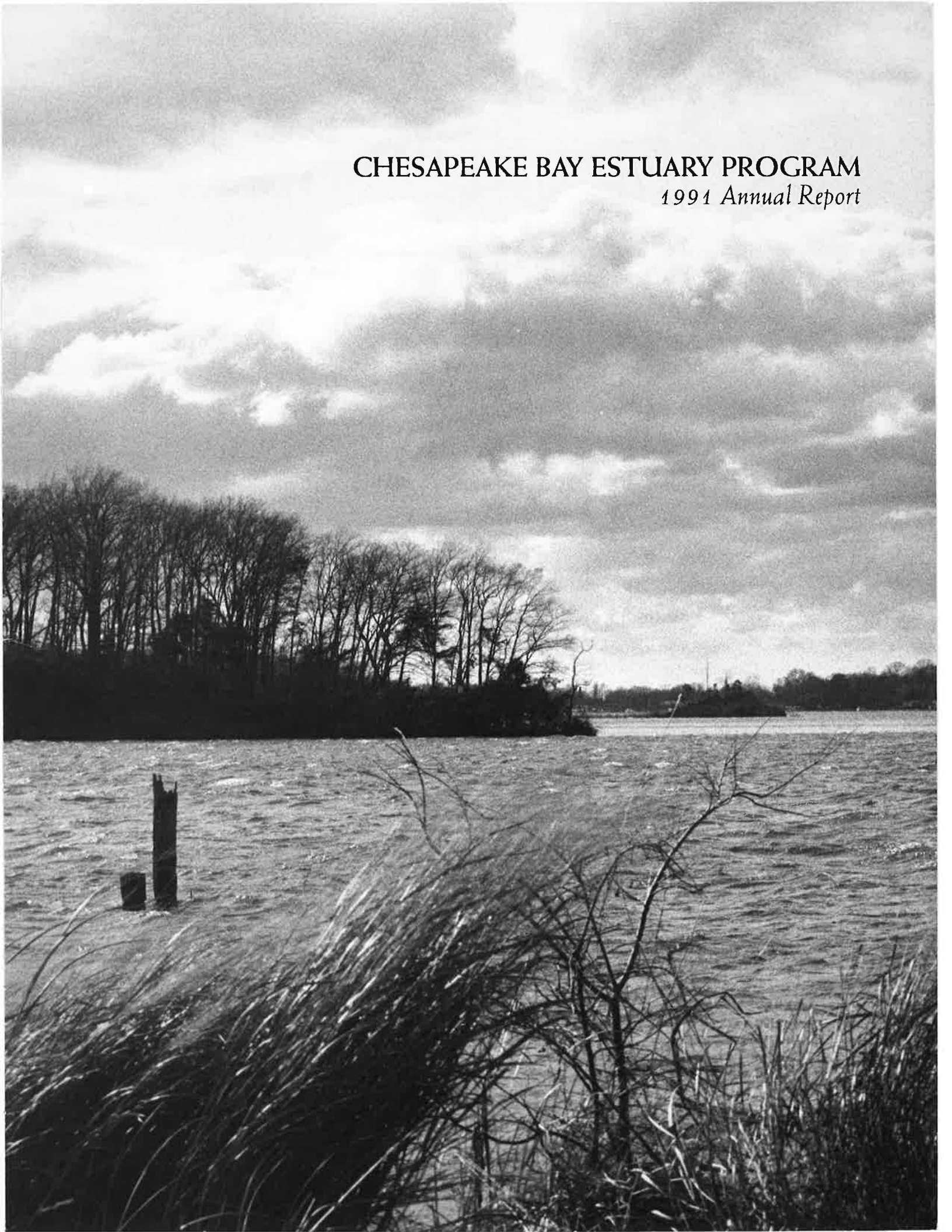


CHESAPEAKE BAY ESTUARY PROGRAM  
*1991 Annual Report*







*"It is all a circle, an ecosystem of plants and animals and people, air, water, and soil. And these parts are no more important than the patterns by which they connect and influence one another. This is how we must learn to understand Chesapeake Bay - not as water, or watershed, or in terms of seafood or sport, but also as an interrelated system of buffers and banks, of filters and traps and sinks, all working together to keep the bay's house in order to maintain resilience".*

Tom Horton  
*Turning The Tide*

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## The Chesapeake Bay Restoration Program

### *A Partnership for Progress*



**Troubled Waters** For centuries the Chesapeake Bay has been an important influence on the historic, cultural, social, and economic development of the people who live in and around its shores. Long before colonial times, Native Americans who roamed the marshes, valleys, and forests of the "Chesepiooc" revered the Bay as the "Mother of Waters" and "Great Shellfish Bay." Colonists who first settled the area in the early 1600's extolled the estuary as a "fruitful and delightsome land." Centuries later, one of the Bay's favorite sons, Baltimorean, H.L. Mencken, aptly termed it "a great, big protein factory."

The Bay's living resources, some 2700 species of fish, wildlife, and plants, provide important recreational, aesthetic, and economic benefits for the 13.6 million people who live in its drainage. Unfortunately, over the last three decades the "Mother of Waters" has become the "Troubled Waters." Pollution, including the runoff of sediment and chemicals from the land, discharge of toxic substances from factories, and acid deposition from auto and industrial emissions, has seriously impaired the functioning of the estuary. The most visible sign of this stress has been the severe decline in the Bay's fish, wildlife, and habitats — known collectively as living resources.

Submerged aquatic vegetation (SAV) are underwater plants that stabilize sediments, provide food for waterfowl, and serve as shelter for fish and shellfish. SAV has declined by over 65% since the 1960's. Excess nutrients in the Bay have been identified as the primary culprit. Runoff of fertilizers from agricultural and urban sites and discharges from sewage treatment plants upset the

balance of nitrogen and phosphorus needed for a healthy estuary. These nutrients feed the explosive growth of algae, known as "blooms," that cloud the water and prevent sunlight from reaching SAV, thus impeding photosynthesis.

Wetlands, important as habitat for waterfowl, juvenile fish, and a variety of other birds and mammals, have been lost at a rate of 2800 acres per year. Conversion of wetlands for agricultural, suburban, and urban development is the primary cause of loss. With the destruction of these habitats comes the loss of not only wildlife benefits, but also economic and social benefits,



Glenn Kinser, USFWS

including flood control, groundwater recharge, and recreational opportunities.

Losses of SAV and wetlands have contributed to the decline of another important Bay resource, waterfowl. Twenty-nine different species depend upon the Bay for food and habitat during

migration and overwintering. Since the 1950's, most duck species that winter on the Bay have declined. Black duck numbers fell from 200,000 to 32,000; canvasbacks, from 250,000 to 50,000; and redhead, from 70,000 to 2,000. The number of Canada geese, however, steadily increased. Geese are able to adapt to land-based food sources, such as waste corn in agricultural fields. But in the late 1980's, even Canada goose populations plummeted.

The Bay's recreational and commercial fisheries have also declined. Populations of anadromous fish, including shad, herring, striped bass, and yellow perch, that depend upon the estuary for some part of their life cycle have declined significantly. One problem is that dams and other blockages on rivers and streams prevent the fish from reaching their freshwater spawning grounds. Poor water quality and overharvesting have also contributed to the problem.

### **Chesapeake Challenge**

To reverse the precipitous decline in the Bay's resources, in 1983 the Governors of Maryland, Pennsylvania, and Virginia, along with the Mayor of the District of Columbia and the Chair of the Chesapeake Bay Commission signed the Chesapeake Bay Agreement with the Administrator of the Environmental Protection Agency. The signatories, known collectively as the Chesapeake Bay Executive Council, pledged to unite resources to address problems with toxics, nonpoint source pollution, and decline of SAV.

