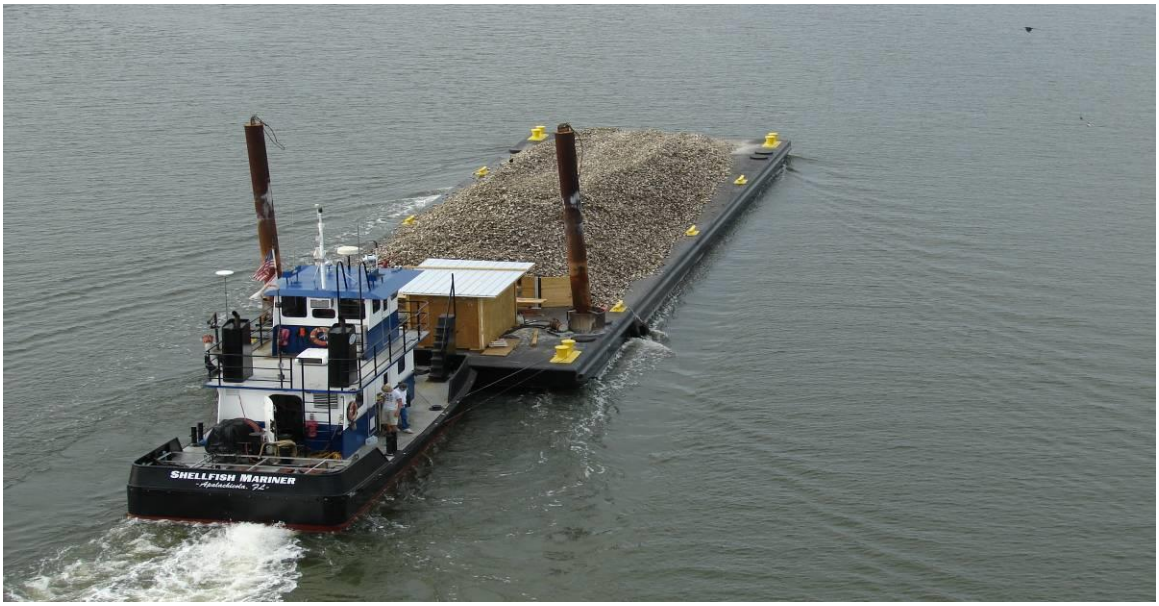
Project Name: Oyster Reef Restoration in the St. Andrew Bay System

Organization: Florida Department of Agriculture and Consumer Services

Project Narrative: Productive oyster reefs in the St. Andrew Bay System play an essential role in sustaining ecological relationships within the estuarine ecosystem, as well as the Gulf of Mexico (GOM). Beyond the fact that oysters and oyster reef communities represent important food sources for many species of commercially important fish and invertebrates, functioning oyster reefs are also recognized as critical structural and community components which stabilize and sustain a broad array of ecological relationships. When oysters, oyster reef habitat, and oyster population dynamics are injured, impaired or damaged, the result can be widespread throughout broader ecosystems and extend beyond local geographical boundaries. Many commercially valuable, recreationally important, and ecologically critical species within the GOM depend upon or spend a portion of their life cycles associated with oyster reef communities. Because of this complexity of food webs and life cycles, restoring functioning oyster communities is the cornerstone for any broad-scope aquatic resource restoration plan and a prudent management decision. This project will replace substrate and re-establish elevation using 12,000 cubic yards of shell on debilitated oyster reefs in West Bay, North Bay and East Bay, Bay County. Placing substrate or "cultch" in bays where natural reproduction occurs, is the most effective technique used throughout the GOM to 1) create three-dimensional reef structure, 2) stimulate spat setting, 3) enhance community functions, 4) increase natural productivity and 5) accelerate the recovery process. The Florida Department of Agriculture and Consumer Services (DACS) has been involved in rehabilitating oyster reefs for more than sixty years and provides a multi-dimensional approach built on decades of experience. DACS has the equipment, staff and expertise to obtain, stockpile, transport and deposit suitable substrate materials (quarried and processed shell) to successfully restore the structure and function of debilitated oyster reefs.



DACS has a history of completing restoration projects following devastating natural disasters, such as hurricanes, floods and droughts {Management of Oyster Resources in Apalachicola Bay

Following Hurricane Elena, *Journal of Shellfish Research*. (1988)*;* Biological and Economic Assessment of an Oyster Resource Development Project in Apalachicola Bay, Florida, *Journal of Shellfish Research* (1990); and Final Report - Restoration of Oyster Reefs Impacted by Hurricanes (2008)}. DACS is uniquely positioned to provide a single operational unit, with the infrastructure in place to effectively complete oyster reef construction projects; is currently engaged in multi-faceted programs to restore oyster habitat in numerous Florida estuaries; and manages a network of contractors with the knowledge, skills, ability and equipment to work effectively. This experience ensures that all critical components, including biological, environmental, hydrological, physical, logistical and operational parameters are considered.

