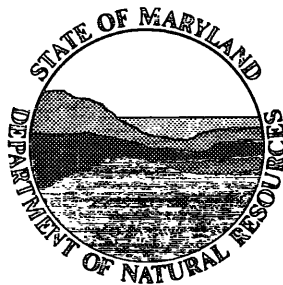


Maryland Department of Natural Resources

Annual Activities Report

1990



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DEPARTMENT OF NATURAL RESOURCES
INFORMATION RESOURCE CENTER
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MARYLAND
DEPARTMENT OF
NATURAL RESOURCES

ANNUAL ACTIVITIES
REPORT 1990





The Department of Natural Resources has a mission to protect, renew and wisely manage the natural resources of Maryland for the greatest benefit to the state and its citizens. The Department directs activities affecting water resources, fisheries, forests, parks, wildlife, geology, waste and energy management as well as land acquisition and management and historic preservation work.

A Department-wide workforce of 1,500 regular and 1,700 contractual employees includes biologists for fisheries and wildlife, recreation specialists, computer specialists, graphic artists, construction specialists, law enforcement officers, foresters, park rangers, public affairs officers, engineers, accountants, planners and administrators.

DNR employees are actively involved in the management and enhancement of the Chesapeake Bay watershed through forestry management, waterway improvement, enforcement of waterway and landway use, research, restoration of fish stocks and preservation of endangered plants and animals.

Within this workforce, DNR employees manage 70 state parks, forests, natural environment areas and natural resource management areas ranging in size from four acres to 52,800 acres, for a total of 244,557 acres. In FY90 some 8,000,000 people visited these public lands.

With public understanding and support we will continue to protect and enhance Maryland's natural resources and to so manage our facilities that they remain a source of recreation, enjoyment and education for all citizens.

A handwritten signature in cursive script that reads "Torrey C. Brown".

Torrey C. Brown, M.D.

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OFFICE OF THE SECRETARY

CHESAPEAKE BAY RESTORATION PROGRAM BACKGROUND

In response to major studies which indicated that the health of Chesapeake Bay was declining, leaders of the jurisdictions of the Chesapeake region launched major efforts to clean up the Bay. In December of 1983, an agreement was signed affirming the intention to carry out a restoration program for the Chesapeake. In 1987, the region's leaders responded anew to the challenge of restoring the Bay. On December 15, 1987, an expanded agreement was signed containing new, specific commitments and tightly-scheduled time frames designed to intensify efforts to restore the Chesapeake. The new Bay agreement is divided into six areas of focus: living resources, water quality, population growth and development, public information - education - participation, public access and governance.

Most of DNR's responsibility in the state's Bay program are in the area of living resources, although many others are contained in the other areas of focus. To strengthen the coordination with other jurisdictions as well as between units within the department, DNR created a new position of assistant secretary and an Office of Chesapeake Bay Programs.

The department's efforts toward meeting the goals of the Bay agreement are represented by individual projects or initiatives within various units. Collectively these initiatives constitute the department's Bay program but this is only one level or tier of effort by the department towards the Bay's restoration. Many of the programs within each of the units provide activities that in one way or another help to restore and enhance the Bay and its living resources. Wildlife management, Program Open Space and public affairs are examples of these activities. This constitutes the second level or tier of the department's Bay program.

Program Overview

Nineteen priority sites in eleven watersheds have been identified for blockage removal, re-stocking of migratory fish and construction of structures to allow the passage of migrating fish. In addition to the continued planting of shell and seed oysters, scientist continue to examine causes and cures of the two oyster diseases, MSX and Dermo.

Protection of the Bay's living resources requires close attention to the conditions determining how a species exists within its environment. To answer these questions, staff biologists are focused on three key areas: 1) the role of climatic and water quality factors

in striped bass reproductive success; 2) water quality factors affecting oyster mortality; and, 3) comparative watershed impacts on fish abundance. The Bay-land connection is also an important focus. Investigations are underway to understand how living resources respond to development, land use, habitat restoration and pollution abatement.

New regulations are being developed to protect non-tidal wetlands as we continue our protection of those in tidal waters. Because of the resulting water quality benefits, Bay foresters have been working with private land owners and on state-owned lands to plant trees along the Bay's shoreline. Efforts have been increased to stabilize eroding shorelines with non-structural alternatives. People are part of the solution to the restoration of the Chesapeake Bay. Through public participation programs, the Youth Conservation Corps, the Critical Areas Program and technical assistance, the department is working to minimize the impacts of land use and to provide increasing opportunities for the public to be an active part of the clean-up.

In the final analysis, the success in restoring the Bay will be manifested in the health and abundance of the Bay's living resources. When the fish, oysters, crabs, waterfowl and wildlife that inhabited the Chesapeake ecosystem again become plentiful, the success of the program will be obvious.

LEGAL SECTION

The Legal Section is supported by thirteen assistant attorneys general. One serves as counsel to the Secretary of Natural Resources and one as deputy counsel. They are responsible to the attorney general for the direction and supervision of the section. The legal staff represents agencies of DNR involved in litigation, and supplies legal advice inherent in the normal functioning of the Department. This includes the approval of contracts and regulations, and representing the agency at administrative hearings.

During FY90, the legal staff continued its active role in the formulation and enforcement of laws protecting and preserving the state's natural resources. It handled cases in the federal courts, initiated legal action at the state circuit court level and prosecuted violations in the state district courts. In addition, assistance and legal advice were rendered in administrative proceedings at federal and state levels.

FISCAL AND SUPPORTIVE SERVICES

The Fiscal and Supportive Services Program provides assistance, direction and support to the department in financial management and control. The program is responsible for administering the department's more than \$183 million budget, providing fiscal information to agency administrators and maintaining fiscal control over income and expenditures.

The Payroll section processed payroll for over 1,600 regular employees and more than 1,700 contractual employees. This involves maintaining positive time reports and leave records, when appropriate, for each employee and certifying hours worked to Central Payroll Bureau.

Supportive Services

The Supportive Services project is responsible for controlling real and personal property, fleet management, facilities maintenance, telecommunications, forms management, insurance management and payroll distribution. The total value of the assets for which Supportive Services is responsible exceeds \$358 million.

Mail Distribution

The Department's mailroom is responsible for the receipt, processing and distribution of all incoming and outgoing mail and shipments. In addition, the mailroom provides a courier service to Annapolis area facilities. During FY90, the mailroom handled in excess of six million pieces of mail and parcels.

Procurement/Accounts Payable

This project processes service, maintenance and construction contracts, requisitions and purchase orders in accordance with Title 21, State Procurement Regulations and reviews for final approval, personal service and timber sale contracts. All invoices are also processed through this project.

During FY90, there were 1,192 commodity orders with an approximate value of \$6,896,936; 2,363 commodity contract orders processed by units of DNR and reviewed by Procurement valued at \$1,134,325; 1,120 service, maintenance and construction contracts with an approximate value of \$36,021,966. Personal service contracts processed through Procurement for approval totaled over 3,455.

The Accounts Payable section is responsible for processing all invoices for transmission to the Comptroller's Office for payment. Some 6,000 to 7,000 invoices are processed each month.

Management Information Services

The Management Information Services Division maintains a central review authority over all data processing activities of the department. In addition, the division is directly responsible for all administrative/financial computer applications in the Office of the Secretary's Fiscal and Supportive Services as well as Licensing and Consumer Services. This division also administers hardware maintenance contracts for most of the Department's microcomputers and supports a large computer network for communications between DNR and the Annapolis Data Center.

LICENSING AND CONSUMER SERVICES

Licensing and Consumer Services is the support unit of the department responsible for the collection of revenue through the sale of licenses and permits and the titling and registration of vessels. This unit provides information to the users of Maryland's natural resources and management data to operating units of the department. Licensing and Consumer Services includes the central office in Annapolis and six regional service centers throughout Maryland. The central office and regional service centers issue vessel certificates of title and registration, collect excise tax, record security interests on vessels, and issue commercial fishing licenses as well as sport hunting and fishing licenses.

The staff of Licensing and Consumer Services provides direction and coordination between the department and licensed boat dealers, seafood dealers, hunting and fishing license distributors and agents and the general public.

The six regional service centers provide localized accessibility to the department and to the public, and comprehensive administrative support to field managers and field personnel of other DNR units located in the service centers. These centers are the Southern Regional Service Center, Prince Frederick; East-Central Regional Service Center, Centreville; Eastern Regional Service Center, Salisbury; Central Regional Service Center, Belair; Western Regional Service Center, Cumberland and the satellite office is in Dundalk. The Western Regional Service Center also maintains a satellite office during the summer at Deep Creek Lake Management Area in Garrett County to accommodate weekend boaters.

During FY90, Licensing and Consumer Services moved the Annapolis Office counter operation to the main lobby of the Tawes State Office Building. A reduction in the time required to issue licenses, registrations and titles was accomplished by revising applications and simplifying processing procedures.

PERSONNEL SERVICES PROGRAM

Equal Employment Opportunity

The Office of Equal Employment Opportunity is responsible for the administration of fair practices programs within the Department. This includes responsibility for the coordination of equal employment opportunity and affirmative action activities to ensure compliance with both state and federal civil rights laws and regulations. The Office of Equal Employment is also responsible for monitoring all personnel transactions, investigating complaints of discrimination, recruitment and community relations.

The major activities undertaken during FY90:

- Revised the Affirmative Action Plan
- Prepared Equal Employment Opportunity (EEO) annual report for submission to Department of Personnel

- Provided technical assistance in all areas of EEO and affirmative action to supervisors and employees
- Conducted 10 investigations of formal complaints
- Reviewed 297 structured interview questions
- Approved a total of 341 appointments to hire new employees
- Conducted EEO and Affirmative Action training seminars in which 213 employees participated
- Conducted in-service training on racial, religious and ethnic violence for 210 Natural Resources Police Officers
- Participated on a committee to develop a training video on accessibility for the disabled for the US Fish and Wildlife Service

Personnel Office

The Personnel Office provides assistance in the areas of benefits administration, employee/employer relations, recruiting, testing, classification and employment.

Activity Summary

Personnel Transactions processed (appointments, reclasses, etc.)	5,530
Classifications Studies	455
Desk Audits	53
Personnel Services Salary	
Certification	223
Specifications Revised	19
Suggestions Processed	2
Blood Program	
Drives	4
Donors	317
Units Produced	287
Disbursement	45
Interview and Moving Expense	
Requests	20
Applicant Activity	
Correspondence	450
Walk-ins	150
Interviews	110
Telephone Inquiries	658
Employee Reviews	95
Examinations Requested	25
Examinations Administered	3
Career Fairs	2
Employee Grievances (2nd and 3rd step hearings)	34
State Accident Fund Activity	
Injury Reports Processed	269
Bills Processed	519
Miscellaneous Campaigns (Flu inoculations, various benefits programs)	4
Unemployment Insurance Hearings	3



HUMAN RESOURCES AND STAFF DEVELOPMENT

HRS staff work with agencies to identify needed skills and to foster active management of employee learning and development in support of the effective execution of DNR's long term strategies. Responsibilities include performance improvement, operational improvement, employee orientations, employee development and workplace issues.

Activity Summary: IN-SERVICE TRAINING

	Number of Participating Employees	Cost of Program
Employee Assistance	24	\$ 13.20
Adult CPR and Standard First Aid	116	4,776.71
Child/Infant CPR	30	744.41
O.U.C.H. Training	213	1,612.25
Proofreading	52	1,988.26
Time Management	69	1,611.92
Stress Management	63	1,510.00
Stop Smoking Clinic	30	-0-
Career Development	8	10.00
Myers-Briggs/Team Building	19	28.31
CORE	85	13,479.50
English Language	17	918.00
Racial Relations	210	177.75
New Employee Orientation	247	222.65
TOTAL	1,193	\$27,092.96
Service Awards (3 Qrts. 1989 & 1988 Awards)	278 employees received	
Government Executive Institute	5 participants	
Employee Guide	all employees have received an employee guide	
Wellness Program	150 employees have registered for the wellness program as of June 30, 1990	

PUBLIC AFFAIRS

The Public Affairs Office provided information and public relations support for the department's programs and projects. The range of services available to DNR units and agencies includes media relations, educational program support, promotion, editorial and publication production, graphic arts and design, photographic support with video and still cameras, special events management, exhibits and displays. Specifically during 1990:

- A major media and promotion campaign was developed to support the state-wide Endangered Species and Chesapeake Bay Tax Check-Off Program. The office produced bumper stickers, one-page flyers, posters, public service announcements, press releases and other materials. In addition, there was extensive promotion of the campaign through GIANT food stores, Maryland tax preparers, banks, etc. Highlight of the effort was a bumper sticker contest which resulted in the distribution of over \$20,000 worth of donated prizes to randomly-selected winners.

- The partnership between DNR's Public Affairs Office and the Department of Economic and Employment Development (DEED) continued with the production of the OUTDOORS IN MARYLAND supplement to DEED's Maryland Magazine. Four issues were produced by DNR and 3,000 copies of the supplements are sent to the governor's office for distribution to school children through the Maryland Office of Environmental Education.

- DNR's PAO continued to work closely with Maryland Public Television to produce four one-hour television shows featuring various aspects of the Maryland outdoor milieu. PAO was instrumental in arranging the production of several special segment features of the television show, one on forestry and another on biological diversity. These segments, about six to ten minutes each, now constitute a video library of 26 featurettes on Maryland's outdoor environment. Both the OUTDOORS IN MARYLAND Magazine supplement and television shows received national awards of excellence from professional organizations.

- Through an exhibits/display program designed to reach local communities and effect grass roots understanding of our mission, the Public Affairs Office has participated in a variety of special public events. Included in FY90 was the Maryland Waterman's Convention in Ocean City, an event which annually draws an attendance of 1,200; the Harrisburg, Pennsylvania Eastern Sports and Outdoor Show (620,000 attendance); Bayfest, which includes the Chesapeake Bay Bridge Walk and Run, (55,000); the Maryland Municipal League Convention, (1,800); Maryland Association of County Officials, (2,200); Patuxent River Discovery Day, (1,000); Congressional Black Caucus, (2,100); Rocky Gap Country Music Festival, (40,000); Maryland State Fair, (600,000); Patuxent River Appreciation Days, (18,000); Baltimore Harbor Expo, (20,000); and Chesapeake Appreciation Days,

(40,000). In addition, the office provided support with media contacts, planning or logistics, for other special events including the Crisfield Crab Feast, Party on the Bay, the Governor's Cup Fishing Tournament, **Greenways** kickoff ceremonies, Governor's Conference on Forestry, and Earth Day.

- News and media-focused activities included the production/distribution, in FY90 of 193 press releases, 20 For Your Information (FYIs), 12 Calendars of Events and other public service announcements; the organization and conduct of nine press events, participation in four statewide emergency information exercises as part of the state public affairs officers emergency management team and support to the governor's press office on various DNR-related activities. PAO utilizes a computer based system for a mailing list including all Maryland media — radio, television, newspapers, magazines — as well as media in contiguous states and natural resource interest areas.

- Continued expansion of the publication series, "All About." This represents basic outdoor/DNR-related facts in easy-to-read language for public understanding of often complex issues.

- This office also conducts the annual Maryland Migratory Waterfowl Stamp and the Maryland Trout Stamp Contests. These contests solicit artwork from Maryland artists for selection by a team of judges for reproduction as stamps. The stamps are affixed to the licenses of hunters of waterfowl and fishermen respectively for their annual hunting and fishing licenses.

- The DNR Annual Activities Report and the Boards and Commissions Report are published annually by the PAO.

- In cooperation with the State Highway Administration, DNR periodically publishes a unique map featuring the state highway map of Maryland on one side, with the reverse side indicating natural resources areas of state, county and municipality on the opposite side.

- The PAO annually coordinates DNR's portion of the Governor's Annual Chesapeake Bay Report.

- The PAO publishes an internal tabloid for employees six times a year. Generally an eight-page publication, **UPDATE** published a special 12-page feature on Earth Day in FY90.

- Outreach efforts to distribute DNR publications in FY90, in addition to the outlets of exhibits at festivals and shows, included an arrangement to distribute to waiting rooms of health maintenance organizations, the National Institutes of Health, and John Hopkins University.

- The Public Affairs Office functions as a primary telephone contact point with the public. The office routinely handles calls of all varieties and also serves as the reference source for questions on all the components of the department. In addition to telephone reference, the office handles correspondence and is routinely requested to distribute the DNR coloring book to teachers, and special groups concerned with environmental education.

Helen Avalynne Tawes Garden

One hundred one guided tours took over 1,300 visitors through the garden. Thirty-nine programs, including four sessions of the popular Natural Resources Club for children, attracted 670 participants while special events drew 600 people.

Plans for a water-conserving (xeriscape) demonstration area within the garden began as did an effort to include additional rock displays. The two will be combined at the overlook site. Limestone and red sandstone rocks will form a natural-looking outcrop on the bank against the overlook and plantings that require low amounts of water will replace most of the lawn area.

The Tawes Garden Club discontinued its operation of the gift shop after three years of operation. Total receipts for the period exceeded \$40,000 with more than \$12,500 in profits given to the garden's Stevie Lyttle Fund. The shop is under the management of the Public Affairs Office.



BOATING ADMINISTRATION

The Boating Administration was formed in 1988 to foster the protection, safe enjoyment, enhancement, and balanced use of Maryland's waterways for the boating public. The agency is comprised of four major programs: General Administration, Waterway Improvement, Operations, and Planning and Policy.

GENERAL ADMINISTRATION

This program is responsible for the overall direction, supervision and coordination of the administrative activities of the Boating Administration. Support is provided in the areas of budget, personnel management, contract management, procurement, data processing, public information and legal services. In the public information and outreach activity is the effort to inform and educate the Maryland general boating public about safe boating, access to Maryland waters, state funding availabilities for marinas and local jurisdictions and general Boating Administration activities and services.

PLANNING AND POLICY PROGRAM

This program is responsible for planning the wise and safe use of Maryland's waterways; developing river systems management plans; identifying the location of marine-related facilities; administering grant programs for the installation and operation of marine sewage pumpout facilities; promulgating regulations for administering the state Boat Act; providing liaison with the boating industry, other state agencies and federal and local governments. This program works closely with the Boat Act Advisory Committee testifying on all legislation pertaining to boating matters; and establishing policies and regulations in order to protect and enhance the public safety, welfare and recreational interests on waters of the state.

The Planning and Policy Program also publishes the **Guide for Cruising Maryland Waters**, and provides information to the boating public on state and federal regulations. This is accomplished by issuing news releases, brochures, posters, and the annual publication of the **Maryland State and Federal Requirements for Recreational Boats**.

Boat Act Advisory Committee

All regulations affecting the operation and equipment required on vessels, which the Department proposes, are submitted to the Boat Act Advisory Committee (BAAC) for advice and opinions.

During FY90, the Boat Act Advisory Committee reviewed twelve individual petitions for speed limits on waterways and offered advice on the development of three chapters including new regulations on noise, the operation of personal watercraft and the complex regulatory scheme to implement the Severn River Vessel Management Plan. Committee activities included participation in demonstrations of personal watercraft, the review of the canoe use on the Potomac River and site visits to the proposed regulated areas.

Boat Dealers Advisory Council

The Boat Dealers Advisory Council (BDAC) is an ad hoc council whose members are appointed by Natural Resources Secretary Brown to provide counsel on boating industry matters. The FY90 Council reviewed departmental legislation that affected the boating industry; approved the proposal to raise boat dealer surety bonds that are required before a boat dealer license may be issued as well as the proposal to have dealers issue boat numbers.

Marine Sewage Pumpout Grants

The Boating Administration administers grants for the construction of marine sewage pumpout stations around the Bay. These grants are authorized from the Waterway Improvement Fund and offered to public and private marinas in an effort to aid in the Bay clean-up, and to ensure that Maryland will eventually have sufficient pumpout facilities to enable the state to petition the Environmental Protection Agency to declare substantial portions, if not all, of the Bay a "no discharge zone." In 1990 grant applications were received from 49 marinas. Fifteen pumpout facilities were completed and nine of these marinas have been reimbursed with a total expenditure of \$52,570.

An extensive **Pump Don't Dump** campaign including signs, brochures, posters, bumper stickers, and television public service announcements was launched. A number of marinas are now displaying the state symbol for pumpout facilities. In cooperation with the Maryland Marine Trades Association and the Maryland Watermen's Association, the Boating Administration designed posters and bumper stickers reflecting the theme **The Bay Needs Relief Too. Pump Don't Dump**.



INFORMATION AND PUBLICATIONS DIVISION

Guide to Cruising Maryland Waters

The 16th (1990-1991) edition of the **Guide to Cruising Maryland Waters** was published in March 1990.

The **Guide** is a biennial publication containing reproductions of the National Oceanic and Atmospheric Administration (NOAA) nautical charts of the Maryland portion of the Chesapeake Bay. These charts have been updated with the new and proposed buoy changes through February 1990, and is one of the few Maryland publications available with the Coast Guard buoy changes marking the new 50' channel. The publication notes on the chart the location of marine sewage pumpout facilities as well as the nesting areas of protected birds. In 1990 approximately 7,500 publications were sold with receipts totaling \$67,721. These funds are used only to create, publish and market the **Guide**.

RESOURCE PLANNING AND UTILIZATION DIVISION

The Resource Planning and Utilization Division is responsible for developing comprehensive vessel management plans for Maryland waterways to accommodate the various recreational boating activities in state waters, protect natural resources, and promote safe boating on increasingly congested waterways. In FY90 the Severn River Comprehensive Vessel Management Plan was completed. The plan was required by legislation passed during the '89 session of the Maryland General Assembly. To solicit public input in developing the plan, five public meetings and a public hearing were held with representatives of recreational boating user groups, community associations, safe boating, and the general public. Over 1,000 members of the public participated in the planning process. New regulations for the Severn River and its tributaries became effective May 24, 1990. An educational brochure describing the Severn River Plan was designed and distributed.

A preliminary management analysis of recreational boating potential on Jennings Randolph Lake was begun, working cooperatively with representatives of the US Army Corps of Engineers and the State of West Virginia.

Responding to the special needs of boaters is a primary responsibility of this division. Working with the Waterway Improvement Program, other state agencies and experts, the division developed hurricane preparedness for boaters information in both poster and brochure formats in anticipation of the '90 hurricane season.

RECREATIONAL BOATING AREA MANAGEMENT

Division personnel administer the mooring registration required by COMAR; draft and promulgate regulations related to boating; monitor police citations to locate "trouble spots" and explore ways to address the problems of boaters. This group also serves as the initial point of contact between many of the user groups of Maryland waters and DNR, directing boaters to other sources of information when issues arise which are outside the scope of the administration.

This unit is responsible for surveys of each area for which a petition is received to limit or increase use of Maryland waterways. Overflights of many of Maryland's waterways have been completed and a photographic library is being developed which will assist in determining boater use patterns.

Personnel draft regulations and assist in the development of policies for safe boating.

Recreational area management personnel review applications for wetland licenses and permits, and waterway construction permits, for possible impact on boating interests. A consistent pattern of response related solely to boater use and safety is developed for each area of the state.

Public meetings are hosted by project personnel, and personnel attend functions such as homeowner association meetings, special user group organizations, etc., to explain DNR boating issues.

In 1990, boating area management personnel have assisted in the development of boater education programs for the upper Potomac and the use of tributyltin paints.

Recreational boating area management acted on the following speed limit petitions and regulations in FY90.

Speed limit petitions:	
Received	17
Awaiting Action	15
Deferred	1
Withdrawn	1
Surveys Completed	11

Regulations:	
New	39
Emergency	16
Repealed	3
Withdrawn	14
Reproposed	6
Proposed Amendments	7
Adopted Amendments	5
Total Regulations Processed	90

In addition, the Natural Resources Police requested changes to two regulations, and both are currently under review.

WATERWAY IMPROVEMENT PROGRAM

Hydrographic Operations Division

The Hydrographic Operations Division is responsible for hydrographic engineering services to establish, maintain, and chart regulatory buoys and aids to navigation; to survey and chart pound nets, oyster seed and shell plantings and private oyster leases in different areas; to assist the Potomac River Fisheries Commission; and to provide ice breaking services during the winter for commercial shellfish operations.

Hydrographic Operations responds to requests for the placement of regulatory, navigational, and special buoys in the Chesapeake Bay and its tributaries from state agencies as well as counties and municipalities for placement of channel markers, shoal/hazard, speed limits, swimming and restricted areas as well as buoys for special projects and events such as Chesapeake Appreciation Days.

A summary of the placement of buoys/markers in FY90 follows:

Regulatory	1,807
Aids to Navigation	373
Special	294

The Hydrographic Operations Division performed the following work in FY90:

Survey Corners of Private Oyster Leases	650
Survey Shell and Seed Plantings	20
Pound Net Location Survey	15
Construction of New Triangulation Stations	75

Hydrographic Operations had a very early and very busy three weeks of icebreaking. The icebreakers responded to approximately 75 calls.

During the FY90 scheduled overhauls of all Waterway Improvement vessels — the M/V TAWES, WIDENER, SANDUSKY, and BIG LOU — were fitted with holding tanks and provided with the necessary equipment and piping to convert them to “no discharge” vessels.

Dredging Division

The Dredging Division is responsible for state waterway projects involving the dredging and protection of harbors and channels that are not maintained by the US Army Corps of Engineers. Activities include the development of hydrographic and topographic surveys at proposed channel areas, determining the need for protective structures at project sites, reviewing the design of all state funded dredging/breakwater projects and conducting bathymetric surveys of previously completed and proposed channel dredging sites. In FY90 five projects were completed at a total cost of \$253,500.

The Dredging Division currently has 117 active funded projects in various stages of development with an estimated construction value of \$21,685,600.

Waterway Grants and Project Planning Division

The Waterway Grants and Project Planning Division is responsible for state-related recreational development of the Chesapeake Bay with particular emphasis on projects and activities directly related to the general boating public. Specific activities include financing and coordinating the planning and construction of public marine facilities on state lands. In addition, the division also provides grants and technical assistance to county and municipal governments to design and construct boating projects on public lands. All projects are financed through Waterway Improvement Funds pursuant to the state Boat Act.

During FY90, the Waterway Grants and Project Planning Division continued its planning efforts for the development of the Ocean City Airport Marina, and completed the engineering for the regional boating facilities at Fort Washington Marina, Somers Cove Marina and Dundee Creek Marina. Work continues on various phases of construction at Fort Washington Marina, and Sweden Point Marina. Various construction projects were completed at Pt. Lookout and Elk Neck State Parks, and Solomons Island Boat Ramp.

In its contribution towards Chesapeake Bay clean-up efforts, the Waterway Grants and Project Planning Division completed the engineering on 11 marine sewage pumpout and dump stations located throughout the state and commenced construction on five of these projects at a construction value of \$30,000. The Derelict Boat Removal Program and public information regarding all aspects of the Waterway Grants and Project Planning Program was provided through displays set up at numerous boat shows, programs and activities.

Total projects during FY90 included 104 local grants and 9 state projects at a construction value of \$1,188,530 and \$617,514 respectively. During FY90, the Waterway Grants and Project Planning Division processed payments and reimbursements amounting to \$8,007,003 for a total of 236 continuing projects.