An updated agreement, signed in 1987, promoted a variety of specific restoration goals. Working through subcommittees and workgroups, the Bay program partners, representing over 100 Federal, state, local, and private agencies, have developed a series of management and implementation plans to guide the restoration of the Chesapeake's water quality and living resources. Most of these plans are now in place and the program is beginning to enter the implementation

phase. As this occurs, four new strategic directions, adopted by the Chesapeake Executive Council in August 1991, will focus resources on nutrient reduction, pollution prevention, living resources, and public participation.

### **U.S. Fish and Wildlife Service - A Partner in Bay Restoration**

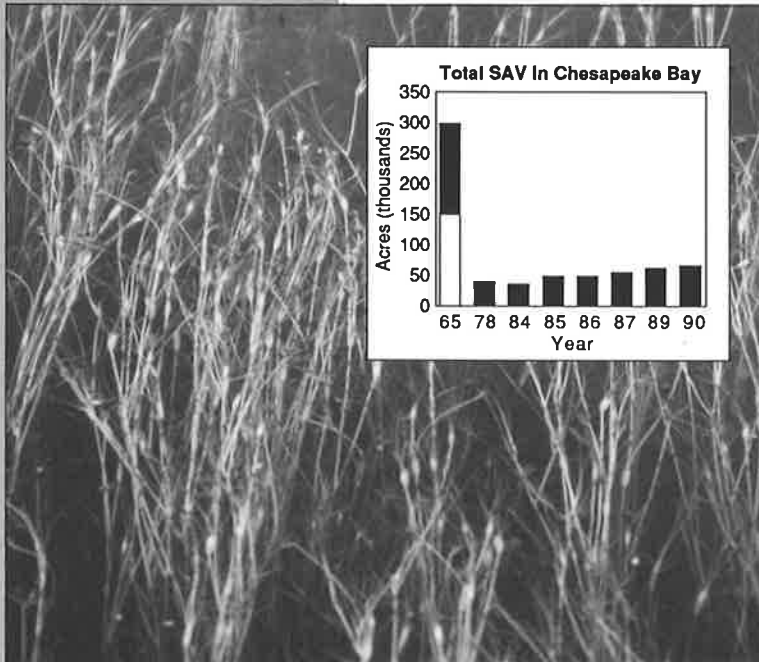
The U.S. Fish and Wildlife Service has been active in efforts to restore the Bay since 1984. This partnership was formalized by a Memorandum of Understanding with EPA that gave the Service responsibility for efforts to restore the Bay's fish, wildlife, and habitats. The Service's Chesapeake Bay Estuary Program was created to carry out these responsibilities. Guided by the 1987 Chesapeake Bay Agreement, the Chesapeake Bay Estuary Program works closely with EPA, state governments, and other Federal agencies to:

- ◆ Assess living resources, particularly wetlands, submerged aquatic vegetation, waterfowl, and anadromous fish.
- ◆ Assess threats to these resources, particularly the impact of poor water quality, and work with other Bay cooperators to develop pollution reduction strategies.
- ◆ Develop and implement strategies for management and protection of the Bay's resources.
- ◆ Enhance environmental awareness by educating the public about threats to the Bay and what actions each citizen can take to help prevent or reduce them.
- ◆ Work in coordination with a variety of Federal, state, and local agencies to develop policies and activities which protect the Chesapeake Bay.

This report summarizes Chesapeake Bay Estuary Program activities for Fiscal Year (FY) 1991■

# Assessing Resources

The foundation of any successful fish and wildlife management program is sound information on the status of a resource, including information on population levels, location of the resource, and reproductive success. The Estuary Program works with other Bay program cooperators to develop these types of data for Chesapeake Bay fish, wildlife, and habitats, particularly waterfowl, anadromous fish, SAV, and wetlands. Resource assessment activities conducted in FY 1991 include the following:



Steve Funderburk, USFWS

*In the last 30 years, as water quality has declined, the acreage of SAV has decreased by 65%. Recently, SAV has increased slightly, mainly in the lower Bay.*

## SAV Monitoring

Submerged aquatic vegetation (SAV) is one of the most important living resources of the Chesapeake Bay. SAV serves as food or habitat for fish, invertebrates, and waterfowl. Its dramatic decline coincided with a general decline in water quality. Because of this link to water quality, SAV serves as an excellent barometer to measure the health of the Chesapeake Bay ecosystem. In cooperation with other Federal and state agencies, the Service funds and coordinates an **annual SAV survey** that interprets aerial photography to determine the density and location of SAV beds in the Chesapeake Bay. Results of the 1990 survey show a small increase in total SAV acreage in the Chesapeake Bay compared to 1989. Although the lower Bay continued to show gains in SAV distribution, losses were again observed in the upper Bay, indicating poorer water quality conditions in this portion of the Bay. The 1991 SAV aerial survey is completed and the final report will be issued in 1992.

## SAV Composite Maps

The Estuary Program and the EPA's Chesapeake Bay Program have prepared maps depicting the distribution and area of all known SAV beds based on aerial surveys. The maps also depict areas of potential SAV habitat. The maps are being compiled into two atlases (Maryland and Virginia) which will be distributed to agencies with regulatory responsibility for resource protection and management.

## SAV Statistical Survey

Aerial photography is an expensive and time consuming method of monitoring SAV. In 1991, the Estuary Program funded a study by the Patuxent Wildlife Research Center to determine if SAV can be accurately monitored by analyzing randomly selected samples of aerial photographs. Initial results indicate that the statistical survey provided a close estimate of 1989 SAV acreage, only 4% larger than the true 1989 acreage. At this time, there is a need for precise SAV population acreage and distribution data. This method is under further review, however, to determine whether it can be used in future monitoring programs.

## Wetlands Five Year Status and Trends

The Estuary Program is working with the Service's National Wetlands Inventory (NWI) and EPA to conduct a wetlands status and trends analysis as part of the Chesapeake Bay Wetlands Policy Implementation Plan. The NWI office is currently interpreting wetland acreage from recent aerial photography. These data will form a baseline against which future changes in the **status and trends of Chesapeake Bay wetlands** will be measured. The Estuary Program is also developing a strategy to monitor wetland functions and assess wetland status. A cooperative effort between the Wetlands Workgroup, EPA, and the Service's Office of Wetlands Inventory, this monitoring strategy will be structured around wetland issues such as restoration and natural loss.

## Waterfowl Abundance Database

A database of Mid-winter Waterfowl Surveys conducted in Virginia, Maryland, and Pennsylvania for the years 1956-1991 has been developed. The database will be useful for several purposes. A **Waterfowl Status and Trends Brochure** will be developed to depict waterfowl population fluctuations over the last 35 years and explain the reasons for the changes. The data will also be used to analyze changes in abundance and distribution in relation to coastal development and loss of SAV. Finally, waterfowl concentrations maps will be developed to identify critical waterfowl habitats. The atlas of maps will help local governments direct growth and land development away from valuable waterfowl habitats.

## Peregrine Falcon Banding

The Estuary Program coordinated the **1991 Peregrine Falcon Production** for Chesapeake Bay watershed under the direction of Region 5, Office of Enhancement and the Annapolis Field Office. The 1991 nesting season produced 32 peregrine young in Maryland, Virginia, and West Virginia. Of these, 27 were banded prior to fledging. The Bay continues to support approximately 17 pairs of falcons that nest on hack towers, building ledges, and bridge spans.

