

# Natural Geography in Shore Areas

## A detailed description of sampling strategies and sample processing

Brenda Konar and Katrin Iken  
University of Alaska Fairbanks, Fairbanks, USA  
[bkonar@ims.uaf.edu](mailto:bkonar@ims.uaf.edu) and [iken@ims.uaf.edu](mailto:iken@ims.uaf.edu)

The following gives a detailed description of sampling strategies in the two target areas, rocky substrates with macroalgal cover and soft-sediment seagrass communities. Additional physical measurements, sample processing, and analysis of data are described. This is a supplement to the standard protocols.

### 1. Sampling Protocol for Rocky Substrate with macroalgal stands:

#### *Sampling Strategy*

At each study site a stratified random sampling strategy will be employed, with strata representing vertical heights above and below low water datum. That is for each site, five random replicate samples will be taken at high, mid and low intertidal positions and 1, 5 and 10m subtidal water depths (15 and 20m depth strata are optional). The most expedient randomization procedure should be adopted. Sampling of each study site should take place at least once a year, during the period of expected highest diversity, and commence by the end of 2002.

#### *Sampling Methodology*

For rocky substrates, three different quadrat sizes will be used at each sample location: 1x1m, 50x50cm, and 25x25cm.

Within each 1x1m quadrat, a photographic image record (digital or film) will be made immediately prior to sampling. If conditions do not permit such a photographic record to be made (e.g. poor visibility) then a hand-drawn map should be constructed as an alternative.

All macrophytes and conspicuous macrofauna (>2cm length) within the 1x1m quadrat will be identified *in-situ*, and either counted or an estimate of percent cover made using a standard technique. Counts will be made of solitary macroflora and macrofauna whilst percent cover will be used for species whose individuals cannot be differentiated.

Adjacent to the 1x1m quadrat, a 50x50cm quadrat will be placed. Within each 50x50cm quadrat, a 25x25cm quadrat shall be placed (always the same position within the larger sample). Within the 50x50cm quadrat all macroalgae shall be completely removed, except for the 25x25cm area. This 50x50cm sample is taken in order to ensure sufficient algal reference material to support the *in-situ* observation.

In each 25x25cm quadrat, a photographic image record (digital or film) should be made immediately prior to sampling. All macrophytes and fauna within the quadrat will be carefully and completely removed and placed into a 63 µm mesh bag. Hand scrapers will be used to facilitate removal of attached organisms.

## **2. Sampling Protocol for seagrass-soft sediment substrate**

### *Sampling Strategy*

At each study site five random replicate samples are to be taken in the center of the seagrass bed. The most expedient randomization procedure should be adopted. Sampling of each study site should take place at least once a year, during the period of expected highest diversity.

### *Sampling Methodology*

For seagrass communities, two different quantitative samples will be taken at each location: a 50x50cm quadrat and a 15cm diameter cylindrical core.

In each 50x50cm quadrat, counts will be made of solitary fauna, flora and seagrass shoots. Percent cover estimates (using a standard technique) will be made for encrusting colonial organisms.

In each 15cm diameter cylindrical core (to 10cm substrate depth), a photographic image record (digital or film) will be made immediately prior to sampling. All macrophytes and fauna within the core sample will be carefully and completely removed. All organisms will be transferred to a 63 µm mesh bag. If possible, cores will be sieved in the field using a 63 µm mesh sieve.

## **3. Physical Descriptions**

When possible, the surface and bottom seawater temperature should be measured at each sample location. In addition, the substratum should be visually classified according to the standard Wentworth convention for the description of sediments.

## **4. Initial Processing of Direct Samples**

Resulting samples should be sieved on nested meshes of 0.5mm and 63 µm. Macrophytes remaining on the 0.5mm sieve should be carefully washed (and if necessary scraped) over the mesh to remove associated macrofauna. Both the floral and faunal component of the 0.5mm sample are to be retained, but should be stored separately. The material retained on the 63 µm sieve will largely comprise of meiofauna. All portions of the sample should be separately fixed and preserved using 5% neutralized\* seawater formalin (2% formaldehyde).

\*concentrated formalin (=35% formaldehyde) saturated with borax (sodium hexaborate)

## **5. Secondary Processing of Direct Samples**

All macrophytes will be sorted and a wet weight determined. For each macroalgal species a wet weight – dry weight ratio will be established. Wet weight of a small subsample per species will be taken, and then the sample will be dried at 60°C for 24h and weighed again. Dried samples will be re-weighed every 24h until a constant weight is reached. Selected samples will be pressed and vouchers made. All macrofauna also will be sorted and wet weight determined. Vouchers also will be made from these samples. Meiofauna will be stored for future work.

## **6. Analyses**

Wet weight will be determined for all macroflora and macrofauna. Various parameters can be analyzed, including species richness, evenness, dominance and rare species. Various analyses to be completed include the Shannon Weaver index and the Hurlbert biodiversity index

## **7. Recommendations**

The above protocol constitutes the minimum standardized sampling requirement for the proposed biodiversity determination, comparison and monitoring study. The following recommendations represent actions that are considered useful optional additions to the program: (1) Sampling to take place more than once a year, e.g. during potentially separate periods of highest diversity for macrophytes and associated fauna. (2) Sampling of additional habitats that occur at study site, e.g. mangrove, coral reef, unvegetated sediment. (3) Creation of a macrophyte and macrofauna reference collection for the study site (4) Taking of additional samples for future molecular studies (fixed and preserved in 100% ethanol). (5) Compilation of a site species inventory from existing information. (6) Construction of site history, e.g. adjacent terrestrial land 'use', potential anthropogenic impacts. (7) The addition of other surveys (fish, larger mobile invertebrates, etc.). (8) Measurement of other abiotic factors at each study site, e.g. light, current, salinity.