

**City of Sanibel**  
**Natural Resources Department**

**Memorandum**

**April 23, 2012**

**TO:** Rob Loflin, Natural Resources Director

**FROM:** Holly Downing, Environmental Specialist

**RE:** Final Report: Community-Based Restoration of Oyster Habitat in Clam Bayou

The restoration of Clam Bayou has been a priority for both the City and the Sanibel Captiva Conservation Foundation's (SCCF) Marine Laboratory for many years. From 2000-2005, without a tidal connection, Clam Bayou routinely suffered from seasonal flooding, fish kills, algae blooms, poor water quality, and hypersalinity. In 2004, Hurricane Charley caused further devastation. Restoration of the system began in earnest in 2006. The City received several grants totaling \$375,000 to install of a culvert beneath Sanibel-Captiva Road and restore a tidal connection to the Gulf of Mexico through Pine Island Sound. Once complete, the SCCF Marine Lab initiated several efforts to "jump-start" the recovery of the Bayou's mangrove forests.

Since 2009, the City's Natural Resources Department has partnered with SCCF on two grant-funded projects to restore oyster habitat in Clam Bayou. Both grants were part of NOAA's Community-Based Partnership Program, one in coordination with the National Association of Counties (NACo) and the other with The Nature Conservancy (TNC). The City of Sanibel was included as a partner in both projects, providing in-kind contributions of staff time (Natural Resources and Public Works), permitting assistance, and equipment.

As noted in the accompanying final report and fact sheet, these two projects have engaged more than 1,300 volunteers contributing 2,800 hours, and resulted in the placement of over 100 tons of fossil shell into Clam Bayou. Bags of fossil shell were arranged into five distinct reefs, totaling 761 m<sup>2</sup> of habitat. After one year, all five reefs met success criteria for density, growth, recruitment, and resident reef community development. These reefs also removed 13-44% of chlorophyll a from the adjacent water column, suggesting that the reefs were providing valuable ecosystem services (habitat and water quality improvement) in as little as one-year post reef construction.

The entire final report "Community-Based Restoration Of Oyster Habitat: A Project to Evaluate Its Success, Associated Effects on Water Quality and Seagrass Health in a

Recently Modified, Substrate-Limited Southwestern Florida Embayment" is available on the City's website at [http://www.mysanibel.us/council/agendas/Final\\_SCCF\\_Clam\\_Bayou\\_TNC\\_3\\_13\\_12.pdf](http://www.mysanibel.us/council/agendas/Final_SCCF_Clam_Bayou_TNC_3_13_12.pdf).



# CLAM BAYOU

## Oyster Reef Restoration Project

Marine Laboratory



The Nature Conservancy  
Protecting nature. Preserving life.™



### Native Reef Restoration on a SW Florida Barrier Island

#### Background

Native oysters (*Crassostrea virginica*) are a foundational species in the subtropical ecosystems of Southwest Florida. They are prolific in intertidal reefs and below the red mangrove (*Rhizophora mangle*) fringe. Numerous shell middens found throughout the barrier islands of Charlotte Harbor are evidence of the long history of shellfish consumption by the Calusa Indians. Oysters have always been important to the fishing folklore of Sanibel since its habitation by people in the early 20<sup>th</sup> century.

The global losses of oyster reefs (TNC reefs at risk) to overharvesting and water quality degradation has prompted oyster restoration projects. While recreational harvest is no longer permitted in Charlotte Harbor, people recognize that oyster reef declines in the region have affected the overall health of the barrier island ecosystem.

#### Oyster Reef Restoration Project

Sanibel Island, Lee County, Florida, is the site of the oyster reef restoration within the boundary of the Charlotte Harbor National Estuary Program (CHNEP) and immediately adjacent to the J.N. "Ding" Darling National Wildlife Refuge (NWR). Clam Bayou includes over 235 acres of public parks (Silver Key and Bowman's Beach Regional Park) and 14 miles of mangrove shoreline (12 miles publicly- and 2 miles privately-owned).