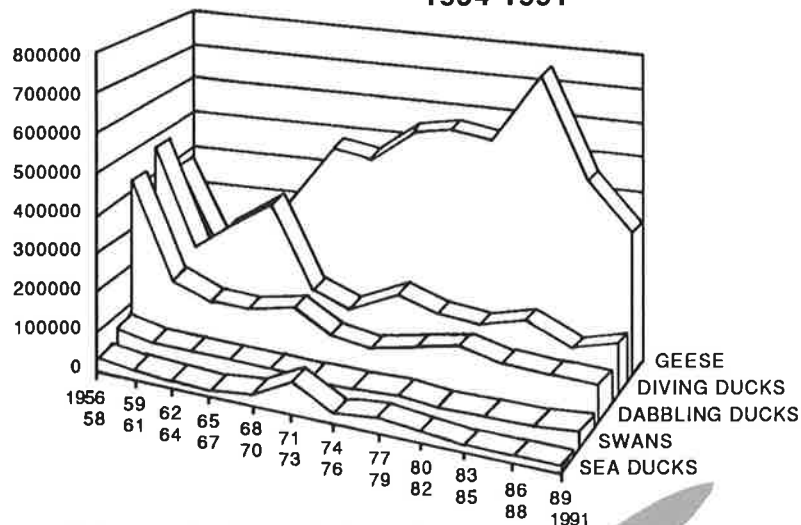


Craig Koppie, USFWS

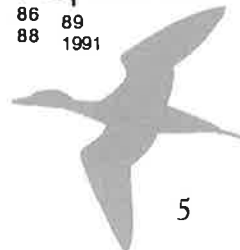
## Maryland Natural Resource Areas

*Inventory of Natural Resource Areas within the Chesapeake Bay Region, Volume I: Maryland* was produced by the Estuary Program. This compilation of important natural resource areas on private lands were identified as worthy of protection by Federal and state agencies and private organizations. The document provides natural resource information and maps for 270 sites and will be used to facilitate protection of natural resource areas in Maryland. Similar documents for Virginia and Pennsylvania are under consideration ■

## Chesapeake Waterfowl Counts 1954-1991



Loss of habitat and SAV, a vital food source for waterfowl, has contributed to the decline of waterfowl populations. Since the 1950's, the number of ducks on the Bay has declined by 70%.



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## Identifying Threats

**T**he Estuary Program works with other Bay program cooperators to identify and assess a variety of threats to the estuary's fish and wildlife. Prominent among these are: **Toxic pollutants**, including chemicals, heavy metals, and pesticides enter the Bay through industrial discharges and urban runoff. There are over 400 compounds toxic to fish and wildlife of Chesapeake Bay. **Excessive nutrients**, especially nitrogen and phosphorus, enter the Bay through agricultural and urban runoff and municipal waste. Excessive nutrients, together with erosion and sedimentation, lead to poor water quality and, ultimately, to a decline in SAV and other types of benthic life. **Habitat destruction** results from natural forces such as erosion and sea level rise and from human activities.

Efforts undertaken by the Estuary Program during FY 1991 to assess threats to the Bay's fish and wildlife include:

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Courtesy, USFWS

*Aerial surveys show an increase of turbidity in some areas due to hydraulic clam dredging. Chesapeake Bay Foundation and the Chesapeake Bay Estuary Program have cooperatively initiated a study to determine the effects of hydraulic clam dredging on the distribution of SAV.*

### Clamming Study

A cooperative study with the Chesapeake Bay Foundation was initiated to determine the effects of hydraulic clam dredging on the distribution of SAV. Preliminary results show that clamming produces large plumes of suspended material which increases turbidity, thus reducing the light available to SAV. This project will continue in FY 92.

### Sea Level Rise Impact Study

The Estuary Program conducted a study of the effects of sea-level rise on seven islands recognized as valuable habitat for black ducks. The rates and patterns of land loss were determined from historical maps and photos and correlated with sea level rise. Habitat restoration on some of the islands is under consideration. Options for restoration include creating new marsh habitat with clean dredge material, building up the surface of degraded marshes by spraying clean dredge material, and protecting marshes from further erosion via hard shore structures.



## Choptank River

A program was developed, cooperatively with Maryland Department of Natural Resources, to assess water quality in the upper Choptank River and its tributaries during the striped bass spawning season. The results show numerous locations of toxic materials that may be impacting the success of striped bass breeding. Results will be used to design a more thorough study of potential contaminant threats to striped bass.

## Rapidan River Water Quality Assessment

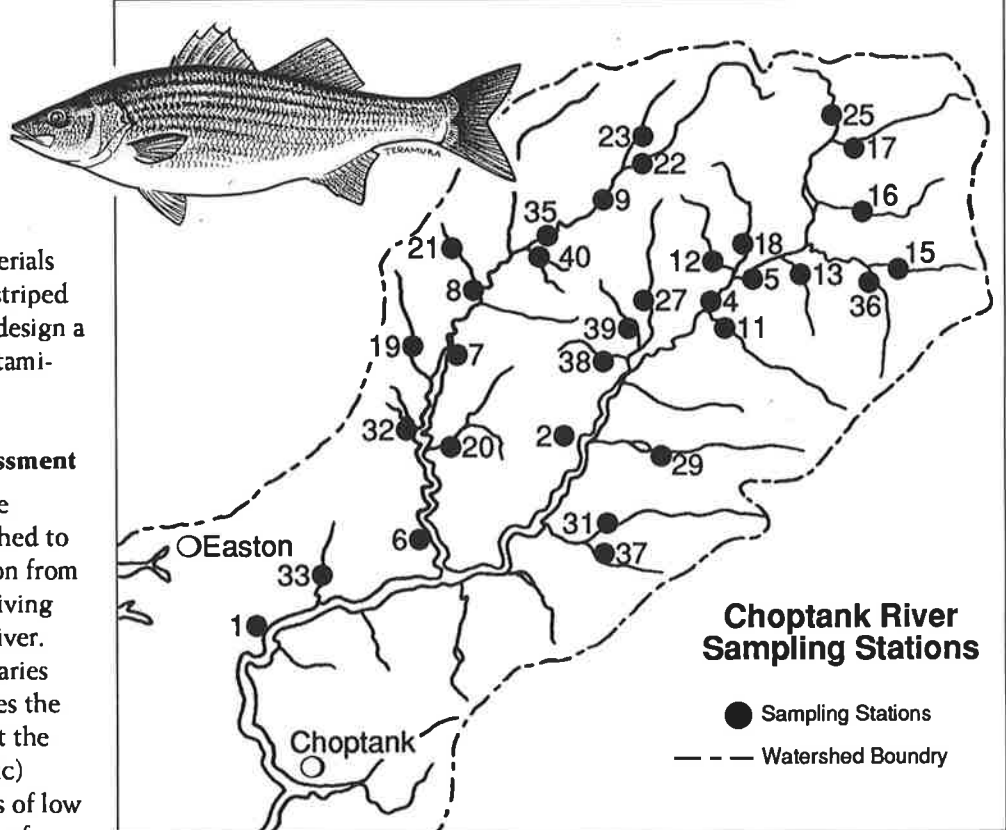
Twenty-eight sampling stations were established within the Rapidan watershed to evaluate how nonpoint source pollution from different tributaries may be affecting living resources within the Rappahannock River. The study has identified several tributaries that are contributing two to three times the concentration of nutrients measured at the control sites. Bottom-dwelling (benthic) invertebrates were also sampled. Areas of low benthic diversity coincided with areas of degraded water quality. These results, along with land use information, will be made available to be used for targeting Best Management Practices for these subwatersheds.

## Stormwater Discharge

The Estuary program is currently developing a plan to evaluate the effects of stormwater discharges on living resources. Potential sites in the Severn and Magothy Rivers in Maryland were identified and field evaluation has begun.

