Protocol: Fouling Community Survey

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MarineGEO
THE TENNENBAUM
MARINE OBSERVATORIES NETWORK

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Introduction

This protocol provides methods on deployment, retrieval, and standardized data collection for the development and composition of fouling communities. Development here is defined as colonization and growth of species over monthly intervals during the most productive season in a given region (June – August for northern temperate and tropical sites and December – February for southern temperate sites). Sites are selected based on habitat type and where other MarineGEO activities occur. It is recommended that 3 different sites be used for each habitat of interest. Habitats include but are not limited to docks or marinas, seagrass beds, soft-sediment, mangroves, oyster reefs, and coral reefs. It is recommended that at a minimum, docks or marinas be used as these are important for monitoring introduced species and have analogous hard surfaces similar to fouling panels.

Measured Parameters

- Community development and composition
- Species richness and diversity of the sessile community
- Total community biomass
- Optional: Mobile fauna abundance and diversity

Requirements

Personnel: 1-2 people

Estimated Total Time Per Location (n = 3 sites per habitat):

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

*Estimated times will vary by site and conditions

Replication: At least three (3) sites per habitat, the number of habitats is decided by the partner site.

Fieldwork:

- ☐ GPS
- ☐ Multiparameter sonde or similar to measure temperature and salinity
- ☐ Field sheets
- ☐ Fouling panels (*n* = 6 per site)
- ☐ PVC plastic sheets, 13 x 13 cm, roughened with sandpaper on experimental side, thickness can vary from 0.5 – 1 cm
- ☐ Labels for panels
- ☐ Colored cable ties to identify individual panels at each site
- ☐ Camera
- ☐ Cable ties (zip ties) – large 8 -13” ties
- ☐ Rope
- ☐ Bricks

Figure 1: Photo of a 13 x 13 cm fouling panel.

- ☐ PVC frames

Post-Processing:

- ☐ Scissors and/or cable tie cutters
- ☐ 1-gallon zip sealable plastic bags or containers labeled by site and color
- ☐ Paper labels (waterproof) with site and color
- ☐ Data sheets
- ☐ Container with ice or buckets for transport
- ☐ Metal paint scraper
- ☐ Labelled vials
- ☐ Forceps
- ☐ Dissecting microscope

Methods

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

Preparation:

1. Review the MarineGEO Fouling Community Survey Design for selection of permanent sites.
2. Become familiar with GPS equipment and test the device to make sure it works.
3. Prior to deployment, weigh several clean panels to obtain an average weight of a clean panel. This weight will be used when panels are retrieved to obtain community biomass.

Fieldwork:

Deployment in Artificial Habitats (e.g. docks and marina)

1. Attach each panel to a brick (or half brick) with a cable tie going through the panel connected tightly to the brick (Figure 2). The experimental surface of the panel should be horizontal, facing the seafloor. Attach a rope to the brick with enough line to tie down to the dock. Panels should hang at least 1 m below mean low water. It is recommended that panels be further from shore and closer to flow if possible. Panels should also be at least 0.5 m from the seafloor. *Panels can also be hung using a float or buoy if necessary.
2. Each panel must be labeled. It is recommended that a colored cable tie be used for this rather than engraving the panel or attaching a label (see Figure X). Generally, a single colored cable tie will last for 90 days. Six colors would be required for 6 replicate panels per site. However, it is up to the practitioner on how panels are labeled.
3. Panels should be at least 1 m for each other.
4. At 30, 60, and 90 days after the initial deployment, take photographs of the panels (see fouling panel

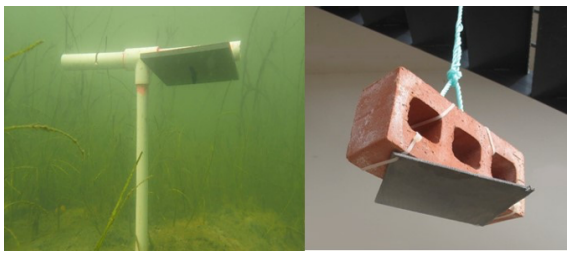

Figure 2: Photos of benthic deployment on a PVC (left) and a dock deployment using a brick (right).

photography protocol) and record environmental measurements (see environmental monitoring protocol).

