

Proposal to Fund a Comprehensive Oyster Assessment and Monitoring Program in Wakulla County, FL

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Project Rationale:

COMPREHENSIVE ASSESSMENT AND MONITORING OF WAKULLA OYSTER REEF ENVIRONMENTS: *BUILDING SUSTAINABLE FISHERIES, CREATING JOBS AND PRESERVING OUR COASTAL HERITAGE*

Summary

In partnership with Wakulla Environmental Institute (WEI) and Panacea Waterfronts Florida, we propose to restore and rehabilitate Gulf of Mexico oyster reefs in the Ochlockonee and Wakulla Rivers watersheds in Wakulla County, FL, a key segment of the Apalachicola Bay oyster regional harvesting area. We will conduct a comprehensive oyster resource assessment of the watersheds, then develop, implement and monitor shelling (cultching) and relaying (transferring) restoration projects, with a goal of reaching a 200 bag per acre, per year production rate within five years. Two hundred bags per acre is defined as the threshold indicating oyster populations are capable of supporting limited commercial harvesting in this region.

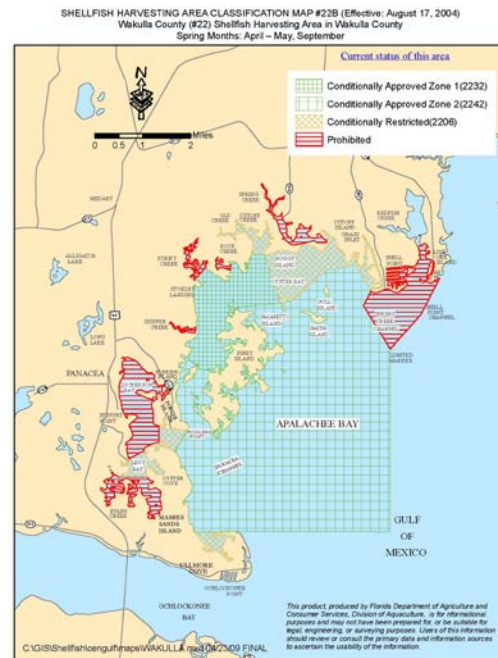
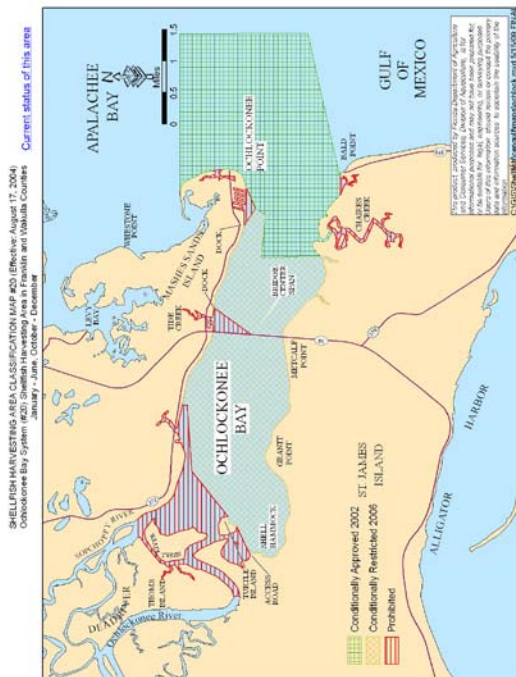
- The budget for three years of assessment and monitoring is \$1,624,634. The budget to conduct three years of oyster transfers (relays) is \$750,000. The total project cost is \$2,734,635.
- This project can begin immediately upon authorization. This is a proven process, used by our environmental consulting partner, CSA Ocean Sciences, as prime contractor for Martin County, to restore 27.5 acres of oyster habitat in the St Lucie River between 2009 and 2011; by Panacea Waterfronts to transfer oysters in Wakulla County under a Department of Agriculture & Consumer Services Division of Aquaculture (DACSDA) contract; and by DACSDA for shelling throughout Florida oyster habitat.

Project Location

Figures 1 and 2 show the Wakulla oyster environment. **Figure 1** is a close-up showing the extensive and anastomosing reef structures. **Figure 2** shows the present oyster management strata for Wakulla and Franklin Counties.



Figure 1. Wakulla County and Apalachee Bay; close up showing the extensive, anastomosing oyster bars.



complexes in the Wakulla area show substantial losses of oyster populations, with severe declines in oyster densities, standing stocks and production estimates since 2010 (see *Oyster Resource Assessment Report*, August 2012²).

The importance of this proposal for the future of Wakulla oystering is widely recognized and supported by the public, as oysters in these watersheds are severely depleted and suffering from the absence of science-based resource management plans. We have spoken directly with officials at Florida's Fish & Wildlife Conservation Commission, Florida Fish & Wildlife Research Institute and DACSDA, who concur there is a significant need for a science-based resource assessment in Wakulla.

A further urgency for the need of a comprehensive resource assessment has recently been reported. Oyster fishers, including the leaseholders of an oyster aquaculture bed who very closely monitor the resource, report that larger-sized oysters (>2.5 inches) are exhibiting much higher than normal mortality. DACSDA conducted a preliminary investigation, which indicated stress is involved. However, the extent of the mortality, and in particular, an effective remedy, cannot be fully determined without a resource assessment and monitoring plan.

Local government and industry officials recognize the severity of the oyster disaster, but are severely constrained fiscally in their ability to respond. Wakulla County, which is one of the eight Florida Panhandle counties designated as "disproportionately affected" by the Macondo oil spill, is also designated by the State of Florida as both a "small entity" and a "fiscally constrained" county, meaning "the county has extremely limited resources to meet the fundamental requirements of a safe society."³

Local job creation is a vital component of this project. The unincorporated Panacea area of Wakulla County, which is at the center of the county's fisheries industry, is further burdened by a very high unemployment rate, attributed by project partner Panacea Waterfronts to the collapse of the local oyster fishery. Panacea unemployment rates are higher than in neighboring Franklin County, which has recently benefitted from extensive aid to rebuild oystering, and higher than Wakulla County as a whole.

Location	Panacea	Apalachicola	Franklin County	Wakulla County
Unemployment	13.2%	9.3%	10.7%	7.3%

In the absence of outside funding, Wakulla County will be unable to address this critical and urgent need to understand, respond to and mitigate the impact of the disaster.

Oyster fishing is important to Wakulla County and Panacea. The most recent data on saltwater products licenses⁴ (2008-9) show 257 licenses issued to Wakulla residents; 1066 to Franklin, a 1:4 ratio. Trip tickets, which record the county in which a catch is landed, are overwhelmingly skewed toward Franklin by a more than 100:1 ratio, strongly

²

http://www.freshfromflorida.com/content/download/5108/90903/Oyster_Res_Assessment_Report_August_2012.pdf

³ From the Florida Association of Counties, November 5, 2013, comments on proposed US Treasury rules.

⁴ Marine Fisheries Information System, Florida Fish & Wildlife Conservation Commission, Saltwater Products Licenses

supporting extensive anecdotal observations that oysters harvested from Wakulla waters are landed in Franklin County and counted toward Franklin County's reported harvest.