Marine Services Division

The Marine Services Division provides general waterway maintenance of channels, harbors, and areas of the Chesapeake Bay not maintained by the US Army Corps of Engineers. Activities include: removal of debris and derelict vessels from the Chesapeake Bay and its tributaries, installation of public owned facilities such as piers, bulkheads, boat launching ramps, and dredging operations associated with the above projects. Winter activities also include ice breaking operations.

During FY90, ten state vessels were hauled at the Cambridge Terminal Railway for annual maintenance and repairs.

Construction was completed on the pier and off loading ramp at St. Clement's Island. The emergency boat ramp on Tanners Creek and the replacement of a floating pier at Point Lookout State Park also were completed. Dredging was accomplished at Whitehall Creek and Tanners Creek with a total of 3,300 cubic yards removed. Other projects included the creation of a marine habitat offshore at Tolchester Beach, the construction of a 165-foot elevated timber walkway and a pumpout station platform. Routine facilities maintenance was accomplished statewide, including replacement of piling and other structural members damaged by winter storms.

OPERATIONS PROGRAM

This program operates and maintains facilities used to promote the economic, environmental and recreational importance of Chesapeake Bay to Maryland.

At present, the most prominent state-owned facility is Somers Cove Marina in Crisfield. In addition to providing the boating public with 500 reasonably priced slips, the marina houses the Tawes Museum and hosts a number of events including the National Hard Crab Derby and Fair, the Waterman's Festival and the Pro-Am Fishing Tournament, sponsored by Budweiser and the Crisfield Chamber of Commerce. These activities and those of the marina are designed to help promote and stimulate the economic and community development of the City of Crisfield.

Under construction, just off the Potomac on Piscataway Creek, is the Fort Washington Marina. Once completed this \$9.5 million, 292-slip marina is expected to significantly contribute to the boating public's enjoyment of Maryland's waterways. Fort Washington will, when completed, be a full service marina offering hauling and launching, dry storage, major boat repairs, boat maintenance, food service, ship's store and a complete inventory of marine supplies. These services and more will be made available as construction progresses. It is expected that by the spring of 1992 the marina will be 100 percent operational, at which time it will be turned over to a private concessionaire to operate under the direction and control of the state.

Also under the direction of the Operations Program is the state flagship, MARYLAND INDEPENDENCE. In addition to providing the governor and other state officials with an informal facility for the conduct of state business, it is used to entertain foreign dignitaries and business people who have occasion to visit the state.

Included in the fleet of vessels operated by the Boating Administration is the H.J. ELSER, a 48-foot steel hulled demonstration vessel equipped as a marine sewage pumpout facility. The vessel's mission during boating season is to acquaint the boating public with marine sewage pumpout stations at marinas throughout the state. Maryland is the first state to own and operate its own mobile marine pumpout station.

The H.J. ELSER also joins the DECLARATION in providing DNR scientists with the vessels needed to continue their studies and reviews of the Chesapeake Bay.

The DECLARATION, a 45-foot Hatteras confiscated for illegal use in drug trafficking, is now being put to use by the state in support of its Bay programs.

The ANNA MCGARVEY is a skipjack; the skipjack is the official boat of the State of Maryland. This sailing craft is on display at the Tawes Museum located in the Somers Cove Marina in Crisfield. It is taken around the Bay to water-oriented events to educate the public on the history of oystering and the maritime industry in Maryland.



CAPITAL PROGRAMS ADMINISTRATION

The Capital Programs Administration consists of six programs in addition to the General Direction Program: Land Planning Services, Program Open Space, Shore Erosion Control, Engineering Services, Enterprise Development and Maryland Environmental Trust.

The Administration provides: planning services for state parks, natural resources management areas, and recreational facilities; administers Program Open Space funds, under the provisions of the Outdoor Recreation Land Loan of 1969, and federal funds, provided by the US Department of Interior's Land and Water Conservation Fund; provides shore erosion control service to public and private landowners; operates properties that have been identified for enterprise development; major capital improvement or innovative natural resource management; and provides engineering services to agencies within DNR for the design and construction of new facilities.

LAND PLANNING SERVICES

Land Planning Services provides the Department with technical assistance and a variety of studies, plans, and information that are used as a basis for making decisions on the acquisition, development, and management of public lands. The activities of Land Planning Services are organized under four projects, each administered by a project chief: Planning; Scenic and Wild Rivers Program; Acquisition Graphics and Research; and, Capital Facilities Planning and Environmental Review.

Resources Planning

The Resources Planning Project is responsible for the development of master plans for new state parks, revisions to existing plans for established parks, and the development of interim use management plans for recent land acquisitions. This project also prepares detailed analyses and conceptual studies for potential acquisitions, and works on many special planning projects in cooperation with other DNR agencies.

During FY90, the Resources Planning staff completed a number of projects including:

- Revised master plan for Greenwell SP
- Revised master plan for Janes Island SP
- Master plan for Isle of Wight NRMA
- Master plan for the Patuxent River NRMA

Projects in progress during FY90 included:

- Acquisition plan and master plan for Morgan Run
- Statewide greenways planning
- Lower Patapsco Greenway
- Master plan for Black Marsh SP
- Final master plan printing for Kings Landing NRMA
- Revised development plan for Tuckahoe SP
- Comprehensive review of Maryland's proposed wildlands

Resources Planning includes a computer-based Geographic Information System (GIS) under which a digital mapping and data base are being constructed. The GIS is used to inventory and analyze natural resources, and serves several projects — most notably the Patuxent River watershed inventory.

During FY90, the following GIS work was completed:

- DNR Patuxent properties: a comprehensive inventory of existing resources shown on 13 master plan base maps.
- Statewide mapping of county recreational areas for the ongoing Chesapeake Bay sensitive areas project.

These projects will be developed further in FY91 and work will begin on the Maryland Greenways mapping project including the Lower Patapsco River Area, selected Wild and Scenic Rivers projects and Environmental Reviews.

Scenic and Wild Rivers Program

The Maryland Scenic and Wild Rivers Program is required to inventory and evaluate all rivers within the state to determine eligibility for scenic and wild river status. The program also prepares river conservation and resource management plans for designated rivers that comprise the Scenic and Wild Rivers System in Maryland; promotes the preservation and protection of natural resources associated with designated rivers; and coordinates planning activities with local citizen advisory groups and government bodies to develop river conservation and land use recommendations.

Nine rivers are currently designated by state law (8-401 et seq) as "scenic" or "wild" and are in various stages of planning:

- Anacostia River - Plan completed. Cooperating with the Interstate Commission on the Potomac River Basin for implementation of the Plan.
- Deer Creek - Plan completed. Working with the Deer Creek Citizen Advisory Board to update and implement the Plan
- Monacacy River - Draft Plan completed. The Draft Plan has been approved by the Frederick County Commissioners. Anticipate approval by Carroll County and the State Scenic Rivers Review Board in FY91.
- Patuxent River - Plan not started. Cooperating with the Patuxent River Commission to implement the Patuxent River Policy Plan. Working with the Resource Planning Section of LPS to develop a management plan for public land along the Patuxent.
- Pocomoke River - Plan completed.
- Potomac River (in Montgomery and Frederick Counties) - Plan not started. Initial contacts have been made with the National Park Service C & O Canal Park, and other appropriate jurisdictions.
- Severn River - Plan completed. Meeting as necessary with the Severn River Commission to implement the scenic river plan.
- Wicomico-Zekiah River (in Charles and St. Mary's Counties) - Plan underway. Convene monthly meetings with the Local Citizens Advisory Board. A completed plan expected in FY92.
- Youghiogheny River - Plan underway. Convene monthly meetings with the Local Citizens Advisory Board. Scenic corridor re-established; commercial whitewater regulations adopted; and recreational capacity study completed.

Acquisition Graphics and Research

This project is responsible for the research of property records (deeds, surveys, and land patents) and the preparation of boundary lines and reference lists for Department-owned lands and for privately owned properties authorized for acquisition by the Department. These activities are coordinated with other Department, state and federal agencies. In addition, the project provides mapping and graphics services and is responsible for the preparation of the Department's annual acreage report.

Project boundary maps, special project maps, and aerial photography projects completed in FY90 were:

- Jabez Branch portion of Severn Run NEA
- Merkle Wildlife Management Area
- South Mountain State Park - Remapping
- South Mountain State Park - Completion of the Appalachian Trail Acquisition Plan
- Savage River State Forest - Completion of the topographic base that will be used for the new project boundary map.

Acquisition Graphics staff provides technical research and support to the Department's legal section to help resolve property disputes between the Department and private property owners with adjoining land. Boundary resolution includes property research, field visits, and meetings with landowners — culminating in a final report recommending methods of resolution.

Property research projects were completed in FY90 within the following land units:

- Patapsco Valley SP
- Severn Run NEA
- Gunpowder Falls SP
- Susquehanna SP
- South Mountain SP
- Pocomoke River SF
- Fishing Bay WMA
- Wye Mills FMA
- Elk Neck SF
- Savage River SF
- Patuxent River NRMA
- Round Top Natural Heritage Area
- Garrett SF
- Morgan Run NEA
- Black Marsh SP
- Green Ridge SF
- Dans Mountain WMA
- Assateague SP

Capital Facilities Planning and Environmental Review

This project is responsible for coordinating the long-range planning and programming for capital facility development on DNR land. This includes the annual assessment and update of the Department's Five-Year Capital Improvements Program, which is prepared and submitted to the Department of Budget and Fiscal Planning to be considered for inclusion in the state Capital Budget.

In addition, this project administers the Environmental Review and Evaluation Process for Capital Programs Administration. This process includes the evaluation of proposed projects and actions that affect the use, management, and protection of natural resources and facilities owned and operated by DNR. In FY90, 145 projects were processed for review and evaluation.

The Maryland Rails-to-Trails study was completed in FY90. This study of Maryland's railroad rights-of-way and their potential for conversion to multi-use trails was required by legislation (House Bill 615). The completed study was submitted to the Maryland General Assembly during the 1990 session and resulted in the passing of House Bill 1171.

PROGRAM OPEN SPACE

Grants-in-Aid

During FY90, Program Open Space (POS) celebrated 21 years of public service in protecting land and water resources and providing recreation opportunities in Maryland. The mission of POS is to provide financial assistance for the provision of public recreation and open space areas within Maryland. The Program coordinates all state land acquisition for DNR and administers federal funds for acquisition and development for Forest, Park, and Wildlife projects. POS administers state and federal grants for Maryland's subdivisions to develop local recreation areas and preserve open space.

Current Funding - New Legislation

The joint subcommittee on POS and Agricultural Land Preservation of the Maryland General Assembly was appointed to make recommendations during the 1990 session. This subcommittee was co-chaired by Senator C. Bernard Fowler and Delegate George C. Edwards.

After extensive study and consultation with Governor William Donald Schaefer and numerous citizen groups, the joint subcommittee brought forth the Consolidated Land Preservation Act of 1990. (House Bill 1302 and Senate Bill 811). Major revisions were enacted for Program Open Space in April 1990 when House Bill 1302 passed both the House and Senate. The Consolidated Land Preservation Act of 1990 was signed into law by Governor Schaefer on April 25, 1990, providing the following revisions:

- Allocation, over a period of five years, of an additional 10% of the total state property transfer tax revenue annually to POS, the Agricultural Land Preservation Fund, and the Heritage Conservation Fund, beginning in FY92.
- Increases the allocation to the Agricultural Land Preservation Fund to \$10 million over a four-year period: an additional \$2 million in FY92, and an additional \$1 million each year thereafter until the \$10 million annual allocation is reached.
- Increases the allocation to the Heritage Conservation Fund to \$2 million annually over a two-year period beginning in FY92, an additional \$500,000 annually until the \$2 million annual allocation is reached. Establishes a one-time allocation of \$500,000 to establish a Land Trust Grant Fund. Future funding for the Grant Fund will be as budgeted by the governor.
- Provides that the \$1 million annual allocation for state debt reduction under current law shall continue until the outstanding debt authorized under the Outdoor Recreation Land Loan of 1969 has been reduced to zero.
- Provides that if actual state property transfer tax collections exceed the revenue estimates used as a basis for the appropriations to the Program and the general fund, the amount of the

excess shall be appropriated to POS in the subsequent fiscal year. If collections are less than the revenue estimates, the appropriation to the Program in the subsequent fiscal year shall be reduced by the amount of the deficiency.

- Provides that, beginning in FY92, up to 25% of the funds available to the state under the Program may be appropriated in the state budget for capital improvements on land owned by the state for use by DNR. Any capital improvements must be consistent with the park master plans and the natural features of the land.
- Establishes a Land Trust Grant Fund, under the DNR, to be administered by the Maryland Environmental Trust. The Trust will dispense grants for the acquisition of interest or rights in real property for recreational or preservation purposes.
- Defines a land trust as a qualified conservation organization that is a qualified organization under subsection 170(H)(3) of the Internal Revenue Code and has executed a cooperative agreement with the Maryland Environmental Trust.
- Authorizes a local government to use its acquisition funds to establish a land trust grant fund. Projects receiving funding under the fund must be approved by DNR, the Office of Planning, and the state Board of Public Works.
- For a more detailed listing of legislative changes, please contact the POS office in Annapolis.

State Share Activity

During FY90, POS continued to make progress in meeting the Department's goal to protect through acquisition 395,944 acres of Natural Resources lands for use by the different agencies within the Department. Approximately 1,973 additional acres were optioned for purchase in fiscal year 1990 leaving a balance of 63,376 acres to be acquired. Noted state acquisitions this year included the 430-acre Meloy property on the Patuxent River in Prince George's County. The governor and state legislature have allocated \$15,000,000 in 1990 for acquisition of natural resources lands.

Local Share Activity

In FY90 there were 43 land acquisition grants approved for the county and municipal governments. The completion of these projects will result in an additional 920 acres of local open space and parkland. Local acquisitions of note include the McNasby property in Annapolis, Anne Arundel County, and the Merryman property near Oregon Ridge in Baltimore County. There were also 67 development projects or amendments approved by the Board of Public Works this year. In all, the Board of Public Works approved \$17,237,741 to assist county and city governments in buying land and developing recreation and park areas. Since 1970, POS has provided \$255.4 million to local governments for park grants. At the end of FY90 the unencumbered balance was \$32,366,728.

In 1990, POS began computerization of the local share component of its data base. When completed in 1991, the data base will contain information on all local POS projects since the inception of the program.

Land and Water Conservation Fund

POS also administers the annual apportionment of Federal Land and Water Conservation Funds (LWCF). Each year since 1966, with the exception of 1982, the US Department of the Interior has apportioned a sum of money to the State of Maryland to be used for the acquisition and development of park and natural resource areas throughout the state. To receive federal funding, the state must submit a detailed project application that conforms with the approved state's Comprehensive Outdoor Recreation Plan. Upon completion of an approved project, the state receives fifty percent reimbursement of the costs incurred to acquire or develop a specific park site.

Through FY90, the State of Maryland received apportionments totaling \$62,230,826. Of that amount, \$61,749,827 has been obligated on 367 park acquisition and development projects throughout the state, an obligation of 99 percent. Half of all federal funds are made available for local government projects.

NEW DIRECTIONS

The IDEA Group

The Initiatives Development and Education Administration (IDEA) within POS has been established to help instill and encourage a greater outdoor ethic in the people of Maryland. The program is designed to:

- A. Improve the habits of some outdoor users by generating a higher sense of respect and personal responsibility for our parks and open spaces;
- B. Buffer increasing urban and suburban areas with sufficient natural lands to preserve our natural heritage for present and future generations.

Currently more than 13% of Maryland is now developed. Should the development trends continue, within 50 years that figure will balloon to 30%. The broad based goals outlined in "A" and "B" above will be accomplished through three major functions:

- A. Coordination of new initiatives between various diverse groups with similar goals and missions.
- B. Education and training of staff and other professionals in new concepts and techniques that will help expand open space and public recreational opportunities amidst the growing urban and suburban fabric of Maryland.
- C. Promotion and development of a heightened outdoor ethic in Maryland's citizens.

The educational focus of the IDEA Division this year has been on Program Open Space, Capital Programs Administration, the American Heritage Trust Fund, the National Celebration of the Outdoors and the new Greenways initiative. The IDEA Division has also been assigned the public relations and outreach coordination responsibilities for the entire Capital Programs Administration.

Americans Outdoors

Because of the emphasis placed on providing outdoor recreation and natural areas amidst urban growth, considerable attention has been given to the recommendations of the federal Commission on Americans Outdoors. Consequently, numerous new initiatives and exciting outdoor recreation, park, and conservation projects are being proposed and planned all over Maryland. POS, because of its mission to fund these kinds of projects, continues to play a major role in the development of many of these new efforts.

Open Space Educational Film

DNR, in cooperation with the Maryland Recreation and Parks Association, continues the campaign to raise private funds for an educational film on Maryland's parks, recreation, and open spaces to help promote a new land ethic in the people who use and enjoy public parks and open spaces. To date, over \$139,000 has been raised and/or pledged to help finance the cost of this film. Issembert Productions Incorporated has been filming recreation and park events all over Maryland throughout 1989 and 1990, and plans are to release the film in the fall of 1990 at a grand premiere event to be followed by numerous regional premieres as part of MRPA's People for Parks Campaign.

SPECIAL PROJECTS

Days Cove

POS is coordinating the development of the Days Cove Area of Gunpowder Falls State Park. This cooperative venture between DNR and several private companies will be a model for future enterprise projects. After years of negotiation and planning, the state has reached an agreement with private businesses that will accomplish the following:

- Provide mining of valuable sand and gravel resources.
- Transfer ownership of the land to DNR for a park.
- Provide millions of dollars of private money for public park development.
- Return the land to its original contours after mining and enhancing the area for use as a park.
- Significantly reduce the time required to develop the park. Protect thousands of acres of critical plant and wildlife habitat within the confines of an extremely urban area.

The project is now into the fourth year of construction. The Environmental Education Center at Days Cove is available for meetings and should open to the public in FY91. The forestry demonstration trail and Duck Creek observation platform are scheduled to be opened in the fall of 1990.

In FY90, the Days Cove environmental education and training center development plan and landscaping around the center were completed. With the assistance of the Maryland Student Service Alliance, the Maryland Conservation Corps, and DNR's Forest, Park and Wildlife Service, many trails were established on the environmental education portion of the property. The surface mining company assisting the Department has continued to expand the park road system. Interior renovation of the former Smuck house was begun to convert the building to a handicapped-accessible environmental education center.

Resource Management Improvement Grants - NOAA

In FY90, five of these federally-funded projects were completed, including:

- Leight Park, Harford County
- Northside Park Wetland Walk, Ocean City
- Mattingly Park, Indian Head
- Gardner Canoe Launch, MNCPPC
- Rock Hall Waterfront Park

Nine of these projects were started, including:

- Oregon Ridge Wetland Planting, Baltimore County
- Solomons Riverwalk and Kings Landing Observation Pavilions, Calvert County
- Colmar Manor Nature Study Area, M-NCPPC
- Byrd Park Canoe Landing, Snow Hill
- Inlet Boardwalk Phase II and Northside Lagoon Pier, Ocean City
- Northern Central Trail Bank Stabilization and Sandy Point Habitat Enhancement, Capital Programs.

These projects will be completed by December 31. Funding of this program is provided through Section 306A of the Coastal Zone Management Act.

Maryland Greenways Program

The Maryland Greenways Commission, appointed by Governor William Donald Schaefer on February 5, 1990, submitted its report to him on June 1, 1990. The report included the commission's findings, selected case studies, and a strategy for expanding and completing Maryland's greenways network. The commissioners have begun Phase II of their work, the establishment of the Lower Patapsco Greenway.

Their mission will be to rehabilitate the long-disused state lands along the Patapsco River and improve its wildlife habitat suitability, water quality, and general environmental condition, while providing recreational opportunities for the public. The commissioners will be working with local governments and the private sector to strike the correct balance between environmental protection and the enhancement of a run-down, degraded riverfront. The Maryland Greenways Commission is staffed and operated through POS assisted by grants from the National Oceanic and Atmospheric Administration (NOAA).

Concurrent to the Patapsco Greenways project, the Maryland Greenways Commission will be touring the state disseminating information on the greenways initiative in counties and municipalities. There is a strong belief among the commissioners that local governments will be the crucial players in the establishment of Maryland's greenways network. In cooperation with the Greenways Commission, the Maryland Recreation and Parks Association is planning its 1990 Leisure Institute on the greenways theme. The Leisure Institute is an annual event aimed at providing timely information and training to park and recreation department directors and staff, natural resource administrators, and travel and tourism cooperators statewide. FY90's event will be the first annual Governor's Conference on Greenways, and DNR will be a major co-sponsor.



PROGRAM OPEN SPACE GOALS

The following are POS goals for the next five years:

- Provide the staffing to carry out the objectives and administrative mandate defined in the Consolidated Land Preservation Act of 1990.
- With the assistance and cooperation of the Department of General Services, POS will expedite the annual rate of land acquisition to meet state goals for open space and public recreation, park, and conservation lands.
- Purchase or pursue the donation of easements for sensitive forest, agriculture, and wetland areas as identified by the Maryland Heritage Program.
- Improve acreage and financial record-keeping system on Program Open Space by utilizing computers and word processing equipment.
- Stress the importance of environmental quality, public open space, conservation lands, greenways, rails-to-trails, and public recreation areas through promotional and educational efforts.
- Assist with the development of coalitions and support groups to implement the recommendations of the Federal Commission on Americans Outdoors.
- Assist where possible with innovative projects at both the state and local level with concentrated efforts on greenways and rails-to-trails.
- Update and print an educational brochure on POS.
- Update and print a new grants-in-aid manual and application forms for POS.
- Reassess the land acquisition goals for the state Natural Resources land acquisition program.
- Assist the public outreach efforts of the governor's greenways initiatives.

SHORE EROSION CONTROL PROGRAM

The Shore Erosion Control Program (SECP) of DNR is charged with the following responsibilities:

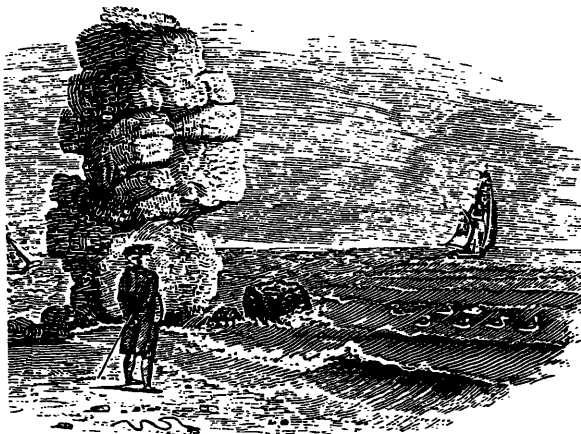
- to educate the public on the causes of beach and streambank erosion along the state's shorelines;
- to assess and make recommendations on the overall erosion problem in Chesapeake Bay and tributaries;
- to provide technical assistance to property owners, communities and counties experiencing shore erosion problems;
- to evaluate the effectiveness of new materials and methods developed to control erosion;
- to prepare budget requests for the design and construction of shore erosion control projects in private and public land;
- to administer the Shore Erosion Control Revolving Loan Fund which provides interest-free loans to design and construct projects for qualified applicants;
- to provide matching grants for the design and construction of non-structural shore erosion control projects;
- to provide design supervision and construction management, at no cost to qualified applicants;
- to design and construct shore erosion control projects, funded by the capital budget, on state lands;
- to manage the establishment of the Ocean City Beach Replenishment and Hurricane Protection Project; and
- to periodically inspect completed projects for the purpose of recommending preventive and corrective maintenance to the property owner.

The activities of SECP extend across more than 4,300 miles of shoreline along the Maryland portion of the Chesapeake Bay and its rivers, and the 31 miles of Maryland's Atlantic coastal beaches.

Ocean City Beach Replenishment & Hurricane Protection Project

September 21, 1988, saw the successful completion of Phase I of the "Ocean City Beach Replenishment and Hurricane Protection Project", which was implemented by DNR's Shore Erosion Control Program, in coordination with the US Army Corps of Engineers, Baltimore District. Over 2.2 million cubic yards of sand were dredged from areas more than two miles offshore and spread along 8.3 miles of Ocean City's Atlantic Ocean shoreline between 3rd Street and the Maryland/Delaware state line at a cost of \$11,783,580.75.

In cooperation with Worcester County and Town of Ocean City, DNR aggressively pursued completion of the General Design Memorandum (GDM) by the US Army Corps of Engineers, Baltimore Engineer District, for Phase II which is the federal cost-shared project providing hurricane protection. Approval of



the GDM by the Corps headquarters and administration provides the basis for the execution of the local cooperation agreement (LCA) and finalization of the plans and specifications for contract advertisement.

As the coordination and concurrent review process evolved during FY90, Maryland's Board of Public Works approved execution of the LCA on March 7, 1990 and the Office of Management and Budget approved the GDM and LCA on March 16, 1990. The LCA was executed on March 30, 1990 by the Secretary, DNR, and the Assistant Secretary of the Army for Civil Works. District awarded the initial construction contract on May 11, 1990 to Great Lake Dredge and Dock Company in the amount of \$15,268,000. This contract includes the placement of 3.6 million cubic yards of sand for additional beachfill from 3rd Street north to the Maryland-Delaware State line and dune construction from 27th Street north to the state line. The dune will be vegetated and sand fence installed with 208 beach access cross-overs. A Notice To Proceed was issued on May 25, 1990.

The second contract for bulkhead construction along the boardwalk from 27th Street south to 4th Street was on bid June 19, 1990 with the apparent low bidder, M&M/Russell Construction, submitting a bid amount of \$5,554,980. A contract award was made on August 3, 1990.

Phase II is expected to be completed in FY91 and will provide the Atlantic Coast of Maryland at Ocean City with a significant level of protection against severe storm and hurricanes. A beach monitoring and renourishment program, cost-shared with the federal government, is an integral feature of the Phase II project.

Other Shore Erosion Control Projects

The Shore Erosion Control Program (SECP) also provides technical and financial assistance to shore-front property owners in other parts of the state. Technical assistance, provided free of charge, is in the form of on-site visits to assess erosion problems and make recommendations to the property owners about alternative actions. For cases where shore erosion poses a severe threat to shorefront property or buildings, the state maintains a revolving loan fund, which provides 25-year loans covering 100% of the first \$60,000.00 of project costs, 50% of the next \$20,000.00, 25% of the next \$20,000.00, and 10% of any remaining portion of costs over \$100,000.00.

SECP also administers a state program of 50/50 matching grants which provide funds to private property owners in stabilizing suitable eroding shorelines by means of vegetative plantings.

The following table provides a summary of activities in the areas mentioned above for FY90.

Shore Erosion Control Program FY90

No.		Value	Length in Miles
Technical Assistance Actions:			
34	Structural Non-Structural		196
Applications Received:			
41	for Loans for Grants		33
Financial Assistance Awards:			
27	Loans \$ 620,998.00	0.34	7
	Grants \$ 369,586.67	1.79	
Projects Completed:			
27	Structural \$1,608,756.70	0.81	16
	Non-Structural \$ 760,093.93	2.13	

Another responsibility of SECP is the management of design and construction contracts for selected projects on state and public lands. Many of these are undertaken in coordination with other DNR programs related to developing Bay access, open space, or state parks. Some of the highlights of these accomplishments during FY90 are:

- Sandy Point State Park in Anne Arundel County: Design work for East Beach where protective stone works will be installed along with beach replenishment in late 1990 or early 1991.
- Elk Neck State Park in Cecil County: Over 3,493 linear feet (LF) of shoreline at Turkey Point has been stabilized with a stone revetment. A construction contract was let for building an additional 3404 L.F. of stone revetment to protect the western shoreline of Turkey Point.
- St. Catherine's Island in St. Mary's County: This Potomac River island received much-needed assistance in stabilizing the eroding southern and western flanks. A combination of stone revetment, offshore breakwaters, beach fill derived from a nearby Corps of Engineers maintenance dredging project, and wetland plantings

now provides shore protection, habitat restoration, and reduces sediment supply to this portion of the river.

