SARASOTA BAY ESTUARY PROGRAM

OYSTER HABITAT MONITORING

RESULTS: YEAR 1

by

Jay R. Leverone

Mote Marine Laboratory
1600 Ken Thompson Parkway
Sarasota, Fl 34236

to

Gary Raulerson

Sarasota Bay Estuary Program
111 S. Orange Ave
Sarasota, FL 34236

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Background

The Sarasota Bay Estuary Program has been interested in enhancing valuable coastal habitats since the inception of the Program. Recently, oyster habitats have been receiving increased attention and the Program has focused on identifying, permitting and planting oyster habitat within Sarasota Bay. A subcommittee of the Technical Advisory Committee was formed and tasked with several responsibilities: evaluating the historical presence and current conditions of oyster habitat, selection of potential restoration sites, and finally, habitat construction and monitoring.

This effort began with an initial field reconnaissance to oyster habitats in Little Sarasota Bay in May 2003. Oyster habitat and potential habitat was surveyed from the Blackburn Bridge to the Stickney Point Bridge in Little Sarasota Bay. Various oyster habitats were encountered and evaluated for potential restoration. Several sites were selected for further assessment and analyses.

A follow-up field trip took place in July 2003. Three locations were identified for in-depth assessment: North Creek, which was chosen as a reference site, and Turtle Beach and White Beach, which were considered prime candidates for oyster habitat enhancement. At each location, a suite of physical observations and biological measurements were made. Results from this initial oyster habitat assessment were submitted in a final report to the Sarasota Bay National Estuary Program (Leverone, 2003).

White Beach and Turtle Beach sites were selected for the creation of new oyster habitats. In 2005, permit applications were submitted and approved, materials purchased, and designs and configurations for each habitat project developed. Field construction for oyster habitat creation took place in August 2005.

NOAA Fisheries has developed a manual for the development of success criteria in restoration projects and we determined that the SBEP should generate criteria for this project following those guidelines. NOAA considers oyster habitat valuable because the "provide natural larval settlement habitat for oysters and the complicated three-dimensional meshwork necessary to support complex biological communities. Oysters are food items for juvenile blue crabs, mud crabs, and larval gobies and blennies. Many recreationally valuable fish species depend on oyster reefs as feeding grounds and

nursery areas. Oysters improve water quality and clarity by filter feeding nutrients and sediment out of the water column." Our goals for measuring success in the first year of this project were simple, but these goals can be used to build upon as we move forward into successive years of creating and monitoring oyster habitats in Sarasota Bay

Description of Monitoring Activities

Recruitment monitoring began immediately after the completion of habitat construction in August 2005. Site visits were made monthly to White Beach (existing restoration site), Turtle Beach (existing restoration site), and North Creek (reference site). Recruitment monitoring consisted of two components: the installation and retrieval of removable settlement plates and the collection of a limited number of shells from the shell bags at each restoration site. The settlement plates allowed for the temporal monitoring of spat settlement while analysis of the oyster shell allowed for the assessment of how well the habitat structures were attracting oyster recruits.

Settlement plates measured 15 x 15 cm square and were suspended vertically in the water column roughly one foot off the bottom. Four plates were deployed at each site. Each month, two of the plates were removed and replaced by new, clean plates. The next month, the other two plates were exchanged. This resulted in each set being allowed to "soak" for two months, which allowed time for the settlement and growth of oyster spat. By overlapping the exchange frequency of plates, episodes of recruitment could be determined to within a particular month. Plates were allowed to air dry for several weeks. The number of oyster spat (and barnacles) per plate was determined.

Removing a limited number of shells from bags at each site was valuable in monitoring how well the created habitat was attracting oyster recruits. Over time, the shells should become colonized with oysters and this could be semi-quantitatively measured by counting the number of colonizing spat over the first year of monitoring. Roughly six to twelve shells were removed from the surface of an "oyster sausage" (=habitat module) and returned to the laboratory. The shells were allowed to air dry over several weeks and the number of oyster spat per shell counted.

The NOAA Fisheries manual for the development of success criteria in restoration projects was used to help generate criteria for this project. Criteria are divided

into two components: structural objectives and functional objectives. Elements of our success criteria for this project are listed in the results.

Results

The results from the first year of monitoring are very straightfoward and can be summarized in just a few tables and figures. However, we have added a series of photographs in the Appendix to help visualize these results.

Table 1 summarizes the sampling schedule for the first year. One point of interest is that during the Spring, 2006, sampling frequency increased to every three weeks for the remainder of the year. This was done in an attempt to better characterize the anticipated spring pulse of recruitment typically associated with invertebrate populations.

From Table 2, however, we see that there was no pulse of recruitment at any location during 2006. Recruits were only found in October, 2005 at Turtle Beach and not again until July, 2006 at White Beach. The following month, August, found recruitment occurring at White Beach and North Creek.

