

**NOAA Chesapeake Bay Office
Fiscal Year 2005
Grant and Contract Report**



November 2005

Contents

Program Overview	3
Fisheries Program	
<i>Fisheries Research</i>	5
Habitat Program	
<i>Non-native Oyster (C. ariakensis) Research</i>	19
<i>Submerged Aquatic Vegetation Restoration</i>	33
<i>Native Oyster Restoration</i>	40
<i>Additional Habitat Program Projects</i>	42
Education Program	
<i>Bay Watershed Education and Training (B-WET)</i>	44
<i>Additional Education Program Projects</i>	62
Coastal Observations Program	
<i>Integrated Coastal Observations</i>	65
Mission Support	
<i>Science, Technical, and Administrative Services</i>	70
Appendix A	
<i>Review and Selection Process for Competitive Awards</i>	72



2005-01

Program Overview

The NOAA Chesapeake Bay Office is in its second decade of providing science, service, and stewardship to advance NOAA's mission in the mid-Atlantic region and to support the efforts of the Chesapeake Bay Program. The NOAA Chesapeake Bay Office (NCBO) implements NOAA's mission to understand and predict changes in the Earth's environment and to conserve and manage the coastal and marine resources to meet our nation's economic, social, and environmental needs. NCBO works to achieve NOAA objectives on a regional scale.

NCBO represents various NOAA line offices, including the National Marine Fisheries Service (NMFS), the Office of Oceanic and Atmospheric Research (OAR), the National Ocean Service (NOS), and the National Environmental Satellite, Data, and Information Service (NESDIS), and collaborates with other NOAA offices. It also provides a focal point within NOAA for Chesapeake Bay initiatives, involves relevant NOAA entities in Bay restoration efforts, funds research to support Chesapeake Bay management objectives, and strengthens NOAA's interactions with Chesapeake Bay partners.

NCBO has offices in Maryland and Virginia to better coordinate with constituents and partners around the watershed. In Maryland, offices are located in Annapolis and Oxford. In Virginia, NCBO has offices in Norfolk and Gloucester Point. NCBO staff work on issues including stock assessment and other fisheries management-related activities, ecosystem-based fisheries management, habitat restoration, atmospheric deposition, remote sensing, GIS and data analysis, education, outreach, and information management.

NCBO awards competitive grants, noncompetitive grants, and contracts in order to further its mission of science and stewardship in the Chesapeake Bay. Specifically, NCBO offers funds for research and restoration projects involving fisheries, native and non-native (*C. ariakensis*) oysters, submerged aquatic vegetation, and education.

Grants (including *grants* and *cooperative agreements*) involve the transfer of money, property, services, or anything of value to a recipient in order to accomplish a public purpose of support or stimulation that is authorized by federal statute. A grant features no substantial involvement by the federal government; the grant recipient is expected to perform the project without substantial collaboration or intervention by NOAA. In a cooperative agreement, there is substantial involvement of the federal government during performance of the proposed activity.

Contracts reflect a relationship between the Department of Commerce and a business, organization, or individual where the principal purpose is the acquisition by purchase, lease, or barter of property or services for the direct benefit or use of the federal government.

In fiscal year 2005, NCBO awarded \$13,354,499 in grants and \$1,303,204 in contracts to support a variety of projects. This report includes grants awarded through a competitive process as described in Appendix A, as well as noncompetitive awards that are congressionally directed to specific recipients. In addition to competitive and noncompetitive grants, NCBO awards contracts for services to support its mission. Descriptions of contracts awarded using fiscal year 2005 funds are also included in this report, following the grant descriptions in each NCBO program area.

For more information about funding opportunities available through NCBO please visit noaa.chesapeakebay.net/fundingopportunities.aspx. For information on the Review and Selection Process for Competitive Awards, see Appendix A.

Fisheries Program

Fisheries Research

The Chesapeake Bay Integrated Research Program for Fisheries is a competitive program that supports research, monitoring, modeling, and assessment of Chesapeake Bay fisheries.

Funded projects enhance knowledge and understanding of the Chesapeake Bay ecosystem by providing biological information and life history characteristics for many individual Chesapeake Bay fisheries stocks, and by broadening the multispecies knowledge base to support ecosystem-based management.

All projects supported through this program must address recommendations of *Fisheries Ecosystem Planning for the Chesapeake Bay*, the Chesapeake 2000 Agreement, and provide timely information for making resource management decisions in an ecosystem context. Specific fisheries management needs may also be defined on an annual basis (e.g., Menhaden in fiscal year 2005).

In fiscal year 2005, NCBO awarded \$4,686,267 in grants and \$182,250 in contracts to support fisheries research.

Grant-Funded Projects

Project Description: Striped Bass Stock Health Assessment: Mycobacteriosis Prevalence and Distribution

Award Number: NA03NMF4570377

Purpose: The overall project objectives will be to: (1) determine the distribution and prevalence of mycobacterial infection in different age classes of Chesapeake Bay and mid-Atlantic striped bass stock; (2) examine young-of-the-year menhaden, an important prey species, as a possible vector for transmission; (3) analyze region, prevalence, age, severity, and gender relationships in striped bass relative to mycobacteriosis, mode(s) of transmission, and year class strength; and (4) conduct outreach and work with management agencies to develop strategic plans.

Awardee: University of Maryland, College Park

Program Officer: Derek M. Orner

Principal Investigator: A. Kane

2005 Funding:

Federal: \$269,170

Non-Federal: \$90,032

Project Description: Estimating Relative Abundance of Ecologically Important Juvenile Finfish and Invertebrates in the Virginia Portion of Chesapeake Bay

Award Number: NA03NMF4570378

Purpose: The fisheries trawl survey conducted by the Virginia Institute of Marine Science (VIMS) is the oldest continuing monitoring program (50 years) for marine and estuarine fishes in the United States. This survey provides a monthly baseline assessment for the abundance of juvenile marine and estuarine fishes and invertebrates in the tidal and mainstem areas of the Chesapeake Bay. The survey provides crucial, real-time data to various state fisheries management agencies, the Atlantic States Marine Fisheries Commission, the Mid-Atlantic Fisheries Management Council, and the National Marine Fisheries Service. For 50 years, in the Virginia portion of Chesapeake Bay, several annual indices of juvenile abundance have been generated from trawl survey data for species of key ecological, recreational and commercial importance (spot, croaker, weakfish, summer flounder, black sea bass, striped bass, white, channel and blue catfish, scup, white perch, northern puffer, silver perch, American eel, bay anchovy, and blue crab).

Awardee: Virginia Institute of Marine Science

Program Officer: Derek M. Orner

Principal Investigator: M. Montane

2005 Funding:

Federal:	\$56,201
Non-Federal:	\$0

Project Description: Trophic Portfolios in Commercial Fishing: A Finance-based Approach to Ecosystem Management with an Application to Chesapeake Bay Fisheries

Award Numbers: NA04NMF4570355 (Resources for the Future) and NA04NMF4570356 (Duke University)

Purpose: The project design follows three main objectives, some of which require multiple tasks to complete. The objectives and tasks are:

Objective 1. Literature review and data collection

Task 1.1 Undertake a thorough literature review of financial portfolio management, economic theory of sustainability, and Chesapeake Bay fisheries.

Task 1.2 Collect commercial landings and ecological information, including trophic levels, prey species, and estimates of maximum sustainable yield.

Objective 2. Derive mean-variance efficient frontiers that correspond to optimal portfolio shares of fishing assets in the Chesapeake Bay through a retrospective analysis of fisheries data.

Task 2.1 Develop and estimate empirical covariance matrices for fishing assets in the Chesapeake Bay.

Task 2.2 Identify biological constraints for multispecies management in the Chesapeake Bay.

Task 2.3 Perform sensitivity analyses to evaluate the robustness of optimal portfolio shares.

Objective 3. Analyze the role of portfolio management techniques and concepts in fishery management.

Task 3.1 Undertake counterfactual policy analysis where we compare past management decisions regarding the shares across species and total extracted from the Chesapeake Bay against the optimal portfolio.

Task 3.2 Assess the potential for applying portfolio management to multispecies fisheries in other regions.

Awardee: Resources for the Future and Duke University

Program Officer: Derek M. Orner

Principal Investigator: J. Sanchirico (RftF) and M. Smith (Duke)

2005 Funding:	Resources for the Future	Duke University
Federal:	\$46,209	\$51,778
Non-Federal:	\$0	\$12,012

Project Description: Menhaden abundance and productivity in the Chesapeake Bay: Linking the environment and primary production to variability in fish recruitment

Award Number: NA04NMF4570359

Purpose: Young-of-the year Atlantic menhaden are filter-feeding planktivores. Diets include a large phytoplankton fraction. The link between spatio-temporal distributions of phytoplankton biomass and primary production and variability of menhaden recruitment is being evaluated in the Chesapeake Bay. In the funded project, the level, floral composition, and regional variability of primary production are hypothesized to control production and recruitment of young-of-the-year menhaden. A suite of environmental variables is included in analyses and modeling to identify and quantify factors that affect the trophic linkage between primary producers and menhaden. Building on criteria established to evaluate phytoplankton production and quality, statistical modeling, climatology analysis, and bioenergetic modeling are proposed to develop capability to explain and predict variability in menhaden recruitments. In a second year of support, it is proposed to broaden the scope of research to include a coastal ocean component in which remotely sensed phytoplankton from satellite data is evaluated and related to young-of-the-year menhaden recruitment in the Chesapeake Bay. In this component, it is hypothesized that productivity of the coastal ocean during menhaden's larval stage controls growth and survival in early life, prior to transport of larval menhaden into the estuary. The proposed research is responsive to needs of the Chesapeake Bay Program and the Atlantic States Marine Fisheries Commission and to recommendations in the Chesapeake Bay Fisheries Ecosystem Plan.

Awardee: University of Maryland, Center for Environmental Science

Program Officer: Derek M. Orner

Principal Investigators: E. Houde

2005 Funding:

Federal: \$158,181

Non-Federal: \$73,890

Project Description: Probing the population structure of Atlantic menhaden (*Brevoortia tyrannus*) in the mid-Atlantic

Award Number: NA05NMF4571257 (UMCES) and NA05NMF4571259 (ODU)

Purpose: We propose to quantify the role of spatial structure in the dynamics of the coastwide Atlantic menhaden population. We will quantify and analyze the chemical composition of otoliths of menhaden from selected life history stages to ascertain the contribution of different spatial components to overall dynamics by testing five specific hypotheses. First, over two years of sampling, we will test the hypothesis that larvae entering the Chesapeake Bay share the same oceanographic origin. In so doing we will also quantify the characteristics of immigrating larvae. Second, we will test the hypothesis that juvenile production in the Chesapeake Bay is derived from larvae from a single oceanographic source. If the pattern of natal regimes in the larvae and juveniles are equivalent we can conclude that there is no source of differential mortality that selects larvae based on natal region. Third, by comparing the chemical signatures in the core of age-1 menhaden with the signatures in juveniles collected in the Chesapeake Bay in the previous year, we will test the hypothesis that the contribution of different natal areas to year class strength is constant. Fourth, we will analyze the chemical composition in cores of otoliths of fish from a range of age classes collected from the to test the hypothesis that the distribution of adults in the population from different nursery sites is constant from year to year. Finally, we will use a spatially explicit, age-structured predator prey model to explore the consequences of population structure to the efficacy of spatially explicit management for menhaden.

Awardee: University of Maryland, Center for Environmental Science and Old Dominion University Research Foundation

Program Officer: Derek M. Orner

Principal Investigators: T. Miller (UMCES) and C. Jones (ODU)

2005 Funding:	UMCES	ODU
Federal:	\$125,549	\$147,839
Non-Federal:	\$11,118	\$13,647

Project Description: Do Environmental Conditions in Nursery Habitat Contribute to a Mismatch in (Growth and) Production of Young Atlantic Menhaden (*Brevoortia tyrannus*) and Striped Bass (*Morone saxatilis*)?

Award Number: NA05NMF4571258 (UMCES) and NA05NMF4571260 (U DE)

Purpose: We will employ a coordinated set of laboratory experiments and field collections involving juvenile menhaden and striped bass from Chesapeake and Delaware Bays designed to a) improve predictions of recruitment in these two species; b) assess the degree to which nursery ground processes may explain the current mismatch in productivity of these species in the Chesapeake Bay; and c) develop a more precise and operational definition of essential fish habitat in both systems. We will use a high-resolution biochemical technique to quantify the relative value of different habitats to the overall production of menhaden and striped bass recruits. A set of controlled, factorial experiments will quantify the relationships between temperature, salinity, feeding level, nucleic-acid based condition, and growth rate in juvenile menhaden and striped bass.

