ASSOCIATED FAUNAL/FLORAL COLLECTION METHODS

Virginia (P.G. Ross et al.)
(1-3x per year, key season(s) typical)

Residents (epifauna, infauna, mobile, sessile)

Epifaunal communities on the reefs were characterized from the same quadrate samples described above. All organisms in the quadrate samples were identified to the lowest practical taxon and enumerated***.***

We sampled small resident mobile fishes and crustaceans using substrate baskets embedded in the reef. Thirty cm diameter PVC pipe was cut into 15 cm lengths and one end covered with 1 mm plastic mesh. Three 15 cm diameter ovals were made along the midline of this PCV ring and also covered with 1 mm mesh. Baskets were then filled with clean oyster shells similar to those used in the reef construction and buried by divers flush with the reef surface. The mesh bottom and holes in the sides permitted the exchange of interstitial pore water with the surrounding reef, while the basket allowed the retrieval of intact samples which retain mobile reef residents such as blennies, gobies and mud crabs. Divers retrieved baskets and they were transported to the laboratory for processing. All motile organisms in the baskets were removed and fixed initially with an isotonic histological fixative (Normalin) and then transferred to 70% ethanol for storage. Organisms were later identified to the lowest practical taxon, enumerated, and, where appropriate, measured.

Related References

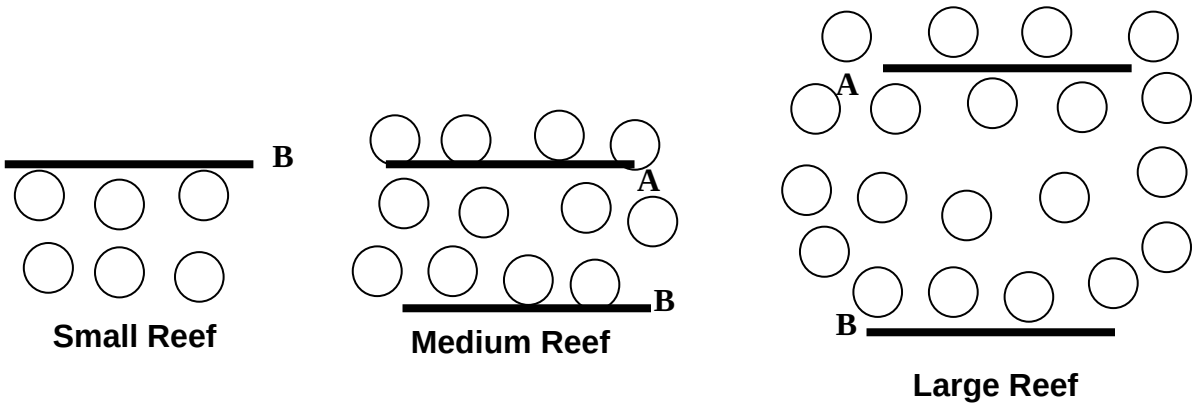
Luckenbach, M. W. and P. G. Ross, 2003. An Experimental Evaluation of the Effects of Scale on Oyster Reef Restoration: Final Report Submitted VA Sea Grant Consortium (120 pp).

Luckenbach, M. W., L. D. Coen, P. G. Ross and J. A. Stephen. In Press. Oyster Reef Habitat Restoration: Relationships between oyster abundance and community development. Journal of Coastal Research.

Transients

Gill Netting – Anchored monofilament gill nets were precisely deployed for 3 hr at both inner and outer reef locations (Figure 10). Nets measured 9 m long by 3 m high and were rigged to fish from the seabed up (i.e., sinking rigged net). During 2001, 7.5 cm (3”) and 12.5 cm (5”) stretch mesh nets were used. Because the larger mesh caught very little (the mesh size was too large for the fish present during sampling), 6.3 cm (2.5”) and 7.5 cm (3”) were used during 2002. Nets were set at all outer and inner locations during a given deployment (2 nets each per large and medium reef and 1 net per small reef). Sets were repeated so that all locations were sampled with both mesh sizes during both flood and ebb tidal cycles within sampling periods. Nets were randomly allocated to specific locations

