IMPLEMENTATION OF THE INLAND BAYS CCMP

Work Plan for the Period
October 1, 2008 - September 30, 2009

DELAWARE

Limulus polyphemus

CENTER FOR THE INLAND BAYS

Rehoboth Indian River Little Assawoman

TABLE OF CONTENTS

Delaware Center for the Inland Bays, Inc.

Implementation of the Delaware Inland Bays CCMP

Abstract

The Delaware Center for the Inland Bays, Inc. will implement the Inland Bays Comprehensive Conservation and Management Plan (CCMP) through a series of ambitious projects initiated in FY'09. These projects implement various CCMP Action Plans and Tactics and may include, but are not limited to the following:

1. CCMP Implementation- Project management and oversight
2. Statistical analysis of environmental indicators with application to Delaware's Inland Bays
3. Eelgrass habitat restoration enhancement in Delaware's Inland Bays
4. Volunteer intensive and representative condition assessment of the bays (VIRCAB)
5. Benthic diatoms as indicators of water quality in Delaware's Inland Bays
6. Rehoboth Beach Yacht and Country Club restoration and natural resource management program
7. Restoration of a tidal transition wetland on Indian River at Sandy Beach
8. Great Cypress Swamp wetland restoration project: hydrological enhancement via water level control structures
9. Eelgrass planting project in Delaware's Inland Bays
10. Lord Baltimore School native habitat restoration
11. Water quality, habitat, and aesthetics improvement project at Gosling Creek Purchase
12. Inland Bays wetland education and citizen stewardship opportunities (guidebook)
13. Inland Bays wetland education and citizen stewardship opportunities (workshop)
14. Serving as a demonstration model to retrofit condos and communities to save our environment

Preface

This document is written to meet EPA requirements for an annual work plan for award of funds pursuant to Section 320 of the Clean Water Act. This Work Plan serves as an agreement between the Center for the Inland Bays and the U.S. Environmental Protection Agency for work to be carried out during fiscal year 2009 (October 1, 2008 through September 30, 2009). The focus of this Work Plan is the implementation of the Delaware Inland Bays Comprehensive Conservation and Management Plan via research, demonstration, education/outreach, and habitat restoration activities.

Introduction

Delaware's Inland Bays and their encompassing watershed have been the subject of study since 1969. Since 1988, the Inland Bays have been part of the National Estuary Program, established under the Federal Clean Water Act and administered by the Environmental Protection Agency. This estuary program effort has culminated in a Comprehensive Conservation and Management Plan for the Inland Bays, which is in the implementation phase. To support this implementation effort and to ensure that an open and collaborative process continues for future conservation efforts in the watershed, the Center for the Inland Bays, Inc. was established by the Delaware General Assembly in 1994 under the auspices of the Inland Bays Watershed Enhancement Act.

The purposes of the Center are:

1. To build, maintain, and foster the partnership among the general public, the private sector, and local, state, and federal governments, which is essential for establishing and sustaining policy, programs, and the political will to preserve and restore the resources of the Inland Bays watershed;

2. To sponsor and support educational activities, restoration efforts, and land acquisition programs that lead to the present and future preservation and enhancement of the Inland Bays watershed; and

3. To serve as a neutral forum where Inland Bays watershed issues may be analyzed and considered for the purposes of providing responsible officials and the public with a basis for making informed decisions concerning the management of the resources of the Inland Bays watershed.

Mission Statement:

The mission of the Center for the Inland Bays is to promote the wise use and enhancement of Delaware's Inland Bays and their watersheds.

2007 Goals and Accomplishments

Achievements

During FY2007, the Center for the Inland Bays completed the following research and demonstration projects with EPA grant monies to implement the Inland Bays CCMP. Project summaries and/or final reports are included:

1. Using Cover Cropping Systems to Reduce Nutrient Losses to the Environment

2. Assessment and Monitoring of Harmful Algal Cysts in High Nutrient-Rich Areas of the Delaware Inland Bays

3. Ingress of Larval Fishes through Indian River Inlet: Patterns of Abundance and Development of a Juvenile Fish Index to Assess Water Quality in the Inland Bays System

4. Inland Bays Oyster Gardening Program and Little Assawoman Bay Shellfish Restoration

5. Annual Inland Bays Clean-Up

6. Camp Awareness: Youth Educational Camp

7. Invasive Species Control at Savannahs Landing

8. Discover Delaware's Inland Bays! A Pontoon Boat Program at Delaware Seashore State Park

In addition, the CIB engaged in the following activities, which were listed as **Goals and Focus** in the FY2007 Work Plan:

Goal/Focus: Develop a long-term finance strategy

Following the success of a $1M capital campaign to fund renovations of the CIB's new administrative headquarters, the CIB will develop a long-term finance strategy to sustain and diversify funding to support CIB's core activities. This will include expansion of a non-profit endowment campaign with the Delaware Community Foundation as well as development of other charitable giving options.

The CIB made great strides in its efforts to sustain and diversify funding to support core activities. Two major achievements can be highlighted for the reporting period.

1. The CIB executed an agreement with the Delaware Community Foundation (DCF) to create a non-profit endowment fund. An initial contribution of $35,000 was deposited into the account, with a subsequent contribution of $5,000 offered by the Freeman-Bayside Community. CIB staff continues to work with the DCF to develop charitable giving options to support the endowment fund.

2. The CIB hired a part-time Development Coordinator to assist the Center for the Inland Bays with planning, coordinating and implementing the fundraising and marketing efforts of the CIB, which includes building and maintaining relationships and securing financial support from current and prospective donors. Upon hire, the Development Coordinator examined and evaluated various components of previous fundraising efforts including solicitations, mailings, membership, special events, major donors and donor lists. The Development Coordinator also initiated the creation of a comprehensive finance strategy to outline funding goals and provide the guidance necessary for successful fundraising efforts.

Goal/Focus: Complete the development of an effective tracking database for the CIB

The CIB previously hired consultants to develop a "useful" and "user-friendly" database to track CCMP implementation; however, the results have been very unsatisfactory. Due to the generosity of the New Hampshire Estuaries Project, the CIB has been afforded an opportunity to customize a proven tracking system for our purposes and applications. Center staff will complete revisions to the tracking system and populate the database to generate information that will facilitate the assessment of progress implementing CCMP actions.

The New Hampshire Estuaries Project database was modified to reflect the particular needs of the CIB. Volunteer assistance from a professional computer programmer was obtained to assist in refining the database structure. Center staff was also consulted to determine their desires for the database based in its function. The services of an intern were acquired to begin populating the database, and collaboration with the DNREC was discussed concerning the analysis of CCMP implementation.

Goal/Focus: Engage the Inland Bays Citizens' Advisory Committee (CAC) in activities which support the revisions of Sussex County's Comprehensive Land Use Plan

Sussex County will revise its Comprehensive Land Use Plan in 2007 and the CIB is poised to offer its assistance. An ad hoc subcommittee of the CAC will complete its review of progress implementing the Land Use Action Plan of the CCMP and report its findings to the Board of Directors. Subsequently, the Inland Bays CAC will collaborate with the University of Delaware's Sea Grant Program's Coastal Communities Initiative to organize and host citizen seminars that educate the watershed's residents about a variety of land use issues.

The Inland Bays CAC coordinated its activities with Sussex County's process to update its Comprehensive Land Use Plan (CLUP). The CAC hosted meetings with the County's Land Use Planner as well as the Director of the Office of State Planning Coordination. An ad hoc subcommittee of the CAC also hosted a meeting with the leadership from local environmental organizations to receive input concerning the update of Sussex County's CLUP. These meetings established the groundwork for the ad hoc subcommittee to assess the County's progress toward implementing the Land Use Action Plan of the Inland Bays CCMP.

The ad hoc subcommittee issued its report on County progress at a meeting with officials and staff from the Sussex County Planning & Zoning Department as well as the County's land use consultant hired to update the CLUP. The subcommittee also shared its findings on CCMP implementation progress with the Board of Directors of the CIB.

The Citizens' Advisory Committee presented its recommendations to the Board of Directors, which endorsed these actions with some amendments. CIB staff and members of the Citizens' Advisory Committee subsequently met with representatives from Sussex County, the Office of State Planning Coordination, and Department of Natural Resources & Environmental Control to examine opportunities for integrating the recommendations into the update of the Sussex County Comprehensive Plan.

Goal/Focus: Develop a Request for Proposals that results in an increase in the number of proposed and funded restoration activities as well as additional education and outreach projects from outside agencies or organizations

During our first decade, the CIB solicited scientific research and demonstration project proposals for annual funding, with little interest or effort dedicated to attract and fund restoration projects and education/outreach activities. The CIB intends to emphasize funding opportunities for restoration projects and education/outreach activities during its next round of RFPs.

The CIB was successful in generating a request for proposals (RFP) that solicited a greater number and wider variety of research, education, and restoration oriented proposals. The research component of the RFP was geared towards projects that would revise existing and develop new Inland Bays environmental indicators, and we received a number of excellent proposals to this end. In the past research proposals from Universities were received almost exclusively from the University of Delaware (UD). CIB was successful in soliciting a greater variety of researchers in UD as well as researchers at the University of Maryland. Education and restoration project proposals were increased over the previous year, partially due to cooperation with a property management company that distributed our RFP to its list of homeowners associations, one of our priority audiences. Unfortunately, the funding cuts forced the CIB to rescind its RFP and no projects were funded for FY'08.

Goal/Focus: Establish and execute a strategy to report updates for the adopted Inland Bays Environmental Indicators

Since publishing its first report on Inland Bays Environmental Indicators in summer 2004, the Inland Bays Scientific & Technical Advisory Committee has engaged in discussions regarding methods for analyzing water quality trends and strategies for disseminating this information. The CIB will convene a subcommittee of the STAC to determine a schedule and method for the regular and routine reporting of water quality trends and data for adopted Inland Bays environmental indicators.

Since publishing its first report on Inland Bays Environmental Indicators in summer 2004, the Inland Bays Scientific & Technical Advisory Committee has engaged in discussions regarding methods for analyzing water quality trends and strategies for disseminating this information. The CIB has directed the focus of its STAC to revise and improve its use of environmental indicators to tell the most complete and comprehensive manner the condition of the Bays over time in a manner the public and policy makers can understand. A framework including goals, principles, products, and a timeline has been developed. Three regular meetings of the STAC as well as two indicator subcommittee meetings devoted to this effort were convened. Existing environmental indicators have been updated with new data and evaluated by the STAC. Currently the STAC is developing a water quality index for the Bays and a method to report indicators using a spatially-consistent, map-based approach.

Goal/Focus: Initiate a Schoolyard Habitat Program/"Green Schools" Program

CIB will create a schoolyard habitat program targeting schools in the watershed so that "watershed education" becomes part of the student experience throughout the entire school year. This program will help to further our education and outreach objectives, but will support other areas of our mission, including habitat restoration and science/research (data collection).

CIB will also initiate a Green Schools" program in the Inland Bays watershed, modeled after the very successful Maryland Green Schools program. Our proposed Green School Award Program will recognize schools that include environmental education in the curricula, model best management practices at the school and address community environmental issues.

CIB expanded its education program beyond our already successful outdoor learning activities at the James Farm with the establishment of a partnership with the Indian River School District to bring a Schoolyard Habitat Program to the Inland Bays Watershed. This program has enabled CIB to deliver watershed education to an additional 1,400 students as well as hundreds of parents, teachers, staff and volunteers in the schools and the wider community that we had not previously reached. It has also provided the opportunity to place volunteers in key positions in the schools to create a link between schools and communities for the furtherance of the CIB mission in the watershed. Highlights of this program included:

- Proposed and established the Lord Baltimore Elementary School as the "Schoolyard Habitat Demonstration School" for the district
- Formed a partnership with Environmental Concern, one of our "Gardening for the Bays" partners, and obtained a NOAA grant and technical assistance to build schoolyard wetland habitats at two elementary schools in the Inland Bays watershed this spring.
- Recruited Community Volunteer Leaders and Committees to support each school in building/restoring, developing and maintaining their schoolyard habitats, and recruiting garden clubs to take on major projects and provide expertise to community volunteers
- Completed schoolyard habitats at Long Neck E.S. and Showell E.S.

The program also included workshops for teachers, students and volunteers, assemblies in the schools, presentations at PTO meetings, presentations and plants in the classrooms, bulletin boards at the schools, and development of festivals around the watershed.

Goal/Focus: Explore Development of a Minority Outreach Program

EPA Region III staff has requested that CIB explore the development of a minority outreach program, which might include internship opportunities and an associated career training program for students from Delaware State University. CIB should expand this type of effort to include contact with other minorities (Hispanic, Asian, etc.) to effectively share our conservation message with these communities.

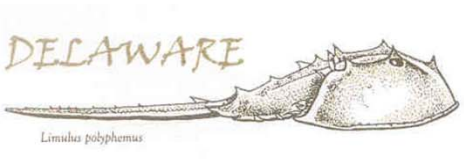
CIB signed a Memorandum of Understanding with Delaware State University (DSU), an historically Black college/university, to create a partnership to expand the Inland Bays Shellfish Restoration Program. DSU has received a three-year, $300,000 USDA assistance award for Land Grant Institutions (Morrill Act of 1890) to support this partnership. DSU is actively promoting aquaculture as a sustainable and ecologically sound agriculture industry for Delaware by

identifying suitable aquaculture species and low-input methods to raise them.

CIB hosted graduate students, technicians and interns involved in grant activities. These activities included a study of the habitat value of the CIB's artificial reef as well as various shellfish aquaculture gears used by the CIB, including the equipment used by the oyster gardening program.