- Deal Island Wildlife Management Area in Somerset County: A second water impoundment structure located in Big Sound Creek was completed.
- Greenwell State Park in St. Mary's County: A stone revetment stabilizing 363 LF of shoreline was completed.
- Patapsco River Greenways Project: Construction of the demonstration "non-structural" Shore Erosion Control Project on the Patapsco River near the Potee Street Bridge in Baltimore was completed. The project, which included vegetative wetland plantings protected by an offshore breakwater, is located near the confluence of the Patapsco River and Baltimore Harbor, and will be a focal point at the entrance to the Greenways Project.
- Chesapeake Bay Shoreline Study, undertaken by DNR in cooperation with the Baltimore District, US Army Corps of Engineers: Since the study was initiated in 1986, several shoreline sites have been evaluated for costs and benefits related to potential federal shore erosion control projects. In addition, "Field Modelling and Monitoring Projects" testing innovative breakwater measures, have been installed at Elk Neck State Park in Cecil County and Terrapin Park in Queen Anne's County. The Draft Feasibility Report, recommend no specific shoreline sites on the Chesapeake Bay in Maryland for federal funding of shore protection projects. However, three sites identified during the study have been entered into the Corps' small project program for project implementation and construction. The three sites are Solomons Island, Middle Hooper Island and McCreadys Point Road.
- Matapeake Terminal in Queen Anne's County: The design is being completed for the renovation south of the Bay Bridge on Kent Island. Construction of this harbor for state and private vessels, located off of a new offshore breakwater for the anchorage area, and renovation of the adjacent boat ramp will begin later in FY91. The new breakwater structure will feature a fishing pier with easy access for the handicapped.

ENGINEERING SERVICES

The Engineering Services program provides engineering, architectural, landscaping, construction, and administrative services to DNR agencies for the design and construction of new facilities. The 1990 session of the General Assembly approved funding for \$5,805,000 for capital projects.

Major projects completed during FY90 include:

- Office and maintenance complex at Sandy Point State Park
- Fishing pier at Point Lookout State Park

- Three comfort stations in Patapsco Valley State Park
- Office and maintenance building at Rocks State Park
- Handicapped access at Assateague, Milburn Landing, and Janes Island State Parks

ENTERPRISE DEVELOPMENT

The Enterprise Development Program is responsible for all real estate transactions occurring on land managed by DNR and promotes the development, use and rehabilitation of real property owned by DNR through public-private partnerships. The activities of Enterprise Development are accomplished through three primary projects: public private ventures, cultural resources management and real property review and evaluation.

Public-Private Ventures

The public private ventures project promotes development of recreational and tourism facilities on state lands by private entities to generate benefits and revenue for both public and private sectors. These ventures ensure the preservation and integrity of our natural resources while enhancing their recreational potential and fiscal productivity.

During FY90 the Enterprise Development Project accomplished the following:

- **Rocky Gap State Park** - continued negotiations with a developer and operator for the construction and management of a 210-room resort hotel/conference center and 18-hole Jack Nicklaus signature golf course. The developer shall fund approximately \$36,000,000 for the construction of the hotel/conference center. Construction is expected to begin in the spring of 1991.
- **Mt. Airy Plantation in Rosaryville State Park** - successfully negotiated a lease agreement with the developer-operator of the Morrison Clark Inn in Washington, DC to operate a restaurant in the Mt. Airy Plantation mansion house. The developer has further plans for the 85-acre tract, including renovation of the stable to provide for overnight accommodations and restoration of the pool and tennis courts.
- **Fair Hill** - successfully negotiated a lease agreement for the relocation from New York of the national office headquarters of the Thoroughbred Racing Association (TRA) and Thoroughbred Racing Protective Bureau. Construction of an 11,000-square-foot office building will begin in September, 1990.



Cultural Resources Management

The Cultural Resources Management Project secures private sources of funding for preservation and restoration of historic structures owned by DNR. In addition, it assists other Capital Programs Administration units with issues relating to the acquisition, planning, and capitally-funded restoration of historic structures. It also assists DNR-Forest, Park and Wildlife Service (FPWS) preservation and restoration of FPWS-owned historic structures under the FPWS's operations budget, and assists FPWS with publications, exhibits, and special educational programs.

In FY90, the Cultural Resources Management Project accomplished the following:

- Secured Board of Public Works approval for two additional resident-curatorships (total curatorships: 12);
- Performed 16 inspections of restoration progress at all curatorships;
- Supervised \$230,411.00 worth of restoration services donated to the state during FY90 (cumulative value of curatorships to the state through FY90: \$1,184,785.00);
- Conducted negotiations for six additional curatorships;
- Conducted negotiations for three leases of historic properties for restoration and use for commercial purposes;
- Documented with photographs and measured drawings of six structures for Maryland Historical Trust concurrence to raze.
- Advised FPWS on six in-house preservation projects;
- Advised other Capital Programs units on two capitally-funded restoration projects;
- Assisted FPWS with three exhibits, two publications, and several special events in parks;
- Assisted DNR personnel office with Black History Month exhibit.

Real Property Review and Evaluation

This project is responsible for the overall review, coordination and execution of all housing, agricultural, grazing leases and, miscellaneous long term leases, as well as all rights of way, easement and use agreements for DNR. This project also maintains all real property records and inventory, does reappraisals and processes real property gifts, disposals, razings and office space requests.

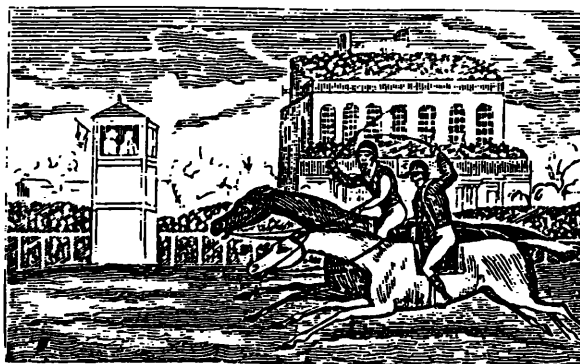
In FY90 the Real Property Review and Evaluation section accomplished the following:

- Processed 76 requests for new right of ways, easement and use agreements
- Reviewed, coordinated and approved approximately 300 lease agreements
- Inspected and reappraised 450 houses owned by DNR

Fair Hill Natural Resources Management Area

This 6,000 acre tract of land in Cecil County is being promoted and developed as a major equestrian center on the eastern seaboard. In FY89 the following major projects and events were accomplished at Fair Hill:

- Successfully negotiated with the National Steeplechase and Hunt Association to relocate their corporate headquarters to Fair Hill
- Successfully negotiated with the Thoroughbred Racing Association and Thoroughbred Racing Protective Bureau to relocate their corporate headquarters to Fair Hill. This project will involve the construction of a new office building on the property.
- The October 29, 1988 Fair Hill Breeders' Cup Steeplechase was run at Fair Hill. This event received national television coverage and, attracted national and international participation.
- Under the direction of the Fair Hill Equestrian Event Organization, the United States Four-in-Hand Driving Championship, the Fair Hill Horse Trial Championship and screening trials for pairs driving were held in support of the Olympics Equestrian Team effort.
- The annual Cecil County Fair is held at Fair Hill with approximately 70,000 people attending.
- Other events held include a steeplechase race in the spring, the Colonial Highland Gathering and Scottish Games and several horse and pony shows.



MARYLAND ENVIRONMENTAL TRUST

The Maryland Environmental Trust was established by the General Assembly in 1967 to conserve, improve and perpetuate the state's natural, scenic, and cultural qualities. Activities of the "Keep Maryland Beautiful" program were also transferred to the Trust in 1967. Programs and policies of the Trust are defined and supervised by a volunteer Board of Trustees consisting of 12 citizens and three ex-officio members (governor, president of the Senate, speaker of the House).

For 18 years, the Trust's major program has been the acquisition of easement donations (development rights) on properties of recognized public conservation easements include farmland, woodland, waterfront, marshes, streams and ponds, scenic views, wildlife and plant habitats, historic properties, archeological sites, and properties of educational or recreational value. The Trust has accepted conservation easements on 182 properties statewide encompassing approximately 31,016 acres valued at over \$70 million. Easements accepted by the Trust are reviewed and approved by the Board of Public Works prior to recordation.

The Trust received 99 easement inquiries in FY90. A total of 23 easements covering 1,696 acres were documented, accepted and recorded in FY90. Nine of the easement properties are adjacent to prior easement sites. Five have frontage on tidal tributaries of the Chesapeake Bay, increasing the protection of seven miles of shoreline. Two have historic homes and 13 have productive agriculture land. Approximately 93% of the FY90 easement acreage is attributable to the Trust's Chesapeake Bay Initiatives.

Easement highlights for the year include two contiguous easements on Otter Point Creek in Harford County which contain 181 acres of tidal and non-tidal wetlands. They are part of a larger area nominated as a component of the National Estuarine Research Reserve System. The sites, with their wildlife habitat and rare plant species, are used for environmental education programs by the Chesapeake Bay Foundation, Izaak Walton League, and Harford County Schools.

In Baltimore County two contiguous easements were accepted under a cooperative agreement between the Caves Valley Land Trust and MET. These easements protect a large portion of the Caves Valley Historic District listed on the National Register of Historic Places. Two other easements in Baltimore County help to protect the Worthington Valley Historic District and one of the largest remaining undeveloped properties in Cromwell Valley.

Four Howard County easements protect woodland, farmland, two historic houses and about one mile of Rockburn Branch, a tributary of the Patapsco River. The donors of these easements also formed a local land trust, the Rockburn-Morning Choice Historic

Conservation District, Inc. to hold and enforce the conservation easements jointly with MET, and to pursue other easement donations and land protection projects in their area.

The Maryland Transportation Authority established a positive precedent in protecting the Bay watershed and the views from I-95 in Harford County with an easement donation on woodlands at James Run. Governor Schaefer, along with the "Keep Maryland Beautiful" Committee of the Trust, presented the Margaret Rosch Jones Award to the Ecology Club of Elkton High School during a State House ceremony. The governor, and the Keep Maryland Beautiful Committee also awarded two environmental education mini-grants to Calverton School and the Bethesda/Chevy Chase Izaak Walton Girl and Boy Scouts.

The Land Trust Assistance Program, conducted in cooperation with the Chesapeake Bay Foundation with a \$43,000 grant from the National Oceanic and Atmospheric Administration (NOAA) implemented through DNR's Coastal Resources Division, has resulted in the formation and training of 25 new local land trusts in Maryland. Local land trusts pursue land protection on a local level using a variety of techniques including conservation easements held jointly with MET.

In July, Environmental Protection Agency Administrator William K. Reilly awarded its 1990 Center for Environmental Learning Award to the Trust and to the Chesapeake Bay Foundation for their joint Local Land Trust Assistance Council. Local land trusts now protect about 12,000 acres of open space in the state. MET worked with these trusts and several national land conservation organizations to form the Maryland Land Trust Alliance, an umbrella group for coordinating land trust activities in Maryland. A Land Trust Assistance Manual was published to guide new local land trusts in the formation and in participation in this joint program. In 1990, MET will begin providing matching administrative grants to local land trusts through the Janice Hollmann Land Trust Grant Fund, named for the founder of the Severn River Land Trust.

Also in FY90, MET launched a Rural Historic Village Protection Program in collaboration with the Maryland Historical Trust, the Maryland Agricultural Land Preservation Foundation, the Maryland Office of Planning, the National Trust for Historic Preservation and several local official and citizens groups. This program is designed to market a menu of state and local land preservation programs around selected historic villages, in order to protect these villages in their historic rural setting of farm and forest lands, or bay shorelines. A conference on "Conserving the Countryside" held in May in connection with this program, drew over 250 participants to the National 4-H Center in Chevy Chase.

CHESAPEAKE BAY CRITICAL AREA COMMISSION

BACKGROUND

The Chesapeake Bay Critical Area Commission was charged by law passed in 1984 to develop a protection program for the **Critical Area**. The commission and the protection program came into being because the General Assembly recognized that the immediate shoreline areas were the last bastion for the protection of water quality entering the Bay, and that they also provided a wealth of habitat for fish, wildlife and plants. The critical area is defined as those lands under the tidal waters, the tidal water themselves, as well as the shoreline measured 1,000 feet from the mean high water line of tidal waters or the landward side of tidal wetlands.

During calendar years 1985 and 1986, the 25-member Critical Area Commission held over 20 public hearings and met more than 75 times to develop a strategy for protecting the water quality and habitat of the Bay with respect to present and future land use in the 1,000-foot critical area boundary. Criteria were developed and promulgated by the commission on December 1, 1985, passed by the General Assembly, and signed into law by the governor on May 13, 1986. Four guidebooks were published to help the local governments apply the criteria.

For the remaining months of 1986 as well as calendar years 1987 and 1988, 16 counties and 44 municipalities applied the criteria in the development of their respective critical area programs. During that time, the commission held 180 panel meetings to discuss the local programs and held 104 local hearings to approve the local programs that were required to be submitted to the commission. During this time, the commission published ten additional documents and conducted an economic impact assessment of the criteria as well as an assessment of the effectiveness of the "one dwelling unit per 20 acres" criterion. Two sets of regulations were also promulgated: 1) regulations requiring notification from the local governments to the commission as to the kinds and numbers of projects approved by them in the critical area (Section 8-1811 of the law); and 2) regulations pertaining to state and local agency actions in the critical area requiring commission approval (Section 8-1814 of the law).

In part of 1988 and all of 1989, the role of the commission was directed toward program implementation. By the end of 1989, all local critical area programs had been approved by the commission and were adopted locally. In fact, in 1989 and part of 1988, the commission reviewed approximately 645 local government projects, commenting upon approximately 150 of them which had an effect upon the design of the project. The commission also reviewed and

approved 55 state and local government-sponsored projects and made comments on each one of them so as to affect the design and increase compliance with the critical area criteria. In addition, over 11 local program amendments were reviewed, with nine receiving approval from the commission and two being denied. Judge John C. North, II became the new commission chairman in 1989.

ACCOMPLISHMENTS

Calendar year 1990 continued the commission's work in implementing the protection program. Six-hundred eighty local government projects were reviewed with comments made to 232 of them. Forty-five state projects were also reviewed and commented upon and eight amendments to local programs were approved. The commission produced a history of its activities from 1984-1988 and published it, together with a **Guidebook on the Conservation and Management of Forest Resources**, and a public information pamphlet. Regulations pertaining to oil and gas exploration and drilling in the critical area were promulgated pursuant to law and are to be enacted in final form by January, 1991. In addition, the commission worked with the Joint Legislative Oversight Committee on Critical Areas to change the impervious surface limitation of the criteria and to streamline the amendment process. Three court cases were initiated during this period with one continuing on from a prior year. Staff also responded to 175 telephone calls citing violations in the critical area and followed-up on them with the appropriate local governments.



CHESAPEAKE BAY TRUST

The Chesapeake Bay Trust is a public non-profit organization created to promote a partnership between government, the business community, and the public in support of the restoration of the Chesapeake Bay. The Trust's board of trustees considers financial support grant applications from community groups, private organizations, schools, and public agencies for hands-on Bay restoration and awareness projects.

In FY90 the Trust awarded \$708,037 in grants to fifty Maryland organizations. Highlights include:

- \$1,000 to the Severn River Land Trust for the development of a brochure on conservation easement opportunities.
- \$39,353 to the University of Maryland Center for Environmental and Estuarine Studies and the National Aquarium to support an intensive environmental education training program for high school teachers that studied the Bay from western Maryland to the Eastern Shore.
- \$2,524 to the Friends of Gwynn Falls/Leakin Park for the Dead Run water quality assessment project performed by volunteers in Baltimore County and Baltimore City.
- \$18,000 to the Alliance for the Chesapeake Bay in support of the Chesapeake Regional Information Service (CRIS), a toll-free telephone system serving as a clearinghouse for Bay information.
- \$852 to the Gunpowder Valley Conservancy for expenses of the Conservancy's 1990 Earth Day volunteer stream clean-up activities in the Gunpowder watershed.

During FY90, the Trust received contributions totaling \$736,826 and approved distributions totaling \$716,078 for a wide range of Bay education and restoration activities. The amount received since the organization's inception climbed to \$2,657,690, with over \$2 million being committed to date for Bay projects

The Trust is supported not only by contributions from the business community, but it also receives half of the monies donated by private citizens to the Chesapeake Bay and Endangered Species Fund via the tax check-off on the Maryland State Income Tax Return. Check-off donations account for approximately one-third of the monies received in the past five years and came to \$404,000 in 1989 and \$495,000 in 1990.

The success of the check-off, in its first two years, is a credit to the generosity of Marylanders and promises continued growth in the ability of the Chesapeake Bay Trust to meet the needs of organizations interested in taking an active role in the restoration of the Bay.

An annual highlight of Trust activities is the celebration of Chesapeake Bay Day, in FY90 on May 6, in conjunction with the Bay Bridge Walk and the Governor's Bay Bridge Run. A record setting crowd of 60,000 took part in the day's activities which also featured the fourth annual Bayfest in Sandy Point State Park.

Fundraising continues to be a major priority for the Trust as does the recruitment of more civic and community organizations to become involved in Bay restoration projects.



MARYLAND ENVIRONMENTAL SERVICE

The Maryland Environmental Service (MES) was created by the General Assembly in 1970 to offer planning, engineering, financing, operating, and management services to the state's smaller communities and industries to help them meet new and rigorous standards for water supply and wastewater treatment.

MES, an agency of more than 280 employees, currently provides quality services in the areas of water supply, wastewater treatment, energy and resource recovery, sewage sludge disposal, recycling, compost marketing, dredged material containment, and solid and hazardous waste management. MES serves state agencies and institutions, municipalities, county governments, and the private sector.

MES operates both as an agency of the Department of Natural Resources and as a non-profit public utility corporation. It is entirely self-supporting through charges billed to its clients and customers. Charges are based upon actual direct costs of the services provided and are made in accordance with agreements and budget estimates. Service contracts range from under \$5,000 to multi-million dollars per year.

MES's staff consists of certified water and wastewater technicians, chemists, biologists, horticulturists, heavy equipment operators, mechanics, financial analysts, engineers of several kinds - mechanical, environmental and civil, and a variety of other professionals who perform their duties at the Annapolis headquarters and at projects and facilities throughout the state.

Corporate affairs of MES are managed by a seven-member board of directors, including the MES director, deputy director, secretary and treasurer, and three appointed citizens of Maryland. The board of directors is appointed by the secretary of Natural Resources with the approval of the governor. MES is organized in three divisions: administration and finance, waste management, and water and wastewater.

ADMINISTRATION AND FINANCE

This division is responsible for setting the direction of MES and for its internal support functions, including personnel, purchasing, issuance of revenue bonds, data processing, contract management, fiscal activities, grant administration and accounting.

An employee recognition program was instituted at MES. Once a month, an "Employee of the Month" is chosen. Employees are considered on the following criteria: motivation and attitude, communication, problem solving, organization and supervision and civic activity. At the end of the year an "Employee of the Year" will be selected from among the employees who were selected as "Employee of the Month."

Now on board is a full-time customer relations representative who serves as a constant liaison between MES and its clients.

WASTE MANAGEMENT

The Waste Management Division provides engineering capabilities within MES for planning, design, and construction. In addition, the division operates and maintains special projects for dredged materials containment, hazardous waste disposal, leaf composting, recycling, construction management, and restoration of sludge disposal operations.

Solid Waste Management

The state's first regional municipal solid waste landfill for Caroline, Queen Anne's and Talbot Counties is under construction. This mid-shore regional landfill will relieve the capacity and operational limitations of several existing county landfills. Operation of the landfill, which will be managed by MES, was scheduled for October 1990. MES designed a new solid waste landfill and the closure of an existing landfill for Garrett County. Construction of this new landfill is scheduled for early 1991. Aside from completing the design of the vertical extension for its existing landfill, MES is also designing a new solid waste landfill for Somerset County.

Recycling

MES is assisting eight or more counties in meeting the Maryland mandate for recycling: 20% for large counties and 15% for small counties by January 1, 1994. Five of these counties are planning to use Material Recovery Facilities (MRFs) to sort, pack and ship commingled recyclables from curb-side pick up and/or neighborhood drop-off locations. MES is operating several composting facilities which both divert yard waste and grass clippings from the respective landfill and produce a saleable product for gardeners and nurseries. Several more composting operations for other counties are in MES planning and design at this time.

MES has been contracted by MDE for the clean-up and removal of tires from the Hughesville tire site in Charles County. Over 600,000 tires were removed from the site in FY90. These tires have been shredded for tire-derived fuel and small rubber chips.

Dredged Material Management

In FY90, MES continued to operate and maintain the Hart-Miller Island dredged material containment facility, the designated placement site for the dredged material from the deepening of the Baltimore Harbor shipping channels.

At the end of FY90, this facility had received over 48 million cubic yards of dredged material. The interior containment volume of the facility is approximately 62 million cubic yards. Contract II of the 50-foot project was to be completed by December 1990.

Crust management activities were scheduled to begin in November 1990 in preparation for planned recreational development.

Hazardous Waste Management

In FY90, the Waste Management Division continued the operation of the Hawkins Point hazardous waste landfill as a chromium containment facility for waste from Allied-Signal. The entire site is maintained by MES through leachate collection and groundwater and surface water quality monitoring.

MES has completed remediation of the Joppa Sand & Gravel site in Harford County. MES continues to perform environmental monitoring of the groundwater, aquatic life and surface water quality.

Composting and Organic Products

In Montgomery County, MES continued to operate the yard waste composting facility near Dickerson. Nearly 90,000 cubic yards of leaves were received at the Dickerson facility in FY90. Based on the results of the pilot program conducted in FY89, grass is also being collected on a voluntary basis within the Montgomery County Collection District and is being co-composted with the fall leaf collection. Other municipalities within the county began contributing their collection of yard wastes to the Dickerson facility.

In Prince George's County, MES has entered into an intergovernmental agreement to manage and operate both yard waste composting and wood waste processing facilities. The leaf and grass portion of the yard waste collection will be composted at the Western Branch facility in Upper Marlboro, and the wood waste will be processed at the existing Brown Station Road Landfill. Preparation of the facilities was begun in FY90 to be ready for start-up operation in the fall of 1990.

During FY90, the U. S. Patent and Trademark office issued a registered trademark to the Maryland Environmental Service for Leafgro® organic compost. Compro® and Leafgro® sales were strong last year. Net revenues for the Compro® program totalled \$220,695.00.

Used Oil Recycling

MES is responsible for implementing a unique statewide used oil recycling program. The program has increased the number of local government and state agency operated used oil collection facilities to over 125. The program also distributes public education material and operates an information center toll free telephone line to encourage citizens to recycle used motor oil.

Construction Management

The MES construction group successfully completed the \$2.4 million construction at the Hart-Miller Island facility. This work ranged from seeding and stabilization to spillway construction to the moving of several thousand cubic yards of material. The Construction Group is presently winding up \$360,000 of dike raising work at Hawkins Point Hazardous Waste Landfill. This work involved the placing of 18,000 CY of clay and approximately 5,500 tons of stone. Work also ongoing is chip and tar, block work and concrete work at both the Texas Landfill (BCRRF) and Western Acceptance Facilities. Future work for the construction group includes: Western Branch Access road, pipe line at Dorsey Run, and this winter excavation work on Hart-Miller Island.

WATER AND WASTEWATER

This division provides planning, design, construction, and operational services for water and wastewater treatment facilities throughout the state. The Operations and Maintenance Section operates and maintains over 100 wastewater and water treatment facilities. The Engineering Section provides Operations with technical support and provides project management for new construction, plant renovations and expansion, and sludge management.

Operations and Maintenance

The Operations and Maintenance Division is responsible for operating over 130 water, wastewater, and other environmental facilities statewide. Operations comprises the largest section of the division and is supported by the Administration, Maintenance, Training, Safety, Laboratory, Permits and Compliance sections. The division employs over 150 people and has annual revenues of over \$14 million.

Services are provided by the O&M division to both state and non-state clients and range from on-going full service contracts to part-time technical assistance on an as-needed basis.

The O&M division grew significantly during FY90, and is now responsible for 62 wastewater treatment plants, 46 water treatment plants, 15 wastewater pumping systems, 4 regional sludge disposal facilities, 4 regional laboratories, 1 incinerator, in addition to numerous monitoring and special projects. The division has recently begun assuming full responsibility for water and wastewater facilities at 29 state parks and youth camps. Other significant new projects include overall management of the Town of Elkton's wastewater collection and treatment system and regional lab.

The division began several new initiatives during the year in an effort to improve the quality of service. All sections have computerized data handling and reporting, and training and safety have been emphasized. Many state facilities were upgraded during the

year, and much deferred maintenance was accomplished. Compliance with pollution control and drinking water regulations continued to improve dramatically in FY90.

Operations

The operations section is made up of over 130 licensed operators, and is primarily field-based. The section is divided into four geographic regions of the state, with sub-regional "anchor" headquarters located at some of the larger facilities.

During the year there were several start-ups of new or significantly upgraded water and wastewater treatment plants, among them the Crownsville and Sandy Point water treatment plants, and the wastewater treatment facilities at Swallow Falls, Rocky Gap and Greenbrier State Parks, Victor Cullen, and the Southern Pre-release Unit. Also during the year, MES assumed operations of the Elkton wastewater treatment plant and collection system, and the Eastern Correctional Institute water and wastewater system.

Maintenance

The maintenance section is responsible for corrective and preventive maintenance and calibration of equipment at facilities operated by the division. During the year, the mechanical and electrical maintenance staff responded to numerous emergency situations, or managed contractors as needed to effect repairs or rehabilitation of equipment. Demands on the maintenance section have increased in direct proportion to the complexity and sophistication of upgraded and new facilities.

A major initiative of the section has been the implementation of computerized preventive maintenance systems throughout the state. This will require a two-year effort, but is expected to greatly enhance the efficiency of the maintenance section.

A new capability in FY90 is television inspection of underground pipes. Typically, the TV inspection equipment is inserted into a sewer to determine the condition of the pipe and to identify extraneous sources of infiltration of groundwater. TV inspection services are now available to both state and corporate clients.

Laboratory, Permits and Compliance

This section manages four regional laboratories, monitoring and sample collection, permits management, data management, and reporting. More than 26,000 samples were processed during FY90 at the Crownsville, Dorsey Run, MCI and Elkton laboratories, or at contract labs.

In addition to the routine laboratory analyses, there were numerous special studies conducted by the sections scientists and technical staff. Removal of

phosphorus at the Elkton WWTP and intensive process control monitoring to allow the Dorsey Run AWWTP to discontinue use of powdered activated carbon are two examples of diagnostic services which this section has provided. Capabilities have been expanded to include a wide variety of sampling and monitoring techniques, which are performed under close quality control and in accordance with Safe Drinking Water Act and Clean Water Act regulations. Liaison between regulatory officials and state and corporate clients has been expanded and includes representation of clients in negotiation of permits and during enforcement activities.

