

Seagrass Habitats: Survey Design

v 0.1.0



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Introduction

Seagrasses are among the most ubiquitous coastal habitats in the world, and the communities they support provide a range of valuable ecosystem services. They are also among the most threatened, so understanding their structure and function—and how they are changing in the face of local and global stressors—is key to understanding their future.

In this document, we provide MarineGEO’s standard survey design for sampling seagrass habitats, including key measurements of the plants, associated fauna, and other properties of the ecosystem. Additionally, we provide define best practices for site selection, layout, and workflow.

The overall design and replication adheres as closely as possible to other seagrass monitoring programs, such as [SeagrassNET](#) and [Seagrass Watch](#). Our goal is to provide a standardized sampling design and measurements of the key aspects of seagrass habitats that can be compared globally and rigorously.

Additional copies of this document, protocols, field datasheets, data entry templates, instructional videos, literature, and more can be found on the MarineGEO protocol website: <https://marinegeo.github.io>.

Modules

Note: For the latest versions of protocols mentioned below, see: <https://marinegeo.github.io/>

Core (required)

- Environmental parameters
- Percent cover and composition: [Quadrats](#)
- Shoot density: [Point counts](#)
- Epiphytes and disease: [Shoot collections](#)
- Consumption: [Squidpops](#)

Recommended

- Large mobile fauna: [beach seine](#) or visual census
 - [Sediment organic matter](#)
 - Above- and belowground biomass and infauna: [Biomass cores](#)
 - Small mobile fauna: [Mesh bags](#)
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Workflow

Preparation:

1. Identify the required and any recommended modules above that you wish to conduct at your site
2. Download copies of the protocols, field data sheets, and data entry templates
3. Familiarize yourself with the methods (including data preparation and submission) of each protocol, and consult instructional videos at <https://marinegeo.github.io/> (if available)
4. Contact marinegeo@si.edu to schedule a brief conference to discuss your project and address any questions before proceeding to the field

Site Selection:

1. Identify one or more seagrass beds to sample. Beds should be:
 - a. typical of your region;
 - b. large enough to deploy 3 50-m transects;
 - c. reasonably accessible;
 - d. generally persistent (so that they can be visited from year-to-year)
2. Contact marinegeo@si.edu (ideally before field sampling) to verify your sites with our team and to receive permanent standard MarineGEO site codes

Fieldwork: Day 1

1. At the site, begin by recording GPS coordinates. Take photos of the surrounding landscape, as well as some underwater photos of the seagrass habitat. Also record field notes on the general layout and condition of the habitat, conspicuous features or organisms, etc.
2. Lay out and mark the positions of three 50-m fixed transects. They should be placed parallel to shore and representing the shallow (inshore), middle (interior), and deep (offshore) parts of the bed (Fig. 1)
 - a. If the bed is intertidal or relatively shallow, select transects that are increasingly far from shore and separated by the largest distance that is logistically feasible
 - b. If the bed extends into water too deep to work in, deploy

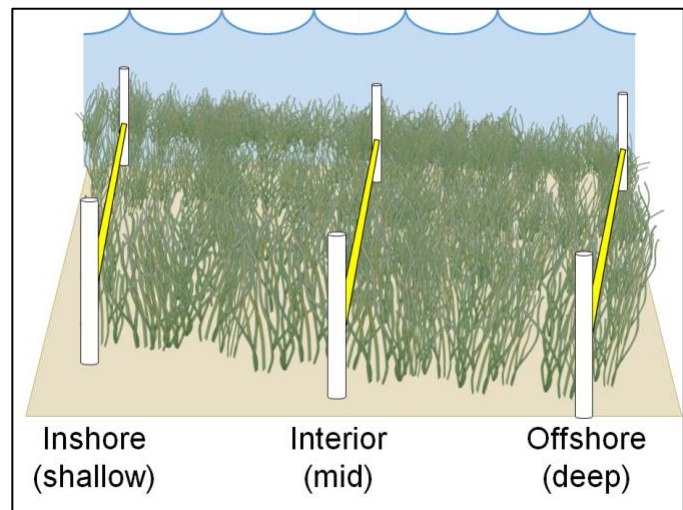


Figure 1. Position of three 50-m transects within a bed.