Figure I shows how well the shells used to create oyster habitat were able to attract oyster recruits. Oysters recruited immediately at both sites and the shells maintained a very healthy number of spat. Shells at White Beach had roughly twice as many spat per shell as Turtle Beach. This may be due to the habitat at White Beach being more subtidal and therefore, more often submerged than Turtle Beach. This would allow for more opportunity for oysters to recruit. Nonetheless, both sites attracted a substantial number of oyster recruits. Photographs of colonized oyster shell and spat collectors are attached in an Appendix at the end of this report.

Conclusions

The two oyster habitats created in Little Sarasota Bay during 2005 functioned successfully as substrates for the attraction of viable oyster spat. Recruitment was effectively monitored during the first year. However, the "substrates" selected to monitor temporal spat recruitment did not perform as efficiently as anticipated and, therefore, we recommend that suspended oyster shell be used to monitor recruitment during year two.

Table 1. Settlement Plate and Shell Monitoring Schedule

Date	White Beach			Turtle Beach			North Creek		Comments
	Shells	Plates		Shells	Plates		Plates		
		Deploy	Retrieve		Deploy	Retrieve	Deploy	Retrieve	
24-Aug-05		4			4		4		
26-Sep-05	x	4	4	x	4	4	4	4	
24-Oct-05	x	4	2	x	4	2a	4	2a	
5-Dec-05	x	2	2	x	2a	2b	2a	2b	2 outside plates at WB missing; replace next visit
2-Jan-06	x	2		x	2	2	2	2	
6-Feb-06	x	2	2	x	2	2	2	2	
27-Feb-06		2	2		2	2	2	2	Inc. plate freq. to every 3 wks
20-Mar-06	x	2	2	x	1	2	1	2	1 plate stuck at TB & NC each
14-Apr-06	x	2	2	x	2	2	2	2	
5-May-06	x	2	2	x	2	2	2	2	
26-May-06	x	2	2	x	2	2	2	2	New recruits @ WB;Barnacles over spat @ TB
16-Jun-06	x	2	2	x	2	2	2	2	
11-Jul-06	x	2	2	x	2	2	2	2	
3-Aug-06			2			2		2	