Restoring the foundation and structural integrity of estuarine habitat should be a priority and a critical piece of the GOM restoration strategy. Restoring oyster habitat acts as an essential building block to offset the potentially injurious impacts from petroleum-based pollutants on estuarine and marine trophic systems. Rebuilding oyster reef infrastructure contributes to a "bottom up approach" to repairing injured, impaired and damaged natural resources along Florida's Gulf Coast. Improved habitat will form the foundation for oysters, as an engineering species, to contribute to wide reaching fishery and ecological benefits throughout estuarine, coastal and open Gulf ecosystems. Economic benefits are realized through harvesting, processing, and marketing fishery products and felt locally and regionally by all who enjoy high-quality, wholesome Florida seafood; depend upon commercial fisheries for employment and income; and recreate in Florida's waters. Ecological benefits are realized through an array of ecological services in the form of increased fishery and wildlife habitat; increased biodiversity and trophic dynamics; increased filtering capacity to improve water quality and recycle nutrients; and increased structural stability to reduce coastal erosion and to protect near shore resources.

Modified Scope of Work

The Department of Agriculture and Consumer Services (DACS) will act as the primary contractor for the NRDA project in the St. Andrews Bay System. DACS will be responsible for the administration, planning, implementation, management, and successful completion of all aspects of the proposed project. DACS will also be responsible for developing, implementing, and completing a monitoring program to assess the success and benefits of the restoration activities.

Administration

DACS will be responsible for all financial actions involved in the project, including: selecting subcontractors, vendors and service providers, executing contracts, purchase orders and agreements, reviewing invoices and making payments for services provided, and verifying accounting practices.

Planning

DACS will be responsible for planning all components of the proposed project, including: the review and approval processes for selecting subcontractors (bid quotes, contractual agreements); developing the scope of work for the entire project and for individual components and subcontractors; allocating staff time and equipment to participate and manage project operations; select suitable sites for restoration; and schedule on the ground restoration operations. Staff will schedule meetings with subcontractors to establish project schedules and timelines, logistics, operating parameters, and job-related responsibilities.

Implementation and Management

DACS will review, evaluate and select subcontractors that can provide the required services to implement the project, establish schedules for operations, and manage project logistics. DACS staff will maintain on-site project management and supervision; delineate project boundaries, and ensure the operations conform to the terms and conditions of contract agreements and purchase orders.

Completion

DACS will be responsible for approving work upon completion to determine if the project was completed in accordance with contract provisions and job specifications. Staff will verify that all jobs listed in the scope of work are completed before approving invoices for payment.

Monitoring

DACS will be responsible for developing a post-completion monitoring program to assess and report on the project's progress and success. Restored reefs may become productive in as few as 3 to 6 months under optimal conditions, with oyster reaching market size in 12 to 18 months. However, since recruitment and survival can be highly variable, some reefs may not become

productive for 2-5 years. It has been shown that restored reefs can remain productive for more than 10 with little additional maintenance (dragging to re-expose shell material and substrate enhancement). Based on the expected longevity of the restored reefs, DACS will conduct a monitoring program which will assess oyster population parameters for ten years.

DACS has conducted oyster resource surveys on oyster-producing reefs since 1982, and this information is used by resource managers to reliably predict trends in oyster production; to monitor oyster population dynamics, including recruitment, growth, natural mortality, standing stocks; and to determine the impacts of climatic events such as hurricanes, floods, and droughts on oyster resources.

Oyster Restoration Monitoring Plan

DACS will be responsible for effectively assessing the status of oyster resources on reefs that are restored during this project. Staff will develop and apply specific metrics to delineate reef locations and reef area, measure population parameters, and estimate production potential.

The proposed monitoring schedule will include collecting samples following project completion on all restored reefs and establishing a sampling schedule based on expected recruitments cycles. All restored reefs will be sampled twice a year from year-one through year-five and once a year from year-six through year-ten. Sampling intervals may be modified to assess significant events which may affect oyster population dynamics. A total of sixteen sampling trips are planned for each restored reef.