	2008-9 Licenses	2009 Trip Tickets
Franklin	1066	39,442
Wakulla	257	355

Figures from 2012 Florida Fish & Wildlife Conservation Commission trip ticket tallies show 63,282 pounds of oyster meat (<10,000 bushels) landed in Wakulla. Recreational oystering and, of course, poaching, also remove an unknown portion of the local resource.

The most recent information from DACSDA clearly suggests that a collapse of Wakulla oystering is underway, as inspectors and dealers are reporting that virtually no Wakulla oysters are being delivered to wholesalers. Observers also report that, as of November, 2013, there are very few oysters of legal size in open waters in Wakulla County.

An assessment prepared by the Florida Fish & Wildlife Conservation Commission, aptly titled "*2012-2-13 Florida Gulf Coast Oyster Disaster Report*⁵," shows dramatic, and likely unrecoverable declines without swift assistance in oyster productivity throughout the Florida Gulf coast. For example, the following table shows a greater than 50% decline in the total value of oysters landed in December, 2012, compared to the period 2007 through 2011 for the region.

2007	2008	2009	2010	2011	5-Year Average	2012
698,625	583,727	465,701	584,315	1,130,874	692,648	252,889

There is a demonstrated need for a science-based, countywide inventory and best management practice guidance at the scale of the individual water bodies in the Bay. Oyster harvest has increased in Wakulla County since 2005, but the fishery had become stagnant (**Figure 3**) and now, declining (**Figure 4**), with pounds landed reaching an asymptote as a function of trips with catch per unit effort reduced in recent years. (**Figures 3 and 4**)

⁵ http://www.noaanews.noaa.gov/stories2013/20130812_oysterdisasterdeclaration.html

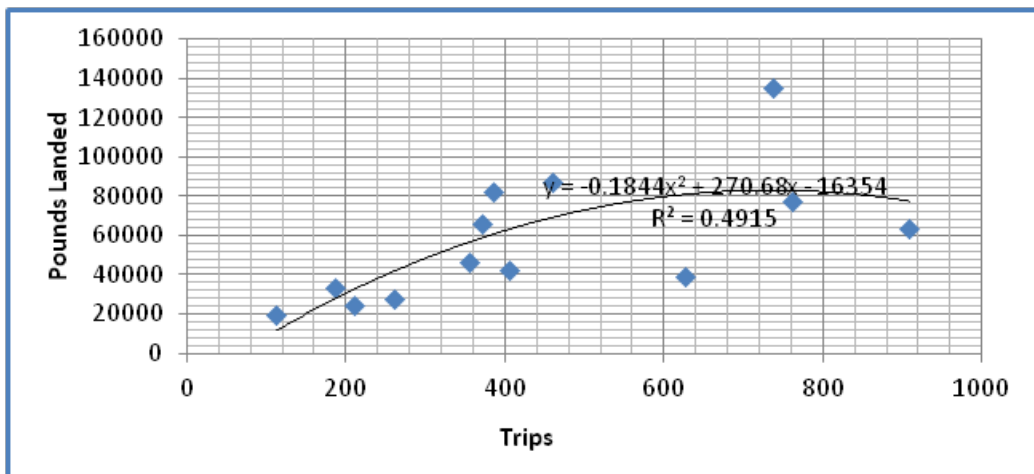


Figure 3. Wakulla County pounds of oysters landed vs. trips.

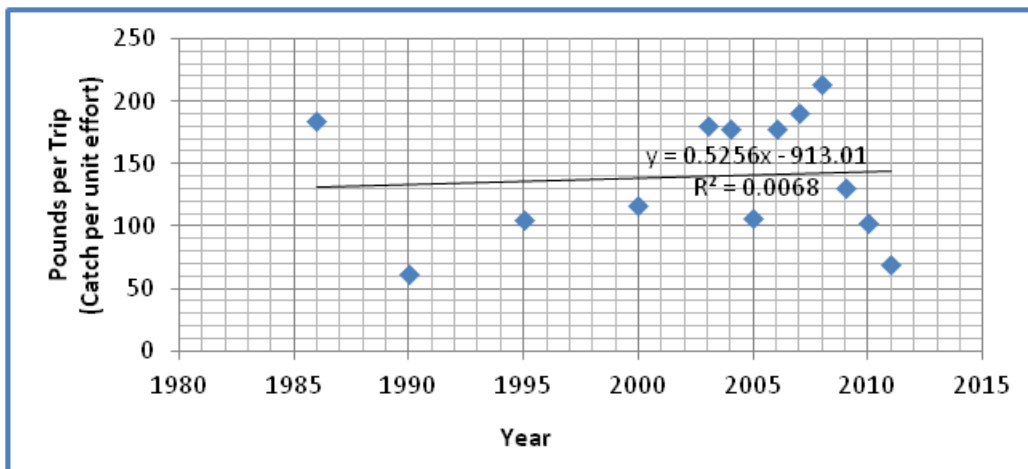


Figure 4. Wakulla County catch per unit effort (pounds of oysters per trip) over time; note dramatic decline in last 4 years.

Stressors governing the abundance and health of the oyster resource include habitat destruction (e.g., sedimentation), physical disruption (e.g., dredging), alteration of hydrologic regimes (e.g., freshwater diversion, impoundment, and channelization), pollution burdens, disease, predation (especially from the oyster drill, *Stramonita haemastoma*), and harm from over harvesting. Combined, these stressors have resulted in long-term population losses (VanderKooy, 2012). As a result, a science-based approach to guiding shelling, relay/transfer and aquaculture projects, habitat restoration, and, most perhaps most importantly, harvest decisions is required immediately. This effort would be supported by accurate geographic information regarding the resource, are all needed to guide fishery maintenance and growth and its associated economy.

The goal of this proposal is to mitigate harm to the resource by creating an up-to-date inventory of oyster habitat and its physical and biological status to guide a sustainable harvest program. Saving, stabilizing and expanding oyster reefs in Wakulla County will contribute to recovery of Apalachicola Bay and across the Northern Gulf of Mexico. This project will enhance community resilience in a small county that otherwise cannot

marshal the resources to achieve these goals. By developing localized, geographically accurate, and science-based best management practices, we can ensure that wild oyster beds are not over harvested, providing many generations with viable fisheries that preserves an important aspect of the community's culture and heritage.

The metric of success is to increase oyster production to >200 bags/acre/year within five years. Using this measure provides us an opportunity to demonstrate our effectiveness by showing whether oyster cohorts are moving into the harvestable size class; if the resource is overwhelmed by unregulated harvest pressure, we can use our data to feedback into controlling overharvest (improved enforcement, additional resource improvements).