RNA and DNA concentrations in fish muscle will be determined after 7-10 d exposure in each treatment, using fluorometric techniques. Response surface analysis will be used to develop models to predict specific growth rate as a function of temperature, salinity, and RNA/DNA for each population and examine differences between populations. Additionally, we will conduct experiments to quantify the response time of changes in RNA/DNA to changes in ration and hence growth. These results will allow us to quantify and compare habitat-specific productivities of young menhaden and striped bass in both systems. Fishes will be collected in collaboration with ongoing surveys and from specifically designed sampling in both bays. Estimates of habitat specific productivity will be derived from the product of the relative abundance at each site and the specific growth rate predicted from the experimental results. Finally, we will quantify relationships between estimated productivity and environmental parameters measured on collection, or inferred from routine monitoring or remotely sensed data.

Awardee: University of Maryland, Center for Environmental Science and University of Delaware

Program Officer: Derek M. Orner

Principal Investigators: T. Miller (UMCES) and T. Targett (U DE)

2005 Funding:	UMCES	U DE
Federal:	\$93,389	\$92,295
Non-Federal:	\$10,717	\$11,339

Project Description: Chesapeake Bay Stock Assessment Research

Award Number: NA05NMF4571261

Purpose: In this project, we will collate data for Atlantic menhaden in the Chesapeake Bay region, develop an assessment methodology for stocks in which it is unsafe to assume a simple production function due to large-scale movements in and out of the Chesapeake Bay, and incorporate assessment results into broader ecosystem fisheries management plans. The project also includes an educational component through training opportunities for existing fisheries scientist and a PhD opportunity.

Awardee: University of British Columbia

Program Officer: Derek M. Orner

Principal Investigators: S. Martell

2005 Funding:
Federal: \$56,067
Non-Federal: \$0

Project Description: Assessment of Chesapeake Bay Commercial Softshell Clams *Mya arenaria* and *Tagelus plebeius*

Award Number: NA17FU1652

Purpose: Hydraulic escalator dredge samples to be taken during the summer of 2006 and the winter/spring of 2007 in five regions of the Chesapeake Bay consistent with Objectives 1 and 2. Disease diagnostics will be made on representative samples from each region surveyed during August-September 2006. Additional disease samples will be collected, as needed, during the winter/spring of 2007, consistent with Objective 2. Statistical comparisons among regions and among years, when appropriate, will be used to test inferences regarding clam abundances including comparisons with historical data.

Awardee: Maryland Department of Natural Resources

Program Officer: Derek M. Orner

Principal Investigators: M. Homer

2005 Funding:
Federal: \$24,380
Non-Federal: \$48,840

Project Description: National Aquarium in DC Exhibit Renovations and Outreach Programs

Award Number: NA05NMF4571286

Purpose: National Aquarium in Baltimore is working with the Department of Commerce, National Aquarium Society, and National Aquarium in DC staff to direct repairs to the Aquarium infrastructure during an interim period (2004-2010). Full renovation of the Aquarium will occur as part of the larger-scale renovation of Commerce Building after 2010. During the interim period, National Aquarium in Baltimore staff are working with National Aquarium in DC and NOAA Chesapeake Bay Office education staff to develop new education programs and evaluate and produce education materials, develop an education outreach strategy, and prepare for a temporary shutdown during Commerce Building renovations that may interrupt Aquarium operations.

Objectives:

1. Upgrade public spaces.
2. Complete exhibits enrichment and backup space improvements.
3. Develop basic water quality and medical laboratories.
4. Develop an education outreach strategy and materials to showcase the new renovation and continue student programs during potential renovation shutdowns in the future.

Awardee: National Aquarium Society

Program Officer: Derek M. Orner

Principal Investigators: A. Dehart

2005 Funding:

Federal: \$937,000

Non-Federal: \$0

Project Description: Fisheries Ecosystem Model of the Chesapeake Bay

Award Number: NA17FU1654

Purpose:

1. To explore policy options for exploitation of the Chesapeake Bay based on the fitted fisheries ecosystem model.
2. To enhance spatial and temporal resolution of the ecosystem model centered on the exploited parts of the Chesapeake Bay, developed and documented as part of the previous phases of this activity.
3. To update time series data related to the abundance and exploitation of the ecosystem resources, nutrient loading and physical forcing climate.

Focus will be on use of the Chesapeake Bay fisheries ecosystem model for exploring policy options and on dissemination of model capabilities and results. Integration of output from a two-layer hydrodynamic model that uses historical information on nutrient loading and physical forcing to predict spatial and temporal variation in primary productivity will be continued. Update of data material.

Awardee: University of British Columbia

Program Officer: Derek M. Orner

Principal Investigators: V. Christensen

2005 Funding:

Federal: \$49,832

Non-Federal: \$0

Project Description: Blue Crab Tag-Recapture Analysis

Award Number: NA17FU1655

Purpose: A tagging program was initiated in November 2001, on the terminally molted, mature female component of the baywide blue crab stock. Specimens tagged were obtained from the VIMS and Maryland DNR (MDNR) components of the baywide Winter Dredge Survey (WDS) throughout the survey area in Virginia and lower Maryland waters. Crabs were measured, tagged with a strap (cinch) tag tied around the lateral spines, and released on site. Tagging was also conducted in June on crabs obtained from the CHESMAP trawl survey and the VIMS and MDNR trawl surveys. Tag returns will be analyzed using Brownie-type tagging models. Annual mortality rates will be calculated and, potentially, semiannual estimates. In addition, we will compare the rates of return of tagged animals released inside and outside the spawning sanctuary as a way to evaluate sanctuary effectiveness.

Awardee: Virginia Institute of Marine Science

Program Officer: Derek M. Orner

Principal Investigators: J. Hoenig

2005 Funding:

Federal: \$25,680

Non-Federal: \$0

Project Description: The Blue Crab, *Callinectes sapidus*: An Integrated Research Program of Basic Biology, Hatchery Technologies, and the Potential for Replenishing Stocks

Award Number: NA17FU2841

Purpose: Throughout its habitat, and particularly in the Chesapeake Bay, the fisheries for blue crab (*Callinectes sapidus*) are experiencing dramatic declines. The long-term management of blue crab populations in the Bay (and other habitats) must rely on a full understanding of the blue crab's basic biology, natural history, and ecology, as well as assessing and remediating current problems. This ongoing, multiinstitutional, collaborative project continues to use a multidisciplinary approach to develop and evaluate the feasibility of replenishing wild stocks of blue crab on the East Coast and in the Gulf of Mexico. Specifically, we will continue ongoing studies on the critical aspects (endocrine, molecular, physiological) of blue crab reproduction, molting, development, growth, disease, and the manipulation of these processes. Congressional funding since 2002 has already resulted in significant progress in each of the above areas. In addition, we have developed advanced methods for the captive production of these animals and conducted comprehensive studies to evaluate (through small-scale population enhancement field trials, nursery analysis, and optimized migration models) the ecological potential of using hatchery-reared juveniles to replenish the declining wild-spawning stocks. To date, consortium results on blue crab abundance and stock assessment indicate that *Callinectes* is a good candidate for the stock-enhancement approach. Encouraging field releases of hatchery-raised crabs have led to recent efforts to mass-produce juveniles on a scale sufficient for stock enhancement. Continued funding will enable the consortium to optimize current protocols, scale up production methods, and conduct additional field studies and monitoring using the hatchery-produced crabs. Partnerships with watermen and state agencies have been formed, and a mass-production facility has commenced operation.

The consortium will also develop additional screening methods for viral pathogens of crabs, conduct epidemiological surveys (especially in the Gulf of Mexico) of diseases in wild populations, assess the potential risk factors, and further develop a computer model for the development and spread of select crab pathogens. Finally, we will intensify efforts to develop sophisticated and efficient technologies to identify and monitor distinct populations (both wild and animals released from hatcheries) of blue crabs, including genetic markers (DNA "tagging" methodologies) and PCR-based techniques to evaluate diseases in natural stocks. Consortium work in this area will build upon available data from the recently sequenced blue crab mitochondrial genome. This proposal represents our long-term strategy; however, only a 12-month continuation of funding is requested in this submission.

The benefits of this integrated and multifaceted approach are already apparent. Much information has already been transferred to watermen and state fisheries managers. While the project is clearly focused on assessing and rectifying current regional problems associated with the decline of blue crab harvests, the underlying goal of developing state-of-the-art methodologies to be used in blue crab research and development, expanding our information base, and establishing shared databases is expected to result in better management practices on a national level and faster solutions to local issues that may arise in the future.

Awardee: University of Maryland, Biotechnology Institute
Program Officer: Derek M. Orner
Principal Investigators: Y. Zohar
2005 Funding:
Federal: \$2,089,999
Non-Federal: \$0

Project Description: Fisheries Management Coordination and Community Modeling Support

Award Number: NA17FU2890

Purpose: CRC staff will continue assembly of regional hydrological, hydrodynamic, and biogeochemical models of the Chesapeake Bay watershed, through expansion of the Chesapeake Community Model Project. Second, bottom habitat characterization (hard, soft bottom mapping) will be increased through the use of ship-deployed sonar and video technologies. Third, through a subcontract, University of Maryland researchers will partner with NOAA scientists in developing and distributing environmental indicators and assessments of Bay health, including forecasts of climate-driven water quality changes and subsequent impacts on fish stocks. Fourth, CRC staff and subcontractors will expand model development and application through the Coast Survey Development Laboratory and product transfer from CRC's Chesapeake Community Model Program to the NCBO Coastal Prediction Center, ensuring regional distribution of information, forecasts, and graphics for general use in the basin. Fifth, CRC will provide a summer intern to assist NCBO in education and outreach in summer 2005. Finally, CRC will assist NCBO in developing, organizing, and conducting cross-institutional workshops required for assessing community ideas on pertinent and often urgent fisheries-related topics.

Awardee: Chesapeake Research Consortium, Inc.
Program Officer: Derek M. Orner
Principal Investigators: K. Sellner
2005 Funding:
Federal: \$462,698
Non-Federal: \$0

Contract Projects

Project Description: Estimating total removals of key forage species by predators in the Chesapeake Bay

Purpose: We will derive estimates of total annual removals of bay anchovy and Atlantic menhaden by their main finfish predators (e.g., striped bass [*Morone saxatilis*], weakfish [*Cynoscion regalis*], Atlantic croaker [*Micropogonias undulates*], and summer flounder [*Paralichthys dentatus*]) in the Chesapeake Bay. Age-specific diet composition data for these predators generated by the Chesapeake Bay Multispecies Monitoring and Assessment Program (ChesMMAP) will be combined with predator gastric evacuation rates to produce daily consumption estimates of each prey species. These daily estimates will then be scaled to generate estimates of the total annual removal of Atlantic menhaden and bay anchovy due to fish predation.

Awardee: Virginia Institute of Marine Science

NCBO Technical Representative: Derek Orner

Project Managers: Dr. Robert J. Latour, Christopher F. Bonzek

2005 Funding: \$74,375

Project Description: Data collection and analysis in support of single and multispecies stock assessments in the Chesapeake Bay: the Chesapeake Bay multispecies monitoring and assessment program

Purpose: Two research cruises will be conducted. During each cruise, 80 stations will be sampled using a stratified random design encompassing the entire main stem of the Chesapeake Bay. At each station, all fish and selected invertebrates will be enumerated, all or a significant subsample will be measured, and a smaller subsample will be processed for length, weight, and girth measurements, as well as sex determination. In addition, aging structures and stomachs will be removed, labeled, and preserved on board. Trawl monitoring equipment and hydroacoustic gear will also be deployed at all or most stations (under favorable sea conditions). In support of single species assessments, data products from these cruises will include estimates of distribution and abundance, length frequency distributions, sampled-population age structure, and age/sex/location-specific diet composition for each species. The vessel, vessel crew, and scientific crew will be available during each cruise to perform additional duties in support of partner projects.

Awardee: Virginia Institute of Marine Science

NCBO Technical Representative: Derek Orner

Project Managers: Dr. Robert J. Latour, Christopher F. Bonzek

2005 Funding: \$48,375

Project Description: Specimen analysis in support of single species and multispecies stock assessments in the Chesapeake Bay

Purpose: In support of species stock assessments, otoliths removed from specimens sampled by the Chesapeake Bay Multispecies Monitoring and Assessment Program (ChesMMAP) during 2001 to 2005 will be prepared and ages will be determined. In support of multispecies or ecosystem assessments, seasonal, spatial, and age-specific fish diets will be estimated by analysis of stomachs removed from specimens sampled by the ChesMMAP program during 2001 to 2005.

Awardee: Virginia Institute of Marine Science

NCBO Technical Representative: Derek Orner

Project Managers: Dr. Robert J. Latour, Christopher F. Bonzek

2005 Funding: \$27,250

Project Description: Editorial support for *Fisheries Ecosystem Planning for Chesapeake Bay*

Purpose: To provide funding for publishing services related to proofreading, checking citations/reference matches, and subject indexing of *Fisheries Ecosystem Planning for Chesapeake Bay* in accordance with the Statement of Work.

