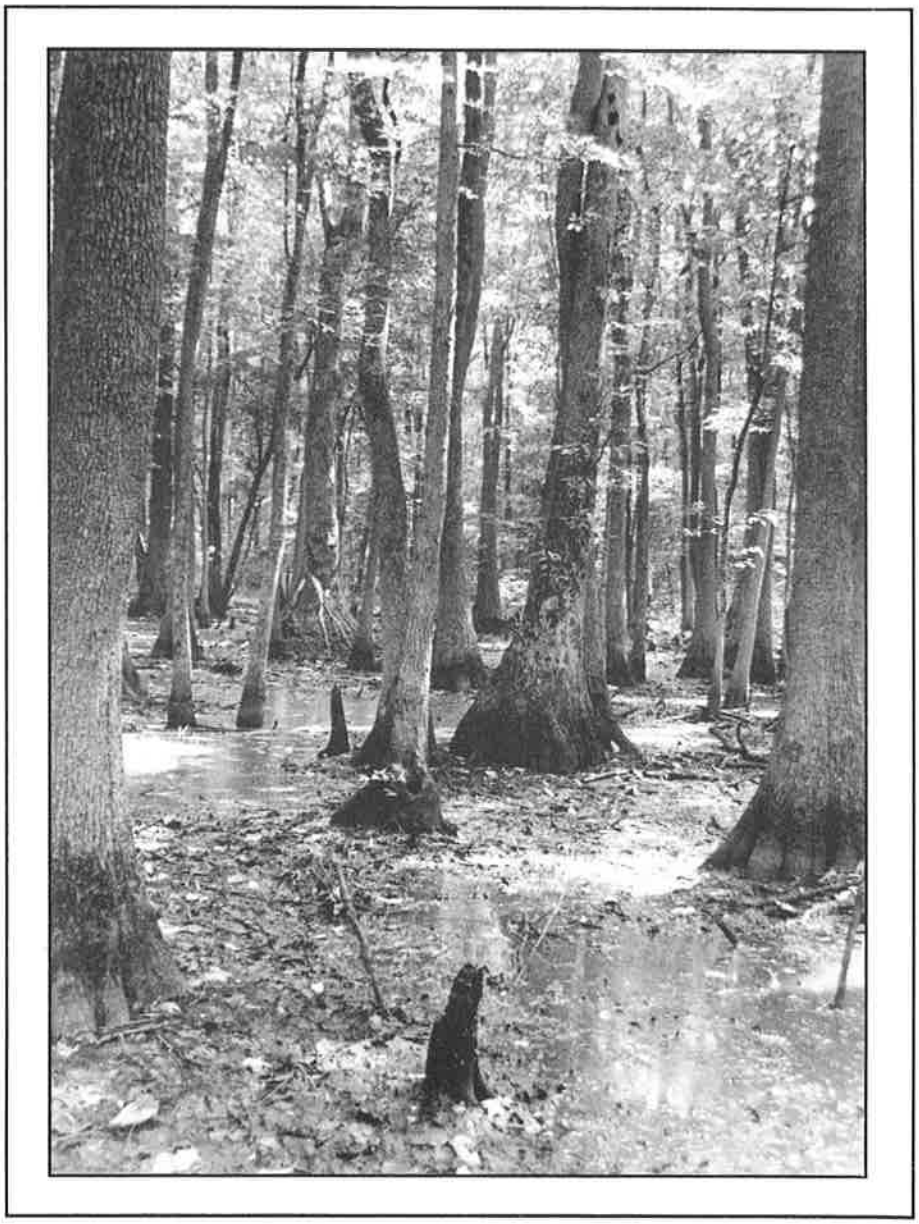
Chesapeake Executive Council

The First Progress Report under the 1987 Chesapeake Bay Agreement



January 1989

Foreword

To the People of the Chesapeake Bay Region:

We have accomplished much these past two years in our common enterprise to restore the Chesapeake Bay and its tributaries to their rich productivity of earlier times.

In 1987, we drafted a new Bay Agreement to extend and expand upon the 1983 compact that originally launched this ambitious State-Federal regional restoration effort. The public was consulted at roundtable forums held throughout the Bay basin, and the final Agreement signed in December was a much stronger document as a result.

In 1988, hundreds of people--Federal, State and local government employees and other citizens as well--devoted thousands of hours to crafting the strategies, policies and guidelines that had to be developed during the year to meet specific provisions of the Bay Agreement.

Strategies to reduce by 40% the levels of nutrients reaching the Bay, to control toxic and conventional pollutants, and to more effectively deal with population growth and development were among the implementation documents developed. Like the Agreement itself, all drafts were offered for public review and comment before their adoption by the Executive Council. For that participation, we are grateful.

I am proud to report that we met the deadlines laid down for 1988. It sets the stage to stay on schedule in the months and years ahead as we move, step by step, to transform into reality the aspirations embodied in the 1987 compact. As productive as these past two years have been, however, we know we are barely beyond the starting line in this crucial race to rescue the Bay from the pressures of population growth and development. Each of the implementation plans we develop becomes, in effect, an extension of the Agreement itself, setting down additional commitments whose fulfillment must challenge all of us--not just State and Federal agencies, but local governments throughout the watershed, scientists, educational institutions, the business community, civic groups and each and every individual citizen.

The 1987 Agreement specifically recognizes the need to disseminate timely information on the progress of the restoration program to encourage the broad public participation so essential to the program's future success. I hope this report helps meet this objective.

I thank the other signatories of the 1987 Agreement--my colleagues on the Chesapeake Executive Council--for their efforts throughout these past two years. Governors Robert P. Casey of Pennsylvania and William Donald Schaefer of Maryland; Mayor Marion Barry of the District of Columbia; Lee M. Thomas, Administrator of the U.S. Environmental Protection Agency; Kenneth J. Cole of Pennsylvania, chairman of the Chesapeake Bay Commission in 1987, and his successor in 1988, W. Tayloe Murphy Jr. of Virginia, have been steadfast in their commitment to the restoration program.

And my thanks, as well, to the many others who contributed to the restoration effort in 1987 and 1988. Keep up the good work and we shall "save the Bay."

Gerald L. Baliles, Governor of Virginia
Chairman, Chesapeake Executive Council

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The Wetlands

As the marsh grasses of a Chesapeake Bay wetland undulate in the familiar northwesterly breeze, a birdwatcher patiently waits. Poised at the edge of the sedge and rush vegetation, a great blue heron stands motionless. Its senses are focused on a small killifish, similarly foraging in the shallows for a meal. The link binding these three is the wetland environment. Each one - humans, fish, and wildlife--are threatened by wetland destruction.

Even to those who consider themselves informed Bay area citizens, the realm of wetlands and wetlands terminology is often a mystery. Perhaps some misconceptions arise from the variety of environments encompassed by the term "wetlands;" tidal marshes, inland bogs, coastal mudflats, shrub swamps, bottomland hardwood forests, and wet meadows are some types of wetlands encountered in the Chesapeake Bay watershed.

Wetlands are generally semi-aquatic lands, either flooded or saturated by water for varying periods of time during the growing season. These low-lying lands form a transition zone between dry land and deeper, permanent bodies of water.

Like a golden nugget hidden in the silt, wetlands are highly valuable, fertile lands in humble guise. They nourish and shelter an astonishing array of animals--from finfish, shellfish, waterfowl and wildlife down to microscopic aquatic species. In addition to vital habitat, wetlands also provide a wide spectrum of other benefits.

Wetlands comprise the primary spawning and/or nursery sites for many species, such as striped bass, shad, river herring, menhaden, spot and croaker, as well as blue crabs, oysters, and clams. Large flocks of migratory ducks, geese and swans spend their winters using marshes and ponds for feeding and cover, while resident bird species rely year-round on the Bay's wetland habitat. Wetland vegetation lessens shoreline erosion as its roots hold soil in place, helping to reduce sedimentation problems. As upland runoff and drainage waters pass through the wetlands, they are essentially "cleansed." This water quality improvement is due to the wetland's ability to process excess nutrients and intercept other pollutants, trap sediment, and reduce suspended solids in the overlying water. Controlling flood- and stormwaters is another important function of wetlands. Potentially damaging volumes of fast-moving water are temporarily stored in wetland areas. Subsequent gradual release of the water minimizes erosion and urban/suburban property damage.

The wetlands of the Bay states have an intrinsic natural beauty, providing opportunities for boating, fishing, crabbing, waterfowl hunting, hiking, birdwatching, and canoeing. One would think these richly productive areas would be highly regarded by all. Yet, for years they were destroyed without thought. We must ensure that the remaining wetlands are protected--for they are fundamental to the restoration of our Chesapeake Bay.

Contents

Summary

Integrated State and Federal efforts achieved substantial progress in 1987-88 toward the goals of the Chesapeake Bay restoration and protection program, including the signing of a new Bay Agreement in December 1987 that promised accelerated advances in the years ahead. This report reviews program accomplishments in these two years and summarizes major implementation actions taken in 1988 to carry out provisions of the Bay Agreement.

The 1987 Agreement--signed by the Governors of Maryland, Pennsylvania and Virginia, the Mayor of the District of Columbia, the Chairman of the Chesapeake Bay Commission, and the Administrator of the U.S. Environmental Protection Agency (EPA) on behalf of the Federal Government--is a significant departure from the brief declaration of purpose signed in 1983 to initiate the joint State-Federal cleanup program. In addition to outlining broad goals and objectives, the pact includes 29 specific commitments and, in almost every case, deadlines for meeting them.

Along with development of the more comprehensive Agreement, there has been continued progress in the implementation of restoration activites throughout the watershed since the start of 1987. In addition to ongoing improvements in wastewater treatment facilities in the Bay basin, Pennsylvania, Maryland and Virginia, with funding help from EPA and the U.S. Department of Agriculture, expanded efforts to reduce levels of nutrients and sediment reaching the Bay. USDA's Soil Conservation Service (SCS) reported that conservation practices in the watershed reduced the amount of nitrogen entering the Bay by 7,679 tons in fiscal 1987. Reductions of phosphorus amounted to 1,564 tons. Some 39,000 farmers received technical help during the year. The District, in turn, is implementing urban stormwater management regulations.

The Chesapeake Bay Monitoring Subcommittee produced its second annual "State of the Chesapeake Bay" report summarizing data collected at 167 stations Baywide from June 1984 through September 1985. The monitoring program, over time, will help to distinguish between natural variations in water quality of the Bay and those induced by human activities. The data already are being used in the design of models to project the effects of restoration programs.