Clam Bayou was connected to the Gulf of Mexico and Pine Island Sound through natural flow-ways. Storm events (hurricanes) and human activities isolated this water-body from natural tidal exchange and resulted in the degradation of mangrove, seagrass and oyster reef habitats (estimated loss of 150 acres of mangroves, 20 acres of oyster habitat, and 120 acres of seagrass). In 2006, a culvert was built to re-introduce tidal flushing.

Sampling units with fossil shell were used to monitor reef development at constructed reefs and compared to nearby natural reefs (above)

#### Importance of oyster reefs

- Oysters filter large quantities of water, removing algae, nutrients and sediments.
- Oysters were once abundant in many of the island's bayous; the remnants of these reefs can still be seen.
- Restoration of flows in 2006 allowed for more natural tidal levels and associated salinities, and access for manatees and other mobile species.
- By adding substrate at the appropriate tidal height we are enhancing settlement sites for oysters, increasing brood stock, as well as feeding/nursery sites for numerous finfish, invertebrates, birds, and mammals.

## Research and Monitoring

Oyster reefs were constructed at suitable sites adjacent to seagrass habitats to improve water quality (clarity) and expand shallow fringing seagrass communities. *In situ* fluorometry by Dr. R. Grizzle were used to calculate uptake rates on constructed reefs. Trimble GPS surveys were done and maps prepared to define the 5 reef footprints and areas. We will be monitoring water quality, seagrasses, oysters and the associated organisms within restored and adjacent natural areas.

The project also deployed recruitment sampling units in Clam Bayou, Tarpon Bay, Pine Island Sound and San Carlos Bay to assess oyster recruitment and constructed reef progress at sites with a variety of salinity ranges and larval abundances. Oyster densities (>50 m<sup>-2</sup>), size frequency distributions, invertebrate reef resident diversity (> 10 species), and relief (> 5 cm) of the constructed reefs were used to determine success (TNC restoration evaluation guidelines)



Measuring oyster shell height.



Oyster spat growing through the bags.

## Outcome (TNC/NOAA efforts)

Metric	Goal	Actual (2012)
Reef Area (m <sup>2</sup> )	400	637
Recruitment (oysters m <sup>2</sup> yr <sup>-1</sup> )	50	137
Growth Rate (mm day <sup>-1</sup> )	Positive	0.1
Resident Species	>10	14
Water Quality Improvement	percent reduction in chl a	18%
Reef Relief	m above sediment	0.100
Community Involvement	volunteers	383
Community Involvement	hours	798



A juvenile stone crab residing in the shell bags at TNC-1



A wading bird forages on the constructed TNC-2 reef in Clam Bayou

## How You Can Help

The Sanibel-Captiva Conservation Foundation has annual membership and fund drives. Volunteer events are continuing in Clam Bayou and elsewhere on and around Sanibel. SCCF has started a oyster shell recycling program with area restaurants to build more reefs in the future. Prioritization of shellfish restoration sites has started through the CHNEP Shellfish Restoration Plan and continued collaboration with the Bailey-Matthew Shell Museum. For more information contact the SCCF Marine Laboratory (239) 395-4617, or stop in when you are visiting Sanibel Island

The National Partnership between the NOAA Community-based Restoration Program and The Nature Conservancy implements innovative conservation activities that benefit marine, estuarine and riparian habitats across the United States. The NOAA Restoration Center has worked with community organizations to support locally-driven projects that provide strong on-the-ground habitat restoration components that offer educational and social benefits for people and their communities, as well as long-term ecological benefits.

## Working Together

This effort is a collaborative effort between The Sanibel Captiva Conservation Foundation's (SCCF) Marine Laboratory, the City of Sanibel, the University of New Hampshire, Lee County and numerous volunteers and stake holders living around Clam Bayou. A related SCCF project funded by NOAA and the National Association of Counties (NACo) enhanced mangroves, seagrass and oysters in Clam Bayou.

Since October 2009, the overall Clam Bayou restoration has engaged more than 1,300 volunteers contributing 2,800 hours, and placed over 100 tons of fossil shell into Clam Bayou.



Join us for a Restoration Volunteer Event!

*The mission of The Nature Conservancy is to preserve the plants, animals, and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive.*