

**MACALLOY RESTORATION PROJECT**  
**Intertidal Oyster Restoration Project**

**Year 2 Interim Progress Report**  
**Submitted by SCDNR**  
**January 2013**

**Interim Project Summary**

In Year Two of this project, SCDNR planted 24,240 bushels of oyster shells at four large-scale restoration sites to create 1.88 acres of hard structure for oyster recruitment along the shorelines of Charleston Harbor Watershed. Total acreage of oyster habitat to be established is 4.0-4.5 acres. During Year 3 of the project we will restore a minimum of 1.5 acres, bringing the total restored area after 3 years to 3.38 acres.

SCDNR is monitoring restoration site development to ensure that we are reaching target goals as set forth in the Oyster Restoration Plan and to evaluate the need for adaptive management. Each year perimeter footprints of the planted sites are mapped with Trimble® XP Pro GPS to accurately document restored area. Oyster recruitment potential is monitored with trays of shell deployed each spring and retrieved after 10-12 months. Preliminary assessments of actual recruitment and growth are made by subsampling restored areas at approximately 1 year post-construction. Reefs constructed in 2012 will be sampled in spring 2015 when they are approximately three years old. This will be our first opportunity to evaluate restoration success using the criteria outlined in the Statement of Work. Three years is the minimum time required for a restored reef to begin to display population characteristics typical of a natural reef.

The SCSPA Veterans Terminal on the Cooper River functions well and is critical to this project as an embarkation site to stockpile tractor trailer loads of Gulf Coast oyster shell and load the contractor's self-propelled barge with up to 1,200 bushels per planting operation. SCDNR has an agreement with SCSPA to use this site for the next several years.



Figure 1: Restoration sites planted in 2012 for Macalloy Project (see Table 1 for creek names)

Table 1: Oyster reefs constructed for MacAlloy Project in 2012. Site numbers refer to labeling on map.			
Site	Bushels Planted	Area Planted (acres)	Dates Planted
Site 49: Cooper River	6,210	0.536	6/29,7/2-7/6,7/31,8/1
Site 50: Charleston Harbor	7,260	0.61	7/10,7/24-7/26,8/2,8/3
Site 60: Ashley River	6,300	0.39	8/6-8/10,8/13
Site 67: Cooper River	3,150	0.348	7/11-7/13,7/17
<b>TOTALS</b>	<b>24,240</b>	<b>1.884</b>	<b>23</b>

## Year Two Accomplishments

### Restoration

Prior to the oyster recruitment season (April – September), DNR biologists identified and measured four restoration sites in the Cooper River, Ashley River and Charleston Harbor (Figure 1, Table 1).. Target shell planting depths of 3-4” and 5-6” were determined based on bottom type and energy potential of shorelines, with higher energy areas receiving greater planting depths. One inch diameter PVC poles were used to demarcate areas where shells were to be deployed and the volume of shell required to achieve the target planting depth was calculated. Shell was delivered from shucking houses out of state and quarantined at the SPA’s Veteran’s Terminal for 3-6 months before use.

DNR contracted with a private company to plant oyster shell for this project. DNR biologist loaded shells onto the contractor’s barge via conveyor. Each barge load of oyster shell (960-1,140 bushels) was transported to the predetermined restoration site and washed overboard onto intertidal shorelines using a high-pressure water cannon (Figure 2). Shells were planted in the selected areas approximately one hour before and after each high tide, depending on the day’s diurnal tidal range. PVC stakes that demarcated shell placement during the planting process were removed after planting and sites were mapped by walking the perimeter or “footprint” using a Trimble® XP Pro GPS (Figure 3). Polygons were downloaded into DNR’s Shellfish Management Database. In 2012, a total of 24,240 bushels of shell were deployed on 1.884 acres of shoreline (Table 1).