Development of the Steady-State Water Quality Model of the Bay and major tributaries was completed in March 1987, enabling Bay managers to evaluate the effects of various nutrient levels and project the results of control options. Work began in October 1987 on development of a three-dimensional, time-variable model, the second phase of the Chesapeake Bay Modeling Strategy.

The Bay Program gained another powerful analytic tool with acquisition of the ARC/INFO geographic information system (GIS) in autumn 1987. GIS provides the capability to display spatial data in a variety of ways showing the complex relationships among various environmental elements.

The District of Columbia, Maryland and Virginia have passed legislation to protect striped bass. Maryland and Virginia continued working with the U.S. Fish and Wildlife Service (FWS) to rebuild striped bass populations. Over one million fingerlings have been released since 1985. Both States also pressed forward with programs to improve oyster habitat and transplanted nearly 800,000 bushels of oyster seed. Pennsylvania expanded efforts to promote the restoration of shad in the Susquehanna River, once a prime spawning ground for the species.

Virginia enacted the Chesapeake Bay Preservation Act to help promote land use practices intended to protect Bay water quality. Effective July 1, 1988, the law calls for development of criteria for use by local governments in designating preservation areas, such as wetlands and sensitive shorelines, that merit special protection.

Maryland continued implementation of its Critical Areas Program to control shoreline development. All 60 local jurisdictions included in the program were expected to have approved plans in place by the end of January 1989.

Other restoration activities and options for future action to protect the living resources and water quality of the Bay were described in the report, "A Commitment Renewed," published by the Bay Program Implementation Committee in February 1988.

The 1987 Chesapeake Bay Agreement

The signing of the second Chesapeake Bay Agreement on December 15, 1987, was a giant step forward in a restoration program that began as a Federal research study more than a decade ago.

Meeting to put their names to the new compact at ceremonies in Baltimore were Virginia Governor Gerald L. Baliles; Pennsylvania Governor Robert P. Casey; Maryland Governor William Donald Schaefer; District of Columbia Mayor Marion Barry; Kenneth J. Cole, Chairman of the Chesapeake Bay Commission, and, for the Federal Government, Lee M. Thomas, Administrator of the U.S. Environmental Protection Agency.

Formal approval of the Agreement was the culmination of a year-long effort that began in January 1987 when Governor Baliles, Chairman of the Chesapeake Executive Council, proposed a review to evaluate the adequacy of the original Bay Agreement of 1983. In May, a committee of Council members was formed to develop a broader pact addressing key issues and defining specific goals and milestones which would facilitate public accountability and further public participation in the Bay Program.

Draft language was approved for public review at a meeting of the Executive Council in August 1987. The Council's Citizens Advisory Committee sponsored a series of nine roundtable meetings in the fall to elicit public views on the draft, and subsequently proposed a number of changes to strengthen the Agreement. The text signed in December included many modifications as a result of the review process.

The 1987 Agreement is a significant departure from the three-point declaration signed in 1983, although the initial Agreement was itself a milestone event, committing the signatories to a "cooperative approach...to fully address the extent, complexity, and sources of pollution entering the Bay."

The 1983 Agreement called for three organizational actions to provide a Basin-wide approach to the restoration program:

1. Formation of the Chesapeake Executive Council to assess and oversee the implementation of coordinated plans to improve and protect water quality and living resources of the Bay;
2. Appointment by the Executive Council of an Implementation Committee to coordinate technical matters and the development and evaluation of management plans; and
3. Establishment of an EPA Liaison Office to support the restoration program.

The 1987 Agreement goes well beyond that original pact, listing specific goals, objectives and commitments in six categories: Living Resources; Water Quality; Population Growth and Development; Public Information, Education and Participation; Public Access, and Governance.

Among the commitments is the challenging assignment of reducing levels of nitrogen and phosphorus reaching the Bay by 40 percent by the year 2000. A basin-wide strategy to reach that target was adopted in July 1988. More than a dozen other commitment plans, policies or strategies were developed in 1988 and subsequently approved by the Chesapeake Executive Council. These included strategies to control or reduce toxic and conventional pollutants, a wetlands protection policy, and development policies and guidelines.

The full text of the new Agreement follows. Additional information concerning some of the Agreement provisions is in the narrow column.

Preamble

The Chesapeake Bay is a national treasure and a resource of worldwide significance. Its ecological, economic, and cultural importance are felt far beyond its waters and the communities that line its shores. Man's use and abuse of its bounty, however, together with the continued growth and development of population in its watershed, have taken a toll on the Bay system. In recent decades, the Bay has suffered serious declines in quality and productivity.

Representing the Federal government and the States which surround the Chesapeake Bay, we acknowledge our stake in the resources of the Bay and accept our share of responsibility for its current condition. We are determined that this decline will be reversed. In response, all of our jurisdictions have embarked on ambitious programs to protect our shared resource and restore it to a more productive state.

In 1980, the legislatures of Virginia and Maryland established the Chesapeake Bay Commission to coordinate interstate planning and programs from a legislative perspective. In 1985, Pennsylvania joined the Commission. And, in 1983, Virginia, Maryland, Pennsylvania, the District of Columbia, the U.S. Environmental Protection Agency, and the Chesapeake Bay Commission formally agreed to a cooperative approach to this undertaking and established specific mechanisms for its coordination. Since 1983, our joint commitment has carried us to new levels of governmental cooperation and scientific understanding. It has formed a firm base for the future success of this long-term program. The extent and complexity of our task now call for an expanded and refined agreement to guide our efforts toward the twenty-first century.

Recognizing that the Chesapeake Bay's importance transcends regional boundaries, we commit to managing the Chesapeake Bay as an integrated ecosystem and pledge our best efforts to achieve the goals in this Agreement. We propose a series of objectives that will establish a policy and institutional framework for continued cooperative efforts to restore and protect the Chesapeake Bay. We further commit to specific actions to achieve those objectives. The implementation of these commitments will be reviewed annually and additional commitments developed as needed.

Goals and Priority Commitments

In addition to EPA, seven other Federal agencies participate directly in the Bay Program, and the Federal Government as a whole is pledged to support the restoration effort. EPA's participation became a statutory responsibility under 1987 amendments to the Clean Water Act. That legislation also provided for the continuation of Federal grants to the States for Bay activities.

This new Agreement contains Goals and Priority Commitments for Living Resources; Water Quality; Population Growth and Development; Public Information, Education and Participation; Public Access; and Governance.

The parties to this 1987 Agreement are the U.S. Environmental Protection Agency, representing the Federal Government, the District of Columbia, the State of Maryland, and the Commonwealths of Pennsylvania and Virginia (hereinafter the "States"), and the Chesapeake Bay Commission. This Agreement may be amended and attachments added in the future by unanimous action of the Chesapeake Executive Council.

Living Resources

Goal: Provide for the restoration and protection of the living resources, their habitats, and ecological relationships. The productivity, diversity and abundance of living resources are the best ultimate measures of the Chesapeake Bay's condition. These living resources are the main focus of the restoration and protection effort. Some species of shellfish and finfish are of immense commercial and recreational value to man. Others are valuable because they are part of the vast array of plant and animal life that makes up the Chesapeake Bay ecosystem on which all species depend. We recognize that the entire natural system must be healthy and productive. We will determine the essential elements of habitat and environmental quality necessary to support living resources and will see that these conditions are attained and maintained. We will also manage the harvest of and monitor populations of commercially, recreationally and ecologically valuable species to ensure sustained, viable stocks. We recognize that to be successful, these actions must be carried out in an integrated and coordinated manner across the whole Bay system.

Objectives:

- Restore, enhance, protect and manage submerged aquatic vegetation.
- Protect, enhance, and restore wetlands, coastal sand dunes, forest buffers and other shoreline and riverine systems, important to water quality and habitat.
- Conserve soil resources and reduce erosion and sedimentation to protect Bay habitat.
- Maintain freshwater flow regimes necessary to sustain estuarine habitats, including, where appropriate, establishing minimum instream flows.
- Develop compatible Bay-wide stock assessment programs.
- Develop Bay-wide fisheries management strategies and develop complementary state programs and plans to protect and restore the finfish and shellfish stocks of the Bay, especially the freshwater and estuarine spawners.
- Provide for the restoration of shellfish stocks in the Bay, especially the abundance of commercially important species.
- Restore, enhance and protect waterfowl and wildlife.

Commitment: To achieve this goal we agree:

- By January 1988, to develop and adopt guidelines for the protection of water quality and habitat conditions necessary to support the living resources found in the Chesapeake Bay system, and to use these guidelines in the implementation of water quality and habitat protection programs.
- By July 1988, to develop, adopt, and begin to implement a Baywide

The first "due date" in the new Agreement was fulfilled in January 1988 with the adoption of the document, "Habitat Requirements for Chesapeake Bay Living Resources." The habitat guidelines were developed by the Chesapeake Bay Program Living Resources Task Force over the previous two years.

Two additional commitments were met in July 1988 with adoption of a schedule for developing Baywide resource management strategies and a plan for Baywide stock (fish) assessment. Maryland, Virginia, and the District of Columbia, with the support of NOAA and the U.S. Fish and Wildlife Service, have traditionally conducted individual stock assessments. However, there has never been a comprehensive program to provide long-term data for finfish and shellfish throughout the Bay system. Data needs include better information on catches and fishing effort, and biological statistics on length, age, weight and sex of Bay species. In addition to these data from commercial and recreational fisheries, plans are to be completed in spring 1989 for a Baywide trawl survey to obtain independent estimates of abundance and distribution.

A comprehensive wetlands policy approved by the Executive Council outlines a wide range of actions to protect existing wetlands and to acquire lands suitable for wetland creation projects. A goal of the wetlands plan is "no net loss" of wetlands in the Bay region. Implementation plans in eight categories ranging from research to education are to be completed by July 1990.

A report on the removal of impediments to fish migration was submitted to the Executive Council by a Fish Passage Workgroup. Among other recommendations, the panel called for a comprehensive inventory of obstructions to fish migration and offered a multi-faceted approach to bring about their removal.

plan for the assessment of commercially, recreationally, and selected ecologically valuable species.

- By July 1988, to adopt a schedule for the development of Baywide resource management strategies for commercially, recreationally and selected ecologically valuable species.