Awardee: American Fisheries Society

NCBO Technical Representative: Derek Orner

2005 Funding: \$21,000

Project Description: Chesapeake Bay Game

Purpose: In accordance with the statement of work entitled "2005 Bay Game Activity Book," the purpose of this contract is to prepare a Chesapeake Bay publication that will enhance the understanding of the Chesapeake Bay watershed through firsthand activities. The Bay Game is designed to educate and instruct young children on the Bay's natural resources while in the car traveling from Maryland's Chesapeake Bay Bridge to Maryland's number one summer vacation spot, Ocean City. Deliverables: 350,000 Bay Game Activity Books by Labor Day 2005. Distribution of the Activity Books will be via toll booths at the Chesapeake Bay Bridge upon request.

Awardee: Maryland Department of Natural Resources

NCBO Technical Representative: Derek Orner

Project Managers: Dr. Robert J. Latour, Christopher F. Bonzek

2005 Funding: \$11,250

Habitat Program

Non-native Oyster (*C. ariakensis*) Research

The Non-native Oyster Research Program is designed to generate scientific information for a programmatic Environmental Impact Statement (EIS) on the proposed introduction of a non-native oyster species, *Crassostrea ariakensis*, to the Chesapeake Bay and other tidal waters of Maryland and Virginia.

The program is aimed at research priorities recently identified by the National Research (NRC) and the Scientific and Technical Advisory Committee (STAC) of the Chesapeake Bay Program, as well as guidance from the International Code of Practice on the Introductions and Transfers of Marine Organisms (ICES Code of Practice). As a cooperating agency on the EIS, NOAA initiated this research program to ensure adequate scientific information is available to complete a full and thorough EIS.

In fiscal year 2005, NCBO awarded \$1,816,994 in grants to support research involving non-native oysters.

Grant-Funded Projects

Project Description: Predation by Polyhaline Invertebrate Predators on Young Non-Native Oysters, *Crassostrea ariakensis*, in the Chesapeake Bay

Award Number: NA04NMF4570425

Purpose: Project objectives: 1. Determine effects of polyhaline and marine invertebrate predators on comparative survival of *Crassostrea ariakensis* and *Crassostrea virginica*. 2. Provide these results to population modelers and federal and state personnel responsible for an EIS assessment.

Awardee: University of Maryland, Center for Environmental Science

Program Officer: Jamie King

Principal Investigators: V. Kennedy and R. I. E. Newell

2005 Funding:

Federal: \$106,244

Non-Federal: \$62,831

Project Description: Long-term mesocosm studies of competitive interactions between diploid *Crassostrea virginica* and *Crassostrea ariakensis*

Award Numbers: NA04NMF4570414 (UMCES), NA04NMF4570417 (VIMS), NA04NMF4570418 (SI), NA04NMF4570419 (DNR)

Purpose:

1. Determine the ecological interactions between diploid *C. ariakensis* and *C. virginica* at all life stages from larval settlement through juvenile and to three-year-old fully grown oysters.
2. Compare the growth rate and gametogenic cycle of diploid *C. ariakensis* and *C. virginica* under ambient annual temperature and salinity cycles typical of the upper Chesapeake Bay.
3. Determine the susceptibility of diploid *C. ariakensis* to native parasites and pathogens under mesohaline conditions typical of the Chesapeake Bay.
4. Compare the reefs formed by multi-age cohorts of *C. ariakensis* and *C. virginica* growing either separately or sympatrically and the relative utilization of these reefs by various invertebrates and vertebrates.
5. Synthesize data obtained in this study on settlement, survival, growth, and reproduction to develop an age-based matrix population model to predict the potential for population growth of *C. ariakensis* and *C. virginica* growing either alone or sympatrically.

Awardee: University of Maryland, Center for Environmental Science (UMCES), Virginia Institute of Marine Science (VIMS), Smithsonian Institution (SI), Maryland Department of Natural Resources (DNR).

Program Officer: Jamie King

Principal Investigators: R. Newell (UMCES), M. Luckenbach (VIMS), D. Breitburg (SI), and C. Dungan (MD DNR)

2005 Funding:	UMCES	VIMS	SI	DNR
Federal:	\$95,862	\$29,952	\$27,387	\$21,728
Non-Federal:	\$43,207	\$4,020	\$0	\$10,101

Project Description: *Crassostrea ariakensis*-pathogenic *Bonamia* species: determination of salinity and size-susceptibility thresholds and field evaluation of parasite sources in Bogue Sound

Award Number: NA04NMF4570422

Purpose: The overall objective of this project is to provide finer focus to the threat *Bonamia* spp. hold over *C. ariakensis*—*where* in terms of estuarine salinity profiles, *when* in terms of oyster size/age, and *from what source* in the local environment. We will address this through pursuit of five sub-objectives:

- 1) To determine the threshold salinity below which *Bonamia* sp. pathogenicity in *C. ariakensis* declines.
- 2) To determine the threshold size or age above which *C. ariakensis* resists acute bonamiasis.
- 3) To identify potential non-oyster sources of *Bonamia* sp. in Bogue Sound.
- 4) To determine if *B. ostreae* can be transmitted to *C. ariakensis* by cohabitation with infected *O. edulis*.
- 5) To determine if *C. ariakensis* can become infected by *B. ostreae* through injection, and if it can persist at salinities typical of the Chesapeake Bay.

Awardee: Virginia Institute of Marine Science

Program Officer: Jamie King

Principal Investigators: R. Carnegie, E. Burreson, and C. Audemard (VIMS), C. Peterson, and M. Bishop (UNC-IMS)

2005 Funding:

Federal: \$175,000

Non-Federal: \$22,149

Project Description: Genetic and Ecological Structures of Oyster Estuaries in China and Factors Affecting Success of *Crassostrea ariakensis*: Clues from a Reclassification

Award Number: NA04NMF4570424

Purpose: The overall objective of this project is to redefine *C. ariakensis* populations in China in light of a recent taxonomic correction, and to understand factors that affect the distribution and relative abundance of *C. ariakensis* under species competition in its native habitat.

Specifically, we propose to:

- 1) Develop a set of diagnostic markers for identification of common oysters from China;
- 2) Reclassify oyster populations along China's coast using molecular markers;
- 3) Study recruitment and competition between *C. ariakensis* and its competitor species; and
- 4) Collect and correlate ecological data with relative abundance at each site.

Awardee: Rutgers, The State University of New Jersey

Program Officer: Jamie King

Principal Investigators: X. Guo and H. Wang (Rutgers), A. Wang (Hainan University), and G. Zhang (Institute of Oceanology Chinese Academy of Sciences)

2005 Funding:

Federal: \$165,680

Non-Federal: \$27,310

Project Description: A histological investigation of oyster parasites and pathology in three Chinese estuaries containing mixtures of coexisting oyster species, including *Crassostrea ariakensis*

Award Number: NA04NMF4570427

Purpose: Project objectives: This is a continuation of NOAA award NA04NMF4570427 of the same title and a companion project to NOAA award NA04NMF4570424: Genetic and Ecological Structures of Oyster Estuaries in China and Factors Affecting Success of *Crassostrea ariakensis*: Clues from a Reclassification. Year 2 of this proposal continues to document parasites in three species of oysters along the coast of China via standard histology. Molecular genetic and immunological assays are added as recommended by reviews from year one. During year two we will (a) survey a growing cohort of *C. ariakensis*, *C. gigas*, and *C. hongkongensis* during spring and fall 2006 from three estuaries for parasites and pathologies using histological, molecular genetic and immunological methods, and (b) disseminate results for the development of the EIS.

Awardee: Rutgers, The State University of New Jersey

Program Officer: Jamie King

Principal Investigators: D. Bushek, S. Ford and X. Guo

2005 Funding:

Federal: \$84,705

Non-Federal: \$13,962

Project Description: Fertilization interference between *Crassostrea ariakensis* and *Crassostrea virginica*: Supplement for distance experiments

Award Number: NA04NMF4570428

Purpose: This project expands previously funded work on fertilization in *Crassostrea ariakensis* and *C. virginica* by using annular flume experiments to determine the effective fertilization distance for inter- and intraspecific fertilization of these two oyster species.

Awardee: Rutgers, The State University of New Jersey

Program Officer: Jamie King

Principal Investigators: D. Bushek, X. Guo, G. DeBrosse, and J. Quinlan

2005 Funding:

Federal: \$11,087

Non-Federal: \$0

Project Description: Assessing levels of genetic variation within and among native populations and hatchery stocks of the *Suminoe* oyster *Crassostrea ariakensis* using a suite of molecular markers.

Award Number: NA04NMF4570432

Purpose: Objectives outlined in our original proposal included using nuclear, mitochondrial, and microsatellite markers to: 1) assess the amount of intraspecific genetic variation within and among existing native populations of *C. ariakensis*; 2) determine the genetic relationship of current U.S. hatchery stocks of *C. ariakensis* to native populations to aid in determining the strain of *C. ariakensis* best suited for any introductions that may become approved; and 3) provide molecular tools that can be used to identify the source population(s) of any unapproved *C. ariakensis* introductions into Chesapeake Bay. In the second phase of the project we will focus on objectives 2 and 3, the completion of the project as a whole, and the compilation and dissemination of the results.

Awardee: Virginia Institute of Marine Science

Program Officer: Jamie King

Principal Investigators: J. F. Cordes and K. S. Reece

2005 Funding:

Federal: \$115,653

Non-Federal: \$17,856

Project Description: Biological material support for studies on *Crassostrea ariakensis*

Award Number: NA04NMF4570433

Purpose: Project goal: Provide biological materials for studies on *C. ariakensis* in association with funded projects from NCBO non-native oyster research program. Project objectives: 1) Maintain brood stock of *C. ariakensis* and *C. virginica* of sufficient diversity to produce a variety of test material for lab and field studies; 2) maintain overlapping year classes of diploid and triploid *C. ariakensis* and *C. virginica* adults for distribution as needed to projects in 2004, 2005, and 2006; and 3) produce new year-classes of diploid and triploid *C. ariakensis* and *C. virginica* larvae, seed and juveniles for distribution as needed to projects in 2004, 2005, and 2006.

Awardee: Virginia Institute of Marine Science

Program Officer: Jamie King

Principal Investigator: S. K. Allen, Jr.

2005 Funding:

Federal: \$74,606

Non-Federal: \$10,014

Project Description: Does *Crassostrea ariakensis* accumulate more microbial pathogens from *Crassostrea virginica*, increasing the pathogenic risk for human consumption?

Award Number: NA05NMF4571230

Purpose: This study will determine if *C. ariakensis* accumulates human pathogens to a greater or lesser degree than *C. virginica* and whether this may be complicated by ploidy status. It is known that *C. virginica* serves as a reservoir and vector of bacterial pathogens; the extent to which *C. ariakensis* plays a similar role is unknown. This is a situation that might affect the economic viability of the fishery and have implications as to the suitability of applying safe-fishing zones as an umbrella for all oyster species.

Awardee: University of Maryland, Center for Environmental Science

Program Officer: Jamie King

Principal Investigator: C. L. Mitchelmore

2005 Funding:

Federal: \$89,350

Non-Federal: \$10,653

Project Description: Supply and Management of Oyster Harvests in the Chesapeake Bay: An examination of historical factors and their implications for introduction of non-native oysters and targeted alternatives.

Award Number: NA05NMF4571231

Purpose: Objectives: Determine harvest and production costs in the oyster fishery and analyze net returns in the industry over the recent past to inform prospects for a public *C. ariakensis* fishery and alternatives. Examine publicly funded oyster restoration and management efforts and specific management initiatives and analyze these for comparisons of net benefits to the introduction and its alternatives.

Awardee: Main Street Economics

Program Officer: Jamie King

Principal Investigator: R. Wieland

2005 Funding:

Federal: \$80,860

Non-Federal: \$0

Project Description: Will predation mortality differ for larvae of native and non-native oysters?

Award Number: NA05NMF4571232

Purpose: Demographic models and other means of predicting the potential for population increase of native *Crassostrea virginica* vs. non-native *C. ariakensis* require information on relative mortality rates of the two species. Predation mortality is likely the major source of mortality during the larval stage. There are large and potentially important differences in coloration, size, and swimming behavior between *C. ariakensis* and *C. virginica* veligers, and among *C. ariakensis* veligers from different source populations, that are likely to result in differences in their encounter rates with predators and capture rates, and hence their mortality rates. The ability to predict differences in survival through the larval stage is critical to any attempt to model larval dispersal, model the potential for population growth, predict which strain is suitable for introduction, or predict differential settlement of native and non-native oyster species in Chesapeake Bay.

