

Ecosystem Services Provided by Oyster Reefs: An Experimental Assessment in Mobile Bay, AL (focus: infaunal community)

Metadata:

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Identification_Information:

Citation:

Citation_Information:

Originator:

Dauphin Island Sea Lab (DISL): Marine Ecology Lab

Publication_Date:

20080222

Title:

Ecosystem Services Provided by Oyster Reefs: An Experimental Assessment in Mobile Bay, AL (focus: infaunal community)

Geospatial_Data_Presentation_Form:

spreadsheet and report

Description:

Abstract:

The Alabama Oyster Reef Restoration Program began in 2004 to experimentally assess ecosystem benefits of oyster reef restoration in marsh creeks in Mobile Bay, AL, USA, and document the spatial scale at which such benefits could be measured. The project relied on a Before-After-Control-Impact (BACI) design in which 3 pairs of marsh creeks were monitored for 8 months prior to oyster additions, and fifteen months after oyster reef additions. Addition of oysters to one randomly selected creek of each of the three pairs resulted in densities higher than ever previously reported. We assessed whether oyster addition affected water clarity, nutrient dynamics, water-column primary production, benthic primary and secondary production, and abundance of juvenile fish and invertebrates by sampling monthly or bimonthly. While there were short-lived, small-scale increases in water clarity, there were no persistent, large changes in any response variables between experimental and control creeks. The absence of dramatic effects was likely due to a combination of factors, including inaccurate initial assumptions, between-creek variability and intense tropical

storm activity. Regardless of cause, we did not find substantial changes in water clarity and biological activity in the experimental creeks. Therefore, we do not expect large ecosystem benefits to result from oyster restoration in other marsh creeks in the Gulf of Mexico. This is not to say that restoration of oyster reefs should not be carried out, especially since our oyster reef restoration was successful and functional oyster reefs offer other benefits such as enhanced benthic-pelagic coupling and denitrification through deposition of feces onto sediments. But our findings do suggest that surrounding landscape may play a critical role if the major goal of oyster reef restoration is to augment mobile fishes and decapod crustaceans.

Purpose:

Because live oysters remove organic particle from the water column as a result of their filtration activities, oyster reefs may provide an important ecosystem service of improving water quality. This project investigates and quantifies the potential of oyster reefs to positively change water clarity, benthic primary production and secondary production, and the nursery value of embayments around Dauphin Island and Little Dauphin Island. By employing a replicated Before-After-Control-Impact (BACI) design beginning in Summer 2004, we have begun to specifically address each point in the overall hypothesis: 1.) quantifying and monitoring the abundance of water-column suspended solids, and nutrients imported into and exported out of the embayments 2.) quantifying and monitoring the abundance and productivity of phytoplankton, benthic micro- and macroalgae, and macrobenthos 3.) quantifying and monitoring species number, densities and secondary productivities of infaunal and benthic macrofaunal communities 4.) quantifying and monitoring relative abundances of juvenile and adult fish and mobile invertebrates.

Supplemental_Information:

This metadata record describes the only the "infaunal community structure" (secondary productivity) component of the larger work.

Time_Period_of_Content:

Time_Period_Information:

Range_of_Dates/Times:

Beginning_Date:

200405

Ending_Date:

200608

Currentness_Reference:

ground condition

Status:

Progress:

Complete

Maintenance_and_Update_Frequency:

None Planned

Spatial_Domain:

Bounding_Coordinates:

West_Bounding_Coordinate:

-88.11629

East_Bounding_Coordinate:

-88.08363

North_Bounding_Coordinate:

30.27601

South_Bounding_Coordinate:

30.25368

Keywords:

Theme:

Theme_Keyword_Thesaurus:

None

Theme_Keyword:

oyster

Theme_Keyword:

restoration

Theme_Keyword:

marsh creeks

Theme_Keyword:

Before-After-Control-Impact

Theme_Keyword:

BACI

Theme_Keyword:

water clarity

Theme_Keyword:

nutrient dynamics

Theme_Keyword:

water-column primary production

Theme_Keyword:

benthic primary production

Theme_Keyword:

benthic secondary production

Theme_Keyword:

juvenile fish

Theme_Keyword:

invertebrate

Theme_Keyword:

abundance

Place:

Place_Keyword_Thesaurus:

None

Place_Keyword:

Mobile Bay

Place_Keyword:

Alabama

Place_Keyword:

Gulf of Mexico

Place_Keyword:

Dauphin Island

Access_Constraints:

Permission to access these data must be given by Dr. Kenneth Heck of the Dauphin Island Sea Lab.

