Determination of Belowground Biomass of Wetland Macrophytes

Date Prepared: 07/17/2014

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Partnership for the Delaware Estuary (PDE) Method
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Description

This method describes the procedure for collecting and processing the belowground biomass of emergent vegetation (EV) in tidal marshes and wetlands. This method is a slightly modified version of a SOP prepared by the Academy of Natural Sciences of Drexel University, which has been used for the Mid-Atlantic Coastal Wetland Assessment (MACWA) Quality Assurance Project Plan maintained by the Partnership for the Delaware Estuary.

Core samples are taken from target areas of wetlands using a standard sized core and standard depth. For some special studies, the core dimensions and depth can be varied, but the standard MACWA protocol is described here. In most situations, several replicate cores should be collected within targeted areas of interest, such as locations each dominant dominated by different vegetation species, different wetland elevation zones, etc. See individual study design (and project-specific QAPPs, by request) for core placement details of various projects.

Summary of Approach

Belowground biomass is collected using a 15-cm diameter x 30-cm long polyvinyl chloride (PVC) pipe and taken back to the laboratory. Biomass is sorted (live and dead rhizomes and roots are separated), washed, and dried at 60°C to a constant weight. Biomass is weighed and a subsample is ground for loss on ignition (LOI) determination (Method for Loss-On-Ignition (LOI) Weight Analyses). The LOI procedure is necessary for calculating out mineral and non-organic particles associated with the biomass.

For consistency, sampling should be conducted during the peak growing season, typically between mid-July and late August in the Mid-Atlantic region, US. Sampling is conducted at low tide whereby the core sample can be placed directly on the marsh surface with little water coverage.

Equipment

- 15-cm diameter PVC pipe
- Polyurethane block with handle
- Sledge hammer
- Shovel
- Plastic bags.
- Non-erasable marker.
- Refrigerator, 5°C
- Paper bags.
- Drying oven, 60°C.
Desiccator and fresh desiccant, or low humidity chamber. Analytical balance, ±0.1 g.

Procedure

39.1. Belowground biomass collection

39.1.1. To minimize compaction of the core, sharpen bottom edge of PVC pipe.

39.1.2. Place PVC pipe in plant community and place polyurethane block on top of PVC pipe. Two individuals are required for collection procedure. One individual holds the handle attached to the polyurethane block and the second individual uses the sledge hammer to pound the PVC pipe into the soil until the top of the PVC is flush with the soil surface.

39.1.3. Use the shovel to extract belowground biomass core, by digging a narrow hole next to the PVC core and ensuring that the core is retained at the bottom when removing (with hands).

39.1.4. Label the PVC pipe with the date and location of the core collection using the non-erasable marker.

39.1.5. Place the core (still contained in the labeled PVC pipe) into a labeled plastic bag.

39.1.6. Collect at least two replicate samples within each target plant community.

39.1.7. Transport belowground biomass samples to the laboratory.

39.2. Belowground Biomass Determination

39.2.1. In the laboratory, place cores in refrigerator at 5° C until processed.

39.2.2. Remove cores from labeled plastic bags and extrude core from PVC pipe.

39.2.3. Place core on a large sieve with 2 mm mesh size and wash soil and sediment from root material. Sort biomass according to species-specific live and dead material.

39.2.4. Place biomass in labeled paper bag for drying.

39.2.5. Place bags in drying oven set at 60° C until it reaches a constant weight and biomass can be considered dry.

39.2.6. Weigh samples to a tenth of a gram.
39.2.7. See PDE-33 for Determination of Ash in Biomass for LOI determination.

39.2.8. Multiply the dry weight of the biomass by the percent organic matter determined by the LOI procedure.

39.2.9. Calculate the resulting ash-free dry weight to be on a meter-square basis.

References (if necessary)