Project Summary

- There are almost no data on Wakulla oysters and a comprehensive assessment has never been performed.
- Oyster reefs in Wakulla County are severely depleted, harmed particularly by over-harvesting brought on by the factors delineated in the oyster fishery disaster declaration.
- Bushels and meat poundage collected per trip have decreased, resulting in economic hardship to the local community and an erosion of the communities' heritage.
- Rehabilitation of existing reefs and the creation of new reef habitat are desired to mitigate harm.
- Effective oyster reef management and restoration rests on having accurate geographic information regarding the distribution and status of existing reefs as well as potential new reef sites; success also will be aided by monitoring and reasonable enforcement.

Construction and Installation

Here we propose to fuse existing knowledge and planning recommendations as well as new approaches and partnerships to create a science-based oyster resource assessment, monitoring and habitat enhancement program. This program mitigates harm to the northern Gulf of Mexico oyster resource by implementing a resource monitoring and restoration process that will guide a scientifically valid restoration and enhancement of degraded existing oyster reefs and the creation of new oyster reefs in Wakulla County.

Historically, restoration projects in Wakulla (and many other locations along the Florida Gulf) have not been based on current, accurate, and scientifically sound data, resulting in sub-optimum outcomes for several reasons: inappropriate site selection; insufficient monitoring; an inability to measure effectiveness.

By conducting a systematic assessment survey of Wakulla waters, we will provide a scientifically valid inventory and assessment of habitats, which will inform the selection of habitats for enhancement, and identify potential sites for construction of new oyster reefs and aquaculture. This inventory will include not only georeferenced bathymetry and bottom composition, but also status of the oyster reefs (e.g., size classes and abundance). Such an inventory is badly needed; FFWRI does not have any monitoring in place (S.Geiger, pers com.) and the currently mapped oyster habitat (**Figure 5**) does not describe readily visible habitat well (see **Figure 1**).

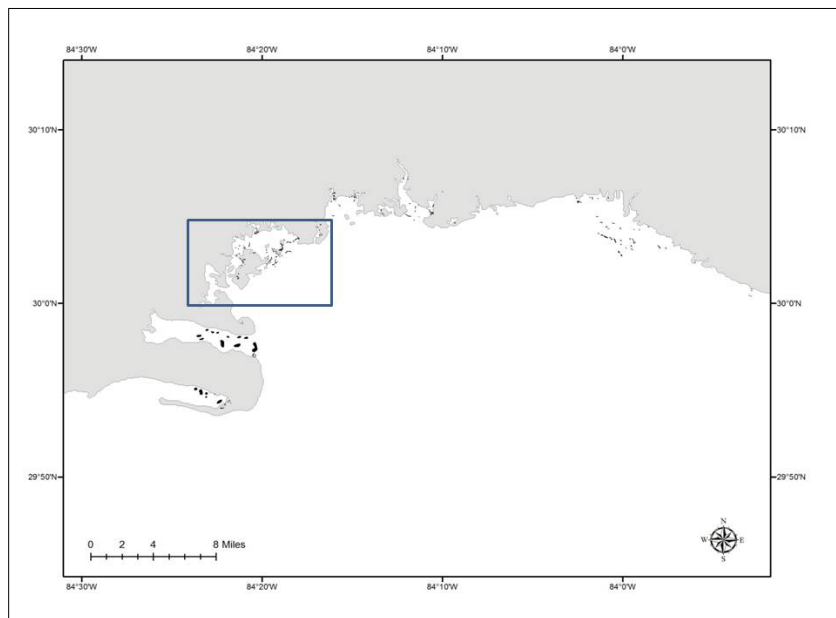


Figure 5. Current delineation of producing oyster beds in Wakulla County (black polygons); note the discrepancy of this map with the observable oyster reefs in Figure 1 (inset rectangle = approximate view of **Figure 1**). Taken from VanderKooy (2012).

Effective management of oyster resources and measuring the mitigation of harm requires an understanding of how many oysters occur within each defined management unit, the locations of those resources, the age classes and recruitment and mortality rates within each unit. Considering the fundamental importance of effectively modeling population status and suitability for harvest, there remains a surprising dearth of information regarding the stock status of oysters in the Gulf of Mexico (VanderKooy, 2012). This proposal would directly address this shortcoming and additionally provide a basis for subsequent application of production models that are currently under development by the Gulf States Marine Fishery Commission. These models hold the promise to accurately forecast oyster resources in response to stressors that influence life history stages of Wakulla oysters, providing an objective means to guide harvest and management strategies. For example, the Constant Abundance Surplus Production (CASP) model requires a data time series of population abundance, annual recruitment (i.e., spat set), stage-specific mortality rates, fishery harvest, and the impact of fishing on both cultch abundance and the mortality of pre-recruit life stages. The data requirements of this model and the Sustainable Oyster Shell stock (SOS) model are relatively low for an assessment model.

We will integrate our assessment with a modeling method to identify those sites best-suited for restoration activities. The absence of a baseline of information heightens the importance of conducting a resource assessment before we undertake restoration activities.

Approach

- Compile all available geographic data layers and assemble Geographic Information System (GIS) datasets with accumulative layers depicting and representing the resources that are positively and negatively impacted by the proposed oyster transfer project and mosaic seagrass and oyster reef marine environments.

- Perform remote-sensed and ground-truthed survey of oyster reefs and their status (oyster size classes and abundance) in Wakulla County, stratified by closed, prohibited and open areas in the following areas:
 - Ochlockonee Bay,
 - Zone 2 (near shore central Wakulla),
 - Zone 3 (off shore central Wakulla), and
 - Apalachee Bay (in front of St Marks).
- Develop oyster reef rehabilitation site selection criteria (identifying restoration method(s) appropriate to the site(s)).
- Promulgate reef mitigation and creation protocols.
- Using the GIS database, refine the prioritized list of rehabilitation sites and creation sites.
- Refine definition of transfer donor and recipient sites.
- Define locations for new reef creation and enhancement (e.g., water flow modification).
- Integrate submerged aquatic vegetation in reef design to control erosion, enhance ecosystem services, mitigate water quality, and provide buffering for ocean acidification.
- Coordinate and develop methods to enhance and facilitate oyster reef remediation and creation:
 - Transfer Process – Controlled harvest and deployment,
 - Circulation Modifications – Changes in water quality (temperature, salinity, water clarity), and
 - Recruitment Enhancement Areas – Assess contribution of natural vs. hatchery-provided recruitment.
- Quantify the effectiveness of the rehabilitation, creation, and transfer efforts through scientifically defensible monitoring studies.
- Work with all stakeholders, including especially commercial harvesters, to develop best management practice rules.
- Integrate assessment and monitoring with course offerings at the Wakulla Environmental Institute (WEI), a Wakulla campus for Tallahassee Community College. The WEI Wakulla campus was funded by the Florida Legislature. WEI's mission is "to seek out and support any efforts to foster growth in Wakulla and the surrounding coastal counties." As a part of this mission, WEI is offering an A.S. degree in aquaculture, as well as a "certificate program" in oyster aquaculture beginning in January, 2014. This certificate program is part of WEI's emergency response to the unfolding oyster disaster, and was developed to help address the growing hardships faced by local oyster fishers.

