Zostera marina and Halodule wrightii shoot counts from quadrats and Zostera marina seed counts from sediment cores in Back Sound, North Carolina between May and July of 2014

Website: https://www.bco-dmo.org/dataset/728465
Data Type: Other Field Results
Version:
Version Date: 2018-04-24

Project

» Collaborative Research: Habitat fragmentation effects on fish diversity at landscape scales: experimental tests of multiple mechanisms (Habitat Fragmentation)

Contributors	Affiliation	Role
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Abstract

Zostera marina and Halodule wrightii shoots were quantified using quadrats in Back Sound, North Carolina between May and July of 2014. Zostera marine seeds were quantified using sediment cores.

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Coverage

Spatial Extent: **Lat**:34.6833 **Lon**:-76.5667
Temporal Extent: 2014-05 - 2014-07

Dataset Description

These data relating to fragmentation effects on Zostera seed distribution were utilized in the following publication (Livernois et al., 2017)

Location: Back Sound, North Carolina; N 34º 41', W 76º 34'

Methods & Sampling

To quantify the average shoot density of *Z. marina* in each bed as well as the ratio of flowering to vegetative shoots, six 0.063 m2 quadrats were haphazardly placed over vegetated substrate, and all seagrass shoots present within each quadrat were removed by the roots. *Z. marina* flowering and vegetative shoots were separated and counted in the lab. Sampling occurred in May 2014, when the flowering season was determined to be at its approximate peak based on observations of flowers in the region, and when water temperatures

reached the optimal range for flowering, 20-21oC (Moore & Short, 2006).

To sample the distribution and density of seeds at specified positions within each bed, 10-cm diameter sediment cores were taken to a depth of approximately 10 cm, as *Z. marina* seeds are generally buried no deeper below the sediment surface (Morita et al., 2007). Sediment core samples were collected in July 2014, after the flowering season had ended and sufficient time had passed for all seeds to settle. In continuous beds, two transects ran from the center of the bed to the edge. The first transect direction was selected haphazardly, with the second being approximately perpendicular to the first. In each transect, one core sample was taken at the starting point, located at the approximate center of the bed; a second core sample was collected halfway between the center and the edge of the bed, the location of which differed for each bed based on its size; and a third core sample was taken at the edge of the bed.

In fragmented beds, one core sample was taken within each of two different vegetated patches near the center of the bed; within each of two vegetated patches along the edge of the bed; within each of two bare, unvegetated areas in the interior region of the bed; and in each of two bare areas along the edge of the bed (i.e., 8 cores per bed; Fig. 1C.). In both continuous and fragmented beds, two additional transects were used to sample directly outside of the bed. These transects ran perpendicular to the edge of the bed, and one core sample in each transect was collected at the following distances away from the edge of the bed: 0, 2.5, 5, 7.5, 10, and 15 meters.

Each core was wet-sieved in the field in 400-micron mesh bags to wash away sediment. Remaining coring contents were taken to the lab where they were frozen until processed, which involved individually examining them under a dissecting microscope. Any seeds, whether they were fully intact or the casing of an already germinated or dead seed, were identified and counted. *Z. marina* and *H. wrightii* shoots in each core were also counted.

Data Processing Description

BCO-DMO Data Manager Processing Notes:
* added a conventional header with dataset name, PI name, version date
* modified parameter names to conform with BCO-DMO naming conventions
* N/A values in this dataset are displayed as the missing data identifier "nd" for "no data" in the BCO-DMO system.
* original Lat_Lon column containing lat and lon degrees and decimal minutes used to create two columns (Lat,Lon) in decimal degrees.
* Comments within Lat_Lon split into a new column "Comments"

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Data Files

File
zostera_seeds.csv(Comma Separated Values (.csv), 9.89 KB) MD5:a42fbc01da10f15abfb3911c84d3f191
Primary data file for dataset ID 728465

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Related Publications

Livernois, M. C., Grabowski, J. H., Poray, A. K., Gouhier, T. C., Hughes, A. R., O'Brien, K. F., ... Fodrie, F. J. (2017). Effects of habitat fragmentation on Zostera marina seed distribution. Aquatic Botany, 142, 1–9. doi:10.1016/j.aquabot.2017.05.006
Results

Moore, K. A., & Short, F. T. (2006). Zostera: Biology, Ecology, and Management. SEAGRASSES: BIOLOGY, ECOLOGYAND CONSERVATION, 361–386. doi:10.1007/978-1-4020-2983-7_16
Methods

