

Massachusetts *Marine Fisheries* Standard Operating Procedure

Monitoring eelgrass (*Zostera marina*) in a reference bed

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Point of Contact:

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I. OBJECTIVE:

Monitoring eelgrass at reference beds for comparison to transplanted sites

II. GEAR LIST:

(Per 2-person dive team)

Dive gear

Safety gear, dive float

Field notebook

Underwater digital camera and drop camera, charged

2 x 0.25 m² quadrat

Meter stick

50m transect tape

2 x screw anchors

Rebar

Surface buoy and drop weight

Clip board and data sheets

HOBO, launched

Zip ties

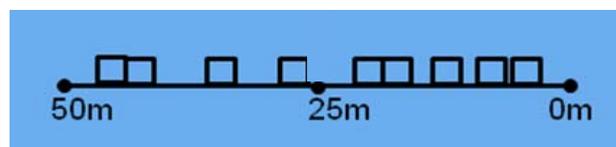
III. METHODS:

A. Site Selection

The reference site should be located within a continuous, healthy and natural eelgrass bed. This site should not be one used for harvesting or transplanting efforts. An approximate site location can first be identified through aerial image analysis and then ground-truthed with drop camera work and a reconnaissance dive, during which the divers determine the best location and orientation for the transect based on site bathymetry, substrate composition and presence of algae, rocks or other obstacles.

B. Site Layout

When an appropriate site is selected, divers lay one 50m transect across the site and install a permanent screw anchor at each end. Marker buoys are placed next to the screw anchors so that GPS coordinates can be recorded for each point. A HOBO monitor is affixed with a ziptie in a south facing direction to one of the screw anchors. Twelve meter markings between 0 and 50 are selected using a random numbers generator. These locations correspond to the meter markings that will be sampled during each monitoring session.



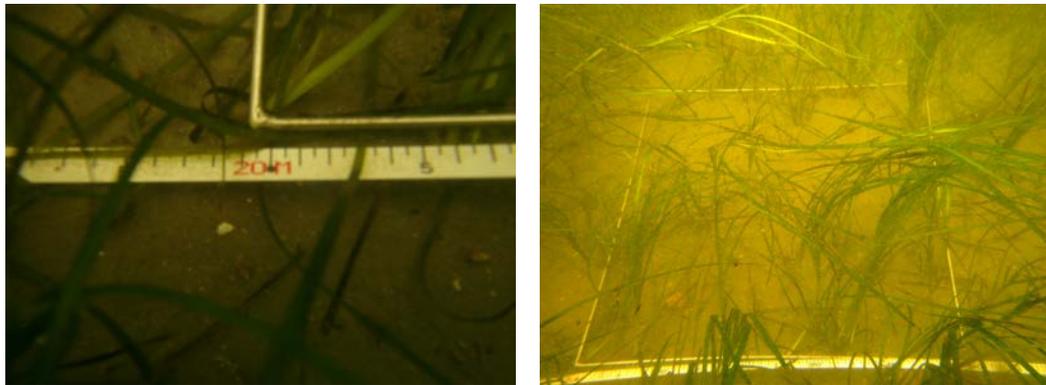
C. Monitoring

Divers drop a sash weighted buoy at one of the end points, descend along the buoy line and search for the end-point screw anchor. Divers affix the end of the transect tape to the anchor and swim toward the other screw anchor with the tape reel, based on the bearings recorded in the field notebook.

Replace the HOBO temperature monitor with a new launched HOBO at the end of the dive.

▪ **Diver 1** – Takes Pictures at each Quadrat

Start at the 0m mark on the tape measure (staying on the opposite side of the tape to avoid stirring up sediment), and swim the transect line until you come across the first designated sampling quadrat listed on the data sheet. Place the 0.25m² quadrat on correct meter marking. If any plants have been folded over when placing the quadrat, gently pull them inside or outside of the sampling area depending on where they are rooted. Remove any unattached algae or large mobile animals but make sure to note their presence. Take a close-up picture of the transect tape clearly showing the meter marking. Take a picture of the entire quadrat aerially while hovering a few feet above it. Be sure to fit the transect tape and the entire quadrat in the picture (see example below).



