Porites astreoides coral settlement counts collected in July of 2017 from an in situ larval coral settlement experiment in St. John, US Virgin Islands

Website: https://www.bco-dmo.org/dataset/742565
Data Type: experimental, Other Field Results
Version: 1
Version Date: 2018-09-21

Project
» Coral Chorus: The Role of Soundscapes in Coral Reef Larval Recruitment and Biodiversity (Coral Chorus)

Contributors	Affiliation	Role
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Abstract
Brooding coral Porites astreoides colonies were collected on St. John, U.S. Virgin Islands on June 22nd, 2017 and used in an in-situ larval coral settlement experiment. Settlement counts were taken on June 28th, 2017.

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Coverage

Spatial Extent: **N**:18.31789 **E**:-64.72218 **S**:18.30962 **W**:-64.76065
Temporal Extent: 2017-07-28

Methods & Sampling

Coral collections and spawning
Eight colonies of the brooding coral Porites astreoides were collected on St. John, U.S. Virgin Islands (18.31384N, 64.76439W) on 22 June 2017. The colonies were maintained in a shaded outdoor ambient seawater-supplied aquarium. Corals spawned overnight 22-24 July and larvae were collected each morning and maintained in 0.2m filtered seawater. On 25 July, larvae from all colonies and spawning nights were pooled, and groups of 55 actively swimming larvae were selected. Groups were randomly assigned to one of 9 light or 9 dark 140ml polyethylene chambers (preconditioned with reef water for one month) filled with 0.7m filtered seawater (remove grazers, retains microbes). Each chamber contained two preconditioned settlement surfaces: a clay stilt (3.8cm diameter) and a red cable tie (10.2cm; chosen from previous findings, Mason et al. 2011). Light chambers were transparent, allowing ambient light ingress, while dark chambers were externally covered with black tape to prevent light transmission.

Settlement experiments

Following larval addition, three light and three dark settlement chambers were each affixed to a vertical pole deployed at three sites: Tektite Reef (18.30962N, 64.72218W), Cocoloba Reef (18.31528N, 64.76065W), and a sand site with no reef structure within 100m (18.31789N, 64.75059W) (Table 1). Sites differ in biophysical habitat characteristics (Table 1) known to influence soundscape properties (6). The experimental set-up included acoustic recorders (SoundTrap ST-300, Ocean Instruments NZ), recording continuously at 48 kHz, and temperature/light loggers (HOBO Pendant UA-002, Onset Corporation). The chambers and instruments were secured 0.20.5m above the seafloor in 710m water depth (see Figure 1C). Larvae were completely isolated within settlement chambers, allowing exposure to ambient sounds (polyethelene plastics have high acoustic transparency) while preventing exposure to other water-borne habitat cues (e.g., reef water chemicals).
Chambers were recovered after 62 hours and maintained in seawater tables during the 6-hour processing period in which settled corals were enumerated. Some actively swimming larvae were still present, suggesting that oxygen remained sufficient for larval survival.

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Data Files

File
settlement.csv (Comma Separated Values (.csv), 1.87 KB) MD5:bb04b0d625558604b6ae2773d095ee22 Primary data file for dataset ID 742565

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Related Publications

Kaplan, M., Mooney, T., Partan, J., & Solow, A. (2015). Coral reef species assemblages are associated with ambient soundscapes. Marine Ecology Progress Series, 533, 93–107. doi:10.3354/meps11382
Methods

Mason, B., Beard, M., & Miller, M. W. (2011). Coral larvae settle at a higher frequency on red surfaces. Coral Reefs, 30(3), 667–676. doi:10.1007/s00338-011-0739-1
Methods

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Related Datasets

IsRelatedTo

Apprill, A., Mooney, T., Lillis, A. (2018) **Soundscape monitoring acoustic data collected in July of 2017 during an in situ larval coral settlement experiment in St. John, US Virgin Islands.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2018-07-27 doi:10.1575/1912/bco-dmo.742573.1 [view at BCO-DMO]
Relationship Description: Acoustic recordings from the reefs where the settlement occurred.

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Parameters

Parameter	Description	Units
Sample_ID	Sample identifer	unitless
Site	Site name	unitless
Latitude	Site Latitude	decimal degrees
Longitude	Site longitude	decimal degrees
Cup_ID	Number of the treatment chamber	unitless
Treatment	Treatment (light or dark)	unitless
Date_examined	Date samples were examined in format m/dd/yyyy	unitless
Time_examined	Time range samples were examined in format HH:MM - HH:MM	unitless
Larvae_settled_clay	Number of larvae that settled on clay	per individual
Larvae_settled_red_ziptie	Number of larvae that settled on the red zip tie	per individual
Larvae_settled_cup	Number of larvae that settled on the cup	per individual
Swimming_in_water	Number of larvae still swimming in the water	per individual
Unsettled_on_clay	Number of larvae on clay but not fully settled	per individual
Notes	Notes	unitless

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Deployments

Coral_Chorus_St_John

Website	https://www.bco-dmo.org/deployment/748532
Platform	Virgin Islands

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Project Information

Coral Chorus: The Role of Soundscapes in Coral Reef Larval Recruitment and Biodiversity (Coral Chorus)

NSF Award Abstract:
Coral reef ecosystems host some of the highest biodiversity of life per unit area on Earth and harbor about one-quarter to one-third of all marine animals. Reef-associated animals are a major source of protein for millions of people, and reefs offer shoreline protection and provide a significant source of tourism revenue, especially in developing countries. Factors that influence supply and settlement of young (larval) fish, coral, and associated animals can have large impacts on reef ecosystem and population structure, and learning more about these can help improve understanding of how to maintain the benefits provided by coral reefs. This study will lead to a detailed, mechanistic understanding of how young larvae use natural sounds to orient toward, locate, and select preferred settlement habitat. The approach will combine detailed field measurements and experiments to isolate key soundscape variables that impact coral reef larvae.

For marine communities, such as those on coral reefs, factors influencing larval supply and settlement can have major impacts on community structure and population replenishment. There are now some indications that sound plays an important role in attracting larvae to suitable settlement habitat. There is little understanding of what soundscape habitat information is available to larvae and how differences and variability in sound can influence settlement. This project will include comprehensive experiments, environmental measurements, and modeling with the goal of understanding the role of sound in influencing larval recruitment and local biodiversity. The investigators will measure in situ settlement of larval fish and coral in relation to

different soundscapes and habitat conditions in a marine protected area using traditional larval sampling methods, moored acoustic recorders, and a suite of environmental observations. Controlled and calibrated environmental playback experiments will isolate soundscape components and determine specific and fundamental acoustic cues larvae use to orient and settle. The spatial and temporal variability of soundscape cues and components across reef habitats will be established. Finally, the project will determine the relevant ranges of sound plumes that larvae may encounter through direct measurements of the sound fields of multiple reefs.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1536782

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