Use_Constraints:

Acknowledgment of the DISL's Marine Ecology Lab, National Oceanic and Atmospheric Administration (NOAA) and The Alabama Center for Estuarine Studies (ACES) would be appreciated in products developed from these data, and such acknowledgment as is standard for citation and legal practices for data source is expected by users of these data. Users should be aware that comparison with other data sets for the same area from other time periods may be inaccurate due to inconsistencies resulting from changes in mapping conventions, data collection, and computer processes over time. The distributor shall not be liable for improper or incorrect use of these data, based on the description of appropriate/inappropriate uses described in the metadata document. These data are not legal documents and are not to be used as such.

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DISL: Marine Ecology Lab

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Principal Investigator

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Postal_Code:
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Country:
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251-861-2141 ext. 2284 or 2179

Contact_Electronic_Mail_Address:
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Hours_of_Service:
8-5:00 CST

Contact_Instructions:
Please email Dr. Kenneth Heck for information regarding this data.

Data_Set_Credit:
DISL: Marine Ecology Lab

Native_Data_Set_Environment:
The data set was produced in Microsoft Excel 2003. The file name is core_data.xls and is 1258 KB.

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Data_Quality_Information:

Logical_Consistency_Report:
not applicable.

Completeness_Report:
Sampling took place from 200405 until 200608. No substantial lapses in data collection exist.

Lineage:

Process_Step:

Process_Description:
We began a study in 2004 to experimentally assess ecosystem benefits of oyster reef restoration in marsh creeks in Mobile Bay, AL, USA, and document the spatial scale at which such benefits could be measured. The project relied on a Before-After-Control-Impact (BACI) design in which 3 pairs of marsh creeks were monitored for 8 months prior to oyster additions and fifteen months after oyster reef additions. Addition of oysters to one randomly selected creek of each of the three pairs resulted in densities higher than ever previously reported. We assessed whether oyster addition affected water clarity, nutrient dynamics, water-column primary production, benthic primary and secondary production, and abundance of juvenile fish and invertebrates by sampling monthly or bimonthly for sixteen months. This metadata record was written for the data concerning benthic habitats.

Process_Date:
200608

Cloud_Cover:
Unknown

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Entity_and_Attribute_Information:

Detailed_Description:

Entity_Type:

Entity_Type_Label:
Core

Entity_Type_Definition:

Attribute table quantifying the abundance of benthic macrofaunal invertebrates for all stations within tidal creek test sites.

Entity_Type_Definition_Source:

DISL: Marine Ecology Lab

Attribute:

Attribute_Label:

Month_Year

Attribute_Definition:

Calendar month and year of the sampling event.

Attribute_Definition_Source:

DISL: Marine Ecology Lab

Attribute_Domain_Values:

Unrepresentable_Domain:

All calendar months are acceptable values. Year values can only be 2004, 2005, or 2006.

Attribute:

Attribute_Label:

Site

Attribute_Definition:

This is the unique code given to each area within a tidal creek where oyster reef restoration occurred.

Attribute_Definition_Source:

DISL: Marine Ecology Lab

Attribute_Domain_Values:

Unrepresentable_Domain:

The site names are: DIF 01 DIF 02 DIF 03 DIF 04 LDI 01 (E) LDI 02 (W)

Attribute:

Attribute_Label:

Control (C)/ Experimental (E)

Attribute_Definition:

"C" and "E" denote whether the site was a control (C) site or an experimental (E) site, where oyster restoration took place.

Attribute_Definition_Source:

DISL: Marine Ecology Lab

Attribute_Domain_Values:

Unrepresentable_Domain:

No values other than "C" or "E" are valid.

