Excerpt from
Appendix B: Oyster Rehabilitation
OYSTER RESTORATION USING DESIGNED REEF STRUCTURES

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Oyster rehabilitation is very complex. Designed reef structures fill a niche in a much larger oyster rehabilitation need, and tend to have a supporting or secondary rather than leading role. Consultation and coordination with knowledgeable practitioners is essential. This section surveys major planning considerations and issues associated with the use of designed reef structures in support of oyster rehabilitation; it is an introduction to the topic. Practical information from previous use of Reef Balls with oyster rehabilitation objectives is also discussed. These projects were correlated or integrated with local area oyster rehabilitation programs as a best practice.

Oysters

Oysters, a keystone species of benthic filter feeders in temperate estuaries and coastal bays, are a type of primitive bivalve with global distribution. An oyster's filtering capabilities enables it to remove large quantities of plankton, nutrients, bacteria, and sediment from the water. A healthy adult oyster can filter 25-60 plus gallons of water per day. A large, healthy oyster population can improve water quality. Oyster beds and reefs also provide valuable habitat for other benthic organisms and fish species. Predation, harvesting pressure, water quality degradation (e.g., high nutrient loads), and diseases, especially parasites in recent years, have combined to drastically reduce many oyster populations. Combined stresses can cause natural oyster populations to decease below the quantity to rebuild the stock at a rate that offsets or is greater than cumulative losses. Rehabilitation may be an option if environmental and institutional conditions are otherwise favorable. Oysters have a complex life history that makes rehabilitation extremely challenging. A basic understanding of the oyster and its environment is fundamental to rehabilitation project design. Effective use of designed reef structures must consider the life histories of the oyster species that will be used, the complexities of oyster propagation, growth and mortality factors, the potential for performance to vary significantly according to prevailing conditions, and rehabilitation issues within the ecosystem.

Designed Reef Oyster Rehabilitation Concept

Constructed beds and structures are routinely used to provide hard substrate for direct attachment by oyster larvae or to serve as a foundation for seeding oysters for rehabilitation and commercial oyster cultivation.

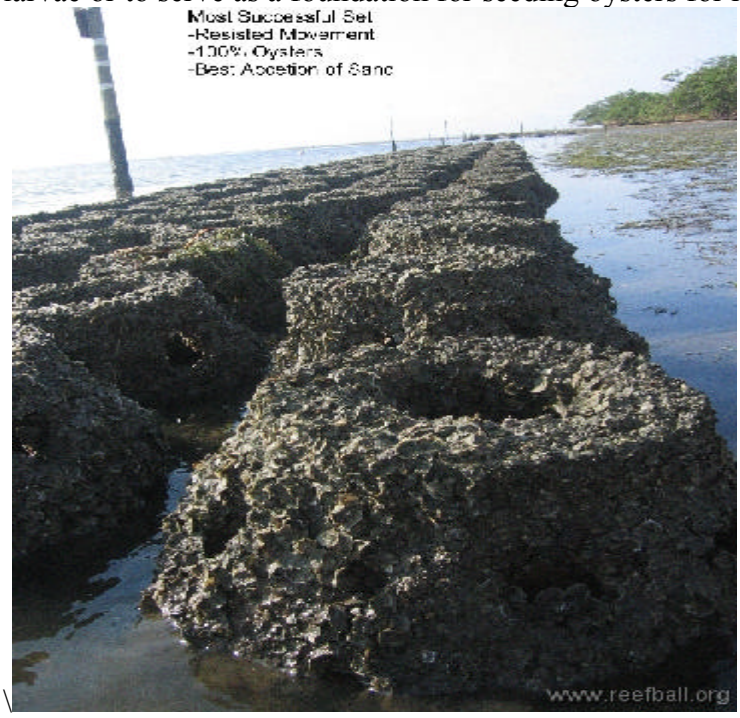

Figure 0 Shoreline stabilization project with oyster recruitment, MacDill Air Force Base, Florida. Photo: Reef Ball Foundation .
As a matter of practical necessity or to facilitate harvesting, such structures may not be configured in the vertical or horizontal dimensions so as to approximate the layout and irregular elevations of natural oyster reefs.

Use of designed reef structures in rehabilitation projects is an adaptation of these longstanding oyster cultivation practices. Rehabilitation of oyster and coral reefs apply the same basic concept. Designed reef structures provide hard substrate for attachment by larval oysters, simulating natural structure (e.g., relic oyster shell formations). The structure provides a core for the reef. Oysters that colonize the core structure form a living veneer of marine organisms. The core and veneer, when fully developed, replicate the functional performance of a natural reef many years in age. Applying this concept, Reef Balls were used successfully as substrate for natural and hatchery-assisted "spat sets" by the American Oyster (Crassostrea virginica) in the Tampa and Chesapeake Bay areas, respectively.

Reef Ball encrusted with oysters.

Actual and potential applications of designed reef modules include:
* Reestablishment of vertical structure for oyster colonization.
* Use of the inner cavity as a grow-out area for spat on shell for protection from predation by fish (e.g. cow-nosed ray).
* Deployment on oyster bars or suitable rehabilitation project sites for natural colonization.
* Deployment on oyster bars or suitable rehabilitation project sites with spat set directly on or manually attached (e.g. spat on shell) to the modules.
* Deployment of modules (with or without spat attached) in patterns that approximate the configuration of a natural reef system.
* Deployment on oyster sanctuaries or oyster aquaculture sites to deter unauthorized mechanical harvesting or protect grow-out cages.
* Deployment at corners or along sides of oyster sanctuaries or oyster aquaculture sites to provide underwater boundaries detectable by fathometers and sonar.
* As secondary benefit for other designed reef applications (e.g., establishment of reef habitat for fish, shoreline stabilization structures).