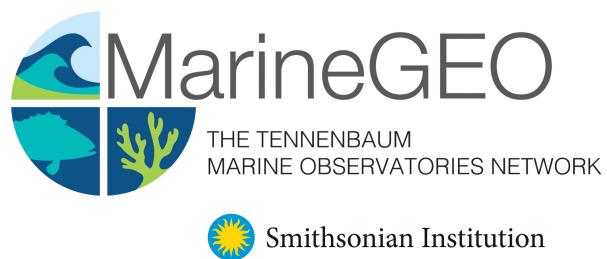


Oyster Reef Habitat Survey Design



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Introduction

In this document, we provide MarineGEO's standard survey design for sampling oyster reef habitat including key measurements on reef attributes (reef area and height), reef composition, oyster density and size, rugosity, and associated biodiversity. Additionally, we provide best practices for site selection, layout, workflow, and data submission.

The overall design and replication adhere as closely as possible to other oyster reef monitoring guidelines and in particular, much of this protocol was developed using the Oyster Habitat Restoration Monitoring and Assessment Handbook (2014), complied by NOAA, The Nature Conservancy, and others. Although this handbook is designed for restoration monitoring, it adopts well to naturally occurring reefs. Our goal is to provide a standardized sampling design that can be used in different regions and for restored or natural reefs, while still being comparative in both space and time.

Protocols

Core protocols below are required for MarineGEO partners:

- Water quality (temperature, salinity, turbidity)
- Oyster reef area and height
- Oyster reef composition
- Oyster density and size frequency
- Oyster reef associated fauna
- Oyster reef rugosity

Requirements vary depending on individual protocols

Workflow

Preparation:

1. Identify and become familiar with the required modules listed above.
2. Download copies of protocols, field datasheets, and data entry templates.
3. Contact marinegeo@si.edu to schedule a brief conference to discuss your project and address any questions before proceeding to the next steps.
4. Acquire all necessary permits and permissions at your planned sites.
5. Review the necessary safety requirements from your institution. MarineGEO is not responsible for any loss or injury incurred during sampling.

Site Selection:

1. Identify 3 oyster reefs (separate locations) to sample on a permanent basis. Sites should be: a) typical of your region, b) large enough to deploy several 30 m transect tapes, c) reasonably accessible, and d) generally persistent.
2. Contact marinegeo@si.edu to verify your sites with our team and to receive permanent site codes to be used when submitting data.

*For Restored Oyster Reefs

Restored oyster reefs make up a large majority of habitat because of the large decline of native populations and the ultimate goal of restoration is to enhance the population and the ecosystem services they provide.

It is therefore important to not only build a restorative habitat but to follow that habitat through time to monitor its success or failure as well as lessons learned. If a restored reef is to be monitored with the following protocols, it is imperative to know as much of the history of that reef as possible. Though there is no associated data sheet, please provide marinegeo@si.edu with a thorough synopsis of restoration efforts including but not limited to:

- If previous natural reef was present at the location
- When did the restoration occur and by whom
- What methods were used in the restoration (oyster bags, etc.)
- What were the goals of the restoration effort
- What monitoring was conducted after restoration was initiated
- Are there any natural reefs in the surrounding area and have data been collected on these

Fieldwork:

1. Approximately 1.5 – 2 months prior to sampling, deploy preconstructed bioboxes ($n = 3$) at each of the reefs that are planned to be sampled.
2. For fieldwork, arrive at the reef during low tide conditions. Because low tides are short-lived events, it is expected that only 1 reef be sampled per day.
3. Measure environmental conditions.
4. Measure the reef area using the Oyster Reef Area and Height protocol.
5. Measure the reef height using the Oyster Reef Area and Height protocol.
6. Lay out 3 30 m transect lines along the crest or approximate center of the reef and one to the left and one to the right at least 1.5 m away from the center line and in areas that are characteristic of the reef.
7. Along each transect conduct the following:
 - a. Use the Oyster Reef Composition protocol to survey the composition of the reef at predetermined random spots ($n = 5$ per transect) along the transect.
 - b. At one of those spots, use the Oyster Density and Size Frequency protocol to excavate a known area of oysters to count the density and measure the size of oysters as well as other invertebrates encountered.
8. Collect and process each bio-box according to the Oyster Reef Associated Fauna protocol.
9. Return all samples to the lab for post-processing.

Data Submission

1. Scan the completed field data sheets and save both paper and electronic versions locally. We do not require you to submit the scanned forms.
2. Enter data into the provided data entry template. Each template is an Excel spreadsheet. Please provide as much protocol and sample metadata as possible, such as the protocol version and contact information. Use the “notes” columns to provide additional information or context if a relevant column doesn’t already exist, rather than renaming or creating columns.
3. Use our online submission portal to upload the Excel Spreadsheet: <https://marinegeo.github.io/data-submission>
4. Contact us if you have any questions: marinegeo@si.edu