MarineGEO Seagrass Core Biomass Protocol

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Introduction

This protocol provides data on above- and belowground seagrass biomass, composition, and shoot density from a standard core. Additional copies of this protocol, field datasheets, and data entry templates can be found at https://doi.org/10.25573/serc.14925114.v1.

Measured Parameters

This assay quantifies seagrass biomass, measured as:

- Aboveground macrophyte biomass (mg)
- Belowground macrophyte biomass (mg)
- Shoot density (number of shoots)

Requirements

Personnel: 2 people

Estimated Total Time Per Location ($n = 3$ transects):

Preparation: 1 person x 1 day
Field work: 2 people x 1 day
Post processing: 1 person x 3-5 days
Data processing: 1 person x 1 day

*Estimated times will vary by site and conditions

Replication: Three (3) core samples taken along three (3) transects (total $n = 9$ per location)

Materials:

Survey Design:

- ☐ 1 50-m metric transect tape
- ☐ Hand-held GPS unit
- ☐ 2 PVC marker poles (diameter and length as needed)

Fieldwork:

- ☐ 9 draw-string mesh bags (roughly 1 mm mesh size, approximately 25cm x 35cm or sized as needed) (example)
- ☐ 9 plastic bags (large enough to hold mesh bags) (example)
- ☐ Sediment corer (round; 15cm diameter-by-20cm length)
- ☐ Large (2-lb) hammer or mallet (optional, recommended if diving)
- ☐ 1 cooler with ice (optional)

Post-Processing:

- ☐ 20+ pre-weighed foil tins (example)
- ☐ Sorting tray
- ☐ Pen/pencil
- ☐ Permanent marker
- ☐ Ruler (mm)

☐ Drying oven

Methods

Fully review this and any additional protocols necessary for the sampling excursion. Address any questions or concerns to maringeo-protocols@si.edu before beginning this protocol.

Preparation:

1. Review the MarineGEO Seagrass Habitats Survey Design for site selection and setup. This protocol assumes $n = 3$ cores taken every 12m along a 50-m transect, replicated along 3 separate transects per location.
2. Place an internal label written on waterproof paper with the site, method, transect, and replicate number inside each of 9 plastic bags (Fig. 1).
3. Label the outside of the bags with the same information using a permanent marker.
4. Fill a cooler with ice immediately before departing for the field.

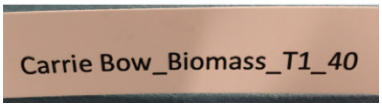

Figure 1: Example label with site (Carrie Bow), method (biomass), transect (1), and replicate (40 m).

Fieldwork:

1. At each point along the transect where the sample is to be collected, haphazardly toss the PVC core tube ~1 m to any side of the transect to obtain a random representative patch of bottom. Be sure NOT to sample within the quadrat used for quantifying percent cover, as this may affect surveys in subsequent years.
2. Place the sediment corer over the bottom. Guide the seagrass through the corer opening to ensure that no seagrass blades are severed in step 3.
3. Push or hammer the corer into the sediment to ~10-15 cm depth.
4. Gently pry the corer up and away from the benthos. To prevent the sediment from falling out of the core, work your hand under the corer and use it to support the sediment within the corer as you lift up.
5. Alternatively, if the seagrass will not fit in the core tube or if the core would obtain fewer than three (3) shoots, select a single shoot and remove it from the sediment so that the leaves, sheath/stem, and ~7-cm of horizontal rhizome with roots are taken intact.
6. Deposit the seagrass sample into the mesh bag. Close the opening, and gently agitate the sample in the water to remove loose sediment.
7. Place the mesh bag with the seagrass in the corresponding labeled plastic bag, and store in a cool, wet environment for transport to lab.
8. Repeat steps 1-7 at the at the remaining 2 sampling locations along the transect.
9. Repeat steps 1-8 for the remaining two transects.
10. Transport samples back to the lab for processing.

Post-Processing:
Samples are best processed immediately (within 24 hours) upon returning from the field. Samples can be stored for longer if frozen, but this risks damaging the organisms and making them difficult to identify, and so is discouraged.

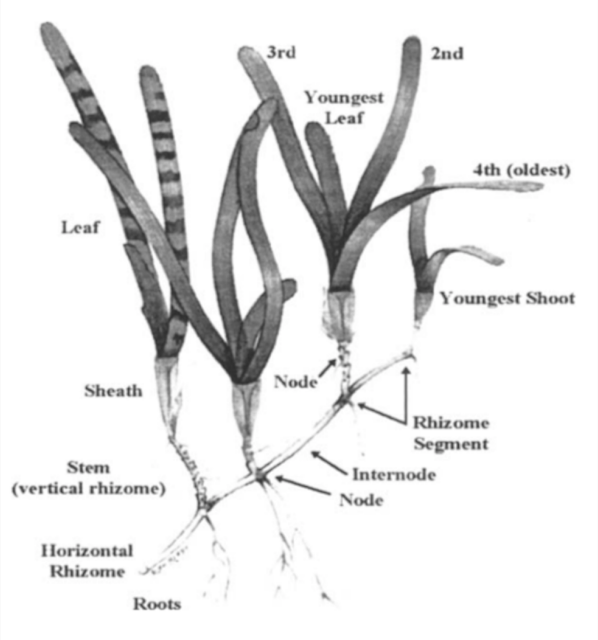

Figure 2: Morphology of seagrasses (*Cymodocea serulata* pictured). From: Short, F. T., & Coles, R. G. (Eds.). (2001). Global seagrass research methods (Vol. 33). Elsevier.

1. Print lab data sheets.
2. Weigh foil tins and record the mass of the tin directly on the foil using a pen. Tins can be either pre-made, or constructed by folding an aluminum foil square over on itself and sealing the sides.
3. Open a plastic bag and record the metadata from the internal label on the lab data sheet.
4. Gently transfer the contents of the mesh bag within the plastic bag into a shallow sorting tray with water.
5. Sort all seagrasses and macroalgae by species.
6. Separate seagrasses into above- and belowground components by gently pinching at the meristem (the intersection of the shoots and rhizomes) until they separate (Fig. 2).
7. For each seagrass species, select a pre-weighed tin and label with the label information (replicate number, date, location), species name (to lowest taxonomic group), and contents (above- or belowground material). Place the macrophytes into the corresponding tins. For each non-seagrass macrophyte species (e.g., unrooted macroalga), place entire individuals into labeled tins. Be careful that no animals are transferred with the macrophytes. This may require picking animals one-by-one out of more complex substrates.
8. If shoot density could not be obtained in the field (see: Seagrass Density protocol) additionally count the total number of shoots of each species in each sample.
9. For each taxon sorted above: record the sample data, species name, the empty tin weight, and the number of shoots on the lab data sheet.
10. Repeat steps 3-9 for all samples.
11. Place tins containing macrophytes into a drying oven. Dry at 60°C to constant weight (usually 1-3 days, depending on the volume of material).
12. Once dried, remove all tins from the oven and weigh to nearest mg. Record this weight (including tin weight) on the lab data sheet.

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. 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-protocols@si.edu