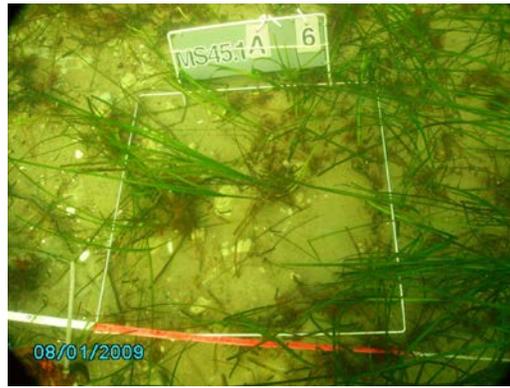
Diver 1 now takes the second quadrat and goes to next location so Diver 2 can work on the biological sampling at quadrat 1. At the next marked spot Diver 1 takes the pictures described above. When Diver 2 catches up, Diver 1 takes their quadrat and goes to next location, leaving quadrat 2 set up (“leap-frog” style).

▪ **Diver 2** – Collecting Data

Diver 2 collects biological data within each quadrat and records it using the data sheet. This data includes percent plant cover, density (shoot count), canopy height (cm), ID of algae or invasives, grazing evidence, and reproductive shoot count.

- Percent cover:

Record the percent coverage of eelgrass when viewed aerially in the water. To quantify this, imagine that all the blades of grass have been pushed to the seafloor and estimate how much of the quadrat they would cover. See examples below.

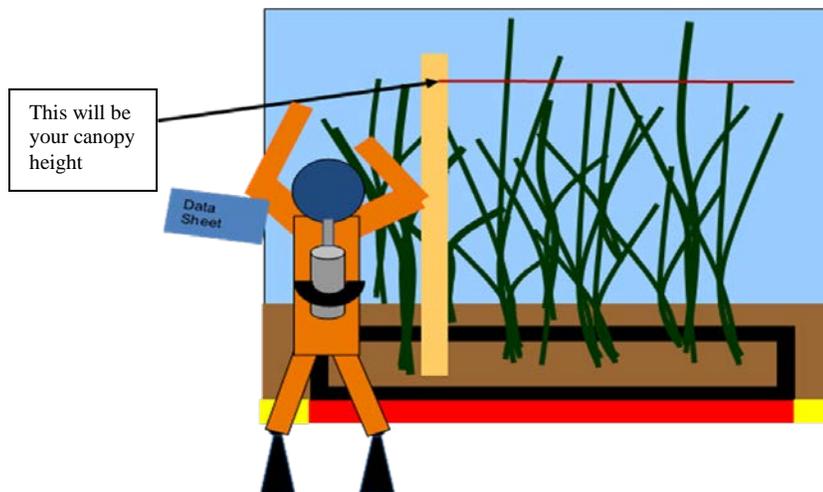


Percent cover approx 20%



Percent cover approx 85%

- **Canopy height:**
Place the meter stick vertically within the quadrat and use your arms to fan the grass upward. Record the height (cm) that describes 80% of the plants (i.e. ignore the tallest 20%). In July, plants are likely to be >1m in height so you may need to slide the meter stick up.



- **Density/Shoot count:**
Count the number of individual shoots rooted within the 0.25m² quadrat.
- **Reproductive shoot count:**
Count the number of individual reproductive shoots within the quadrat, mostly just in July.
- **Evidence of grazers:** record anything notable including bite marks from amphipods or brant geese in the area.

Diver 2 also records the general sediment type along the transect by picking up sediment and characterizing it as mud, fine sand, sand, coarse sand, shell, gravel, or rock.

▪ **Topside person:**

- Set up data sheet before the dive with meter markings
- Record data for dive log
- Continually check for bubbles and keep your eye on the diver's position
- Prep mesh bags for divers, help divers with their gear
- Set up and break down the dive ladder and dive flag
- Keep an eye out for other boats in the area
- Throw current line to divers when they surface

D. Extent of Bed

Once per year (preferably in July), use the drop camera to measure the edge of the bed surrounding the reference site, in at least 2 directions (E/W, and N/S). Mark the edge on the GPS and download coordinates in the office.

IV. TROUBLESHOOTING NOTES:

For HOBO data, use only the first 2 weeks for light analyses due to fouling issues of the sensor. Temperature data logged from the entire sampling period can be used.

V. DATA MANAGEMENT:

Download GPS coordinates and photos to file as soon as possible in the office. Double check that notes have been recorded accurately in the field notebook.

Monitoring data are entered and quality-control checked in the ACCESS DATABASE titled *Hub3 Monitoring Data* stored here <W:\Habitat Project\Habitat Research\Seagrass\HUB3 Eelgrass restoration\Monitoring data>