In addition, staff engaged in numerous other projects and activities during the reporting period, which have been provided to the Regional Coordinator on a quarterly basis as listed below:

- Chronology of progress for the period from August 15, 2006 to November 15, 2006
- Chronology of progress for the period from November 15, 2006 to February 15, 2007
- Chronology of progress for the period from February 15, 2007 – May 15, 2007
- Chronology of progress for the period from May 15, 2007 – August 15, 2007
- Chronology of progress for the period from August 15, 2007 – November 15, 2007



CENTER FOR THE INLAND BAYS
Rehoboth Indian River Little Assawoman

Project Report

Executive Summary

Project Name: Inland Bays CCMP Project Management & Oversight

Responsible Partner
Center for the Inland Bays
39375 Inlet Road
Rehoboth Beach, DE 19971
(302) 226-8105
Edward A. Lewandowski, Executive Director
director@inlandbays.org

Grant ID:

Status: On-going

Project Description

Project Overview

The Center for the Inland Bays, Inc. is an innovative management approach to watershed restoration and protection. Critical to the success of CCMP implementation activities is effective research and demonstration project oversight, grant development and management, contract administration, and coordination with organizations responsible for various work elements as well as tracking and communication of progress. The Board of Directors, the office of the Executive Director and other appropriate staff, will be responsible for these tasks.

The Center for the Inland Bays, Inc. is a unique organization established under the National Estuary Program. The nonprofit Center for the Inland Bays, Inc., enabled under special legislation signed into law in July 1994, sets up governance to oversee implementation of the Inland Bays Comprehensive Conservation and Management Plan.

The CIB is administered by a nine member Board of Directors consisting of the following members: Secretary of the Department of Agriculture, Secretary of Dept of Natural Resources & Environmental Control, a representative from the Sussex Conservation District, the Sussex County Council, a representative from the Sussex County Association of Towns, the Chair of the Scientific and Technical Advisory Committee, the Chair of the Citizens Advisory Committee, a designee of the President Pro-Tem of the Delaware State Senate, and a designee of the Speaker of Delaware State House of Representatives. The EPA is an Ex-Officio member.

Primary Objectives/Opportunity
• Provide for effective project management and oversight • Engage in restoration, research/demonstration, education & outreach projects and the development of sound public policy • Coordinate with responsible organizations and partners • Track and communicate progress
CCMP/Work Plan Goal
Inclusive

Primary Project Deliverables

Milestones	
Task 1:	Secure state funding and other match sources to support the Section 320 grant and CIB Work Plan
Task 2:	Prepare and distribute program updates and associated progress reports to the Board of Directors and EPA (quarterly)
Task 3:	Hire and/or retain appropriate support staff as needed (on-going).
Task 4:	Monitor budgetary and financial reconciling procedures.
Task 5:	Provide administrative (meeting arrangements, notifications, minutes, etc) support for the Board of Directors, Scientific and Technical Advisory Committee, Citizen's Advisory Committee and other CIB committees (on-going).
Task 6:	Provide communication documents, including the Inland Bays Journal (three times per annum- spring/summer/fall), to public and private groups/individuals, state, county, and local governments.
Task 7:	Publish a CIB annual report and distribute to select audiences, including the Delaware General Assembly, as required by HB540- the *Inland Bays Watershed Enhancement Act.*
Task 8:	Facilitate implementation and monitor/track the progress of lead agencies responsible for implementation of CCMP tactics (on-going).
Task 9:	Provide educational programs to schools, homeowners, and other publics to show better management practices within the Inland Bays watershed; methods will include programs, lectures, slide shows, seminars, as well as media interaction (radio, TV, news articles, etc).
Task 10:	Continue to support the promulgation of Inland Bays Pollution Control Strategy regulations in cooperation with the Delaware Department of Natural Resources & Environmental Control.
Task 11:	Continue restoration initiatives at the James Farm Ecological Preserve as well as other public and private sites.
Task 12:	Serve on state-wide and regional committees and task-forces to promote sound

	environmental policies based on best available science.
Task 13:	Continue oversight and management of the Inland Bays Shellfish Restoration Program in cooperation with the College of Marine Studies (U.D.) and Delaware State University
Task 14:	Travel to national and regional EPA meetings and estuary-related conferences; provide technical assistance to other programs.
Task 15:	Serve in an advisory capacity to elected officials, public policy makers and civic leaders.
Task 16:	Organize and host special events, such as the Governor's Wade-In, the Native Plant Sale, the Inland Bays Clean-up, and other public outreach activities.
Task 17:	Augment the CIB's membership program and sustain opportunities for volunteer participation.
Task 18:	Continue to collaborate with the Maryland Coastal Bays Program on the implementation of DAWN (Delmarva Atlantic Watershed Network) to promote regional planning efforts for Delmarva's coastal Atlantic watersheds.
Task 19:	Collaborate with the Inland Bays Citizens' Advisory Committee to expand the activities of its Outreach and Public Policy subcommittees
Task 20:	Diversify sources of non-federal income to support the CIB's programs and activities.

Project Financing

Budget

Award: $591,750

Description	Expense
See attached budget	

Project Critical Success Factors

Outcomes

Short-term: inclusive
Intermediate: inclusive
Long-term: inclusive
Changes in pressure targets: inclusive
CWA programs: inclusive

External Factors

Impacts

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CENTER FOR THE INLAND BAYS
Rehoboth Indian River Little Assawoman

Project Report

Executive Summary

Project Name: Statistical Analysis of Environmental Indicators with Application to Delaware's Inland Bays

Responsible Partner Doug Miller, Principal Investigator / Project Manager
Ryan Dale, Graduate Research Assistant
Cannon Marine Laboratory
College of Marine and Earth Studies
700 Pilottown Road
University of Delaware
Lewes, DE 19958

Grant ID:

Status: Proposed

Project Description

Project Overview

Environmental indicators are often used to summarize and present environmental data. Their utility derives from the ability to capture in a simple, single value the complexities and interrelationships of multivariate physical-chemical, ecological and biological data. A summary of many such factors can then be presented on a scale that is both easily interpreted and directly related to an expert judgment of system state and health.

In 2004, the CIB Scientific and Technical Advisory Committee (STAC) reported2 on eleven key environmental indicators of particular utility to Delaware's Inland Bays. Over the past several months, the STAC has begun a process of reviewing both these existing measures and entertaining potentially new condition indicators. A special emphasis is being given to indicators that are diagnostic, i.e., indicative of a causal relationship between the environmental parameters and potential stressors. The STAC review process is deliberately incremental in order to garner as much perspective and input from as wide an audience as possible.

Factors critical to the selection of useful indicators have been outlined in a recent EPA report3 (and extended as part of the STAC update process), and these include: type of question, spatial scale, temporal scale, and environmental context (i.e., landscape and land use). Since questions of scale, acquisition of data and ensuing analysis are necessarily quantitative in nature, the effective and reliable use of these metrics should be guided by statistical principles. In practice, multiple indicators are typically used simultaneously to assess overall environmental condition, and thus use of indicators is inherently multivariate in nature. Effective interpretation and presentation of such indicators will greatly benefit from methods, techniques and tools of multivariate statistics.

The overall goal of this project is to assist the CIB and its STAC in their re-evaluation of environmental indicators for the Inland Bays. While the final choice will be guided by the collective wisdom of the STAC, it must also be statistically sound, address as many dimensions of the environment and possible stressors as possible (but avoiding redundancy and correlation), and be easily computable and readily explainable to a wide variety of audiences. Multivariate analyses are routinely employed in environmental and ecological research studies supporting management decisions, and they are starting to appear in materials intended for a wider audience, for example, the multidimensional scaling plot of chlorophyll, macroalgae and isotope ratios in a recent newsletter4.

Over the next year, the overall goal of this project will be met through statistical consultation that is coordinated and guided by the STAC indicator evaluation process. The proposed effort will begin with an evaluation of existing and candidate indicators with respect to established criteria3 and especially their statistical properties combined with the working table used by the STAC, resulting in a preliminary ranking. This will be followed by workshops in statistical methods, techniques and interpretation as needed by the STAC and the CIB staff. These will be led by the PI/PM Miller and a graduate assistant well-versed in all aspects of programming and data analysis. Possible topics include: overall principles of statistical inference, hand-on tutorials on standard statistical packages, and overviews of sampling designs for field studies, tests, regressions and correlations, time series and spatial data, multivariate analyses (ordination by PCA, MDS, biplots), and display and exploratory data analysis.

Additional presentations and recommendations may also be made on specific topics as communicated through the STAC and CIB staff, and possibilities include: utility of various macrobenthic indices, recommendation of resource and reference materials, evaluation of particular software or statistical applications, or review of technical reports published by or submitted to the CIB. Throughout the project period, the PI/PM will be on site one day per month (or biweekly for mornings or afternoons) to provide walk-in assistance as needed. The timetable of this project intentionally mirrors the STAC review process in order to provide input as needed throughout the effort.

While the suite of recommended indicators and chosen methods of analysis and presentation will be determined specifically for the Inland Bays, environmental indicators and multivariate analyses are used widely and should be evaluated within that broad context. Continuity of existing, proven indicators, use of historical data, and congruence of Inland Bays indicators with others used in the region is highly desirable.

Primary Objectives/Opportunity

- To improve the utility of existing environmental indicators
- To facilitate the development of new diagnostic indicators
- To enhance the statistical reliability and effective presentation of indicator-based decisions regarding environmental quality in the Inland Bays.

To achieve these objectives, we will:

- Provide statistically based comparison of candidate indicators, both existing and new, and review sampling designs to ensure maximum utility of collected data
- Conduct multivariate analysis to identify correlated (or redundant) environmental variables and ensure efficient use of field sampling and data collection efforts
- Support the CIB, its STAC and funded researchers with statistical consultation as indicators are recorded and developed
- Offer statistical analysis workshops, hands-on experience with standard and multivariate statistical packages, graphical presentation, and walk-in consulting services.

CCMP/ Work Plan Goal

This project satisfies a number of CIB priority Work Plan goals including, 1) improving the utility of existing environmental indicators, (2) facilitating the development of new diagnostic indicators, and (3) enhancing the reliability and presentation of indicator-based decisions regarding environmental quality in the Inland Bays.

Primary Project Deliverables

Milestone 1

- Reports on candidate indicators, including a ranking of indicators based on sampling and statistical properties, provided at mid-project and at conclusion, in coordination with Scientific & Technical Advisory Committee activities

Milestone 2

- Workshops and presentations to STAC and CIB staff on statistical and data analysis needs and solutions; topics will be determined in consultation with staff and committee needs

Milestone 3

- Walk-in consulting, for example, one day / month at CIB offices at the Indian River Inlet Facility

Project Financing

Budget

Award: $10,875

Description	Expense
Salaries & Wages/Fringe	$7,235

Expendables	$400
Travel	$300
Indirect	$2,940

Project Critical Success Factors

Outcomes
Short-term: quantitative/qualitative assessment of Inland Bays environmental indicators **Intermediate:** increased understanding of Inland Bays ecological trends, increased understanding and a learning tool for resource managers involved in planning protection and restoration strategies **Long-term:** enhance monitoring capabilities of partner programs and agencies **Changes in Pressure Targets**: N/A **CWA Program:** improve water quality monitoring

External Factors

Impacts
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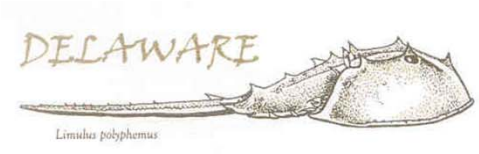


CENTER FOR THE INLAND BAYS

Rehoboth Indian River Little Assawoman

Project Report

Executive Summary

Project Name: Eelgrass Habitat Restoration Enhancement in Delaware Inland Bays

Responsible Partner University of Delaware
College of Marine and Earth Studies
700 Pilottown Road
Lewes, DE 19958

Project Manager: Dr. Doug Miller
302-645-4277
dmiller@udel.edu

Graduate Student: Kayti Tigani
ktigani@udel.edu

Grant ID:

Status: Proposed

Project Description

Project Overview

As a habitat for marine organisms, seagrass beds play a fundamental role in maintaining populations of ecologically and economically important fish and invertebrate species by providing habitat, nurseries, and feeding grounds (Jackson, 2001). Seagrass also serves as a substrate for epizootics and epiphytes that are important to food webs. *Zostera marina* also maintains water quality by stabilizing the substrate to reducing turbidity, removing large quantities of dissolved inorganic nitrogen from the water column and removing nutrients from the soils, reducing overall eutrophication in the estuarine environment (Kohata et al., 2003). However, seagrass systems have been subjected to heightened biotic and abiotic stresses in the last century. The Delaware coast experienced a die-off of *Z. marina* due to "wasting disease" in the 1930's and failure to overcome that loss led to the complete loss of eelgrass beds in Delaware's Inland Bays.