- By July 1989, to develop, adopt and begin to implement Baywide management plans for oysters, blue crabs and American shad. Plans for other major commercially, recreationally and ecologically valuable species should be initiated by 1990.

- By December 1988, to develop, and begin to implement a Baywide policy for the protection of tidal and non-tidal wetlands.

- To provide for fish passage at dams, and to remove stream blockages wherever necessary to restore passage for migratory fish.

Water Quality

Goal: Reduce and control point and nonpoint sources of pollution to attain the water quality condition necessary to support the living resources of the Bay.

The improvement and maintenance of water quality are the single most critical elements in the overall restoration and protection of the Chesapeake Bay. Water is the medium in which all living resources of the Bay live, and their ability to survive and flourish is directly dependent on it.

The pledge to achieve a 40 percent reduction by the year 2000 in amounts of nitrogen and phosphorus reaching the Bay is the most specific--and one of the most challenging--of all the commitments included in the 1987 Agreement.

The strategy adopted to meet the reduction goal lists actions in three phases: 1985 (base year for figuring reductions from point sources) to July 1988; July 1988 to the end of 1991, and 1991 to the year 2000. The strategy describes reduction programs that would be undertaken by the four jurisdictions.

The plan calls for annual progress reports to keep the public informed and to outline modifications in the strategy that may be adopted.

The three-dimensional, time-variable model now in development is to be completed in March 1991, with scenario runs scheduled to begin six months earlier. Those modeling results will be an important element in the reevaluation of the nutrient reduction goal required in 1991.

To ensure the productivity of the living resources of the Bay, we must clearly establish the water quality conditions they require and must then attain and maintain these conditions. Foremost, we must improve or maintain dissolved oxygen concentrations in the Bay and its tributaries through a continued and expanded commitment to the reduction of nutrients from both point and nonpoint sources. We must do the same for toxics and conventional pollutants. To be effective, we will develop basin-wide implementation plans for the control and reduction of pollutants which are based on our best understanding (including that derived from modeling) of the Bay and its tributaries as an integrated system.

Objectives:

- Provide timely construction and maintenance of public and private sewerage facilities to assure control of pollutant discharges.

- Reduce the discharge of untreated or inadequately treated sewage into Bay waters from such sources as combined sewer overflows, leaking sewage systems, and failing septic systems.

- Evaluate and institute, where appropriate, alternative technologies for point source pollution control, such as biological nutrient removal and land application of effluent to reduce pollution loads in a cost-effective manner.

- Establish and enforce pollutant limitations to ensure compliance with water quality laws.

- Reduce the levels of nonpoint sources of pollution.

- Reduce sedimentation by strengthening enforcement of existing sediment control regulations.

- Eliminate pollutant discharges from recreational boats.

- Identify and control toxic discharges to the Bay system, including metals and toxic organics, to protect water quality, aquatic resources and human health through implementation and enforcement of the states' National Pollutant Discharge Elimination Discharge System permit programs and other programs.

- Reduce chlorine discharges in critical finfish and shellfish areas.

- Minimize water pollution incidents and provide adequate response to pollutant spills.

- Manage sewage sludge, dredged spoil and hazardous wastes to protect the Bay system.

- Manage groundwater to protect the water quality of the Bay.

- Quantify the impacts and identify the sources of atmospheric inputs to the Bay system.

A Bay basin toxics reduction strategy accepted by the Executive Council sets forth a phased approach to identify and control toxics from point and nonpoint sources and to design and implement a monitoring program that will define the threat from contaminated sediments. Strategy milestones include the implementation of a broader pesticide monitoring program in December 1990 and the inclusion of monitoring requirements in all major point source discharge permits by July 1991.

Commitment: To achieve this goal we agree:

- By July 1988 to develop, adopt, and begin implementation of a basin-wide strategy to equitably achieve by the year 2000 at least a 40 percent reduction of nitrogen and phosphorus entering the main stem of the Chesapeake Bay. The strategy should be based on agreed-upon 1985 point source loads and on nonpoint loads in an average rainfall year.

- By December 1991, to re-evaluate the 40 percent reduction target based on the results of modeling, research, monitoring and other information available at that time.

The strategy for managing conventional pollutants (BOD, suspended solids, pH, temperature, bacterial contamination, and sediment) calls for aggressive action to improve and enforce current control programs. An annual conference is called for to exchange information on program developments to aid all jurisdictions in achieving Bay restoration objectives.

- By December 1988, to develop, adopt, and begin implementation of a basin-wide strategy to achieve a reduction of toxics consistent with the Water Quality Act of 1987 which will ensure protection of human health and living resources. The strategy will cover both point and nonpoint sources, monitoring protocols, enforcement of pretreatment regulations and methods for dealing with in-place toxic sediments where necessary.

- By July 1988, to develop and adopt a basin-wide implementation strategy for the management and control of conventional pollutants as required by the Water Quality Act of 1987, entering the Chesapeake Bay system from point and nonpoint sources.

- By July 1988, the Environmental Protection Agency, acting for the Federal Government, will develop, adopt, and begin implementation of a strategy for the control and reduction of point and nonpoint sources of nutrient, toxic, and conventional pollution from all federal facilities.

Seven Federal agencies with facilities in the Bay basin joined in formulating the strategy to control and reduce pollution from their facilities. They were the Department of Defense, Corps of Engineers, Soil Conservation Service, U.S. Geological Survey, Fish and Wildlife Service, National Oceanic and Atmospheric Administration, and the Federal Highway Administration. Each of the agencies has its own implementation schedule, but all are to have programs fully under way by April 30, 1989. The Federal Highway Administration is a new participant in the Bay Program.

Population Growth and Development

Maryland's Anne Arundel County earned an environmental award from EPA's Region III for its innovative technique to alert the public against misuse of storm sewers. The county's park and planning agency provided stencils and community volunteers gave their time to paint the slogan, "DON'T DUMP ... Chesapeake Bay Drainage," on curbside storm drains.

The Year 2020 Panel, whose membership includes developers, university faculty members, business people, and local government officials, presented its report to the Chesapeake Executive Council at the Council's annual meeting. Panel deliberations over a nine-month period included open meetings in each State and the District of Columbia to hear citizen views. This Panel report details the consequences of unmanaged growth and development, given the population increase of 2.6 million people anticipated within the Bay basin by the year 2020, and suggests actions to protect the future of the Bay region.

Goal: Plan for and manage the adverse environmental effects of human population growth and land development in the Chesapeake Bay watershed.

There is a clear correlation between population growth and associated development and environmental degradation in the Chesapeake Bay system. Enhancing, or even maintaining, the quality of the Bay while accommodating growth will frequently involve difficult decisions and restrictions and will require continued and enhanced commitment to proper development standards. The States and the Federal government will assert the full measure of their authority to mitigate the potential adverse effects of continued growth.

Local jurisdictions have been delegated authority over many decisions regarding growth and development which have both direct and indirect effects on the Chesapeake Bay system and its living resources. The role of local governments in the restoration and protection effort will be given proper recognition and support through State and Federal resources.

States will engage in an active partnership with local governments to establish policy guidelines to manage growth and development.

Objectives:

- Designate a State-level office responsible for ensuring consistency with this Agreement among the agencies responsible for comprehensive oversight of development activity, including infrastructure planning, capital budgets, land preservation and waste management.
- Provide local governments with financial and technical assistance to continue and expand their management efforts.
- Consult with local government representatives in the development of Chesapeake Bay restoration and protection plans and programs.
- Identify and give public recognition to innovative and otherwise noteworthy examples of local government restoration and protection-related programs.
- Assure that government development projects meet all environmental requirements.
- Promote, among local, State, and federal governments, and the private sector, the use of innovative techniques to avoid and, where necessary, mitigate the adverse impacts of growth.

Commitment: To achieve this goal, we agree:

- To commission a panel of experts to report, by December 1988, on anticipated population growth and land development patterns in the Bay region through the year 2020, the infrastructure requirements

necessary to serve growth and development, environmental programs needed to improve Bay resources while accommodating growth, alternative means of managing and directing growth, and alternative mechanisms for financing governmental services and environmental controls. The panel of experts will consist of twelve members: three each from Virginia, Maryland, and Pennsylvania, and one each from the District of Columbia, Environmental Protection Agency, and the Chesapeake Bay Commission.

- By January 1989, to adopt development policies and guidelines designed to reduce adverse impacts on the water quality and living resources of the Bay, including minimum best management practices for development and to cooperatively assist local governments in evaluating land-use and development decisions within their purview, consistent with the policies and guidelines.

- To evaluate state and federal development projects in light of their potential impacts on the water quality and living resources of the Chesapeake Bay, and design and carry out each State and Federal development project so as to serve as a model for the private sector in terms of land-use practices.

- By December 1988, to develop a strategy to provide incentives, technical assistance and guidance to local governments to actively encourage them to incorporate protection of tidal and non-tidal wetlands and fragile natural areas in their land-use planning, water and sewer planning, construction, and other growth-related management processes.

Bay watershed development policies and guidelines adopted by the Executive Council provide a perspective for judging whether land is developed in a manner that protects the quality of the Bay. The report includes a series of follow-up actions and plans to be completed in 1989 and beyond. Reviews of State and Federal adherence to these policies/guidelines are to be completed by July 1990.

The strategy on technical assistance and incentives, adopted by the Executive Council, includes a matrix showing incentives and technical assistance now available to local governments, including program name, geographic area covered, program description, and contact person. It also outlines a process for integrating educational, technical assistance, and incentive elements developed under the 1987 Agreement and proposes a continuing role for the Local Government Advisory Committee as part of this process.

Public Information, Education and Participation

Goal: Promote greater understanding among citizens about the Chesapeake Bay system, the problems facing it, the policies and programs designed to help it, and to foster individual responsibility and stewardship of the Bay's resources.

Goal: Provide increased opportunities for citizens to participate in decisions and programs affecting the Bay.

The understanding and support of the general public and interests groups are essential to sustaining the long-term commitment to the restoration and protection of the Chesapeake Bay system and its living resources. Citizens must have opportunities to learn about that system and associated management policies and programs and must be given opportunities to contribute ideas about how best to manage that natural system.

Objectives:

- Provide timely information on the progress of the restoration program.

- Assure a continuing process of public input and participation in policy decisions affecting the Bay.