Restoration activities based on assessment data will include:

- **Transfer (relay) projects**

Transfer means the relocation of living oysters from conditionally closed waters to open harvest waters. Wakulla is well-suited for transfer projects, as large numbers of oysters are contained in conditionally closed areas. Also, transfers can be conducted during the closed summer season, when oyster fishers are oftentimes under-employed. Transfers have been conducted annually in Wakulla for many years, but there has never been an inventory/assessment of the donor site, of the recipient site; or of the resulting harvest or other benefits.

Transfers would be conducted in close coordination with the DACSDA, which has overseen past programs. A goal of a science-based transfer program will be to increase the effectiveness of oyster harvest in a sustainable manner, and the possibility of identifying new sites for reef creation. Moreover, our inventory will include the performance of these areas before, during, and after an oyster transfer and any reef creation process. When oyster resources are assessed and managed properly, an effective and well-managed transfer program should significantly increase the number of open beds available to Wakulla fishers.

Most important is that this project is designed to use the local, working watermen and women, as well as WEI students, as partners not only in the selection of sites, transfer, and construction of any new oyster reefs, but also in the execution and management of the transfer effort. This creates jobs and buy-in to the science-guided framework of best management practices.

- **Shelling (cultching)**

The Florida Fish & Wildlife Conservation Commission, in its proposed budget seeking funding from the US Congress for the oyster fisheries disaster declared by the Department of Commerce, writes:

[T]he most effective oyster restoration technique in the Gulf of Mexico is to deposit shell (cultching) on wild harvesting grounds. Substrate or "cultch" is strategically placed and used to (1) create three-dimensional reef structures, (2) stimulate spat setting, (3) enhance community functions, (4) increase natural productivity, and (5) accelerate the recovery process.

*This proposal supports a **separate request to fund 60 acres of cultching in Wakulla County**, which would be conducted by the Division of Aquaculture. Site selection for cultching would benefit greatly from this proposed resource assessment, according to Aquaculture officials (pers. com).*

- **Education and Training**

The Wakulla Environmental Institute will develop courses for its aquaculture A.S. degree program as a part of the assessment and monitoring process. This process relies on precise "chain of evidence" procedures; training students in this process will involve highly practical field and classroom work. Here is a description of the real-world experience and types of training students will receive:

- Shop test required equipment to perform survey
 - o Vessel - check engine, safety gear, trailer, towing vehicle, make sure all preventative maintenance is up to date.
 - o Side Scan Sonar - Set up system and check all connections and data sets, rub test. transducers, check firmware / software for most current versions, inventory spares kit
 - o Sub Bottom Sonar - Set up system and check all connections and data sets, check firmware / software for most current versions, inventory spares kit.
 - o DGPS - Set up system and check all connections and data sets, turn on correction service if required and verify on benchmark.
 - o Motion Sensor - Set up system and check all connections and data sets, check firmware / software for most current versions.

- o Navigation software - Set up survey package on primary computer as well as backup computer - position offsets for equipment from DGPS antenna, planned lines, background charts, aerial imagery, any available bathymetric data
- Make all necessary arrangements for travel to survey area
 - o Driving directions, hotel accommodations, locate secure boat ramp and / or marina, locate local service provider for truck, outboard and trailer.
- Arrive on site
 - o Launch vessel and set up SSS, SBP, motion sensor, computers, etc.
 - o Verify all instruments are receiving the correct and necessary data streams.
- Conduct survey
 - o Follow planned line file and make appropriate adjustments on SSS and SBP as necessary.
 - o Maintain a highly detailed logbook of all notes - start of line / end of line times, any anomalies or areas of interest, equipment adjustments, equipment issues, etc.
 - o Back up collected data at every available time, within reason. A minimum back up of all data at the end of the survey day.
 - o Rinse off and secure vessel and equipment at the end of each survey day
 - o Before departing survey area at completion of field survey, verify that all data was collected and there are no missing areas.
- Departing site
 - o Vessel - check trailer and towing vehicle, load vessel on trailer, secure all survey equipment, etc.
- Data processing
 - o Copy all raw data onto secure server, this copy is not to be used for processing and is to be archived.
 - o Begin processing data to predetermined level of deliverables i.e. mosaics, geotiffs, etc.
 - o Back up processed data every available time, within reason. A minimum back up of all data at the end of the processing day.

Students also will learn business skills (finance), necessary to operate a profitable enterprise upon completion of their degree program.

In addition, we expect that WEI students will continue to perform ongoing monitoring in Wakulla waters, providing training to future generations, and providing critical information needed to maintain a sustainable fishery.

In addition to the activities listed above for which funding is requested, the comprehensive science assessment and monitoring component may recommend additional projects, such as:

- **Aquaculture**

Oyster aquaculture (oysters in cages) is a very new and exciting development in Wakulla. In 2013, the Board of Trustees granted aquaculture leases to WEI, and, more recently, oyster fishers, to grow oysters in cages that will utilize the entire water column. Site selection is critical to oyster aquaculture. Bob Ballard, executive director of WEI, will use the findings of the resource assessment to identify future submerged land sites. One criterion is that submerged lands leased for aquaculture should not be over active oyster (or other resource) beds. The Institute is strongly supportive of aquaculture, describing in a press release about its partnership with Spring Creek Restaurant, which has been growing oysters in cages with the Institute's involvement for the past year:

Wakulla County's coastal region is uniquely suited for such a venture. Oyster farming is prevalent internationally, but many believe that Wakulla could become the epicenter of production for this growing industry...

- **Hydrology, Water Flow and Water Quality**

Oyster fishers anecdotally report that oyster beds close to the west shore of Ochlockonee Bay are diverting water flow toward the east, causing shoreline erosion in the area know as Mashas Sands, and preventing oyster "spat" from attaching to beds in that area. The resource assessment may recommend further investigation of possible steps to restore flow in this area (home to some of the largest oyster beds in the county). In addition to erosion issues, upstream contaminants also flow toward the Mashas Sands area, requiring beach closures.

Operations and Maintenance

Project work is expected to commence immediately after funding is received.

Assessment work can be given immediately and the initial comprehensive dataset completed in approximately three months. Findings from the assessment will properly inform site selection for cultching and transfers.

Cultching activities have been historically conducted from February to November. Ideally, cultching activities are conducted prior to a spat fall event; however, cultching activities are similar to crop rotation in that many oyster reef complexes require routine maintenance in the form of cultching. DACS rotates which reefs receive the required attention based on commercial harvesting seasons, availability of material, and severity of reef conditions.

Transfer activities have historically been conducted during summer months, when Wakulla oyster beds are closed. This project funds three waves of transfers, moving up to 90,000 bushels of oysters per year for three years, recognizing that the assessment and subsequent monitoring could alter the size, scope, or necessity of further transfers. Unlike cultching, which is usually conducted by barge, transfers are performed by local oyster fishers, employing an estimated 100 individuals during the summer months when harvest is closed. Transfers thus generate significant local income to an economically challenged area.