## Maryland Target Watershed Program

Estuary Program staff assisted the Maryland Department of the Environment in the development of water quality monitoring and resource inventory plans for four target watersheds in Maryland. Staff assisted in the collection of fish and water quality samples in the watersheds. The baseline resource assessments indicate moderate to severe degradation due to nonpoint source and toxic pollution. This information is being used by Maryland to develop restoration plans (see page 9).



## Marina-Related Impact Assessment

To identify sources of toxic pollution, a study was developed with the Service's Annapolis Field Office and Maryland Department of the Environment to examine the levels of contaminants in marina sediments and benthic organisms, and to evaluate the effects of these contaminants on the organisms. The Bohemia River Marina was selected for the study. Sediment and water samples from 10 stations in the marina were collected. Samples are being analyzed and the results will be presented to the Toxic Subcommittee.

## Pesticide Use Survey

The Estuary Program provided data to the Pesticides Workgroup on the levels of pesticide used on agricultural lands located on National Wildlife Refuges within the Bay watershed. With the reduction of contracted agriculture on several refuges in the Bay basin, the active use of pesticides decreased. The Estuary Program will continue to monitor pesticide use on refuges and report annually to the Workgroup ■

*There are over 400 compounds identified as toxic to Bay fish and wildlife. Sample sites in the upper Choptank river during striped bass spawning season located numerous toxic materials that may be impacting the success of breeding.*

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## Strategies for Management and Protection

**C**ontinuing a proactive approach, the Estuary Program contributed to the development of management and implementation plans for threatened resources. Each plan identifies activities to protect, enhance, and restore the resource. The Estuary Program led the development of the Chesapeake Bay Waterfowl Policy and Management Plan and SAV Implementation Plan. The Estuary Program also contributed to an implementation plan for fish passage focusing on removing blockages to vital fish spawning habitat. Activities undertaken as a result of the management and implementation plans include:

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Courtesy, USFWS

*Wetlands provide critical nesting and wintering habitat for waterfowl and nursery areas for fish. Between the mid-1950's and late 1970's, loss of wetland acreage averaged 2800 acres per year.*

### SAV Management Reports

Several draft reports developed to aid in the management of SAV were completed. The University of Maryland was funded to complete an update to the 1979 publication: *Summary of Available Information on Chesapeake Bay Submerged Vegetation*. This report will be published in the FWS "Resource Publications" series. A report on the **feasibility of transplanting SAV** suggests that transplanting is not a practical method for restoring SAV given the present degraded water quality of Chesapeake Bay. The development of the SAV Technical Synthesis defines habitat requirements and restoration goals for SAV in Chesapeake Bay.

### Advanced Wetlands Planning

This multi-year project addresses the **cumulative impacts** of landscape changes on wetland structure and function within the Chickahominy River watershed. This is a cooperative effort between the Estuary Program, U.S. Geological Survey, and Virginia Institute of Marine Science. This project will document the effects of human activities, both past and present, on wetlands and identify future impacts. The information will serve as the basis for the development of a watershed management plan to promote the protection of nontidal wetlands.

## Wetland Mitigation Guidelines

The Estuary Program chairs an interagency committee that developed ecologically-based technical guidelines to follow when considering mitigating wetland loss. The document is currently under review within the Chesapeake Bay Program, and is scheduled for release in late Spring 1992.

## Federal Wetlands Manual

The Estuary Program participated in several Federal-state training sessions on the 1989 Federal wetlands identification and delineation manual. Federal, state, and local government employees and consultants attended the workshops. In cooperation with the Annapolis Field Office, the Estuary Program participated as a member of a Federal and state team to test the proposed 1991 revisions to the *1989 Federal Manual For Identifying and Delineating Jurisdictional Wetlands*.

## Coastal Fish Habitat Conservation Conference

The Estuary Program and the Service's Fisheries Program prepared a paper titled, "What is Habitat Conservation?" for presentation by the Assistant Director of Fisheries. Participants included members of recreational and commercial fishing communities, resource managers, industry representatives, and environmentalists. Recommendations from this paper were selected for inclusion in the Executive Summary of the Symposium's final recommendations and conclusions. Specifically, the Service recommended that future fisheries management include the management of biological communities and ecosystems on which fishery resources depend.