State and Federal agencies completed communication plans in early spring. A unified, Baywide plan, completed in May 1988, includes comprehensive procedures to encourage public review and comment on plans and strategies as they are developed to meet Agreement commitments.

The first Governors Cup Fishing Tournament, which is to be one of a series of annual Baywide Watershed Awareness events to promote restoration efforts, was held July 30-31, 1988.

- Enhance Bay-oriented education opportunities to increase public awareness and understanding of the Bay system.
- Provide curricula and field experiences for students.
- Promote opportunities to involve citizens directly in Bay restoration efforts.
- Coordinate the production and distribution of Bay information and education materials.

Commitment: To achieve these goals, we agree:

- To conduct coordinated education and information programs to inform the general public, local governments, business, students, community associations, and others of their roles, responsibilities, and opportunities in the restoration and protection effort, and to promote public involvement in the management and decision-making process.
- To provide for public review and comment on all implementation plans developed pursuant to this agreement.
- By March 1988, to develop state and federal communication plans for public information, education, and participation, and by May 1988, o develop a unified, Bay-wide communication plan.
- To promote Chesapeake Bay restoration efforts by establishing an annual Bay-wide series of Chesapeake Bay Watershed Awareness events, to include a Governors' Cup Fishing Tournament.

Public Access

Goal: Promote increased opportunities for public appreciation and enjoyment of the Bay and its tributaries.

Interest in and commitment to the Chesapeake Bay and its tributaries are greatly affected by personal contact with that natural system. Consequently, improved opportunities for access to the shores and waters of the system are essential if public awareness and support are to be maintained and increased.

Objectives:

- Improve and maintain access to the Bay including public beaches, parks and forested lands.
- Improve opportunities for recreational and commercial fishing.
- Secure shoreline acreage to maintain open space and provide opportunities for passive recreation.
- Secure necessary acreage to protect unique habitat and environmentally sensitive areas.

Commitment: To achieve this goal we agree:

- To intensify our efforts to improve and expand public access opportunities being made available by the Federal government, the States, and local governments, by developing a strategy, which includes an inventory of current access opportunities by July 1988, which targets state and federal actions to secure additional tidal shorefront acres by December 1990 along the Bay and it tributaries.

- By December 1988, to prepare a comprehensive guide to access facilities and the natural resource system for the tidal Chesapeake Bay.

A State-Federal task group completed an inventory of public access facilities in the Bay watershed in mid-1988. A comprehensive guide to the many public access sites around the Chesapeake Bay and in the Susquehanna River basin will become available early in 1989. The attractive guidebook will include more that a score of regional maps along with descriptions of recreational and historic attractions in the watershed and an easy-to-use master matrix providing specific information on each site. The guide also will introduce readers to the history and ecology of the Bay. For information about the availability of the book, call Karen Meyer at (301) 974-7231 or Derral Jones at (804) 786-9042.

Governance

Goal: Support and enhance the present comprehensive, cooperative, and coordinated approach toward management of the Chesapeake Bay system.

Goal: Provide for continuity of management efforts and perpetuation of commitments necessary to ensure long-term results.

The cooperation necessary to sustain an effective Chesapeake Bay restoration and protection effort requires a formal working arrangement involving the States and the Federal government. That institutional arrangement must allow for and promote voluntary individual actions coordinated within a well-defined context of the individual responsibilities and authorities of each State and the Federal government. It must also ensure that actions which require a concerted, Bay-wide approach be addressed in common and without duplication. One of the principal functions of the coordinating institution is to develop strategic plans and oversee their implementation, based on advice from the public, from the scientific community, and from user groups.

In addition, the coordinating body must exert leadership to marshall public support, and it must be accountable for progress made under the terms of this agreement. The coordinating body will continue to be the Chesapeake Executive Council. The Chesapeake Executive Council shall be comprised of the Governors, the Mayor of the District of Columbia, the Administrator of the Environmental Protection Agency, and the Chairman of the Chesapeake Bay Commission. The chairmanship of the Council shall rotate annually as determined by the Council. The term of the chairman shall be one year. The Administrator of the Environmental Protection Agency shall represent the federal government, and the chairman of the Chesapeake Bay Commission shall represent all Commission members.

Since the first Bay Agreement was signed in 1983, State and Federal staff members from many agencies have worked together on committees to develop and implement comprehensive cooperative programs, trade ideas and exchange technical information. The 1987 Agreement recognizes the need for institutional arrangements that will assure continuation of these interactions.

Objectives:

- Continue to demonstrate strong, regional leadership by convening an annual public meeting of the Chesapeake Executive Council.

- Continue to support the Chesapeake Executive Council and provide for technical and public policy advice by maintaining strong advisory committees.

Under the 1987 Agreement, the signatories themselves (the three Governors, Mayor of DC, EPA Administrator, and Chesapeake Bay Commission Chairman) make up the Executive Council. Formerly, its members were State department heads and their Federal counterparts.

- Coordinate Bay management activities and develop and maintain effective mechanisms for accountability.

- The Chesapeake Bay Liaison Office shall provide staff support to the Chesapeake Executive Council by providing analyses and data management, and by generating reports related to the overall program. The Implementation Committee shall provide guidance to the Chesapeake Bay Liaison Office Director in all matters relating to support for the Council and its supporting committees, subcommittees, and work groups, including the development of all plans and documents associated with the Council.

A living resources monitoring plan adopted in July 1988 provides a framework for sustained monitoring of major "ecosystem components" -- finfish; shellfish; wildlife; and plant, benthic faunal, and planktonic communities.

- Examine the feasibility of joint funding support of the Chesapeake Bay Liaison Office.

- Track and evaluate activities which may affect estuarine water quality and resources and report at least annually.

- Develop and maintain a coordinated Chesapeake Bay data management system.

- Continue to implement a coordinated Bay-wide monitoring system and develop a Bay-wide living resource monitoring system.

The first annual Chesapeake Bay work plan is now in development, with completion anticipated in early1989.

- Develop and implement a coordinated Bay-wide research program.

Commitment: To achieve these goals we agree:

- To develop an annual Chesapeake Bay work plan endorsed by the Chesapeake Executive Council.

The comprehensive research plan developed in response to the Agreement establishes a mechanism for an annual assessment of Chesapeake Bay Program research activities and the identification of priority research needs. A research implementation group has been established to review funding sources and to evaluate and recommend additional financial options.

- To continue to support Baywide environmental monitoring and research to provide the technical and scientific information necessary to support management decisions.

- To strengthen the Chesapeake Bay Liaison Office by assigning, as appropriate, staff persons from each jurisdiction and from participating federal agencies to assist with the technical support functions of that office.

- By July 1988, to develop and adopt a comprehensive research plan to address the technical needs of the Chesapeake Bay Program, to be evaluated and updated annually.

A 20-member Local Government Advisory Committee named in response to the Agreement commitment is chaired by Gerald W. Hyland, Fairfax County (Virginia) Board of Supervisors. The committee sponsored a three-day conference in November 1988 to stimulate participation by local officials in the Bay Program.

- By July 1988, to develop a Baywide monitoring plan for selected commercially, recreationally, and ecologically valuable species.

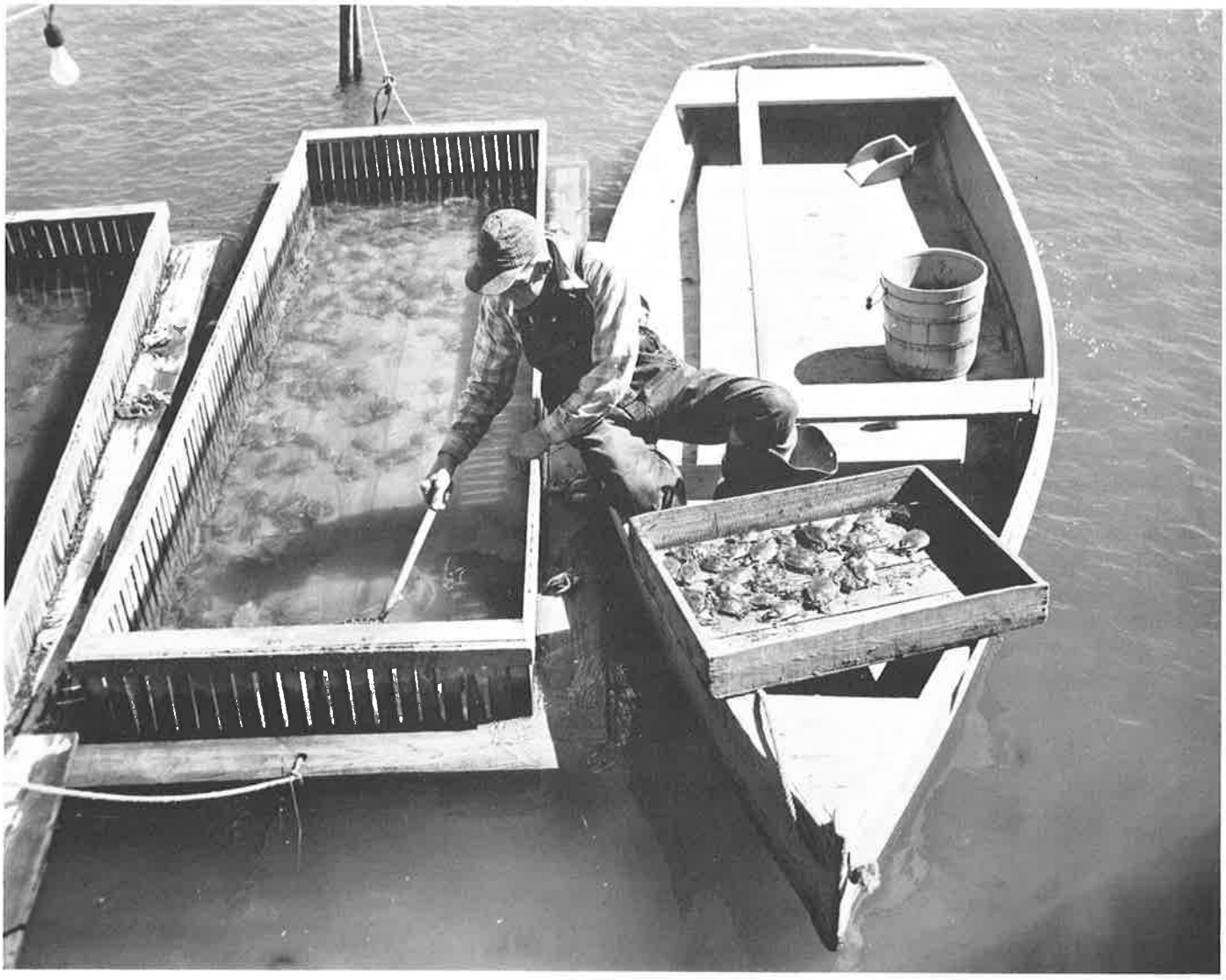
- By March 1988, to establish a local government advisory committee to the Chesapeake Executive Council and charge that committee to develop a strategy for local government participation in the Bay program.