Staff will establish and describe the parameters and metrics required to accurately assess oyster reef habitat and populations on restored reefs. Staff will measure and delineate the restored oyster reefs to determine the surface area and reef boundaries, and estimate the coverage forming available reef habitat. DACS has been engaged in monitoring since 1982 and data analyses have allowed resource managers to develop a scale using defined sampling protocol to determine the relative condition of oyster resources based on estimated production parameters. Staff will apply the Standard Oyster Resource Management Protocol to establish baseline and serial oyster population data to measure and report changes in oyster populations and oyster population dynamics.

The Standard Oyster Resource Management Protocol is based on collecting oyster samples from quadrats established at specific sampling locations on restored reefs. Samples are collected by divers using current standard procedures and returned to the laboratory for analyses. Live oysters collected during replicated samples are individually measured, dead oysters and recent boxes are counted, predators are identified and counted, and the general condition of the reef is recorded. The numbers and size of live oysters are converted to size frequency distributions that are used to develop population parameters, such as density, production levels, recruitment, growth, and survival, which in turn, can be applied to predict population trends and identify adverse impacts from events such a hurricanes, floods and drought.

The Standard Oyster Resource Management Protocol provides that estimated production exceeding 400 bags of oysters per acre indicates healthy oyster reefs capable of sustaining

commercial harvesting. Accordingly, oyster populations are 1) capable of supporting limited commercial harvesting when stocks exceed 200 bags/acre, 2) below levels necessary to support commercial harvesting when stocks fall below 200 bags/acre, and 3) considered depleted when marketable stocks are below 100 bags/acre (Berrigan, 1990). Generally, the protocol has been an accurate indicator of oyster production in Apalachicola Bay, and can be applied as a condition index in other oyster producing areas.

Modified Budget: Estimated Project Costs for Oyster Restoration Project in St. Andrews Bay

Assumptions:

Volume Delivered = 12,000 cubic yards (10,000 ton @ 1.2 cu yd/ton)
Acres Restored = 60 acres (200 cu yds per acre)
Contractor provides materials, transport and deposition
DACS provides project planning, on-site supervision, monitoring for 10 years

Activity (Expenses)	Hours	$/ Hour	Cost
Planning (Mapping)	240	27.00	$ 6,480
Contract Manage	60	35.00	$ 2,100
Supervision (On-site) (3-man crew for 15 days)	450	27.00	$ 12,150
Monitoring (16 monitoring trips: 1 post-project; 2/yr for years 1-5; 1/yr for years 6-10)			
Post Project	120	27.00	$ 3,240
(2 x annual)	1200	27.00	$ 32,400
(1 x annual) (3-man crew for 15 days)	600	27.00	$ 16,200
Equipment	Days	$/Day	
(Sea Hawk)	100	250.00	$ 25,000
(Vehicles)	100	100.00	$ 10,000
Replacement Equipment ($120,000 not listed if included in another project)			
Travel (100 days x 3)	300	100.00	$ 30,000
Subtotal			$ 137,570
Administration (15%)			$ 20,630
Sub Total			$ 158,200

Estimated Contract Expenses (Material, Transport and Deposition)

(12,000 cubic yards of No.57 Limestone Aggregate @ $65/yd	$ 780,000
(12,000 cubic yards of No.57 Fossil Shell @ $95/yd	$1,140,000

Total Project Cost (12,000 yds @ $65.00/yd)	**$ 938,200**
Total Project Cost (12,000 yds @ $95.00/yd)	**$1,298,200**

Projected Restoration Sites in St. Andrew Bay System

West Bay

Mid-bay Reef (ICWW) (Site #1): Reef is improved habitat constructed on sand shoals and spoil in the middle of West Bay along the north side of the Gulf Intracoastal Waterway; the existing substrate is clam and oyster shell matrix, and the surrounding bottom is generally sand shoals landward of reef.

L/L Coordinates:	30:16. 40N / 85:49.60W
Proposed Restoration Area / Depth:	10 acres / 3-8’
Proposed Restoration:	Improve substrate, re-establish elevations
Cultch Material:	Lime rock aggregate or fossil oyster shell
Cultch Deposition Method:	High pressure water
Deposition rate	200 cubic yards per acre

Doyle Point (Site #2): Reef is improved natural habitat constructed on sand shoals on the north side of West Bay, south of Doyle Point; the existing substrate is clam and oyster shell matrix, and the surrounding bottom is generally sand shoals.