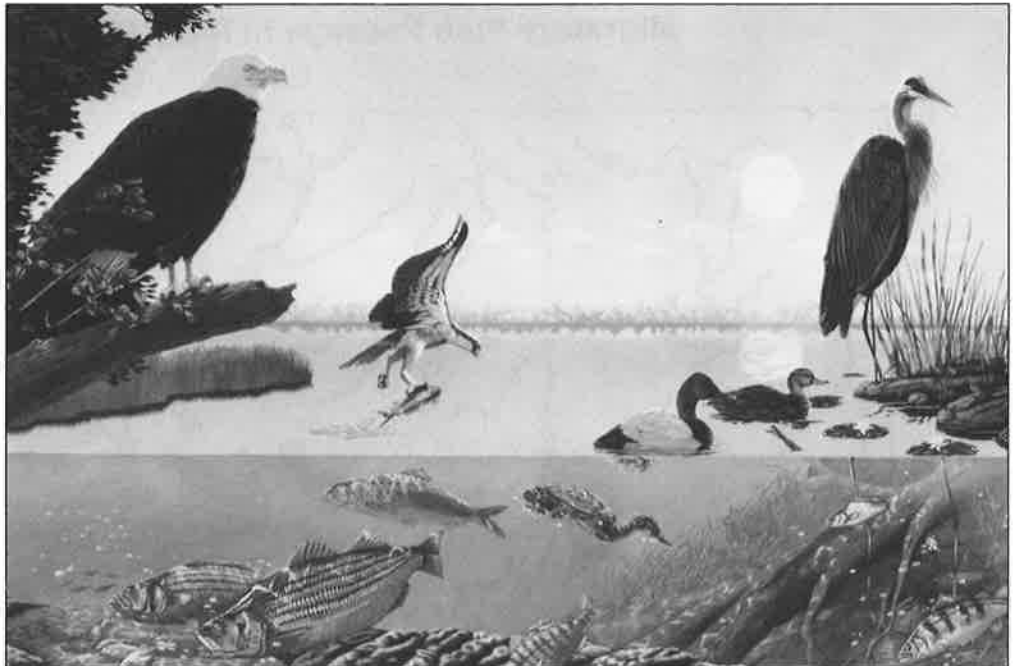


Illustration by Bob Lynch

## Habitat Requirements Revision

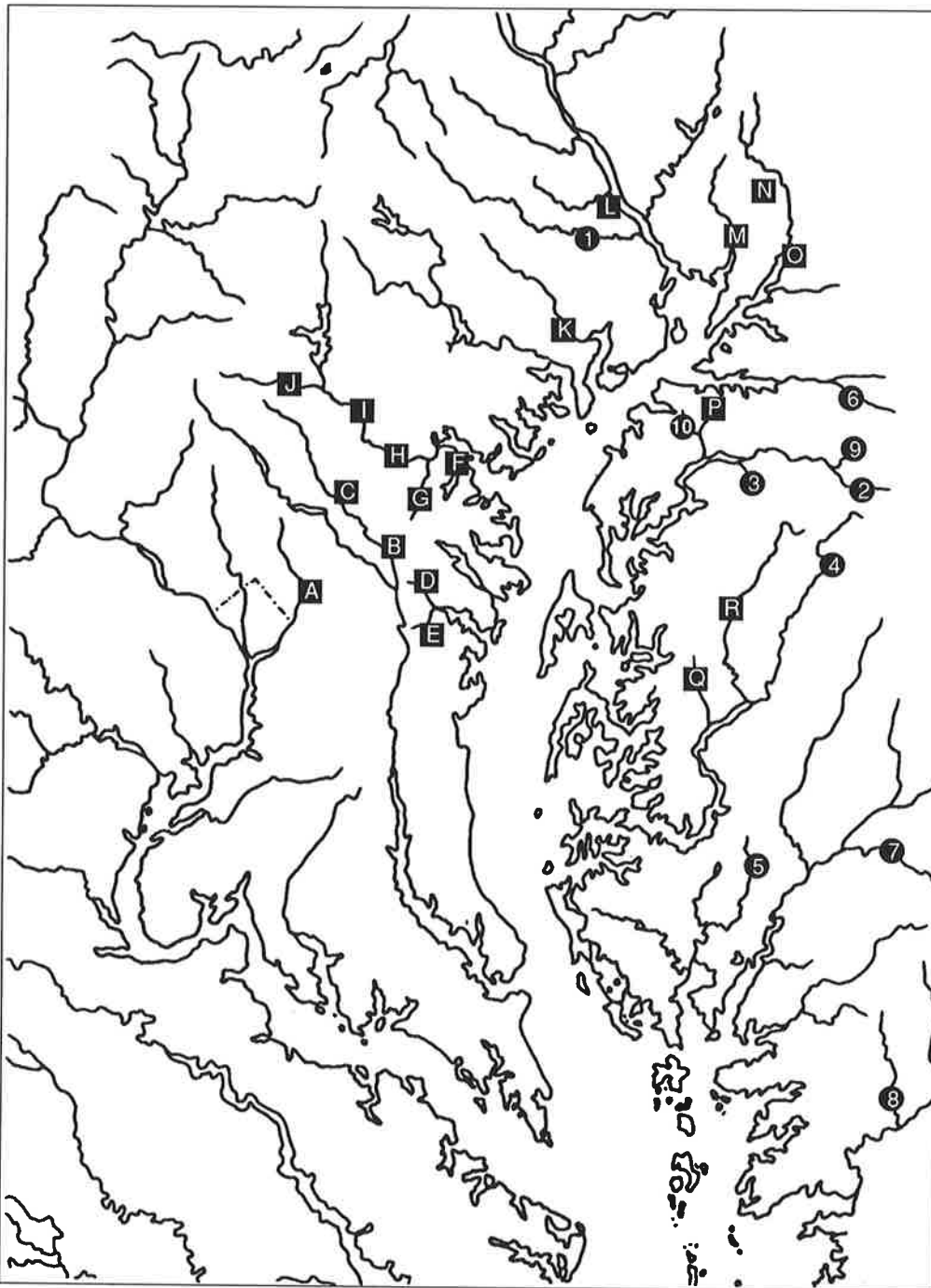
In cooperation with the Maryland Department of Natural Resources and Chesapeake Research Consortium, the Estuary Program spearheaded the production of *Habitat Requirements for Chesapeake Bay Living Resources*. The first of its kind, this resource management document summarizes information important for the management and protection of 31 species critical to the Chesapeake Bay ecosystem. Effects of contaminants on shellfish, finfish, and birds are also summarized. Thirty scientists contributed to this effort. The report will aid planning officials and resource managers in developing water quality guidelines and making management decisions. It is also an excellent reference for researchers and students (see page 16).

*Habitat Requirements for Chesapeake Bay Living Resources Cover Art, Bob Lynch.*

## Maryland Target Watershed

The information collected for the water quality and living resources monitoring plans has been used to develop restoration strategies and management plans for the four target watersheds. Estuary Program staff contributed to the development of the draft Sawmill Creek Restoration Strategy. This strategy focuses on the decline in water quality due to urban growth and development in the watershed.

## Migratory Fish Passage In Maryland



### Fish Passage Completed and In Progress

- A** Potomac River/Dam on Northeast Branch
- B** Little Patuxent River/ Ft. Meade Dam
- C** Little Patuxent River/ Savage Sewer Crossing
- D** South River/ USGS Flow Weir on Bacon Ridge Branch
- E** South River/Culvert on North River
- F** Patapsco River/Dam on Stony Run
- G** Patapsco River/Dam on Deep Creek
- H** Patapsco River/Bloede Dam
- I** Patapsco River/ Union Dam
- J** Patapsco River/Daniels Dam
- K** Bush River/ Dam on Winter's Run
- L** Susquehanna River/ Conowingo Dam
- M** Northeast River/Dam on Northeast Creek
- N** Elk River/Culvert on Dogwood Run
- O** Elk River/Dam on Big Elk Creek
- P** Chester River/USGS Weir, Morgan Creek
- Q** Choptank River/ USGS Weir, Beaver Dam Branch
- R** Choptank River/Dam on Tuckahoe Creek

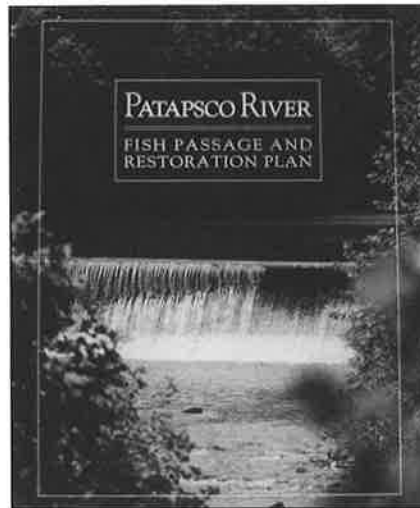
*Note: 13 completed  
2 under construction  
3 under engineering design*

### Priorities for EPA Funding

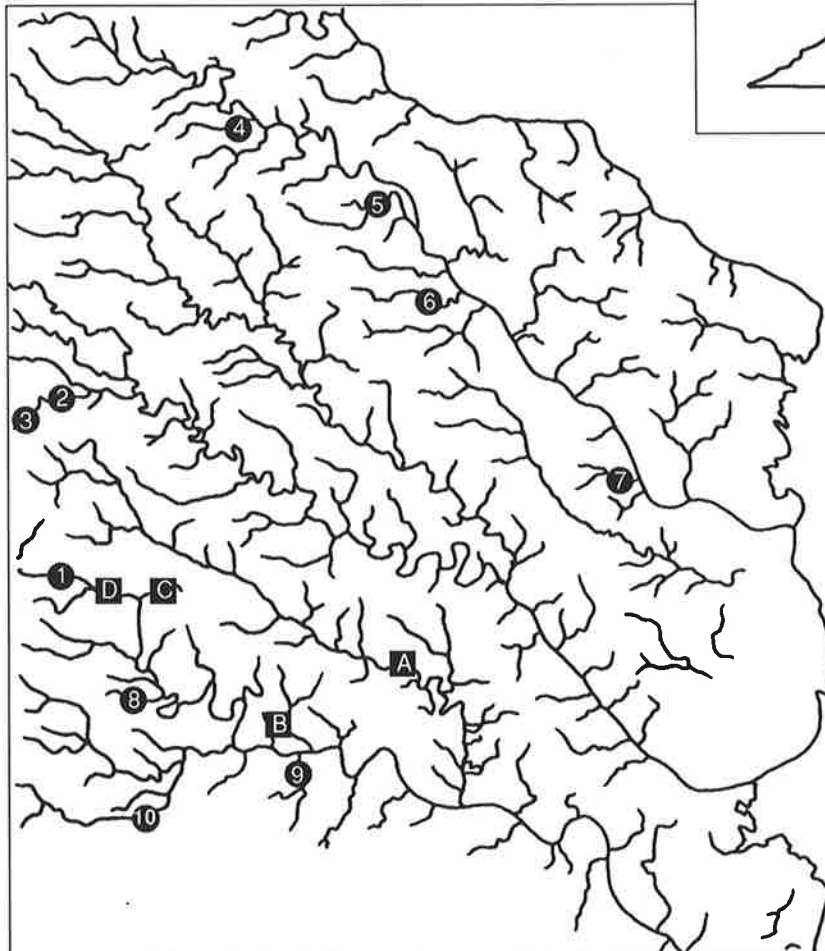
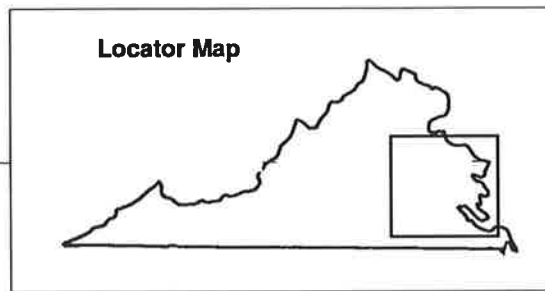
- 1** Susquehanna River/Dam on Deer Creek Dam
- 2** Chester River/Dam on Andover Branch
- 3** Chester River/Dam on Unicorn Branch
- 4** Choptank River/Dam on Broadway Branch
- 5** Nanticoke River/ Dam on Chicamacomico River
- 6** Sassafras River/Dam on Herring Run
- 7** Nanticoke River/Dam on Barren Creek
- 8** Pocomoke River/ Dam on Adkins Race
- 9** Chester River/Dam on Cypress Branch
- 10** Chester River/Dam on Left Fork of Morgan Creek

