Restoring Ecosystem Services in Mississippi Coastal Waters by enhancing Secondary Productivity using Oyster Cultch and Artificial Reefs

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CEER – 2014 New Orleans
Mississippi Early Restoration
Tier I

- **Oyster Cultch**
  - Oyster cultch provides hard substrate for larval settlement and success
  - Consists of shell, limestone or crushed concrete

- **Artificial Reef**
  - Low or high Profile “hard bottom” placement to diversify habitat in a predominantly soft bottom habitat
  - Achieved by placing “cultch” material slightly larger than oyster cultch
  - Increases secondary production with a combination of sessile organisms and associated flora and fauna
Oyster Life Cycle

Source: South Carolina DNR
Mississippi Oyster Areas
Telegraph Shell Plant Pre Katrina

Side Scan of Spring 2005 Telegraph Shell Plant Conducted July 2005 Pre Hurricane Katrina.

SideScan of 2005 Telegraph Shell Plant Conducted July 2006 Post Hurricane Katrina.
Indicates commercial oyster production in MS could be Cultch Limited.
Oyster Restoration

• 12000 Acres of Oyster Areas
  Approximately 9,000 acres of managed western harvest areas
  3000 acres of relay areas in Eastern Mississippi Sound

• 2009 Restoration Management Results
  – 386,000 sacks

• Injured by exposure to Deepwater Horizon oil and/or response activities to prevent, minimize and/or remediate oiling
Oyster Cultch Project Summary

Objective: Restore approximately 1430 acres of oyster cultch areas in the marine waters of Mississippi

Project Components: Cultch Plan and monitoring

Estimated Project Cost: $10,100,000

Lead Agency: Mississippi Department of Environmental Quality (MDEQ)

Public Outreach: Project live on NOAA atlas database

Permitting: Existing General Permit

Schedule: Construction 2012-Spring 2013; Fall 2014
Tier 1 Assumptions for offset estimate

• Mississippi Oyster Cultch Restoration
For the purposes of negotiations of Offsets with BP in accordance with the Framework Agreement, the Trustees used Resource Equivalency Analysis to estimate Offsets for Mississippi Oyster Cultch Restoration, resulting in expected production of oysters on cultch material over time. Offsets reflect estimated kilograms of oysters produced, and would be applied against oyster injuries in Mississippi Sound injured by the Spill as determined by the Trustees’ total assessment of injury. The Trustees considered a number of factors in estimating oyster production, including, but not limited to, typical oyster production in the project area, estimated project life span and size of the project. Total estimated Offsets for Mississippi Oyster Cultch Restoration is 2.0 million Discounted Kilogram (Dkg) Years of oyster biomass. These Offsets are reasonable for this resource and this project.

These Offsets are applicable first to any oyster injuries in Mississippi.

If any surplus remains, to nearshore benthic invertebrate injuries in Mississippi.
Oyster Restoration

- Cultch Placement
2012 Pre-deployment Side Scan Area
LFSS
Inshore Artificial Reefs

- Substrate Placement
Offset Assumptions

- **Mississippi Artificial Reef Habitat**
For the purposes of negotiations of Offsets with BP in accordance with the Framework Agreement, the Trustees used Resource Equivalency Analysis to estimate Offsets for Mississippi Artificial Reef Habitat project, resulting in expected production of invertebrate infaunal and epifaunal biomass at nearshore artificial reefs. Offsets reflect estimated kilograms of biomass produced, and would be applied against secondary productivity injuries in Mississippi Sound from the Spill as determined by the Trustees’ total assessment of injury. The Trustees considered a number of factors in estimating biomass production, including, but not limited to, typical productivity in the project area, estimated project life span and size of the project. Total estimated Offsets for the Mississippi Artificial Reef Habitat project are **763,609 Dkg-Ys of invertebrate infaunal and epifaunal biomass** at nearshore artificial reefs in Mississippi.

Ash-Free-Dry-Weight of Secondary Production of invertebrate infauna and epifaunal biomass.
Monitoring

• Standard Construction monitoring
  – Material placement with sidescan
  – Dive assessments

• Ecological Monitoring
  – Calculate secondary productivity in cultch areas for 7 years
  – Project lifetime issues. Sidescan
Oyster & Artificial Monitoring

• DMR Sampling Plan
  – Spring sampling of Oyster reefs initiated
  – Dredge samples of several reefs completed
  – Quadrat samples underway

• GCRL Sampling Plan
  – Baskets and Trays deployed in May and Picked up in June
Sample Locations (circles) Pass Marianne Reefs. Red squares indicate location of NRDA cultch plant.
Dredge Samples (semi-quantitative)
Oyster Spat on Limestone
DMR sampling -5-13-2014
Monitoring Strategy

Nearshore Artificial Reefs

MS-DEQ NRDA Early Restoration Candidate - Artificial Reefs

West Stratum

Central Stratum

East Stratum
Preliminary Observations from Oyster Dredge Samples 5/15/2014

• Fall spat set resulted in observed spat and seed oysters in the samples.
• Dredge sampling in range of historic sampling
• Minimal spat set so far this spring, but early in season
Cultch Quadrat Samples
Spring 2014
Quadrat Sample - Cultch 4A
5/13/2014
Preliminary Results
6/24/2014

• Quadrat Results from 5-13/2014 to 6/6/2014 confirm dredge tow samples that a good spat set occurred in late summer/fall of 2013
• To date, indications of good survival for spat and growth to seed for fall 2013 recruits
• New cultch plants do not show sufficient sack oyster currently for harvest.
Status

- Oyster and Artificial Reefs all in place as of 6-31-2013
- Adaptive Management of some oyster cultch areas continues in 2014
- Long Term Ecological Monitoring initiated Spring 2014
- Preliminary Results demonstrate good spat settlement on deployed oyster cultch
More Info

NOAA Data Atlas

- http://www.nodc.noaa.gov/deepwaterhorizon/

RESTORE.MS

- http://www.restore.ms/