L/L Coordinates:	30:16. 70N / 85:47.55W
Proposed Restoration Area / Depth	10 acres / 7-9’
Proposed Restoration:	Improve substrate, re-establish elevations
Cultch Material:	Lime rock aggregate or fossil oyster shell
Cultch Deposition Method:	High pressure water
Deposition rate	200 cubic yards per acre

Breakfast Point Bar (Site #3)): Reef is improved habitat constructed adjacent to unconsolidated natural reefs on the south side of West Bay, north of Breakfast Point; the existing substrate is clam and oyster shell matrix, and the surrounding bottom is generally muddy.

L/L Coordinates:	30:15.55N / 85:47.08W
Proposed Restoration Area / Depth:	10 acres / 7-9’
Proposed Restoration:	Improve substrate, re-establish elevations
Cultch Material:	Lime rock aggregate or fossil oyster shell
Cultch Deposition Method:	High pressure water
Deposition rate	200 cubic yards per acre

East Bay

Strange Point Bar (Site #4): Reef is improved habitat constructed adjacent to unconsolidated natural reefs on the south side of ICWW in eastern East Bay, offshore of Strange Point in the vicinity of Strange Bayou; the existing substrate is clam and oyster shell matrix, and the surrounding bottom is generally muddy with sand shoals shoreward of the reef.

L/L Coordinates:	30:01.85N / 85:29.40W
Proposed Restoration Area / Depth:	5 acres / 7-9’
Proposed Restoration:	Improve substrate, re-establish elevations
Cultch Material:	Lime rock aggregate or fossil oyster shell
Cultch Deposition Method:	High pressure water
Deposition rate	200 cubic yards per acre

Baker Point Bar (Site #5): Reef is improved habitat constructed adjacent to unconsolidated natural reefs on the south side of ICWW in eastern East Bay, offshore of Baker Point in the

vicinity of Farmdale Bayou; the existing substrate is clam and oyster shell matrix, and the surrounding bottom is generally muddy with sand shoals shoreward of the reef.

L/L Coordinates:	30:01.45N / 85:28.38W
Proposed Restoration Area / Depth	5 acres / 7-9’
Proposed Restoration:	Improve substrate, re-establish elevations
Cultch Material:	Lime rock aggregate or fossil oyster shell
Cultch Deposition Method:	High pressure water
Deposition rate	200 cubic yards per acre

Little Oyster Bar Point (Site #6): Reef is improved habitat constructed adjacent to unconsolidated natural reefs, offshore of Little Oyster Bar Point; the existing substrate is clam and oyster shell matrix, and the surrounding bottom is generally muddy with sand shoals shoreward of the reef.

L/L Coordinates:	30:03.17N / 85:30.47W
Proposed Restoration Area / Depth:	5 acres / 7-9’
Proposed Restoration:	Improve substrate, re-establish elevations
Cultch Material:	Lime rock aggregate or fossil oyster shell
Cultch Deposition Method:	High pressure water
Deposition rate	200 cubic yards per acre

Auburn Cove (Site #7): Reef is improved habitat constructed adjacent to unconsolidated natural reefs in the vicinity of Auburn Cove; the existing substrate is oyster shell matrix, and the surrounding bottom is generally muddy with sand shoals shoreward of the reef.

L/L Coordinates:	30:03.74N / 85:30.87W
Proposed Restoration Area / Depth:	5 acres / 7-9’
Proposed Restoration:	Improve substrate, re-establish elevations
Cultch Material:	Lime rock aggregate or fossil oyster shell
Cultch Deposition Method:	High pressure water
Deposition rate	200 cubic yards per acre

