

Oyster Restoration in Galveston Bay Following Hurricane Ike

By Charlene Drake | July 1, 2012

(see <http://www.texassaltwaterfishingmagazine.com/fishing/oyster-restoration-galveston-bay-hurricane-ike/subpage26.html>)

Hurricane Ike made landfall September 13, 2008 on the upper Texas coast. Visible damage was apparent everywhere. Over 80% of the homes on Bolivar Peninsula were destroyed, windows were blown out of downtown Houston office buildings, boats, vehicles and debris were scattered everywhere, and 34 people died in Texas.

Damage to the natural resources was just as catastrophic. Galveston Bay was filled with 12 feet of water from tidal surges, depositing tons of debris and sediment into the bay covering and killing ecologically and historically important oyster reefs.

In the US, the Eastern Oyster (*Crassostrea virginica*) range from Maine to Texas and oyster reefs are an important part of any bay ecosystem. A single oyster can filter 50 gallons of water in one day, allowing for improved water clarification and water quality. Using this rate, at a minimum density of 10 oysters per square meter, 130 acres of reef would be capable of filtering approximately 260 million gallons of water per day. By comparison, in 2009, the city of Houston's 39 wastewater treatment plants had a combined average daily wastewater treatment flow of 252 million gallons per day (Greater Houston Partnership, see <http://www.houston.org/economic-development/facts-figures/utilities/index.aspx>). Oyster reefs also provide habitat for vertebrates and invertebrates and are ideal destinations for recreational harvest of fish such as red drum, spotted seatrout, and black drum.

Oysters in Texas have been harvested as far back as the 17th century (Karankawa Indians). Number of oysters harvested and overall reef sizes have been on a decline for decades for many reasons, including overfishing, shell mining, disease, silt overburden, extended times of flooding, and drought conditions.

Texas Parks & Wildlife Department (TPWD) Oyster Restoration Program has staff and equipment dedicated to mapping the bay bottom with side scan sonar. Images were recorded in Galveston Bay prior to Hurricane Ike and after landfall. These data show that 60% of reefs in Galveston Bay and 80% of reefs in East Galveston Bay (8,000 total acres) were either damaged or destroyed by sediment deposition over the reefs. East Galveston Bay was closed to commercial oyster fishing November 2009 until November 2011 to allow oyster reefs time to recover from hurricane damage and allow TPWD time to conduct oyster restoration activities.

The goal of oyster restoration is to provide a hard substrate (referred to as cultch), upon which the free swimming oyster larvae will attach, grow and help repopulate the reefs. The preferred cultch material is oyster shell, but demand for oyster shell for other purposes has made its use in restoration cost prohibitive. Materials used today include limestone, river rock, or clean crushed concrete.

Reef restoration work in Texas goes back to the 1940s, but the first large scale cultch planting took place in East Galveston Bay in September 2008. This type of reef restoration has been used for years along the Gulf and mid-Atlantic coasts, though it is a very expensive endeavor.

In 2009, TPWD received a \$7 million National Oceanic and Atmospheric Administration grant for fishery disaster relief due to Hurricane Ike. Portions of the money were used to "restore" (quotes LDC, was monitoring included?) damaged oyster reefs in Galveston Bay.

Sub-bottom profile surveys were conducted by Texas A&M University at Galveston to determine sediment depths over the oyster reefs. Detailed maps showing sediment depths were used to determine which reefs were better suited for bagless oyster dredging (less than 6 inches of sediment) and which reefs were better suited for cultch plantings (greater than 6 inches). Areas in central Galveston Bay had the least amount of sediment overburden while reefs in East Galveston Bay had the most. Some reefs of East Bay were buried with over 12 inches of sediment.

Hurricane Ike restoration work was divided into two phases - bagless dredging and cultch plantings. Both phases were timed to take advantage of the summer/fall larvae set.

Phase one began in June 2010 and ended in October 2010. TPWD hired commercial oyster fishermen from the Galveston Bay area who held oyster licenses and had verified oyster landings prior to the hurricane to pull bagless oyster dredges across designated reefs depositing the hard shell back on top of the silt. Several hundred applications were received, and one hundred sixty-six boats were utilized during five months. On average 1-2 reefs were **restored** each week and depending on the size of the reefs, anywhere from 5-50 boats worked each day.

Over the five month period 819 "boat days" resulted in the restoration of approximately 1,104 acres of oyster habitat at a cost of \$740 per acre (*replanted with cultch, is this truly restoration??, LDC*).