- the transects at the maximum distance from shore that is logistically feasible.
- c. Ensure that the transects are reasonably independent (separated by a minimum of 5-10 m). If it's not possible to arrange 3 transects within the bed so that they are not overlapping or they are too close, contact MarineGEO for further guidance
 - d. If in subsequent years the margins of the bed change such that the transects are no longer in seagrass, conduct as many of the surveys as possible at the former position, then move the transect to a new position so that as much of the transect is in seagrass as possible
3. Measure environmental conditions
 4. *RECOMMENDED* – conduct beach seines/visual census to survey large mobile fauna
 5. Deploy consumption assay ('Squidpops') every 2-m along each transect ($n = 25$ per transect, 75 total) (Fig. 2)

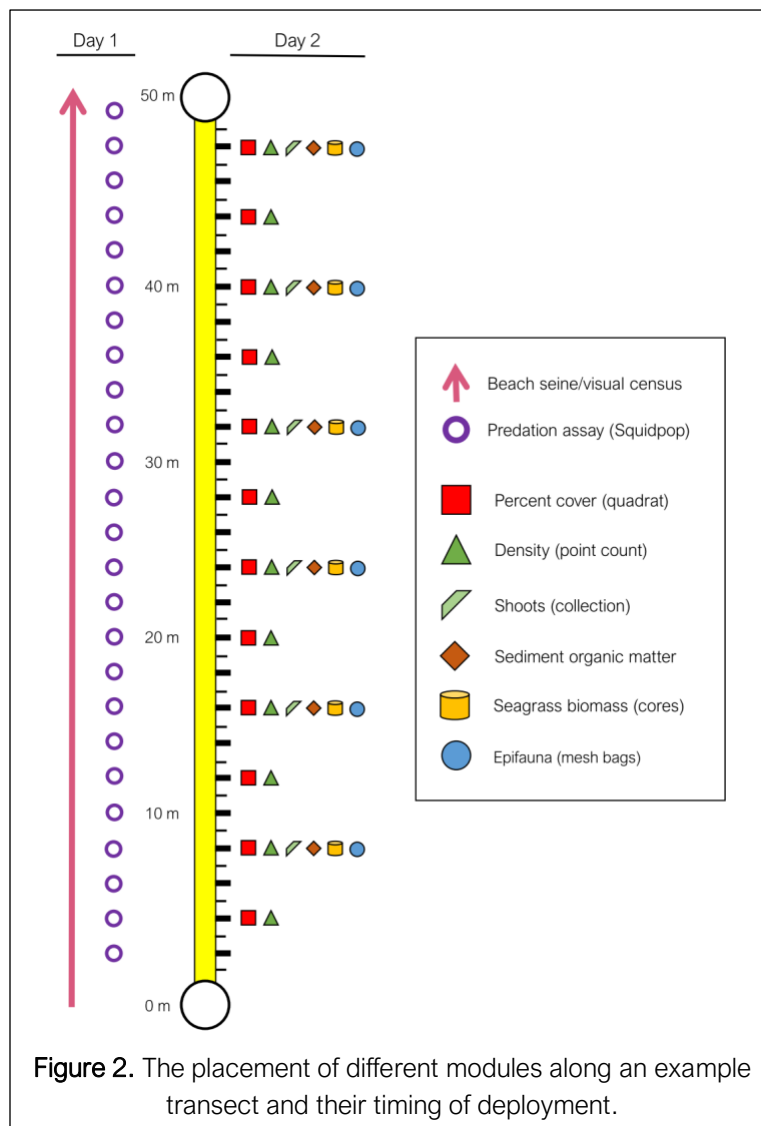
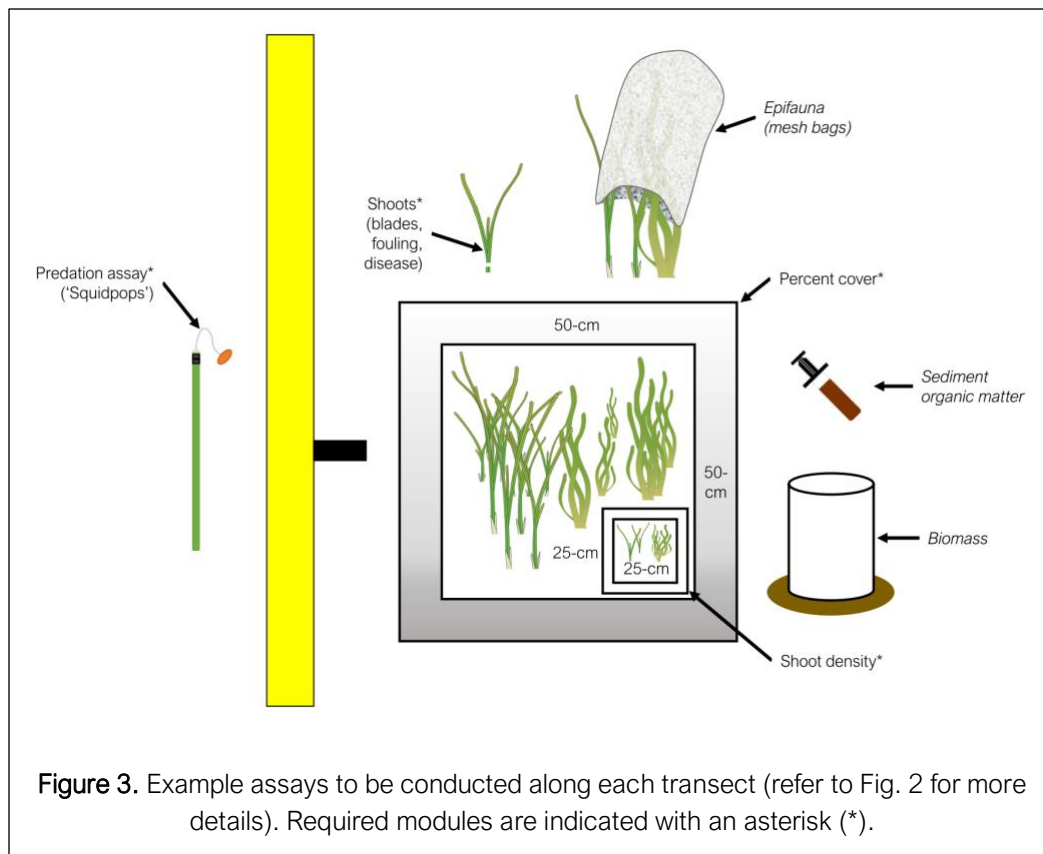