Post construction performance monitoring would focus on the recruitment and growth of oysters on the new cultch and transfer placements. Restored reefs may become productive in as few as 3 to 6 months under optimal conditions, with oysters 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 to 5 years. It has been shown that restored reefs can remain productive for more than 10 years with little additional

maintenance. Based on the expected longevity of the restored reefs, a monitoring program would assess oyster population parameters for 10 years. Three years of monitoring is included in this proposal, with WEI students being trained to conduct monitoring, as an elective part of the school's A.S. degree in aquaculture. Subsequent survey years are proposed to be conducted by DACS, working with the Institute.

Project Benefits

This project will mitigate harm to natural resources (habitats, species) and provide environmental and economic benefit for the coastal community by:

- Providing information necessary to plan, construct and monitor restoration programs such as oyster transfers (relays), shelling, and to provide guidance for the expansion of Wakulla's new and growing oyster aquaculture.
- Increasing production in Wakulla, which will benefit complementing restoration efforts in the adjacent Apalachicola/Franklin watershed.
- Replenishing wild oyster beds, the creation of new oyster reefs and, potentially, new artificial reefs to support fisheries and recreation.
- Guiding the development of sustainable harvest practices.
- Offering field and class work to students of the Wakulla Environmental Institute's (WEI), Associate of Science degree in Aquaculture.
- Providing, through WEI, and Panacea Waterfronts, the human resources needed to help transform the oyster industry of the northeastern Gulf of Mexico from a wholly extractive fishery to one with a label of a Sustainable Fishery.
- Implementing a proven assessment and monitoring process that can serve as a template for oyster restoration efforts in other Panhandle counties.
- Increasing revenue earned from sustainable oyster harvesting. We predict a near-term estimated annual return of $\geq \$1$ million (1/3 greater than current landings) by sustainably harvesting oysters under our science-based best management practices, driven initially by oyster transfer revenue, and growing in future years as aquaculture expands and re-shelling takes place.
- Restoring poundage landed per trip to recent historic averages of 200 lbs meat/trip, and improving sustainable production to 200 bags/year/acre within five years.

Objectives

- Develop a geographically accurate and up-to-date inventory of oyster reefs and associated habitats; use these data to guide management actions (e.g., rehabilitation methods and priorities, site selection for both rehabilitated and new reef creation).
- Rehabilitate existing oyster reefs and create new reefs with a goal of reaching a 200 bag per acre, per year production rate within five years.
- Provide local employment through the transfer and the subsequent harvesting and management of replenished wild oyster beds and new reefs.

Outcomes

- Mitigating harm by creating a sustainable oyster harvest.
- Significantly improved monitoring and assessment programs.
- Sustainable local jobs (maintaining oyster harvesting, processing, and marketing).
- Improved resiliency of the social and ecological framework of Wakulla County.
- Enhanced water quality through oyster filtration.
- Increased nursery habitats for other commercially important Gulf of Mexico species.

Evaluation Criteria

This proposal meets four out of five State of Florida criteria⁶ to determine project eligibility for NRDA, NFWF or RESTORE funding.

This project meets the specific stipulations in the court order establishing the NFWF Gulf Benefit Fund.

The Transocean and BP criminal settlement agreements state:

NFWF shall use the money it receives from the defendant pursuant to this Order for the following purposes and subject to the following conditions:

a. To remedy harm and eliminate or reduce the risk of future harm to Gulf Coast natural resources, NFWF shall use approximately half of the payments to conduct or fund projects to remedy harm to resources where there has been injury to, or destruction of, loss of, or loss of use of those resources resulting from the Macondo oil spill.

The US Department of Commerce has declared an oyster fishery disaster for the Florida Panhandle. **The proposed project is within the disaster area.** Secretary Penny Pritzger stated:

A fishery resource disaster occurred for the oyster stocks along the west coast of Florida, primarily in the Apalachicola Bay area. (The disaster occurred) because of three factors: (1) a drought throughout the southeastern U.S. that has led to below average river flows; (2) reduced downstream river flow from manmade dams along these rivers; and (3) increased salinities in the bays that not only stressed the oyster populations, but allowed a persistent occurrence of oyster predators, such as stone crabs and oyster drills.

The Florida Fish & Wildlife Conservation Commission established three objectives to respond to the oyster fishery disaster. **This project meets all three FWC objectives:**

- Restoration of oyster habitat;
- Monitoring of existing oyster resources and of restoration efforts;
- Vocational and educational training for affected oyster fishermen and their communities.

Despite the need and a growing awareness of its importance to the Florida oyster industry, Wakulla County has yet to receive any NRDA oyster restoration or NFWF awards. No Florida County, except Franklin, has received funding to conduct comprehensive resource assessments needed to guide restoration efforts.

⁶ Proposals must meet at least one criterion. The four criteria met by this proposal are in bold-face:

1. Stormwater / Wastewater infrastructure projects,
2. **Community resilience / Living shorelines,**
3. **Water quality projects,**
4. **Implementation of agriculture best management practices, or**
5. **Fish and wildlife habitat and management.**

Funding this project will enable implementation of a process that may also be used as a template for comprehensive restoration efforts in other Florida oyster-producing counties, many of which similarly lack important assessment data. NRDA recently authorized some funding to monitor cultching programs in Escambia, Santa Rosa, Bay and Franklin Counties, but significant areas remain unassessed in Escambia, Santa Rosa and Bay.

The project is technically feasible and utilizes proven techniques with established methods and documented results. Florida agencies have successfully implemented similar projects in the region. These projects were designed following established methods and techniques utilized by Florida agencies, other states, and private contractors to restore oyster bars. In addition, DACS has a Programmatic General Permit SAJ-99 (SAJ-2007-03138) issued to them from the US Army Corps of Engineers to accomplish oyster restoration utilizing these techniques. For these reasons, the project has a high likelihood of success.

Furthermore, the cost estimates are based on similar past projects executed by DACS, CSA Ocean Sciences and Panacea Waterfronts and therefore the project can be conducted at a reasonable cost. Transfers and cultching are part of DACS's Division of Aquaculture Shellfish Program and are therefore consistent with the long term restoration needs of the State.

This project also takes place within in the 8-county panhandle area that deployed boom and was impacted by response and SCAT activities for the Spill.

Performance Criteria, Monitoring and Maintenance

As part of the project costs, assessment and monitoring will be conducted to ensure project designs are correctly implemented and to evaluate project effectiveness. Performance criteria will be used to determine project success or the need for corrective actions.

Assessment and monitoring will utilize the Standard Oyster Resource Management Protocol. 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 Florida.

Effective management of oyster resources and measuring the mitigation of harm requires an understanding of how many oysters occur within each defined management unit, the locations of those resources, and recruitment and mortality rates within each unit. Considering the fundamental importance of effectively modeling population status and suitability for harvest, there remains a surprising dearth of information regarding the stock status of oysters in the Gulf of Mexico (VanderKooy, 2012). This proposal would directly address this shortcoming and additionally provide a basis for subsequent application of production models that are currently under development by the Gulf State Marine Fishery Commission. These models hold the promise to accurately forecast oyster resources in response to stressors that influence life history stages of Wakulla oysters, providing an objective means to guide harvest and management strategies. For example, the Constant Abundance Surplus Production (CASP) model requires a data time series of population abundance, annual recruitment (i.e., spat set), stage-specific mortality rates, fishery harvest, and the impact of fishing on both cultch abundance and the mortality of pre-recruit life stages. The data requirements of this model and the Sustainable Oyster Shell stock (SOS) model are relatively low for an assessment model.