The second phase entailed hiring a contractor to place cultch material (river rock) on reefs that were covered in deeper sediment. Restoration work began in 2010 when permit applications were submitted to the US Army Corps of Engineers and surface lease applications were submitted to the Texas General Land Office. Upon receipt of permits and leases, solicitation of competitive bids for the cultch planting were received and finalized in spring 2011.

Over 56,760 cubic yards of river rock were "planted" on 139 acres of reef in Galveston Bay and East Galveston Bay during the summer of 2011 at a cost of \$3,106,513 or approximately \$22,000 per acre.

The oyster restoration team will monitor these sites for the next two years to determine the level of success of the two restoration techniques.

To learn more about oyster restoration, please visit the Texas Parks & Wildlife page on YouTube .com

Texas Parks and Wildlife and CCA Texas Partner on 180 Acre Oyster Reef Restoration Project

By John Blaha | September 16, 2014

(see <http://www.texassaltwaterfishingmagazine.com/fishing/texas-parks-wildlife-cca-texas-partner-180-acre-oyster-reef-restoration-project/subpage2596.html>)



A very strong current has already been created between Vinson Slough and Cedar Bayou.

Photo by Lisa Laskowski

Across the world it is estimated that 85% of oysters have been lost since the late 1800s. Oysters are an important part of a healthy and sustainable ecosystem. A single healthy oyster can filter roughly 1.3 gallons of water per hour. Oysters are the natural filters of the ecosystems and a healthy oyster system improves water quality by filtering out excess nutrients, algae, and sediments. This has several benefits; improved water clarity in particular.

In 2008, roughly 50% of Galveston Bay's oyster reefs were lost during Hurricane Ike due to heavy sedimentation. Oyster reef losses in East Galveston Bay are estimated to have been up to 80%. Texas Parks and Wildlife Department (TPWD) and CCA Texas began working together in late 2010 to secure substantial funding through the Coastal Impact Assistance Program (CIAP). A \$3.2 million grant was secured for an oyster restoration project and CCA Texas provided an additional \$500,000 to help restore 180 acres, completed in August 2014.

This project focused on four areas in East Galveston Bay. 80 acres were restored at Hannah's reef, 70 acres at Pepper Grove reef, 15 acres at Middle Reef and 10 acres at CCA Middle Reef. CCA Middle reef was constructed in a "mounding" configuration in order to create more bottom relief and fish habitat, and to provide opportunities for evaluating construction methods and success. The other three sites used a more evenly spread cultch material; river rock of 1- to 2 inches. This material was chosen so that it would pass through the commercial oyster dredge, thus minimizing the removal of cultch from the bay. The effort produced near instant success as cultch materials deployed in May 2014 and collected from Hannah's reef in late July have already had oyster spat set and growth beginning. In an effort to

protect these restoration efforts, recent legislation has been passed that will close these reefing sites to harvest for two years.

"A project like this does so much for a local volunteer and it is like connecting the dots," commented Mike Petit, longtime CCA Texas member and CCA Texas Executive Board member. Mike commented further, "It is really gratifying as a local volunteer to see where the money goes that local chapters raise and to see that it is making an impact on the local bay system."

CCA Texas's habitat initiative, Habitat Today for Fish Tomorrow (HTFT) continues to work closely with state agencies, like organizations, and academia to restore and create vital habitat all along the Texas coast. Projects like this are critically important in helping to ensure healthy coastal ecosystems are viable now and for future generations.

"Oyster reefs are an important part of a healthy ecosystem. They not only improve water quality, but also provide essential fish habitat," commented Robby Byers, CCA Texas Executive Director. Byers continued, "CCA Texas contributed \$500,000 to this project. These dollars raised by CCA Texas volunteers are a great example of a true grassroots effort to put money and effort back into the resource."

CCA Texas will continue to remain a part of this project by recruiting local recreational fishermen to fish the new reefs as "citizen scientists". This effort is needed to create baseline data that will be used in the study to evaluate the success of the project. Volunteers are encouraged to work with TPWD and CCA Texas and fish designated areas by designated methods and be a part of the success and evaluation of the project. CCA Texas will also work with TPWD to provide outreach and education to the general public about oyster reefs and the efforts to restore them.

If you are interested in helping TPWD and CCA Texas collect this type of data, please contact John Blaha at jdblaha@ccatexas.org or Bill Rodney at Bill.Rodney@tpwd.texas.gov.