Awardee: Smithsonian Institution

Program Officer: Jamie King

Principal Investigators: D. Breitburg and R. Fulford (SI), M. Luckenbach (VIMS), and R. I. E. Newell (UMCES)

2005 Funding:

Federal: \$92,255

Non-Federal: \$13,563

Project Description: The use of non-native oysters in the restoration of Chesapeake Bay oyster populations and the potential threats posed by harmful algae

Award Number: NA05NMF4571234

Purpose: Evidence is mounting that harmful algae, particularly species common to the Chesapeake Bay, have detrimental effects on oysters. We thus aim to compare the impacts of two common harmful algal (HAB) species on *Crassostrea ariakensis* and *C. virginica* in terms of: 1) the impact of HABs on spawning success; 2) larval growth and survival when exposed to HABs; 3) larval settlement when exposed to HABs; and 4) the rate of spat growth. There is strong evidence to date that some HABs common in the Chesapeake Bay contribute to shellfish toxicity and/or mortality, induce physiological stress, inhibit oyster spawning, and reduce larval survival and settlement. Experiments will be undertaken in the quarantine laboratory of the Horn Point Laboratory. Experiments will be conducted at different life stages of both oyster species under controlled, 'standard' algal diet, and with a diet of, or exposure to, one of the harmful algal species of interest. Spawning success, fecundity, larval growth and survival, settlement success, and shell growth will be measured and compared for the standard diet controls and the harmful algae-exposed treatments.

Awardee: University of Maryland, Center for Environmental Science

Program Officer: Jamie King

Principal Investigators: P. M. Glibert, D. Meritt, and D. K. Stoecker

2005 Funding:

Federal: \$88,751

Non-Federal: \$42,019

Project Description: The Potential for Using Triploid *Crassostrea virginica* for bottom culture in the Chesapeake Bay

Award Number: NA05NMF4571235

Purpose: The overall objective of the project is to test the feasibility of using triploid *Crassostrea virginica* spat on shell in the same manner as oyster planters have used wild oyster seed from seed rivers, grown out to market size. The specific objectives are: 1) to measure growth, mortality, and disease prevalence in a selected strain of triploid *Crassostrea virginica* spat on shell grown on the bottom in the same manner as oyster planters have employed for wild oyster seed from natural settlement; and 2) compare the costs versus yields of growing that triploid strain with diploid wild *C. virginica* spat on shell (seed oysters) grown in the above manner.

Awardee: Virginia Institute of Marine Science
Program Officer: Jamie King
Principal Investigators: M. Southworth and R. Mann (VIMS), A. T. Leggett Jr. (CBF) and A. J. Erskine (Bevans Oyster Company & Cowart Seafood Corporation)

2005 Funding:
Federal: \$28,187
Non-Federal: \$14,685

Project Description: Metabolic differences between *Crassostrea ariakensis* and *Crassostrea virginica* at varying temperature and salinity – is *C. ariakensis* sensitive to low oxygen?

Award Number: NA05NMF4571237

Purpose: 1) to characterize the metabolic rate of native and non-native oysters; 2) to determine the ability of *C. ariakensis* to tolerate periods of anoxia or hypoxia; and 3) to determine the release of metabolic byproducts during hypoxic or anoxic exposure.

Awardee: University of Maryland, College Park
Program Officer: Jamie King
Principal Investigator: K. Paynter

2005 Funding:
Federal: \$37,429
Non-Federal: \$5,326

Project Description: Caged *Crassostrea ariakensis* deployment in the Chesapeake Bay: Growth, disease, *Polydora* infestation, and mortality in three- and four-year-old non-native oysters

Award Number: NA05NMF4571239

Purpose: This project will measure the growth, disease acquisition and mortality of the non-native oyster *Crassostrea ariakensis* in the field. The project extends the experimental growout of native and non-native oysters at four sites in the Chesapeake Bay for two additional years.

Awardee: University of Maryland, College Park

Program Officer: Jamie King

Principal Investigator: K. Paynter

2005 Funding:

Federal: \$37,440

Non-Federal: \$5,180

Project Description: Comparative performance of triploid *Crassostrea ariakensis* and *C. virginica* in bottom habitats in Virginia and Maryland

Award Number: NA05NMF4571240

Purpose: Our overall objective is to provide a better understanding of how *C. ariakensis* will grow and survive in bottom environments. Specifically, our objectives are to:

1. Determine growth and survival rates of *C. ariakensis* in different bottom environments.
2. Compare the growth and survival of *C. ariakensis* and *C. virginica* within and across bottom environments.
3. Compare the growth and survival of each species under intra- and interspecific competition.
4. Characterize the growth forms of *C. ariakensis* and *C. virginica* grown in dense assemblages on the bottom and quantify the associated habitat complexity.
5. Investigate disease dynamics associated with cohabitation by *C. ariakensis* and *C. virginica* within experimental reefs.

Awardee: Virginia Institute of Marine Science

Program Officer: Jamie King

Principal Investigators: M. W. Luckenbach, S. K. Allen Jr., and P. Kingsley-Smith (VIMS), K. Paynter, and D. Meritt (UMCES)

2005 Funding:

Federal: \$121,894

Non-Federal: \$32,805

Project Description: Comparative economic evaluation of triploid *C. ariakensis* and triploid disease-resistant *C. virginica*: Companion trial to 2005 VSC deployment

Award Number: NA05NMF4571241

Purpose:

1. Compare relative commercial potential of triploid *C. ariakensis* with triploid *C. virginica* using commercial grow-out techniques from the 10 farms in the VSC trial, to include measurements of size, weight, and mortality.
2. Determine the extent to which triploids are responsible for disease resistance by comparing diploid and triploid *C. virginica* from same stocks at the 10 farms.
3. Provide a platform for continuation of ODRP study on shell disease and initiate new investigation to determine the effect of hardening on incidence of Polydora and shell stock shelf life.

Awardee: Virginia Institute of Marine Science

Program Officer: Jamie King

Principal Investigators: S. K. Allen Jr., K. Hudson, and B. Fisher

2005 Funding:

Federal: \$75,011

Non-Federal: \$28,554

Project Description: Susceptibility of *Crassostrea ariakensis* to *Bonamia* species: Potential for increased disease transmission between oyster species

Award Number: NA05NMF4571242

Purpose: In order to gain further insight into the risks of introducing exotic oyster species (*C. ariakensis*) into Chesapeake Bay, we propose to: 1) investigate in whole-animal studies the ability of *Bonamia* species to cause disease in *C. ariakensis* and *C. virginica*; 2) examine *in vitro* the possibility that even without developing disease, *C. ariakensis* and *C. virginica* may become reservoirs for *Bonamia* species; and 3) develop novel specific tools for parasite diagnosis and cell separation that will further contribute to advancement in this field.

Awardee: University of Maryland, Biotechnology Institute

Program Officer: Jamie King

Principal Investigators: G. Vasta and J. Robledo

2005 Funding:

Federal: \$120,614

Non-Federal: \$30,857

Project Description: Potential for *Crassostrea ariakensis* to harbor pathogens of humans and shellfish: Potential for increased disease transmission between oyster species

Award Number: NA05NMF4571243

Purpose: It remains unknown if *Crassostrea ariakensis* may harbor, transmit, or alternatively kill, pathogens of humans, or pathogens of fish and shellfish to a different degree than native oysters. The proposed study will 1) survey the presence of a series of human and shellfish pathogens (bacterial, viral, protozoal) in *C. ariakensis* and *C. virginica* deployed in Chesapeake Bay waters 2) study the ability *in vitro* of hemocytes of both *C. ariakensis* and *C. virginica* to either kill or harbor the pathogens under study, and 3) investigate the ability of experimentally-infected oysters to transmit pathogens to conspecifics and heterospecific oysters co-cultured in aquaculture or in a field setting.

Awardee: University of Maryland, Biotechnology Institute

Program Officer: Jamie King

Principal Investigators: G. Vasta and E. Schott (COMB), D. Breitbart, and A. Hines (SERC)

2005 Funding:

Federal: \$137,299

Non-Federal: \$33,908

Habitat Program

Submerged Aquatic Vegetation Restoration

The Submerged Aquatic Vegetation (SAV) Culture and Restoration Program is designed to enhance and increase this important fisheries habitat in the Chesapeake Bay and its tidal tributaries. This program focuses on large-scale SAV planting, site assessments for future SAV planting, applied research on SAV seed ecology, enhanced capacity for SAV propagation, and integrated restoration (e.g., with oysters).

In fiscal year 2005, NCBO awarded \$677,733 in grants to support research and restoration of submerged aquatic vegetation.

Grant-Funded Projects

Project Description: Restoration of Submerged Aquatic Vegetation in the Piankatank River, Chesapeake Bay (year 3)

Award Number: NA03NMF4570462

Purpose: Objectives: 1) To provide sufficient eelgrass (*Zostera marina*) seed stock for large-scale reseeding projects; 2) to evaluate the effectiveness of large-scale eelgrass restoration using seeds; 3) to conduct experiments with both seeds and adult plants to determine factors influencing seed success; 4) to monitor success of test and established seagrass areas; 5) to monitor water quality in the Piankatank River using continuous monitors and DataFlow; and 6) to coordinate all aspects of this study with MD DNR scientists who are conducting similar projects in Maryland's Chesapeake Bay. Summary of work: Seeds will be harvested in the spring of 2005 and broadcast into large (0.5 to 2 acre) plots in the Piankatank River in the fall of 2005. Water quality will be closely monitored in the shoal areas where eelgrass is currently surviving and in all restoration sites. Experiments will be established to better understand processes leading to success or failure of transplants. Close collaboration with Maryland scientists will be a priority as they continue large-scale SAV restoration efforts in the Potomac and Patuxent Rivers. This project will be linked to proposed projects now being reviewed for additional seed work in the Piankatank as well as those proposed by MD DNR scientists.

Awardee: Virginia Institute of Marine Science

Program Officer: Peter W. Bergstrom

Principal Investigator: R. J. Orth

2005 Funding:

Federal: \$94,323

Non-Federal: \$11,380

Project Description: Restoration of Eelgrass Communities in the Chesapeake Bay with Seeds: The Emerging Issues (Year 3)

Award Number: NA03NMF4570463

Purpose: Goal: To understand basic ecological principles governing successful establishment of eelgrass seedlings that have direct application to eelgrass restoration efforts.

Objectives:

1. Determine the relative importance of seed burial for spring and fall distribution of eelgrass seeds.
2. Identify the mechanisms enhancing eelgrass seed germination in protected containers.
3. Determine whether high initial eelgrass seedling densities limit plant survival.

Eelgrass seeds are the dominant mode of dispersal and establishment of new beds. However, using seeds in a restoration program must require a basic understanding of seed ecology, especially those mechanisms that determine the fate of a seed once it arrives at a suitable microsite (Harper, 1977). The goal of this proposal is to understand basic ecological principles governing successful establishment of eelgrass seeds and seedlings and apply this knowledge to large-scale eelgrass restoration programs. Each objective will be approached with a series of manipulative experiments that builds upon data from experiments conducted in previous years. Knowledge from these experiments will have direct application to planned, large-scale restoration of eelgrass communities using seed as it will allow optimal allocation of seeds to appropriate areas at the right time.

Awardee: Virginia Institute of Marine Science

Program Officer: Peter W. Bergstrom

Principal Investigator: R. J. Orth

2005 Funding:

Federal: \$59,685

Non-Federal: \$7,286

Project Description: Large Scale Restoration of Eelgrass (*Zostera marina*) in the Patuxent River, Maryland

Award Number: NA03NMF4570470

Purpose: Project Objectives:

1. To carry out large-scale restoration of eelgrass at sites previously identified as promising for eelgrass restoration on the Patuxent River.
2. To determine the relative effects of seeding density, predation, water quality, and epiphytic growth on the success of large-scale seeding of eelgrass beds in the Patuxent River, Maryland.

Summary of Work to be Performed: The recently adopted “Strategy to accelerate the protection and restoration of submerged aquatic vegetation in the Chesapeake Bay” calls for the planting of 1,000 acres of SAV baywide by 2008. To date, only a few sites in Maryland have undergone the site assessment process necessary before large-scale restoration may begin, of which the Patuxent is one. This project will continue ongoing work designed to conduct large-scale eelgrass seeding at two to three sites in the Patuxent River. Associated with the restoration sites will be spatially and temporally intensive habitat monitoring as called for in the Chesapeake Bay Program’s SAV Strategy. Finally, the project will be designed to test the effects of seeding density, habitat conditions, epiphytic growth, and predation on success or failure of the restored beds.

Awardee: Maryland Department of Natural Resources

Program Officer: Peter W. Bergstrom

Principal Investigators: T. Parham and M. Naylor

2005 Funding:

Federal: \$157,335

Non-Federal: \$15,734

Project Description: Site Assessments for Future, Large-Scale Submerged Aquatic Vegetation Restoration in Chesapeake Bay.

Award Number: NA03NMF4570471

Purpose: Project Objectives: The primary objective of the project is to continue assessing the suitability of several sites in both Maryland and Virginia portions of the Chesapeake Bay for large-scale restoration of SAV by conducting the necessary two years of intensive habitat assessments and test plantings as required by the Chesapeake Bay Program's SAV Strategy. This project is a continuation of work funded in CY'04 and '05.

