

**AN EXPERIMENTAL ANALYSIS OF ECOLOGICAL PROCESSES
THAT STRUCTURE FISH AND INVERTEBRATE
REEF COMMUNITIES**

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Purpose: Establish experimental reefs to be colonized by fish and invertebrates, census early fish colonists of these reefs, and sample plankton providing stock for recruitment to reefs in this environment (Report No. 80-6)

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Accomplishments: Fifteen artificial reefs were established along a 150-meter transect along the east wall of Salt River Canyon. The reefs were 10 meters apart and 10 meters west of the rubble along the east wall. Reefs for fish colonization were constructed of cinder blocks aged in seawater and held in place by rebars. Artificial reefs were established for invertebrates by placing pieces of normal coral rubble (sun dried in order to provide unoccupied space for settling cryptic organisms) at a given reef site. The artificial reef was established by impaling each piece of rubble on a short rebar. In addition, four small houses made of ceramic clay and plexiglass were around each piece of rubble, thus allowing the observation of the invertebrates settling in the holes of these houses through the plexiglass base. Three experimental conditions were established among the shallow reefs: five (Type A) reefs were constructed of both cinder blocks and sites for invertebrate colonization (rubble, ceramic houses); five (Type

B) reefs provided only sites for fish (cinder blocks); and five (Type C) reefs were comprised of only sites for invertebrates (coral, rubble, ceramic houses). The reefs were placed in an A, B, C, A etc., sequence along the transect. Five artificial reefs were also constructed for fish and invertebrates (cinder blocks, coral rubble, ceramic houses) along the 33.5 m depth contour across the mouth of the Salt River Canyon. These reefs were initiated 20 meters west of the east wall, and placed 10 meters apart. Five Type A reefs were constructed in very shallow water (6 m), using surface diving techniques on the back reef of Salt River Canyon as a control for the deeper sites.

Ten pieces of naturally occurring coral rubble were collected along the east wall adjacent to each artificial reef containing sites for colonization by invertebrates. Ten pieces were also collected along the east wall, adjacent to the reefs at 33.5 m. These pieces of coral rubble were isolated in plastic bags and sent to the surface. Each piece was then chiseled into fine pieces and sieved so that all cryptic fauna could be preserved, recovered, and quantitatively analyzed. These measurements will provide a control for seasonal effects and indicate which cryptic species are available to colonize the artificial reef. On three separate nights, one plankton sample was collected near the light of the habitat and two samples were taken away from the habitat and near the artificial reef sites along the 18.3 m transect.

This study will provide the first comprehensive analysis of colonization of fish and invertebrates at deep 33.5 m, moderate 18.3 m, and shallow 6 m sites. The patterns of colonization and variations in the resultant community structure

will be identified in detail during the next two missions. This fauna is almost totally different in species composition from that found in very shallow habitats. The assemblage undoubtedly contains undescribed species and probably undescribed genera. All of these samples will be identified and quantified, with the help of Smithsonian specialists for certain taxa.