to study the orientation capabilities of larval fish in the wild throughout development and under a variety of environmental conditions to see if the gap between observations and predictions of population connectivity can be resolved. The project will have broader impacts in three key areas: integration of research and teaching by training young scientists at multiple levels; broadening participation of undergraduates from underrepresented groups; and wide dissemination of results through development of a website with information and resources in English and Spanish.

The overall objective of the research is to investigate the role of larval orientation behavior throughout ontogeny in determining population connectivity. This will be done using the neon goby, Elacatinus lori, as a model system in Belize. The choice of study system is motivated by the fact that direct genetic methods have already been used to describe the complete dispersal kernel for this species, and these observations indicate that dispersal is less extensive than predicted by a high-resolution biophysical model; E. lori can be reared in the lab from hatching to settlement providing a reliable source of larvae of all ages for proposed experiments; and a new, proven behavioral observation platform, the Drifting In Situ Chamber (DISC), allows measurements of larval orientation behavior in open water. The project has three specific objectives: to understand ontogenetic changes in larval orientation capabilities by correlating larval orientation behavior with developmental sensory anatomy; to analyze variation in the precision of larval orientation in different environmental contexts through ontogeny; and to test alternative hypotheses for the goal of larval orientation behavior, i.e., to determine where larvae are heading as they develop.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1459546

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