The section successfully managed the development of local limits and updating of the Town of Elkton's wastewater pretreatment ordinance which was approved.

MES's record of permit compliance has improved in the last few years, in large part due to the reduced turnaround time for sample processing, and better data handling abilities.

Safety

The MES safety program was expanded during the year to include all facilities and employees. Facilities were inspected for safety hazards and a report was issued to employees and management outlining the corrections required.

Training classes were conducted in-house on many safety issues as required by law and included employee Right to Know, First Aid/CPA, use of self-contained breathing apparatus (SCBA) and fire fighting equipment.

Compliance was met with regulations such as employee and community Right to Know, Sara Title III and hazardous materials.

A safety committee was established with all areas represented and meets once a month for direction. Personal injury/accidents were reduced by 34% in 1989.

Other activities of the section include development of the agency risk management plan, safety policies and programs and a reduction in MOSH inspections and compliance problems.



ENGINEERING

Ten Year Plan

MES is developing a master facility plan for all state water and wastewater treatment facilities. A joint effort with the Department of Budget and Fiscal Planning and the Department of General Services, this plan will provide the first comprehensive inventory of the state's facilities. The complete master plan will ensure that proper maintenance is performed in a timely manner and will provide a schedule for each facility for when capital improvements will be needed.

Capital Improvement Program

MES is involved in an aggressive program to upgrade the wastewater and water treatment facilities throughout the state. Several projects were completed in FY90. The wastewater plants at Greenbrier State Park and Southern Pre-release Unit were upgraded using EPA construction grants. The new Southern WWTP uses spray irrigation for final disposal of the treated wastewater. This project has improved the water quality of the stream into which the plant formerly discharged.

Several other new plants started up during the year (i.e., Swallow Falls State Park WWTP in June, Woodstock Job Corps Center WWTP in April, and Crownsville State Hospital WTP).

Fourteen other capital improvement projects were underway, either in design or construction.

Major Maintenance

In FY90, MES completed over sixty major maintenance projects at state facilities. The projects included replacing pumps and blowers, installing ultraviolet disinfection systems, paving access roads, upgrading the electric systems, rebuilding/repairing components of water and wastewater systems, and painting several water towers. Most projects were bid out to contractors and some were undertaken by the MES staff. Operations personnel built an enclosure at the Deep Creek Lake State Park wastewater treatment facilities, installed the diffusers and piping at I-70 rest stop wastewater lagoon, installed ultraviolet disinfection unit at Maple Run Youth Center, installed ultraviolet unit and control building at New Germany State Park, and completed working on the biofilter at the wastewater treatment plant located at the Maryland Correctional Institution in Hagerstown.

Pretreatment

MES continued the pretreatment program which was initiated in 1989 to enhance the treatment efficiency and improve the operating conditions at our state wastewater treatment facilities. The activities covered by the pretreatment program include identifying and correcting the problems created by excessive amounts of solids, grease, organic material, and

infiltration/inflow. These enter the treatment facilities and impair the treatment efficiency and sometimes reduce the capacity. To date, MES has completed 18 projects at a total cost of \$490,000.

Sludge Management

MES continued its contractual agreements with the Washington Suburban Sanitary Commission and the District of Columbia to monitor its sludge landspreading operations. These operations cover a geographical area from the Maryland/Pennsylvania border into Virginia and from the Eastern Shore of Maryland to the Maryland/West Virginia state line. MES also continues to monitor the composting operations for the District of Columbia.

The Sludge Management group has been assisting corporate clients, such as the Cities of Bowie and Cumberland in permitting sludge utilization sites and developing sludge management programs. Additionally, MES continues to locate, permit, and manage suitable sites for its state-owned facilities. In 1989, MES managed over 12,300 wet tons of sewage sludge for corporate and state facilities. Land application, composting, lime stabilization, and dewatering are methods of sludge handling currently in use at MES-operated facilities.

A Regional Facility Plan has been prepared as a part of the Ten-Year Master Plan. This plan, which will be implemented in FY91, will consist of the design and construction of several large, regionalized, sludge receiving, treatment, and beneficial reuse facilities located throughout the state. This will allow small communities to participate in a large sludge utilization program at a fraction of the cost of developing individual programs.

Project Management Capabilities

During FY90, MES continued to offer open-ended service contracts to some of its clients. These contracts give our clients the ability to call on the engineering and operations staff to prepare feasibility studies, evaluate current systems and operational procedures, suggest improvements, design treatment system improvements, and add new treatment processes to their plants.

MES enlisted several architectural/engineering (A/E) firms to provide engineering services on an as-needed basis. The services provided by these firms cover the areas of water/wastewater treatment, landfills, hazardous wastes, waste recycling, and sludge management.

Having these A/E firms on board has allowed MES immediate access to engineering services whenever the need arises. As a result, MES has been more responsive in accomplishing the various tasks since it is no longer necessary to solicit A/E services on a project-by-project basis. Significant savings in time and energy were experienced through this contract service, which will be continued in FY91.

MARYLAND FOREST, PARK AND WILDLIFE SERVICE

The Department of Natural Resources-Forest, Park and Wildlife Service (FPWS) has the following mandates: to promote, administer and manage every state-owned forest, park, scenic preserve, natural area, parkway, historic monument and recreation area; to protect and promote the health, safety, economy and general welfare of the state; to administer forest conservation practices on privately-owned forest land and manage publicly-owned forest land; to conserve wildlife and wildlife resources; and protect, conserve, and maintain viable populations of nongame, threatened and endangered animals and plants. These mandates are implemented through activities on state parks, forests and wildlife management areas and through assistance programs to citizens and local governments. Its operational elements are: General Direction, Planning and Program Development, Forest and Park Management, Cooperative Forestry, Wildlife Management, and Natural Heritage.

GENERAL DIRECTION

General Direction provides direction, administrative support and services including: budget, personnel, purchasing, training, motor vehicle fleet management, radio communications, safety, equal opportunity, public information, and marketing functions to serve the unit's program areas.

Personnel in this program work as a team in providing administrative support and services and extol the motto, "Service to the field!"

PLANNING AND PROGRAM DEVELOPMENT

This division conducts strategic long-term planning for statewide forestry and wildlife programs. Included is the development of resource plans for 40 state forests and wildlife management areas encompassing 250,000 acres of state-owned land. Another area of responsibility is environmental review. This part of the program handles over 900 requests per year for determining the presence/absence of threatened and endangered species of both plants and animals, species in need of conservation and other concerns relating to forestland and wildlife habitats.

- FY90 saw the continuation of the Wildlife Comprehensive Plan Revision (WCPR). The WCPR Citizen Participation Plan called for conducting internal goals/issues workshops, as well as involving the public in 10 external workshops across the state this past fall. A booklet of goals, issues and solutions was produced and returned to all participants.

- As a follow-up to last year's Interdisciplinary Team that developed a state land planning process, planning was initiated at Savage River State Forest. This effort encompasses a year-long time-line of planning steps, a fully developed Citizen Participation (CP) Plan that has set up more than 50 events involving the public over the planning year and the creation of an advisory group of local citizens. These citizens represent 20 major interest groups concerned about Savage River State Forest. They will be instrumental in the planning job.
- A citizen participation consultant was hired to provide training to the Savage River Planning Team. Thirty individuals learned about citizen participation, how to identify publics, how to design CP meetings, how to design CP plans and how they apply to what is being conducted at Savage River.
- Personnel participated on the National Responsive Management Advisory Board which has created, with the help of many participating state fish and wildlife agencies, a public opinion survey/marketing technique. When this program's software is installed on the computer and training is completed, surveys may be conducted addressing any issue and have results in one-three days. This will help to conduct programs to reflect public desires while effectively managing the state's wildlife resources.
- The critical area law and regulations continue to bring about a considerable number of environmental review (ER) requests from counties, engineers, developers and consultants. Other ER efforts dealt with transmission corridors, State Highway Administration projects, land fills and others. Many of them required time to plan mitigation for habitats that were impacted by these projects.

FOREST AND PARK MANAGEMENT PROGRAM

The Forest and Park Management Program is responsible for the operation and management of 70 state parks, forests, natural environment areas and natural resource management areas ranging in size from 4 acres to 52,800 acres, for a total of 244,557 acres. In FY90, over 7,400,000 people visited these state lands, participating in activities as diverse as camping, boating, swimming, historical reenactments, owl prowls, triathlons and fossil hunts.

The operation and management of these lands includes maintenance of facilities. Field personnel maintain over 1,400 buildings, 553 miles of roads and 2,457 campsites, plus swimming pools, beaches, marinas, piers, monuments, cabins, vehicles, boats, parking lots, trails, and sewer, water and electric lines. Eighty-five contracts were awarded for a total of \$1,150,238 for maintenance and repair of facilities. Seasonal technician program labor and materials for maintenance and repairs amounted to \$353,100.

Highlights of the past year include:

- For the first time, two sessions of Ranger School were held. A total of 42 rangers - including two rangers from the Delaware Park Service, graduated from the programs. Ranger School is held at Elk Neck State Park, and is conducted by FPWS personnel. The school accepts students from outside Maryland on a space-available basis.
- Efforts continued to make facilities and programs accessible to persons with disabilities. Open houses for persons with disabilities were held at Patapsco Valley and Assateague State Parks. Capital improvement renovations to increase disabled access were completed at Assateague and Point Lookout State Parks. In-house improvements for the disabled at parks include accessible picnic tables, trails, campsites and amphitheatres.
- The dedication of the Northern Central Railroad Trail and Monkton Train Station took place in November 1989. The trail is over twenty miles long and runs from Ashland to the Maryland state line. It is used for hiking, jogging, bicycling, horseback riding and walking. The trail and train station are managed by Gunpowder Falls State Park.

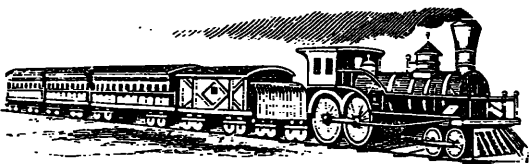
New camping services were initiated at six pilot parks beginning in April 1990. The services include a new reservation system and reservation policies, campground policy changes, and enhanced program activities for campers. The camping initiative was designed to give more people an opportunity to camp in Maryland state parks, and to give them more services and activities while camping.

- PARKLINE, an expanded version of the state park and forest newsletter, completed its first full year of publication with a total of 774 paid subscriptions, and a statewide circulation of 40,000+.
- Rocky Gap State Park hosted the first annual Rocky Gap Country Bluegrass Festival in August 1989. The three-day festival attracted 55,000 people and featured big-name stars of country and bluegrass music, as well as music workshops, crafts, and children's activities.

In addition to management and operation of facilities and sites, the Forest and Park Management Program is responsible for providing activities and programs for visitors. Campfire programs and other activities are available at each park. A number of larger events are held at various parks each year, including maple syrup demonstrations, canoe and backpacking trips, holiday programs, fishing tournaments, triathlons and marathons, cross-country ski races, and historical reenactments.

Programming highlights in FY90 include:

- "The National Celebration of the Outdoors" and Earth Day were celebrated in state parks and forests throughout Maryland in April, 1990. Special events included an "Adventure Expo" of outdoor sports equipment, trash clean-ups, open houses, recycling programs, a volksmarch, tree plantings and flower and bird walks. Harford County's Earth Day celebration was held at Susquehanna State Park.
- "Midweek Mountain Memories" and "Steppin' Out" programs were piloted for senior citizens in several state parks. "Steppin' Out" is a day trip to a state park to introduce seniors to Maryland state parks. "Midweek Mountain Memories", a four-day visit to a state park for an in-depth outdoor experience, includes lodging at a park cabin. The first two "Midweek Mountain Memories" programs introduced a total of 47 seniors to the state parks of western Maryland.
- "Your State Park" was the theme of an expanded state park exhibit at the 1989 Maryland State Fair. A great hit with the crowds, the exhibit featured a large "Scales and Tales" animal program, Junior Ranger Hut and activities, concessions gift sales, and park information area.
- Sandy Point State Park hosted Chesapeake Appreciation Days in October 1989. The state park exhibit, Ranger World, was a great crowd-pleaser. The exhibit featured Scales and Tales, hay rides, equipment displays, the Junior Ranger Hut and activities, gift sales, and a park information table.



FY90 VISITATION

Assateague	290,761
Big Run	31,055
Calvert Cliffs	60,255
Casselman River Bridge	18,833
Cedarville	93,581
Chapel Point	3,716
Choptank River Bridge	83,075
Cunningham Falls	770,266
Dans Mountain	36,370
Deep Creek Lake	136,688
Elk Neck	253,894
Fort Frederick	140,799
Gambrill	385,221
Gathland	63,676
Greenbrier	305,797
Gunpowder Falls	665,597
Herrington Manor	100,483
Janes Island	184,400
Jonas Green	34,662
Martinak	46,179
Matapeake	54,978
Morgan Run	4,147
New Germany	46,679
Patapsco Valley	696,876
Patuxent River	14,728
Pocomoke River	256,312
Point Lookout	343,261
Rocks	110,489
Rocky Gap	272,423
St. Clement's Island	8,905
St. Mary's River	23,530
Sandy Point	448,825
Seneca Creek	109,563
Severn Run	29,546
Smallwood	236,611
Soldiers Delight	57,854
South Mountain	76,363
Susquehanna	136,383
Swallow Falls	175,436
Tuckahoe	77,365
Washington Monument	127,998
White Water	38,278
Wye Oak	31,444
Green Ridge	180,654
Savage River	122,047
Potomac Garrett	93,475
Pocomoke	6,532
TOTAL	7,486,010

COOPERATIVE FORESTRY PROGRAM

The Cooperative Forestry Program provides technical assistance to private landowners, municipalities, and other government units for the management of their forests and individual trees. The program's goal is to improve and maintain the economic, aesthetic, recreational, environmental, and social contributions of trees, forests, and related resources for the benefit of Maryland's citizens.

The program has five major elements; Forest Resource Management, Forest Protection, Chesapeake Bay Forestry Initiative, Urban and Community Forestry, Forest Products Utilization, and Marketing.

Accomplishments of the past year include:

- The 1990 tree planting season for the Cooperative Forest Management Division resulted in just under 5,000 acres being planted. Woodland plantings accounted for 2,533 acres while field plantings contributed 1,783 acres. The Green Shores Program produced 544 acres of buffer plantings.
- A total of 28.95 acres of school forests were established on 62 individual school properties under the Chesapeake Bay School Reforestation Project. This project, funded through Maryland's Green Shores Program, provided \$50,000 to the Maryland Association of Forest Conservancy District Boards for the purpose of establishing school forests. Each one of Maryland's 24 district forestry boards were allocated a portion of these funds during the spring 1990 tree planting season. Applications were solicited from interested schools and 62 sites were selected for funding. The students and school community helped organize and implement the plantings in cooperation with the county forestry board and FPWS. Each school developed an environmental education program centered around the newly established forest and integrated it with the existing school curriculum. These forestry-oriented programs will help educate students across the state on the importance of forests and trees in overall environmental protection.
- The Maryland Forest Stewardship Committee developed a five year program and accompanying budget to promote the concept of forest stewardship for non-industrial forest landowners. The intent of the program, initiated by the National Association of State Foresters and the US Forest Service, was to coordinate and provide an inter-disciplinary approach to forest resource management emphasizing all of the resources' benefits and values. The program's proposed budget calls for total expenditures of \$1,238,000 million over five years to prepare some 1,900 resource conservation plans on about 100,700 acres.

- The Woodland Incentive Program, a new cost-share program, was initiated by the Cooperative Forestry Division. It was funded from transfer taxes on the sale of woodlands in Maryland. The maximum annual funding for the program is \$200,000. Landowners with 10 to 500 acres of forest land who agree to maintain the forestry practices for 15 years, are eligible for this program. Money from this cost-share program can pay up to 50% of the costs associated with forest management.
- Fourteen cooperative forestry personnel attended the annual training meeting of the Mid-Atlantic Interstate Forest Fire Protection Compact at the National Emergency Training Center in Emmitsburg. They joined 70 other personnel from Pennsylvania, Delaware, New Jersey, Ohio, Virginia and West Virginia in a program entitled "Wildland Arson: Problem Identification and Prevention." Experts from the compact states and other invited speakers led a discussion on the problem of wildland arson. In the compact states, arson is the first or second leading cause of wildfires.
- The Cooperative Forest Management Program teamed up with the US Forest Service, the Bureau of Land Management and the Virginia Department of Forestry to host a Smokey Bear night with the Washington Bullets at the Capital Center in Landover. The activities at the basketball game between the Washington Bullets and the San Antonio Spurs helped promote forest fire prevention. It featured a pre-game football clinic with former Washington Redskin Mark Mosley for youngsters 16 and under; a ceremonial tip-off with Smokey Bear; and an awards ceremony. The Washington Bullets and Mark Mosley were recognized for their contributions to forest fire prevention by US Forest Service Chief F. Dale Robertson, Deputy Director of the Bureau of Land Management Dean Stepanek, Don Morton of the Virginia Department of Forestry and State Forester Jim Roberts. The game was attended by 13,522 fans.
- "Street Tree Factsheets" was published to assist the Maryland urban forest manager in the selection of trees for planting in urban areas. It provides concise, practical information about street tree cultivars and species that are readily available.
- The book was produced through a cooperative agreement between the Municipal Tree Restoration Program at Pennsylvania State University and the USDA - Forest Service, New Jersey Division of Parks and Forestry, Illinois Department of Conservation, Pennsylvania Department of Environmental Resources and the Maryland Department of Natural Resources, Forest, Park and Wildlife Service.
- The Resource Utilization and Marketing Section exhibited at NEWPEX - Northeastern Wood Products Exposition in Hershey, Pennsylvania. This was a joint effort between the Garrett County Development Corporation and FPWS. The group promoted industrial development and marketing of forest products in Garrett County as well as statewide. Special emphasis was placed on exporting forest products through the Port of Baltimore.
- On May 21-22, the *Governor's Conference on Trees and Forests* was held at the Ramada Inn in Annapolis. The conference provided more than 300 attendees with a unique opportunity to develop a bold new vision for shaping the future of Maryland's tree and forest resources. Public comment was solicited to incorporate into the draft report prepared by the 34 member task force composed of state legislators, distinguished professionals and conservation leaders appointed by the governor. Recommendations in the final plan were presented to Governor Schaefer and his Commission on Growth in the Chesapeake Bay Region.

FORESTRY AND WILDLIFE JOINT PROJECT

- Two highly successful "Natural Design in Development" conferences were held at the Baltimore Convention Center. These major events were coordinated jointly by the Forestry and Wildlife Divisions. Over 200 people attended. The purpose of the conferences was to highlight the need for understanding and cooperation on the part of natural resource managers, land developers and builders to ensure environmentally sound land use planning and development. Such developments protect, conserve and enhance trees, forests, wetlands, stream channels and wildlife habitat. Information on wildlife conservation, wetland protection and environmentally sound planning, engineering and watershed management was shared with the natural resources specialists, engineers, planners, builders and developers attending the conferences. The conferences helped those in attendance focus on real world issues and problems encountered in devising environmentally sound development plans.



WILDLIFE MANAGEMENT PROGRAM

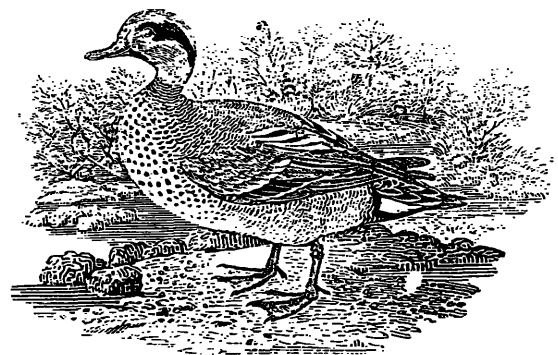
The primary goal of the wildlife management program is to conserve, protect and enhance the wildlife resources of the state and the habitat those resources depend on for food, shelter and reproduction. Achievement of this goal will ensure that Maryland's wildlife resources will be maintained for future generations to enjoy.

The wildlife management program also provides for both consumptive (hunting) and non-consumptive (bird watching, wildlife photography, etc.) uses of wildlife. In FY90 more than \$4 million came largely from the sale of 150,000 hunting licenses and various hunting stamps. Five wildlife program managers and four regional managers develop and implement the program's activities. The following are highlights of wildlife management program accomplishments for FY90:

- Efforts to inform and involve the public and other state and federal agencies in resolving wildlife issues and problems included the creation of several special advisory committees to assist and advise the Wildlife Division in the preparation and implementation of species-specific management plans. These committees include businessmen, sportsmen, elected officials, and experts from academia and state and federal agencies.
- The Canada Goose Advisory Committee members were appointed to assist in the development of a management plan to restore and maintain Maryland's wintering population of Canada geese. The committee has set 400,000 geese as the goal for the size of the wintering goose population following the hunting season and has recommended the harvest rate for Canada geese be limited to no more than 20 percent. Currently, the committee is reviewing and commenting on a final draft of a long-range Canada goose management plan for Maryland which includes population goals and objectives, population surveys and research needs, habitat needs and management and the management of resident Canada geese.
- To assist and advise FPWS in its efforts to implement the North American Waterfowl Management Plan, the Wildlife Division has convened a statewide implementation committee for the Atlantic Coast Joint Venture. Wildlife personnel have identified six areas within the state which contain significant waterfowl habitat. Under the plan, these areas are known as focus areas. The Joint Venture committee is assisting the wildlife division in identifying private organizations and individuals to act in partnership with FPWS in enhancing and protecting wetlands within each focus area. Part of the committee's charge is to develop and put into

action a plan to secure and coordinate assistance from the public sector in habitat enhancement and protection activities within the focus areas.

- The Division established the Blackwater-Nanticoke Focus Area Local Advisory Group, the first of several to be created in Maryland as part of the Atlantic Coast Joint Venture activities. The local advisory group, working with wildlife habitat specialists, has developed a draft work plan for enhancing and protecting important wetland habitat in the Blackwater-Nanticoke focus area.
- The black bear population in western Maryland, particularly in Garrett and Allegany Counties, has increased greatly in the past few years. Anticipating the possibility of problems resulting from further growth in the bear population and the need in the future to maintain the black bear population within both the biological and the social carrying capacity of the region, the wildlife division began development of a black bear management plan for Maryland. A series of black bear workshops were held around the state to inform and involve the public in developing the plan. At these workshops, wildlife personnel shared with the public the benefits and problems associated with the increase in the black bear population. They also reviewed the current knowledge of black bear biology and management practices. A portion of each workshop was devoted to soliciting recommendations from the public about how FPWS should manage black bears. The public response to the workshops was extremely positive and helpful, especially in Garret County where more than 200 residents attended the workshop.



- **Project Wild** celebrated the start of its second full year of activity in June. Designed to provide balanced and accurate instructional material on wildlife biology for use in primary and secondary school programs, Project Wild has been adopted by 49 states, 10 Canadian provinces and by Iceland. The wildlife division's Project Wild coordinator planned and organized the initial Project Wild workshop for facilitators in June of 1989. In subsequent workshops, presented at various locations around the state, more than 600 facilitators and primary and secondary teachers have received training in the use of Project Wild's educational tools and materials.
- Through its Wildlife Habitat Improvement Program (WHIP) and Upland Habitat Restoration Project (UHRP) the wildlife division continued to cooperate with private landowners in enhancing and maintaining wildlife habitat throughout the state.
- The UHRP program, initiated in Baltimore, Carroll, Frederick and Washington Counties during FY89, was expanded in FY90 to include five counties in southern Maryland. The long range goal of the project is to restore traditional farm habitat for upland game species. Wildlife management plans are prepared by UHRP personnel for each private land holding accepted for habitat restoration. In FY90, 170 landowners filed applications to participate in the project.
- The WHIP program was initiated in FY89 to encourage improvement of wildlife habitat on private land. The program pays farmers to plant, but leave unharvested, crops that provide food and cover for ring-necked pheasants, bobwhite quail and Canada geese. These three important Maryland game species are undergoing population declines. During FY90, landowners in 10 counties (Washington, Frederick, Carroll, Baltimore, Calvert, Charles, Kent, Queen Anne's, Talbot and Dorchester) applied to participate in the program. Of the \$225,000 available to reimburse landowners for habitat improvement activities, about half was awarded for goose habitat improvement and half for upland game habitat improvement.
- In cooperation with the Maryland Chapter of Quail Unlimited, the wildlife division sponsored a public workshop on habitat improvement for bobwhite quail at Hughesville. More than 100 private landowners attended the workshop. They received information and advice on basic land management practices beneficial to quail, on federal agricultural assistance programs applicable to habitat improvement and on integrated pest management.
- Maryland hunters established an all-time harvest record for deer in FY90. A total of 46,293 deer were harvested in the firearms, bow and black powder seasons. Bow hunters harvested 7,844 white-tails and 144 sika deer. In the firearms season, 33,449 white-tails and 1,069 sikas were harvested. And in the muzzleloader season, 3,716 white-tails and 71 sika were taken. Factors contributing to the record harvest include continuing growth of the deer herd statewide, snow cover statewide on opening day of firearms season, antlerless permits being valid during the regular firearms season in western Maryland, and the availability of the second-deer stamp. The high harvest in 1989 will help achieve a stabilization of the state's deer herd at its current level, one of the primary goals of the deer management program.
- Maryland's wild turkey population continues to increase and expand its range with the assistance of the trap and transplant program. The state's wild turkey population is currently estimated at 10,000 birds. Turkeys now live in 20 of the 23 counties in Maryland and will be introduced into the remaining three counties by 1991. Spring turkey hunting is now permitted in 12 counties. Hunters bagged 1,122 gobblers in the seven counties open to hunting during the 1990 spring turkey season. The 1990 spring harvest was the largest yet for the state.
- Cooperative agreements have been entered into with the National Wild Turkey Federation (NWTf) and with the National Ruffed Grouse Society (RGS).
- Under the agreement with the NWTf, FPWS will develop proposals for project beneficial to wild turkeys and submit them to NWTf for funding approval and also will develop specific recommendations concerning the needs of wild turkeys in Maryland. The NWTf will provide assistance to FPWS on projects which it has reviewed and approved. NWTf has established a Wild Turkey Super Fund account for FPWS to pay for those projects which it has approved.
- The agreement with the RGS provides funding and technical assistance for a five-year project to reintroduce ruffed grouse in Maryland's coastal plain. The Pennsylvania Game Commission and a private landowner in Charles County are cooperating in the project; Pennsylvania is providing access areas in which wildlife personnel can trap up to 75 grouse for release in Maryland while the private landowner is allowing his property to be used as the release site. The RGS is contributing funds, equipment and technical assistance. The wildlife division will be responsible for monitoring the survival, movements and establishment of the grouse following the release.
- With funding support from the Maryland tax check-off, the Non-game and Urban Wildlife program continued its efforts to survey selected populations of endangered and non-game species. A total of 197 bald eagle nests were

tored; 115 of the nests were active; 164 young hatched in 92 of the nests. Other activities under this program included monitoring peregrine nesting success in selected sites in Maryland; monitoring colonial waterbird colony sites throughout tidal areas; nesting and population surveys of waterfowl, woodcock and great blue herons; surveys of nocturnal marsh bird populations; surveys to determine the extent of use of duck blinds by barn owls and the monitoring of experimental barn owl nest boxes in marsh ecosystems. A woodcock singing ground survey was also conducted as part of an international effort between the US and Canada to monitor trends in the North American woodcock breeding population. Efforts also continued to monitor the reproductive success and movements of Delmarva fox squirrels introduced into new habitat.