Figure 10. Location of possible "inner" (A) vs. "outer" (B) gill net sets and diver transects on large, medium and small reefs using a generalized footprint from Drumming Ground study site.



and a total of 31 sets were done at each site x reef size x intra-reef location combination. After 3 hr, nets were retrieved and fish were identified, enumerated, measured and released away from the reefs. In some cases, due to high catches, processing of samples had to be undertaken after all nets were harvested and taken to a remote location. In these instances, most fish were not released alive. Although the majority of gill net sampling occurred between dawn and dusk because of logistical and safety reasons, one sample effort that included all scale treatments was undertaken during the night.

Diver Observations - Divers swam 15.25 m transects along the long axis of the reefs at several locations relative to the reef (Figure 10). Transect lines consisted of cord weighted at each end. Additionally, one weight was tethered to a buoy on the surface to facilitate divers finding the beginning of a transect line without disturbing it. These transect lines were deployed >2 hr prior to actual data collection. "Inner" and "outer" transects were paired on large and medium reefs, while only an "outer" transect was deployed on small reefs. Divers recorded the species and number of fish and crabs observed. Over a 5-day period each reef in the study was surveyed twice in this manner, once during flood tide and once during ebb tide. Diver observations were conducted in June 2001 and 2002 and in August 2001.

Trawl Samples – A small 4.9 m bottom-fishing otter trawl was towed to sample finfish not caught in other gear to provide further background information on transient finfish using reefs. Paired tows, one along and one across the longest reef matrix axis were timed and performed on both flood and ebb tidal cycles. At each reef site another set of similarly paired tows were performed away from the reef arrays to get a sense of any potential "at-reef" vs. "away-from-reef" differences in species composition or abundance.

Related References

Luckenbach, M. W. and P. G. Ross, 2003. An Experimental Evaluation of the Effects of Scale on Oyster Reef Restoration: Final Report Submitted VA Sea Grant Consortium (120 pp).

North Carolina (M. Posey et al.)

Breder traps are used to sample small fish and crustaceans utilizing structured and non-structured habitats. The traps are constructed of clear acrylic (31 cm length X 16 cm height X 15 cm width). The traps are constructed in three pieces. The body of the trap is consists of two pieces 1) consist of two sides (each 31cm X 16 cm) and 2) consists of two sides (each 31cm X16cm) and back (16cm X 15cm). The body of the trap fits together with no gaps or opening. Small spacers glued ¼ inch from the inside edge help keep the traps stable once assembled. The body of the trap can be held together with two size 84 rubber bands. The third piece of the trap is the funnel or wings that fit about 3inches into the mouth of the trap. The funnel of the trap is 15cmX 16cm with a 2.5 cm opening into the trap. The maximum spread of the funnel or wings is 29.5 cm (~ 11.5 inches). When submerged these traps are transparent and catch epibenthic fish and crustaceans passively, as they move into the habitat. Based on preliminary work these traps "fish" best with the opening oriented toward the channel or downstream based on preliminary data that indicates this positioning is optimal for obtaining highest catches. Because these traps are light-weight they need to be secured to the substrate, in most cases tent stakes work well.

South Carolina (L. Coen et al.)

(1-3x per year, key season(s) typical)

Residents (epifauna, infauna, mobile, sessile)

Collected either by excavating quadrats, removing embedded samplers filled with reef material, deploying traps, and removing reef cores. Suction sampling (subtidal) also has been used. Identify to lowest practical taxon. ID invertebrates (especially decapods, mollusks) and fish, these can also include counts, relative abundance categories (e.g., rare/common, 0, 1=10-29, 2=30-40, 3=41 or greater).

Approaches can include: (1) size-frequency and/or biomass of above animals; (2) biomass of smaller invertebrates (e.g., polychaetes, amphipods); (3) % cover for sessile/encrusting organisms; (4) infauna (varies with programs, subtidal and intertidal different); and (5) species richness/diversity to name a few.