Summary of Work to be Performed: The recently adopted "Strategy to accelerate the protection and restoration of submerged aquatic vegetation in the Chesapeake Bay" calls for a two-year site assessment to be conducted before initiating large-scale SAV restoration projects in the Chesapeake Bay. These assessments include both evaluation of habitat conditions and two-year survival of test plantings. This project will pre-screen potential sites using existing GIS based targeting tools, and then carry out the required two-year habitat evaluations and test plantings of both eelgrass and wild celery at several sites in Maryland and Virginia portions of the Chesapeake Bay in order to identify sites for large-scale restoration of these species.

Awardee: Maryland Department of Natural Resources
Program Officer: Peter W. Bergstrom
Principal Investigators: D.Goshorn (MD DNR) and R. J. Orth (VIMS)
2005 Funding:
Federal: \$220,429 (DNR: \$110,707; VIMS: \$109,722)
Non-Federal: \$30,182

Project Description: Wave exposure: an additional parameter for identification of suitable SAV restoration sites (year 2)

Award Number: NA04NMF4570416

Purpose: Project objectives: The main objective of this project is to test the wave-exposure component of the GIS model developed by MD DNR to assess the suitability of future large-scale SAV restoration sites. As part of the first phase of this project (year 1), we are in the process of adding a new layer (wave exposure) to the existing model, which was based mainly on light availability (bathymetry, water quality) and SAV distribution (present and historic). The objectives of the second phase of this project (year 2) are 1) to validate the wave-exposure component currently being added to the SAV site selection model, and 2) to understand the processes that limit SAV distribution in wave-exposed areas.

Summary of work to be performed: SAV is sometimes absent from areas with suitable water quality and transplant attempts in such areas have failed. As wave exposure has been suggested as the main parameter responsible for the SAV exclusion zones in the Chesapeake Bay, we hypothesize that wave exposure is limiting to SAV in some areas with suitable water quality. In the first phase of this project (currently underway), we are applying the Wave Exposure Model (WEMO) to the Chesapeake Bay and thereby developing a 7th GIS layer in the current DNR SAV site selection model. We are also relating WEMO outputs with the wave climate in situ via collection of wave data in SAV habitats throughout the Bay. This summer, these data will be used in a series of flume experiments in order to understand the processes that limit SAV in certain wave-exposed areas. For the second phase of this project (current proposal), we suggest to establish SAV test plots at select sites. These will be chosen along wave exposure gradients (where water quality has been met) according to the new MD DNR SAV site selection model. We will then plant or seed test plots with a SAV species suitable to that salinity zone and monitor their establishment and development as well as abiotic parameters (e.g., wave climate, sediment movement) in order to validate the model and to better understand the processes that limit the colonization of SAV in wave-exposed areas in situ. Fine tuning of the model and restoration recommendations will follow.

Awardee: University of Maryland, Center for Environmental Science

Program Officer: Peter W. Bergstrom

Principal Investigators: E. Koch (UMCES) and M. Fonseca (NOAA) (Note: All funds went to UMCES; none to NOAA.)

2005 Funding:

Federal: \$66,137

Non-Federal: \$21,097

Project Description: Coupling Oyster and SAV Restoration in South River, Maryland

Award Number: NA05NMF4571249

Purpose: Project Objectives: The primary objective of the project is to demonstrate the effectiveness of native oysters (*Crassostrea virginica*) in improving water quality specifically to support SAV restoration, growth, and survival. This addresses item 5 in the FFO. "Integrated SAV and native oyster restoration projects that include measures to abate tidal sediment from two sources: tidal shoreline erosion and nearshore sediment resuspension." Summary of Work to be Performed: In 2003, a small oyster reef (0.2 acres) was constructed across the mouth of a small cove (2.5 acres) in Harness Creek, South River, Maryland, and seeded with 200,000 native oysters. The proposed work would augment the existing oyster reef with additional spat to increase filtering capacity. After water quality improvements have been demonstrated by an intense monitoring program (combining continuous monitoring, water quality mapping and fixed station sampling), SAV will be planted inshore of the reef. This project will support two major goals of the Chesapeake 2000 Agreement, SAV and oyster restoration.

Awardee: Maryland Department of Natural Resources

Program Officer: Peter W. Bergstrom

Principal Investigator: L. Karrh

2005 Funding:

Federal: \$55,106

Non-Federal: \$13,777

Project Description: A Comparative Test of Mechanized and Manual Planting of Eelgrass Seeds

Award Number: NA05NMF4571250

Purpose: Objectives: (1) to evaluate the effectiveness of two existing mechanized seed planters, and (2) to compare the methodological efficiency of mechanized seed planting with that of standard seed broadcasts at sites in the Potomac, Piankatank and York Rivers.

Summary of work to be performed: We outline a project comparing seedling establishment using a mechanized seed-planter to seed distribution by broadcasting seeds from the surface, the traditional method we have used. The scale of eelgrass restoration using the seed broadcast method has been limited by the fact that only 1-5% of seeds broadcast in the fall develop into seedlings. In comparison, we have observed that seeds held in protected conditions can germinate at much higher rates, typically 60-70% (personal observation). Three methods of seed distribution and ultimately seedling survival will be tested in this study: 1) Seeds broadcast directly on the sediment surface similar to what we have done in all previous work; 2) seeds injected below the sediment surface with a planting machine constructed by the University of Rhode Island (Traber, et al., 2003); and 3) seeds injected below the sediment surface with a planting machine now under construction by the Maryland Department of Natural Resources. Seedlings in each of the treatment plots will be counted in April 2006. Seedling abundance data will be analyzed with the appropriate statistical tools and written for a formal publication for the journal *Restoration Ecology*.

Awardee: Virginia Institute of Marine Science

Program Officer: Peter W. Bergstrom

Principal Investigator: R. J. Orth

2005 Funding:

Federal: \$24,718

Non-Federal: \$3,318

Habitat Program

Native Oyster Restoration

NOAA is one of the primary federal agencies involved in oyster restoration in the Chesapeake Bay. As a participant in the Chesapeake 2000 (C2K) agreement, NOAA is committed to reaching the goal of a minimum of a ten-fold increase in the numbers of oysters in the Chesapeake Bay by 2010. The baseline for this increase was set from the low numbers recorded in 1994. To achieve this goal, the NOAA Chesapeake Bay Office (NCBO) is working with federal, state, and local partners in Maryland and Virginia to implement large-scale restoration and monitoring.

In fiscal year 2005, NCBO awarded \$3,966,131 in grants to support restoration of native oysters in the Chesapeake Bay.

Grant-Funded Projects

Project Description: Native Oyster Restoration in the Virginia Portion of the Chesapeake Bay: Continuation of Research Program

Award Number: NA04NMF4570386

Purpose: To affect a multifaceted collaborative effort focused on native oyster restoration, between the Virginia Institute of Marine Science (VIMS), the Virginia Marine Resources Commission (VMRC), U.S. Army Corps of Engineers, Chesapeake Bay Foundation, and NOAA. Major program areas include: a) Great Wicomico River implementation and monitoring; b) coordinated habitat restoration; c) brood stock development and disease challenge; d) molecular biology; e) population assessment in the Lynnhaven River; and f) remote setting on cultch for public-private oyster restoration.

Awardee:	Virginia Institute of Marine Science
Program Officer:	Richard L. Takacs
Principal Investigators:	R. Mann, S. Allen, M. Luckenbach, and K. Reece
2005 Funding:	
Federal:	\$1,900,000
Non-Federal:	\$0

**Project Description: Chesapeake Bay Oyster Restoration Activities
2005-2006**

Award Number: NA17FL2583

Purpose: This cooperative agreement represents a continuing partnership created to further the restoration of oyster stocks and the conservation of oyster reef habitat in Maryland's portion of Chesapeake Bay. The multiple restoration efforts proposed will significantly enhance the ongoing efforts by NOAA's Chesapeake Bay Office (NCBO) to fund, facilitate, and leverage outside funding for aquatic reef restoration and its associated activities.

Awardee: Chesapeake Appreciation Inc.,
dba Oyster Recovery Partnership

Program Officer: Richard L. Takacs

Principal Investigator: C. Frentz

2005 Funding:
Federal: \$2,066,131
Non-Federal: \$0

Habitat Program

Additional Habitat Program Projects

In fiscal year 2005, NCBO awarded \$114,966 in contracts to support other research on habitat-related topics.

Contract Projects

Project Description: Marine Debris Survey in Virginia

Purpose: This project is intended to demonstrate the feasibility of using side scan sonar surveys to locate abandoned or “ghost” fishing gear, particularly crab pots, in the Virginia tidal waters of the Chesapeake Bay; analyze existing records of ghost pots from the trawl survey program in Virginia; investigate the potential effect of ghost pots on fish communities in Virginia waters; and complete an initial survey of the lower York River for ghost fishing gear.

Awardee: Virginia Institute of Marine Science

NCBO Technical Representative: Paula Jasinski

Project Manager: Carl Hershner

2005 Funding: \$65,000

Project Description: Preliminary Economic Assessment of Chesapeake Bay Derelict Fishing Gear

Purpose: During commercial fishing efforts, gear such as nets, traps, and crab pots are lost when marker buoys are severed by passing vessels or as a result of trawl or seine warps breaking during fishing operations. Fishermen may also need to cut gear adrift in bad weather conditions for safety reasons. Derelict nets and traps left behind are often not retrieved due to their lack of markings and therefore have accumulated in water bodies where commercial fishing takes place. While lost fishing gear represents a financial loss to the operator, its larger affects are associated with their impacts on the surrounding estuarine environment. In the Chesapeake Bay, derelict gear can cause the degradation of marine ecosystems in addition to trapping, wounding, or killing fish, blue crabs, birds, reptiles, and marine mammals. Derelict gear can also be a hazard to the many types of vessels using the body of water where they are located.

In the past it been difficult to locate derelict gear, but the NOAA Chesapeake Bay Office is now using side scanning sonar to locate and map the locations of derelict gear. The apparent impact of derelict gear indicates that there would be significant benefits from removing derelict gear from the Chesapeake Bay. The purpose of the proposed study is to assess the cost effectiveness of various methods of removal and compare them with expected benefits.

This project will develop preliminary estimates of the cost of retrieving and disposing of ghost traps in the Chesapeake Bay and compare them with the expected benefits. Cost will depend strongly upon method, location, and nature of gear being removed. Benefits will be inferred from the estimated costs (foregone benefits) of leaving the gear in place, which will depend on such factors as the type and number of species impacted, the range of the impacts, effects on recruitment and growth in various fisheries, and so on. These factors ultimately will be translated into estimated economic losses in commercial and recreational fish catches and related economic impacts. Once costs and benefits are estimated a comparative analysis will be made to examine the cost effectiveness of various options. Additional economic analysis will be aimed at the alternative strategies that might be employed for removing ghost traps. Different strategies may include the following: engineering based, where the method of removal is specified by NOAA; performance based, market based, where the method of removal is determined by bidders; and performance based, where the method of removal is confined to technical boundaries.

Awardee: King and Associates, Inc.

NCBO Technical Representative: Steve Giordano

Project Manager: Dennis King

2005 Funding: \$49,966

Education Program

Bay Watershed Education and Training (B-WET)

The Chesapeake B-WET (Bay Watershed Education and Training) grant program is a competitive program that supports existing environmental education programs, fosters the growth of new programs, and encourages the development of partnerships among environmental education programs throughout the entire Chesapeake Bay watershed.

Projects support organizations that provide students with “meaningful” Chesapeake Bay or stream outdoor experiences and teachers with professional development opportunities in the area of environmental education throughout the Chesapeake Bay watershed. Typical grants range from \$10,000 to \$150,000 and are available to school systems, schools, teachers, nonprofit groups, and state and local governments.

In fiscal year 2005, NCBO awarded \$2,207,374 in grants and \$265,373 in contracts to support B-WET and other education projects.

Grant-Funded Projects

Project Description: From Chesterfield to the Chesapeake: Teaching the Watershed

Award Number: NA03NMF4570242

Purpose: Intensive and sustained staff development will be provided that combines a meaningful experience for Chesterfield County teachers involved as well as specific guidance in the integration of such outdoor learning experiences into the classroom curriculum.

Awardee: Chesterfield County Public Schools

Program Officer: Jill Bieri

Principal Investigator: K. Butta

2005 Funding:

Federal: \$33,417

Non-Federal: \$11,191

Project Description: Field Experiences in the Chesapeake Bay Watershed for Ninth-Grade Students in Keystone Central School District

Award Number: NA03NMF4570213

Purpose: 350 students in the Susquehanna watershed will conduct water quality testing, macroinvertebrate identification, tree and shrub identification, and wetland studies at the Keystone Central School District's Environmental Education Center on Big Fishing Creek.

