

FCE LTER Seagrass Protocols

Density

A rapid, visual assessment technique developed early in the 20th century by the plant sociologist Braun-Blanquet is used to assess frequency, abundance, and density of seagrass and macroalgae. This method is very quick, requiring only minutes at each sampling site; yet it is robust and highly repeatable, thereby minimizing among-observer differences. At each permanent seagrass monitoring site, a 50 m long transect is established at the beginning of the study period by driving steel rods into the substratum at both ends of the transect. At each mapping site, a 50 m transect is set up by extending a meter tape along the bottom in an up-current direction. Ten quadrats (0.25 m²) are placed along each transect at pre-determined random distances from one of the marker rods. A new set of random numbers is chosen before each visit to a site. Each quadrat is examined by divers using SCUBA. All seagrass species occurring in the quadrat are listed, and a score based on the cover of the species in that quadrat is assigned (0= Taxa absent from quadrat; 0.1= Taxa represented by a solitary shoot, less than 5% cover; 0.5= Taxa represented by a few (less than 5) shoots, less than 5% cover; 1= Taxa represented by many (greater than 5) shoots, less than 5% cover; 2= Taxa represented by many (greater than 5) shoots, 5 - 25% cover; 3= Taxa represented by many (greater than 5) shoots, 25 - 50% cover; 4= Taxa represented by many (greater than 5) shoots, 50 - 75% cover; 5= Taxa represented by many (greater than 5) shoots, 75 - 100% cover). Cover, as defined for this purpose, is the fraction of the total quadrat area that is obscured by a particular species when viewed from directly above.

Nutrient Content

At each sampling site, 5 intact short shoots of *Thalassia testudinum* (and a minimum of 10 *Syringodium filiforme* and 15 *Halodule wrightii* short shoots, if present) are haphazardly collected from a 10 m² area. These short shoots are returned to the lab, where all attached green leaves are cut from the short shoots and cleaned of adhering epiphytes by gently scraping with a razor blade. All leaves from a site are pooled and dried at 80 degrees C. Dried leaves are ground to a fine powder using a ceramic mortar and pestle. Powdered samples are analyzed in duplicate for carbon and nitrogen content using a CHN analyzer (Fisons NA1500). Phosphorus content is determined by a dry-oxidation, acid hydrolysis extraction followed by a colorimetric analysis of phosphate concentration of the extract (Fourqurean et al. 1992). Elemental content is calculated on a dry weight basis; elemental ratios are calculated on a mole:mole basis.

Stable Isotopes

At each sampling site, 5 intact short shoots of *Thalassia testudinum* (and a minimum of 10 *Syringodium filiforme* and 15 *Halodule wrightii* short shoots, if present) are haphazardly collected from a 10 m² area. These short shoots are returned to the lab, where all attached green leaves were cut from the short shoots and cleaned of adhering epiphytes by gently scraping with a razor blade. All leaves from a site are pooled and dried at 80 degrees C. Dried leaves are ground to a fine powder using a ceramic mortar and pestle. Powdered samples are analyzed for ¹⁵N and ¹³C at the SERC Stable Isotope Laboratory at Florida International University using standard elemental analyzer isotope ratio mass spectrometer (EA-IRMS) procedures. Standards are Pee Dee Belemnite (PDB) for carbon and air (AIR) for nitrogen.

Productivity

At approximate 2-month intervals seagrass leaf productivity is measured using the Zieman (1974) leaf marking technique.

Fourqurean, J. W., J. C. Zieman, and G.V.N. Powell. 1992. Phosphorus limitation of primary production in Florida Bay: Evidence from the C:N:P ratios of the dominant seagrass *Thalassia testudinum*. *Limnol. Oceanogr.* 37: 162-171.

Zieman, J. C. 1974. Methods for the study of the growth and production of turtle grass, *Thalassia testudinum* Konig.. *Aquaculture*, 4: 139-143.