- The number of Canada geese wintering on the Eastern Shore during 1989 was similar to the population wintering there in 1988. However, the harvest of geese during the hunting season increased 40% over the harvest taken in 1988, due primarily to increased vulnerability of the geese to hunters. The preliminary 1989 federal harvest estimate for Canada geese for Maryland is 108,000. The harvest rate index was 30 per cent, up from the 21 per cent harvest rate index in 1988. Hunting regulations in effect last year were not sufficient to maintain the 20 per cent harvest rate needed to allow the wintering goose population to rebuild. Late-melting snows in northern Quebec and Labrador delayed nesting again this spring resulting probably in another year of below normal reproduction. Based on available information, the number of geese returning to winter on the Eastern Shore will be similar to that of last year.

NATURAL HERITAGE PROGRAM

The Natural Heritage Program is the lead unit within DNR for the identification and protection of threatened and endangered species and their habitats. The program also locates and helps protect natural areas (pristine natural communities that are the best examples of the ecosystems that make up Maryland's landscape). These species, habitats, and natural areas are essential elements of our state's natural heritage and their loss would diminish Maryland's biological diversity.

The Natural Heritage staff systematically collects, records and analyzes information about the state's biotic diversity, and maintains an extensive data base of species and habitat information in Maryland. Program activities include: identifying rare and endangered species and their habitats; monitoring of these species and habitats to assess threats to their survival; and protecting these significant resources through information exchange and environmental reviews (over 3,000 formal requests in FY89), coordi-

nation with land management agencies, and the development of acquisition and easement priorities. The program also identifies important natural areas and works for their protection through acquisition, easement, and voluntary landowner cooperation. In addition, the program aids many private and public conservation groups, such as the Maryland Environmental Trust, The Nature Conservancy and the Chesapeake Bay Foundation, to facilitate their efforts to protect significant habitats.

The following are the highlights of the Natural Heritage Program's accomplishments for FY90:

- The Natural Heritage Program received just over \$200,000 from the Chesapeake Bay and Endangered Species Fund. Projects initiated with these funds included:
- Surveys to locate new populations of wood rats, rock voles, water shrews, black rails, map turtles, barking tree frogs, carpenter frogs, narrowmouth toads, mussels, rare butterflies, tiger beetles, and cave invertebrates;



- Life history and habitat studies on northern flying squirrels, wood rats, loggerhead shrikes, piping plovers, regal fritillary butterflies, tiger beetles, harperella, sandplain gerardia, Canby's dropwort, and swamp pink. This information will help determine protection and restoration plans for these species;
- Production of a 1990 Threatened and Endangered Species of Maryland calendar;
- A study to locate forested tracts possessing characteristics of old growth forest, a rare community type which may be important to rare species;
- Ten instructional units comprised of video and printed materials to be used in the environmental education curriculum for school systems;
- Employment of an information and education coordinator to help educate the public about the value of protecting and restoring threatened and endangered species populations;
- Promotional activities that increase public understanding of the need for the tax check-off and keep them informed on tax check-off projects.
- The Natural Areas Registry Program, funded by a federal Coastal Zone Management Grant through DNR's Tidewater Administration, was initiated. The Registry Program helps protect significant natural features, such as rare, threatened and endangered species or rare, unique or pristine natural communities through voluntary cooperation with landowners. Owners of significant natural areas are informed of the importance of their property and invited to enter a verbal, non-binding agreement to protect the site. A plaque is presented to cooperating landowners to recognize their contribution to maintaining Maryland's biological diversity. At the close of the fiscal year, nearly 120 landowners had been visited and 45 had agreed to register their sites.
- The Natural Heritage Program coordinated a revision of the state's threatened and endangered species list. The Threatened and Endangered Species Committee, made up of representatives from four DNR units, reviewed rare plants and animals primarily from central and western Maryland to determine which species qualified for protection under the Endangered Species Act. Most of the species proposed for listing are so rare that fewer than five populations of them are known to occur in the state.
- Basic research on the life needs of two species of tiger beetles, harperella and sandplain gerardia, all federally listed species was completed. Monitoring programs were established for these species, as well as the federally listed Canby's dropwort and swamp pink.
- Restoration efforts were initiated for three important sites. Competing vegetation was removed from portions of Soldiers Delight Natural Environment Area, where a rare natural community occurs on serpentine rock outcrops. This community provides habitat for a number of rare plants. A similar project was completed at a private camp in Harford County. Restoration was also begun at the only site in Maryland for the snow trillium.
- At the request of The Nature Conservancy, the program provided an overview of its responsibilities and activities and a look at its data base to ten biologists and botanists from Latin America.
- During the course of surveys over the year, Natural Heritage Program staff found four species that had never before been reported in Maryland. Additionally, four species which were listed as endangered extirpated (extinct within Maryland) were rediscovered.



MARYLAND GEOLOGICAL SURVEY

GENERAL DIRECTION

The Maryland Geological Survey conducts topographic, geologic, hydrologic and geophysical surveys and prepares topographic, geologic and other types of maps to meet specific needs. Through scientific investigation and analysis, the Survey seeks to obtain a better understanding of the geology, water and mineral resources of the state and to apply this knowledge to practical problems related to the earth sciences.

Survey publications are the primary means of providing information to the public. Geological exhibits at schools, state parks, libraries and public events are also used to inform the public of Survey activities.

The Survey was represented by its director at meetings of the Interstate Mining Compact Commission, Outer Continental Shelf Policy Committee, Land Reclamation Committee, the Association of American State Geologists, the American Geological Institute and the Committee on Water Resources Research of the National Research Council.

HYDROGEOLOGY AND HYDROLOGY PROGRAM

Most projects of this program are carried out under the auspices of the US Geological Survey-Maryland Geological Survey Cooperative Agreement. Through this agreement, funds budgeted by the state and participating intrastate agencies are generally matched by the federal government on a 50/50 basis. Staffs of both Surveys participate in project activities.

The program is responsible for the maintenance of a statewide water data network and the investigation of the hydrologic and geologic characteristics of Maryland's water resources. The surface water data network provides information on minimum, maximum and average streamflows for the planning of water supply and sewage facilities, water power projects, dams, bridges and other public and private works. The ground water data network provides information on water levels and ambient water quality in selected wells throughout the state and the ground-water network monitors the hydrologic effects of long-term changes in pumpage, land-use patterns and precipitation.

In addition to the statewide network activities, local and county projects are undertaken to determine aquifer and streamflow characteristics, water-quality parameters and rates of replenishment. Applied research projects of this type are often supported by funds from county or state cooperators. During FY90

investigations were underway in areas of Anne Arundel, Calvert, Carroll, Garrett, Harford, Howard, Somerset and Worcester Counties.

Streamflow Gaging Network

During the year, the US Geological Survey maintained 81 continuous-record stream gaging stations, including 21 quality-of-water sites and 5 sediment sites. In addition 58 low flow sites were operated. Data from these stations for the 1989 water year were compiled and published in *Water Resources Data for Maryland and Delaware*, US Geological Survey Water-Data Reports MD-DE-89-1 and MD-DE-2.

The low-flow study continued with updated low-flow frequency characteristics determined for 91 continuous-record gaging stations in Maryland (and adjacent states). Development of the improved low-flow transfer technique was completed. This technique will be used to make estimates of low-flow characteristics at ungaged stream sites upstream and downstream from gaged sites. Preliminary results from regression model runs on the Eastern Shore Coastal Plain indicate that low flows are highly related to soil type and drainage area.

Ground-Water Data Networks

Water levels: This project maintains a continuous inventory of ground-water levels in aquifers and selected springs of the state and relates changes in ground-water levels to withdrawals and precipitation. Of the 191 observation wells and 6 springs monitored in the network, 3 wells are located in the Appalachian Plateau, 8 wells in the Valley and Ridge, 2 wells and 2 springs in the Blue Ridge, 20 wells and 4 springs in the Piedmont, 72 wells in the western shore coastal plain and 86 wells in the Eastern Shore coastal plain.

Ambient Ground-Water Quality Network: In FY90, 14 wells on Maryland's Eastern Shore were selected for inclusion in the statewide ground-water quality network. This brings the total number of wells and springs in the network to 37. The network will serve to monitor the effects on ambient ground-water quality of non-point sources of pollution, such as road salting and agricultural chemicals. The Eastern Shore wells represent the third segment of a statewide network that is being established over a five-year period in cooperation with the US Geological Survey and the Maryland Department of the Environment.

Project Reports Published or "In Press"

The following Maryland Geological Survey reports were either published or in press at year's end:

- Basic Data Report No. 18 — *Ground-Water and Surface-Water Data For Washington County, Maryland* by Mark T. Duigon, James R. Dine and Michael D. Tompkins.
- Bulletin No. 34 — *Water Resources and Estimated Effects of Ground-Water Development, Cecil County, Maryland* by Edmond G. Otton, Richard E. Willey, Ronald A. McGregor, Grufron Achmad, Steven N. Hiortdahl and James M. Gerhart.
- Bulletin No. 35 — *Hydrogeology and Ground-Water Resources of Somerset County, Maryland* by William H. Werkheiser (in press).
- Report of Investigations No. 51 — *Hydrogeology, Brackish-Water Occurrence, and Simulation of Flow and Brackish-Water Movement in the Aquia Aquifer in the Kent Island Area, Maryland* by David D. Drummond.
- Report of Investigations No. 53 — *Geologic and Hydrologic Assessment of Coastal Plain Sediments in the Waldorf Area, Charles County, Maryland* by William B. Fleck and John M. Wilson (in press).

The following US Geological Survey report was issued in cooperation with the Maryland Geological Survey:

- US Geological Survey Open-File Report 87-540 — *Ground-Water Use in the Coastal Plain of Maryland, 1900-1980* by Judith C. Wheeler and Franceska D. Wilde.

Status of County Water Resources Projects:

Howard County - Ground water and surface water sampling for chemical analysis was completed during FY90. Ninety-five wells were sampled for basic chemistry, nutrients, radon and either industrial organic constituents or agricultural herbicide/pesticide residues. Each of 24 surface water sites were sampled two times for basic chemistry and nutrients. Bottom sediment samples were collected once at each site and analyzed for either chloro-phenoxy acid herbicides, organo-chlorine and organo-phosphorus insecticides or trace metals.

Analysis of the hydrogeological factors affecting well yields was completed during the year. Also during the year, rainfall-runoff relationships were investigated using the HEC-1 design flood model.

Kent County - A well inventory was initiated to identify potential sites for water level measurements and water quality sampling.

Somerset County - The Somerset County project was completed and the report (Bulletin No. 35) was in press at year's end.

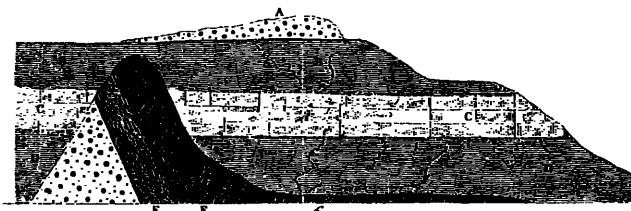
Washington County - A final draft of *Water Resources of Washington County* was completed; Bulletin No. 36 is expected to be in press in FY91. Basic Data Report No. 18, containing supplemental ground-water and surface-water data, was published.

Anne Arundel County (Annapolis Neck, Broadneck and Mayo Peninsula Areas)

During FY90 progress on the Anne Arundel County Brackish-Water Intrusion Study consisted of test drilling, aquifer testing, chemical sampling and water level monitoring. Six test wells, one located at Sherwood Forest and five located at Quiet Waters Park, were completed in the Magothy aquifer and the Aquia aquifer respectively, by the Water Resources Administration's Technical Services Division. Aquifer tests and chemical sampling were conducted at each test well. Two additional wells, a previously drilled test well and a domestic well were also sampled. Eighteen water level recorders were installed and maintained on test wells completed during the previous fiscal year. In addition to data collection, the design and construction of a ground-water flow model was initiated.

Fractured Rock Aquifers of the Piedmont (Westminster Area)

In the crystalline-rock aquifers of the Piedmont, ground water is transmitted through heterogeneous networks of joints and fractures. The low well yields characteristic of this area may be due, in part, to construction methods which fail to exploit the network geometry. The purpose of this study is to investigate how maximum well yields may be obtained from wells in fractured rock aquifers by matching the geometry of the well to the geometry of the aquifer and using well development and stimulation techniques. A test well was constructed in cooperation with the City of Westminster utilizing construction and development strategies aimed at optimizing the match of borehole and aquifer geometries and properties. The most significant improvement in yield was obtained by enlarging the borehole from 6 to 15 inches.



Harford County (Coastal Plain Area)

The fourth year of the Harford County project included the calibration and completion of the ground-water flow model. Model runs were made to simulate projected and alternative pumpage in average and drought conditions. Particle-tracking analyses were performed to determine recharge areas of production wells and migration paths of ground-water contaminants.

Stormwater Infiltration

A five-year study examining the effect of stormwater management practices on ground-water quality was completed; a comprehensive report of data and results is being prepared for distribution in 1991. Hydrologic and chemical data from three sites were analyzed to determine the factors that mitigated or abetted contamination in ground water receiving stormwater infiltrate. The sites are located near Prince Frederick, Calvert County; near Annapolis, Anne Arundel County; and near Greenmount, Carroll County. The findings of the study have general application to similar management facilities. Some results of the study were:

- the major-ion and trace-element chemistry of ground water was modified beneath and down-gradient of storm water impoundments;
- US Environmental Protection Agency and Maryland Department of the Environment regulations for drinking water quality for aluminum, cadmium, chloride, chromium and lead were occasionally exceeded in ground water;
- concentrations of anthropogenic organic compounds which were measured in stormwater were below or at detection limits in ground water;
- ground-water concentrations of barium, cadmium, chloride, copper, nickel, strontium, zinc and total dissolved solids were consistently elevated compared to background levels for two to three sites, while dissolved-oxygen concentrations and pH tended to be lower than background at each site;
- elevated concentrations of chloride and trace metals in ground water resulted from hydrodynamic factors that prevented effective dilution and geochemical factors — especially pH fluctuations — which enhanced constituent solubility.

Worcester County (Ocean City Area)

The Manokin aquifer system is the sole supply of potable water to Ocean City, Maryland. In 1989, that beach resort withdrew about 1,940 million gallons of water from this aquifer system. Brackish water exists in parts of the aquifer system and chloride concentrations have risen over the past twenty years in parts of the Ocean City aquifer. In FY90, a study of the distribution and movement of brackish water in the Ocean City and Manokin aquifer system began.

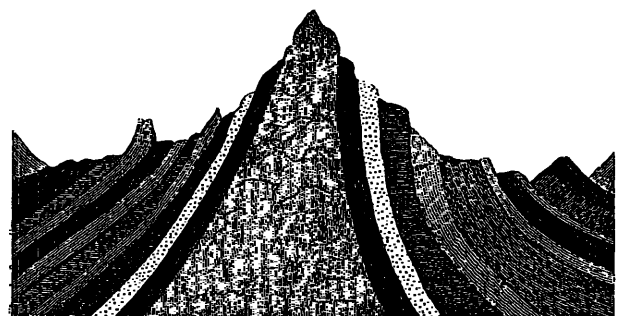
Ongoing project work includes relating the distribution of chlorides to the hydrostratigraphy of the aquifers at Ocean City, collection and analysis of water quality data, development of a solute-transport model to simulate the movement of salty water to the aquifer system and recalibration of a ground-water flow model of the aquifers at Ocean City.

Other Active Projects

During the year, the effect of ground-water pumpage on water levels in the vicinity of three Southern Maryland power plants (Calvert Cliffs, Chalk Point and Morgantown) was monitored. In the spring and fall of each year, several hundred wells are measured and synoptic water level maps prepared for the Aquia and Magothy aquifers. In FY90, water level monitoring at the Vienna Power Plant in Dorchester County was initiated. Project activities are carried out in cooperation with the Power Plant Research and Environmental Review Division.

Local data collection networks were operated in the Glen Burnie area of Anne Arundel County to monitor ground-water levels and streamflow in Sawmill Creek and on Kent Island, Queen Anne's County, to monitor ground water levels and chloride content.

Additional runs of the Glen Burnie area Patapsco aquifer flow model were made for the Sawmill Creek Watershed Targeting Project. The model was used to evaluate the effects of precipitation and pumpage on stream base flow for the period 1985 to 1989. A report, *Simulated Hydrologic Effects of the Development of the Patapsco Aquifer System in Glen Burnie*, by Grufron Achmad describing the model was being prepared for publication at year's end. Distribution in FY91 is planned.



At year's end, Open File Report No. 91-02-5 was in review. *Hydrogeology and Stratigraphy of a 1,515 Foot Test Well Drilled near Princess Anne, Somerset County, Maryland* discusses the results of exploratory drilling at the Eastern Correctional Institution. The project was undertaken to find alternate ground water sources so that pumpage from the Manokin aquifer could be reduced. The occurrence of potable water in a deep Patapsco aquifer was confirmed and a production well was constructed.

The hydrologic effects of deep mining are being investigated at the Mettiki Coal Mine in southwestern Garrett County. Changes in streamflow, groundwater levels and water quality are being documented at several sites and related to mining progress, mine geometry and volume of mine drainage.

An article co-authored with Dr. Katherine Kula, Department of Pediatric Dentistry at the University of Maryland, was published in the Journal of the Maryland State Dental Association. The article was "Fluoride Supplementation and the Concentration of Fluoride in Ground Water from Eastern and Southern Maryland."

During FY90, many inquiries from private individuals, consultants, academic institutions and other state and federal agencies were handled by program staff.

ENVIRONMENTAL GEOLOGY AND MINERAL RESOURCES PROGRAM

This program is responsible for geologic and environmental mapping and research, topographic map revision, mineral and energy resources investigations and dissemination of geologic information. These studies provide the basic geologic framework for delineating and managing the state's mineral, energy and land resources.

Geologic Mapping

Geologic mapping was once again focused in central and western Maryland. Field work was completed for the Barton, Westernport, Paw Paw, Smithsburg, Hagerstown, and Manchester quadrangles, and was nearly completed or well underway in the Artemas, Keedysville, Harpers Ferry, Littlestown, and Westminster quadrangles. Field mapping was initiated in the Bittering quadrangle. Contractual mapping was completed in the Williamsport and Mason-Dixon quadrangles. Scribing of the Hampstead quadrangle geologic map was completed in preparation for publication.

As part of a GOGEMAP Project with the Pennsylvania Geological Survey and the US Geological Survey, a geologic map and a landform map (scale 1:24,000) were prepared for the Delta quadrangle, as was a lithologic map (compiled at 1:100,000 scale) of the Fawn Grove, Norrisville, New Freedom and Lineboro quadrangles.

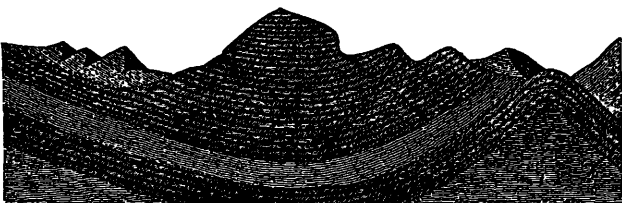
Geologic maps of Charles and St. Mary's Counties were published, thereby completing an earlier Maryland COGEMAP Project with the US Geological Survey.

Geologic maps for parts of Howard and Carroll Counties were compiled (scale 1:62,500) and preliminary versions produced for the respective county governments.

Compilation (scale 1:100,000) began for the first three sheets of a new six-sheet *Geologic Map of Maryland*, with the compilation completed for the map of the lower Eastern Shore (Dorchester, Somerset, Wicomico, and Worcester Counties). In progress are the maps for Southern Maryland (Anne Arundel, Prince George's, Charles, Calvert and St. Mary's Counties) and for northeastern Maryland (Baltimore, Harford and Cecil Counties). These constitute a new map series to mark the 100th anniversary of the Maryland Geological Survey in 1996.

Topographic Mapping

Revised topographic maps of Prince George's and Allegany Counties were published during the year; the Carroll County topographic map was ready for printing; and revisions were nearly complete for the St. Mary's County topographic map. Revision of the



Howard County topographic map was begun. Topographic maps of Garrett and Talbot Counties were reprinted.

Technical Reports

Report of Investigations No. 52, *The Mississippian System of Maryland*, by David Brezinski, was the major report published in FY90. A pamphlet titled *Geology of the Sideling Hill Road Cut* was also printed.

The Geology of Cecil County was in final proofing of camera-ready copy at year's end and is scheduled for printing in early FY91.

Mineral Resource and Environmental Studies

Mineral resources maps for eight of nine counties on the Eastern Shore were completed during the year. The last such map will be prepared in FY91. With their completion, mineral resource maps will be available for all 16 counties surrounding Chesapeake Bay and tidal waters of Maryland.

A sixth year of support by the Minerals Management Service (US Department of Interior) provided funds to process Corps of Engineers' cores from Maryland's inner continental shelf. Cores were logged, photographed and split into samples, which were then analyzed for heavy minerals. *Steve Analyses and Heavy Mineral Concentrations of the Sediment Taken from the Inner Continental Shelf of Maryland* reports on the fifth year's work.

The first phase of a radon soil-gas investigation was completed. The objective is to determine the relationship between soil-radon occurrence and bedrock geology.

Oil and Gas

Preparation of new state oil and gas regulations continued throughout the year, with the draft going through various levels of review procedures. The Oil and Gas Coordinator also represented the Survey at meetings of the Regional Technical Working Group, the Federal Minerals Management Service, the Maryland Agricultural Land Preservation Foundation of the Department of Agriculture, and the Chesapeake Bay Critical Area Commission. No new drilling permits were issued. There were nine gas wells producing during FY90.

Public Relations and Inter-Agency Cooperation

Program staff continued coordination with architects and contractors on the geologic exhibit for the Sideling Hill Visitors Center, participated in the Forest, Park and Wildlife/Capital Programs Wildlands Committee and in the Savage River Planning Team. Staff members served as field trip leaders for trips by the Pittsburgh Geological Society and by the

Pennsylvania Conference of Field Geologists, as well as three field trips for the International Geological Congress. Program geologists staffed exhibits at the Baltimore Gem and Mineral Show, at Chesapeake Bay Appreciation Days, at Bayfest 90, at Rockville Science Day (Earth Day), and at a special program at US Geological Survey headquarters for earth science teachers. Talks given at various schools in Anne Arundel County, Baltimore City, Baltimore County and Harford County by three staff geologists on such wide-ranging topics as Maryland earthquakes, building stones and regional geology.

Earth Science Information Center (ESIC)

The state affiliate continued to serve the needs of Maryland users of cartographic information. Approximately 200 inquiries were processed, with two-thirds of them related to aerial photography. The rest involved maps and charts, geodetic data, and satellite imagery. A very useful reference was compiled in the form of an index map of Maryland showing the locations and the roll and frame numbers of all NAPP (National Aerial Photography Program) photographs.

COASTAL AND ESTUARINE GEOLOGY PROGRAM

The program investigates and determines the geologic framework and resources of the state's coastal environments extending from the barrier island of the Atlantic Ocean to the wetlands and shorelines of the Chesapeake Bay. The modification of the geologic framework by current geological processes is an important element.

Geological Framework of Chesapeake Bay and Inner Continental Shelf

The cooperative study with the US Geological Survey and the Virginia Institute of Marine Sciences ended with the publication of the final map series, *Maps Showing Quaternary Geology of the Northern Maryland part of the Chesapeake Bay* (USGS Map MF-1949-D) by Steven M. Colman and Jeffrey P. Halka. An interpretative report was submitted for publication in the Geological Society of America Bulletin.

Currently, efforts are underway to drill through the paleochannels and sample the channel-filled sediments. Land-based drilling will sample sediments deposited in the Exmore paleochannel (400,000 years old) and the Eastville paleochannel (100,000 years old).

A companion study with US Geological Survey on the inner continental shelf resulted in the publication, Report of Investigation No. 50, *Quaternary Stratigraphy of the Inner Continental Shelf of Maryland* by Marguerite A. Toscano, Randall T. Kerhin, Linda L. York, Thomas M. Cronin and S. Jeffress Williams.

Shoreline Studies

In cooperation with the Coastal Resources Division of the Tidewater Administration, the second year of a four-year initiative continued with the acquisition of an imagery processing workstation. In addition, a joint funding agreement with the US Geological Survey was signed to produce 80 orthophoto quadrangles using 1988 NAPP aerial photography. Nine orthophoto quadrangles have been received for a section of the Potomac River.

The orthophotoquads, combined with historical shoreline erosion maps, provided the basis to evaluate shoreline changes in the Bay region. The Image Laboratory of Salisbury State University provided technical support in the use of the imagery processing workstation.

Hart and Miller Islands Monitoring

For the past nine years, physical features and geochemical components of the sedimentary environments around Hart-Miller Island Dredged Material Containment Facility have been monitored. The long-term sedimentological database was incorporated into the 3-D hydrodynamic model of Chesapeake Bay. Using the model and geochemical methods, an area of zinc enrichment in the sedimentary environment was delineated. A time-series analysis of the zinc enrichment showed a distinct transport pattern around the bay side of the facility. Continued tracking of the enrichment zone is set for the next few years.

Cohesive Sediments

Efforts from the Dredged Monitoring Study and the Sedimentary Geochemistry Study were combined to better assess the role of fine-grained sediment transport and resuspension in the geochemical cycling history of Chesapeake Bay.

An interagency agreement with Water Resources Administration was executed for analysis of the impact of the overboard deposition of dredged sediment in the vicinity of Pooles Island. Impacts addressed the transport and fate of the sediment, water quality effects during and after deposition and priority pollutants. With the water quality issue, a Memorandum of Understanding with the Maryland Department of Environment allowed participation by that department.

Resuspension of fine-grained sediments was studied with the deployment of a instrument tripod in the upper Bay. The instrument package recorded salinity, depth, current velocity, temperature and suspended sediment concentration. The University of Maryland Center for Environmental and Estuarine Studies-Horn Point Laboratory participated in the study.

In the sediment geochemistry study, direct evidence of early diagenetic processes occurring in estuarine sediment was interpreted for color scans of one-meter cores. A core scanner constructed by program personnel provided means to evaluate color changes in sediments. Report of Investigations No. 49, *Physiographic Distribution of Interstitial Water in Chesapeake Bay* by James M. Hill was published.

Efforts in the two studies afforded the opportunity to submit a proposal to Maryland Sea Grant - Chesapeake Bay Environmental Effects/Toxics Research Program. The proposal entitled, "Resuspension and Transport of Sediment Associated Toxics in the Northern Chesapeake Bay" was the first submittal to Maryland Sea Grant by the Maryland Geological Survey.

Support Operations

Two diesel engines of the research vessel, *Discovery*, were completely rebuilt. The vessel was out of commission for two months during the winter.

The program sponsored a field trip on Chesapeake Bay for participants of the International Geological Congress. Two different sessions were held aboard the R/V *Discovery*. Participants represented such countries as West Germany, Japan, Soviet Union and Netherlands.

