FEASIBILITY STUDY
PROPOSED OYSTER BED / CARBON FOOTPRINT REDUCTION
OLD DOMINION UNIVERSITY
WHITEHURST BEACH LOCATION

07 December 2011

Prepared for: Old Dominion University
Oceanography and Biology Departments

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Executive Summary

This report covers the proposed feasibility of constructing a man-made oyster reef at Old Dominion University, at Whitehurst beach. Throughout the 19th century, the native population of oysters has been on a sharp decline. This is due to over harvesting, fishing, disease, pollution and loss of reef habitat, which oysters need to survive. The aim is to introduce an exotic, disease-resistant oyster species to the proposed location in an attempt to measure the beneficial impact these organisms bring to the environment. The location is ideal because it already contains some of the necessary debris, or cultch necessary for oysters to thrive. Once established, the oyster bed is expected to filter pollutants and carbon, therefore improving water and air quality in significant, measurable volume. Oysters have proven to be an effective means for filtering large quantities of water per day. This pilot study is expected to be spearheaded by the oceanography and biology departments at Old Dominion University and will draw upon community involvement to keep costs at a minimum. Additionally, research and support from the Chesapeake Bay Foundation is expected and to provide further volunteer involvement. The goal of this pilot is to prove to the community the beneficial aspects this project provides over the course of one year. The data provided by this study is expected to generate financial funding for a project of greater magnitude.

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Introduction

The water at Old Dominion's Whitehurst Beach, like much of the water in the Hampton Roads area, has issues with pollution. This has numerous negative effects on the community; from a decrease of marine animal populations to beach erosion. One way that this pollution could be reduced is the introduction of oyster reefs to the area. Oysters are natural filters, with an adult oyster being able to filter between 20-50 gallons of water a day. A thriving oyster reef at ODU's Whitehurst Beach would dramatically reduce the pollution in the water with many other benefits. A small scale pilot study would determine whether or not this is a feasible project for the university to take on.

Aim

The purpose of this feasibility report is to outline a pilot study that introduces an exotic species of oysters to the Whitehurst beach area at Old Dominion University. The aim of the pilot is to measure a marked reduction of the pollutants in the water, thus reducing the carbon footprint of the surrounding area.

Scope

The feasibility study will cover the benefits oysters bring to the environment and why this project is necessary for the surrounding Old Dominion University/Chesapeake Bay area. This report will outline benefits the oceanography and biology departments (ODU) will have spearheading this project. This report does not go into the specifics of constructing an artificial oyster bed or reef, but will list several elements needed for oysters to thrive. Further research from the pilot study would be needed to justify a larger, more widespread project that aims to

improve water quality and reduce the carbon footprint.

Background to Study

Oysters are vital to the health of water systems by effectively filtering nutrients, algae, bacteria, fine sediments and toxins from water, improving water quality.

- ¤ Oyster biomass and harvest in the Chesapeake Bay system has been on a decline since 19th century
- ¤ Oysters in the Chesapeake Bay could once filter a volume of water equal to the entire bay (19 trillion gallons) in one week. Today – it would take more than a year
- ¤ Today – The population is 2% of what it used to be
- ¤ There is a link between decreasing oyster population and deterioration in water quality in the Chesapeake Bay proposed by Newell
- ¤ 19th century oyster population could filter entire volume of the Chesapeake Bay in less than a week
- ¤ Increasing oyster population could improve water quality by removing large quantities of carbon
- ¤ Oysters used to grow in tall reefs that were much better for the Chesapeake Bay than today's flat oyster beds
- ¤ Reefs need to be elevated to keep oysters above silty bottom and expose them to food-rich currents above
- ¤ Reefs provided more nooks and crannies for marine life habitats
- ¤ Oysters will need a constructed reef area in which they can attach and continue their development

Environmental Benefits

Oysters provide tremendous ecological value. Typical adult oysters filter between 20-50 gallons of water per day (Oyster Reef Restoration, 2009). There are several additional benefits for

placing oysters into the water at Whitehurst Beach:

- Oyster reefs provide refuge for over 300 species of invertebrates including shrimp, crabs, snails and worms
- Oysters serve as food for larger animals, such as striped bass, blue crab, and grouper which are native, economically valuable species(Oyster Reef Restoration, 2009)
- Oysters reduce harmful sediment, carbon, and nitrogen pollutants
- Packets of sediment that oysters deposit on bottom provide food for other marine life
- Oysters improve water quality by filtering nutrients, algae, bacteria and toxins
    - Water clarity will make the beach more appealing to students for recreation and collegiate water sports
    - Water Clarity will aid in the growth of sea grasses
        - Sea grasses are natural habitats for many species of marine life, especially as a nursery
        - Sea grasses also greatly reduce beach loss due to erosion

Oysters are an indicator species and can be used to gather information on the overall health of a water system.

Economical Benefits

There are more than just environmental benefits to be had from oyster reefs. There is the possibility for financial gains as well.

- Less money spent combating beach erosion
- More recreational use means more money spent on equipment rentals
- Reducing ODU's carbon footprint could result in federal grants
- Once a stable population is reached, monitored harvesting for consumption could begin

Educational Benefits

There are benefits that would be unique to Old Dominion compared to putting an oyster reef in any other public waters.

- Cleaner water increases recreation which improves student moral
- Creation of the cultch could be a project for students in the engineering department
- The oceanography and biology departments could create related hands-on projects
- Whole classes on subjects directly related to the oyster reef could be created
    - Reef maintenance
    - Tracking of water quality improvement
    - Tracking of health and abundance of inhabiting marine life
    - Tracking of beach health

Cost

The cost of the materials for the reef is $10,000 per acre (O'Neil, 2003). Because of the scope of this pilot study is much smaller than this, the cost of these materials would be proportionately less. The cost of the disease-resistant oyster spat on shells is $19.25 per 1000 (Oyster Recovery Partnership, 2011). These would be the only major expenses for the university. If students and volunteers are used for the construction of the cultch, there would be minimal –if any- cost involved in the construction. There is already plenty of rubble in the proposed area for the oyster spat to be placed for the pilot study. The same is true of the reef maintenance.

Conclusions

ODU has a responsibility as a reputable university to reduce its carbon footprint. Universities should be the leaders in the "Going Green" movement. The placement of an oyster reef at Whitehurst Beach would be a positive step in that direction. In addition to setting a global

example, the environmental, economical, and educational benefits clearly outweigh the costs that would be incurred in this process.

Recommendations

It is recommended that ODU's oceanography and biology departments seriously consider taking on this study. Just the study itself would be beneficial to the students and the university. And if the study proves that a project of larger scale is feasible, it would have dramatic positive effects on the environment as well.

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