Recent studies have suggested that the key to seagrass success may lie in a better understanding of the role of the associated microbial community. Published work on seagrass/microbial community associations has demonstrated the importance of microbial associations for nutrient cycling, symbiotic growth stimulation, and survivorship during climate change events (Kusel et al., 2006; Jensen et al., 2007; Koch et al., 2007). However, through work with tissue culture, we (Tigani et al., 2008) observed an endogenous bacterium associated with of a variety of *Z. marina* tissues including the seed, spadix, inflorescence, and vegetative material (rhizomes and shoot meristems). A partial (500-bp) sequence of the 16S rRNA gene and fatty acid analysis revealed two undescribed species of the α-Proteobacteria genus *Thalassospira*, a relatively new genus comprised of only three described species (Lopez-Lopez et al., 2002; Liu et al., 2007). The novelty of a newly discovered eelgrass-bacterium association is upstaged by the potential ecological ramifications of such an interaction. Our initial experiments suggest this bacterium could be a valuable restoration tool to enhance germination rates (Tigani et al., 2008) although much remains to be discovered about the mechanism of this response. In addition to promoting germination, *Thalassospira* has also been shown to exhibit antimicrobial properties. We conducted a preliminary study utilizing pixel analysis of digital photography over time to investigate the effects of bacteria treatments on *Z.marina* leaf segments exhibiting wasting disease lesions. This study revealed a dramatic reduction in lesion progression in the *Thalassospira* treatment.

This project will focus on laboratory work intended to expand on our preliminary data on the effects of *Thalassospira* sp. on the seagrass *Z. marina*. Continued studies of seed germination response to elevated *Thalassospira* populations will include the effects of a refined bacteria filtrate (to better explore a potential chemical signaling) as well as abiotic factors, such as salinity, redox potential, and the minimum required exposure period. The latter will also serve to test the practical application of this as a restoration tool. Determining effective population densities could also allow us to index a threshold population level in existing beds that supports prolific growth. We will also conduct a series of 1-2 week-long experiments looking at the effects of the *Thalassospira* treatment on *Z. marina* wasting disease lesions while considering factors of treatment population density, temperature, light, and initial surface area of lesion. The role the Center's support plays is to initiate this laboratory study by executing critical pilot experiments. This initial experimentation, as well as the full-scale experiments derived from the results, will require the input of live plant material. We plan to conduct limited, small-scale field collection trips to acquire such material from the James Farm Ecological Preserve, the first of which will also serve as a survey of the existing seagrass bed.

Primary Objectives/Opportunity

- To conduct laboratory experiments testing the potential utilization range of *Thalassospira* sp. as it relates to *Z. marina* restoration in germination, enhanced growth rate, and wasting disease control.

CCMP/ Work Plan Goal

G2: Protect, restore and enhance living resources by improving water quality and protecting and enhancing habitat
G2A: Promote recurrence of submerged aquatic vegetation
G2E: Enhance monitoring and response strategies

Primary Project Deliverables

Milestone 1

- collection of plant material used to initiate the pilot laboratory experiments (October 2008)

Milestone 2

- full-scale laboratory experiments (February 2009)

Milestone 3

Project Financing

Budget

Award: $12,500

Description	Expense
Salary, wages & benefits	$8,750
Expendable supplies & equipment	$3,750

Project Critical Success Factors

Outcomes

Short-term outcomes: understanding and practical application of a potential restoration tool
Intermediate outcomes: N/A
Long-term outcomes: restoration of an ecologically significant plant community in the Inland Bays
Changes in pressure targets: increase in SAV acreage
CWA core programs: N/A

External Factors

Impacts
• N/A

CENTER FOR THE INLAND BAYS
Rehoboth Indian River Little Assawoman

Project Report

Executive Summary

Project Name: Volunteer Intensive and Representative Condition Assessment of the Bays (VIRCAB) &

Responsible Joseph G. Farrell, UD SGMAS Marine Resource Management Specialist, and Program Manager, UD Citizen Monitoring Program
University of Delaware, College of Marine and Earth Studies
204H Cannon Laboratory, 700 Pilottown Road, Lewes, DE 19958
302-645-4250 (phone)
jfarrell@udel.edu (e-mail)

Edward Whereat, Ph.D., Program Coordinator, UD Citizen Monitoring Program
University of Delaware, College of Marine and Earth Studies
105 Pollution Ecology Lab, 700 Pilottown Road, Lewes, DE 19958
302-645-4252 (phone);

whereat@udel.edu (e-mail)

Robin Tyler, Ph.D.
Department of Natural Resources & Environmental Control
Laboratory Services Section
89 Kings Highway
Dover, DE 19903
(302) 739-9941
robin.tyler@state.de.us

Grant ID:

Status: Proposed

Project Description

Project Overview

The UD Citizen Monitoring Program has been collecting water quality data in the Inland Bays since 1991, primarily from shoreline bulkheads, docks or piers in tributaries and the main bays.

Our data provides valuable trend information over 17 years. In general, our coverage is more comprehensive in the tributaries than the main bays where we have recruited volunteers from the many tributary based waterfront communities. On the other hand, the existing suite of environmental water quality indicators have been based on the habitat requirements of Eelgrass (Zostera marina), the keystone species of submerged aquatic vegetation (SAV) for the Inland Bays, and as such, they are only applicable to the main bays (Secchi depth, Chlorophyll a, Total Suspended Solids, Dissolved Inorganic Nitrogen and Phosphorus). Over the years, our volunteers have expressed interest in boat sampling. To be effective, this effort would require additional oversight and modified sampling design. It would, however, provide a new dimension to our Citizen Monitoring Program effort and offer the potential benefit of an additional data source for an SAV indicator.

This pilot project will extend our monitoring capabilities to sample open water bay sites by boat, and will provide sequential monthly assessments from May through September that will be reported to the public on our web page. The project will offer comparisons to previous research on the habitat requirement of Eelgrass in the Inland Bays done by researchers at the UD CMES and DNREC.

In addition, other pertinent indicators will also be included in the study, such as Dissolved

Oxygen, the abundance of Macroalgae and Harmful Phytoplankton blooms, and the levels of fecal bacteria that are used as an indicator of the safety of recreational contact (Total Enterococcus).

In the past, the Center for Inland Bays has supported our previous pilot efforts, including the Phytoplankton Monitoring Program, which has become a highly successful core program.

Primary Objectives/Opportunity

- To form a small group of volunteers (6 boats, with teams of 2-3 volunteers per boat) committed to using their personal vessels to collect water quality samples from the main bays on a monthly basis during summer 2009.

- To focus on measuring parameters that are core diagnostic environmental indicators for Eelgrass habitat requirements (*), or other indicators routinely used by EPA or DNREC (**i.e. things for which standards exist).

  Parameters measured by volunteers on boat:
  - Secchi Depth* and Water Depth
  - Water Temperature and Salinity
  - Dissolved Oxygen**
  - Macroalgae abundance (by grapple hook)
  - Parameters measured by laboratory analysis:
  - Chlorophyll a* and Total Suspended Solids*
  - Dissolved Inorganic Nitrogen* and Phosphorous*
  - HAB identification and enumeration
  - Total Enterococcus**

- To compare data from the main bays to data collected from existing shoreline sites which largely are in the tributaries.

- To compare results to previous environmental indicator studies, and to form a low cost option of continuing sampling of the bays by volunteers with boats in future years.

CCMP/ Work Plan Goal

G2E: Enhance monitoring and response strategies

Primary Project Deliverables

Milestone 1

- October 1, 2008 to April 30, 2009- Coordination, Planning and Training of Volunteers

Milestone 2

- May 1, 2009 to September 30, 2009- Sampling, Analysis and Reporting

Project Financing

Budget

Award: $25,000

Description	Expense
Total Salaries and Benefits	$15,278
Expendable Supplies & Equipment	$4,000
Domestic Travel	$200
Analysis	$400
Small Boat	$400
Total Direct Costs	$20,278
Indirect Costs @ 32.0%	$4,722
Total Project Costs	$25,000

Project Critical Success Factors

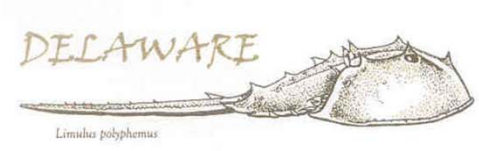
Outcomes

Short-term: expand citizens' monitoring effort
Intermediate: provide additional data sets
Long-term: enhance monitoring capabilities of partner programs and agencies
Changes in pressure targets: increase in number and type of sampling sites
CWA Programs: improve water quality monitoring

External Factors

Impacts

-



CENTER FOR THE INLAND BAYS

Rehoboth Indian River Little Assawoman

Project Report

Executive Summary

Project Name: Benthic diatoms as indicators of water quality in Delaware's Inland Bays

Responsible Partner Kathryn J. Coyne, Assistant Professor
University of Delaware, College of Marine and Earth Studies
700 Pilottown Rd., Lewes, DE 19958
Phone: 302-645-4236, FAX: 302-645-4007
kcoyne@udel.edu

Grant ID:

Status: Proposed

Project Description

Project Overview

Benthic diatoms are excellent indicators of environmental change in aquatic ecosystems and are routinely used to monitor water quality in freshwater ecosystems in the US and Europe (e.g. Potapova and Charles 2007). Diatoms have several attributes which make them ideal for water quality assessments (summarized from McCormack and Cairns 1994):

1. **Diatoms are ubiquitous and biologically relevant**. Diatoms are components of virtually every aquatic habitat and many species are globally distributed. As primary producers, diatoms are also vital members of aquatic ecosystems and function at the interface between biotic and abiotic components of the food web. In addition, diatom assemblages generally contain a large number of species, so that changes in population structure provide an "information-rich" system for ecological analysis.

2. **Diatom assemblages provide excellent continuity through time and space.** Although seasonal changes in diatom populations occur, community-level characteristics are maintained throughout the year. Furthermore, the ubiquity of diatom assemblages within a geographical region provides spatial continuity for fine-scale resolution of environmental impacts.

3. **Diatoms are sensitive to a broad range of environmental stressors over small temporal and spatial scales.** Benthic diatoms have relatively high growth rates and respond rapidly and predictably to alterations in water chemistry. When compared to minimally-impacted reference sites, the ecological conditions of other sites along a gradient are reflected by differences in diatom abundance and diversity.

4. **Diatom indicators provide information about ecosystem health that is complementary to information provided by other indicator organisms.** As direct recipients of increased nutrient loading, changes in diatom community structure are reliable indicators of changes in trophic status. Other commonly used indicators, such as invertebrate and fish populations, respond better to changes in their physical habitat, such as increased sediment loading or temperature.

5. **Sampling protocols for diatoms have little impact on the environment.** While

sampling higher organisms may be destructive to the environment or detrimental to indigenous populations, diatom sampling rarely impacts the environment or other trophic levels.

6. **Diatoms indicators are cost effective.** In contrast to indicators species from higher trophic levels, large numbers of benthic samples can be easily collected and rapidly processed for molecular analysis of diatom species.

Although the value of diatom indices for water quality assessment in freshwater ecosystems has long been recognized, recent research has also demonstrated the utility of benthic diatoms as reliable indicators of water quality within marine systems (e.g., Frankovich et al, 2006; Weckstrom and Juggins 2005; Webber et al., 2005; Marshall et al., 2003). In Delaware's Inland Bays (DIB), however, there has been only one study of benthic diatoms, as paleoecological indicators of climate change (Beasley, 1987). This investigation revealed an increase in diatom diatom abundance and decrease in diversity with increased agricultural activities (and nutrient input) over time. In the most recent sediments, Beasley (1987) also identified diatom species indicative of nitrogen pollution with declining oxygen levels. A study of representative salt marsh habitats in nearby Canary Creek, Lewes, DE also investigated the effects of nutrient enrichment on diatom assemblages and found that long-term exposure to nutrient stress resulted in a shift in community structure and a decrease in diatom diversity (Sullivan 1976). These results, along with the considerable amount of data provided in studies on other systems, suggest that diatom assemblages in Delaware's Inland Bays may be useful indicators of environmental conditions over a range of temporal and spatial scales.

Primary Objectives/Opportunity

- Explore the impact of nutrients in structuring benthic diatom assemblages in Delaware's Inland Bays.
- Evaluate tolerance of potential indicator species within diatom assemblages to nutrient input.
- Make recommendations for appropriate diatom indicators to CIB and DNREC.

CCMP/Work Plan Goal

This project satisfies a number of CIB priority Work Plan goals including, (1) facilitating the development of new diagnostic indicators, and (2) enhancing the reliability and presentation of indicator-based decisions regarding environmental quality in the Inland Bays.

Primary Project Deliverables

Milestone 1

- Analyze archived DNA from sediments, statistical analysis of results (Fall '08)

Milestone 2

- Sequence DNA for species identification (Fall '08/Winter '09)

Milestone 3

- Develop and test high-throughput assays (Winter '09/Spring '09)

Milestone 4

- Collect and analyze sediments from selected sites of interest (Spring '09/Summer '09)

Milestone 5

- Mesocosm experiments (Summer '09)

Milestone 6

- Analyze and evaluate results mesocosm experiments (Summer '09)

Milestone 1

- Write reports, make recommendations for diatom indicator species (Summer '09/Fall '09)

Project Financing

Budget

Award: $12,000

Description	Expense

Project Critical Success Factors

Outcomes

Short-term: new Inland Bays environmental indicator
Intermediate: increased understanding of Inland Bays ecological and water quality trends; increased understanding and a learning tool for resource managers involved in planning protection and restoration strategies.
Long-term: enhance monitoring capabilities of partner programs and agencies
Changes in pressure targets:

CWA Programs: improve water quality monitoring

External Factors

Impacts
•

Project Report

Executive Summary

Project Name: Rehoboth Beach Yacht & Country Club (RBYCC) Coastal Restoration and Natural Resource Management Program

Responsible Partners RBYCC Home Owners' Association

Envirotech Environmental Consulting, Inc.
c/o Todd Fritchman
34634 Bay Crossing Blvd., Suite C
Lewes, DE 19958

Grant ID:

Status: Proposed

Project Description

Project Overview

The project will create a resource management plan for the proposed area using Integrated Vegetation Management (IVM) practices. The IVM practices are specific and selective for the control/eradication of exotic, invasive and/or native, nuisance species. In addition, vegetative enhancement plantings will assist in the colonization of native flora as well as improving overall habitat and aesthetics. The HOA will also establish restrictions regarding the impacts to the enhanced conservation areas. The project will also stabilize and eroding shoreline using biologs with plantings of Salt Meadow Cordgrass.