Awardee: Keystone Central School District

Program Officer: Shannon Sprague

Principal Investigator: W. F. McCollough

2005 Funding:

Federal: \$13,879

Non-Federal: \$1,700

Project Description: Bay Grasses in Classes - using student-grown bay grasses for education, restoration, and a "meaningful" bay experience

Award Number: NA03NMF4570215

Purpose: Maryland Department of Natural Resources will raise bay grasses with 4,000 Maryland students in classrooms throughout Maryland. 150 Maryland students will be involved in planting these grasses in restoration sites in the Chesapeake Bay.

Awardee: Maryland Department of Natural Resources

Program Officer: Shannon Sprague

Principal Investigator: M. Naylor

2005 Funding:

Federal: \$88,544

Non-Federal: \$20,000

Project Description: Watershed: A Lifetime of Stewardship II

Award Number: NA03NMF4570217

Purpose: Using birdwatching and fishing as a context for environmental learning, the National Audubon Society reaches 48 high school and elementary school classrooms with meaningful field experiences. The student experiences are buoyed by professional development programming for their teachers.

Awardee: National Audubon Society
Program Officer: Shannon Sprague
Principal Investigator: A. Bourque, M Scallion, and E. B. James
2005 Funding:
Federal: \$68,941
Non-Federal: \$37,260

Project Description: Virginia Chesapeake Bay Watershed Academy

Award Number: NA03NMF4570220

Purpose: The Virginia Education Resource Use Council (VRUEC), in conjunction with the Virginia Department of Education, will develop and administer a comprehensive professional development program for Virginia, utilizing the particular expertise and resources of 32 member agencies and focusing on unique local and regional resources of the Chesapeake Bay, its tributaries, and headwaters. 250 teachers will be reached with this project.

Awardee: Virginia Resource Use Education Council
Program Officer: Jill Bieri
Principal Investigators: L. Guilliams and M. S. Gilley
2005 Funding:
Federal: \$70,000
Non-Federal: \$77,602

Project Description: Washington, DC, EnvironMentors Academic Preparation Program

Award Number: NA03NMF4570221

Purpose: The EnvironMentors program teams 75 D.C. high school students with mentors in the natural resources field to conduct research projects on environmental issues. The students present their fundings at a judged poster session. In addition, a subset of rising seniors are offered scholarships to the College Summit, and at least 10 seniors receive early career experiences in natural resources.

Awardee: National Environmental Education and Training Foundation

Program Officer: Shannon Sprague

Principal Investigator: S. Carlson

2005 Funding:

Federal: \$35,450

Non-Federal: \$143,290

Project Description: Chesapeake Research Fellowship Program

Award Number: NA03NMF4570228

Purpose: The objectives of the Chesapeake Research Fellowship (CRF) Program are to improve participants' science content knowledge, help teachers develop and implement lessons that build on Chesapeake research, and disseminate this information throughout the watershed.

Awardee: University of Maryland, Center for Environmental Science

Program Officer: Shannon Sprague

Principal Investigators: J. Kramer (MD Sea Grant), J. A. Frederick (COMB), L. Murray (HPL), C. D. Stylinski (AL), and J. Takacs (CBL)

2005 Funding:

Federal: \$85,950

Non-Federal: \$24,951

**Project Description: Virginia Sixth-Grade Science Standards Institute:
A Collaboration for Meaningful Watershed Education**

Award Number: NA03NMF4570237

Purpose: This project will provide training to teachers and volunteer instructors that meets both Virginia's new academic standards and goals of MWEEs. A series of multiday teacher institutes will provide sixth-grade teachers with resources and training to undertake MWEEs.

Awardee: Virginia Department of Environmental Quality

Program Officer: Jill Bieri

Principal Investigator: K. Jarvis

2005 Funding:
Federal: \$44,750
Non-Federal: \$4,600

Project Description: Headwaters of the James: A Source for Environment Based Learning

Award Number: NA03NMF4570239

Purpose: To continue the partnership between Mary Baldwin College, MeadWestvaco Corporation, Covington City Public Schools, and Alleghany County Public Schools, to sustain the professional development program provided for teachers in the first two years of the project, and to support teacher implementation of meaningful watershed experiences with students.

Awardee: Mary Baldwin College

Program Officer: Jill Bieri

Principal Investigator: T. L. Willis

2005 Funding:
Federal: \$20,539
Non-Federal: \$4,160

Project Description: Using GPS and GIS to Direct Watershed Education and Restoration Efforts in Coastal Virginia

Award Number: NA03NMF4570240

Purpose: This project will train 19 lead Earth science teachers and five resource agency persons who work in eight critical watersheds. Teachers will learn the connection between land use and water quality, how to do restoration activities, and how to plan MWEEs.

Awardee: Virginia Polytechnic Institute and State University

Program Officer: Jill Bieri

Principal Investigator: J. L. Kirwan

2005 Funding:
Federal: \$50,000
Non-Federal: \$0

Project Description: Meaningful Bay Experiences for Students in the District of Columbia

Award Number: NA03NMF4570243

Purpose: In cooperation with the DC Environmental Education Consortium, the DC Department of Health and its partners will reach approximately 1,000 DC students per year with meaningful watershed experiences. DC Department of Health will also increase the number of teachers participating in their network by 12 annually and increase outreach to administrators in DC government to raise awareness and appreciation of environmental education.

Awardee: DC Department of Health

Program Officer: Shannon Sprague

Principal Investigator: H. Karimi

2005 Funding:
Federal: \$114,000
Non-Federal: \$62,714

Project Description: Student Training in Aquatic Research (STAR)

Award Number: NA03NMF4570244

Purpose: The Smithsonian will continue the Student Training in Aquatic Resources (STAR) program. This program partners high school students with local researchers to complete in-depth research projects in the Chesapeake Bay and its tributaries. The results are presented at a symposium to natural resource managers, researchers, and other students.

Awardee: Smithsonian Institution

Program Officer: Shannon Sprague

Principal Investigator: A. M. Haddon

2005 Funding:
Federal: \$82,365
Non-Federal: \$7,977

Project Description: Chesapeake Classrooms Initiative

Award Number: NA03NMF4570246

Purpose: The Chesapeake Bay Foundation will continue its Chesapeake Classrooms Program by reaching 175 teachers and providing meaningful field experiences to approximately 3,675 students. New in 2005, CBF's Schoolyard Habitat Program will be incorporated into the Chesapeake Classroom's program, providing an opportunity for teachers to create habitat on their school grounds and engage countless additional students.

Awardee: Chesapeake Bay Foundation

Program Officer: Shannon Sprague

Principal Investigator: D. Baugh

2005 Funding:
Federal: \$200,000
Non-Federal: \$150,000

Project Description: Potomac Stream Samplers: Stewards of our Watershed from the Mountains to the Sea

Award Number: NA04NMF4570261

Purpose: The Mountain Institute will lead a three-day professional development opportunity for 10 teachers and will provide support for these teachers as they provide local watershed investigations for their approximately 300 students. All data will be available on a "stream status" map on the web.

Awardee: The Mountain Institute

Program Officer: Jill Bieri

Principal Investigator: B. Bailey

2005 Funding:

Federal: \$90,448

Non-Federal: \$9,060

Project Description: Mapping and Monitoring Maryland Streams

Award Number: NA04NMF4570262

Purpose: Objectives of the Chesapeake Research Fellowship (CRF) Program are to improve participants' scientific knowledge, help teachers develop and implement lessons and support MWEs, and disseminate these teacher developed lessons to educators throughout the watershed. Twelve teacher fellows will participate.

Awardee: University of Maryland, Center for Environmental Science

Program Officer: Shannon Sprague

Principal Investigators: C. D. Stylinski (AL) and E. Takaki (DNR)

2005 Funding:

Federal: \$81,203

Non-Federal: \$19,283

Project Description: Chesapeake Connections Program

Award Number: NA04NMF4570263

Purpose: Arlington Echo connects classroom learning to greenhouse experiences and ultimately to local restoration projects in Anne Arundel County. To accomplish this, Arlington Echo provides teacher training, classroom and field assistance leading to outdoor experiences for students, and summer programming for students.

Awardee: Arlington Echo Outdoor Education Center

Program Officer: Shannon Sprague

Principal Investigator: S. G. Barry

2005 Funding:

Federal: \$58,589

Non-Federal: \$293,336

Project Description: Watershed Course Development of Delaware Clusters

Award Number: NA04NMF4570268

Purpose: University of Delaware will develop K-6 and 7-12 content relevant standards-based watershed courses and have these courses approved as part of the state-wide environmental cluster. They will also assist educators by helping them implement environmental education in their curriculum.

Awardee: University of Delaware

Program Officer: Shannon Sprague

Principal Investigator: W. Hall

2005 Funding:

Federal: \$40,463

Non-Federal: \$8,907

Project Description: Schoolyard Habitat Program—Growing Success

Award Number: NA04NMF4570270

Purpose: The proposed project will provide meaningful Chesapeake Bay Watershed experiences by significantly increasing the number and quality of sustainable natural habitat projects completed by students on Maryland schoolyards.

Awardee: Maryland Association for Environmental and Outdoor Education

Program Officer: Shannon Sprague

Principal Investigators: C. Towle and K. Kelly

2005 Funding:
Federal: \$83,200
Non-Federal: \$17,500

Project Description: Potomac River and Chesapeake Bay Watershed Issue Investigations

Award Number: NA04NMF4570272

Purpose: Through field studies at Hard Bargain Farm, 1,000 fourth to seventh graders from Prince Georges and Charles County Public Schools will be reached with class prep, overnight field studies, and post-study reflection.

Awardee: Alice Ferguson Foundation, Inc.

Program Officer: Shannon Sprague

Principal Investigator: T. Bowen

2005 Funding:
Federal: \$63,750
Non-Federal: \$87,918

Project Description: Wetland Education Initiative

Award Number: NA04NMF4570273

Purpose: Utilizing a multipronged approach including training, curriculum integration tools, and the construction of schoolyard wetland habitats, the intent is to increase the level of wetland education in Chesapeake Bay watershed schools. Specifically, 12 workshops will reach 240 educators with six new habitats created.

Awardee: Environmental Concern, Inc

Program Officer: Shannon Sprague

Principal Investigator: B. Mitchell

2005 Funding:
Federal: \$19,523
Non-Federal: \$0

Project Description: From Our Creek to Our Bay: Watershed Wanderers

Award Number: NA04NMF4570274

Purpose: The Virginia Aquarium uses Owls Creek to model watershed dynamics. Activities focus on strategic teaching techniques to bring the Chesapeake Bay topics alive for students in the classroom. This program reaches approximately 1,000 students in the Virginia Beach area annually from mostly high-needs schools.

Awardee: Virginia Aquarium Foundation, Inc

Program Officer: Jill Bieri

Principal Investigators: C. Witherspoon and N. Walsh

2005 Funding:
Federal: \$80,016
Non-Federal: \$17,479

Project Description: The Rivanna River: A Heritage Resource for Student Learning

Award Number: NA04NMF4570275

Purpose: The Rivanna Conservation Society will facilitate the development of a new partnership among the public schools in the Rivanna watershed and the civic, historic, and natural resource agencies in the area. Specifically, this program will target 600 students and 25 teachers with the goal of increasing capacity for teachers to provide meaningful watershed experiences for their students.

Awardee: Rivanna Conservation Society

Program Officer: Jill Bieri

Principal Investigator: A. Regn

2005 Funding:

Federal: \$32,603

Non-Federal: \$17,501

Project Description: Rally for Restoration: Students Become Stewards of the Chesapeake Bay Watershed by Hands-on Habitat Restoration

Award Number: NA05NMF4571173

Purpose: Chesapeake Bay Environmental Center will provide hand-on watershed experiences to 4000 students and professional development for 30 teachers on the Eastern Shore of Maryland. The main focus will be the eradication of non-native species.

Awardee: Wildfowl Trust of North America

Program Officer: Shannon Sprague

Principal Investigators: J. Wink, P. Campbell, and B. Schmeckpeper

2005 Funding:

Federal: \$40,000

Non-Federal: \$38,990

Project Description: Chesapeake Bay AquaEcosystem Program

Award Number: NA05NMF4571174

Purpose: The National Aquarium will install three fish-plant recirculating aquaculture systems per year at high-needs schools in Maryland. The plants and fish grown at these sites will then be used in restoration projects in the Chesapeake Bay. This experience will be provided for four teachers and 140 students annually; however, the on-site ponds will be a valuable teaching tool for all of the teachers in a recipient school.

Awardee: National Aquarium In Baltimore

Program Officer: Shannon Sprague

Principal Investigator: A. Ashley

2005 Funding:
Federal: \$44,500
Non-Federal: \$27,135

Project Description: Comprehensive Watershed Investigative Project

Award Number: NA05NMF4571175

Purpose: Benton Area School District will use this funding to reach 80 elementary and 80 high school students with restoration and protection projects focused on the Susquehanna River. The funding will also be used for inter- and cross-disciplinary curriculum for the school district for incorporation into the classroom, which will reach an estimated 780 students. Finally, the school district will develop the first environmental education summer school program in the area.