- To consider and review the feasibility of establishing an independent Chesapeake Bay Executive Board.

- By July 1988, the Environmental Protection Agency, acting for the federal government, will develop a coordinated, federal agency

workplan which identifies specific federal programs to be integrated into a coordinated federal effort to support the restoration of the Chesapeake Bay.

By this Agreement, we reaffirm our commitment to restore and protect the ecological integrity, productivity, and beneficial uses of the Chesapeake Bay system. We agree to report in January 1989 on progress made in fulfilling the commitments in this agreement, and to consider at that time additional commitments. The implementation strategies which will be developed pursuant to this agreement will be appended as annexes, and annual reports will include an accounting of progress made on each strategy.



Bay Program Activities

The signing of the 1987 Agreement was an important milestone in the evolution of the Chesapeake Bay restoration and protection program, but it did not represent a change in direction. The program's focus on living resources and water quality in 1987 and earlier provided a solid foundation for major commitments spelled out in the new compact. Continued progress of State and Federal agencies in other areas as well as the work of Bay Program committees and subcommittees also contributed to the development of the compact signed in December.

The State of the Bay

"The State of the Chesapeake Bay," the second annual report of the Monitoring Subcommittee, was published in March 1987. The report summarized data collected at 167 stations from June 1984 through September 1985, laying the groundwork for a store of coordinated information that in time will enable Bay managers to determine long-term trends in the character of the estuary and the driving forces behind them. Eventually, the monitoring program is expected to establish the link between water quality and the health of the Bay's living resources and help to distinguish the effects of natural events from the changes induced by human activities.

Part of the report deals with the physical-chemical characteristics of the Bay: flows, salinity, dissolved oxygen, chlorophyll *a*, nutrients, sediments and toxicants. Another section deals with living resources, ranging from plankton, the first link in the food chain, to submerged aquatic vegetation, finfish and shellfish.

The monitoring period included two distinctly different years, with 1984 characterized as "wet" and 1985 as "dry." Higher streamflows in 1984 brought large pulses of nutrients, which triggered heavy plankton growth and larger areas of oxygen-poor waters. Dry 1985 brought higher salinities with less clearly defined surface-to-bottom salinity differences and some improvement in deep-water oxygen conditions. The monitoring results also underscored the uniqueness of patterns within each Bay sub-basin as well as the importance of Baywide relationships.

The monitoring program has not yet collected sufficient data to document the effects of control programs, but the Subcommittee said the 1984-85 observations represented "a solid start toward establishing a base-line characterization."

A comprehensive technical compendium was issued as a companion publication to the summary report.

Projecting the State of the Bay

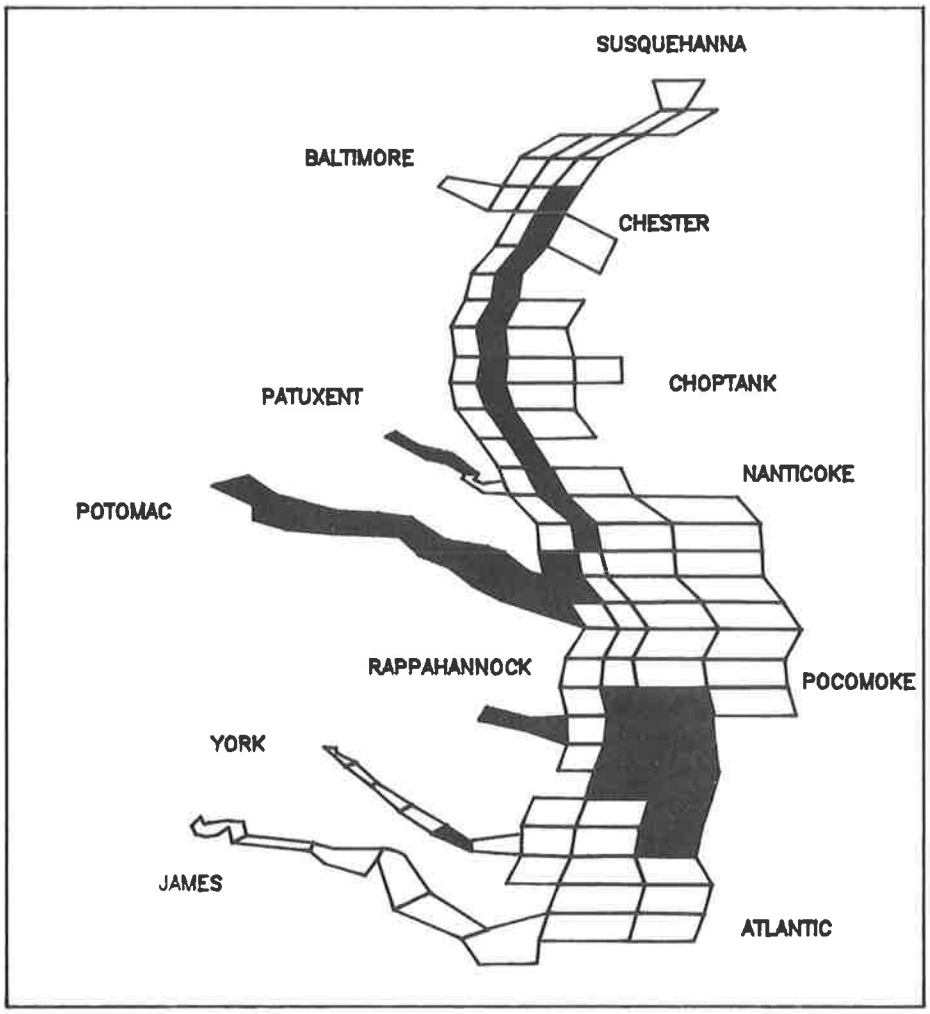
Development of the Steady-State Water Quality Model of the Bay and major tributaries was completed in March 1987, providing a valuable tool for Bay managers. It was used in conjunction with the watershed model--which simulated the production and delivery of nutrients to the Bay--to demonstrate the effects of different nutrient levels as well as results that could be expected from various control options.

Numerous scenarios were run to evaluate the impact of various strategies for the control of nutrients from both point and nonpoint sources. Model projections became the basis for the 40 percent nutrient reduction goal eventually adopted as part of the Bay Agreement. Modeling data showed that reductions at that level could achieve many of the habitat goals established to protect living resources of the Bay.

Work was initiated in October 1987 on the development of a three-dimensional, time-variable eutrophication model of Chesapeake Bay, the second phase of the Bay Program Modeling Strategy. The time-variable model will address issues beyond the capabilities of the steady-state model and produce results which will merit a higher degree of confidence than those obtained previously.

The time-variable model will be capable of assessing:

- the impact of controls on Bay bottom sediment processes, which control Bay water quality;
- the impact of the spring non-point source load;



- lateral water quality variations in the Bay;
- the water quality response of area-specific controls (sub-basin or zone);
- time required for Bay to respond to controls;
- the increase and causes of anoxia since 1950.

Information developed through this project will provide a scientific basis for the 1991 reassessment of the 40 percent nutrient reduction target required under the 1987 Agreement.

The time-variable modeling project is to be accomplished by the Corps of Engineers' Waterways Experiment Station under a joint funding arrangement with EPA spelled out in a Memorandum of Understanding approved in August 1987. In addition to Corps technical personnel, consultants with specialized expertise in modeling and water quality evaluations are contributing significantly to the project. The Chesapeake Bay Program's Modeling Subcommittee along with an expert panel, the Model Evaluation Group, are responsible for overseeing and monitoring progress of the modeling project.

Four technical workshops were held to develop recommendations which have been incorporated into a work plan for development of the model. Work on the project is scheduled for completion in March 1991, with the last six months of the study devoted to use of the model in assessing various management scenarios.

Geographic Information System

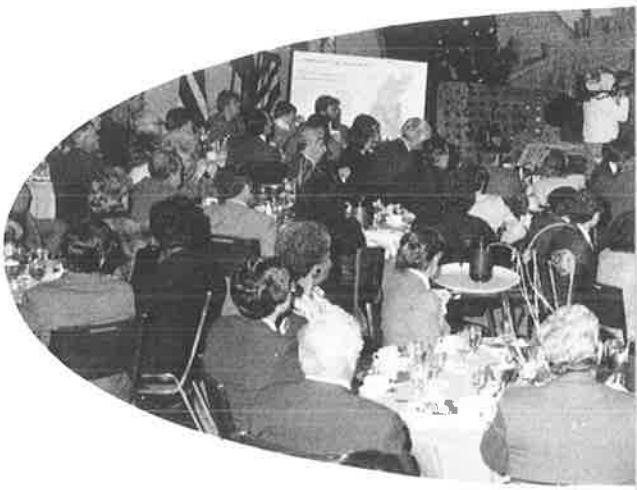
The Bay Program gained another powerful analytic tool with the acquisition of the ARC/INFO geographic information system (GIS) in the fall of 1987. GIS provides a capability to display spatial data in multiple ways that show the complex relationships among various elements of the environment. The system can be used to map changes from year to year in distributions of the Bay's living resources such as oysters and submerged aquatic vegetation. Water quality data can be mapped over these distributions to graphically demonstrate the relationship between one and the other. The proximity of such resources to different land uses can be shown, and natural factors such as salinity and temperature can be illustrated to show potential sources of impact.

After acquisition of the system, the first priority was to build a map data base to support the needs of the Bay Program. Information on land use, streams and rivers, Bay shorelines, watershed boundaries, political boundaries, distribution of living resources, and agricultural activities is now part of the system--more than 5000 data files overall covering the entire Bay basin.