Using the above quadrat samples, tray contents are washed onto a large 500 μm or 1 mm mesh sieve to remove sediment and loose residents (crabs and mussels primarily). During this process all mussels should be removed and counted and placed in labeled sample jars for later enumeration, counts and measurements. A total combined mussel count and biomass value is most common.

Boonea impressa - Work in SC has pointed to an important resident constituent of intertidal oyster reefs, the pyramidelid gastropod, *Boonea impressa*. Typically we separate out *Boonea* during resident sorting, examine them in a petri dish with water. One needs to examine them under a dissecting microscope. Determine live from dead *Boonea* are "live" (See notes below). Dying the samples with Rose Bengal stain at the time of collection makes it easier for initial sorting and allows one to see stained tissue through the translucent shell. Another way is to look in the aperture for tissue. When it is impossible to determine whether the snail was alive or dead by the above methods, smash the shell on the 2-layered paper towels using a spatula smash the *Boonea* on the paper towel. Examine smashed contents to determine status.

Related References

Coen, L.D., D.M. Knott, E.L. Wenner, N.H. Hadley, A.H. Ringwood, 1999. Intertidal Oyster Reef Studies in South Carolina: Design, Sampling and Experimental Focus for Evaluating Habitat Value and Function. Pages 131-156, In: M.W. Luckenbach, R. Mann, J.A. Wesson (eds.), Oyster Reef Habitat Restoration: A Synopsis and Synthesis of Approaches. Virginia Institute of Marine Science Press, Gloucester Point, VA.

Osman, R. W., R. B. Whitlatch, and R. N. Zajac. 1989. Effects of resident species on recruitment into a community: larval settlement versus post-settlement mortality in the oyster *Crassostrea virginica*. Marine Ecology Progress Series 54:61-73.

Transients

Lift nets, drop nets, seines, minnow traps, Breder traps, crab traps, gill nets, throw traps (subtidal), trawls, diver observations, videography, on or off reef. Identify to lowest practical taxon.

Related References

Coen, L.D., M.W. Luckenbach, and D.L. Breitburg. 1999b. The role of oyster reefs as essential fish habitat: a review of current knowledge and some new perspectives. Pp. 438-454, in L.R. Benaka, (ed.). Fish habitat: essential fish habitat and rehabilitation. American Fisheries Society, Symposium 22, Bethesda, MD.

Lehnert, R.L., and D.M. Allen, 2002. Nekton use of subtidal oyster shell habitats in a southeastern U.S. estuary. Estuaries 25:1015-1024.

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Zimmerman, R., T. Minello, T. Baumer, and M. Castiglione. 1989. Oyster reef as habitat for estuarine macrofauna. NOAA Tech. Mem. NMFS-SEFC-249, 16 pp.

Florida (G. Tolley et al)

Lift nets (1 m^2) were constructed using 3.2-cm PVC frames and 6.4-mm delta-weave netting dipped in vinyl to minimize wear and tear resulting from constant contact with oyster shell. The bag on each net measured 0.5 m in height and the bottom was made using 1.6-mm netting to prevent the escape of small organisms. Upon deployment, a 1 m^2 area of the substrate was cleared of oyster shell. The net walls were then collapsed as each lift net was pinned to the substrate using 45-cm lengths of PVC attached to a PVC T-fittings. Approximately 5 liters (volume displacement) of live oyster clusters were collected from adjacent portions of the reef and were then placed in each net. Because each net would be deployed for a period of 30 d, no effort was made to remove existing fauna from these oyster clusters. Upon retrieval of the nets oyster clusters were removed and any associated decapods and fishes were extricated using forceps. Any remaining decapods and fishes were then either removed from the net by hand or by using dip nets to sweep the interior of the lift net. These8 organisms were then transported on ice back to the laboratory for identification. Specimens were stored in 70% isopropanol for archiving and further analysis.

For images and video on lift net usages see the Coastal Watershed Institute at http://www.fgcu.edu/cwi/research1.htm