Awardee: Benton Area School District

Program Officer: Shannon Sprague

Principal Investigator: A. Pollock

2005 Funding:
Federal: \$50,000
Non-Federal: \$0

Project Description: Creative Solutions to Stormwater Management: Creating an Outdoor Classroom and Community Commons through Rainscape Gardens and EcoArt

Award Number: NA05NMF4571176

Purpose: Northwoods High School, a new high school in Montgomery County, will construct two rainscape gardens, a greenroof, and a bog in their courtyard to reduce runoff and erosion. This will create an outdoor classroom where this previously unusable space will be used for ongoing learning and communication about the Bay through an EcoArt and theatre program.

Awardee: Montgomery County Public Schools-Northwood High School

Program Officer: Shannon Sprague

Principal Investigator: J. Coutts

2005 Funding:

Federal: \$9,345

Non-Federal: \$1,650

Project Description: Watershed Education and Participation Project

Award Number: NA05NMF4571178

Purpose: Boxerwood Gardens will provide 650 students from Lexington, Buena Vista, and Rockbridge Counties with multiple outdoor field experiences, including water quality testing, wildlife identification, and identification of water quality threats. A summer camp will be offered to 30 sixth and seventh grade students to further solidify the watershed concepts.

Awardee: Boxerwood Education Association

Program Officer: Jill Bieri

Principal Investigator: H. S. Mohring

2005 Funding:

Federal: \$34,125

Non-Federal: \$60,039

Project Description: Improving Student Achievement and C2K Meaningful Watershed Education Experience Implementation in Virginia

Award Number: NA05NMF4571179

Purpose: The Virginia Office of Environmental Education will work to better coordinate and implement meaningful watershed experiences for Virginia students. Specifically, they will identify target school districts, coordinate communication and delivery of resource materials, and evaluate existing programs.

Awardee: Virginia Department of Environmental Quality

Program Officer: Jill Bieri

Principal Investigators: A. Regn and E. Rhoades

2005 Funding:

Federal: \$98,000

Non-Federal: \$20,200

Project Description: Professional and curriculum development in the areas of watersheds, wetlands, ecosystems, and human impacts on the environment as it relates to the Chesapeake Bay MWEE

Award Number: NA05NMF4571233

Purpose: Pennsylvania's Department of Education will reach at least 1,000 teachers through professional development and in turn 20,000 students in the Susquehanna watershed.

Awardee: Pennsylvania Department of Education

Program Officer: Shannon Sprague

Principal Investigator: P. Vathis

2005 Funding:

Federal: \$125,000

Non-Federal: \$25,000

Project Description: Meaningful Bay Experience Training for the Teachers in the Anacostia Watershed

Award Number: NA05NMF4571236

Purpose: The Anacostia Watershed Society will provide comprehensive training to 40 teachers. Three teacher training sessions will be held and teachers will be given materials to conduct classroom demonstrations.

Awardee: Anacostia Watershed Society

Program Officer: Shannon Sprague

Principal Investigator: R. E. Boone

2005 Funding:
Federal: \$30,000
Non-Federal: \$26,034

Project Description: Virginia GREEN: A Professional Development Program

Award Number: NA05NMF4571238

Purpose: The goal of Virginia GREEN program is to provide the professional development necessary for 75 Northern Virginia educators to incorporate meaningful watershed experiences into the core curriculum, particularly in areas of grade six science instruction.

Awardee: Earth Force, Inc

Program Officer: Jill Bieri

Principal Investigator: S. Richardson

2005 Funding:
Federal: \$67,893
Non-Federal: \$36,606

Project Description: A Tale of Two Watersheds for Educators

Award Number: NA05NMF4571244

Purpose: Teachers from three jurisdictions will have the opportunity to master new science content, enhance pedagogy skills, refresh research skills and practice hands-on science activities. Thorpe's experiential educators will model dynamic interactive classroom presentations and facilitated hands-on experiences while providing services to more than 400 students each year.

Awardee: Thorpe Foundation

Program Officer: Shannon Sprague

Principal Investigator: A. Morehouse

2005 Funding:

Federal:	\$49,983
Non-Federal:	\$29,865

Project Description: Probing and Protecting the Chesapeake Watershed

Award Number: NA05NMF4571245

Purpose: Fairfax County Public Schools will train 150 middle school life science teachers in the parameters used to evaluate water quality and watershed health and to use specific computer-based probeware to gather data with students.

Awardee: Fairfax County Public Schools

Program Officer: Jill Bieri

Principal Investigator: L. Chin

2005 Funding:

Federal:	\$36,094
Non-Federal:	\$0

Project Description: School Leadership in Urban Runoff Reduction Program

Award Number: NA05NMF4571265

Purpose: Living Classrooms will continue the School Leadership in Urban Runoff Reduction program, which teaches students in Baltimore City about stormwater management. The program takes students on a boat trip to have them experience the Chesapeake Bay firsthand and then has them create stormwater management control measures, such as rain barrels, and outreach materials on the subject.

Awardee: Living Classrooms Foundation

Program Officer: Shannon Sprague

Principal Investigators: S. Raymond and C. Truett

2005 Funding:

Federal: \$164,804

Non-Federal: \$111,148

Education Program

Additional Habitat Program Projects

Contract Projects

Project Description: Pennsylvania Mini-Grants

Purpose: To provide grants of up to \$5,000 to classroom teachers to conduct meaningful watershed educational experiences with their students. The B-WET mini-grant funds will be administered through an existing Pennsylvania Conservation District Association (PACD) program—the Pennsylvania Chesapeake Bay Educational Mini-Grant Program. Proposals will be submitted to the PACD according to established deadlines and prior to the activity date of the program or project to be funded. The PACD staff will review the proposals and make recommendations to the Final Review Panel for a grant decision. NOAA Chesapeake Bay Office staff will actively participate in the review process with PACD, including the review of selection criteria for grantees.

Awardee: Pennsylvania Conservation District Association

NCBO Technical Contact: Shannon Sprague

Project Manager: Kathleen Banski

2005 Funding: \$38,000

Project Description: Maryland and District of Columbia Mini-Grants

Purpose: To provide grants of up to \$5,000 to classroom teachers to conduct meaningful watershed educational experiences with their students. The B-WET mini-grant funds will be administered through two existing Chesapeake Bay Trust grant programs. Proposals will be submitted to the Trust prior to the activity date of the program or project to be funded. The Trust staff will review the proposals and make recommendations to the Executive Director and/or the Board of Trustees for a grant decision.

Awardee: Chesapeake Bay Trust

NCBO Technical Contact: Shannon Sprague

Project Manager: Kerri Bentkowski

2005 Funding: \$50,000

Project Description: Virginia Mini-Grants

Purpose: To provide grants of up to \$5,000 to classroom teachers to conduct meaningful watershed educational experiences with their students. The B-WET mini-grant funds will be administered through an existing VA-DEQ grant program. Proposals will be submitted to VA-DEQ prior to the activity date of the program or project to be funded. VA-DEQ and Virginia Resource-Use Education Council will review the proposals and make recommendations for a grant decision.

Awardee: Virginia Naturally

NCBO Technical Contact: Jill Bieri

Project Manager: Suzie Gilley

2005 Funding: \$38,000

Project Description: Maryland Watermen in the Classroom Program

Purpose: To provide watermen that work on the Chesapeake Bay or its tributaries to participate in classroom sessions to discuss their daily lives, talk about the animals that they work with, and the economics and social sciences involved. The purpose of the project is to expose students who are not in close proximity to the Bay to the daily lives and past activities of watermen on the Chesapeake Bay. Watermen will impart valuable information about life on the Chesapeake Bay and provide an oral history of the activities and changes that have occurred on the water. These presentations will aid in furthering the B-WET Program’s goals and missions—to educate students about the Chesapeake Bay watershed and their greater environment.

Awardee: Maryland Watermen’s Association

NCBO Technical Contact: Shannon Sprague

Project Manager: Betty Duty

2005 Funding: \$15,000

Project Description: B-WET Evaluation

Purpose: To evaluate the success of the meaningful watershed educational experience at improving the stewardship ethic and academic achievement of K-12 students. To evaluate this, a comprehensive B-WET evaluation was developed in 2004. The goal of the 2005 program is to administer the questionnaires and compile the data into a comprehensive report on the effectiveness of the program.

Awardee: eeEvaluations

NCBO Technical Contact: Shannon Sprague

Project Manager: Anita Kraemer

2005 Funding: \$24,873

Project Description: Chesapeake Bay Network for Education of Municipal Officials (Chesapeake Bay NEMO)

Purpose: The network will be a collaborative partnership with existing nongovernmental, federal, and state agencies providing education and support services to elected officials and key local stakeholders to enhance their effectiveness in local land planning and resource protection efforts. The Center's roles are to work with partners to establish the network, coordinate meetings and act as the secretariat on the behalf of the network members, and serve as the initial point of contact with elected officials in the interested regions. The Center will match network partners and service providers with interested local governments, with the specific arrangements for service provision to be mutually negotiated between the individual partner and local governments.

Awardee: Center for Watershed Protection

NCBO Technical Representative: Peyton Robertson

Project Manager: Pam Rowe

2005 Funding: \$99,500

Coastal Observations Program

Intregrated Coastal Observations

NOAA's Chesapeake Bay Office (NCBO) monitors conditions around the Bay and uses this information to produce forecasts about weather, tides, and more.

In fiscal year 2005, NCBO awarded \$275,615 in contracts to support the continued development of an integrated coastal observation system.

Contract Projects

Project Description: Integrating Chesapeake Bay Observations and Models: Data Aggregation and Visualization Software

Purpose: The NOAA Chesapeake Bay Office is implementing ecosystem-based resource management activities in the Chesapeake Bay through habitat restoration, assessment, and monitoring. New environmental monitoring and observation techniques are being developed through NCBO as contributions to the U.S. Integrated Ocean and Coastal Observation System (IOOS). These data, observations, and forecast models, along with other NOAA and IOOS products, are provided to regional users through the NCBO Coastal Prediction Center. NCBO will implement the Applied Science Associates COASTMAP software on the Coastal Prediction Center website to provide GIS-based access to observations and forecasts.

Awardee: Applied Science Associates, Narragansett, Rhode Island

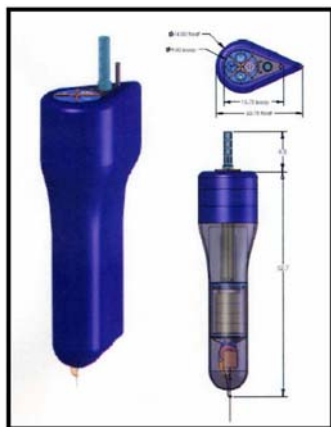
NCBO Technical Representative: Doug Wilson

Project Manager: Eoin Howlett

2005 Funding: \$23,000

Project Description: Innovative Water Quality Observations: A Tethered Moored Water Quality Profiler

Purpose: In support of ecosystem-based resource management activities and the implementation of the Chesapeake Bay Observing System (a component of the U.S. Integrated Ocean Observing System), the NOAA Chesapeake Bay Office (NCBO) is supporting the development of new environmental monitoring and observation techniques. To understand the forecast changes in water quality and how those changes affect Chesapeake Bay ecosystems, there is a demonstrable need for information on the vertical and temporal variability of water quality at important locations around the bay. WetLabs, an Oregon-based underwater sensor and instrument company, is currently developing a compact, low power autonomous bottom-up profiling system called the Mini AMP (Miniaturized Autonomous Moored Profiler) to provide a cost-effective solution for monitoring key water quality parameters in estuarine and nearshore environments. The Mini AMP is a modular, self-contained, winch-driven



profiling platform with an integrated control system, a power system, and a telemetry unit (figure). The profiler is designed to carry a number of physical, optical, and biological sensors—initially including temperature, salinity, dissolved oxygen, chlorophyll, and turbidity. Profiles will be transmitted to NCBO in real time for immediate display on the web. The entire Mini AMP system, including the anchor, can be deployed and recovered from a small boat by two people. The self-contained design of the Mini AMP also means that no permanent surface or subsurface floatation and mooring cable are required. Instrument testing in Chesapeake Bay will begin in spring 2006, with operational deployment in summer of 2006.

Awardee: WetLabs, Philomath, Oregon

NCBO Technical Representative: Doug Wilson

Project Manager: Andrew Barnard

2005 Funding: \$99,000

**Project Description: Support for the Chesapeake Bay Observing System:
Providing Real-time Wave and Current Observations at Thomas Point Light**

Purpose: The NOAA Chesapeake Bay Office, as part of its Integrated Coastal Observations Program and as a contribution to the Chesapeake Bay Observing System, is planning to install an instrument to measure waves and currents in the vicinity of the Thomas Point Light NOAA National Data Buoy Center Coastal-Marine Automated Network (CMAN) station in the Chesapeake Bay. Directional surface wave information and full-depth current velocity profiles are desired, with real-time output available to be integrated into the NDBC data stream. NORTEK USA will provide an AWAC bottom-mounted current profiler/wave field measurement instrument to be placed near the Thomas Point Light, communicating to the CMAN station via acoustic modem. Real-time currents and waves will be available through the NOAA National Data Buoy Center and the Chesapeake Bay Observing System.