Attribute:

Attribute_Label:

Station

Attribute_Definition:

Station values refer to the test site locations in reference to the reef. Negative values refer to locations behind the reef, or away from the mouth of the marsh creek. Positive values refer to locations in front of the reef, or towards the mouth of the marsh creek.

Attribute_Definition_Source:

DISL: Marine Ecology Lab

Attribute_Domain_Values:

Range_Domain:

Range_Domain_Minimum:

-4.0m

Range_Domain_Maximum:

+2.0m

Attribute_Units_of_Measure:

meter

Attribute:

Attribute_Label:

Date

Attribute_Definition:

This is the calendar date the of the sampling event.

Attribute_Definition_Source:

DISL: Marine Ecology Lab

*Attribute_Domain_Values:**Unrepresentable_Domain:*

All calendar dates are acceptable.

*Attribute:**Attribute_Label:*

Time

Attribute_Definition:

This refers to the time of day the sampling event occurred.

Attribute_Definition_Source:

DISL: Marine Ecology Lab

*Attribute_Domain_Values:**Range_Domain:**Range_Domain_Minimum:*

1:00

Range_Domain_Maximum:

12:59

Attribute_Units_of_Measure:

hours and minutes. The abbreviations "am" (ante meridiem) and "pm" (post meridiem) are used to differentiate between times before and after noon, respectively.

*Attribute:**Attribute_Label:*

Total_indiv

Attribute_Definition:

Number of individual organisms collected during a sampling event.

Attribute_Definition_Source:

DISL: Marine Ecology Lab

*Attribute_Domain_Values:**Unrepresentable_Domain:*

Values cannot be negative.

*Attribute:**Attribute_Label:*

Av0 total indiv (hv ctrl or exp)

Avg Total Indiv (by Exp or Ctrl)

Attribute_Definition:

An average total number of individuals was calculated for each station (distance away from the reef) among similar reefs with similar experimental conditions for each sampling event.

Attribute_Definition_Source:

DISL: Marine Ecology Lab

Attribute_Domain_Values:

Unrepresentable_Domain:

Values cannot be negative.

Attribute:

Attribute_Label:

BACI TOT: Exp - Ctrl

Attribute_Definition:

This is the average number of total individuals per experimental station - the average number of total individuals per control for the same station.

Attribute_Definition_Source:

DISL: Marine Ecology Lab

Attribute_Domain_Values:

Range_Domain:

Range_Domain_Minimum:

-90

Range_Domain_Maximum:

91

Attribute:

Attribute_Label:

Avg BACI TOT

Attribute_Definition:

An average BACI total number of individuals was calculated for each station (distance away from the reef) among similar reefs with similar experimental conditions for each sampling event.

Attribute_Definition_Source:

DISL: Marine Ecology Lab

Attribute_Domain_Values:

Range_Domain:

Range_Domain_Minimum:

-58.33

Range_Domain_Maximum:

48

Attribute:

Attribute_Label:

Indiv_m2 (#/0.0044)

Attribute_Definition:

Number of individual organisms collected per meter square of area.

Attribute_Definition_Source:

DISL: Marine Ecology Lab

Attribute_Domain_Values:

Range_Domain:

Range_Domain_Minimum:

0.00

Range_Domain_Maximum:

21136.36

Attribute:

Attribute_Label:

Avg Indv/m2 (by ctrl or exp)

Attribute_Definition:

The average number of individuals found in a control environment per meter squared, or the average number of individuals found in an experimental environment per meter squared.

Attribute_Definition_Source:

DISL: Marine Ecology Lab

Attribute_Domain_Values:

Range_Domain:

Range_Domain_Minimum:

75.76

Range_Domain_Maximum:

11287.87

Attribute:

Attribute_Label:

BACI TOT/m2: Exp - Ctrl

Attribute_Definition:

This is the BACI total number of individuals per experimental station per meter squared minus the

This is the BACI total number of individuals per experimental station per meter squared minus the BACI total of individuals per control per meter squared.