The program held a three-day workshop, "Tides Seminar and Workshop" in conjunction with the Tidal Datums Section of National Ocean Service. The workshop was for DNR employees.

DIVISION OF ARCHEOLOGY

The division was transferred to the Maryland Historical Trust in the Department of Housing and Community Development when Senate Bill 528 was signed by the governor on April 10, 1990. Four employees, the library, site records, collections and equipment were transferred to the Maryland Historical Trust. Six division employees assigned to highway-related archeology studies were transferred to the State Highway Administration by the same legislation. The remainder of the fiscal year served as a transition period to wind up ongoing projects and to plan the physical moves scheduled to take place after the end of the fiscal year.

General Investigations

An exceptionally well-preserved and productive late prehistoric Indian village near Frederick was investigated during May and June, 1990. The two acre Rosenstock site overlooks the Monocacy River from a bluff delimited by ravines. The Rosenstock site is unique in Maryland for its excellent preservation, pottery assemblage and village layout. It is pivotal in explaining late prehistoric relationships with the

Piedmont in Pennsylvania to the north and the Maryland and Virginia coastal plains to the south. These excavations were accomplished with volunteers from the Annual Field Session in Maryland Archeology, a cooperative program for twenty consecutive years between the Archeological Society of Maryland, Inc., and the Maryland Geological Survey. Access to the site was provided by the owner, J & R Limited Partnership, who projects future development of the property.

Over 200 new sites were added to the Maryland Archeological Site Survey files, bringing the total number to 6,496 sites recorded in Maryland. Computerization of the site records has been completed for 14 counties, but this represents only half of the recorded sites.

Permits were issued under authority of the Natural Resources Code (Title 2, Subtitle 3) for archeological field investigations on state lands at the Camden Yards Stadium project in Baltimore, at the Administrative Services Building Project at the University of Maryland-College Park, and for the prehistoric Hughes site in the McKee-Beshers Wildlife Management Area in Montgomery County.

Highway Studies

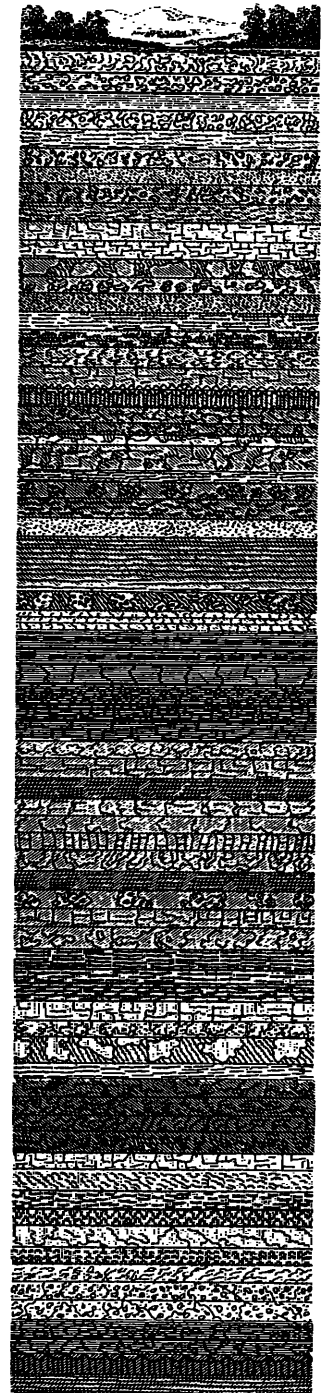
Field studies designed to locate archeological sites in proposed highway alignments were completed for three projects under terms of a cooperative agreement with the State Highway Administration. Analysis and a draft report were completed for the Higgins site (Anne Arundel County) where extensive excavations during the two previous fiscal years revealed the earliest known stratified archeological deposits in Maryland.

Reports were duplicated and circulated for 20 highway projects, and final drafts were in the process of review and/or being readied for distribution for 10 additional projects. All but one of these reports were for projects initiated in prior years.

Public Outreach

Information on prehistoric artifacts, procedures for reporting archeological sites, in-print publications on Maryland archeology and leaflets on volunteer opportunities in Maryland archeology were distributed. The division's traveling exhibit, "Maryland Archeology: Journey Through Time" was shown at five locations. A proposal was developed for establishing an archeological curriculum at DNR's Days Cove Environmental Education Center in Baltimore County. Discussions were held with representatives of the state Department of Education about improving Maryland archeology resources for teachers. A proposal was submitted to the Maryland Forest, Park and Wildlife Service for a summer interpretive program in archeology at Maryland state parks.

The library served 132 researchers and the laboratory and collections were used by 15 investigators. An intern from Towson State University prepared a detailed inventory of human skeletal material in Division of Archeology collections. One hundred forty seven volunteers assisted in the laboratory and field, especially in connection with the 19th and 20th Annual Field Sessions in Maryland Archeology. The state archeologist received the Archeological Society of Maryland's William B. Marye Award for outstanding contributions to Maryland archeology, became president of the Middle Atlantic Archeological Conference, and served on the Maryland Academy of Sciences' Scientific Council and the Governor's Science Advisory Council.



HAZARDOUS WASTE FACILITIES SITING BOARD

The Hazardous Waste Facilities Siting Board is an independent eight-member commission created to give the state a means of locating new facilities for the recycling, treatment and disposal of hazardous waste. In its decisions, the board must consider site suitability and statewide needs, and must consult with affected governments and the public.

Site suitability, by the board's legislative mandate, includes a wide range of social and environmental considerations. Statewide needs and problems address waste generation, source-reduction, recycling and appropriate technologies. The findings govern what types of facilities the board will accept for consideration and constitute the state facilities plan. In Maryland, as in most states, commercially available facilities have not developed as expected.

A major function of the board is to promote awareness of issues by citizens, government and industry.

The board has a corresponding but separate responsibility for low-level radioactive waste.

The Process: Application to the Board is an Option in Developing a Facility.

The board is one of three components in new facility development. The board itself may override local government zoning or restrictions. The Maryland Department of the Environment (DOE) and the US Environmental Protection Agency (EPA) have permitting and regulatory authority which are not changed by board action. Either private firms or the Maryland Environmental Service may propose facilities. The location may be approved by the board. The board does not seek out sites; it acts on applications submitted to it.

A new facility does not automatically require board approval. A developer may negotiate directly with county or municipal government. As an alternative to local approval, the board resembles a special purpose zoning appeals board whose authority discourages arbitrary rejection of the worthy project. For the developer who does apply, however, the board's requirements are rigorous. The board may approve a facility only after presentation of the proposal to the public, opportunity to comment upon and contest the proposal, and public hearing.

Site Suitability is Broadly Stated in Law

The board must consider the following factors as a part of site suitability.

- Health and safety of the public, with particular mention of drinking water quality and site safety following active operation
- Quality of the natural environment
- Social values
- Reasonable and beneficial use of land and natural resources
- Local land use preferences as expressed in planning and zoning provisions
- Equitable geographic distribution of new facilities, considering where waste is generated and where facilities are located

The breadth of the board's mandate indicates that it was established to promote siting decisions in the overall public interest, not to provide a check on regulatory agencies. The board's requirements for recognizing and protecting the social values of the host community are among the most thorough in the US and Canada.

Needs of the State

The General Assembly required the board to consider statewide needs and problems, mentioning in its 1980 Act such timely alternatives as source reduction, reuse, resource recovery, and employment and the cost of treatment and disposal.

Facilities needs are periodically studied, reported and formalized in regulations. Evaluations consider facilities in neighboring states. Besides tracking generation from regulatory reports, assessment have involved waste-reduction experiments, direct contact with generators, advocacy of recycling measurers, and studies of various technologies. The board's work in planning and waste reduction has drawn national attention, and the executive director chairs a board to coordinate a national data base on waste reduction and recycling.

Members and Program

The board is appointed by the governor to staggered four-year terms. Biographies and program information are available from the Board Office, 60 West Street, Suite 200A, Annapolis, MD 21401 (301/974-3432).

NATURAL RESOURCES POLICE

SERVE AND PRESERVE

The Natural Resources Police has two major goals: To preserve the abundant natural resources of this state for future generations, and to provide service to the citizens of Maryland.

With an authorized strength of 228 officers and 48 civilian employees, the Natural Resources Police is divided into two basic groups: Field Operations and Support Services.

FIELD OPERATIONS

The bulk of patrol, law enforcement, and search and rescue activities are carried out by the men and women of Field Operations. Under the command of the chief of operations, the patrol force is divided into geographic regions. Each region is under the command of a regional captain, who has the responsibility for all activities within that region.

Special programs such as emergency medical services and the hovercraft/advanced life support are also under the command of the chief of operations.

Activities

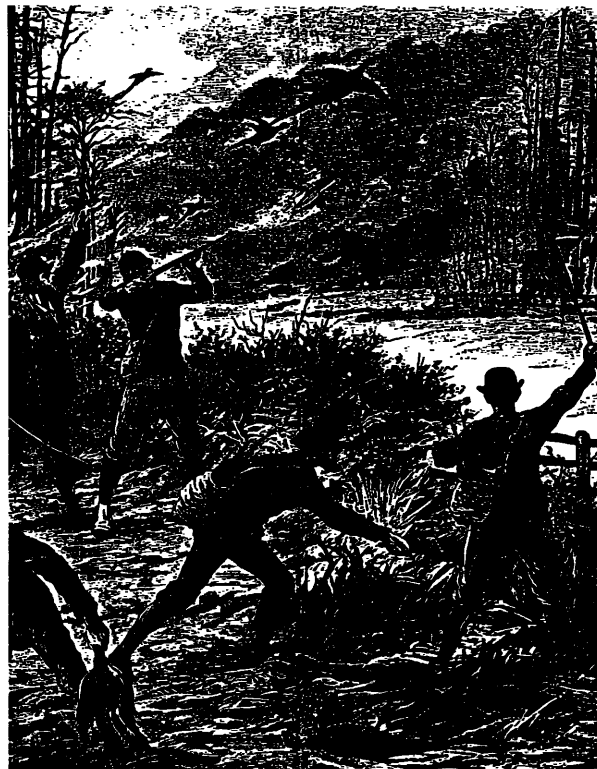
Law enforcement efforts during the past fiscal year resulted in 24,983 total cases (citations and warnings) handled by agency personnel, a nine percent increase from FY89. The most significant increases were in the areas of fishing and boating violations. Special emphasis placed on violations of the closed season (moratorium) on striped bass resulted in a number of cases made ranging from the casual violator, who takes and possesses striped bass for personal consumption, to market operations dealing in hundreds of pounds of illegal fish.

During FY90 a one percent increase in boating patrol hours and cases made for boating violations was reported. The increased use of personal watercraft such as jet skis resulted in a large number of complaints concerning safety and noise regulations. Enforcement efforts have been directed to meet citizen complaints and concerns.

Continuing emphasis was placed on migratory waterfowl enforcement this past year. A dwindling population of waterfowl has resulted in a shorter season and reduced bag limits. An increase in violations such as hunting over bait, use of live decoys, and hunting before/after hours was reported.

Arrests for non-conservation oriented offenses continues to increase, a trend in recent years. Criminal felonies and misdemeanors such as theft, drugs, kid-

napping and rape, once confined to urban areas, have been increasing on the waterways and wilderness areas of the state. A greater portion of an average officers time is now required to deal with these incidental, non-traditional offenses.



Not all activities involve law enforcement. Natural Resources Police officers responded to 392 requests for assistance during the past fiscal year. These responses involved 1,177 man/hours of time and affected 23,831 people. Requests for service included:

Disabled Boats	63
Medical Assists	11
Boats Escorted to Port	18
Relay Emerg Info	4
Boats Aground	45
Rescue Pers in Water	3
Sinking Boats	1
Rescue Pers Stranded	1
Search, Overdue Boats	7
Search/Drownings	2
Boats Towed to Port	70
Search/Missing	7
Crowd Control	8
Security Details	4
Disabled Motorists	19
Traffic Control	25
Drugs	5
Transports	21
Fire Fighting	1
Boat/Safety/Class	9
General Criminal Invs	13
Public Service	55

In addition, 366 requests were received from other federal, state, and local agencies for assistance in a variety of enforcement, rescue, and service-related functions. A total of 2,559 man/hours was spent on these requests. This reflects and increase from previous years, especially in regards to assistance with drug raids/interdictions, and participation in multi-agency task forces.

SUPPORT SERVICES

Specialized tasks are assigned to the following groups: Education/Training, Aviation, Investigations, Special Operations, Communications, Records, Maintenance/Supply, and Water Resources. A brief overview of the activities and responsibilities of these groups is as follows:

Education/Training

The functions of public education in areas of boating and hunting safety were combined with entrance level and in-service law enforcement training in the Education/Training Division during the past year. Law enforcement coordinators worked with a staff of volunteer instructors to provide the legally required safety training for boaters and hunters. Classes are taught in the public school setting and in private settings during evening or weekend classes.

Law enforcement training is given both at the entrance and in-service level by the staff of the Natural Resources Police Academy, supplemented by Natural Resources Police field officers, other law enforcement officers, and representatives of various federal, state, local, and private organizations. Entrance level training lasts 23 weeks and is conducted at the Natural Resources Police Academy. In-service training is mandated by the Maryland Police/Correctional Training Commission and varies in content annually to meet the changing needs of the law enforcement community.

A new *Field Officer Training Program* was initiated this past year to provide hands on experience for newly graduated recruit officers under the direction of experienced patrol officers. The 12-week program is designed to put into practice, in a controlled environment, skills that were learned in the academy setting.

Aviation Section

In an effort to keep up with increasing requests for flight services, the Aviation Section added two rotary wing aircraft late in FY90, to the fixed wing craft currently in use. This addition is expected to improve an already successful program of aerial support for law enforcement and search and rescue efforts. The capabilities of the new aircraft have already proven valuable in detecting illegal hunting and fishing activities, locating vessels in distress, and directing land or water based units to incident or accident scenes.

Investigations Division

The need for comprehensive investigations of criminal violations, accidents, and applicant background investigations is met by personnel assigned to the Investigations Division. The division is staffed by a supervisor and three investigators who are hard pressed to meet the requests for services. The division also coordinates the collection and handling of

all controlled dangerous substance evidence for the agency. The implementation of a new *Drug and Alcohol Abuse Unit* within the division, in FY91, should relieve some of the pressure on investigators.

Also part of the Investigations Division is the *Special Operations Unit*. This unit deals in long-term covert investigations. Undercover officers infiltrate groups of person engaged in the illegal taking, possession and sale of seafood and wildlife. Three long-term investigations concluded during this past fiscal year. The first of these, a 20-month investigation concluded with the arrest of three suspects for the illegal taking and selling of striped bass during the closed season. A special operations officer was successful in penetrating this group and establishing multiple violations of fishing regulations.

A second investigation, known as "Operation Chester River," concluded in February 1990. Initiated in 1988, as a result of information received from field officers, "Operation Chester River" began when a special operations officer succeeded in gathering information concerning a large number of fish and game violations. When the officer uncovered additional evidence of traffic in controlled dangerous substances (CDS), officers from the Maryland State Police-Narcotics Division were brought in to assist. As a result of this joint investigation, 524 charges were placed against individuals for fishing and game violations, and numerous felony and misdemeanor charges were placed involving the interstate transportation and distribution of CDS.

The third operation to conclude during FY90 was known as "Operation Red Fox". This 13-month investigation involved special operations personnel and officers from the US Fish and Wildlife Service, Pennsylvania Game Commission, and the West Virginia Department of Natural Resources. This investigation involved the illegal taking and interstate transportation of protected game species. A total of 210 state and federal charges were filed in three states against 11 defendants. Substantial forfeitures of property and heavy fines have been levied in all states.

Communications Section

The Natural Resources Police Communications Section provides a full range of communications services for the agency as well as services for the Departments of Natural Resources and Environment. The section receives and dispatches all requests for information concerning vehicles and vessels, wanted or mission persons, arrest warrants, summonses, and lost or stolen articles. The section also maintains the agency's case files and coordinates search and rescue efforts on the state's waterways and wilderness areas. A total of 93,000 calls from the public were handled by section personnel during FY90. This number represents a 139 percent increase in the last five years.

Records Section

The Natural Resources Police Records Section provides for the accumulation, storage, and safe keeping of all statistical data for the agency. In addition, the section also maintains boating and conservation arrest records for a number of state and local enforcement agencies. A 157 percent increase in the number of records handled by the section was experienced in FY90.

Maintenance and Supply

The Maintenance and Supply Division has the responsibility for maintenance and repair of all inboard and outboard patrol boats, the agency's radio and electronic equipment, and for maintaining an inventory of parts, uniforms and equipment. Additional duties involve facility management of the repair shops and for the preparation of specifications for acquisition vehicles, vessels, uniforms, and other equipment. Repairs are completed on boats and equipment at the repair facility and technicians respond to all areas of the state to make emergency repairs.

Water Resources Section

Officers assigned to the Water Resources Section provide law enforcement expertise and services to DNR-Water Resources Administration. This is highly specialized enforcement dealing with wetlands, surface mining, non-tidal waterway construction, water appropriations and beach erosion control. The officers assigned to this section conduct surveillance of the operations listed and provide enforcement actions through administrative actions, arrests, or criminal summonses. During FY90, the two officers assigned to this section handled 226 enforcement actions involving violations of waterway construction, tidal wetlands, and surface mining activities.



TIDEWATER ADMINISTRATION

GENERAL DIRECTION DIVISION

This program provides overall direction, supervision and coordination within the administration, as well as coordination of boards and commissions that affect the Bay and its tributaries.

In addition this program administers two other activities:

Fishing for the Needy - This is a one day coordinated effort between the Tidewater Administration, Solomons Charterboat Captains Association, Maryland Saltwater Sport Fishermen's Association, Maryland Office on Aging and the Maryland Food Bank. This program provides Senior Citizens with a free day of fishing. In addition, catch from not only Seniors but other participating groups are cleaned and wrapped by volunteers then donated to the Maryland Food Bank for distribution to soup kitchens and homeless shelters statewide.

Adopt A Stream is a new program dedicated to protecting the health of Maryland's streams by maximizing the number of people involved in conducting activities to benefit the greatest number of streams. This affords groups and individuals the opportunity to assume responsibility for a stream or stream segment by conducting one of six adoption activities: Water Quality Monitoring, Sediment and Erosion Control Monitoring, Watershed Inventory, Stream Survey, Stream Clean Ups and Storm Drain Painting. Adopt A Stream is jointly sponsored by Maryland Save Our Streams.

COASTAL RESOURCES DIVISION

The Coastal Resources Division coordinates Maryland's Coastal Zone Management Program (CZMP). The division uses federal funds to provide financial assistance to local governments and state agencies for coastal management and to improve the data base for better decision making. It ensures that state and local projects take into consideration preservation and protection of coastal resources.

The CZMP is primarily based upon existing state and local laws and regulations which provide the legal and administrative bases for activities in the coastal zone. Through signed agreements, the local jurisdictions and six state departments concerned with coastal zone management have agreed to carry out the goals of the program.

The Coastal Resources Division is composed of the following programs: interagency coordination, local technical assistance, resource enhancement, Chesapeake Bay National Estuarine Research Reserve, and

public participation and education. Overall program direction and fiscal management is carried out through the leadership of the program director with the assistance and support of the program chiefs and support staff.

Direction and Coordination

This section provides overall direction to the activities for the division. Fiscal management activities and the public participation section are included in the unit. Staff support is provided to the Coastal Resources Advisory Committee (CRAC).

Interagency Coordination Program

This program is responsible for conducting the interagency coordination activities of Maryland's CZMP. This section undertakes cooperative work efforts with and provides technical assistance to other state agencies to further the objectives of the CZMP and ensures the effective implementation of the memoranda of understanding with other state agencies. During the past year, this program, in conjunction with other state agencies, has continued development of a comprehensive data base on sensitive natural areas for use in meeting the requirements of the federal CZM Act and the Chesapeake Bay Agreement. The division's map and image processing systems (MIPS) are being utilized for this effort.

Through contractual agreements between Tidewater's Coastal Resources Division and other state agencies, this program has supported the establishment and implementation of local land trusts, development of the state's **Greenways** program, continuance of a multi-year effort with the Maryland Geological Survey to update and computerize information on historic shorelines and shore erosion rates, implementation of the state's Adopt-A-Stream program in conjunction with Save Our Streams, and implementation of modifications to stormwater management measures in the Anacostia River Basin in order to reduce stream channel erosion.

Additional activities of the interagency coordination program include updating the basic CZMP document; attending meetings of the Chesapeake Bay Critical Area Commission, state Soil Conservation Committee, and the Governor's Commission on Growth in the Chesapeake Bay Region, also known as the state 2020 Commission; and providing staff support to Chesapeake Bay Program work groups and departmental efforts in support of the 2020 Commission.

Local Technical Assistance Program

The Local Technical Assistance Program (LTAP) facilitates the involvement of local governments in the implementation of the overall CZMP.

Through the funding provided by the annual federal CZM grant, the LTAP is able to provide financial and technical assistance to coastal local governments (16 counties, Baltimore City, the Baltimore Regional Council of Governments and the Tri-County Council for Southern Maryland). These funds are used by local governments to implement the CZMP by incorporating the program's goals and objectives into their planning and regulatory activities. Examples of CZM-funded special projects include: development of a stream valley management and protection program, a public access study, and development of a nontidal wetlands protection program.

During the past year, the LTAP provided funds to DNR's Natural Heritage Program and Water Resources Administration for the development and implementation of management plans to protect unique, rare, or fragile natural habitats and to develop a guide to planning and designing water-conserving landscapes, respectively. The local jurisdictions were sent copies of these studies to assist them in managing their valuable coastal resources.

Last year the LTAP also provided funds to the Chesapeake Bay Critical Area Commission to enable it to build the data base for their geographic information system (GIS). This activity included digitizing and entering into the GIS all local government tax maps within the Critical Area. In addition, the Critical Area boundary lines and three major land use category boundary lines were digitized and entered. Computer programs were written to make the expanded GIS data base compatible with a number of software mapping applications such as the Map and Image Processing System (MIPS) and ARC/INFO. Funds were also provided to purchase remotely sensed photography to enable the commission to assess land use changes and natural resources conversion to other uses.

The LTAP sponsored two workshops for Maryland's local government coastal zone planners. Every coastal county was represented along with Baltimore City, Baltimore Regional Council of Governments and the Tri-County Council for Southern Maryland. The objectives of the workshops were to provide a forum for the exchange of information and ideas pertaining to coastal zone management. State and federal representatives were also invited to participate.

The LTAP serves as DNR's liaison to the Chesapeake Bay Program's local government advisory committee and acts as the liaison between the committee and the Bay program's living resources sub-committee. All pertinent information is provided to the interested local jurisdictions.

Finally, the LTAP has been participating in the activities of the department's sensitive areas work group which has been providing staff support to DNR's representative on the Governor's Commission on Growth in the Chesapeake Bay Region.

Resource Enhancement Program

This program is responsible for carrying out the state's submerged aquatic vegetation program and administering technical studies designed to enhance the water quality and living resources of the Chesapeake Bay and its tributaries.

The submerged aquatic vegetation (SAV) program was established as part of the Chesapeake Bay Initiatives in 1984 with the goal of restoring submerged macrophytes — rooted flowering plants — to the regions of the Chesapeake Bay where historically the plants have thrived. Through research undertaken as part of the Chesapeake Bay program, the presence of such plants has been shown to be important to enhancing the water quality and the vitality of living resources in Chesapeake Bay and its tributaries. A SAV policy was adopted by the executive council of the Chesapeake Bay Program in July, 1989 which commits the signatories to the following actions: (1) assess the resource annually; (2) protect the existing resource; (3) restore the resource to its former abundance; and (4) provide education and research results to the public to enhance appreciation of the resource.

The annual survey represents the most detailed and comprehensive survey of SAV resources currently undertaken anywhere in the United States. The area of the Chesapeake colonized by SAV improved in 1990 over the levels surveyed in 1989 when 13,965 hectares of SAV were mapped and measured in Maryland's portion of the Bay. Lower water temperatures and higher turbidity during spring and summer 1990, due to higher rainfall levels, have hindered the recovery of SAV in many areas however.

A five-year transplanting effort mandated by the legislature was completed in 1989. Surveys were conducted during 1990 to assess the results of the effort. As adverse weather patterns stress the plants and reduce their rate of growth, grazing by fish and waterfowl becomes more of an impact. Healthy SAV can outgrow normal grazing pressure but apparently severely light-limited SAV can not do so. Few of the transplanted sites in the Upper Bay survived and those which did were protected from grazing. None of the seeded or planted areas in the Choptank River survived through 1989.

A water quality monitoring program was initiated in 1990 to compare the chemistry of near-shore waters which are most immediately affected by land runoff and ground water intrusion, with the chemistry of the water in the main channel where dilution and mixing have taken place. During 1990, historical dis-

tribution records of SAV have been compiled and analyzed. A set of maps showing the composite historical distribution was developed at the EPA Bay Program Office with data provided in part from the Maryland SAV Program. From these maps regional restoration goals for SAV by species are being developed.

Management of the exotic SAV *Hydrilla verticillata* in the Potomac River continued through 1990 by means of mechanical harvesting of boating access lanes and swimming areas at public facilities where dense hydrilla growth interfered with these uses of the river. Dense hydrilla growth removes substantial quantities of nutrients, particularly phosphorus compounds from both the water and sediment and this appears to be limiting the distribution of hydrilla in the tidal river. During 1989 and 1990, areas where hydrilla had previously been at nuisance densities did not require harvesting, while all the areas requiring harvesting were recently established beds. The harvesting program evaluated competitive bids from four firms and selected a new contractor for the 1990 hydrilla growing season with an option to extend to next year. Applications were received from three new sites in Maryland for inclusion in the harvesting program. Two of these sites were determined to meet the requirements for inclusion in the program and were harvested.

Prospects for an increasingly tight budget for the program led to the exploration of ways to automate steps in the annual aerial SAV distribution survey. A cooperative program was developed with the Washington Metropolitan Council of Governments, International Science and Technology, EnviroScan and the Maryland SAV Program to test a new technology for direct videotape input into a computer classification and measurement program similar to the MIPS system in use at DNR. The new technology shows definite potential for the reduction of cost and time to completion of the aerial survey but requires some additional development before it can be integrated into the existing system.

Chesapeake Bay National Estuarine Research Reserve in Maryland (CBNERR-MD)

The final environmental impact statement (FEIS) and draft management plan for Maryland's Estuarine Research Reserve Program was published in March, 1990. The document proposed adding Otter Point Creek in Harford County and Jug Bay in Anne Arundel and Prince George's Counties to the already-designated Monie Bay in Somerset County. This will result in a three-site reserve program. The purpose of the program is to establish estuarine areas which can be utilized for short and long-term estuarine research and environmental education purposes.

Public hearings were held on the FEIS and draft management plan at which generally positive comments were received. Thus, designation ceremonies to formally incorporate the two sites into the program will soon be sponsored.

Research activities presently underway include a study of the effect of sea level rise on marsh development and a study on the role of sulfate from sea water in the degradation of marsh peat.

CRD Research Reserve staff is working with the Izaak Walton League of America to develop plans for a sensory trail at the Otter Point Creek site. The trail will be designed to be accessible to all visitors. It will have special adaptations making it easily accessible to mobility and visually impaired persons.