Opportunities for public education will also be promoted in the 2.35 acre common ground public area, which adjoins the coastal habitat. This area is protected and allows for open space green infrastructure, such as signage and wayside exhibits to further environmental stewardship though Inland Bays outreach. Public access to this area along the coastline will allow for recreational and other community activities.

Primary Objectives/Opportunity

- To demonstrate methods and techniques which reduce nutrients, improve water quality, and improve coastal habitats
- To increase biodiversity on the property and reduce negative impacts associated with exotic species

CCMP/ Work Plan Goal

G2: Protect, restore, and enhance living resources by improving water quality and protecting and enhancing habitat
G2F: Enhance and restore impacted shallow and nearshore habitats
G7: Establish and implement a shoreline protection program which addresses both natural processes and human activities
G6G: Implement an aggressive program to acquire public access lands

Primary Project Deliverables

Milestone 1

- Implement IVM practices and site preparation; biolog installation and planting; trash and refuse removal; vegetation pruning/trimming (OCT '08 – FEB '09)

Milestone 2

- Vegetation installation and plantings (MAR '09)

Milestone 3

- Continue implementing IVM practices; vegetation mortality replacement (APR – SEP '09)

Milestone 4

- Overall monitoring of management practices and progress; final report (OCT '09)

Project Financing

Budget

Award: $1,00

Description	Expense
Expendable materials & supplies	$1,000

Project Critical Success Factors

Outcomes

Short-term: educate citizens about the need and methods for conservation and protection of the Inland Bays

Intermediate: eradicate invasive species and reduce tidal erosion

Long-term: create a natural area that supports a diversity of wildlife and reduces nutrient contributions to the Inland Bays

Changes in pressure targets: increase in habitat

CWA Programs: wetland program

External Factors

Impacts
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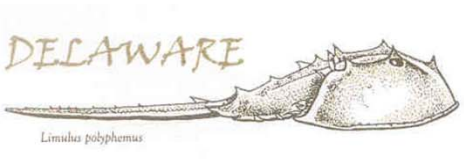

CENTER FOR THE INLAND BAYS
Rehoboth Indian River Little Assawoman

Project Report

Executive Summary

Project Name: Restoration of a Tidal Transition Wetland along the Indian River at Sandy Beach near Dagsboro, DE

Responsible Partners

Jim Chaconas, Environmental Scientist
Melanie Tymes, Environmental Scientist
DNREC – WSLS
89 Kings Highway
Dover, DE 19901
Phone: 302-739-9943

Sandy Beach Homeowners Association
c/o Cal Epperly
131 Pebble Drive
Dagsboro, DE 19939

Envirotech Environmental Consulting, Inc.
c/o Todd Fritchman
34634 Bay Crossing Blvd., Suite C
Lewes, DE 19958

Grant ID:

Status: Proposed

Project Description

Project Overview
The Sandy Beach Community fronts on the Indian River and features in excess of 1,000 feet of shoreline between the ends of Sandy Beach Drive and Pebble Drive located near Dagsboro, DE. The shoreline is comprised of transition marsh including low and high marsh wetlands. The low marsh wetland is comprised of Smooth Cordgrass (*Spartina alterniflora).* The high marsh is comprised of a variety of brackish marsh plants such as Salt Marsh Hay (*Spartina patens),* Spike Grass *(Distichlis spicata),* Common Three-square (*Scirpus pungens),* Salt Marsh Bulrush (*Scirpus robustus),* Water Hemp (*Amaranthus cannabinus),* Seaside Goldenrod (*Solidago sempervirens)* and Groundsel Tree (*Baccharis halimifolia).* Several

sections of the marsh are actively eroding and the erosion is threatening the long term viability of the marsh to provide ecological benefits as well as protect the shore of the community. In 2006 the community invested in the installation of biologs and additional vegetation plantings along the most highly eroded portions of the shoreline in an attempt to protect the marsh and shoreline. Due largely to the high degree of fetch (the site faces north along a section of the Indian River that is over 1,000 feet in width) the biologs and much of the planted vegetation failed.

The work proposed for this grant would install a marsh toe sill comprised of low profile rip-rap and low marsh plantings in front of portions of the shoreline. As money allows, the more actively eroding sections of shoreline will be targeted for marsh toe sill installation first, followed by the toe sill installation in front of less eroded shoreline. The placement of the low profile rip-rap is designed to break the wave energy and protect the vegetation behind it. Adjacent wetland areas may also receive some degree of protection from the marsh toe sill installation. Openings will be placed in the low-profile rip-rap to allow for fish passage.

The project will restore a unique eroding transition marsh by providing an enhanced level of protection via the marsh toe sill design. The project could be partially installed this fall by placement of the low profile rip-rap followed by planting in the spring of 2009.

CCMP elements satisfied by this project are discussed under CCMP Element above. Additional public participation will be achieved because the HOA currently conducts Phragmites control to protect the existing marsh. Also the primary contractor on the project, Envirotech Environmental Consulting, Inc. is donating their expertise and the planting labor to the project.

Primary Objectives/Opportunity

- to restore and provide long term protection to an eroding transition marsh. These types of marshes are becoming less common in the Inland Bays. The restoration would involve restoring the ecological function and the physical integrity of the pre-existing marsh, as well as provide protection for an eroding shoreline.
- to provide an educational opportunity for the residents of the Sandy Beach Community. Additionally, the project should generate some good publicity in the form of a news or magazine article highlighting the cooperative efforts of a homeowners association, the Inland Bays Center, the State and the donated services of a private environmental contractor to restore a unique wetland system in the Inland Bays.

CCMP/ Work Plan Goal

G2: Protect, restore, and enhance living resources by improving water quality and protecting and enhancing habitat
G2F: Enhance and restore impacted shallow and nearshore habitats
G7: Establish and implement a shoreline protection program which addresses both natural processes and human activities

Primary Project Deliverables

Milestone 1

- placement of the low profile rip-rap (Fall ’08)

Milestone 2

- planting (Spring ’09)

Project Financing

Budget

Award: $10,000

Description	Expense
Expendable materials & supplies	$5,000
Plants	$5,000

Project Critical Success Factors

Outcomes

Short-term: educate citizens about the need and methods for wetland protection
Intermediate: reduce tidal erosion
Long-term: restore a tidal marsh
Changes in pressure targets: increase in tidal wetland acreage
CWA Programs: wetland program

External Factors

Impacts

-

CENTER FOR THE INLAND BAYS
Rehoboth Indian River Little Assawoman

Project Report

Executive Summary

Project Name: Great Cypress Swamp Wetland Restoration Project: hydrological enhancement via water level control structures

Responsible Partner
Delaware Wild Lands, Inc
315 Main Street
P.O. Box 505
Odessa, Delaware 19730-0505
302-378-2736

POC: Peter S. Martin

Grant ID:

Status: Proposed

Project Description

Project Overview

Delaware Wild Lands, Inc. is a private, non-profit, tax-exempt organization dedicated to the conservation and preservation of natural areas through the acquisition and management of strategic parcels of land.

The Great Cypress Swamp represents the largest contiguous acreage holding of Delaware Wild Lands, and perhaps the largest private single owner contiguous forest land on the DELMARVA Peninsula. This 11,000 acre property contains the headwaters of the Pocomoke River as well as significant forested and agricultural wetlands altered by a private ditch system that feeds into Delaware's Inland Bays via Vine's Creek. Our current holdings represent most of the remnants of what was estimated to be a swamp of 50,000 to 60,000 acres dominated by Atlantic White Cedar and Bald cypress. This property contains about 1,000 acres in Maryland with the remainder located in Delaware.

Since our initial acquisition, Delaware Wild Lands has investigated numerous management strategies that would protect, preserve, restore, and enhance the natural attributes of the Great

Cypress Swamp. We have sought various partners in our efforts, including Federal and State partnerships that have yielded much research on the hydrology of the area and a baseline Natural Heritage flora and fauna investigation. These studies, in conjunction with more recent work in partnership with the Baltimore District of the U.S. Army Corps of Engineers have left us with a basic framework to develop an effective long term comprehensive management plan for the Great Cypress Swamp.

The **hydrological enhancement via water level control structures project** is designed to partially restore some of the historic wetland functions and values within the most heavily ditched portion of the swamp. Figures 1. And 2. Show the property location and ditch configuration. The proposed earthen plugs and water control structures (Figure 3.) are expected to increase the zone and duration of interstitial saturation but are not expected to result in inundation greater than that normally associated with seasonal variation. The resulting improvements in hydrology will help insure the success of Atlantic White Cedar and Bald cypress community restoration efforts currently underway with the support of our partners.

Primary Objectives/Opportunity

- To partially restore some of the historic wetland functions and values within the most heavily ditched portion of the swamp
- To insure the success of Atlantic White Cedar and Bald cypress community restoration efforts currently underway

CCMP/ Work Plan Goal

G2: Protect, restore and enhance living resources by improving water quality and protecting and enhancing habitat

Primary Project Deliverables

Milestone 1

- Install six water level control structures at selected locations in the Great Cypress Swamp

Milestone 2

- Install five earthen plugs at selected locations in the Great Cypress Swamp

Project Financing

Budget

Award: $8,958

Description	Expense
Materials & installation of water control structures	$5958

Construction of earthen plugs	$3000

Project Critical Success Factors

Outcomes
Short-term: N/A **Intermediate:** restoration of freshwater wetland functions and values **Long-term:** restoration of an ecologically significant plant community in the Inland Bays watershed **Changes in pressure targets:** increase in the numbers of a rare plant species **CWA programs:** N/A

External Factors

Impacts
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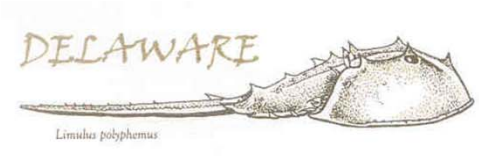

CENTER FOR THE INLAND BAYS

Rehoboth Indian River Little Assawoman

Project Report

Executive Summary

Project Name: Eelgrass Planting Project in Delaware's Inland Bays

Responsible Partner

Ariane K. Nichols, Environmental Scientist II
Division of Soil and Water Conservation
Shoreline and Waterway Management Section
89 Kings Highway
Dover, Delaware 19901
(302) 739-9921

Grant ID:

Status: Proposed

Project Description

Project Overview
The proposed project involves collecting eelgrass seeds from plants within Virginia's Chesapeake Bay, storing these seeds in a controlled storage tank, and distributing the seeds into areas within the Inland Bays that are deemed likely to support the growth of these seeds. This project would also involve surveying the areas within the Inland Bays that have existing eelgrass beds. Information that will be gathered at these sites will include water depths, salinity, and dissolved oxygen. This information will then be used to determine where the best sites are for establishing new eelgrass beds.

Collection of the seeds would be done manually with human labor collecting the seeds by hand in the spring. Collecting the seeds would be done in coordination with Virginia's SAV restoration program and done in a manor to reduce any damage to the established plants within the Chesapeake Bay.

After the seeds were collected they would be divided into two halves. Half of the seeds would be dispersed in the spring using a floating tethered bag method shortly after the seeds are collected. The other half of the seeds would be placed in a pool and maintained in a cool and dark area to reduce the chances of any algal growth within the pool. This pool will be located at the Division of Soil and Water Conservations new facility in Lewes, Delaware. These seeds that will be pool kept through the summer will then be broadcast by hand in the fall, shortly before germination of the seeds will occur. Monitoring of the seeds will occur throughout the year to determine the success of the planting efforts.

Primary Objectives/Opportunity

- to increase the population of eelgrass within the Inland Bays
- provide for increased benthic habitat because eelgrass beds provide habitat for juvenile fisheries species.
- to survey the existing eelgrass beds within the Bays and gather information on characteristics of these areas that support the growth of these bed
- to establish a system for eelgrass seed collection, dispersal, and monitoring that will become an annual program within the Department and Division.

CCMP/Work Plan Goal

This project directly correlates with the objectives of the CCMP, Habitat Protection Action Plan. Within this Action Plan it is stated that: "There are presently no substantial SAV beds in the Inland Bays; potential habitat may currently be limited and existing habitat is marginal. For these reasons, and because of other concurrent uses of the Bays, protecting areas where planting is being attempted is both feasible and desirable. If SAV is to become re-established, it must be protected. Healthy SAV beds will become primarily shellfish spawning sanctuaries and finfish nursery areas."

Within this Action Plan, Implementation of Tactic A states that:

"The purpose of this plan is to develop a strategy for designating sensitive locations in need of protection and for establishing and managing Resource Protection Areas (RPSs)."

From this description of the Action Plan and its Tactic A, the establishment and monitoring of eelgrass beds fits in directly with the Center's CCMP.