Figure 2. The placement of different modules along an example transect and their timing of deployment.

Fieldwork: Day 2

1. Return to the site
2. Conduct 24-h check of consumption assay
3. Along each transect, conduct the following (Fig 2):
 - a. Use quadrat survey (every 4 m, $n = 12$ per transect) to measure percent cover and shoot density
 - b. Collect shoots (every 8 m, $n = 6$ per transect), and measure blade characteristics, fouling load, disease in the lab
 - c. *RECOMMENDED* – Sample sediment organic matter (every 8 m, $n = 6$ per transect): measures organic carbon in sediments in the lab
 - d. *RECOMMENDED* – Collect sediment core (every 8 m, $n = 6$ per transect): measures above- and belowground biomass of seagrasses, infaunal community structure in the lab
 - e. *RECOMMENDED* – Sample small mobile fauna (every 8 m, $n = 6$ per transect): measures epifaunal community structure in the lab
4. Assays should be conducted adjacent to the transect so they are not overlapping (Fig. 3)
5. Return samples to the lab for post-processing



Post-processing:

Activities from Day 1 require no post-processing.

1. We suggest processing the samples from Day 2 by the following times:

- a. Shoot collections = within 24-h;
- b. *RECOMMENDED* – sediment organic matter = within 1-3 days
- c. *RECOMMENDED* – biomass cores:
 - i. Macrophytes = within 24-h;
 - ii. Dry weight = within 1-3 days;
 - iii. Infauna = at leisure
- d. *RECOMMENDED* – small mobile fauna:
 - i. Macrophytes = within 24-h;
 - ii. Dry weight = within 1-3 days;
 - iii. Fauna = at leisure

Data Submission

1. Site observations and photographs should be labeled and shared with MarineGEO. Site image files should be named to include the MarineGEO site code, specific location, and date (yyyymmdd) separated by underscores, e.g., “BEL-CBC_Site1_20190101.jpg”
2. For the individual modules, transfer data from all datasheets (field and lab) onto the appropriate data entry template(s). Refer to the individual protocols for further guidelines regarding metadata and images



Well done — Thank you!