Coastal Resources Advisory Committee

The Coastal Resources Advisory Committee (CRAC) acts as the public oversight and advisory body to Maryland's Coastal Zone Management Program. CRD staff acts as liaison between CRAC and the Maryland Coastal Zone Management Program.

CRAC is represented by a broad base of concerned individuals and organizations, ranging from conservation to development, and local, state and federal agencies.

The committee actively endorses and encourages Maryland's participation in the annual COAST-WEEKS event, a national celebration and appreciation of the state's coastal areas and resources. Staff coordinated the production of the **MARYLAND COASTWEEKS '90 CALENDAR** for public distribution.

Public Participation/Education

CRD is responsible for citizen education and outreach for the Maryland CZM Program through production and distribution of informative materials pertaining to the program, and participation in outreach activities.

Staff participated in, and video-taped, a coastal planner's workshop held to discuss coastal-related problems/solutions in the various coastal counties of Maryland.

A poster and matching postcard, "You can make a difference - help restore the Chesapeake Bay and Maryland's coastal areas," was distributed to approximately 3,000 federal, state and local agency representatives, community associations, private interest groups, and citizens. There is still a supply of posters and postcards available and will continue to be distributed.

The newsletter **MARYLAND COASTAL MANAGEMENT REPORT** is being developed to replace "Coast and Bay Bylines." Focus of future articles will be directed toward coastal issues, better understanding of the CZMP and updates on the status and progress of CZM projects underway in Maryland.

A brochure, **MARYLAND COASTAL PROGRAM REPORT - SITE CREATION AND IMPROVEMENT** has been developed and awaits publication. The brochure describes the public access sites which were funded through CZM funds. The brochure will provide a description of the sites with photographs and maps.

Acid Deposition Program

The Acid Deposition Program evaluates the effects of acid deposition on Maryland's resources. The program conducts a wide range of research on topics such as atmospheric transport and deposition, responses of surface waters and biota to atmospheric deposition, and mitigation of surface water acidification. In addition, the program prepares an annual report on acid deposition in Maryland which summarizes research findings and identifies issues needing further study.

For the past several years, a major focus has been on determining the extent and magnitude of stream acidification across the state. Regional surveys and intensive watershed studies have shown that a large percentage of freshwater coastal plain streams, and streams in western Maryland, are acidic or sensitive to undergoing pulses of acidity during rain events. Aquatic toxicity studies performed on migratory fish such as blueback herring, yellow perch, American shad, and striped bass show that early life stages, particularly larvae, are sensitive to increased acidity and dissolved aluminum levels in streams.

Studies in FY90 were directed toward determining the dynamics of episodic stream acidification in western Maryland, evaluating stream liming techniques, and determining levels of acid deposition which could protect streams from acidification.

A multi-year study of episodic stream acidification began in Garrett County in the Big Run watershed, a tributary to the Savage River Reservoir. Stream samples are being collected from a number of stations along Big Run and its tributaries during rain storm- and snowmelt, and during base flow periods. The samples will undergo full chemical analyses to examine changes in stream chemistry. Precipitation samples are also collected and will be used to estimate atmospheric inputs of various chemicals to the watershed. Flow data and watershed physical characteristics are also being collected. The goal of this study is to develop input-output budgets of chemical constituents and predictive models which will be used to evaluate the effects of acid deposition on stream chemistry.

Another continuing area of research is evaluating stream liming as a method of mitigating stream acidification. A project which is investigating the ability of automated stream liming equipment ("dosers") to neutralize pulses of increased acidity, and improve survival of early life stages of fish such as yellow perch, herring and white perch in Coastal Plain streams continued. The doser, located on Bacon Ridge Branch in Anne Arundel County operated from February through June, the spawning period for the focal fish species. In a separate project, the feasibility of watershed liming is being investigated. With this technique, calcite is placed on selected portions of the watershed through which groundwater discharges, thus neutralizing acidity before the water reaches the stream channel. Candidate watersheds are located in western Maryland. The final choice will be made following collection and interpretation of physical, chemical, and biological data. Pretreatment monitoring will be conducted for a year prior to limestone application, which is tentatively planned for fall 1991.

A third major activity in FY90 was the determination of critical loads, which are the levels of deposition which would protect sensitive resources from acidification. This project is estimating the critical loads of sulfur and nitrogen for 73 watersheds across the state. The design of the study will allow extrapolation of the results to the small streams in Maryland. The critical loads estimates will be used in a technique called linear programming which will develop emission reductions strategies at national, regional and state scales which can achieve various levels of protection for Maryland streams.

Fisheries Research Program

The primary mission of the Fisheries Research Program (FRP) is to provide the best technical basis for decisions related to the management and research of Chesapeake Bay fishery resources. The program is responsible for research and assessment activities that include: development of technical portions of fisheries management plans; the conduct of analytical fisheries stock assessment and other analyses that provide a scientific basis for management and regulatory decisions; survey sampling design and research project evaluation; development, coordination and funding of a Bay-wide fisheries research program; coordination of the Chesapeake Bay Stock Assessment Committee; and representation on interstate and other federal fisheries technical committees concerned with research and management of Chesapeake Bay fishery resources. Three sections comprise the FRP: Research Planning and Coordination (RPAC); Resource Analysis Section (RAS); and Special Investigation Section (SIS).

In 1990, four new permanent staff joined the FRP to complete the Resource Analysis Section.

The program recently completed an analytical assessment of the population dynamics of striped bass in the Maryland portion of Chesapeake Bay. This investigation provided the life history and fisheries information required to develop a deterministic age-structured mathematical model which derives a pre-season estimate of an allowable annual harvest quota for Maryland striped bass fisheries given prespecified target reference points established by the ASMFC (e.g., size limit, exploitation rate). This harvest control model (HCM) will serve as the cornerstone of the Department's strategy to manage striped bass in the future. Through its representation on the Interstate Striped Bass Scientific and Statistical Committee, and the Striped Bass Stock Assessment Committee, both under the aegis of the Atlantic States Marine Fisheries Commission (ASMFC), program staff are contributing to the development of east coast population assessment of striped bass. The latter will serve as the basis of interstate fisheries management decisions for these coastal stocks.

The Fisheries Research Program developed the State of Maryland's plan to monitor the recreational striped bass harvest in its jurisdictional waters, including the Potomac River, during the 1990 fishing season. The plan contains both the details of the monitoring program, and the analytical methodology the state will use to estimate weekly harvest, and total seasonal harvest at the level of precision required by Amendment #4 to the ASMFC's Striped Bass Fisheries Management Plan. This survey will provide state management officials with the ability to terminate the fishing season upon reaching the recreational harvest quota, should this occur before the scheduled end of the season. Otherwise, this monitoring program will provide a precise post-season estimate of total recreational harvest.

Program staff conducted a stock assessment of white perch the Maryland portion of Chesapeake Bay. The assessment should provide information on the distribution, growth and mortality of white perch and will feature a comparative study among the Patuxent River, Choptank River and the upper Chesapeake Bay stocks. The results of the white perch stock assessment will be used to support the development of a Maryland white perch fisheries management plan scheduled for completion in 1991.

In 1990, the FRP received funding from the National Marine Fisheries Service under the Anadromous Fish Conservation Act (PL 89-304) to conduct a research investigation to examine the mechanisms of Chesapeake Bay striped bass recruitment, and those factors which influence the determination of year-class strength. The project's goal is to improve understanding of the stock-recruitment relationship, and the role of density-dependent (stock biomass), and density-independent (e.g., environmental, anthropogenic) factors on the recruitment process. The research will examine the specific pattern of survivorship for each recruited year-class. The survival rate will be viewed in relation to those hypothesized biotic and abiotic factors which affect survival of

pre-juvenile life stages. By following platoons within a cohort through early life and the variation in cohort-specific growth and mortality, survivorship can be examined in terms of conditions which contribute to episodic mortality events, or those which encourage successful recruitment to the stock.

Program staff are evaluating the efficiency of the estimated mean catch-per-haul traditionally used as a measure for the Maryland striped bass juvenile index. Using the existing historic seine survey data set, alternative estimators of mean catch rates are being developed to quantify juvenile striped bass abundance. Further, appropriate weighting factors for contributions from the four river systems included in the index are also being considered. The objective of this work is to improve the basis for quantifying juvenile striped bass abundance and its application in the management decision-making process.

As part of the terms of reference of the Chesapeake Bay Stock Assessment Committee (CBSAC), the FRP is currently developing a long-term research and monitoring program for important commercial and recreational fisheries in Chesapeake Bay. Proposed research projects to: (1) assess the status of blue crabs in Chesapeake Bay, (2) improve the accuracy and timeliness of commercial catch and effort statistics, (3) collect biological information on the commercial catch, (4) monitor the status of recreational fisheries, and (5) design the prototypical fishery independent monitoring system. Researchers and managers from the University of Maryland, the Virginia Institute of Marine Science, and the Virginia Marine Resources Commission are participating in these activities.

Other program responsibilities relating to the CBSAC include coordinating the relevant fisheries research actions of other state agencies, and serving as a forum for review and discussion of methods and status of Chesapeake Bay resource assessments.

The program is developing a report on blue crabs in Chesapeake Bay in cooperation with UMCEES-CBL. Completed to date are: (1) a blue crab stock assessment, (2) results of the winter dredge survey pilot program with a sampling procedure for future years, and (3) analysis of catch-per-unit-effort data obtained from 1987-1989 from commercial blue crab fishing vessels and processing plants. Ongoing work includes a bioeconomic analysis of the commercial blue crab industry, and an analysis of mark and recapture data obtained from tagging in 1988 and 1989.

Program staff are participating in the development of the technical component of interstate fisheries management plans for striped bass, bluefish, Atlantic sturgeon, winter flounder, scup, summer flounder and black sea bass. These activities are carried out under the auspices of the Scientific and Statistical Committees of the Atlantic States Marine Fisheries Commission, and other inter-jurisdictional fisheries technical and research committees on which the state is represented by Fisheries Research Program personnel.

Power Plant Topical Research Program

The goals of the Power Plant Topical Research Program (PPTRP) are to identify information needs for the future and to conduct the research necessary to obtain the information. Research ideas are solicited from the scientific community on an annual basis in the form of preproposals and later developed into full proposals if specific scientific and relevance criteria are met.

The major aquifers in Maryland, the Aquia, Piney Point and Magothy, are presently under study to determine the areas of recharge, the flow paths, the flow rates and where cross connections may exist. Geochemical tracers present in samples taken at various depths of over twenty-six wells located in the coastal plain of Maryland are being taken. The information is essential for optimal use of the ground-water resources in Maryland.

Potential ground water impacts from selected trace elements in coal leachate is also being determined. Interaction of iron, beryllium, chromium, copper and aluminum with coastal plain soils are under varying conditions of soil: leachate ratios and organic acid content are being determined in batch experiments. The results will be used to predict transport behavior of these elements if accidental coal pile leachate releases should occur. Presently, all coal pile leachates are contained and treated prior to release.

American shad have increased in abundance in the Susquehanna River. It is not known whether the resurgence is due to increased survival of natural stocks, immigration from other river systems, or results from a stocking program which, for the past ten years, has introduced juvenile shad from several river systems outside the Susquehanna basin.

A technique of genetic fingerprinting is being employed to determine the rivers of origin for the Susquehanna River stock. Mitochondrial DNA techniques are being used to identify unique genetic configurations of specimens from all the river systems which may have contributed to the Susquehanna stock to determine the proportional contribution of each. The information will be used to guide effective fisheries management.

Direct deposition of trace elements and organic compounds into Chesapeake Bay is being estimated through a project jointly sponsored by MDE and DNR. Weekly precipitation and ambient air samples are being taken at Wye Island and the Elms in St. Mary's County by scientists from the Universities of Maryland and Delaware. A companion station, sponsored by EPA/CBLO, is located in the Virginia portion of Chesapeake Bay.

Three additional studies are expected to start by January 1991. They are:

- Studies on the Influence of Power Plant Emissions on Aquatic Mercury Biogeochemistry and Bioaccumulation.
- Mechanisms Whereby Magnetic Field Exposure Modifies Pineal Indoleamine Metabolism and Secretion."
- Biochemical Assessment of Trace Metal Exposure of Oysters in a Tributary of Chesapeake Bay.

Habitat Impacts Program

This program implements Chesapeake Bay initiatives concerned with monitoring living resources, understanding and correcting habitat problems, and management of living resources data.

Living Resources Monitoring

Participation in the Bay-wide living resources monitoring program, in cooperation with several other state and federal agencies, is the key responsibility of this project. The Chesapeake Bay Living Resources Monitoring Plan, a commitment of the 1987 Bay Agreement, was developed by an interstate work group under the direction of the program manager.

Long-term data collection is required to meet monitoring objectives: (1) to collect information on the abundance and habitat quality of living resources; (2) to determine the effectiveness of pollution control measures in protecting and restoring the living resources of Chesapeake Bay; and (3) to assess the effects of habitat quality on survival and reproductive success of living resources.

Staff biologists monitor the abundance and survival of anadromous fish eggs and larvae and the quality of spawning habitats in the Choptank River each spring, a project initiated in 1980. The long-term data has increased understanding of the environmental conditions on the large year-to-year variations in striped bass reproductive success. Similar information has been collected, although for shorter periods of time, in the upper Bay, Potomac River and Nanticoke River spawning areas.

In cooperation with the Acid Deposition Program, yellow perch abundance and reproduction are monitored in several spawning streams to evaluate the benefits of stream liming in protecting this valuable species from stream acidification.

Biologists and analysts are working to develop "biological indicators" of the quality of Bay habitats, based on the abundance, diversity, and health of fish. Several Bay tributaries are being monitored including the Magothy, Severn, South, and Wicomico Rivers on the western shore, and Fishing Bay on the Eastern Shore. Some of these areas suffer from water

quality problems like low dissolved oxygen. The work's goal is to understand the influences of habitat conditions and pollution on fish "communities" and make the information easily accessible to non-specialists by the use of simple indexes.

Since 1986, DNR scientists have worked cooperatively with University of Maryland scientists to gain better understanding of factors influencing juvenile and adult oyster survival. From 1986-1988, oyster mortality levels and water quality over the oyster bars were monitored in the lower Choptank River. Oyster survival was affected most by the MSX and Dermo parasites. Low dissolved oxygen did not appear to be a problem for the oysters. Present work is focused on understanding the high mortality rates observed in monitoring newly set oysters (spat).

Staff have been working with the US Environmental Protection Agency, the US Fish and Wildlife Service, and Bay scientists through the Chesapeake Research Consortium on an extensive revision and improvement of "Habitat Requirements for Chesapeake Bay Living Resources," another Bay Agreement commitment. The information, based upon knowledge of the habitat needs of fish, shellfish, wildlife and aquatic plants, will be used to help the Chesapeake Bay Program set water quality restoration goals to protect living resources.

Watershed Targeting

Four priority watersheds have been identified in Maryland's Chesapeake Bay watershed and targeted for intensive monitoring and restoration efforts. The restoration efforts are twofold: to demonstrate success of coordinated management action in improving water quality and ecological habitat and to increase public awareness and understanding of the complexity of Bay ecosystems and efforts to manage them.

The targeted watersheds are Sawmill Creek in Anne Arundel County, German Branch in Queen Anne's County, Piney and Alloway Creeks in Carroll County, and Bird River in Baltimore County. Sawmill Creek and Bird River are in urban areas with plans for future development. The other two streams are in heavily-farmed regions of the state. These four watersheds were selected because they represent land use types that are of priority concern to the state in directing restoration efforts for the Chesapeake Bay.

Water quality monitoring, aquatic life surveys, and flow measurements are being used to make a baseline assessment of the ecological effects of existing pollution sources. Problems that are identified will be controlled through coordinated management efforts. Restoration plans will be drafted in the upcoming year and data collected in monitoring programs will be analyzed and reported.

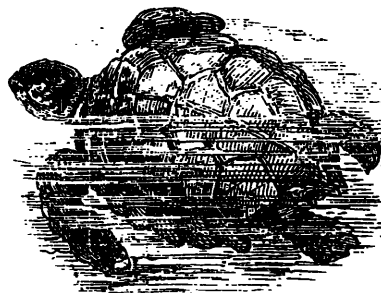
Almost one year of sampling has been conducted in the Sawmill Creek and German Branch watersheds, six months in the Piney/Alloway watersheds, and monitoring plans are being completed for the Bird River. Implementation actions are underway: the agricultural agencies are focusing their efforts on nutrient control through best management practices incentive programs; in the urban watersheds pollution sources are being identified and brought to the attention of regulatory and planning agencies at the county and state level. Communication between government agencies, citizens, and researchers is fostering pollution control and assessment activities.

Citizen-volunteers are collecting data in three of the watersheds and will soon be assisting in the Piney/Alloway watersheds. The water quality, rainfall, flow, and aquatic insect data collected by these trained citizen-monitors augments the work of government agencies. The volunteers are recruited and trained by the Alliance for the Chesapeake Bay and by Save Our Streams.

Toxics

While Maryland has long had strong programs to control the discharge of toxic substances into its waters, most of the emphasis, appropriately, has been on human health concerns and reducing toxic inputs from industrial sources. The Bay Agreement of 1987 and the subsequent "Basinwide Toxics Reduction Strategy" have put an additional emphasis on protecting the Bay's living resources from harmful exposures to toxic contaminants. In 1990, a new effort was begun to assess the potential danger to living resources from toxics - not only those discharged by industry, but also the many toxic substances that can reach the Bay in runoff from farms, cities, and residential areas. Bay water and bottom sediments from several sites will be tested according to carefully developed methods to determine whether their toxicity to fish and invertebrate animals. Do toxic effects occur only in a few highly contaminated areas, or "hot spots", or are they more widespread? The answers to this important question will help to determine how toxic contamination problems are to be managed by the Chesapeake Bay Program and the states.

A three-day scientific workshop held in July 1989 helped to review the objectives and guide the methods of this effort. The proceedings, "Chesapeake Bay Ambient Toxicity Assessment Workshop Report," were published by the Chesapeake Bay Program in May 1990.



Data Management Project

The data management project has two important functions: (1) to provide the overall program with the programming, data entry, data base management, and hardware and software support necessary to manage the large quantities of data collected and to insure that they are readily available for use and analysis; (2) to assist the Chesapeake Bay Program to acquire, document, and quality assure living resources data for its Chesapeake Bay data base.

During the past year, work on a new data management system has come close to completion. Many bottlenecks that formerly existed in computerizing data have been overcome. Data entry, documentation, storage, and retrieval now are accomplished quickly and routinely. Completion of the system will require the creation of some additional computer programs for specialized purposes and to produce enhanced quality assurance reports that will include statistics and graphics.

Several large living resources data sets (for example, long term fisheries landings, oyster, crab and juvenile fish monitoring), have been submitted to the Chesapeake Bay Program Computer Center.

Cooperative Oxford Laboratory

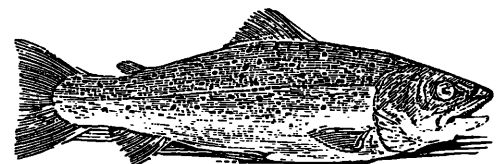
The Cooperative Oxford Laboratory was created in April 1987 by an agreement between the Maryland Department of Natural Resources and NOAA, National Marine Fisheries Service to establish a state/federal research laboratory to study the impact of diseases on fish and shellfish in the Chesapeake Bay. The agreement combined trained shellfish and finfish pathologists, a unique technical library on fishery disease information, a 13,000-square foot laboratory, and state personnel familiar with Bay management problems. The present program concentrates on describing the disease distribution and the resultant impacts on fish and shellfish stocks in the Bay. Several research projects are underway to improve survey methodology, develop new diagnostic techniques, describe new life stages of parasites and diseases, and to evaluate potential management tools to offset the impact of disease. The first year of funding under the Governor's Bay Initiative Programs, (FY 89) expanded the state component of the Laboratory by adding three senior staff members and five technical support personnel to accomplish the shellfish disease survey and research tasks. The Cooperative Lab completed annual surveys of the oyster disease situations in 1986 through 1990, and has statistically organized all existing data on shellfish diseases in Maryland waters. These studies show two major periods of MSX disease infestation from 1965 through 1968, and 1981 through 1988, as well as a gradual intensification and geographic expansion of Dermo disease throughout this period. From the results of 1989 surveys, MSX disease appears to have virtually disappeared from Maryland waters, whereas, Dermo disease continued to spread

up all river systems and intensify in its impact. Oyster mortality induced by Dermo disease is at a lower level than caused by MSX, but has destroyed all market-sized oysters on several oyster bars.

The Cooperative Laboratory and Shellfish Propagation personnel operated Deal Island Hatchery to spawn and evaluate the use of disease resistant stocks of oysters developed by New Jersey and Virginia. Spat from these special stocks and from Maryland stocks have been placed in various river systems throughout the Maryland portion of the Chesapeake Bay. In 1987 these studies found unusually high infection rates of Dermo and MSX in early life stages of both disease resistant and Maryland oysters and the persistence of Dermo disease as the oysters grew older. Research activities have developed a rapid blood diagnostic technique to determine the presence of MSX and Dermo diseases in the circulatory system of oysters. A recent modification of this procedure includes a gill biopsy which now allows diagnosis of all stages of shellfish infection in less than two weeks after receipt of oysters. In the past, complex traditional histological techniques required an entire year before final diagnosis of disease situation in Maryland waters could be developed.

Several Maryland lease holders have submitted their oysters for diagnoses and technical advice on how to better utilize their oyster leases. Experimental studies have developed an in vitro test technique to study treatment of oyster diseases with chemotherapeutic drugs. It is anticipated that an array of treatments for oyster diseases will shortly be available to the management agencies.

Cooperative investigations of finfish disease are conducted among members of the Maryland Department of the Environment, the University of Maryland at College Park, University of Maryland Medical School, DNR-Fisheries Division personnel, and the Cooperative Oxford Laboratory staff. Fish kill numbers have been very high each summer and have provided an opportunity to describe several new bacterial and parasitic infestations in the fish populations. These investigations provide a definition for fish mortality causes which are especially useful to management agencies.



POWER PLANT AND ENVIRONMENTAL REVIEW DIVISION

Power Plant and Environmental Review (PPER) staff direct environmental research and provide technical information and recommendations to regulatory agencies concerning actions necessary to minimize the impact of siting and operation of power plants and associated facilities. The division's environmental review staff review and evaluate permits issued by federal, state and local jurisdictions for development projects throughout the state. In addition to evaluating the consequences of development activities on a case-by-case basis, the cumulative impact of these projects on a watershed-wide basis is assessed.

Major Power Plant-Related Activities

- Ongoing monitoring of radionuclide concentrations and distributions in Susquehanna River and Chesapeake Bay to assess the environmental impact of radioactivity discharged by Three Mile Island, Peach Bottom and Calvert Cliffs nuclear power plants.
- Served as lead state agency for review of events associated with the shutdown and restart of the Peach Bottom nuclear power plant. PPER continued to conduct independent inspections of the plant, working closely with the utility and the NRC to ensure safe plant operation.
- Served as lead state agency for the review of changes implemented and planned at the Calvert Cliffs nuclear power plant to correct past deficiencies and restore the plant to a condition which ensures safe and reliable operation upon restart.
- Reviewed and provided input to the NRC on Baltimore Gas and Electric Company's application and proposal to construct and operate an interim spent fuel storage facility at Calvert Cliffs nuclear power plant.
- Participated in exercises of the radiological emergency plans for Peach Bottom and Calvert Cliffs nuclear power plants. PPER provides the lead technical representative for the state for all nuclear power issues in all exercises and in the event of an accident.
- Conducted detailed studies to assess the impact of PEPCO's Faulkner ash storage site in Charles County on groundwater and surface water. Included in these studies were an evaluation of impact to the Zekiah Swamp Run and an assessment of yellow perch spawning success and larval survival in the watershed.
- Evaluated the impact of entrainment of larval finfish in the Patuxent River by PEPCO's Chalk Point stream electric station. Completed evaluations and recommended approval with condition for the PSC to license the combustion turbines and air quality permits for the combustion turbines and combined cycle, of PEPCO's proposed coal gasification/combined cycle Station H power plant to be constructed at its Dickerson site.
- Updated the utility data base which includes extensive information on a variety of economic/demographic variables, energy sales data and energy prices for each of Maryland's utilities.
- Participated in an on-going proceeding before the Maryland PSC to review Delmarva Power and Light's proposal to competitively solicit future baseload generation capacity from non-utility generators.
- Completed new econometric load forecasts of the Delmarva Power and Light System, Potomac Electric Power Company and the Allegheny Power System.
- Participated in a proceeding reviewing the appropriate avoided cost of the Allegheny Power System.
- Initiated a study to examine the potential for large and small scale cogeneration in Maryland.
- Participated on a task force to evaluate ways to change ratemaking policies that encourage conservation programs.
- Participated in a collaborative process identifying and designing potential demand-side management programs for PEPCO.
- Participated in a regional working group which is examining implementation issues associated with pending Clean Air Act legislation.
- Analyzed the status and balance of Maryland's electric supply and demand, with emphasis on in-state vs. out-of-state generation and transmission facilities and capacities.
- Conducted preliminary routing studies field reviews for planned transmission lines.
- Initiated a joint annual review with the PSC and Maryland utilities to review electric system supply, construction, and route applications plans.
- Initiated the first semi-annual report to the Maryland PSC on potential health effects associated with power frequency electric and magnetic fields (EMF).

- Developed a citizen and local government response program concerning inquiries related to the potential health hazards associated with electric transmission lines and distribution systems.
- Analyzed and recommended approval with condition for the PSC's certification of BG&E's proposed Westminster to Finksburg 115 kV transmission line.
- Initiated a comprehensive electric system/power supply study, in cooperation with the Maryland PSC and Maryland utilities, to identify current and future operating conditions within Maryland and its regional power pool, and between regional power pools.
- Conducted a comprehensive review of Maryland's energy future, including electric power supply and demand options, siting issues, future technologies and developing environmental issues.
- Completed analysis and recommended conditional approval for the PSC certification of four combustion turbines at PEPCO's Chalk Point site.
- Continued relicensing activity for PENNELEC Power Company's hydroelectric plant on Deep Creek Lake.
- Participated in the final permitting of the design plans for a permanent fish lift facility at the Conowingo Dam on the Susquehanna River. Facility was to be operational by Spring of 1990.

Major Environmental Review Activities

The Project Review Section of the Power Plant and Environmental Review Division is responsible for providing and coordinating the comment on environmental impacts statewide as they affect natural resources under the responsibility of the Tidewater Administration.

During FY90 an important function of the environmental review responsibilities was implementing the requirements of Section 307 of the federal Coastal Zone Management Act. The Act requires that federal activities in the coastal zone be consistent with, to the maximum extent practicable, the state's Coastal Zone Management Program. Due to the broad nature of the CZMP, this requires a comprehensive review of the potential impacts associated with a development proposal. Outside of the coastal zone, the division's review focuses primarily on impacts to water and aquatic resources. Major types of projects reviewed include erosion control, dredge and fill, municipal and industrial waste disposal, filling within the 100 year tidal and non-tidal floodplain, shoreline residential development, and transportation projects.