Primary Project Deliverables

Milestone 1

- Late fall/winter 2008 – Survey of existing eelgrass beds

Milestone 2

- Spring 2009 – Collect seeds in Chesapeake Bay, disperse half of the seeds in tethered floating bag method, place half of seeds in a monitored pool

Milestone 3

- Spring/Summer 2009 – Monitor pool with eelgrass seeds

Milestone4

- Fall 2009 – Hand dispersal of seeds that have been in pool

Milestone 5

- Fall/Winter 2009 – Monitor seed dispersal areas for germination

Project Financing

Budget

Award: $4,000

Description	Expense
Collection	$2,000
Equipment	$2,000

Project Critical Success Factors

Outcomes

Short-term: N/A
Intermediate: exploration of an alternative restoration methodology
Long-term: restoration of an ecologically significant plant community in the Inland Bays watershed
Changes in pressure targets: increase in SAV acreage
CWA programs: N/A

External Factors

Impacts

•

Project Report

Executive Summary

Project Name: Lord Baltimore School Native Habitat Restoration

Responsible Partner
Gardeners by the Sea
Pat Wood
58 Daisey Avenue
Ocean View, Delaware 19970
302-539-5173
pkwood@mchsi.com

Grant ID:

Status: Proposed

Project Description

Project Overview

This project will restore a wetlands area located in the school yard; (B) establish a buffer of trees along the eastern fence line (Banks Tax Ditch) and (C) create an area of seed-bearing trees and shrubs designed to attract birds and to reduce the amount of storm water run-off and pollution that eventually flows into the Inland Bays.

A) Wetland Restoration: A previously existing wetland area includes an outdoor classroom that has fallen into disuse. Remodeling of the school and excavation of portions of the school yard in order to install a geothermal heating system resulted in compression of the area behind the school, redirected the natural flow of rainwater, clogged the drainage pipe and dried up the wetland. With assistance of a CIB grant the Club would be able to have the existing drainage pipe cleaned out, or replaced if necessary, in order to allow water to flow more freely into the area. Just to the north of the now-dry wetland area is a drainage ditch that currently is directly receiving the parking lot runoff without the benefit of capture and filtration in the available wetland area. Site enhancement, surface stabilization and replanting in the area will further enhance the site and aid the area in more effectively capturing the runoff from the bus driveway located to the northwest of the wetlands area

(B) Tree Buffer: The Club would like to create a buffer of trees along the eastern property line. New commercial and residential construction has largely removed the buffer of trees that previously existed along that side of the property and did not retain the required buffer between their property and the existing drainage ditch - adding significantly to runoff problems as well as noise and disruption to the school yard due to commercial activities.

(C) Bird-seed, nut and/or berry Garden: A small pond was created by the Lions Club a number of years ago in the northeast corner of the school property. The addition of several seed, nut or berry-bearing trees and shrubs in the area behind the pond would provide a buffer from the nearby commercial area and assist in reducing runoff into the drainage ditch bordering the property. In addition it would complement the existing pond in providing food and cover for the birds. While Delaware is the migratory path for a tremendous number of birds, few are sighted at the school - as there is little in the way of cover or food supply for them. New plantings would serve as an attraction for birds. In addition to supporting the habitat, such a garden would provide an excellent teaching tool for the students. Younger students can learn to identify the birds and the older students would be able to conduct bird counts and learn about their migratory habits - important steps in developing their sense of land stewardship.

Primary Objectives/Opportunity

- Restore a native habitat to the Lord Baltimore Elementary School
- Assist the faculty and administration in developing a love and understanding of nature in the students.
- Work with the Indian River School District Science Advisor and the teachers, to incorporate the concept of habitat restoration into the curriculum as well as develop some outdoor activities
- Develop a bird population count at the site as an indicator of the health of the Bays
- Help students to understand the value of environmental indicators as measures of progress in restoring/improving our environment.

CCMP/Work Plan Goal
G1A: Manage urban and rural applications and handling of fertilizers, pesticides, herbicides, manure, sediment, animal carcasses and other contaminants G1E: Adopt the most effective BMPs t provide maximum ground and surface water protection G5B: Promote water conservation G5D: Address nitrates and other contaminants G7B: Attain maximum wetlands preservation by providing adequate setbacks and buffer zones G9E: Emphasize programs in the public schools

Primary Project Deliverables

Milestone 1-
• Make arrangements to have drainage pipe cleaned out and/or replaced
Milestone 2-
• Contact a number of the reputable garden centers in order to obtain the best price (and quality) of trees and seed, nut or berry-bearing shrubs
Milestone 3
• Commence planting as quickly as possible upon receipt of the grant.

Project Financing

Budget

Award: $1,000

Description	Expense
Plants	$1,000

Project Critical Success Factors

Outcomes

Short-term: increase knowledge and awareness of students regarding Inland Bays resources
Intermediate: changes in the school's maintenance and operations of its stormwater runoff
Long-term: improve water quality
Changes in pressure targets: decrease in nutrient concentrations
CWA Programs: controlling non-point source pollution

External Factors

Impacts
• In the event that funds are not received until later in the year, planting might have to wait until spring

DELAWARE
Limulus polyphemus
CENTER FOR THE INLAND BAYS
Rehoboth Indian River Little Assawoman

Project Report

Executive Summary

Project Name: Water Quality, Habitat, and Asthetics Improvement Project

Responsible Partner

Gosling Creek Purchase Homeowners Association
Nicole M. Minni, Gosling Creek Board Representative
4 Gander Lane
Lewes, DE 19958
Phone: 302-644-8584
Email: nminni@udel.edu

Joe Farrell, Gosling Creek Development, Resident
132 Harbinger Drive
Lewes, De 19958
Phone: 302-645-7455
Email: jfarrell@udel.edu

Grant ID:

Status: Proposed

Project Description

Project Overview

There are two components of project:

Component 1
The community will address two storm water areas in the community, improving function and aesthetics of both areas. In Phase One of the community, a single drainage easement receives runoff from 24 homes plus a recreation area. We will landscape a storm water easement channel with a mix of shrubs and grasses. This channel directs non point source pollution runoff from our community into a forested wetland that is the headwaters of the Love Creek watershed. This restoration effort will help provide water quality improvement, habitat, and reduce the need for mowing. An added benefit would be an attractive demonstration area that will encourage and educate homeowners to consider similar practices. In Phase Two of the community there is a retention basin that is presently overgrown with aggressive honeysuckle. We will remove invasives and replant with wetland tolerant shrubs. We also plan to secure the soil on the banks to reduce soil erosion. This basin empties into the same area as above and receives water from over 30 homes. The plants will help remove nutrients caused from non point source pollution and provide a functional and aesthetic purpose.

We believe these efforts will reduce non point source pollution in the watershed, improving water quality and provide wildlife benefits. In addition, we will provide an educational component to inform the current community as well as future residents of Gosling Creek Purchase on why this effort was undertaken. This would include creating and purchasing signage for the two areas mentioned above as well as creating and purchasing literature to distribute explaining about the plants selected, their benefits and this restoration effort. Through these efforts we hope to serve as a model development that others will look to do similar practices.

More specifically the plan includes:

- Drainage Ditch: Plant low growing bunch grass in the bottom of the ditch.
- Plant a taller grass along the banks.
- Mix a planting of shrubs along the bank.
- This combination will slow water allowing for nutrient removal,sediment removal, wildlife habitat, and reduce the mowing interval that contributes debris into the runoff.
- Retention Basin: Clear and cleaned retention basin. Plant native and wildlife friendly shrubs. The sides will be stabilized with sod.

Component 2
To engage homeowners in improving backyard habitat and reducing nutrient loads into the Inland Bays watershed, we will provide an incentive for participating residents who volunteer with storm water component and commit to becoming personal stewards of the their own backyards and the Inland Bays watershed.

This backyard habitat starter package would include the following:

- Wildflower seed mix 15.00
- Native plant stock mix 20.00
- Soil test 8.50
- Small Bird bath 17.50

Total - $60.00 per package

We will also raffle off for one rain barrel for participating residents; chance to win a rain barrel $35.00

Primary Objectives/Opportunity

- Improve function and aesthetics of two key storm water areas
- Engage community in a backyard habitat improvement program

CCMP/ Work Plan Goal

G2: Protect, restore, and enhance living resources by improving water quality and protecting and enhancing habitat
G5D: Address nitrates and other contaminants
G9C: Develop programs involving senior citizens and other special interest groups

Primary Project Deliverables

Milestone 1

- Initiate stormwater restoration in fall 2008

Milestone 2

- Complete stormwater restoration and backyard habitat component in spring 2009

Project Financing

Budget

Award: $3,000

Description	Expense
Stormwater area restoration	$1,590
Backyard habitat component	$1,410

Project Critical Success Factors

Outcomes
Short-term: raise awareness by the HOA regarding stormwater practices and native plants **Intermediate:** secure effective stormwater management facility maintenance and operations by an HOA **Long-term:** improve water quality by reducing pollutant contributions to the Inland Bays **Changes in pressure targets:** decrease in nutrient concentrations **CWA Programs:** controlling non-point source pollution

External Factors

Impacts
•

DELAWARE
Limulus polyphemus
CENTER FOR THE INLAND BAYS
Rehoboth Indian River Little Assawoman

Project Report

Executive Summary

Project Name: Inland Bays Wetland Education and Citizen Stewardship Opportunities

Responsible Partner
Rebecca Rothweiler
Watershed Assessment Section
820 Silver Lake Blvd., Suite 220
Dover, DE 19904
Office: 302-739-9939

Grant ID:

Status: Proposed

Project Description

Project Overview

The goal of this project is to heighten citizen awareness and wetland stewardship in the Inland Bays watershed. To achieve this we will use two methods of outreach including a guidebook and a workshop to present the contents of the guidebook.

1.) Guidebook
We will produce a guidebook for residents summarizing the data garnered on wetland conditions of the Inland Bays watershed. Our intent is to better inform residents of the value of wetland resources and to encourage their support and appreciation of wetlands. The guidebook will provide the public with tools and opportunities to translate their awareness into wetland protection, restoration, and watershed stewardship. The guidebook will be distributed to the workshop audience and additional copies will be made for interested parties. The guidebook will be designed to serve as a standalone resource or in conjunction with the workshop.

2.) Workshop
The intent of the workshop component, to be hosted in September of 2009, is to disseminate the guidebook contents in an audience friendly manner while offering an occasion to address the public's questions and concerns and create discussion regarding the watershed's wetland resources. Our plan is to distribute the guidebook to interested residents and to clarify and lead them through the contents. We will begin with an introduction of the wetland assessment data garnered by the Wetland Monitoring and Assessment Program (WMAP) to enhance the attendees' comprehension of the status of the wetlands in their watershed and the pressures and stressors these habitats bear. Following, we will lead the audience through the guidebook while covering the contents in summary form. Presentations will be made to familiarize the participants with the wetland habitat types of their watershed including their functions and values, assessed condition, and current or potential threats. Finally, restoration and protection options for landowners will be covered briefly while referring the audience to the appropriate agencies for more information. Volunteer programs in the region will be summarized to stimulate volunteer recruitment and participation. Residents will be informed of wise choices that they can make when managing their property as stewards of the watershed and provided with do-it-yourself options. We will set aside time to address the audiences' questions and concerns. Two weeks prior to the workshop, paid radio and print advertising will be enlisted to invite residents in the Inland Bays. Earned media will also be utilized to minimize costs.

Primary Objectives/Opportunity

- to increase wetland protection and minimize wetland degradation by recruiting the support and involvement of the public
- to provide information on the stewardship tools that are available and motivate individuals to participate in voluntary programs by sharing the data we have garnered from comprehensive field sampling and the values of the wetland resources in their local watershed.
- to reduce the negative impacts endured by wetlands

G1E: Adopt the most effective BMPs to provide maximum ground and surface water protection
G2: Protect, restore, and enhance living resources by improving water quality and protecting and enhancing habitat
G3B: Provide maximum protection of waterways, groundwater, natural areas, open space, and tidal and non-tidal wetlands
G7B: Attain maximum wetlands preservation by providing adequate setbacks and buffer zones
G9A: Establish a speakers' bureau

Primary Project Deliverables

Milestone 1

- Development of Guide Book- May '09

Milestone 2

- Printing of Guide Book- August '09

Milestone 3

- Development of workshop presentations- August '09

Milestone4

- Development of Promotional Materials/Advertising- September '09

Milestone 5

- Host workshop- September '09

Project Financing

Budget

Award: $3,500

Description	Expense
Printing (Guide Book)	$2,250
Workshop support	$1,250

Project Critical Success Factors

Outcomes
Short-term: inform residents about the function and value of wetland resources **Intermediate:** increase wetland protection and minimize wetland degradation by recruiting the support and involvement of the public **Long-term:** prevent loss of wetland resources **Changes in pressure targets:** reduce negative impacts to wetlands in the Inland Bays watershed **CWA programs:** wetlands program

External Factors

Impacts
•

CENTER FOR THE INLAND BAYS
Rehoboth Indian River Little Assawoman

Project Report

Executive Summary

Project Name: Demonstration Model to Retrofit Condos and Communities to Save Our Environment: A Community Education and Outreach Request

Responsible Partner

Nancy Feichtl
Member of Board of Directors; Chairperson of "Green Committee"
Sea Chase Condominium Association
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Managed by Guardian Property Management
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302.227.7878

Grant ID: EPA CE99399-008-2

Status: Proposed

Project Description

Project Overview

Recognizing that many communities and condos were built over the years when there were very few regulations governing the land development and construction practices of developers who operated very close to our wetlands and waterways, we at Sea Chase have developed policies and plans to have our community actively change our way of operating and to become a model of a green community, even though it involves undoing past problems.