Attribute_Definition_Source:

DISL: Marine Ecology Lab

Attribute_Domain_Values:

Range_Domain:

Range_Domain_Minimum:

-9318.18

Range_Domain_Maximum:

20681.82

Attribute:

Attribute_Label:

Avg BACI TOT/m2

Attribute_Definition:

An average BACI total number of individuals per meter squared was calculated for each station (distance away from the reef) among similar reefs with similar experimental conditions for each sampling event.

Attribute_Definition_Source:

DISL: Marine Ecology Lab

Attribute_Domain_Values:

Range_Domain:

Range_Domain_Minimum:

-8408.09

Range_Domain_Maximum:

20681.82

Attribute:

Attribute_Label:

Counts

Attribute_Definition:

The number of individuals collected from the following categories: Amphopod/Isopod Gastropod Bivalve Penaeid Caridean Fish Polychaete Mysid Other

Attribute_Definition_Source:

DISL: Marine Ecology Lab

Attribute_Domain_Values:

Unrepresentable_Domain:

Unrepresentable_Domain:

Values cannot be negative.

*Attribute:**Attribute_Label:*

BACI: Counts

Attribute_Definition:

This is the number of total individuals per experimental station - the number of total individuals per control for the same station in the following categories: Amphopod/Isopod Gastropod Bivalve Penaeid Caridean Fish Polychaete Mysid Other

Attribute_Definition_Source:

DISL: Marine Ecology Lab

*Attribute_Domain_Values:**Unrepresentable_Domain:*

Values cannot be negative

*Attribute:**Attribute_Label:*

Average of treatment per station per month

Attribute_Definition:

An average total number of individuals was calculated for each station (distance away from the reef) among similar reefs with similar experimental conditions for each sampling event in the following categories: Amphopod/Isopod Gastropod Bivalve Penaeid Caridean Fish Polychaete Mysid Other

Attribute_Definition_Source:

DISL: Marine Ecology Lab

*Attribute_Domain_Values:**Unrepresentable_Domain:*

Values cannot be negative

*Attribute:**Attribute_Label:*

Counts per square meter

Attribute_Definition:

Number of individual organisms collected per meter square of area in all of the following categories: Amphopod/Isopod Gastropod Bivalve Penaeid Caridean Fish Polychaete Mysid Other

Attribute_Definition_Source:

DISL: Marine Ecology Lab

Attribute_Domain_Values:

Unrepresentable_Domain:

Values cannot be negative

*Attribute:**Attribute_Label:*

BACI of counts/m²

Attribute_Definition:

This is the BACI total number of individuals per experimental station per meter squared minus the BACI total of individuals per control per meter squared in the following categories:
Amphopod/Isopod Gastropod Bivalve Penaeid Caridean Fish Polychaete Mysid Other

Attribute_Definition_Source:

DISL: Marine Ecology Lab

*Attribute_Domain_Values:**Unrepresentable_Domain:*

All values are measured to the thousandths place.

*Attribute:**Attribute_Label:*

Average of treatment/m² per station per month

Attribute_Definition:

An average total number of individuals per meter squared was calculated for each station (distance away from the reef) among similar reefs with similar experimental conditions for each sampling event in the following categories: Amphopod/Isopod Gastropod Bivalve Penaeid Caridean Fish Polychaete Mysid Other

Attribute_Definition_Source:

DISL: Marine Ecology Lab

*Attribute_Domain_Values:**Unrepresentable_Domain:*

Values cannot be negative

*Attribute:**Attribute_Label:*

Total_drywt

Attribute_Definition:

This is the mass of a sample when dried.

Attribute_Definition_Source:

DISL: Marine Ecology Lab

Attribute_Domain_Values:

Unrepresentable_Domain:

Values cannot be negative. Dry weights were taken for each of the following categories: Amphopod/Isopod Gastropod Bivalve Penaeid Caridean Fish Polychaete Mysid Other, and then added together for a total sample weight.

*Attribute:**Attribute_Label:*

drywt_m2

Attribute_Definition:

This is the calculated dry weight of a sample per square meter.

Attribute_Definition_Source:

DISL: Marine Ecology Lab

*Attribute_Domain_Values:**Unrepresentable_Domain:*

Values cannot be negative.