**Fish Passage**

The Service was active in efforts to restore passage for anadromous fish in Chesapeake tributaries and participated in the Fish Passage Workgroup. The Workgroup is responsible for coordinating the implementation of a Bay-wide fish passage strategy. The Estuary Program worked closely with the Chesapeake Bay Foundation (CBF) and other workgroup members to update a public information brochure on fish passage. The Estuary Program also worked with Maryland Department of Natural Resources, CBF, and National Fish and Wildlife Foundation to develop the *Patapsco River Fish Passage and Restoration Plan*. The document outlines a strategy for restoring migratory fish by providing fish passage at obstructions and restocking certain species. The plan is being used as a model for planning passage in other Bay tributaries (see page 12) ■



*Patapsco River Fish Passage and Restoration Plan*



**Migratory Fish Passage In Virginia**

**Fish Passage Completed and In Progress**

- A** Chickahominy River/ Walkers Dam
- B** Herring Creek/Harrison Lake
- C** James River/Manchester Dam
- D** James River/Brown's Island Dam

**Priorities for EPA Funding**

- 1** James River/William Island Dam
- 2** South Anna River/ Ashland Mill Dam
- 3** South Anna River/Ashland Water Supply
- 4** Massaponix Creek/Ruffins Pond Dam
- 5** Mill Creek/Unnamed Pond Dam
- 6** Golden Vale Creek/Gouldman Pond Dam
- 7** Haskins Creek/Unnamed Pond Dam
- 8** Proctors Creek/Route 10 Bridge Blockage
- 9** Walls Creek/Route 10 Bridge Blockage
- 10** Appomattox River/Harbvell Dam

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## Environmental Awareness

**U**ltimately, the success of restoring the Chesapeake Bay and its resources lies in the hands of the general populace. Every citizen living within the Chesapeake Bay watershed impacts the Bay either positively or negatively depending how they live. The Estuary Program has a responsibility to inform the public about problems and issues that affect the Bay and what they can do individually to help restore the health of the ecosystem. This "Take Pride in Chesapeake Bay" message is promoted through a variety of activities.

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Courtesy, Chesapeake Bay Foundation

*"... answering questions of impressionable children, I feel I had made a difference in their lives ... and mine."*

Letter To The Editor, *The Capital*  
Jennifer Dixon, Student Volunteer

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### Publications

During FY 1991, the Estuary Program distributed over 150,000 publications about the Bay and its resources to the general public. In addition, several new publications were produced:

- ◆ The Chesapeake Bay fact sheet series was expanded to fourteen. Two new fact sheets on wetlands and alewife and blueback herring were produced.
- ◆ Keeping track of the multitude of Bay information materials is much easier using the new "Chesapeake Bay Estuary Program Resource Guide," an illustrated brochure listing available materials and ordering information.
- ◆ Summaries of several Bay-wide management plans for fish passage, SAV, and waterfowl were produced by the Service for the Bay Program's Living Resources Subcommittee to further public understanding of these documents.
- ◆ *The Patapsco River Fish Passage and Restoration Plan*, produced in cooperation with the Maryland Department of Natural Resources, National Fish and Wildlife Foundation and Chesapeake Bay Foundation, is now being used as a model for other river systems.

## Festivals and Exhibits

Approximately 100,000 people viewed Service exhibits and received information at over a dozen Bay-related festivals and events attended by Estuary Program staff. Several new exhibits were developed:

- ◆ **Hunters on the Wing**, a new exhibit about raptors of the Chesapeake Bay, was developed for Chesapeake Appreciation Days, held each year in October.
- ◆ An interagency plan to use dredge spoil to build new waterfowl habitat areas was explained in **Island Restoration, A Beneficial Use of Dredge Spoil**. Developed in cooperation with the Service's Annapolis Field Office for a state legislative briefing, this exhibit is now being used by a number of Federal and state agencies to inform the public about the island enhancement project.
- ◆ An exhibit, **Chesapeake Bay Waterfowl Management Plan**, was prepared for the Living Resources Subcommittee for a briefing of the Chesapeake Executive Council. This exhibit was also displayed at the 1991 Atlantic Flyway Technical Group Meeting in Easton, Maryland.
- ◆ Fisheries-related exhibits included a **striped bass exhibit** created for the Northeast Fisheries Center in Lamar, Pennsylvania, and a **fish passage display** for the Fisheries Habitat Conservation Conference in Baltimore, Maryland.

## Volunteer Programs

Encouraging participation by volunteers in public outreach and education is an excellent way to enhance such efforts by the Service. During FY 1991, the Chesapeake Bay Estuary Program led two very successful volunteer programs.

- ◆ In cooperation with the Maryland Department of Education and Anne Arundel County Public Schools, the Estuary Program started a pilot program for student volunteers. Under the Chesapeake Bay Environmental Advocacy



Craig Koppie, USFWS

Program, twelve students from South River High School were recruited and trained to deliver in-school presentations for elementary school students, focusing on fish and wildlife of the Chesapeake Bay. After a semester of training, the volunteers delivered presentations to nearly 1000 students in 27 elementary classrooms. This successful program will be expanded to include two new high schools in FY 1992.

*Hunters on the Wing display developed for Chesapeake Appreciation Days held in October.*

- ◆ Along with the aerial SAV survey, the Estuary Program and Chesapeake Bay Foundation coordinate the SAV Hunt, a citizen groundtruthing effort to locate SAV beds and identify SAV species in Chesapeake Bay and its tributaries. Seven workshops were conducted throughout Maryland and Virginia to inform citizens about the importance of SAV and the purpose of the annual survey, as well as providing instructions for identification of SAV. Thanks to over 160 citizens who participated, SAV was identified at over 350 locations. Of these, over 200 were new sites of SAV growth.

## Media

Through a weekly newspaper column, "Chesapeake Corner," the Estuary Program provides Bay information to more than twenty newspapers and newsletters,





## **Bay Naturalist**

reaching a combined audience of over 500,000 throughout the watershed. Another column appears in the "Insider's Guide" distributed to hotels, stores, and tourist facilities in Annapolis, Maryland, and Williamsburg, Virginia. The "Bay Naturalist" column was initiated in FY 1991 and appears monthly in the Bay Journal, a newsletter with a circulation of 20,000 published by the Alliance for the Chesapeake Bay.