North Bay

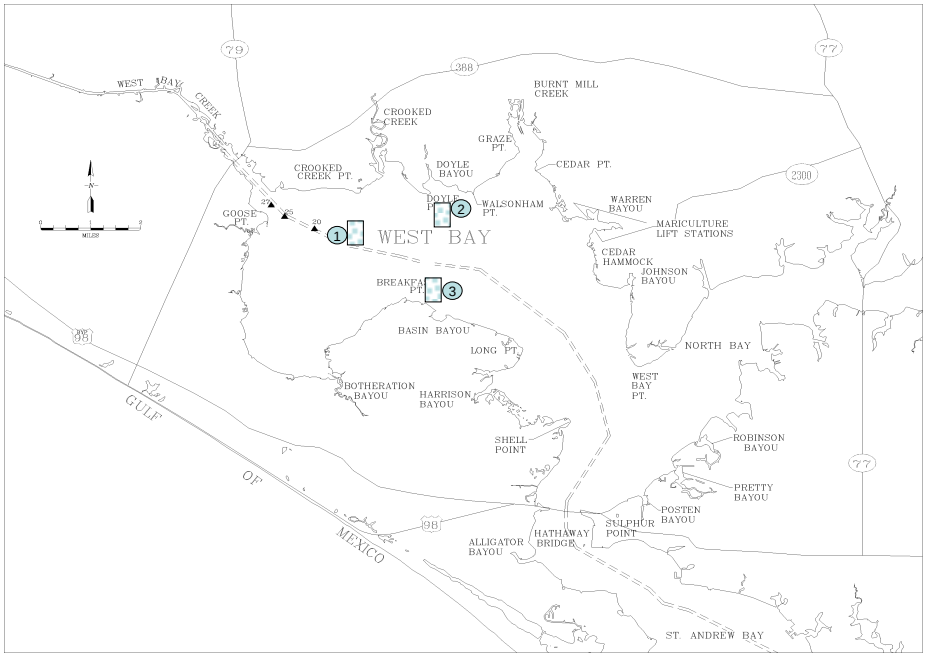
Newman Bayou Bar (Site #8): Reef is improved habitat constructed adjacent to unconsolidated natural reefs in North Bay in the vicinity of Newman Bayou; the existing substrate is clam and oyster shell matrix, and the surrounding bottom is generally sand shoals shoreward of the reef.

L/L Coordinates:	30:15.61N / 85:40.75W
Proposed Restoration Area / Depth	5 acres / 5-7
Proposed Restoration:	Improve substrate, re-establish elevations
Cultch Material:	Lime rock aggregate or fossil oyster shell
Cultch Deposition Method:	High pressure water
Deposition rate	200 cubic yards per acre

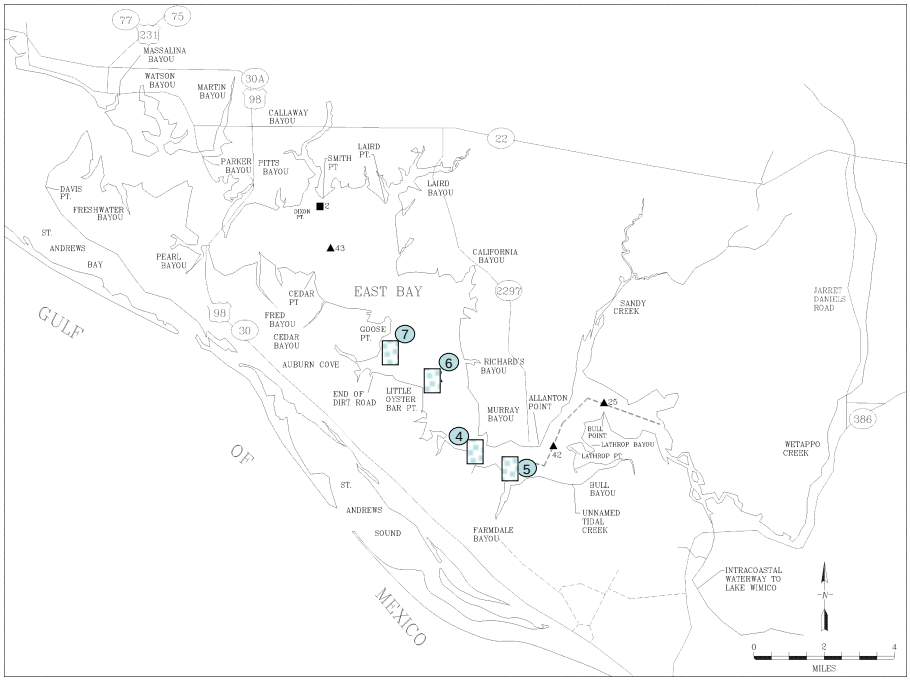
Fanning Bayou Bar (Site #9): Reef is improved habitat constructed adjacent to unconsolidated natural reefs in North Bay in the vicinity of Fanning Bayou; the existing substrate is clam and oyster shell matrix, and the surrounding bottom is generally sand shoals shoreward of the reef.

L/L Coordinates:	30:15.89N / 85:39.85W
Proposed Restoration Area / Depth	5 acres / 5-7
Proposed Restoration:	Improve substrate, re-establish elevations
Cultch Material:	Lime rock aggregate or fossil oyster shell
Cultch Deposition Method:	High pressure water
Deposition rate	200 cubic yards per acre

Map 1 Showing Oyster Reef Restoration Locations in West Bay, Bay County Florida



Map 2 Showing Oyster Reef Restoration Locations in East Bay, Bay County Florida



Map 3 Showing Oyster Reef Restoration Locations in North Bay, Bay County Florida