The project objective is to promote reef development for oysters by restoring oyster reef habitat using transfer and cultching. Specific success criteria include: construction of reefs that meet project design criteria, support oyster secondary productivity, and achieve the goal of attaining a >200 bags per acre per year sustainable harvest within five years. Using this measure provides us an opportunity to demonstrate our effectiveness by showing whether oyster cohorts are moving into the harvestable size class; if the resource is overwhelmed by unregulated harvest pressure, we can use our data to feedback into controlling overharvest (improved enforcement, additional resource improvements).

One of the early tasks to be completed will be to assess the number and size of viable oyster reef habitats within closed areas and estimate the amount and size⁷ of oysters (pounds or bushels) available for transfer. The second assessment should involve determining the extent of available wild habitat that exists in the open oyster areas. The study team will additionally determine if the proposed size and methodologies of transfer and harvest needed will fully replenish (and make sustainable) Wakulla beds without further major transfers. With this information compiled and with direction from Wakulla fishers, whose work will be supervised by Panacea Waterfronts, the study team would determine the most advantageous transfer process and methodology. When oyster resources are assessed and managed properly, an effective and well-managed transfer program should significantly increase the number of open beds available to Wakulla fishers.

The goal of this proposal is to mitigate harm to the resource by creating an up-to-date inventory of oyster habitat and its biological status to guide transfer and cultching restoration programs.

Post construction performance monitoring will focus on the recruitment and growth of oysters on the new cultch and transfer placements. Reefs restored by cultching may

⁷ Relay contracts issued by the Florida Division of Aquaculture allow oysters of “any size” to be transferred. The protocols for this project will focus on larger oysters—2.75” or greater—using tonging retrieval methods. It is projected that a higher number of transferred oysters will be harvestable in the near-term.

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 cultch reefs may not become productive for 2-5 years. Reefs restored by transfer (moving live oysters from conditionally closed waters to conditionally open waters) can be productive in as little as two weeks, the time needed for an oyster to cleanse itself.

It has been shown that restored reefs can remain productive for more than 10 years with little additional maintenance (dragging to re-expose shell material and substrate enhancement). The monitoring program proposed here will assess oyster population parameters for three years; ongoing monitoring will be performed by WEI.

WEI and CSA Ocean Sciences will closely coordinate with DACS to assess and provide guidance on the status of oyster resources on reefs that are restored during this project. Specific metrics to delineate reef locations and reef area, measure population parameters, and estimate production potential will be accomplished.

The overall likelihood of success is good, in the short and long term. There is a risk of sedimentation of the oyster cultch, which would prevent successful attachment of spat and cause the destruction of reefs during extreme weather events (e.g., hurricanes). However, these projects are anticipated to have a high likelihood of success.

Funding

- Partner with other programs, such as the Coastal and Marine Habitat Restoration Project grant, NFWF, NRDA and RESTORE, to fund specific restoration projects.
- Coordinate project with existing and proposed DACSDA relay and cultching programs.

Estimated Project Costs *(Describe the estimated costs of the project, including any assumptions for contingency and ongoing operations/maintenance. Identify other secured funding sources such as matching funds, in-kind contributions or state/federal dollars. In addition, if possible, complete and submit the Cost Appendix Sheet associated with this Form):*

Project costs will arise from initial inventory and ground-truthing, site familiarization, site marking and maintenance, flow modification, permitting, active restoration, purchase of monitoring and statistical analysis, economic analysis, and reporting. These costs include a mix of capital expenditures (e.g., imagery acquisition, software maintenance, sediment fill, application costs, buoy and ground tackle, a work boat for the Institute, and typical expendables for field operations), subcontracts (e.g., marine services for buoying and sediment filling), and labor with associated overhead.

- The budget for three years of assessment and monitoring is \$1,656,946 to be conducted by the Wakulla Environmental Institute, M&W Consulting and CSA Ocean Sciences.
- The budget to conduct three years of oyster transfers (relays) is \$750,000, to be administered by Panacea Waterfronts.
- Total project budget for three years = \$ 2,406,946.

This proposal significantly strengthens another project that is proposed for Wakulla oyster restoration (but not included in the proposed budget for this project):

- A \$1.14 million disaster response plan prepared by FWC to shell (cultch) 60 acres of Wakulla waters. This to be managed directly by DACSDA. DACSDA will be able to utilize assessment information we provide to inform its site selection.

This cost reflects current cost estimates developed from the most current information available at the time of the project negotiation. The cost includes provisions for planning, design, construction, monitoring, and potential contingencies.

Other Funding *(Indicate if the project is submitted for any potential funding or if it may be used to leverage additional funding, if so please describe the funding source [e.g. State/Federal Grants]):*

A version of this project that does not include the Wakulla Environmental Institute or DACSDA cultching component has been submitted for funding through the FDEP website (Restoration.Projects@dep.state.fl.us). As explained in the narrative, Wakulla County is unable to assist financially, but has released a Board of County Commissioners resolution strongly supporting this effort.

Technical Feasibility *(Describe the technologies involved and any relevant past experience or proven success with similar projects):*

All aspects of this project utilize established procedures (i.e., GIS and remote sensing techniques, science-based and statistically valid monitoring). Modification of oyster bars to promote water quality is technically feasible, but its link to an outcome of enhanced oyster production remains experimental and would be the subject of complementary proposals.

Environmental Benefits *(Describe the nature, magnitude, and timing of any environmental benefits attributable to the project. If possible, describe potential environmental performance measures [e.g., pollutant reduction]. Please address any potential environmental impacts associated with implementing or maintaining the project [e.g., loss of a habitat or conversion of habitat from one type to another during implementation]):*

The environmental benefits of increased oyster populations have several immediate and long-term benefits. Oyster reefs have long been known for their key role as a keystone species and as bio-engineers of many coastal ecosystems; they are recognized as Essential Fish Habitat by the Federal government. Moreover, increased numbers of living oysters provide proportional increases in water column filtration (by the living oysters) and improve water quality. Increased living oyster populations build and maintain reef habitat, which is a foundation habitat for a wide variety of other ecologically and economically valuable organisms both in the short and long term. Living oyster reefs also maintain the long-term physical stability of the water masses, regulating exchange, temperature, salinity, and geochemical processes fundamental to healthy ecosystem functions. Integration of submerged aquatic vegetations (SAV) with oyster reefs provides a continuum of habitat function and increases ecological diversity and

productivity as well as buffering water column pH to mitigate any potential acidification associated with climate change. Finally, healthy oyster reefs provide an important mechanism for carbon sequestration and, thus, buffering of climate change.