GIS data are organized as "points" (e.g., monitoring stations), "lines" (e.g., streams), or "polygons" (e.g., oyster beds). Various attributes--water temperature, the depth of a stream, etc.--can be ascribed to these features. All features are geo-referenced so they can be analyzed in spatial relationship to one another.

One of the first uses of the system was to create simple maps showing interchanges on the Baltimore

Former U.S. Senator Charles McC. Mathias of Maryland speaks at signing ceremony.



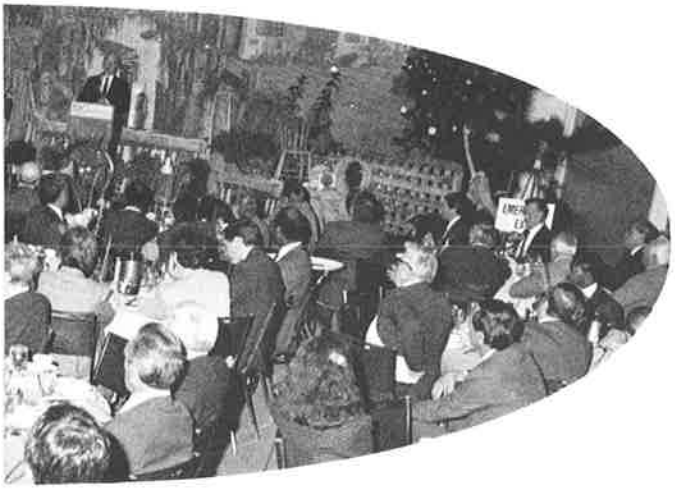
Breakfast gathering

Press photographer meets Governors Schaefer and Baliles as they enter room for signing ceremony.

It's official! Signing new Agreement, from left, Kenneth J. Cole Marion Barry of the District of Columbia; Governors Robert P. C L. Baliles of Virginia; and Lee M. Thomas, Administrator of the

There had to be oysters! Donald Murray, director of District of Columbia Department of Consumer and Regulatory Affairs, EPA Administrator Thomas and Governor Schaefer chat over succulent snack during reception.

Panel fields questions from floor during one of twelve



ɔding signing ceremony.

Edwina H. Coder and Maurice Lynch receive awards in recognition of their services as chairmen, respectively, of Citizens Advisory Committee and Scientific and Technical Advisory Committee.

ryland, 1987 Chairman of the Chesapeake Bay Commission; Mayor of Pennsylvania; William Donald Schaefer of Maryland, and Gerald nvironmental Protection Agency.

Mayor Barry adds his signature to display, "A Commitment to the Chesapeake Bay."

hops conducted in conjunction with Agreement signing.

Bay Commission Chairman Cole and Governors Baliles and Schaefer compare notes during tour of Bay exhibits on display at Baltimore Convention Center.

Beltway where wetlands could be created to control urban runoff. In a second study, oyster habitat was mapped in conjunction with water quality monitoring data to identify locations where improvements in quality would do the most good. GIS also is being used to sort agricultural county data into tributary basins for use in the Bay Program watershed model.

In addition to making possible more in-depth analyses of the interactions of water quality and living resources, GIS also will be used to map results of model runs, providing pictorial displays to facilitate understanding of scenario results.

Publications

A comprehensive report on the status and future directions of the Bay Program was prepared in 1987 under the direction of the Implementation Committee and published early in 1988 following the signing of the Bay Agreement. Entitled "A Commitment Renewed: Restoration Progress and the Course Ahead Under the 1987 Bay Agreement," the 88-page publication explores in some depth issues related to living resources goals, the control of nutrients, managing toxic pollutants, and program research needs. Technical appendices were published in a separate volume.

A two-year study by an ad hoc Living Resources Task Force culminated in August 1987 with acceptance of its report by the Implementation Committee. "Habitat Requirements for Chesapeake Bay Living Resources" subsequently was adopted by the Executive Council in January 1988, the first commitment met under the 1987 Agreement. The habitat requirements report will be used in conjunction with EPA water quality criteria, State water quality standards, and other information to refine data on the conditions necessary to protect the Bay's living resources. The Imple-mentation Committee has established a Living Resources Subcommittee as a permanent panel to carry on the work of the task force.

Also published in 1988 was "Chesapeake Bay Nonpoint Source Programs," a 122- page report describing current programs to control nonpoint pollution, achievements in removing pollutants, and recommendations for future actions.

Twenty-three new publications in the Chesapeake Bay Technical Report Series went to press in 1987-88. They are listed at the end of this report.

Scientific and Technical Advisory Committee

The Chesapeake Bay Program's Scientific and Technical Advisory Committee (STAC) played an active role in shaping the 1987 Bay Agreement.

Formed in 1984, the 20-member advisory panel includes representation from major university and research institutions in Pennsylvania, Maryland, Virginia and the District of Columbia. Its work includes the review of program documents and scientific activities, participation in technical subcommittees, sponsorship of workshops, and the dissemination of scientific information relevant to the Bay.

In discussions that preceded the drafting of the Agreement, STAC recommended that the new pact provide for:

- measurable goals to be attained through Bay restoration efforts
- more emphasis on establishing the linkage between water quality and the health of key species
- a duel nutrient control strategy involving biological removal of both phosphorus and nitrogen by wastewater treatment plants in the watershed
- a basin-wide toxics control strategy
- expanded biological monitoring and the use of new monitoring techniques in Bay waters
- timely identification of research needs

STAC also participated in the review of the draft Agreement that was approved in August 1987, urging a stronger commitment to the control of toxic materials and endorsing the draft's focus on population growth and development. Subsequent to the signing of the Agreement, STAC spearheaded development of the comprehensive research plan which was accepted by the Chesapeake Executive Council in July 1988.

STAC gave major attention in 1987 to the review of modeling projects, including scenarios run on the steady-state model, revision of the Chesapeake Basin Model, and plans for collecting sediment data to be utilized in the time-variable model now being developed for the Bay program.

STAC's work in the area of communicating scientific information included production of the report, "Available Technology for the Control of Nutrient Pollution in the Chesapeake Bay." The 113-page publication consolidates in one volume up-to-date information on technologies available to reduce pollution from combined sewer overflows, nonpoint sources (both urban and rural), and point sources.

Sections on efficiency, economics, and advantages and disadvantages of each technology can help ease the task of matching an appropriate technology to a given situation.

In March 1988, STAC co-sponsored a Baywide research conference to help disseminate the newest scientific information about the Bay. More than 300 research scientists, resource managers and other interested individuals attended the Baltimore conference.

Under the 1987 Agreement, STAC will have a continuing role in implementation of the research plan in addition to providing scientific and technical oversight and guidance for the Bay Program as a whole and serving as a communications link between the Program and the scientific research community.

Citizens Advisory Committee

The 1987 Chesapeake Bay Agreement became a major focus for Citizen Advisory Committee activities after its preliminary approval in draft form in August 1987.

The Committee sponsored a series of nine public meetings to solicit comments on the Agreement draft, and subsequently proposed additional commitments and other changes to strengthen the new cleanup pact. The Agreement signed in December 1987 included many modifications as a result of the review process.

The Alliance for the Chesapeake Bay (formerly the Citizens Program for the Chesapeake Bay), which conducts public outreach under grants from EPA, organized the public meetings on the Agreement and provided other staff support to CAC during the year.

Alliance staff members conducted some 40 briefings throughout the Bay basin to business organizations, watermen's associations, farm groups and other interested organizations. A series of nine public "roundtable" meetings in October 1987 was attended by more than 500 persons. At the roundtable sessions, citizens had the opportunity to meet with State and Federal legislators and administrators to discuss key issues central to the new compact. Sessions were held in Richmond, Norfolk, Fairfax, Annapolis, Baltimore, Easton, Harrisburg, Lewisburg and the District of Columbia.

The Alliance sponsored a two-day conference, "The Chesapeake at Risk: Towards a Toxics Strategy," in Richmond on October 20-21, 1988, coinciding with public consideration of the proposed toxics reduction strategy. At the meeting, speakers representing the scientific community, government, agriculture, major corporations and public interest groups addressed the complex issues posed by toxic contaminants in the Bay basin.

Local Government Advisory Committee

The 1987 Bay Agreement called for the creation of a Local Government Advisory Committee to be charged with the task of developing a strategy for local government participation in the Bay Program. This new panel was established in the spring of 1988 with appointment of 20 members representing varied levels of local government in Virginia, Pennsylvania, Maryland and the District of Columbia. Gerald W. Hyland, a member of the Fairfax County (Virginia) Board of Supervisors, was chosen by the group as its first chairman.

The Committee has the challenging assignment of representing the diverse interests of some 2,000 governments within the 64,000 square mile Bay watershed and seeking to enlist those jurisdictions into active participation in restoration.

"Saving the Bay," a three-day conference for local officials, was sponsored by the Committee in November 1988 as a first step toward aquainting elected and appointed officials with major elements of the Bay Program and the role cities, towns, and counties can play in the restoration. Discussions from the conference will contribute to formulation of the local government participation strategy in 1989.

The Committee will play a continuing role in disseminating information on development guidelines, wetlands protection policies, and other Bay Agreement implementation activities that directly involve local government decision-making. In addition to other communication activities, the Committee plans to distribute a quarterly newsletter to local officials to keep them abreast of Bay Program developments. The Committee also will serve as a channel to bring the concerns of local government jurisdictions to the Executive Council and Bay Program committees.

State & Federal Agency Activities

Living Resources

State and Federal agencies have a variety of programs under way to aid in restoration of Chesapeake Bay living resources and habitats.

Fisheries Restoration. Virginia and Maryland are working with the U.S. Fish and Wildlife Service (FWS) in a striped bass restoration program that involves catching brood fish and raising fingerlings for later release. More than one million fingerlings have been released since 1985. Specially tagged for later identification, the hatchery-raised fingerlings are expected to help improve wild breeding stocks.

Maryland has had a moratorium on taking rockfish in effect since 1985 as a key element of its striped bass conservation program. The State has released more than 800,000 striped bass six to nine inches in length and 300,00 to 400,000 fingerlings. These fish were raised in a cooperative program with the business community, including the Baltimore Gas and Electric Company and the Potomac Electric Power Company.

Virginia has budgeted more than $400,000 over the current biennium for equipment, personnel, and operating costs of programs to improve striped bass populations. In addition, the state has allocated $390,000 to expand hatchery facilities, including the acquisition of additional hatching/holding tanks.

