



Standard Operating Procedure

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| Revision History | | |
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| Version No. | Effective Date | Description |
| 1.0 | 01/01/2024 | Original composition by M. Kachmar |
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Procedure Owners:

Date:

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1 Purpose

The purpose of this SOP is to provide concise guidance and methodology on how to measure oyster bed height.

2 Scope

This SOP is pertaining to the EPA Long Island Sound Study funded Oyster Health project where oyster bed height will be used to characterize vertical relief on each oyster bed as part of biannual population surveys.

3 Definitions/Acronyms

4 Safety Precautions

All survey team members will wear appropriate clothing dependent on weather conditions including but not limited to waders, rubber boots or protective footwear, gloves, hats, sunglasses, long sleeve shirts, and pants. Team members will wash hands thoroughly after each sampling day. A first aid kit will be present for any injury. Extra water will be provided to avoid dehydration or heat stroke. Team members will take regular breaks when needed.

Exercise weather-appropriate field safety measures by monitoring conditions before and during the trip. Do not perform fieldwork during dangerous conditions (e.g. lightning, extreme winds, extreme floods). Do not visit field sites alone (use buddy system). Inform PIs of dates and times of fieldwork. Confirm safe return to the lab. At intertidal sites, perform procedures during low tide. At subtidal sites, divers are to follow NOAA diving regulations according to the instructions of the lab diving coordinator (barry.smith@noaa.gov).

5 Supplies/Materials

1. Line with level attached
2. Meter stick
3. PVC stick with line level attached
4. Waterproof datasheets
5. Mechanical pencils
6. Digital datasheets (made available offline on the field tablet)

6 Equipment

1. Field tablet

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7 Quality Control

All team members will be trained to complete all field tasks, including training on data entry requirements for each specific task. To ensure completeness, [field notebooks](#) will include a checklist of all data that needs to be recorded during each visit. All datasheets will be screenshotted as back up in the event data is lost before connecting to the network.

8 Procedures

1. Bed height protocols are the same for both subtidal and intertidal oyster beds.
2. Two people are needed to measure bed height.
 - a. One person should stand or swim in the middle of the crest of the oyster bed at the highest point identified and stay in this location holding one end of the line against the top of the oysters (Figures 1 & 2).
 - b. The second person walks or swims with the other end of the line, a meter stick, and line level (Figure 2) until they reach the edge of the bed just to the point where oysters are sparsely present (~25% shell cover).
3. The line level should be with the person at the edge of the oyster bed so that they can be sure the height measured is level with the crest of the oyster bed.
4. The height (in cm) from the seafloor to the level line represents the oyster bed height relative to the surrounding soft bottom sediment (vertical relief of the oyster bed) (Figure 2).
 - a. Divers may experience poor visibility while underwater so the line level is attached to a PVC stick with tick marks every 5 cm to assist in achieving an accurate height measurement (Figure 1). Divers will have the ability to move the line up and down the PVC stick.
5. Walk around the bed and take multiple height measurements from each side of the oyster bed (North, South, East, and West). A minimum of 3 measurements are necessary for statistical analysis.
6. If the bed is divided into more than one section, measure bed height on multiple sections and note which section the measurement was taken from. A minimum of 3 measurements should be taken for each section.
7. Values should be recorded in the appropriate datasheet based on site. Example data sheet "[characteristics](#)". Divers will record on a PVC sleeve with waterproof paper.

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Figure 1: Demonstration of what the level line looks like that will be used to measure the bed height. Photo on the left shows a close up of the level generally. Photo on the right is showing the level attached to a weighted and pre-measured PVC pole for divers.

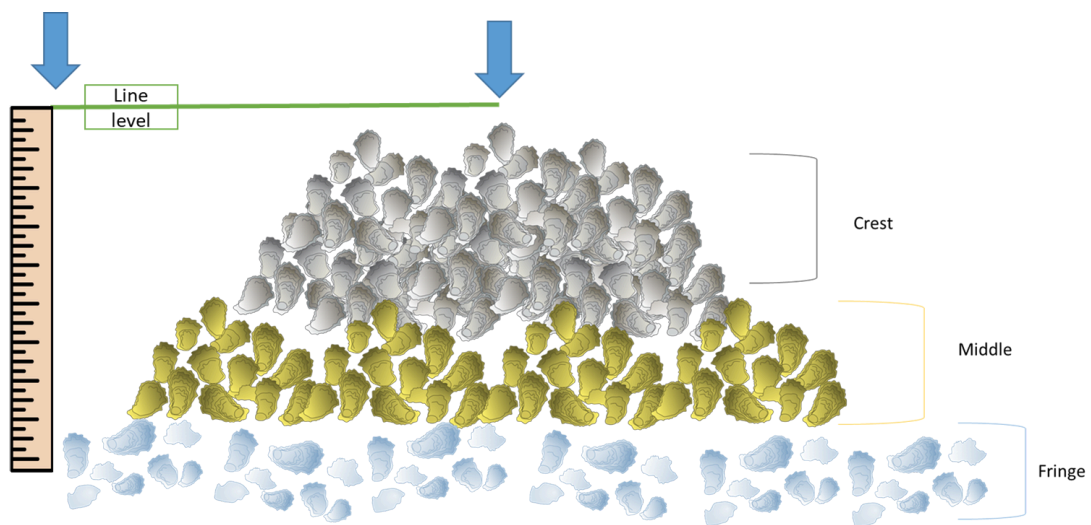


Figure 2: Example of how to measure the reef height. Blue arrows are where two individuals need to stand to properly straighten the measure line (one at the top of the crest, and one holding the meter stick). The location on the meter stick where the level line is balanced is the height of the reef.



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9 References

Janiak, D., 2021. MarineGEO Oyster Reef Habitat Monitoring Protocol. Tennenbaum Marine Observatories Network, MarineGEO, Smithsonian Institution.

10 Appendices

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