

# VIRGINIA SALTWATER RECREATIONAL FISHING DEVELOPMENT FUND SUMMARY PROJECT APPLICATION\*

<b>NAME AND ADDRESS OF APPLICANT:</b>  Town of Saxis Saxis, VA	<b>PROJECT LEADER (name, phone, e-mail):</b>  Darryl W. Nixon (757)503-6264 rotifer@aol.com						
<b>PRIORITY AREA OF CONCERN:</b>  Habitat Improvement	<b>PROJECT LOCATION:</b>  Saxis, Virginia						
<b>DESCRIPTIVE TITLE OF PROJECT:</b>  Town of Saxis Pier Enhancement Project							
<b>PROJECT SUMMARY:</b>  The municipal pier located at the southern end of Saxis Island serves as a platform to 4500 recreational fishermen and tourists annually. The proposed activity is support for the construction and installation of a biogenic, "living" reef system strategically placed around the pier to attenuate wave energy while intentionally enhancing the biodiversity of the benthic community to attract large, predatory gamefish. Reef components include oyster shell, concrete, and rebar, with reef height from 4 to 6 ft & weights from 4500 to 5500 lbs.							
<b>EXPECTED BENEFITS:</b>  Access to the pier is free, yet the pier plays an important role in the State & Local economies, and hosts the annual Saxis Youth Fishing Tournament. Thus, long-term benefits of pier protection from future wave/storm damage include: 1) Reduced future pier maintenance costs (town/state), 2) Shoreline protection, 3) Capacity for adult and youth recreational anglers to enjoy reef fishing without the need to own a boat and/or during rough weather conditions, and 4) Increased fishing & tourism revenue throughout the year.							
<b>COSTS:</b>  <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;"><b>VMRC Funding:</b></td> <td style="border: 1px solid black; text-align: center;">\$49,600</td> </tr> <tr> <td><b>Recipient Funding:</b></td> <td style="border: 1px solid black; text-align: center;">\$49,600</td> </tr> <tr> <td><b>Total Costs:</b></td> <td style="border: 1px solid black; text-align: center;"><b>\$99,200</b></td> </tr> </table>		<b>VMRC Funding:</b>	\$49,600	<b>Recipient Funding:</b>	\$49,600	<b>Total Costs:</b>	<b>\$99,200</b>
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<b>Detailed budget is included below in section entitled, "Estimated Cost and Justification"</b>							

Updated 07/11/12

\*This form alone does not constitute a complete application, see application instructions or contact Rob O'Reilly at 757-247-2247 or [rob.o'reilly@mrc.virginia.gov](mailto:rob.o'reilly@mrc.virginia.gov)

## Town of Saxis Pier Enhancement Project

P.I.: D.W. Nixon

### **1.) Need**

The municipal pier of the Town of Saxis is located at the southern end of Saxis Island and faces westerly into Pocomoke sound with no additional formations to disperse wave energy fetched from many miles offshore. This high wave energy environment discourages visitation during moderate- and high-wind events, further limiting the pier's patronage. In the last two years, recreational fishing has been closed prematurely due to storm-related events (Hurricanes Irene and Sandy) rendering the pier inoperable and unsafe until repairs could be conducted.

The pier serves as a platform to 4500 recreational fishermen and tourists annually. Access to the pier is free, yet it plays an important role in the State and Local economies. Additionally, The Town of Saxis and the pier are hosts to the annual Saxis Youth Fishing Tournament -- an educational event to future generations of fishermen in Virginia waters. Thus, it is clear that this pier serves the Saxis community and nearby municipalities both socioeconomically and culturally.

The Town of Saxis needs to protect its pier and, with an eye towards innovation and synergy, this proposal to construct and install an extensive three-dimensional reef system has been carefully crafted to simultaneously provide attenuation of wave energy and enhance the pier's reputation as a prime destination for recreational anglers who enjoy engaging large, predatory gamefish.

### **2.) Objectives**

- A) Construct and install a biogenic, "living" reef system around the Saxis municipal pier with additional support ("in-kind" services) from willing and capable townspeople of Saxis.
- B) Monitor the effectiveness of the reef system to protect the pier from wave energy
- C) Evaluate the biogenic reef community production (including resident reef fishes) via systematic monitoring protocols and the extent of transient predatory fish attraction via recreational angler surveys

### **3.) Expected Results or Benefits**

Access to the pier is free, yet the pier plays an important role in the State & Local economies, and hosts the annual Saxis Youth Fishing Tournament. Thus, long-term benefits of pier protection from future wave/storm damage include:

- 1) Reduced future pier maintenance costs (town/state),
- 2) Shoreline protection,
- 3) Capacity for adult and youth recreational anglers to enjoy reef fishing without the need to own a boat and/or during rough weather conditions, and
- 4) Increased fishing and tourism revenue throughout the year.