Figure 2: Oyster shells deployed by contractor with high pressured water cannon



Figure 3: Oyster planting being mapped using Trimble XP Pro GPS

## Monitoring

All sites are documented with digital photos of shorelines pre and post shell deployment (Figure 4 and 5). Trays of oyster shell are deployed at restoration sites each year to evaluate recruitment potential. Trays have been used to assess recruitment potential at natural and restored sites in South Carolina since 1998. Fifteen trays were deployed in the Charleston Watershed in April 2012 and will be retrieved and processed in March 2013. Spat on each shell will be counted and measured. Recruitment to the fifteen shell trays will be averaged and compared to recruitment monitored at other sites state-wide for the same time period. A preliminary assessment of oyster population development on planted shorelines will be implemented by taking replicate  $\frac{1}{4}$  meter quadrant samples from the four 1-year old reefs planted in 2012. All live oysters in the each sample will be counted and measured. A more thorough sampling to evaluate restoration success will occur in 2015 when the reefs are approximately three years old. Three years is the minimum time required for a restored reef to begin to display population characteristics typical of a natural reef.

Shoreline changes are being documented using digital photographs, monitoring of *Spartina* marsh erosion/accretion and determination of sediment composition changes over time. Accretion or erosion of adjacent *Spartina* is monitored by mapping the location of marsh grasses using line transects to demarcate the seaward boundary of marsh using the Trimble® XP Pro GPS. Sites will be reassessed after three years to document changes in *Spartina* growth patterns by re-walking line transects. Sediment core samples collected prior to shell deployment and at annual intervals thereafter will be used to evaluate changes in sediment composition. As finer sediments accumulate behind oyster reefs, *Spartina* will spread from nearby areas and eventually (usually after 3 or more years) become established immediately behind the reefs.



Figure 4: Ashley #60 before shell planting



Figure 5: Ashley #60 post shell planting

## Shell Supply

SCDNR started large-scale restoration projects focused on the Charleston Harbor Watershed in 2008. Since the start of these projects, the cost of oyster shell has

continued to increase. Oyster shell prices in 2013 are the highest to date (Table 2). A bid was awarded to Green's Oyster Company of Shallote, North Carolina for delivery of 30,100 bushels of shell to be planted in 2013. The cost of having a contractor plant shell has also increased each year since 2008 (Table 2). We are projecting that there will be another increase in the cost of contractual planting in 2013. Shells are being procured from shucking houses in Florida and North Carolina.

Year	Shell Cost/Bushel (Delivered)	Planting Cost
2008	1.23	1.17
2009	1.65	1.28
2010	1.98	1.38
2011	2.22	1.49
2012	2.26	1.72
2013	2.36	?

### **Year 3 Work Plan**

Site selection for new reefs to be constructed in 2013 will be conducted in early spring and reef construction should begin in May 2013. A minimum of 1.5 acres will be planted in Year 3, bringing the total restored area after 3 years to at least 3.38 acres. In addition to new reef construction, adaptive management in 2013 will include maintenance planting (i.e. adding more cultch material) to portions of the previous restoration sites that are lacking substrate. Approximately 2,500 bushels of oyster shell will be deployed at 1 site, Ashley 60, using DNR's barge and pushboat.

We will continue photo documentation of site construction and reef development, and changes in shoreline (e.g. marsh). Fifteen recruitment trays deployed in 2012 will be retrieved in February-March, 2013 and processed to measure all live oysters. Replicate samples from the restoration sites will be procured simultaneously and number and size of recruits on the reef can be compared to that in adjacent trays as part of our evaluation of whether adaptive management is required. A more thorough sampling to evaluate restoration success will occur in 2015 when the reefs are approximately three years old. Sediment samples will be obtained from each site to continue documentation of changes in sediment grain size.

### **References**

Coen, L. D., N. Hadley, V. Shervette, and W. Anderson. 2011. Managing Oysters in South Carolina: A Five Year Program to Enhance/Restore Shellfish Stocks and Reef Habitats Through Shell Planting and Technology Improvements. South Carolina Marine Resources Center, Technical Report Number 105. 79 pp

Statement of Work. February 2008. Intertidal Oyster Restoration Proposal for the Macalloy Restoration Project Trustees. 11pp.