Sea Chase is a condominium association of 69 units that is within a half mile of Arnell Creek. Within the last decade, hundreds of homes have been built within our immediate area, forests have been destroyed, and we have all, thus, contributed negatively to the watershed. As another new development started ground work next to us, we started seeing , first hand, the inherent problems and recognizing that we were collectively creating a huge environmental footprint, we adopted a "Green Policy" (Attachment #1), into which we are moving now, much of which is to protect ground / storm water. Quoting directly from that policy:

"Last, as part of our movement to retrofit our community into a "Green Friendly" one, we will document and share all of our positive practices e.g. share written policies, pictures , lists of good products we discover, etc. with surrounding communities in order to encourage a rapid, orderly move to such practices in all of our surrounding and/ or neighboring environs."

• Primary Objectives/Opportunity

- To restore forested buffers, or at least some of the tree line, surrounding the neighborhood in those spots that are high priority to prevent erosion.
- To install a single demonstration model of a non-toxic grid parking space which involves locating a vendor, installing, and using to see if it is easily damaged, unsightly, etc. to pilot for future use.
- To work with grounds keepers to encourage use of organic fertilizers and products as well as beneficial plantings.
- To document and showcase this and all "Green" activities to any community who wishes to see.

CCMP/Work Plan Goal
G2: Protect, restore and enhance living resources by improving water quality and protecting and enhancing habitat

Primary Project Deliverables

Milestone 1- March to October
• Seek out vendors and suppliers of green grid systems (See attachment #2 as a model) • Layout small demonstration area for such grid • Study deforested tree line and set up areas of priority based on land erosion and watershed impacts (since we will be financially unable to restore the whole tree line) • Write and disseminate intentions to community, garner support and volunteers • Meet with grounds keepers to insure future use of organic only products before future contracts are cut • Budget monies in annual budget for any matching or enhancing initiatives
Milestone 2- October to December
• Purchase and plant barrier trees • Purchase and install a non-toxic parking grid • Publish to all surrounding communities
Milestone 3
• Evaluate wear and tear on grid system as well as overall acceptability • Update and publish any policies that extend our green efforts • Resume planting of barrier trees by priority

Project Financing

Budget

Award: $1,000

Description	Expense
Portion of purchase and installation of grid	$1,000

Project Critical Success Factors

Outcomes
Short-term: Explore with contracted grounds keepers the use of more organic and earth friendly products; explore plants that will be disallowed in the community even if within "personal space raise awareness by the HOA regarding stormwater practices and native plants **Intermediate:** Incentivize the planting of indigenous, non-invasive trees, particularly along our borders that have recently been "denuded" by the new neighboring developments; attempt to use non-toxic grid pavers, in lieu of asphalt/tar-chip, when installing extra parking spaces so as not to have ground water leaching of petrochemicals **Long-term:** improve water quality by reducing pollutant contributions to the Inland Bays **Changes in pressure targets:** decrease in nutrient concentrations **CWA Programs:** controlling non-point source pollution

External Factors

Impacts
•

DELAWARE

Limulus polyphemus

CENTER FOR THE INLAND BAYS

Rehoboth Indian River Little Assawoman

Project Report

Executive Summary

Project Name: Using cover cropping systems to reduce nutrient losses to the environment

Responsible Partner
Dr. Greg Binford and Dr. Richard Taylor
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College of Agriculture & Natural Resources
Department of Plant and Soil Sciences
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Grant ID: EPA CE99399-008-2

Status: On-going

Project Description

Project Overview

This study compares the benefits of cereal grain versus legume/cereal grain mixtures as cover crops.

It is being conducted at two sites in Delaware (one in Kent and the other in Sussex County) on irrigated cornfields. The cover crop treatments will be established immediately after harvest on fields that received animal manures in the spring prior to corn planting. The following cover crop treatments are being compared:

1) No cover crop
2) Cereal grain only
3) Hairy Vetch/cereal grain/crimson clover mixture
4) Balansa clover/cereal grain mixture
5) Red clover/cereal grain mixture
6) Subterranean/cereal grain mixture

These treatments offer a range in growth habit of cover crops and a range in seed prices. It is important to evaluate no cover crop and a cereal grain cover in this demonstration/research project so the environmental benefit of each of these cover crop mixtures can be determined. Each cover crop treatment will be replicated three times at each location.

In the spring of 2007, the cover crop treatments will be killed and planted to corn. Each cover crop treatment will be subdivided into six smaller plots so that six different fertilizer N rates can be evaluated. Each plot will be monitored during the 2007 season by taking periodic soil samples and leaf chlorophyll meter readings; these measurements will allow an estimate of how nitrogen is being released from the legume residues. In the fall of 2007, corn grain yields will be measured on each plot and soil samples will be taken to measure residual nitrate levels in the soil profile.

Primary Objectives/Opportunity

- To evaluate and demonstrate the value of a legume/grain mixture when using cover crops in Delaware

CCMP/Work Plan Goal

G1A: Manage urban and rural applications and handling of fertilizers, pesticides, herbicides, manure, sediment, animal carcasses, and other contaminants
G1E: Adopt the most effective BMPs to provide maximum ground and surface water protection

Primary Project Deliverables

Milestone 1

- Sussex County and Kent County project sites planted with legumes (fall 2006)

Milestone 2

- Sussex and Kent County project sites planted with corn (spring 2007)

Milestone 3

- Kent County project site replanted with legumes (fall 2007)

Milestone 4

- Kent County site replanted with corn (spring 2008)

Milestone 5

- Soil sampling and analysis (fall 2008)

Milestone 6

- Final report (spring 2009)

Project Financing

Budget

Award: $19,623

Description	Expense
Hourly labor	$3,500
Fringe benefits @ 8%	$280
Supplies and laboratory analyses	$8,272
Travel	$3,160

Indirect costs	$4,411

Project Critical Success Factors

Outcomes

Short-term: demonstrate the efficacy of a legume cover crop for cereal grain production agriculture.
Intermediate: alteration of cover crop applications by agricultural operators
Long-term: improve Inland Bays water quality by attaining TMDLs
Changes in pressure targets: reduce N concentrations in groundwater and surface water
CWA Programs: controlling nonpoint source pollution on a watershed basis

Research elsewhere has shown that a legume/cereal grain mixture can make an excellent cover crop. Nitrogen that is fixed by legumes is slowly released through mineralization. As a result, there is smaller amount of available or leachable nitrogen in the soil at a given time compared to fertilizer N. Therefore, the potential for N loss from the legume residues during late spring and summer is greatly reduced compared to fertilizer N. The cereal grain is also good at scavenging residual nutrients in the soil following harvest. Legumes have also been shown to be excellent crops for building soil health. Both have direct implications for water quality improvement in Delaware's Inland Bays.

External Factors

Impacts

- Legume crops planted in fall 2006 did not establish on the Kent County field. The researcher requested a no-cost extension to replant legumes on the Kent County field in fall 2007, to be followed by a planting of corn in spring 2008. The corn will not be harvested until fall 2008 at which time soil samples will be obtained.

DELAWARE
Limulus polyphemus
CENTER FOR THE INLAND BAYS
Rehoboth Indian River Little Assawoman

Project Report

Executive Summary

Project Name: Assessment and Monitoring of Harmful Algal Cysts in High Nutrient-Rich Areas of the Delaware Inland Bays

Responsible Partner Dr. Craig Cary
Graduate College of Marine & Earth Studies
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carys@udel.edu

Grant ID: EPA CE99399-008-2

Status: Completed

Project Description

Project Overview

This study examines the distribution of harmful phytoplankton cysts over winter periods within areas of the Inland Bays that are known to experience high nutrient input from point sources, as well as other non-point sources. Sediment cores were taken from multiple sites and assayed for harmful algal cysts. It was hypothesized that a larger distribution of these cysts would be found in fine-grained sediment areas that would be downstream of large nutrient influx sources, and these cysts are primary contributors in the spring to seeding the Inland Bays. This study will provide a baseline for the continued assessment of water quality improvement efforts in these nutrient impacted areas, as well as provide a map of resident harmful algal cyst distributions within the Inland Bays. State monitoring agencies can use the map to assess risk potential and ecosystem recovery.

Primary Objectives/Opportunity

1. To identify and chemically characterize high nutrient sources in the Inland Bays.

2. To thoroughly sample sediments at prescribed distances from a variety of characterized nutrient source points to assess the composition and structure of harmful algal cysts in the sediments

3. To determine the effects of different high nutrient source chemistry (elevated nitrogen, phosphorus, or both) on the resident harmful algal cyst community.

4. To develop and extensive map of harmful algal cyst distribution in the Inland Bays that can be used by ecosystem modelers, monitoring agencies and policy-makers wishing to access water quality restoration efforts from the legacy of years of nutrient loading to the Inland Bays.

CCMP/Work Plan Goal

G2E: Enhance monitoring and response strategies
G5D: Address nitrates and other contaminants

Primary Project Deliverables

Milestone 1

- Sample collection (completed)

Milestone 2

- Water and sediment chemistry analysis (completed)

Milestone 3

- Sample extraction (completed)

Milestone 4

- RT-Quantitative PCR

Milestone 5

- Analysis, mapping and report

Project Financing

Budget

Award: $18,490

Description	Expense
Graduate student support	$10,715
Small boat operations	$500
Supplies and expendables	$2,000
Indirect Costs	$5,275

Project Critical Success Factors

Outcomes

Short-term outcomes: attain a more complete understanding of the concentration and location of harmful phytoplankton in the Inland Bays
Intermediate outcomes: improving monitoring and response strategies
Long-term outcomes: N/A

Changes in Pressure Targets: N/A
CWA Program: improving water quality monitoring

Results of this study were presented at a meeting of the Inland Bays Scientific & Technical Advisory Committee. Managers and staff from the Delaware Department of Natural Resources & Environmental Control/Laboratory Services Section attended the meeting and discussed how the findings from this study might be integrated in their water quality monitoring strategies.

External Factors

Impacts
• Because of the seasonal constraints of the research, sample collection was delayed until the algal cysts became stable in the sediment.

CENTER FOR THE INLAND BAYS
Rehoboth Indian River Little Assawoman

Project Report

Executive Summary

Project Name: Ingress of larval fishes through Indian River Inlet: Patterns of abundance and development of a Juvenile Fish Index to assess water quality in the Inland Bays system

Responsible Partner
Dr. Timothy E. Targett
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Grant ID: EPA CE99399-008-2

Status: Completed

Project Description

Project Overview

Indian River Inlet is the primary location for tidal exchange of water between Indian River and Rehoboth Bays, Delaware, and the coastal ocean (Wong 2002). All fish larvae from species spawning in the coastal ocean (and beyond) therefore enter the Inland Bays through this inlet. Abundance and inter-annual variability of these fishes in the bays is determined in part by larval supply. Sampling larval fishes (ichthyoplankton) at the inlet presents a unique opportunity to 1) examine seasonal dynamics in the supply of young fishes such as Atlantic menhaden (*Brevoortia tyrannus*), summer flounder (*Paralichthys dentatus*), Atlantic croaker (*Micropogonias undulatus*), spot (*Leiostomus xanthurus*), and American eel (*Anguilla rostrata*) to the Inland Bays system and 2) link species-specific estimates of larval abundance (larval supply) with existing DNREC juvenile fish (young-of-the-year (YOY)) survey results to begin to determine whether variability in abundance of the above species in the Inland Bays is determined largely by larval influx or by process affecting subsequent survival within the bays.

The project will develop a Juvenile Fish Index (JFI) for each species, which can be used as a measure of the overall health of the Inland Bays system for young fishes, and how the system changes over time. JFIs will be based on juvenile abundance estimates (available from DNREC trawl surveys) scaled to the strength of larval influx (from the proposed ichthyoplankton sampling at Indian River Inlet). DNREC's juvenile fish abundance data (#/minute trawl time) are collected by John Clark with a 3m trawl (5min tows) at 15 sites in Herring, Love, Pepper, and White Creeks, and upper Indian River. Surveys are conducted every two weeks in June, July, and August, and monthly in May, September and October).

The proposed research also offers a unique opportunity to examine dynamics in abundance of larval Atlantic menhaden, summer flounder, Atlantic croaker, spot, and American eel entering the Inland Bays through the inlet and to couple this with assessments of subsequent juvenile (YOY) abundance (already undertaken by DNREC trawl surveys) to provide indices for assessment of the overall health of the Inland Bays system for young fishes. If JFI values for a given species show the same temporal trends as juvenile abundance from the DNREC trawl

surveys, this would indicate year-to-year variability driven largely by differences in larval supply. However, if JFI values show different temporal patterns than juvenile abundance, this would indicate year-to-year variability in survival within the bays overrides larval supply in determining juvenile abundance. For example, increasing JFI values when juvenile abundance is stable would signal decreased survival in the bays for that particular species.

Another advantage of this approach is that annual measures of JFI for each of the target species are indices that can be used in conjunction with water quality indices (e.g. dissolved oxygen, secchi disk depth, dissolved organic nitrogen and phosphorous, chlorophyll a, and suspended solids) generated from 25 sites by the Inland Bays Citizen Monitoring Program to assess water quality in the Inland Bays. The proposed work will help link water quality directly to fish abundance patterns. Furthermore, and perhaps more importantly, the target species may show different JFI patterns over time, which can be related to different water quality indices. This will allow assessment of potential impacts of changes in water quality components, or combinations of components, on fishes in the Inland Bays.

Primary Objectives/Opportunity

- To quantify larval fish ingress into the Inland Bays from offshore spawning by conducting weekly ichthyoplankton collections on flood tides at Indian River Inlet.