### **Bay Education**

Students from kindergarten to twelfth grade and their teachers are important constituents of the Service's Bay outreach efforts. Several programs are aimed at this audience.

- ◆ **Teacher training** - There is a growing demand from educators throughout the Chesapeake Bay watershed for materials of instruction that focus on the environment. The Estuary Program introduced resources available through the U.S. Fish and Wildlife Service to approximately **750 classroom teachers**. In many instances, these programs were conducted cooperatively with state and county boards of education or other Federal and state agencies. For instance, the Service participated in four Aquatic Resource Education Workshops sponsored by Maryland Department of Natural Resources and Maryland

Department of Education that drew over 300 educators. In all, it is estimated that some **22,000 students** will benefit from these sessions.

- ◆ **Chesapeake Bay Reader Series** - Recognizing the lack of resource-based educational material for elementary school children, the Estuary Program is producing a reader series on Chesapeake Bay fish and wildlife and their habitats. Two readers were developed in FY 1991, one on migratory fish and one on waterfowl. Developed in cooperation with local and state boards of education, the text was written by a team of reading specialists, classroom teachers, and Estuary Program biologists. The readers will be distributed to educators and parents in schools and libraries throughout Maryland, Virginia, and Pennsylvania. Additions to the series will be developed over the next two to three years.
- ◆ **Watershed Poster - What is a watershed?** -- a question that is confusing to many students will be answered with the development of the Chesapeake Bay watershed poster and teacher activity guide. With the help of the Soil Conservation Service, various state agencies and the financial assistance of the Chesapeake Bay Trust, the poster will be distributed to teachers throughout the tri-state area. A companion teacher's guide will outline activities that can be conducted in the classroom using the map. The goal of the project is to promote watershed awareness and stewardship.

### *1991 National Envirothon.*



Kathleen Diehl, SCS

- ◆ **Envirothon** - Envirothon is a program for high school students that challenges their knowledge of environmental resources including soils, aquatic ecosystems, forestry, wildlife, and current environmental issues. The Estuary Program, in cooperation with Maryland State Soil Conservation Committee, was a sponsor and assisted in the planning of the 1991 Maryland State Envirothon. The Estuary Program is currently involved in planning the 1992 National Envirothon to be held in Maryland ■



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## Coordination

**T**he work of the multi-agency Chesapeake Bay Program is directed by the Chesapeake Executive Council and guided by the Implementation Committee. Many different Subcommittees and Workgroups deal with topics ranging from toxics to living resources to monitoring. The Service is represented on all major Bay Program Committees and Subcommittees and plays a lead role in directing the work of many of them.

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*Federal, state, local and private representatives join in Patapsco River restocking effort.*

### Living Resources Subcommittee

Service biologists chair three workgroups and two subgroups under the Bay Program's Living Resources Subcommittee: Waterfowl Workgroup, Submerged Aquatic Vegetation Workgroup, Wetlands Monitoring Subgroup, Wetlands Mitigation Subgroup, and Habitat Objectives Workgroup. Support is provided to all other workgroups within the Subcommittee, ranging from living resources monitoring and ecologically valuable species to fish passage and fisheries management. The Service's participation in the Subcommittee's activities includes:

- ◆ **Waterfowl Workgroup** - The Service contributed significantly to the development of the recently approved Chesapeake Bay Waterfowl Policy and Management Plan in cooperation with Maryland, Virginia, Pennsylvania, the District of Columbia, and EPA. Important contributions were provided by the Service's Patuxent Wildlife Research Center and Office of Migratory Bird Management. The plan outlines specific restoration goals and the management strategies needed to meet these goals.
- ◆ **Submerged Aquatic Vegetation Workgroup**- The Estuary Program played a lead role in completing the Submerged Aquatic Vegetation Policy. The Service was also heavily involved in developing the SAV



Craig Koppie, USFWS

*The Living Resource Subcommittee develops a public outreach strategy.*

Implementation Plan in cooperation with the University of Maryland, Harford Community College, Virginia Institute of Marine Science, EPA, U.S. Geological Survey, and Maryland Department of Natural Resources. The plan identifies specific actions to fulfill the policy.

- ◆ **Habitat Objectives Workgroup** - The Estuary Program led the effort to revise *Habitat Requirements for Chesapeake Bay Living Resources*. The effort was guided by the Service, Maryland Department of Natural Resources, EPA, and the Chesapeake Research Consortium.
- ◆ **Wetlands Monitoring and Wetlands Mitigation Subgroups** - The Wetlands Monitoring Subgroup developed a draft protocol for the monitoring of wetland values and functions. Coordinating with the National Wetlands Inventory office, the Subgroup began preparing the wetlands status and trends baseline report. The Wetlands Mitigation Subgroup has completed a final draft of the Chesapeake Bay Program's Mitigation Guidelines, (see page 9).

### **Nonpoint Source Subcommittee**

This Subcommittee is charged with addressing all issues related to nonpoint source programs. Although nonpoint source pollution is often associated primarily with agricultural runoff, the Subcommittee is also involved with urban runoff and forestry management. The Service has supported the Subcommittee in a number of areas:

- ◆ **Nutrient Reevaluation** - In 1988 the Bay Program adopted a Nutrient Reduction Strategy that calls for a 40% reduction of nitrogen and phosphorus to the Bay by the year 2000. The Subcommittee is playing a lead role in a major reevaluation of that goal, initiated in 1991. The reevaluation involves a review of existing nutrient reduction programs and development of specific recommendations on protecting Bay resources. Service biologists support this effort by participating in the Subcommittee's work and by providing information on the impacts of nutrients on fish and wildlife and their habitats.

### **Toxics Subcommittee**

This Subcommittee is charged with developing, adopting, and implementing a basin-wide strategy to reduce toxics in the Chesapeake Bay. Service biologists provided support to the Standards and Criteria Workgroup and Pesticide Workgroup. In 1991, the Toxics Subcommittee focused its efforts on the following:

- ◆ **The Criteria and Standards Workgroup** of the Subcommittee developed a Toxics of Concern List. Analysis of chemical ranking systems, ambient concentrations of toxic substances, and toxicity to aquatic organisms led to the identification of toxic substances that pose an immediate or potential threat to the Chesapeake Bay ecosystem. This list has been accepted by Maryland, Pennsylvania, and Virginia. Efforts are underway to reduce these substances. Both the Estuary Program and Patuxent Wildlife Research Center were

active in this effort. The toxic substances included on the Toxics of Concern List are:

atrazine	chrysene	mercury
benzo(a)anthracene	chromium	naphthalene
benzo(a)pyrene	copper	PCBs
cadmium	flouranthene	tributyltin
chlordan	lead	

- ◆ The Estuary Program chaired the Wildlife Contamination Critical Issue Forum. The Forum was designed to identify the magnitude and extent of the contaminant problems and their risk to the Chesapeake Bay ecosystem. Reports prepared by the Patuxent Wildlife Research Center on birds, reptiles, amphibians, and mammals served as discussion topics. Findings from the Forum will be presented to the Toxics Subcommittee for distribution.