Awardee: NORTEK USA, Annapolis, Maryland

NCBO Technical Representative: Doug Wilson

Project Manager: Eric Siegel

2005 Funding: \$24,999

Project Description: Innovative Water Quality Observations: Support of Computation and Validation of Modeled Particle Trajectories in the Chesapeake Bay

Purpose: In support of ecosystem-based resource management activities and the implementation of the Chesapeake Bay Observing System (a component of the U.S. Integrated Ocean Observing System), the NOAA Chesapeake Bay Office (NCBO) is supporting the development of new environmental monitoring and observation techniques. NCBO is presently involved in the development of the Chesapeake Bay Oyster Larval Tracking Tool (CBOLT), a web-based particle trajectory model for forecasting three-dimensional motion in the Chesapeake Bay, with a particular application toward supporting a management study of the advisability of introducing non-native oysters into the Chesapeake Bay. CBOLT has been developed as an NOS partnership program with the NOS Coastal Services Center, Coast Survey Development Lab, as well as NCBO and NCBO-supported research at the Chesapeake Community Modeling Program at the Chesapeake Research Consortium. Following a successful development phase, the model will be operational at NCBO soon and will require validation. The Research group at the U.S. Naval Academy has been working with the Chesapeake Community Modeling Program and has developed the capability in house to run and analyze the QUODDY numerical model for the Chesapeake Bay used by the CBOLT trajectory modeling program. They are extremely experienced in developing advanced particle trajectory models for the U.S. Navy. In addition, the faculty members within the Naval Academy Department of Naval Architecture and Ocean Engineering are planning a program for Chesapeake Bay research that will include observations of currents useful to validate the modeled trajectories. This agreement will support the analysis of those results and application of the analyses to model improvements.

Awardee: U.S. Naval Academy, Annapolis, MD

NCBO Technical Representative: Doug Wilson

Project Manager: Dr. Reza Malek-Madani

2005 Funding: \$40,000

Project Description: Innovative Water Quality Observations: An Autonomous Water Quality Profiler

Purpose: In support of ecosystem-based resource management activities and the implementation of the Chesapeake Bay Observing System (a component of the U.S. Integrated Ocean Observing System), the NOAA Chesapeake Bay Office (NCBO) is supporting the development of new environmental monitoring and observation techniques. To understand the forecast changes in water quality and how those changes affect Chesapeake Bay ecosystems, there is a demonstrable need for information on the vertical and temporal variability of water quality at important locations around the bay. In 2006, NCBO will acquire a Bottom Stationed Ocean Profiler (BSOP, figure) from the University of South Florida Center for Ocean Technology. The BSOP project goal is to provide relatively inexpensive, near real-time vertical profiles, sampling, and recording information about the environment. From the sea floor, the unit will adjust its buoyancy and rise to the surface collecting information along the way. At the surface, bidirectional satellite telemetry sends the data back to the users. After sending its information back and waiting for any instructions sent to it to change its mission, the profiler reduces its buoyancy and sinks to the bottom, again collecting data along the way. Profiling is repeated at timed intervals for periods of up to several months. The profiler is designed to carry a number of physical, optical, and biological sensors—initially including temperature, salinity, dissolved oxygen, chlorophyll, and turbidity. Profiles will be transmitted to NCBO in real time for immediate display on the web. The BSOP will also be used to validate the Chesapeake Bay Oyster Larval Tracking model, CBOLT, which forecasts trajectories of floating particles. Instrument testing in the Chesapeake Bay will begin in spring 2006, with operational deployment in summer of 2006.



Awardee: University of South Florida Center for Ocean Technology, St. Petersburg, Florida

NCBO Technical Representative: Doug Wilson

Project Manager: Chad Lembke

2005 Funding: \$86,616

Mission Support

Science, Technical, and Administrative Services

In fiscal year 2005, NCBO awarded \$465,000 in contracts to support the office with science, technical, and administrative services.

Contract Projects

Project Description: Science, Technical, and Administrative Services, Chesapeake Bay Office/Cooperative Oxford Laboratory, National Marine Fisheries Service

Purpose: Originally enacted in 1992 as part of the NOAA Authorization Act and then again in the NOAA Re-Authorization Act of 2002 [HR 4883], Congress mandated the establishment of a NOAA Chesapeake Bay Office. Its mission is to understand, predict, and explain changes in the Chesapeake Bay's environment, and conserve and manage coastal resources to meet the region's economic, social, educational, and environmental needs. NOAA has mandates from Congress for additional activities in the Chesapeake Bay region, including the Coastal Zone Management Act and the Atlantic Coast Fishery Conservation and Management Act.

In order to fulfill these mandates, the Chesapeake Bay Office (NCBO) has a requirement for science, technical and administrative services. This involves fishery and aquatic habitats survey design and implementation, geographic information systems (GIS) support, and fisheries ecosystem and environmental modeling support for the purpose of developing integrated ecosystem-based fisheries assessments of subwatersheds in the Chesapeake Bay, and also developing products providing access to the resultant information to managers, stakeholders, and education programs. NCBO operates from four locations, headquartered in Annapolis, Maryland, with field stations in Oxford, Maryland; Norfolk, Virginia; and Gloucester Point, Virginia. Services are to be performed at the NCBO/Cooperative Oxford Laboratory, which is located in Oxford, Maryland.

Support services to be provided include: fishery assessment (single and multiple species), aquatic habitat assessment, geographic information systems, analysis, education and outreach, ecosystem modeling and statistics, fisheries/habitat economical analysis, computer visualization/ image analysis, and internet web site development.

Awardee: Versar, Inc.

NCBO Technical Representative: Peyton Robertson

Project Manager: William A. Richkus

2005 Funding: \$380,000

Project Description: Chesapeake Bay Ecosystem Mapping and Analysis Support

Purpose: The NOAA Chesapeake Bay Office intends to develop a series of products that will further understanding of Chesapeake Bay ecological processes, particularly fisheries science and watershed assessments. Several habitat mapping, monitoring, and fisheries-independent and fisheries dependent databases will be analyzed to examine community interactions, restoration progress, species distributional trends, juvenile indices, commercial landings, interactions with water quality influences, and more. These data and tools will be used to inform state and federal resource managers, legislators, educators, and the public. They will also be used in combination with other ongoing projects, such as identifying ecological hotspots within the region, predicting effects from global climate change and sea level rise to Chesapeake Bay resources, multispecies fisheries model development, the development of education and outreach materials, etc. Product development requires the overlap of expertise in both fisheries science and GIS.

Awardee: Virginia Institute of Marine Science

NCBO Technical Representative: Paula Jasinski

Project Manager: Marcia Berman

2005 Funding: \$85,000

Appendix A

Review and Selection Process for Competitive Awards

NOAA Chesapeake Bay Office (NCBO) competitive grants are awarded on the basis of a rigorous review and selection process.

Proposals are solicited via Federal Register Notices (“Notices”) and Announcements of Federal Funding Opportunities (“Announcements” or “FFOs”). The NOAA Omnibus is published in the Federal Register every year in June and December and is accessed through the NCBO web site (<http://noaa.chesapeakebay.net>) and www.grants.gov. The Announcement is a typical request for proposals and provides the details on a specific program’s requirements (program priorities, format, match requirements, etc.), whereas the Omnibus Notice is a synopsis of multiple NOAA programs. All Federal Register Notices and Announcements of Federal Funding Opportunity are available via links from the NCBO web site.

Eligible applicants may include institutions of higher education, independent school divisions, nonprofit organizations, commercial organizations, international organizations, and state, local, and Indian tribal governments. All proposals are evaluated with the same procedures and criteria, regardless of the affiliation of the applicant. As stated in the Notices and Announcements, proposals received after the published deadline or proposals that deviate from the prescribed format are returned to the sender without further consideration.

Selection Criteria: Unless otherwise stated in the Notice or Announcement, the following criteria are used for evaluating proposals:

1. Importance and/or relevance and applicability of proposed project to the program goals: This ascertains whether there is intrinsic value in the proposed work and/or relevance to NOAA, federal, regional, state, or local activities.
2. Technical/scientific merit: This assesses whether the approach is technically sound and/or innovative, if the methods are appropriate, and whether there are clear project goals and objectives.
3. Overall qualifications of applicants: This ascertains whether the applicant possesses the necessary education, experience, training, facilities, and administrative resources to accomplish the project.
4. Project costs: The budget is evaluated to determine if it is realistic and commensurate with the project needs and timeframe.
5. Outreach and education: The project is evaluated to determine whether it provides a focused and effective education and outreach strategy regarding NOAA’s mission to protect the nation’s natural resources.

Technical Merit Review: All proposals are evaluated and scored for these criteria via an independent technical review and any additional criteria published in the program's Notice or Announcement.

Technical reviewers anonymously provide evaluation of individual proposals. The technical reviewers are individuals with expertise in the subjects addressed by particular proposals. The NCBO program officer solicits reviews from individuals who have knowledge pertaining to the proposal topic, but who do not have a conflict of interests with the applicant. A majority of technical reviewers also reside outside the Chesapeake Bay watershed.

When selecting technical reviewers, NCBO is extremely careful to avoid even the perception of a conflict of interest. A reviewer is considered to have a conflict of interests if he/she holds an appointment at the same institution as the applicant(s), has published with the applicant(s) within the past several years, is currently involved in a collaborative project (or planning a project) with the applicant(s), was a student or advisor to the applicant(s), or has a personal or financial relationship with the applicant(s) that would color the review. No one who has submitted an application for funding from a program is used as a technical reviewer for any competing proposals. Each technical reviewer receives a copy of the Notice and the Announcement soliciting the proposals with the published evaluation criteria, conflict of interests and proposal/peer review confidentiality guidance (including a copy of the conflict of interest and confidentiality certification form CD-571), and a suggested format that restates the evaluation criteria.

Each reviewer sees only certain individual proposals within their area of expertise. In addition to their review narrative, reviewers are required to score proposals on each of the five review criteria listed above to obtain an overall score for each proposal. Technical reviews are solicited from at least three reviewers for each proposal.

Ranking Panel: Upon completion of the technical review, the evaluation process moves to the ranking panel (except for Submerged Aquatic Vegetation, which has very limited funding and a small number of proposals submitted). The ranking panel is an ad hoc assembly of individuals with a range of expertise appropriate to the proposals to be considered. A panel is comprised of four to eight individuals, with individuals having expertise in either the scientific, management, or implementation aspects of the program. Non-federal and federal scientists, managers, and environmental education experts may be used as panel members.

The ranking panel has broader responsibilities than technical reviewers. Like technical reviewers, panelists are asked to evaluate proposals individually. But during panel discussions, they are asked to look at each proposal in comparison with similar proposals, and with all submitted proposals. This is the key difference between the technical review and ranking review.

Panel member(s) identifying any conflicts of interests with proposals, as defined above, are recused from discussion of that proposal and are not present in the room during the discussion. All non-federal panelists are required to sign form CD-571 (conflict of interest and confidentiality certification form) before the panel proceeds. The panel has access to all technical reviews of proposals, and uses the technical reviews in discussion and evaluation of the entire slate of proposals. All proposals are considered,

and each individual panel member numerically ranks the proposals (1 through n). The individual panelist rankings are averaged for each proposal and this average ranking is the primary factor in final selection. No consensus advice is given by the technical review or the ranking panel.

NCBO Program Officers neither vote nor score proposals as part of the review panel. The Program Officer selects the proposals to be recommended for funding based upon the averaged panel rankings (or averaged technical review scores for SAV), and/or any specific objectives published in the Notice and Announcement; and determines the amount of funds available for each proposal subject to the availability of fiscal year funds. Awards may not necessarily be made in rank order. Departures from rank order in selection are based on decision criteria as published in the Notice and Announcement. Recommendations for funding are then forwarded to the Director of NCBO, who serves as the Selecting Official. The Director makes final funding decisions based upon the program officials' recommendations, project funding priorities, and availability of funds.

Investigators may be asked to modify objectives, work plans, or budgets, and provide supplemental information required by the agency prior to the award. When a decision has been made (whether an award or declination), copies of the reviews are made available to the applicant. Declined applications are held at NCBO for 12 months (pending any additional funding availability) and then destroyed.

As required by the Department of Commerce/NOAA Grants Manual, all guidance distributed to technical reviewers and ranking panel members is submitted to NOAA's Financial Assistance Law Division (FALD) for review. Any departures from this process, such as additional or reworded evaluation criteria, guidance issued to reviewers, and changes in the decision and/or recommendation process, must be cleared by the Department of Commerce's Federal Assistance Law Division (FALD) and documented explicitly in the funding Announcement or any published programmatic general terms and conditions.

For further information, contact Derek Orner via e-mail at derek.ornier@noaa.gov or via phone at 410-267-5676