The District of Columbia has promulgated regulations for the protection of striped bass, and allocated additional resources for enforcement in 1988.

Pennsylvania and Maryland continue to cooperate in expanding programs to promote restoration of the American shad in the Susquehanna River, once a prime spawning ground for the species. In 1988, 4,500 prespawn adult shad were trapped below the Conowingo Dam and released to continue their migration to upstream spawning areas. Since 1980, a total of 50,000 shad have been released above the dam; of these, 33,000 were brought in from other river basins. The Pennsylvania Fish Commission rears shad to send to the ocean at its Juniata River hatchery; some 74 million fry and 900,000 fingerlings have been released over the past 13 years.

Maryland completed plans for the management of American shad, Hickory shad, Blueback herring and Alewife herring--all migratory species that use the Bay and its tributaries as spawning and nursery grounds.

Virginia's Fisheries Management Division is responsible for improving and maintaining critical finfish and shellfish stocks. It develops methods to reduce fish mortality, gather biological data and catch statistics, and rebuild and maintain spawning stocks.

The Commonwealth also continued to expand artificial fishing reefs off Wachapreague Inlet, east of the Chesapeake Bay Light Tower, and east of Cape Charles. Forty concrete "igloos" were added to the artificial reef off Ocean View.

With funding provided under a $900,000 state grant and $300,000 from the city of Richmond, fishways are to be constructed at the first two dams on the James River to allow anadromous fish to migrate to traditional spawning areas. The District of Columbia is studying barriers to fish migration

and plans to undertake appropriate remedies.

Shellfish Restoration. Both Maryland and Virginia continued programs to improve oyster habitat and transplant seed oysters in 1987.

Maryland planted nearly 5.8 million bushels of oyster shell in 1987 and transplanted more than 640,000 bushels of oyster seed over an area of 2,269 acres. Virginia put down nearly 1.9 million bushels of clean shell and transplanted about 130,000 bushels of oyster seed. The state produced 440 million eyed oyster larvae in 1987 for industry and research. Maryland's Deal Island Oyster Hatchery became fully operational, producing larvae and spat for management and research projects, including efforts to develop disease-resistant oysters.

Freshwater Flows. Projects undertaken in 1987 are a start toward the Bay Agreement objective of maintaining freshwater flow regimes to sustain estuarine habitats.

The Army Corps of Engineers initiated the Chesapeake Bay and Tributaries Reallocation Study to examine the potential of reservoir storage shifts and the development of new multipurpose reservoirs within the Bay basin as a means of meeting environmental as well as water resource needs.

Maryland conducted a comprehensive hydrological analysis of Octoraro Creek, a Susquehanna tributary, and evaluated Octoraro Reservoir operations as a prelude toward making recommendations to the Susquehanna River Basin Commission regarding freshwater flow from the creek to the Bay. Work also was initiated on a computer model to provide data on controlling salinity in the upper Bay through regulation of discharges from Conowingo Dam.

Submerged Aquatic Vegetation. SAV provides habitat and food for Bay species as well as acting as a nutrient buffer and sediment trap.

Virginia has a $150,000 program in progress to re-establish SAV by transplanting or seeding eelgrass. Thirty acres were planted from 1984 through 1986, and follow-up studies indicated a survival rate of 70 to 90 percent. In some areas, the program produced a 100-fold increase in SAV growth. Nearly 4.3 million viable seeds were harvested in the fall of 1987 for use in further plantings. The project is drawing attention from New York, New England and European nations.

Maryland completed 26 SAV transplanting projects in the Elk and Sassafras rivers and the Susquehanna Flats. The State collected 78 sediment cores from seven tributaries for analysis of SAV seeds, sediment types, and sedimentation rates.

Virginia, Maryland and the District funded mechanical harvesting of Hydrilla by the CoE in the Potomac River in the summer of 1987 and 1988. Virginia reported cutting hydrilla at 10 sites covering 18.5 acres in 1987. The previous year, hydrilla was cleared from channels to provide access to marinas at six locations. Hydrilla was cleared from eight sites in the Maryland/CoE program.

SAV populations continue to be monitored Baywide through aerial reconnaissance. Maryland, Virginia, EPA, CoE, and the U.S. Fish and Wildlife Service cooperate in carrying out the aerial surveys, which help to gauge the health of SAV in the Bay and its tributaries. Ground truthing to verify the aerial photography is carried out by FWS, the Alliance for the Chesapeake Bay, the Chesapeake Bay Foundation and the Maryland Department of Natural Resources Watermen Compensation Program.

Shoreline Systems. The protection, enhancement and restoration of wetlands, coastal sand dunes, forest buffers and other shoreline and riverine systems is a specific objective of the 1987 Bay Agreement and has been an integral part of ongoing efforts to sustain the living resources of the Bay.

Maryland, Virginia and CoE entered into a cost-sharing agreement in May 1987 to carry out a $3 million feasibility study as an extension of the Chesapeake Bay Shoreline Erosion Study initiated in 1983. Some 135 miles of critically eroding shoreline were identified during the reconnaissance phase of the project. Seven field modeling demonstration projects are in design or have been constructed in Maryland and Virginia to evaluate their cost and effectiveness to control erosion of the Chesapeake shoreline. Site-specific erosion control projects now under study would extend to another 15 reaches covering 9.3 miles of shoreline. The overall feasibility study, scheduled for completion in November 1990, is expected to produce recommendations for Federal construction of erosion control projects.

achieve a 42 percent reduction in the State's chlorine discharges to the Bay.

Maryland has virtually met it commitment for chlorine removal at wastewater treatment facilities. Chlorine removal is now on-line at 140 facilities. State bond issues have provided $1.6 million for dechlorination, including grants to the towns of Cumberland, Ridgely, Sudlersville, Hancock, Sharptown, Pocomoke City and Trappe. Two of these projects are on-line and four are under construction. Dechlorination design work is under way at Cambridge, Smith Island and White Rock.

Spoil/Sludge Disposal. The Corps of Engineers Baltimore District sponsored a regional workshop for Federal, State and local officials on beneficial uses of dredged material. Demonstrations of such beneficial uses were carried out by the Corps at Twitch Cove and Slaughter Creek with the cooperation of the National Marine Fisheries Service.

The Navy began implementation of sludge disposal programs at seven of its wastewater treatment plants in the Bay watershed. Sludge application to forest lands was initiated at several locations to reduce landfill requirements.

Ground Water. Several Pennsylvania communities have enacted ordinances regulating construction of manure storage facilities to prevent pollution of ground water. (Such facilities generally are built to SCS specifications.) Other ordinances bar the construction of on-lot septic systems if ground water nitrates are over 10 parts per million.

Acid Rain. Maryland installed liming devices in two tidal tributaries to neutralize acidity thought to be responsible for declining populations of stream-spawning fish.

Virginia initiated an assessment of acid rain at headwaters of Bay tributaries to determine whether there is a threat to spawning grounds.

Population Growth and Development

Governments in the Chesapeake Bay basin have a number of initiatives under way to cope with adverse effects of population growth and land development, one of the environmental problem areas singled out in the new Bay Agreement approved in December.

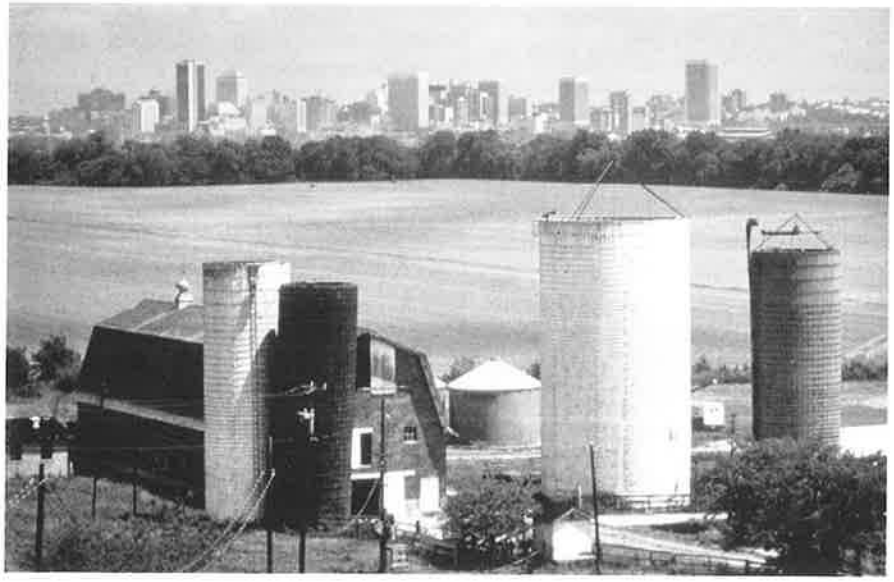
Critical Areas Program. Fifty-five of the 60 local jurisdictions included in the program had received approval of their plans by the State's Critical Areas Commission by the end of 1988, and the five plans still under review were expected to win Commission approval by the end of January 1989.

The Commission issued separate sets of draft regulations applicable to (1) the review of State agency projects, and (2) local projects which would be subject to notification requirements. Guidelines for protecting non-tidal wetlands in critical areas also were published by the Commission to assist local governments in implementing regulations.

While the Critical Areas Commission is considered to be the key factor in ensuring local government participation in the difficult task of regulating shoreline development in Maryland, the local jurisdictions also are playing a major role in the Bay restoration program through enforcement of regulations to control sedimentation and stormwater runoff.

Many local governments in the State have modified erosion and sediment control programs in recent years to improve their effectiveness. Harford County completed a comprehensive evaluation of these programs in 1987 and is amending applicable regulations on the basis of the results.

The Maryland Environmental Trust accepted 10 conservation easements on 689 acres of land in counties bordering the Bay. Vegetation buffer requirements



included in easement agreements will protect more than two miles of shoreline along Bay tributaries.

Informational and educational activities were stepped up to increase public awareness of the value of forests in the Bay restoration program. A lecture series on the Bay and its problems was initiated at Harford Community College.

Technical Assistance.

Virginia has established a Local Assistance Program in the Council on the Environment to aid localities in determining the environmental consequences of large-scale developments or other activities that are being proposed within their boundaries. This program is directed towards those localities lacking the environmental expertise to provide a timely analysis.