In addition, the Town of Saxis hopes to partner with other state, federal, and non-profit agencies for future projects geared toward long-term sustainability with the anticipation of increases in storm frequency and intensity, and challenges associated with rising sea level. The Town views this as the first step forward in a comprehensive strategy to become self-sufficient with long-term benefits of physical protection and development/enhancement of high-quality fishing and associated influx of reliable annual revenues.

#### **4.) Approach**

The proposed reefs will occupy the entire water column with the upper portion of the reef remaining above the surface at high tide (MHW). The Saxis Aquatic Ecosystem Restoration report, generated by the US Army Corps of Engineers in 2003, suggested a reef height of 6 ft for wave dispersal. Additionally, a key equation - "wave height cannot exceed 0.8 times the water depth" - was considered in the 2003 report and in this proposal. The reefs will be placed on the existing substrate (hard sand) and extend to a height of 6 ft. The two smaller reefs will be placed at the midpoint of the pier on both sides to prevent any fetch from true North and South, and will stand at 4 ft in height. The offshore reef will be greater than twice the length of the "T-Head" and be located parallel to it. And as a result of an interview with a representative from the Eastern Shore of Virginia Anglers Club, an offshore distance of 40 ft was determined to ensure recreational fishermen fully benefit from increased gamefish frequency and, thus, has been adopted in this proposal. The ultimate purpose of this design is the effective mitigation of waves fetching from a multitude of directions.

To address potential scouring of substrate, an investigation was conducted. Samples contained sand, rocks and shells resistant to movement during tide and wave events. Further confirmation was observed at low tide around the pier's pilings. Soil boring results for the Saxis report are submitted in this report. During the substrate investigation, neither submerged aquatic vegetation nor benthic shellfish were observed.

#### **Reef Specifications**

- Physical contact to the substrate will be 8 sq ft per structure.
- Individual structures will be interlocked during placement forming a monolithic reef.
- The offshore structures will be 6 ft in height, 10 ft in width and weigh 5500lbs. The inshore structures will be 4 ft in height, 8 ft in width and weigh 4500lbs.
- All reef structures will be steel reinforced concrete and include wire mesh. Shells will be embedded into the surface to promote accretion and biodiversity.
  - Indeed, a biogenic reef will continue to exfoliate (grow and break off) and, thus, provide wave protection services to the pier and biological services to the reef and adjacent benthic communities.

## Reef Construction Site

The individual X-model reefs will be constructed on the adjacent property owner's (Mr. Kefford Linton) land to reduce transportation costs. Additionally, a temporary ramp will be constructed at this site to ensure land-based equipment can safely and economically place the structures along the shoreline. The ramp will consist of crushed concrete that will be subsequently relocated to an existing revetment to support the ongoing effort for shoreline protection in the vicinity of the pier and public landing. Mr. Linton has committed his support for this proposal and will assist state and local efforts in this project.

## X-Model Construction

Each shell-veneered structure (the "X-Model" reef) will be casted from a mold built by Town of Saxis residents. In addition, each casting will be performed by Saxis residents. Prior to casting, individual structures require steel rebar, wire mesh, shell placement and installation of a lifting eye. Upon completion of concrete casting, a drying period of 24 to 48 hrs will commence to ensure shells are well bonded into the surface. After this curing period, Saxis residents will remove the mold from the structure and reassemble the mold for the next casting event. Casting will continue until the prescribed number of reefs has been constructed.

## Installation

A "rough terrain telescopic" forklift will transport the structures from the casting area to the shoreline/water's edge. A pontoon "A" frame will hoist and float the structures from the shoreline to the designated position. During wind events, deployment will be suspended to protect mariners and project integrity. Additionally, a safety meeting will occur at the outset of each deployment.

## Monitoring

Monitoring of the proposed project will be conducted for three years to more completely inform the state and public about the performance of this innovative project. Project monitoring will include assessment of:

- the effectiveness of the reef system to protect the pier from wave energy through
  - observing structural settlement and/or lateral movement, if any, and
  - wave dispersal,
- the development/production of the biogenic reef community (including resident reef fishes) via
  - accretion of biogenic and non-biogenic filter feeders,
- the extent of transient predatory fish attraction via
  - recreational angler surveys.

## 5.) Location

The Saxis municipal pier (Fig. 1) is located at the southern end of Saxis Island, Virginia, a location known for its exposure to regular, strong wave forces (Fig. 2). Installation of a biogenic, "living" reef system (see appended schematics) will occur ~40 ft offshore of, and parallel to, the "T-head" of the Saxis municipal pier and inshore (two reefs

parallel to shore, one on each side of the pier) at the midpoint of the stretch of pier that extends out perpendicular to shore (please see the appended 'map view' drawing for further clarification).