**Public Information and Education Subcommittee**

The Estuary program chaired this Subcommittee, charged with building public understanding and support of the Bay and the restoration efforts. The Subcommittee is responsible for coordinating and implementing tasks relating to public information, education, and participation. Some highlights of the Subcommittee's work follow:

- ◆ A major focus of the Subcommittee's activities was the development of the workshop, "Environmental Stewardship: A Research and Applications Workshop." The audience included cooperative extension agents, district conservationists, and other outreach professionals working with urban audiences. The workshop focused on conservation practices in the home that promote improved water quality. The workshop highlighted the latest research on landscape management and impacts of household hazardous wastes. The forum provided an opportunity for participants to exchange ideas about techniques used to educate the public on these issues. Nearly 150 people attended the 3-day event held in September.
- ◆ In cooperation with the Living Resources Subcommittee, a regional wetlands resource inventory was developed to provide educators and the public with a consolidated list of infor-

mation available about wetlands. The inventory includes curriculum material, general information, and training opportunities. The inventory will be used to catalogue existing material and identify the need for new publications and curricula.

- ◆ The first edition of the **Chesapeake Bay Information Matrix**, a regional data base of nearly 500 Bay-related publications and public information sorted by title and subject matter, was produced to facilitate response to inquiries and the coordination of new productions of education and outreach materials.

Late in FY 1991, the EPA Bay Program's communication and activities were restructured to enhance media outreach activities. A new Communications Subcommittee was formed to implement this program. The Service will chair the Education Workgroup of the new Subcommittee ■

*Environmental Stewardship Poster.*

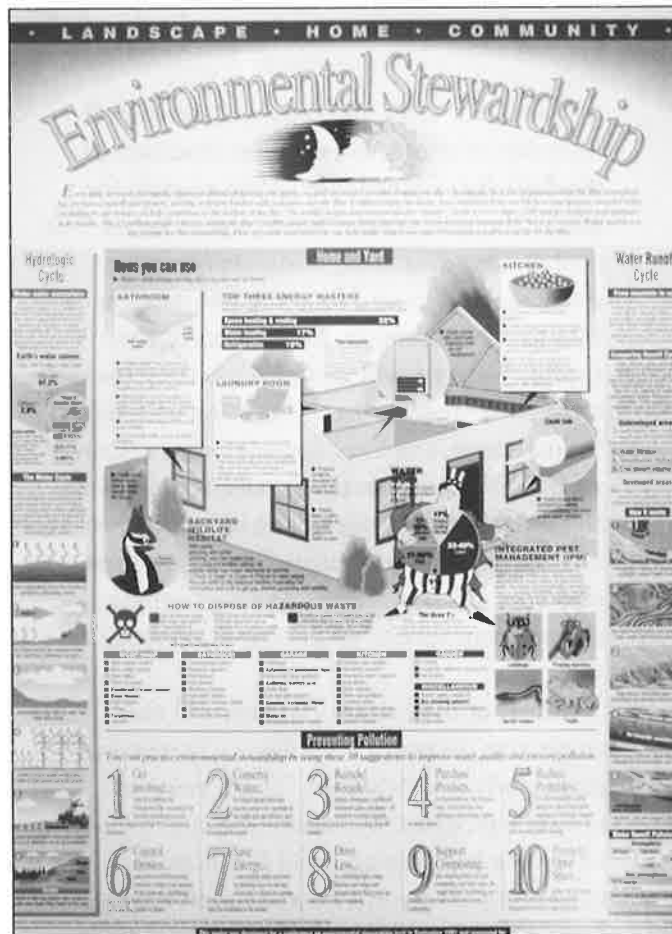


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Craig Koppie, USFWS

## Looking Ahead

During FY 1992, the Estuary Program will intensify its efforts to assess the condition of the Bay's fish and wildlife and to educate the public about important management issues. The overall Chesapeake Bay Program is progressively moving toward focusing its attention on tributary management. As this occurs, the Estuary Program will initiate a tributary assessment pilot program. In cooperation with other Federal, state, and local agencies, data resources such as SAV beds, wetlands, anadromous fish, and waterfowl habitats will be identified for selected tributaries. Potential threats to these resources will be analyzed and appropriate management recommendations developed.

Efforts of the Estuary Program will also emphasize programs on pollution prevention, particularly in urban areas. The Service will initiate a program to evaluate the effectiveness of various Best Management Practices in controlling urban erosion and runoff for the benefit of fish and wildlife. Outreach to urban populations will be intensified with the

Bayscapes Initiative, undertaken in cooperation with the Alliance for the Chesapeake Bay. This program will promote restoration of urban habitats for wildlife and people and build upon concepts outlined in the FY 1991 Environmental Stewardship Workshop. A series of teacher training workshops, targeted at urban teachers, will be conducted in cooperation with EPA and the Bay states.

The problems of the Chesapeake Bay are, in reality, problems with the way that its citizens use or misuse the land and resources. To restore the Bay we must nurture what Aldo Leopold terms our "wild rootage" — a recognition of the fundamental connection and dependency between society and the environment. Working in partnership with the EPA and other Federal, state, local, and private agencies, the U.S. Fish and Wildlife Service's Chesapeake Bay Estuary Program will continue to promote the conservation and restoration of the Bay and its living resources for the continuing benefit of its citizens ■

## Participation

Estuary Program personnel actively chair or participate in a variety of sub-committees and workgroups of the Chesapeake Bay Program. Involvement in the various groups ranges from review and comment to report writing and policy development.

### Implementation Committee

#### Public Access Subcommittee

Recreational Boating Workgroup

#### Modeling Subcommittee

#### Monitoring Subcommittee

#### Living Resources Subcommittee

Habitat Requirements Workgroup, Chair  
SAV Workgroup, Chair  
Wetlands Workgroup  
Monitoring Subgroup, Co-Chair  
Mitigation Subgroup, Chair  
Fish Passage Workgroup  
Fisheries Management Plans Workgroup  
Living Resources Monitoring Workgroup  
Waterfowl Workgroup, Chair  
Ecologically Valuable Species Workgroup  
Public Outreach Workgroup

#### Nonpoint Source Subcommittee

Urban Nonpoint Source Workgroup

#### Toxic Subcommittee

Criteria and Standards Workgroup  
Pesticide Workgroup

#### Federal Agencies Subcommittee

Federal Facilities Workgroup

#### Communications Subcommittee

Education Workgroup, Chair

## Chesapeake Bay Estuary Program Personnel

Glenn Kinser Project Leader

### Living Resources

Steve Funderburk Supervisor  
Rachel Donham Sea Level Rise  
Diane Eckles Wetlands  
Doug Forsell Waterfowl  
Linda Hurley Kelsey Fisheries and Submerged Aquatic Vegetation  
Ed Pendleton Wetlands and Ecologically Valuable Species

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Suzanne Kilby  
Erica Lepping  
Joe Neubauer  
Bob Snow

## Publications

### Fact Sheets

A Chesapeake Bay Primer  
Alewife and Blueback Herring  
Bald Eagle  
Black Duck  
Blue Crab  
Canvasback  
Chesapeake Wetlands  
Fish and Wildlife Service  
Great Blue Heron  
Peregrine Falcon  
Shad  
Shadows of the Past  
Striped Bass  
Where Have All The Grasses Gone?

### Posters

Chesapeake Bay: Its Beauty and Bounty  
Chesapeake Bay Wetlands

### Educational Materials

Bay BC's  
Bay News 2020  
The Changing Chesapeake  
Chesapeake Bay Activity Kit  
Chessie: A Chesapeake Bay Story  
Chessie Returns

### Chesapeake Bay Reading Series

Waterfowl  
Migratory Fish

### Resource Materials

Chesapeake Bay: Passageways For Fishes  
Chesapeake Bay Resource Guide  
Field Guide To Submerged Aquatic Vegetation Of Chesapeake Bay  
Habitat Requirements For Chesapeake Bay Living Resources  
Patapsco River - Fish Passage and Restoration Plan  
Streamside Forests: The Vital Beneficial Resource

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