In 1988, the Virginia legislature passed the Chesapeake Bay Preservation Act establishing a new department and board for the purpose of protecting the Chesapeake Bay and its tributaries from inappropriate development. The Act, which is in effect throughout Tidewater Virginia, directs the Board to establish criteria to be used by local governments to delineate Chesapeke Bay Preservation Areas. The Board is also to determine criteria to be used by local governments in "granting, denying, or modifying requests to rezone, subdivide, or to use and develop land in these areas." The first set of criteria is to be established by July 1989.

The Fish and Wildlife Service also is providing technical assistance to local governments to help encourage the protection of wetlands and other valuable habitat. FWS also is evaluating land use changes as a factor affecting living resources, habitats and water quality.

Public Information, Education and Participation

The Citizens Program for the Chesapeake Bay, Inc. (CPCB), which has managed the public participation component of the Bay Program for 10 years, marked the start of its second decade in the restoration effort with several new projects and initiatives--including a change in name. CPCB became the Alliance for the Chesapeake Bay early in 1988. The Alliance is a private, non-profit federation of citizen organizations, business enterprises and scientists who have as a common goal the restoration of the Bay. It is funded by grants from EPA.

The Alliance furthered the development of grassroots citizen programs, launching a new watershed association in Maryland's Gunpowder River basin. The association brings together community and farm groups, boating clubs, and other citizens to monitor water quality and participate in other activities related to the Bay Program. The Alliance also supported similar citizen efforts in Pennsylvania's Conestoga River watershed and on the middle James River in Richmond.

Other public participation projects sponsored by the Alliance included:

- Three field trips to the Bay for State and local government decision-makers, combining "hands-on" Bay activities with evening discussion sessions to help participants better understand their role in the cleanup effort.
- Speaking appearances before more than 150 organizations.
- Production of a model quality assurance project plan and a monitoring handbook for citizen monitoring programs in the Chesapeake watershed and elsewhere.
- Initiation of a series of Chesapeake White Papers to provide in-depth reports on policy issues and program needs.

The Alliance's quarterly newsletter, "Citizen Report," continued to circulate to 15,000 readers, and the popular handbook, "Baybook: A Guide to Reducing Water Pollution at Home," went into a third printing, sending the number of copies in circulation past 100,000.

The Alliance citizen monitoring project on the Conestoga River in Lancaster County, Pennsylvania, completed its first year of operation in October 1987. The Conestoga project parallels the Alliance monitoring programs initiated in 1985 on the James River in Virginia and the Patuxent River in Maryland. The sampling by citizen volunteers helps to build a long-term data base needed to measure changes in water quality in Bay tributaries.

Other citizen participation activities included Pennsylvania's conference on the Chesapeake at Gettysburg attended by more than 1,000 people. Awards were presented to students who were winners in a Bay essay and poster contest. Four Susquehanna River Basin farmers received Clean Water Awards.

Maryland continued its annual Bay Bridge Walk/Fest, which draws some 65,000 participants. In addition to the hike across the Bay and other activities, the event offers environmental exhibits that demonstrate what Federal, State and local agencies and volunteer groups are doing to restore the Bay.

Maryland Governor Schaefer kicked off a campaign to enlist one

million Marylanders in the program to clean up the Bay. A leaflet listing 10 actions individual citizens can undertake to support the restoration was given wide circulation, and the State initiated a quarterly newsletter, "Chesapeack," which is available Basinwide to keep people informed of Bay Program developments.

Maryland's Department of Natural Resources initiated a "Plant the Bay Way" project with a landscape-garden firm in which homeowners are encouraged to put in plants that provide wildlife habitat and prevent erosion. The State's Soil Conservation Service Earth Team enlisted individuals to volunteer time to assist in soil conservation district activities. The Maryland SCS gave special recognition to 22 individuals who contributed a total of 2300 hours to conservation and water quality activities.

More than 465 Maryland youths participated in 54 projects sponsored by the State's Conservation Corps to rehabilitate the shoreline through clean-up programs and the re-vegetation of barren areas.

Virginia continued its Chesapeake Bay Youth Conservation Grants in 1987, employing 156 teenagers to work on 15 projects designed to reduce erosion and nonpoint source pollution of rivers and streams. Seven projects were completed; the others were still active at the year's end.

School Programs. Pennsylvania's Bay Education Subcommittee conducted an environmental education seminar which attracted more than 250 teachers. The Subcommittee also sponsored an environmental education workshop at Penn State University for some 300 pre-service teachers (seniors who have done student teaching).

Traveling "Bay Team Teachers" gave presentations on the Chesapeake to about 20,000 Virginia students in a program funded by the State and NOAA. The State also funded the Chesapeake Bay Foundation's on-the-water education program, which provided field trips for nearly 5,400 students during the 1986-87 school year and another 974 youngsters during the summer.

The District of Columbia has developed an aquatic resources education program which provides training in ecology and promotes youth fishing during the summer.

A poster contest sponsored by the Virginia Forestry Association under a contract from the State--"Two Renewables: Trees and the Bay"--drew the participation of more than 41,000 children in 360 schools.

Maryland's school program includes funding support that helps selected outdoor education programs take children out on the Bay for a first-hand environmental experience.

Maryland's Dorchester Soil Conservation District took the lead in staging a one-week outdoor education camp at Horn Point. Several other Soil Conservation

Districts sponsored attendees. Southern Maryland Soil Conservation Districts continued sponsorship on the Elms Conservation Camp.

Public Awareness. The National Park Service, in cooperation with the District of Columbia, has developed a comprehensive package of public awareness materials, including a portable display, fact sheets, a poster-brochure, and a prize-winning coloring book.

"Working Together To Save the Bay" was the theme of a Chesapeake Bay exhibit at the 1987 Pennsylvania Farm Show, which drew about one million visitors. Displays by Penn State, the Chesapeake Bay Foundation, the Citizens Program for the Chesapeake Bay, the Pennsylvania Association of Conservation District Directors, and the State Department of Environmental Resources were included in the exhibit. DER's Mobile Nutrient Lab was on display in August during Penn State's Agricultural Progress Days, which attracted about 30,000 visitors interested in farm technology.

A commercial corn and soybean farm in Maryland's Queen Anne County continued to serve as a showcase of Best Management Practices which are being monitored to determine their economic benefits and effects on water quality. Public officials, agricultural groups, and other organizations visited the demonstration/ research site. New educational exhibits demonstrating agricultural efforts to improve water quality were displayed at events such as the Maryland State Fair, Wye Field Days, and Chesapeake Bay Appreciation Days.

Public Access

Several projects were under way around the Bay basin to improve public access and expand recreational opportunities on the Bay and its tributaries.

Pennsylvania added two streams in the Chesapeake Bay drainage basin to its Scenic Rivers Program in 1988. With the addition of LeTort Spring Run (Cumberland County) and Tucquan Creek-Clarks Run (Lancaster County), a total of 90 miles of streams are designated for special management in the basin. The Scenic Rivers Program is a conservation planning program. The Pennsylvania Fish Commission developed a new public access facility, Appletree Road, on the North Branch of the Susquehanna.

The District of Columbia is working with the National Park Service to provide a boat ramp on the Anacostia River, and also is planning an artificial reef in the Washington Channel. Construction of public fishing piers and access for the handicapped is under study.

Virginia scheduled improvements at 13 public boat landing sites.

Governance

State and Federal initiatives to forge stronger interagency ties were reinforced by the formal commitments for joint Baywide efforts included in the new Agreement.

EPA, Maryland, Virginia and the District of Columbia continued monitoring water and sediment quality in the mainstem of the Bay, major tributaries, and at fall lines. Monitoring data was published in the biennial State of the Bay report and accompanying technical appendices. The Susquehanna River Basin Commission continued base flow and storm sample monitoring in Pennsylvania in conjunction with the U.S. Geological Survey.

Maryland monitored habitat quality and striped bass egg and larval abundance and condition in the upper Bay, Choptank, Nanticoke, and Potomac Rivers. Refinements were introduced to establish better linkages between larval abundance and water quality. Oyster habitat monitoring in the Choptank focused on the relationship of low dissolved oxygen levels and disease-induced mortality.

Monitoring of Kepone levels in finfish, shellfish and sediment continued at several sites along the James River in Virginia. Concentrations in fish samples continued to decline except in the vicinity of Hopewell, site of the original contamination of the river.

Chesapeake Bay Program Technical Report Series - 1987/1988

Estimates of Sediment Denitrification and Its Influence on the Fate of Nitrogen in Chesapeake Bay, August 1987 - CBP/TRS 1/87

Vegetated Filter Strips for Agricultural Runoff Treatment, August 1987 - CBP/TRS 2/87

Nutrient-Dissolved Oxygen Dynamics in Chesapeake Bay: The Roles of Phytoplankton and Micro-Heterotrophs Under Summer Conditions, 1985, August 1987 - CBP/TRS 3/87

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A Comparison of Preservation Techniques for Estuarine Water Samples for Analysis of Organic Carbon Fractions, August 1987 - CBP/TRS 5/87

Results of Comparative Studies of Preservation Techniques for Nutrient Analysis on Water Samples, August 1987 - CBP/TRS 6/87

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Distribution of Submerged Aquatic Vegetation in the Chesapeake Bay and Tributaries - 1985, August 1987 - CBP/TRS 9/87

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EPA Staff Papers Presented at the Chesapeake Bay Research Conference, March 1988, June 1988 - CBP/TRS 19/88

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Technical Appendix: A Commitment Renewed, June 1988 - CBP/TRS 21/88

Point Source Atlas, August 1988 - CBP/TRS 22/88

Pesticide Use in the Chesapeake Bay Basin, August 1988 - CBP/TRS 23/88

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Chesapeake Bay: Stock Assessment Plan, July 1988

Chesapeake Bay: Resource Management Strategy Schedules, July 1988

Chesapeake Bay: Wetlands Policy December 1988

Chesapeake Bay Strategy for Removing Impediments to Migratory Fishes in the Chesapeake Bay Watershed, December 1988

Baywide Nutrient Reduction Strategy, July 1988

Chesapeake Bay Basinwide Toxics Reduction Strategy, December 1988

Baywide Conventional Pollutants Control Strategy, July 1988

Baywide Conventional Pollutants Control Strategy, July 1988

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2020 Panel Report; January 1989

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Implementation Committee Reports

Chesapeake Bay Nonpoint Source Programs, January 1988

A Commitment Renewed: Restoration Progress and the Course Ahead Under the 1987 Bay Agreement, June 1988

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