- To describe temporal variation in abundance and diversity of larval supply and couple this with assessments of subsequent juvenile abundance to develop Juvenile Fish Indices (JFI) for Atlantic menhaden, summer flounder, Atlantic croaker, spot, and American eel.

- To use the JFI indices as measures of environmental quality for these young fishes in the Inland Bays by beginning to:

    1) determine whether variability in juvenile abundance is determined largely by larval influx or by process affecting survival within the bays, and

    2) assess how abundance changes over time relate to changes in water quality components.

CCMP/Work Plan Goal

G2: Protect, restore and enhance living resources by improving water quality and protecting and enhancing habitat
G2B: Restore finfish and shellfish populations
G2E: Enhance monitoring and response strategies

Primary Project Deliverables

Milestone 1

- Initiate larval fish sampling at Indian River Inlet in October 2006

Milestone 2

- Calculate Juvenile Fish Indices by September 2007

Milestone 3

- Present research data at meeting of the Inland Bays Scientific & Technical Advisory Committee during Winter '08

Milestone 4

- Complete and release final research report during Summer 08

Project Financing

Budget

Award: $19,995

Description	Expense
Graduate student support	$8,370
Fringe benefits	$251
Expendable supplies & equipment	$2,245
Boat rental fees	$5,000
Indirect costs	$4,129

Project Critical Success Factors

Outcomes

Short-term: more comprehensive understanding of the patterns of the dynamics and patterns of larval fish transport into the Inland Bays
Intermediate: a Juvenile Fish Index to be used as an Inland Bays environmental indicator
Long-term: better strategies for the restoration of finfish populations in the Inland Bays
Changes in pressure targets: N/A
CWA Programs: N/A

External Factors

Impacts

-

CENTER FOR THE INLAND BAYS

Rehoboth Indian River Little Assawoman

Project Report

Executive Summary

Project Name: Inland Bays Oyster Gardening Program and Little Assawoman Bay Shellfish Restoration

Responsible John W. Ewart, Aquaculture and Fisheries Specialist
Delaware Sea Grant Marine Advisory Service
Graduate College of Marine & Earth Studies
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Grant ID: EPA CE99399-008-2

Status: Completed

Project Description

Project Overview

This project continued and expanded the Inland Bay Oyster Gardening Program in all three bays. It also further developed spawning populations of oysters and hard clams in LAB through additional bottom plantings of clam seed in the vicinity of the Little Assawoman Wildlife Area and through deployment of juvenile and adult oysters in Little Assawoman Bay residential lagoons and in off-bottom tray systems deployed at protected locations around the LAB system.

Oyster Gardening
In cooperation with the CIB and the municipality of Fenwick Island and other IB residential communities, additional citizen volunteers were recruited to participate in the Oyster Gardening Program. Oyster gardeners attended a spring orientation/training workshop and were issued Taylor Floats and oyster spat during early summer in accordance with the hatchery production schedule. Oysters were maintained at volunteer field sites throughout the year. A subset of the juvenile oysters produced were deployed for field research being conducted at the James Farm oyster reef.

Little Assawoman Bay Shellfish Restoration
In cooperation with the Assawoman Wildlife Area (AWA) managed by Rob Gano, DNREC, sub-tidal sites located adjacent to the in AWA between Dirikson and Miller Creeks were prepared for deployment of juvenile/adult oysters in off-bottom trays during spring summer and fall. Hard clam seed raised in the floating upweller nursery system (FLUPSY) located at the College of Marine Studies in Lewes were transplanted to AWA sites during fall 2007. The AWA shoreline, closed to public access and shell fishing, served as a refuge for the spawning sanctuaries that were developed. Field monitoring included assessment of LAB shellfish

deployments made during 2005/06 and documentation of evidence of natural spawning and recruitment.

Primary Objectives/Opportunity

- Organize, provide training and coordinate activities of citizen volunteer oyster gardeners to produce juvenile/adult oysters for deployment in Rehoboth, Indian River and Little Assawoman Bay throughout the year.
- Continue deployment of hard clams and juvenile/adult oysters to restore local shellfish populations and develop spawning sanctuaries in the LAB.

CCMP/Work Plan Goal

G2: Protect, restore and enhance living resources by improving water quality and protecting and enhancing habitat
G2B: Restore finfish and shellfish populations
G2F: Enhance and restore impacted shallow and nearshore habitats

Primary Project Deliverables

Milestone 1

- Increased number of shellfish gardening sites (N=95) and number of participating volunteers (N=143)

Milestone 2

- CIB established a partnership and executed a Memorandum of Understanding with Delaware State University (DSU), a Historically Black College/University; DSU received a three-year, $300K USDA Evans-Allen grant to support two graduate students and providing funding for the CIB's oyster gardening program; initiated a two-year master's thesis field study that assessed and monitored residential lagoon water quality and documented the habitat value of oyster gardens.

Milestone 3

- CIB staff conducted oyster gardening workshops in June 2007 at the following sites: 1) Fenwick Island Town Hall, 2) College of Marine and Earth Studies in Lewes, and 3) Offices of the CIB. In addition, CIB staff met with representatives from Maryland Coastal Bays Program to exchange information and discuss respective oyster gardening and shellfish restoration efforts

Milestone 4

- 80,000 hard clam seed reared by CIB were broadcast planted in Little Assawoman Bay

Project Financing

Budget

Award: $9,000

Description	Expense
0.5 month of salary and fringe benefits for the principal investigator (J. Ewart), for, for;	$3,908
supplies and expendables	$712
local mileage	$1,500
contractual services (pathogen testing, oyster spat, clam seed)	$698
indirect costs (32%)	$2,182

Project Critical Success Factors

Outcomes

Short-term: raise awareness regarding the function and value of a healthy oyster population in the Inland Bays

Intermediate: increase participation with Inland Bays restoration efforts by residents, communities and local municipalities

Long-term: improve water quality in the Inland Bays

Changes in pressure targets: increase the number of American oysters living in the Inland Bays

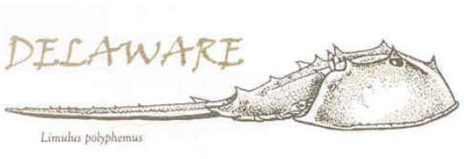
CWA Programs: N/A

CIB played a Primary Role in the implementation of this project. The oyster gardening program continues to be a successful community-based restoration program that now enjoys the support of Delaware State University. In addition, the CIB has cultivated volunteer leadership by identifying "block captains" who serve as a channel of information for oyster gardening.

External Factors

Impacts

- The anticipated funding support and participation of Delaware State University for the 2008 & 2009 field seasons will serve to continue to expand oyster gardening activities in all three of Delaware's Inland Bays



CENTER FOR THE INLAND BAYS
Rehoboth Indian River Little Assawoman

Project Report

Executive Summary

Project Name: Annual Inland Bays Clean-Up

Responsible Partner
Captain James Passwaters
Enforcement Section
Division of Fish & Wildlife
Department of Natural Resources & Environmental Control
89 Kings Highway
Dover, DE 19901
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Grant ID: EPA CE99399-002

Status: Ongoing (No-cost Extension)

Project Description

Project Overview

The annual Inland Bays Clean-up is a partnership between the CIB's Water Use Plan Implementation Committee, the Division of Fish & Wildlife's Enforcement Section, and Delaware State Parks. Volunteers are encouraged to join the host agencies for a one-day clean-up of Delaware's three Inland Bays. Fish & Wildlife Enforcement Agents, CIB staff, and volunteer boat captains transport participants to selected areas around the Inland Bays for targeted clean up. Staging areas are the public boat ramps at Massey's Landing between Rehoboth and Indian River Bay and Mulberry Landing at the Assawoman Wildlife Area.

The 2007 event attracted more than 50 volunteers, who collected a large quantity of debris, including soda bottles and cans, tires, a hot water heater and a lot of plastic. Participants identified and recorded the debris that was collected for reporting to the National Marine Debris Monitoring Program. Numerous local businesses and organizations provided financial support for the event. Local delegates from the Delaware General Assembly also contributed grant assistance to fund the clean-up.

Primary Objectives/Opportunity

- To remove marine debris from Delaware's Inland Bays. Marine debris not only kills turtles, fish, birds and other wildlife through ingestion and entanglement, but it also costs coastal communities through removal, lost revenue from tourism and reductions in property values.

CCMP/Work Plan Goal

G2: Protect, restore and enhance living resources by improving water quality and protecting and enhancing habitat
G2C: Decrease potential for fish kills
G2f: Enhance and restore impacted shallow and nearshore habitats
G8B: Encourage recycling

Primary Project Deliverables

Milestone 1

- More than 50 volunteer participants collected enough debris to fill two 30 cubic yard construction dumpsters

Milestone 2

- Donations and other contributions received to fully fund the event's expenses

Milestone 3

- Debris identified and recorded; data collected submitted to the Ocean Conservancy

Project Financing

Budget

Award: $1,000

Description	Expense
N/A	

Project Critical Success Factors

Outcomes

Short-term: raise awareness about the need for waste minimization and pollution reduction

Intermediate: decrease the potential for the dumping of trash, junk and debris by residents and visitors

Long-term: improve the ecological integrity of saltmarsh and sandy beach complexes in the Inland Bays

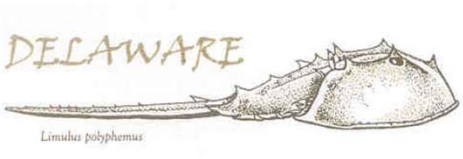
Changes in pressure targets: decrease in the quantity of trash, junk and debris littering the Inland Bays

CWA Programs: N/A

The items collected were reported to the National Marine Debris Monitoring Program.

External Factors

Impacts
• Through the efforts of the CIB's Water Use Plan Implementation Committee and volunteers with the Division of Fish & Wildlife's Enforcement Section, all the necessary supplies and materials for the event were donated; therefore, no expenditures were made during 2007. The Responsible Partner requested a no-cost extension to provide funding for the 2008 Clean-Up event.



CENTER FOR THE INLAND BAYS
Rehoboth Indian River Little Assawoman

Project Report

Executive Summary

Project Name: Camp Awareness: Youth Educational Camp

Responsible Partner
Captain James Passwaters
Enforcement Section
Division of Fish & Wildlife
Department of Natural Resources & Environmental Control
89 Kings Highway
Dover, DE 19901
(302) 855-1922
James.Passwaters@state.de.us

Grant ID: EPA CE99399-008-2

Status: Completed

Project Description

Project Overview

Camp Awareness was a 1.5 day (overnight) conservation camp conducted by the Division of Fish & Wildlife's Enforcement Section at Camp Arrowhead on Rehoboth Bay. Natural resource education at Camp Awareness involved bay seining, boating safety, horseshoe crabs/shorebird connection, and activities focusing on wetlands, waterfowl, and wildlife habitats. Other planned activities included target archery, air rifles and building a bird nesting box. Fishing and wildlife enforcement agents, naturalists, biologists, hunting and boating safety volunteers and other qualified individuals presented the activities. Seasonal staff from the James Farm Ecological Preserve and the Executive Director of the CIB also participated as instructors.

Primary Objectives/Opportunity

To expose children at an early age to the natural resources and outdoor activities Delaware has to offer, including the resources of Delaware's Inland Bays.

CCMP/Work Plan Goal

G9D: Provide education programs statewide

Primary Project Deliverables

Milestone 1

- Eighty-five (85) students participated in the 2007 camp (including the Executive Director's ten year-old daughter)

Milestone 2

- CIB seasonal instructional staff from the James Farm Ecological Preserve integrated Inland Bays curriculum into the natural resource education activities

Project Financing

Budget

Award: $2,000

Description	Expense
Rental Fees for Camp Arrowhead	$2,000

Project Critical Success Factors

Outcomes

Short-term: raise awareness and educate youth about Delaware's Inland Bays
Intermediate: N/A
Long-term: N/A
Changes in pressure targets: N/A
CWA Programs: N/A

Over the past few years, CIB has developed a close working relationship with the Enforcement Section of the Division of Fish & Wildlife. Enforcement agents, such as Capt.

Passwaters, have actively participated on the CIB's Water Use Plan Implementation Committee. Officers from the Enforcement Section have also been an integral part annual Inland Bays Clean-up Event. CIB's support and participation in Camp Awareness was an extension of this tremendous partnership.

External Factors

Impacts

DELAWARE

Limulus polyphemus

CENTER FOR THE INLAND BAYS

Rehoboth Indian River Little Assawoman

Project Report

Executive Summary

Project Name: Invasive Species Control at Savannah's Landing

Responsible Partner
Richard White, President
Savannah's Landing HOA
P.O. Box 309
Bethany Beach, DE 19930
(302) 539-7511

Grant ID: EPA CE99399-008-2

Status: Completed

Project Description

Project Overview

The stormwater management facility at Savannah's Landing consists of 1.35 acres of constructed stormwater wetland and storm water retention pond bench shelf. Parrot feather, an exotic aquatic invasive species, was controlled/eradicated in the project area. The stormwater wetland and stormwater pond bench shelf were planted with Duck Potato, Arrow arum, Blue Flag Iris, Pickerelweed and Smooth Cord Grass. The riparian buffer areas adjoining the pond and wetland bench shelf were planted with Camper Little Bluestream, Butte Side Oats Grama, Silky Wild Rye, Partridge pea, Common milkweed, Wild Senna, Wild Blue Lupine, Wild Bergamot, Smooth Blue Aster, and Early Goldenrod. All work was performed by a volunteer work force consisting of residents of Savannah's Landing in consultation with Envirotech Consulting Service.