*Attribute:**Attribute_Label:*

Total_AFDW

Attribute_Definition:

These values are the ash-free dry weight of the samples. A Muffle furnace was used to burn off organics, and the remaining material was weighed

Attribute_Definition_Source:

DISL: Marine Ecology Lab

*Attribute_Domain_Values:**Unrepresentable_Domain:*

Values cannot be negative. Ash-free dry weights were taken for each of the following categories: Amphopod/Isopod Gastropod Bivalve Penaeid Caridean Fish Polychaete Mysid Other, and then added together for a total sample weight.

*Attribute:**Attribute_Label:*

AFDW_m2

Attribute_Definition:

This represents the measured ash-free dry weight per square meter.

Attribute_Definition_Source:

DISL: Marine Ecology Lab

Attribute_Domain_Values:

Unrepresentable_Domain:

Values cannot be negative.

*Attribute:**Attribute_Label:*

Average AFDW/m²

Attribute_Definition:

An average ash-free dry weight per square meter was calculated for each station (distance away from the reef) among similar reefs with similar experimental conditions for each sampling event.

Attribute_Definition_Source:

DISL: Marine Ecology Lab

*Attribute_Domain_Values:**Unrepresentable_Domain:*

Values cannot be negative, and should be represent a median value between the AFDW calculated for samples taken at equal distances from the reef.

*Attribute:**Attribute_Label:*

AFDW/m² BACI: E - C

Attribute_Definition:

This is the ash-free dry weight per square meter at an experimental station minus the ash-free dry weight per square meter at a control.

Attribute_Definition_Source:

DISL: Marine Ecology Lab

*Attribute_Domain_Values:**Unrepresentable_Domain:*

Values can be both negative and positive.

*Attribute:**Attribute_Label:*

Avg BACI AFDW/m²

Attribute_Definition:

An average BACI ash-free dry weight per square meter was calculated for each station (distance away from the reef) among similar reefs with similar experimental conditions for each sampling event.

Attribute_Definition_Source:

DISL: Marine Ecology Lab

Attribute_Domain_Values:

Unrepresentable_Domain:

Values can be both positive and negative.

*Attribute:**Attribute_Label:*

Poly_AFDWm2

Attribute_Definition:

These values are for the ash-free dry weight of polychaetes per square meter.

Attribute_Definition_Source:

DISL: Marine Ecology Lab

*Attribute_Domain_Values:**Unrepresentable_Domain:*

Values cannot be negative.

*Attribute:**Attribute_Label:*

BACI_POLY_AFDWm2

Attribute_Definition:

A BACI ash-free dry weight per square meter for all polychaetes collected was calculated for each station (distance away from the reef) among similar reefs with similar experimental conditions for each sampling event.

Attribute_Definition_Source:

DISL: Marine Ecology Lab

*Attribute_Domain_Values:**Unrepresentable_Domain:*

Values can be positive or negative.

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Dr. Kenneth Heck

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DISL: Marine Ecology Lab

DISL: MARINE ECOLOGY LAB

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36528

Country:
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Contact_Voice_Telephone:
251-861-2141 ext. 2284 or 2179

Contact_Electronic_Mail_Address:
kheck@disl.org

Hours_of_Service:
8-5:00 CST

Contact_Instructions:
Please email Dr. Kenneth Heck for information regarding this data.

Resource_Description:
Alabama Oyster Reef Restoration Project (core samples of infaunal community)

Distribution_Liability:
The Dauphin Island Sea Lab's Marine Ecology Lab makes no warranty regarding these data, expressed or implied, nor does the fact of distribution constitute such a warranty. The Marine Ecology Lab cannot assume liability for any damages caused by any errors or omissions in these data, nor as a result of the failure of these data to function on a particular system.

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Metadata_Reference_Information:

Metadata_Date:
20090104

MARINE ECOLOGY LAB

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Metadata_Standard_Name:

FGDC Content Standard for Digital Geospatial Metadata

Metadata_Standard_Version:

FGDC-STD-001-1998

Metadata_Access_Constraints:

none

Metadata_Use_Constraints:

none

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