Figure 1. The Saxis Municipal Pier one day after Hurricane Sandy (10/31/12).



Figure 2. Evidence of the wave forces experienced at the Saxis Municipal Pier during and after Hurricane Sandy (10/31/12).

## 6.) Estimated Cost and Justification

Budget Category	Materials	Labor	Total
Structure Production			
Reef Molds	\$620 (\$310/mold x 2 molds)	\$300 (\$15/hr x 10 hr/mold x 2 molds)	\$920
Reef Casting			
Concrete	\$15,750 (\$175/reef x 60 reefs)		\$15,750
Rebar/Wire Mesh	\$9,000 (\$150/reef x 60 reefs)		\$9,000
Oyster Shells	\$3,000 (\$10/bu x 5 bu/reef x 60 reefs)		\$3,000
Concrete Vibrator	\$200 (Purchase)		\$200
Labor		\$13,500 (\$15/hr x 15 hr/reef x 60 reefs)	\$13,500
Forklift	\$20,000 (Rental: \$5,000/mo x 4 mo)	\$4,000 (Operation: \$20/hr x 200 hr)	\$24,000
Structure Deployment			
Vessel Construction			
Steel & Welding	\$12,500 (Construction of Pontoon Vessel)	\$5,000 (Operation: \$25/hr x 200 hr)	\$17,500
Paint	\$350 (Bottom, Deck, & Structure Paint)	\$480 (\$12/hr x 40 hr)	\$830
Vessel Operation		\$1,500 (\$25/hr x 60 hr)	\$1,500
Engineering/Design Fees		\$5,000	\$5,000
Monitoring		\$8,000	\$8,000
Project Total	\$61,420	\$37,780	\$99,200

### Detailed Project Costs and Justification:

Each mold contains \$310.00 of lumber, screws and transportation fees. Two molds will be employed for this project totaling \$620.00 in material cost.

It takes a carpenter ~10 hrs to construct a single mold @ a rate of @ 15.00 per hr. Labor for two molds: \$300.00

Total cost of molds: \$920.00

Each structure will contain approximately one yard of concrete. Saxis will be casting two structures per pour. Two yards of concrete delivered cost \$300.00. A safe practice is to order slightly more concrete than needed to ensure no cold joints are in the structures so we must add \$50.00 dollars to the liquid concrete cost totaling \$350.00 per two-unit pour. Sixty structures are proposed for the project totaling 90 yards of concrete @ \$175.00 per structure = \$15,750.00

Each structure will contain 5 bushels of shell @ \$10 per bushel totaling \$50.00 per unit  
60 structures x \$50.00 = \$3000.00

Each structure contains \$150.00 in rebar, wire mesh and lifting eye.

Transportation / delivery included.

60 structures x \$150.00 = \$9000.00

Each structure requires 15 hrs. of labor to install components and cast @ \$15.00 per hr = \$225.00 per unit.

60 structures x \$225.00 = \$13,500.00

A concrete vibrator will be purchased to ensure proper bonding of shell veneer: \$200.00

Rental fees for a "rough terrain telescopic" forklift approximately \$5000.00 per month including fuel.

In consideration of weather, an estimated 4 months will be needed to rent this equipment.

Qualified equipment operator \$20.00 per hr for an estimated 200 hrs = \$4000.00

4 months x \$5000.00 = \$20,000

Total cost of forklift and operator \$24,000.00

The pontoon "A" frame vessel will have to be constructed for it is not an "off-the-shelf" item.  
Materials to include steel, welding equipment and welding supplies \$12,500  
Qualified welder @ \$25.00 for 200 hrs = \$5000.00  
Bottom, deck and structure paint: \$350.00  
Labor for grinding, sanding and painting \$12.00 per hr for 40 hrs = \$480.00  
Equipment operator \$25.00 per hr for 60 hrs = \$1500.00  
Total cost for vessel: \$19,830

Engineering and design fees: \$ 5000.00

Monitoring, data collection and reporting costs are approximately \$ 8000.00 depending on state recommendations / requirements.

**Total cost est. \$99,200.00**

**Individual unit cost – constructed and deployed: \$1638.00**

Please note that, with regards to future pier projects in Saxis, some costs will not be relisted on future proposals because they are one-time costs.

Costs were compared to the Saxis Aquatic Ecosystem Restoration report and Mathews County shoreline management plan. The Saxis proposal is 50% to 75% lower in cost than conventional methods of reef protection. Additionally, conventional methods are limited in design to enhance biodiversity, biogenic recruitment, and increase gamefish frequency.

## **7.) Timeline**

November 2013: Receive Award

December 2013 to February 2014: Material Acquisition and Vessel Construction

March to June 2014: Construction and Installation of the Proposed Structures

June to October 2014: Monitor Structural Stability and Biological Activity

November to December 2014: Production of Final Report