Primary Objectives/Opportunity

To reduce and or eliminate invasive species in a stormwater management facility; to enhance the stormwater management facility and riparian buffer with native species that will reduce nutrient contributions to the Assawoman Canal and subsequently, to the Inland Bays.

CCMP/Work Plan Goal

G1E: Adopt the most effective Best Management Practices to provide maximum ground and surface water protection
G2: Protect, restore and enhance living resources by improving water quality and protecting and enhancing habitat
G5D: Address nitrates and other contaminants
G9: Ensure, to the maximum extent possible, all planning and management activities related to the Inland Bays involve public participation, information and education
G9B: Identify user groups and their leadership

Primary Project Deliverables

Milestone 1

- Control and eradication of an invasive species from a stormwater management facility

Milestone 2

- Planting of native wetland and riparian buffers species to enhance the effectiveness of a stormwater management facility

Milestone 3

- Established new partnership with a HOA to provide volunteer project assistance from community residents

Project Financing

Budget

Budget: $2,500

Description	Expense
Equipment rental (roto-tiller)	$84.36
Envirotech (consultant)	$1,999.60
Materials/supplies	$416.04

Project Critical Success Factors

Outcomes

Short-term: removal of an invasive species

Intermediate: secure effective stormwater management facility maintenance and operations by an HOA

Long-term: improve water quality by reducing pollutant contributions to the Inland Bays

Changes in pressure targets: decrease in nutrient concentrations

CWA Programs: controlling non-point source pollution

This was the first opportunity that CIB had to collaborate with a Homeowners' Association to retrofit a stormwater management facility in an established community in the Inland Bays watershed. Based on the success of this project, additional HOA's subsequently applied for CIB grant assistance for similar activities. In addition, CIB formed a working relationship with Envirotech Environmental Consulting, Inc., a local firm which specializes in maintenance and operations for stormwater management facilities. Following this project, Envirotech helped other HOAs coordinate their efforts with CIB to address stormwater management facility enhancements.

External Factors

Impacts

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CENTER FOR THE INLAND BAYS

Rehoboth Indian River Little Assawoman

Project Report

Executive Summary

Project Name: Discover Delaware's Inland Bays! A Pontoon Boat Program at Delaware Seashore State Park

Responsible Partner

Ray Bivens
Chief of Interpretation
Delaware State Parks
152 South State Street
Dover, DE 19901
(302) 739-9191
Raymond.Bivens@State.de.us

Grant ID: EPA CE 99399-008-2

Status: Completed

Project Description

Project Overview

Delaware Seashore State Park continued to present two distinct educational pontoon boat programs during summer 2007. The Estuarine Ecology Tour provided a scientific investigation of the inland bays as participants performed water tests, collected and identified plants and animals, and learned about the role that humans play in the ecology of our coastal waters. The Rehoboth Bay Boat Tour presented an opportunity for visitors to observe coastal wildlife, learn about the formation of the inland bays, and take a closer look at the connection between humans and the inland bays. Due to the success of the 2005 and 2006 seasons, there was an additional offering of the Rehoboth Bay sightseeing interpretive pontoon trip running on Thursdays in July following the scheduled Wednesday pontoon trips.

The pontoon boat programs continued to be a successful feature to Delaware Seashore's summer attractions. Several trips were completely booked a week in advance, and a waiting list was established for visitors that were excluded due to full programs. There were no program cancellations due to rain or severe weather, and no cancellations due to mechanical difficulties.

Due to increased costs associated with the pontoon boat contract, State Parks increased the ticket prices from $15 to $18 per person for the Estuarine Ecology trip and from $10 to $13 per person for the Rehoboth Bay sightseeing trip. Paid print advertising was purchased in two local newspapers (DE Wave and the DE Beachcomber) for the 10 weeks covering the span of the trip offerings.

State Parks considered this to be an important service provided to summer educational offerings, but intend to scale back the number of trips offered during the 2008 summer season due to the loss of underwriting grant support.

Primary Objectives/Opportunity

Delaware's coastal resort area attracts hundreds of thousands of out-of-state visitors to the area each summer. The objective of this project was to provide pontoon boat tours of the Inland Bays to recreational visitors at Delaware Seashore State Park. Tours focused on Inland Bays ecology, water quality, and the interactions of humans with the environment.

CCMP/Work Plan Goal

G8C: Educate the public and industry regarding the need for waste minimization and pollution prevention
G9F: Promote education of out-of-state users and visitors

Primary Project Deliverables

Milestone 1

- Ten (10) Estuarine Ecology tours were conducted for 289 participants

Milestone 2

- Eighteen (18) Rehoboth Bay tours were conducted for 471 participants

Project Financing

Budget

Award: $2,000

Description	Expense
Boat Captain and Rental Fees	10 weeks x $350 per trip x 3 trips per week = $10,500
Seasonal Staff Salaries	230 hrs (2 staff members) @ $10.50/hr. = $2415
Administration (Ray Bivens & Jim Hall)	55 hrs @ $25/hr. = $1375
Marketing	Design/layout/calendar of events/advertising= $2100
Equipment	Supplies and materials = $450

Project Critical Success Factors

Outcomes

Short-term: raise awareness and understanding about the resources of the Inland Bays
Intermediate: create interest and involvement in the mission and objectives of the Delaware Inland Bays National Estuary program
Long-term: increase stakeholder support for policies that improve the condition of the Inland Bays
Changes in pressure targets: increase in outreach activities for out-of-state users
CWA Programs: N/A

This was the third consecutive year in which CIB provided financial assistance for the summer pontoon boat programs. Development of these tours was initially completed in consultation with staff from the CIB. Delaware State Parks continues to consult with the science and education/outreach staff from the CIB to refine the information provided during these tours. CIB has marketed these tours as an extension of our Inland Bays outdoor learning opportunities.

External Factors

Impacts
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ADMINISTRATIVE

Staff Descriptions

The **Executive Director**, under the supervision of the Board of Directors, is the administrative head of the Center charged with the responsibility of the day to day operations and business of the Center, and has responsibilities required by the Inland bays Watershed Enhancement Act, including but not limited to: 1) Executing policies established by the Board of Directors and its Chairperson; 2) Recommending to the Treasurer and the Board of Directors an annual budget showing anticipated receipts & expenditures; 3) The selection, employment, control and discharge of Center employees, and the development and maintenance of personnel policies that are compatible with the educational purpose of the

Center; 4) Carrying out procedures (including audits) approved by the Board to insure that the funds are collected and expended effectively; 5) Serving as a liaison to assure effective communication among the members of the Board of Directors, its various committees, and the staff; and, 6) Performing such other functions as may be delegated by the Board of Directors or its Chairperson, and to conduct, in conjunction with the Chairperson, general overall supervision of the business and affairs of the Center.

The **Administrative Assistant** provides program and office administrative services including development, reconciliation, and tracking of the operation budget; managing payroll and benefits packages; managing financial requirements for federal, state, and local assistance awards; maintaining membership and mailing lists; answering phones; drafting general letters and correspondence; ordering basic supplies; faxing; copying; maintaining program calendars and scheduling; filing; mailing; processing and tracking paperwork for staff travel authorizations and reimbursements; taking minutes of meetings; and other duties as assigned by the Executive Director.

The **Education and Outreach Coordinator** serves the Executive Director of the Center for the Inland Bays by managing the activities of the Inland Bays Comprehensive Public Participation and Education Plan component of the Inland Bays Comprehensive Conservation and Management Plan. The Education & Outreach Coordinator Manages the Poultry Integrators Nutrient Effort (P.I.N.E.) program; supervises the Little Assawoman Bay Watershed Coordinator; maintains contact with and provides periodic updates to Steering Committee; Represents the CIB as a seated member of the Delaware Nutrient Management Commission and attends other meetings convened by county, state and federal agencies or organizations for the purposes of addressing Inland Bays and other environmental issues; Supports the activities of the Inland Bays Tributary Strategy Program, which includes recruiting and maintaining an active Tributary Action Team membership; planning, scheduling and convening meetings; and, reporting program activities and progress to the Board of Directors and the State of Delaware concerning efforts to develop and implement Pollution Control Strategies; Serves as the liaison to the Scientific & Technical Advisory Committee; maintains membership roster; prepares and announces meeting agendas; schedules and assists with regular committee meetings; oversees activities of the Environmental Indicators Subcommittee; Plans the composition of, edits, and produces the quarterly newsletter; develops other informational publications including brochures, technical reports, and issue papers; Develops, schedules and conducts outdoor learning activities at the James Farm Ecological Preserve; programs integrate Inland Bays education with current Delaware Science Content Standards and Performance Indicators; Hires, trains and supervises Seasonal Instructors assisting with school programs activities at the James Farm Ecological Preserve; Composes press releases, news advisories, calendar announcements, and public service announcements (PSAs) for distribution by local media outlets; Designs and maintains Center for the Inland Bays' web site; responsible for all audio/visual applications for the Center for the Inland Bays, Inc.; Serves on ANEP Executive Committee as chair of Legislative Affairs Committee; Solicits, identifies, develops, and submits grant proposals to pursue financial assistance to fund educational, demonstration, and research projects sponsored by CIB; manages grant funded projects (ie. Shellfish Gardening Project) as awarded; Conducts public outreach and educational presentations on Inland Bays issues for citizens groups, adult learning groups, and service organizations in the Inland Bays watershed; Provides in-service training for Delaware educators in the areas of estuarine science, ecology, land use, and environmental impacts; Plans, organizes, and conducts annual

fundraiser/social event as well as other special events (egs. “Governor’s Wade-In” & Open House/Pig Roast); Attends to a variety of special support projects as assigned by the Executive Director

The **Habitat Coordinator** serves the Executive Director by managing the Habitat Protection Action Plan component of the Inland Bays Comprehensive Conservation and Management Plan. Primary responsibilities include the development and implementation of a watershed-wide habitat restoration plan which includes developing a plan consistent with the goals of the Comprehensive Conservation and Management Plan (CCMP) and development of programmatic infrastructure to secure funding and oversee project implementation to meet the goals stated in the plan; coordinating program and planning efforts of federal, state, county, and local governmental agencies and other non-governmental agencies and groups related to habitat and habitat restoration within the watershed with an emphasis on keeping Inland Bays habitat and environmental issues at the forefront of other agency/group planning and consideration; representing the CIB at meetings convened by federal, state, county, and local governmental agencies and other non-governmental agencies and groups for the purposes of addressing Inland Bays and other environmental issues which include but are not limited to the Delaware Invasive Species Council, Sussex County/DelDOT Transportation Plan Committees, USDA-Delaware State Technical Committee, CIB Habitat Plan Development Committee, the State Biodiversity Initiative Committee and related subcommittees, and on the CIB Finance Committee; Soliciting, identifying and developing grant proposals to pursue financial assistance to fund habitat restoration projects sponsored by the CIB; managing grant funded projects as awarded; Serving as assistant liaison the Citizens Advisory Committee, which includes preparing and announcing meeting agendas, facility preparation, and scheduling regular meetings; Assisting with outdoor learning activities at the James Farm Ecological Preserve, as requested; Submitting regular habitat and special topic articles to the Education and Outreach Coordinator for the quarterly newsletter and other program publications, including brochures, technical reports, and issue papers; Developing and submitting press releases related to habitat to the Education and Outreach Coordinator for local media distribution, as necessary; Submitting information to the Education and Outreach Coordinator for use on CIB’s web site, DISC web site, and CIB tracking system; Planning and developing topics of interest for participation in weekly radio broadcasts as scheduled; Attending to a variety of special support projects and other duties as assigned by the Executive Director.

The **Wildlife Manager** serves the Executive Director and works in conjunction with the Habitat Coordinator to implement actions in the Habitat Protection Action Plan; The Wildlife Manager manages and oversees the day to day operation of the James Farm Ecological Preserve; monitors the James Farm Ecological Preserve for various wildlife activities, identifying key animal and plant species as a base line for future comparative studies and also for comparison to historical data; replenishes species by learned management techniques; helps to coordinate internships at the Center for the Inland Bays; manages the Inland Bays Shellfish Restoration Program, including the oyster gardening program; coordinates with the State Forest Service to implement the Urban and Community Forestry Program in the Inland Bays watershed; represents the Center on committees including the State Forestry Council and the Board of Directors of the Delaware Quality Deer Management Association; participates in public relation/outreach activities sponsored by the CIB; represents the CIB at meetings convened by county, state, and federal agencies or organizations for the purposes of

addressing Inland Bays and other environmental issues.

The **Science and Technical Coordinator** serves the Executive Director and has the primary role in formulating the research and demonstration project agenda for the Center for the Inland Bays. The Science Coordinator monitors existing research projects and provides guidance on future and potential research projects; Analyzes existing data and provides guidance and consultation on Inland Bays issues related to science and management; Prepares scientific reports and documents as needed; Assists staff and CIB committees with science guidance; Develops and fortifies the CIB tracking system of the Comprehensive Conservation and Management Plan; Procures grants relative to science program priorities; Performs other duties as assigned by Executive Director.

The **Development Coordinator** serves the Executive Director and is responsible for planning, coordinating and implementing the financial plan for the CIB, which includes building and maintaining relationships and securing financial support from current and prospective donors. This individual will also plan and coordinate special events activities. Principal duties and responsibilities include increasing "Friends of the Bays" memberships, organizing mailing lists, identifying donor base, developing prospect research tools, cultivating individual and corporate donors, managing the CIB's endowment fund and annual campaigns, developing, organizing and marketing programs and annual events to the community and target audiences, and identifying and pursuing grant funding opportunities.

BOARD OF DIRECTORS

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