The proposed project involves oyster reef restoration for oyster beds that have reached their productive lifespan. This project is designed to help support natural oyster populations without requiring construction of new facilities or developing new approaches to pursuing the project objectives. The proposed project goals would be to improve and restore existing oyster beds managed by the Florida Department of Agriculture and Consumer Services (DACS). All of the areas are publicly owned and managed by DACS.

The project proponent is relying on existing Programmatic Section Rivers and Harbors Act Section 10 and Clean Water Act Section 404 Programmatic General Permit for Live Rock and Marine Bivalve Placement SAJ-99 (SAJ-2007-03138) issued to DACS. The Programmatic General Permit is intended for DACS activities. The Florida Department of Environmental Protection (FDEP) is relying on the Programmatic General Permit for Rivers and Harbors Act Section 10 and Clean Water Act Section 404 coverage of the proposed project.

Affected Resources

Geology

The existing geology and substrates in project areas for oyster reef restoration is generally flat or gently sloping. The three bays where restoration is planned are part of the Gulf of Mexico formation. Each proposed project location supports existing oyster reef structures.

In general, the estuarine embayments are within the Gulf Coast Lowlands subdivision of the Gulf Coastal Plain. The lowlands constitute a series of parallel terraces rising from the coast in successively higher levels. They formed during the Pleistocene epoch, when fluctuating sea levels were associated with the growth and melting of ice caps. Dunes, barrier islands, beach ridges, and other topographical features were stranded inland as seas receded. Land surfaces of the lowlands are generally level and less than 100 feet above mean sea level (AMSL). Substantial areas are less than 30 feet AMSL and are characterized by excessive wetlands.

Soils

Soils in the area have been sculptured from alluvial plain underlain by sand, gravel, silt, and clay. The soil surveys for the various counties identify the areas for cultch placement as "waters of the Gulf of Mexico," and no soils data are provided (Natural Resources Conservation Service [NRCS] 2013).

Environmental Consequences

Oyster reef restoration would have no adverse impacts on geology or substrates in the proposed project locations. Oyster cultch material would be placed on existing oyster reef structures and, therefore, would not alter the geology or substrates.

Hydrology and Water Quality

Affected Resources

Oyster cultch restoration would take place in nearshore, open-water habitats in three Florida bays. Existing hydrology and water quality are affected by shoreline development and management, as well as boat traffic in the bays and the Gulf of Mexico.

Water Quality

The CWA requires that the surface waters of each state be classified according to designated uses. Florida has six classes with associated designated uses, which are arranged in order of degree of protection required. According to 62.302-400, Fla. Admin. Code, the entire project occurs within Class II waters (Shellfish Propagation or Harvesting). Stricter standards for water quality are required for Class II Shellfish Harvesting Waters. The surface waters of the state are designated Class III unless described in Florida rule. The Pensacola Bay watershed and Apalachicola Bay is also identified as a priority waterbody under Florida's Surface Water Improvement Management (SWIM) Program, which develops comprehensive plans for at-risk water bodies and directs the work needed to restore damaged ecosystems, prevent pollution from storm water runoff and other sources, and educate the public.

Additional oyster populations created by the proposed project would effectively increase water quality due to their filter feeding. Short-term water quality impacts are possible due to sediment disturbance and cultch deposition.

Floodplain

The entirety of the project area is within the Florida panhandle floodplain, and waters where the work would be done are effectively the drainage holding areas for the floodplain areas to the north. The actual floodplain would not be impacted by any of the proposed activities as they would occur in open-water areas.

Wetlands

The project is located in open water, and no wetlands are known to be in the project area. Land-based storage areas for cultch material would be placed outside of wetland areas.

Environmental Consequences

Oyster restoration would have no long-term adverse impact on hydrology and water quality. Restoration would be completed at existing oyster reef locations so no water bottom impacts are expected. There may be short-term impacts during construction. This would include increased sediment disturbance and turbidity during cultch placement. All required permits would be obtained, and conditions, permit requirements, and best management practices (BMPs) would be followed during construction.

The restoration would have a minor, beneficial impact on water quality in the immediate vicinity of the newly placed material.

The placement of cultch for the submerged oyster reefs would result in short-term, minor, temporary impacts to water quality, specifically short-term elevations in turbidity. BMPs, along with other avoidance and mitigation measures required by state and federal regulatory agencies, would be employed to minimize any water quality and sedimentation impacts. Rivers and Harbors Act Section 10 and Clean Water Act Section 404 and water quality certifications would be required and all permit conditions would be adhered to.

Economic and Social Benefits *(Describe the economic and social benefits including those related to the project's improved ecosystem services and any estimates on jobs created or preserved):*

There is substantial harm to the oyster fishery arising from the serious concerns stated in the emergency fisheries disaster declaration. There are many economic and social benefits of maintaining a healthy oyster fishery. First, maintaining a healthy oyster fishery in an area such as Wakulla County where oyster fishing has been a central theme in the fabric of the community directly supports the cultural heritage of the region. Economically viable households, supported by a healthy fishery also have cascade effects through the community, supporting family structure and promoting social justice through elevated standards of living.

Direct job creation also results from this project. Significant resources will be expended through local, qualified marine contractors in the monitoring and ground-truthing surveys, transfer of oysters, clutching, creation of enhanced circulation, hiring of vessels, monitoring support, and the harvesting of oysters. As an example, we have modeled a transfer program that would move up to 90,000 bushels of oysters annually at a cost of \$250,000/year, employing an estimated 100 individuals during the summer months when harvest is closed. Once transferred and oysters have self-cleansed, harvest of just 50% of these oysters (at current rates of ~\$30 per bushel) would provide ~\$1.35 million dollars of revenue to fishermen beginning within weeks of completion of the transfer. In addition to these economic cascades, we anticipate a short-term (1 to 2 year) influx of ~\$2 million dollars to the local economy and a sustained incremental return of ~\$1 million per annum by sustainably harvesting oysters under the science-based best management practices.

Additionally, by our integration with the Wakulla Environmental Institute (WEI), we provide a clear line of sight from academic experience to application of science in the oyster industry. The certificate program through the WEI will provide the region with the human resources needed to transform the oyster industry of the northeastern Gulf of Mexico from a wholly extractive fishery to one with a balance of sustainable aquaculture. The market for good quality oysters and the label of "Sustainable" is an important marketing message with high value. Thus, the oyster market is extensive and expanding for those communities that optimize the productivity of their local resource base, as can be achieved through creation of a Sustainable Fishery.

Community Resilience *(Describe if the project assists Florida's ability to anticipate, withstand, or recover from hazards or threats [e.g. hurricane preparedness, establishing living shorelines]):*

Improving the biological integrity of an ecosystem engineer (Jones et al., 1994) such as the Wakulla oyster reefs provides substantial protection of shoreline and shore-side infrastructure from both waves and storm surge. Maintaining the heritage of oyster harvest provides economic resilience for the community. The value of the reefs is recognized at all levels of government. The existing authorization from the National Oceanic and Atmospheric Administration (NOAA) for the smaller (22,000 bushels) annual transfers since 2006 was created to restore oyster reefs damaged by hurricanes in 2005 (Florida Dept of Agriculture Contract # 018625). Oysters also provide significant carbon sequestration, fixing CO₂ into calcium carbonate.