Morita, T., Okumura, H., Abe, M., Kurashima, A., & Maegawa, M. (2007). Density and distribution of seeds in bottom sediments in Zostera marina beds in Ago Bay, central Japan. Aquatic Botany, 87(1), 38–42. doi:10.1016/j.aquabot.2007.03.001
Methods

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Parameters

Parameter	Description	Units
Site	Code used to identify unique searass meadows. First letter, C/P, indicates whether meadow was contiguous (C) or patchy (P). Second letter, I/N, indicaates whether meadow was isolated (I) from marsh habitat (>100m), or near (N) marsh habitat. # indicates replicate number of meadow	unitless
Lat	Seagrass meadow latitude	decimal degrees
Lon	Seagrass meadow longitude	decimal degrees
Type	T = sample was taken along a transect outside the seagrass meadow. Patch = sample was taken inside the seagrass meadow. Sand = sample was taken from sandy area separating seagrass patches within the meadow.	unitless
Location	For Patch and Sand samples (see 'Type') qualitative characterization of whether sample was collected in the center of the overall meadow (Center), edge of the overall meadow (Edge) or halfway between the center and edge of the overall meadow (Mid)	unitless
Transect_Location	For T samples (see 'Type'), distance outside the seagrass meadow at which sample was taken (relative to the seagrass-sandflat boundary)	meters (m)
Halodule	Number of Halodule wrightii shoots in 0.063 m^2 quadrat	individuals
Zostera	Number of Zostera marina shoots in 0.063 m^2 quadrat	individuals
Total_seeds	Number of Zostera marina seeds in sediment core (seafloor area sampled 0.008 m^2)	individuals
Patch_size	Area of individual seagrass patches in which a sample was collected at the center of the patch	meters squared (m^2)
Comment	Comment	unitless

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Deployments

Fodrie_HabitatFragmentation

Website	https://www.bco-dmo.org/deployment/714268
Platform	Back_Sound_NC
Start Date	2014-05-01
End Date	2015-06-24
Description	Sampling from 6/10 through 6/25.

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Project Information

Collaborative Research: Habitat fragmentation effects on fish diversity at landscape scales: experimental tests of multiple mechanisms (Habitat Fragmentation)

Coverage: North Carolina

Amount and quality of habitat is thought to be of fundamental importance to maintaining coastal marine ecosystems. This research will use large-scale field experiments to help understand how and why fish populations respond to fragmentation of seagrass habitats. The question is complex because increased fragmentation in seagrass beds decreases the amount and also the configuration of the habitat (one patch splits into many, patches become further apart, the amount of edge increases, etc). Previous work by the investigators in natural seagrass meadows provided evidence that fragmentation interacts with amount of habitat to influence the community dynamics of fishes in coastal marine landscapes. Specifically, fragmentation had no effect when the habitat was large, but had a negative effect when habitat was smaller. In this study, the investigators will build artificial seagrass habitat to use in a series of manipulative field experiments at an ambitious scale. The results will provide new, more specific information about how coastal fish community dynamics are affected by changes in overall amount and fragmentation of seagrass habitat, in concert with factors such as disturbance, larval dispersal, and wave energy. The project will support two early-career investigators, inform habitat conservation strategies for coastal management, and provide training opportunities for graduate and undergraduate students. The investigators plan to target students from underrepresented groups for the research opportunities.

Building on previous research in seagrass environments, this research will conduct a series of field experiments approach at novel, yet relevant scales, to test how habitat area and fragmentation affect fish diversity and productivity. Specifically, 15 by 15-m seagrass beds will be created using artificial seagrass units (ASUs) that control for within-patch-level (~1-10 m2) factors such as shoot density and length. The investigators will employ ASUs to manipulate total habitat area and the degree of fragmentation within seagrass beds in a temperate estuary in North Carolina. In year one, response of the fishes that colonize these landscapes will be measured as abundance, biomass, community structure, as well as taxonomic and functional diversity. Targeted ASU removals will then follow to determine species-specific responses to habitat disturbance. In year two, the landscape array and sampling regime will be doubled, and half of the landscapes will be seeded with post-larval fish of low dispersal ability to test whether pre- or post-recruitment processes drive landscape-scale patterns. In year three, the role of wave exposure (a natural driver of seagrass fragmentation) in mediating fish community response to landscape configuration will be tested by deploying ASU meadows across low and high energy environments.

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1635950