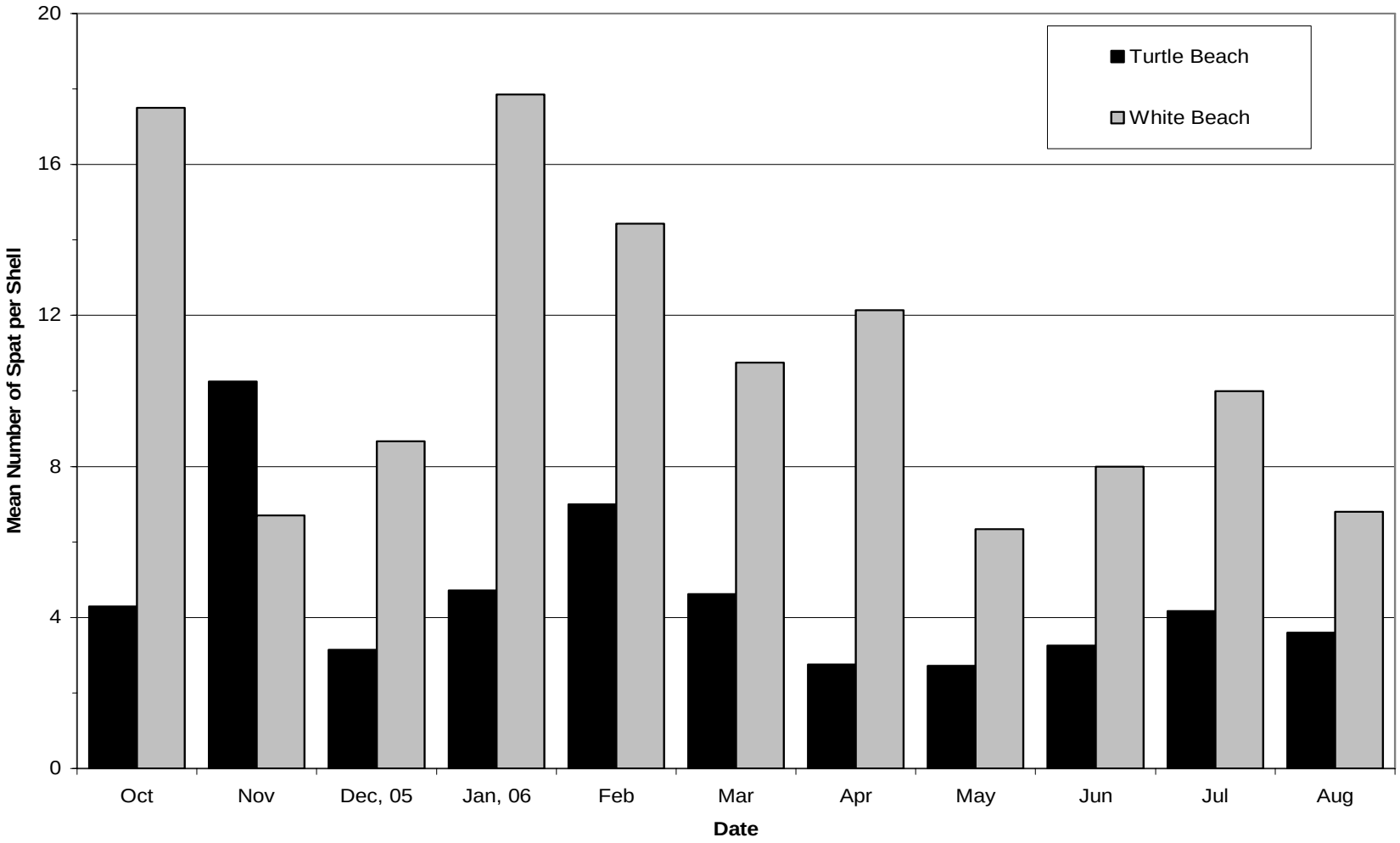


Figure 1. Mean number of oyster spat per shell at the two oyster habitat restoration sites. Total number of shells collected each month ranged from six to ten per site.

Table 2. Total Number of Spat on Settlement Plates During the First Year of Recruitment Monitoring. SBEP Oyster Habitat Program.

Retrieval Date	Turtle Beach	White Beach	North Creek
26-Sep-05	0	0	0
24-Oct-05	3	0	0
5-Dec-05	0	0	0
2-Jan-06	0	0	0
6-Feb-06	0	0	0
27-Feb-06	0	0	0
20-Mar-06	0	0	0
14-Apr-06	0	0	0
5-May-06	0	0	0
26-May-06	0	0	0
16-Jun-06	0	0	0
11-Jul-06	0	3	0
3-Aug-06	0	16	3

Table 3. N.O.A.A. Success Criteria for Monitoring Created Oyster Habitat in Little Sarasota Bay: Year 1

Structural Objective: To create two oyster platforms with fossilized shell material

This objective was met during 2005-06

Functional Objective: To result in successful oyster recruitment on the created platform

Parameter (what will be measured and in what units): oyster recruitment

Technique for measurement: spat counts per settlement plate at each site

Baseline (ideal numerical value for the functional parameter): 0

Reference (ideal numerical value for the functional parameter): ten spat per settlement plate per month during peak spawning season

Target (proposed numerical value desired for the functional parameter): five spat per string per month during peak spawning season.

Timing (sampling frequency and end date): Monthly from August, 2005 through August, 2006

APPENDIX PHOTOGRAPHS

SHELLS PLANTED AT WHITE BEACH OYSTER RESTORATION SITE

Colonized Shells from White Beach (December, 2005)

Colonized Shells from White Beach (February, 2006)

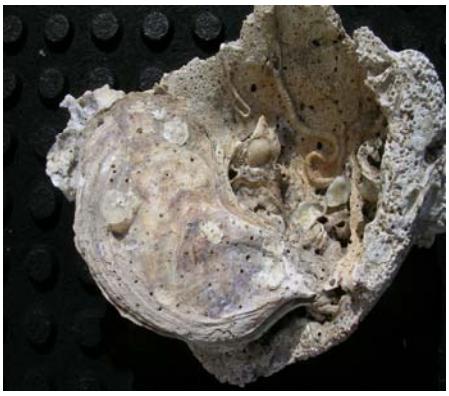
Colonized Shells from White Beach (June, 2006)

SHELLS PLANTED AT TURTLEBEACH OYSTER RESTORATION SITE

Colonized Shells from White Beach (December, 2005)

Colonized Shells from Turtle Beach (February, 2006)

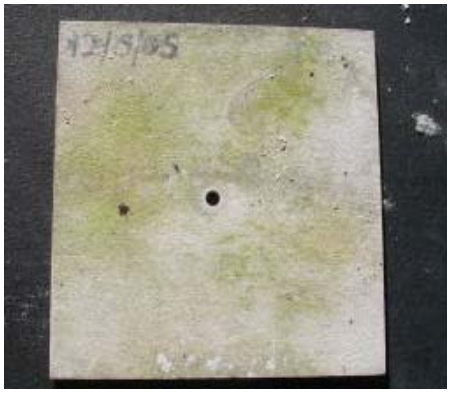
Colonized Shells from Turtle Beach (June, 2006)



Large oyster spat (> 2”) settled on oyster shell
from White Beach (August, 2006)

Colonized Shells from White Beach (August, 2006)

SETTLEMENT PLATES **SETTLEMENT PLATES**



December, 2005

July, 2006

February, 2006

August, 2006

June, 2006