Conflicts or Complements to Existing Efforts *(Describe any ongoing activities in the project implementation area, if the project is part of another plan, and why the project does or does not interfere with that work. Please consider how the project may complement existing local, regional, and state efforts/plans/objectives):*

No oyster restoration projects in Wakulla County have been funded, in the view of these submitters in part because of the lack of information on the true size of the resource in Wakulla. What separates this project from past efforts—besides the larger scope—is the significant science component, which will guide restoration efforts and policy for years to come. This effort will complement oyster restoration projects throughout the Florida Panhandle, including recently announced projects in Franklin, Bay, Santa Rosa and Escambia Counties.

Oyster restoration is a priority concern across the Florida Panhandle, and the Gulf, as the number of requests for funding throughout the region clearly indicates. The Northwest Florida Water Management District has reached out to counties throughout its area of service to collect and submit “on the shelf” proposals as a part of this process. As of December, 2013, dozens oyster restoration projects have been submitted through the DEP submission portal.

This project also provides excellent collaborative opportunities with the Wakulla Environmental Institute, wherein use of hatchery-derived oyster could be used to test augmentation effectiveness in the County. Also, given the georeferenced bathymetry data developed through this proposal, the opportunity to consider hydraulic engineering options to enhance flow and reduce pollution loads on sheltered beds becomes feasible. Finally, this proposal would directly address the recognized dearth of oyster population information needed to effectively manage the resource (VanderKooy, 2012) and would provide data to assess population modeling and management efforts (e.g., the CASP and SOS models).

Moreover, NFWF presents a once-in-a-lifetime opportunity to revive a struggling environment, resource, and industry. Improving and expanding oyster reefs in Wakulla County will contribute to NFWF's objective to eliminate or reduce the risk of future harm to the resource in Florida and across the Northern Gulf of Mexico. This project will enhance community resilience in a small county that otherwise cannot marshal the resources to achieve these goals. By developing localized, geographically accurate, and

science-based best management practices, we can ensure that the wild oyster beds are not over harvested, providing many oyster fisher generations with viable fisheries that preserves an important aspect of the community's culture.

Complies with Federal, State, Local, and Tribal Laws/Regulations (Describe any concerns or potential conflicts):

The assessment and monitoring project will not require permits. Subsequent permits to deploy oyster culture in order to enhance existing reefs, build new oyster habitat, or rehabilitate non-functioning reef habitat in addition to those permits and contracts for oyster transfers will be applied for as needed. Agencies and applicants are well-versed in this matter, and no complications are foreseen. This action will require close cooperation and permits granted by the U.S. Army Corps of Engineers and the Florida Department of Environmental Protection and Wakulla County. The project team will also coordinate closely with and request comments and letters of support from Florida Fish and Wildlife Conservation Commission (FWCC), NOAA, U.S. Fish and Wildlife Service (USFW), and U.S. Environmental Protection Agency (USEPA). In addition, we will also coordinate with the Division of Aquaculture in the Florida Department of Agriculture. In instances where scientific inquiry benefits from testing new procedures, we will engage regulatory officials in pre-application meetings and other steps to facilitate expeditious permitting. We also will conduct outreach and coordination with the Department of Law Enforcement of the FWCC, which is charged with enforcement of all laws and protection of all resources in State waterways. Effective monitoring and enforcement during harvest is a key step toward reef recovery.

Readiness for Implementation (Describe if the project has had any design or permitting work started or completed [attach permits or design work]. Please address any issues that may delay start or finish of the project):

This project is ready for immediate launch. The team has fully prepared and active GIS capabilities; there is a strong local infrastructure of support through WEI and Panacea Waterfronts; watermen and their families are engaged; and vessels are ready. The critical need is well established and is awaiting the enhanced, science-based guidance of this project.

Public Acceptance (Describe any known or potential public approval or opposition to the project):

We expect this to be widely embraced, as the degradation of the oyster reef system is commonly recognized and science-based solutions considered long overdue. We also note that the informed public believes that past oyster restoration efforts were a "summer jobs program" for oyster fishers and did little to replenish or restore the resource. Thus, this science-based approach has won widespread support and enthusiasm, as it will base policy and practice on sound science. Panacea Waterfronts received an official letter of support from the Wakulla Board of County Commissioners for its efforts to restore oystering.

Information you wish to provide *(Please include any maps, designs, drawings, photos, or background resources that may assist in completely and accurately understanding the project):*

See previous sections and:

Jones, C.G, Lawton, J.H., Shachak, M. 1994. Organisms as ecosystem engineers. OIKOS 69:373-386.

VanderKooy, S. (editor). 2012. The Oyster Fishery of the Gulf of Mexico, United States: A Regional Management Plan – 2012 Revision. Publication No. 202, Gulf States Marine Fisheries Commission, Ocean Springs, Mississippi.

RESOLUTION NUMBER

13-57

A RESOLUTION OF THE BOARD OF COUNTY COMMISSIONERS OF WAKULLA COUNTY, FLORIDA IN SUPPORT OF OYSTERS AND THE OYSTER INDUSTRY IN WAKULLA COUNTY; PROVIDING CERTAIN FINDINGS; PROVIDING AN EFFECTIVE DATE.

WHEREAS, oysters and the oyster industry are an important part of Wakulla's history and economy; and

WHEREAS, oysters are important to tourism and many restaurant establishments of Wakulla County; and

WHEREAS, oysters serve an important and necessary function in the health of Wakulla County's coastal waters and eco-systems; and

WHEREAS, the oyster population and oyster industry have been adversely affected by many factors; and

WHEREAS, Wakulla County families that rely on oystering as their primary income are adversely affected by decreased or un-harvestable oyster populations; and

WHEREAS, oysters are recognized as an important and valuable natural resource to Wakulla County.

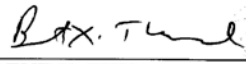
NOW THEREFORE, be it resolved, that the Wakulla County Board of County Commissioners recognizes the importance of oysters and the oyster industry in Wakulla County and encourage Panacea Waterfronts Florida Partnership to pursue grant opportunities that enable, enhance, protect and improve the long-term sustainability of the oyster population and oyster industry in Wakulla County.

This Resolution shall be effective on the date approved by the Board, as provided below. **PASSED AND ADOPTED BY THE BOARD OF COUNTY COMMISSIONERS, WAKULLA COUNTY, FLORIDA, ON**
October 11th, 2013.

WAKULLA COUNTY
BOARD OF COUNTY COMMISSIONERS


RANDY MERRIT, Chairman

ATTEST:


BRENT X. THURMOND,
Clerk of Court

APPROVED AS TO FORM ONLY:


HEATHER ENCINOSA, Esq.
County Attorney