Deployment in Benthic Habitats:

1. Attach a panel to the T-shaped PCV frame (Figure 2).
2. Each panel must be labeled. It is recommended that a colored cable tie be used for this rather than engraving the panel or marking the PVC frame.
3. Push the PVC frame into the sediment until it is secure. Panels should remain at least 0.5 m above the seafloor. Panels also need to be deep enough that they will NOT be exposed during a low tide. In some cases, the sediment is too coarse for this (e.g. reef habitat) and panels can be deployed immediately adjacent to the habitat of interest. *As an example for an oyster reef, the nearest location that is closest to the reef and has soft-enough sediment for deployment of frames and where panels remain subtidal during low tide. In shallow areas, floats or buoys could provide a better means of deployment.*
4. PVC frames should be deployed at least 1 m for each other. It is generally easier to find them if they are in a line parallel to the shore.
5. At 30, 60, and 90 days after the initial deployment, take photographs of the panels **(see fouling panel photography protocol)** and record environmental measurements **(see environmental monitoring protocol)**.

Retrieval:

This is typically done after a 90-day period for sub-tropical and temperate regions.

1. After taking 90-day photos, detach panels from either the PVC frame or bricks.
2. Place the panel in labeled bags or containers with enough fresh seawater to keep moist. Each bag should be labeled on the outside and a paper label should be on the inside. The backs of the panels should be cleaned of fouling species with a paint scrapper either in the lab or in the field as these are not quantified. In some cases, it may be necessary to do this in the field to reduce lab work or even to get the panel into the bag.
3. The easiest method of transport is to place all panels in a cooler with ice for travel back to the lab. In some cases, if travel time is short, panels in bags with fresh seawater can simply be placed in buckets and returned to the lab.

Post-Processing:

1. Depending on the number of panels and time available at the site, panels can either be processed live or frozen. If freezing, simply place the zip lock bag with seawater directly in a freezer.

Optional: Associated Mobile Fauna

Despite a lengthy history of research done on fouling communities, there exists very little data on the associated mobile fauna (non-tube building) found within these communities. Here we provide an optional auxiliary protocol to sampling this group of species in a standardized way.

(a) Once ready to process, place the panel in a 500 µm sieve and pour seawater that was in the bag through the sieve. Wash the panel with fresh water to remove all mobile fauna into the sieve. Discard any non-living material (e.g. shell, rocks, etc.) and wash the sieved fraction into a labeled vial with 70

(b) Pour contents of vial into a dish and sort, identify, and count all mobile fauna. All species should be identified to the possible taxonomic level. However, if this is not possible, please use the provided list of taxonomic categories below. **Be sure to ignore any tube-building fauna (e.g. corophiid amphipods, sabellid and or serpulid polychaetes).**

(c) For counting purposes, only record species that are complete or at least have the anterior region

present ("head-counts"). For mangled or incomplete species without the anterior region, do not count and discard. For gastropods, make sure the animal is present either by looking for the foot or crushing the shell.

(d) Once enumerated, samples should be retained for potential further studies.

2. After rinsing, let the panel hang vertically for 1 minute to allow water to drip off. Place the entire panel on a scale to obtain a wet weight (g). Note that this weight contains the panel itself, which can be subtracted during data entry from weights obtained prior to deployment.
3. Once the panel is washed and weighed, place the panel in a dish with fresh seawater and examine it under a dissecting microscope. If panels were previously frozen, they can go into tap water. Identify all sessile species found and place any mobile fauna into associated vial. **Be careful with tube-dwelling fauna (corophiid amphipods, sabellid or serpulid worms, etc.) as these are considered to be part of the sessile community and get quantified as percent cover from the photographs.** If species are difficult to ID, at least give each a unique identifier. The overall goal is to acquire a species list and a count for total species richness and therefore, there is no need to count the number of individuals on the same panel.
4. At this point, the community can be destructively sampled to find hidden or cryptic species.
5. Take photos of unknown species. Photographs can be shared with the network for help in identifications. Also, a photo library is generally beneficial to have for incoming techs or students to assist in identifications. Within the first sampling year, the majority of fauna will be captured, and this makes the next season's sampling go faster.

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, such as the protocol version and contact information. 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@si.edu