In FY90, the distribution of caseload by type of project was as follows:

Discharge permits	51
State Highway Admin. (SHA)	89
Corps of Public Notice (NAB)	359
Water Quality (WQ)	417
Waterway Construction (WC)	86
Toxic Materials Permits (TMP)	73
Wetlands Permits (WL) (WP)	298
Public Drainage Assoc. (PDA)	36
Surface Mining (SP)	25
Maintenance Repair (MR)	16
Pond (PO)	27
Temporary Construction (TC)	18
DNR Clearinghouse (CHR)	78
Waterway Obstruction (OB)	1
Project Planning (PP)	13
Bureau of Mines Strip Mine (OPA)	5
Total	1,592

A Cumulative Impact Assessment Methodology (CIAM) is being developed by documenting the range and variety of man's impacts within small stream ecosystems. Several small watersheds are being targeted for intensive study and restoration efforts. Major factors affecting these watersheds include transportation, mining, agriculture and urbanization. The CIAM will be used as a tool for a more comprehensive environmental review process.



FISHERIES DIVISION

Recreational Fisheries

The primary goal of the program is to improve the quality of sport fishing on the Chesapeake Bay and its tributaries. This goal is achieved through conservation of sport fish stocks, enhancement of recreation fishing, habitat protection and creation, and research on tidal fishery resources. Major areas are: access through fishing piers; artificial reef construction; youth-oriented fishing derbies; an annual Maryland Sport Fishing Tournament and a Governor's Cup Fishing Tournament, held in FY90 for youth only. The latter event drew a crowd of over 3,000.

The Sport Fish Tournaments Project prepared displays and staffed exhibits for seven major outdoor shows with a total attendance in excess of 500,000 persons. In addition, seminars, small shows and outdoor writers programs were assisted and administrative help was given to three major fishing association tournaments and other events.

Freshwater and saltwater citations, patches, and date bars have been issued for participation in the 25th Maryland Sport Fishing Tournament.

The Urban Fishing Project enhances fishing opportunities. Over 8,000 pounds of catfish were stocked in more than 32 community ponds for the promotion of sport fishing at youth fishing rodeos held cooperatively by community organizations. Ten events were held during National Fishing Week. The fishing pier at Point Lookout State Park, in St. Mary's County, was opened to the public in FY90 and a fishing and boating pier was completed in the Sassafras River at Betterton, Kent County.

The artificial reef feasibility study was completed; the study recommends the enhancement of Chesapeake Bay environmental habitats through redevelopment of complex oyster reef communities.

Publications

The Publication Project produced brochures, pamphlets, information sheets and booklets containing commercial laws and regulations for fishing, oysters, crabs, clams and fish.

A video entitled **Keeping Score** was developed to encourage the conservation of fish. Printed material was distributed with guidelines for releasing fish.

The Tidewater Fisheries News was produced on a monthly basis and the project wrote and distributed materials on particular fisheries issues for sport fishing magazines.

Aquatic Education

Maryland's Aquatic Resource Education program assists Maryland's schools by providing an aquatic resources education grants' reimbursement program, which is available to schools from Grades K through 12. By providing a grants' reimbursement program which is available to any and all public and private schools and school systems, both educators and students are reached.

The grants' reimbursement program is also available to Maryland's marine museums for the purpose of educating children as well as adults about Maryland's aquatic resources. Some marine museums have some aquatic resources education programs. Being able to obtain funds from the grants' reimbursement program will enable them in developing a somewhat broader environmental education program.

Additionally, the "Hooked on Fishing, Not on Drugs" fishing clinics in another major component of Maryland's Aquatic Resources Education Program. The program is available during the summer months to children for seven to twelve years old, and children are recruited in May from schools in four areas of the state. The program provides drug education as well as aquatic resources education studies, ethics and responsibility.

Both the grants' reimbursement program and the fishing clinics provide opportunities to minorities and to those with special needs.

FISHERIES STATISTICS

The Fisheries Statistics and Modeling Project (FSMP) continually evaluates the harvest estimation system. Landing data is also recorded.

Commercially harvested fish species are sampled for sex and size composition data. These data are used for developing and implementing fish management plans.

Sport fishing licenses (300,000 - 320,000 annually) are being optically scanned in order to monitor Maryland sport fishing activity.

Fish Passage

Restoring migratory fish to historic spawning habitat is one of the key components of the 1987 Chesapeake Bay Agreement. Approximately 887 stream barriers have been identified that prevent migratory fish from reaching their historic spawning habitat. The barriers range in size from a few large dams to hundreds of road culverts, weirs, pipeline crossings and low-head dams. Nearly 100 of these barriers

block anadromous fish spawning rivers and twenty-five of them were identified for action in 1990, ranging from planning and surveys to design and construction.

Restoring anadromous fish migration up the Susquehanna River is the number one priority of the fish passage program. Conowingo Dam is the only barrier to fish migration in Maryland's portion of the Susquehanna, and during FY90, construction began on a \$12 million fish lift at the dam.

The Patapsco River is the second priority water body in which to restore migratory fish runs. Four large dams are located on the main stem, and small dams are located on Stony Run and Deep Run which are tributaries to the lower Patapsco. Bloede Dam, which is the first dam as one proceeds upstream from Baltimore Harbor, is owned by the state and is located in the Patapsco Valley State Park at river mile 21.1. Funding for a fish ladder at Bloede Dam was approved by the legislature and an architectural/engineering firm was selected to provide a final engineering design for the ladder. Simkins Dam, the second on the river, is owned by Simkins Industries and is located at river mile 22.6. Negotiations to provide fish passage at Simkins Dam began between DNR and Simkins officials. Union Dam, located at river mile 26.4 was breached to allow fish passage. Daniels Dam, the fourth dam on the river, which is also owned by the state, is located at river mile 30.0. An architectural/engineering firm was selected to provide a final engineering design for a fish ladder at Daniels. The low-head dam on Deep Run was removed and preliminary discussions began with Seagrams Company, the owner of the dam on Stony Run, to provide fish passage there.

The Fort Meade water supply dam on the Little Patuxent River and Aberdeen Proving Ground's water supply dam on Winters Run in Harford County were identified as fish passage priorities. A conceptual design was completed for the Fort Meade dam and construction of a fish ladder began on the Winters Run dam.

Releasing pre-spawning populations upstream of barriers is an important part of the fish passage program. In the spring of 1990, over 10,000 blueback herring were trapped, transported and released into the Patapsco River, the Little Patuxent River, Winters Run, Big Elk Creek, and German Branch and Mason Branch on the Eastern Shore. In addition, approximately five million American shad fry were released into the Susquehanna River.

Bio-monitoring, a third component of the fish passage program, was conducted on 15 water bodies during the annual anadromous fish spawning migrations occurring in late winter and through the spring of 1990.

American Shad Restoration Ponds

The Havre de Grace shad restoration pond (approximately 1.6 acres) was opened on July 5, 1990, and stocked with 384,000 American shad fry. Three additional shad grow-out ponds were completed at Elkton and each stocked with 125,000 American shad fry. After reaching about 2" in size, the juvenile shad will be released during late summer directly into the Susquehanna River from the Havre de Grace pond, and into Big Elk Creek from the Elkton ponds. Raising and releasing American shad into the upper Chesapeake Bay will aid in restoring this recreational and commercially important species.

Stream Classification

The concept of water use classification is being examined to incorporate the concepts of the Chesapeake Bay Agreement. The project is examining ways to enhance the ability of the regulatory system to protect areas which currently support living resources. Computer mapping and data basing are used.

FISHERIES/SHELLFISH PROGRAM

OYSTERS

The oyster harvest for the 1989-90 season was approximately 420,000 bushels, with an estimated dockside value of \$9 million. This is an increase of 26,000 bushels over last year's harvest, but it is the fourth consecutive year of harvests below 1 million bushels. The low harvests are due to the impact of oyster diseases.

Recruitment (spat-fall) was low for the third year in a row. Average counts on natural bars were about six spat per bushel. Seed areas also decreased in reproductive success, resulting in a decrease in the seed transplanting program.

Almost 342,000 bushels of seed oysters were transplanted from seed areas to growing areas. Of this amount, 18,090 bushels were actually small oysters from upper Chesapeake Bay bars that grew very slowly due to low salinities. As was the case in 1989, the seed was transplanted to areas of the Chesapeake Bay and tributaries where the risks of disease (MSX and Dermo) are considered low. This seed will be ready for harvest by 1992.

Approximately 100 watermen participated in the operation and were paid on a per bushel basis for their services.

The dredged shell program to provide oyster shells for cultch planted 304,976 cubic yards (or 5.1 million bushels) during the summer of 1990. The shells are used to rehabilitate oyster bars and to provide clean cultch for seed areas.

Fresh shells are the shells obtained from oysters shucked during the recent oyster season. These shells are purchased from the oyster processing plants and are placed on selected oyster bars to provide cultch for spat attachment. Because of recent low harvest levels, very few oyster shells are available. To augment the fresh shell supply, surf clam shells were also planted. A total of 170,300 bushels of shells were planted, of which 87,650 bushels were surf clam shells.

Bagless dredging is a technique that cleans shells already on the bottom to improve their usefulness as cultch. A standard oyster dredge with the collection bag removed is pulled across the oyster bed. This action loosens the shells from the bottom and helps to clean them. In early May, 135 watermen used their boats and equipment to bagless dredge 49 oyster bars. In late June, six watermen bagless dredged three state seed areas to clean the shells for the oncoming oyster set.

The oyster hatchery at Deal Island continued studies on disease resistant seed, and growth and mortality studies on the Japanese oyster. Cooperative experiments were conducted with the Oxford disease center under the direction of Dr. George Krantz.

Renovations continued at the Piney Point aquaculture center. The road and entrance were improved and the parking lot was graded. Oyster setting experiments were conducted with bagged shell cultch. A private oyster grower is using part of the facility to develop hatchery and grow-out techniques. Attempts to encourage additional aquaculture projects by private industry are in progress.

Soft Shell Clams

The soft clam harvest as of August 1990 was 230,500 bushels, which is slightly behind last year's harvest to this date of 280,000 bushels. The harvests of the past two years have been over 360,000 bushels.

The program of on-board refrigeration to reduce bacterial levels in soft clams harvested during the summer was implemented again this year. Clam check-in stations to monitor the temperature of clams at dockside began operation May 28, 1990 and continued until September 3, 1990.



Freshwater Fisheries

The Freshwater Fisheries Program focuses on the management of the freshwater fisheries resources of the state. These resources — both naturally occurring and introduced populations — include 14 gamefish, 15 panfish, and 65 rough and forage fish species. Gamefish species include: brook, brown, lake and rainbow trout, largemouth bass, walleye, northern pike, striped bass, striped bass hybrid, yellow perch, tiger muskellunge, and channel catfish.

The Freshwater Fisheries Program's long-term goal is to revitalize the warmwater, coolwater, and coldwater fisheries of Maryland. The primary objectives of the program are to protect, conserve, and enhance the quality and diversity of the state's fishery resources and to provide and continue varied angling opportunities through scientific inventory, classification, and management of these resources.

During FY90, a major effort was directed toward intensive ecological studies of the following streams and reservoirs: North Branch Potomac River, Gunpowder Falls, Savage River and its tributaries, Youghiogheny River, Hunting Creek, Bee Tree Run, Paint Branch, Little Seneca Creek, Potomac River, Deep Creek Lake, Prettyboy Reservoir, and Liberty Reservoir. These studies supported a state-wide effort to establish an automated data base of the freshwater resource of the state.

A project by the Appalachian Environmental Laboratory at Frostburg State University, funded by the Tidewater Administration, is directed towards obtaining a complete inventory of the physical, chemical, and biological characteristics of the trout streams of Garrett and Allegany Counties. In FY90, 37 streams were surveyed and data entered in the coldwater fisheries data base. The top ten ranked trout streams were Monroe Run, Dry Run, Middle Fork, Big Run, Poplar Lick Run, Crabtree Creek, Little Bear Creek, Sand Spring Run, Hoyes Run, and Lostland Run. Six of the top ten streams were located in the Savage River drainage basin.

In addition to the inventories conducted by the Appalachian Environmental Laboratory, Freshwater Fisheries conducted inventories on 36 streams located throughout the state to evaluate trout populations.

A major effort, directed toward the tidal largemouth bass fishery, and another focused on the middle and upper Potomac River and major impoundments of the state, round out this inventory effort.

Approximately 239,200 adult rainbow trout and 26,240 adult brown trout were stocked into 90 streams and ponds to provide a high catch rate put-and-take trout fishery in 1990. In addition 48,500 fingerling rainbow trout and 35,500 fingerling brown trout were stocked in support of the high quality put-and-grow trout fishery.

The following numbers of warmwater and coolwater fish species were stocked in Maryland waters during FY 90:

SPECIES	SIZE	NUMBERS
largemouth bass	spring fingerlings	62,400
largemouth bass	fall fingerlings	7,200
walleye	fry	1,700,000
walleye	fingerlings	13,600
bluegill	fall fingerlings	122,700
redear sunfish	fall fingerlings	40,000
tiger musky	fingerlings	42,700

As a result of achieving a full-time coldwater release from Prettyboy Dam, Freshwater Fisheries personnel continued investigations within the tailwater section of Gunpowder Falls during FY90 to assess its potential as a coldwater fisheries resource. Water temperature regimes were monitored at three locations below the dam to evaluate the quality of the coldwater release as it pertains to needs of salmonid species and to determine the rate and extent of downstream warming. Water quality and macroinvertebrate populations were evaluated and finclipped fingerling rainbow and brown trout were stocked at different locations during the spring and early summer to assess the potential of Gunpowder Falls to support trout on a year-round basis. Trout populations were evaluated using the Zippin three-pass removal method at eight locations.

A comparison of the 1988 and 1989 fish population data showed that in 1989 four stations had an increase in brown trout standing crop, one had no change, and three stations had decreases. Rainbow trout were found at six of the eight sample stations. Three stations had an increase in standing crop, two had decreases, and one station had no change.

Beginning 1 January 1989, that section of the Gunpowder River between Falls Road and Prettyboy Dam was made a "Catch-and-Release Area." Under the new regulation, anglers are allowed to use flies and treble hooked lures only and all fish caught must be returned to the stream. In 1989 the catch-and-return area contained the second highest standing crop of trout of all the areas sampled, second only to Quarry station that has maintained the highest standing crop of trout since 1987. The high standing crop of trout at Quarry station is considered to be due to poor angler access and a population that is predominantly brown trout. Bee Tree Run, located in the northeast corner of Baltimore County; has supported a naturally reproducing brown trout population for many years. It has been stocked from Bee Tree Road downstream to its mouth with hatchery reared rainbow trout as part of the annual spring put-and-take trout program. Stocking put-and-take rainbow trout in Bee Tree Run was discontinued in the spring of 1989 in an effort to protect its naturally reproducing brown trout population from overharvest.

Trout populations in Bee Tree Run were evaluated at three locations in 1989 using the Zippin three pass removal method. The investigations documented that in 1989 standing crops (lbs/acre) for the upper and middle stations were significantly higher than those estimated in 1988 (up 49 and 90% respectively). As a result of the discontinued put-and-take program, brown trout populations in the lower station experienced a 3.6 fold increase in standing crop over that found in 1988.

Freshwater Fisheries biologists studying largemouth bass in Maryland's tidal waters in 1989 found this fishery is continuing to improve and that changing environmental conditions have resulted in successful tidal waters bass reproduction.

Tidal water largemouth bass populations were studied during 1989 in the upper Chesapeake Bay, Potomac River, Chester River, Fairlee Creek, Patuxent River, Worton Creek, Blackwater River, Chicomocomo River, Transquaking River, Middle River, Patapsco River, Back River, and the Choptank River.

Largemouth bass spawned in state fish hatcheries have been stocked in upper Chesapeake Bay tidal waters to restore this fishery where natural reproduction has failed. From 1979 to 1988, nearly one million fingerlings were stocked in this area; which includes Dundee Creek, Gunpowder River, Bush River, Susquehanna River, Northeast River, Elk River, Bohemia River, and the Sassafras River. During 1986 and 1987, improving survival rates for bass spawned in these waters was documented. In 1988 the number of fingerling bass spawned in tidal waters was equal to the number of stocked fingerlings. These improvements indicate that the potential now exists for a self sustaining largemouth bass population, and as a result of these findings no fingerling bass were stocked in the upper bay during 1989.

A radio telemetry study was conducted in 1989 by Freshwater Fisheries and the University of Maryland to determine the movement patterns of Potomac River largemouth bass that have been displaced from one section of the river to another during fishing tournaments. During this study, bass caught in Piscataway Creek were moved to Smoots Bay, a distance of about six miles and to Mattawoman Creek, a distance of about fifteen miles. Fifty percent of the displaced fish returned to Piscataway Creek. All of the homing movement occurred within the first month after the fish were displaced, with bass traveling up to three miles in one day.

Studies initiated in 1987 on the Youghiogheny River to define the trout fishery potential of the river continued. The abundance of trout is highest at Hoyes, apparently due to its close proximity to coldwater discharge from the Deep Creek Lake Power Plant. Experimental stocking of various sized brown trout fingerlings indicate that survival to yearlings is improved when fingerlings, three inches and larger were introduced and that they are providing a good sport fishery downstream of the Deep Creek Lake Power Plant at Hoyes.

The closed season on black bass at Deep Creek Lake, implemented in 1987 to prevent the harvest of bass during the spawning season and to promote a better size structure, appears to be working. The age and size structure of Deep Creek Lake black bass in 1989 reflects a continued trend toward older, larger individuals that were characteristic in the lake before 1980.

The average size of tournament caught smallmouth-bass increased for the fourth consecutive year and largemouth bass' average size was the greatest since 1980. The percentage of bass, 15 inches and larger, in an angler's catch is a good indicator of fishing quality. During the period 1984 through 1986, the percentage of largemouth bass 15 inches and larger from Deep Creek Lake ranged from 18 to 22%. In 1987 the first year the closed season was in effect, the number of 15 inch and larger largemouth bass increased to 31%. In 1988 the percentage was 43% and in 1989 it was 52%.

Smallmouth bass size structure has also improved, although not as dramatically. In 1985 and 1986 only 10% of smallmouth bass creel were 15 inches and larger. This percentage increased to 21% in 1987, 16% in 1988, and 22% in 1989. The closed season has also resulted in an increase in yearling smallmouth bass. The catch per unit of effort by electrofishing increased from 18.8/hour in 1987 to 109/hour in 1989. With the prospect of continued good natural reproduction and more larger fish in the population, the future of largemouth and smallmouth bass fishing in Deep Creek lake continues to look promising.

An exciting new dimension to fish culture in Maryland was initiated in July 1989 when brown trout fingerlings hatched at the Lewistown Fish Hatchery were stocked in two net pens located in the stilling basin in the Jennings Randolph Lake tailrace. Net pen culture at Jennings Randolph is the result of a cooperative effort between the Corps of Engineers and DNR. The net pens were designed and the trout were reared by Freshwater Fisheries personnel. As a result, 18,000 adult were reared and stocked in the spring of 1990 in the North Branch Potomac River, Deep Creek Lake, Rocky Gap Lake, Middle Creek, and the Youghiogheny River. Six additional net pen enclosures will be added to the net pen project in 1990, bringing the total adult production potential to 80,000 to 120,000 trout and fall fingerling production to about 145,000.

During 1989 efforts continued in assessing the response of brook and brown trout populations in the Savage River "tailwater" to the water release procedures adapted and implemented by the U.S. Army Corps of Engineers in the spring of 1983. In 1987 special regulations designed to produce trophy trout fishing opportunities were enacted on the Savage River. The upper area includes a one-mile stream section located between the Savage River Reservoir Dam and the Piedmont Dam. Special regulations for this reach prohibit the use of bait (only artificial lures and flies are permitted), allow a five fish-per-day creel

limit, and include a 12-inch minimum size limit on brook trout and an 18-inch minimum size limit on brown trout. No trout are stocked in the upper area. The lower area includes the remaining length of the tailwater between the Piedmont Dam and the North Branch Potomac River (approximately 3.9 miles).

No bait restrictions apply within this area and there is a five fish per day creel limit. A 9-inch minimum size limit for brook trout and a 12-inch minimum for brown trout is in effect. This area receives annual stockings of 5,000 adult rainbow trout. There is no minimum size limit for rainbow trout in either area. Fisheries surveys conducted in 1989 disclosed that brook and brown trout continue to successfully reproduce, the population is increasing, and the number of adult, large trout is growing. Field data collections and monitoring activities during 1989 included trout population estimates and standing crops, macroinvertebrate sampling, water temperature monitoring, spring swim-up fry assessments, and information was collected on the impact of whitewater releases on the trout population.

Information collected on the Savage River indicate that the regulations employed above Piedmont Dam are producing a significantly higher concentration of quality size (greater than 9 inch) brook trout than those in effect downstream. Brown trout standing crops increased in both areas.

Following completion of Jennings Randolph Lake in 1982, water quality improved dramatically in the North Branch Potomac River between the lake and Westernport, a distance of about 11 miles. A section of river, devoid of fish life for many years, is now supporting 20 species of fish and a viable put-and-take trout fishery. Dissolved oxygen, water temperature, and pH are being maintained within the criteria for Class III waters. For the third year, in a cooperative effort with the West Virginia Department of Natural Resources adult rainbow and brown trout were stocked between the lake and Bloomington. Anglers have discovered that the North Branch Potomac is a great stream to fish and fishing effort during the spring of 1990 was up considerably from that in 1988 and 1989. In addition to rainbow and brown trout, brook trout, walleye, and smallmouth bass are also present in the river. The maintenance of a coldwater discharge from Jennings Randolph Lake and continuing good water quality could permit the establishment of a naturally reproducing trout population.

Other activities of the Freshwater Fisheries Program include:

- Evaluation of walleye introductions in Deep Creek Lake, Potomac River, Savage River Reservoir, Bloomington Reservoir, and Rocky Gap Lake.
- Evaluation of black bass populations in the Potomac and Patapsco Rivers.
- Evaluation of slot length for black bass in St. Mary's Lake, Little Seneca Lake, and Potomac River between Dam 3 and 4.

- Channel catfish studies in tidal waters.
- Stocking of coldwater, coolwater, and warm-water fish for put-and-take, put-and-grow, and corrective stocking.
- Evaluation of the naturally reproducing striped bass population in Liberty Reservoir.

Blue Crab Project

The blue crab project conducts surveys, monitors the commercial fishery and generates data and associated analyses for the bi-state crab management plan. During the winter of 1989-90, over 300 sites were sampled by crab dredge to produce information on distribution, abundance and mortality.

The blue crab tagging program, now entering its third year, seeks to answer questions concerning seasonal abundance, movements and harvest. Several hundred have been tagged and returns are running at about 13%.

The summer crab trawl survey continued for the twelfth year and supplies data on summer dispersal, seasonal abundance and resource condition. Samples have also been collected for survey of possible toxic contaminants in crabs.

Ongoing field studies also include tests of tag retention, crab pot escape vents (cull rings), decomposable escape panels and a manufactured crab bait.

Yellow Perch Project

The yellow perch project monitors the adult yellow perch populations in Tuckahoe Creek, Choptank River, Wye East River, Miles River, and with the cooperation of commercial fishermen, the upper Chesapeake Bay. Juvenile abundance is monitored in the upper Chesapeake Bay, Sassafras River, Bush River, Wye River, Miles River, Corsica River, and Marshyhope Creek.

Catches of adult yellow perch increased in most of the rivers sampled in 1990. Moderate increases were noted in the Miles River and Tuckahoe Creek with a marked increase in the Wye East River. The increase in the Wye East River is at least partly due to juvenile stocking efforts in 1988 and 1989. The decrease in catches observed in the Choptank River was partly due to recurrent otter or turtle damage to the net.

Juvenile sampling is conducted in the upper Chesapeake Bay area (Susquehanna Flats, Bush River, and Sassafras River), Patuxent River, Corsica River, Wye River, Miles River and Marshyhope Creek. The upper Chesapeake Bay areas have shown an increase in juvenile yellow perch while the Wye River and Miles River have shown a slight decrease. The Patuxent River, Corsica River, and Marshyhope Creek were not sampled previously so no comparisons can be made although the Patuxent River has produced one of the highest CPUEs to date.

The Corsica River is producing some juvenile yellow perch though not in large numbers. No juvenile yellow perch have been caught in Marshyhope Creek, possibly because the stream habitat is neither conducive to seining nor trawling. Electrofishing may prove to be the only method of collecting yellow perch in this area.

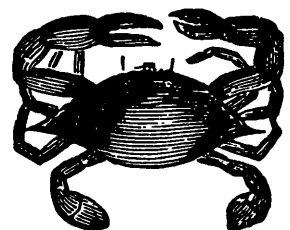
The stocking efforts this year were again two fold in nature. Relocation of prespawning adults occurs in February and March and juvenile stocking is begun in late May. The adult stocking consisted of 20,000 fish in the Patuxent River, 9,400 in Tuckahoe Creek, and 3,500 fish in Marshyhope Creek. Juvenile stocking included 341,600 fish in Marshyhope Creek and 258,900 in the Corsica River. Preliminary results from the OTC antibody study look promising although more samples will be needed to make any conclusions.

Striped Bass Project

Stock assessment programs in Maryland for striped bass have closely monitored spawning stocks and the resident winter stocks annually since 1982. Surveys in 1989 indicated approximately a five fold increase in abundance of female striped bass spawning in the Chesapeake Bay due primarily to reduced fishing mortality. There has been a general increase in overall stock size and an increased range of ages in the population indicating stock recovery to levels not seen since the mid 1970s.

The 1989 Bay-wide striped bass juvenile index was announced in September 1989 as 25.2. This index was derived from the annual estuarine juvenile finfish survey which monitors reproductive success of tidewater fish species in the Upper Bay, Choptank, Nanticoke and Potomac Rivers. The survey indicated spectacular striped bass reproductive success in the Choptank River (97.8) and above average success in the Upper Bay (19.4). The Potomac (2.2) and Nanticoke Rivers (2.9) exhibited below average success. This phenomenon of one or two areas having low reproductive success while other areas have above average success are typical of the Chesapeake Bay system. The good index met requirements in the coastal management plan which would initiate less restrictive management measures.

The Maryland striped bass management plan is guided by Atlantic States Marine Fisheries Commission (ASMFC) requirements. ASMFC requirements allow for a conservative fishery which would allow continued stock growth. The Maryland S.B. White Paper Committee prepared draft regulations which would allow a limited fishery in 1990.



Fishery Management Plans

The Fishery Management Plans Project is responsible for preparing state and baywide management plans for important commercial and recreational fisheries. Maryland, Virginia, Pennsylvania, the District of Columbia, and the Potomac River Fisheries Commission cooperate to identify problems and develop solutions to shared fisheries management issues. Development of Bay plans is also coordinated with the Atlantic States Marine Fisheries Commission and the Mid-Atlantic Fishery Management Council to meet their requirements and recommendations.

In FY 1990, the first series of baywide fishery management plans were completed and adopted. Governor Schaefer and other signatories to the 1987 Chesapeake Bay Agreement signed management plans for oysters, blue crabs, and shad and herring in July 1989, and signed the striped bass management plan in December 1989. These plans were hailed as historic documents signalling new cooperation in the management of Chesapeake Bay fishery resources. The striped bass plan also provided a backdrop for deliberations by the Governor's Striped Bass White Paper Committee on the 1990-1991 reopening of the striped bass fishery. In addition to the management plans, fact sheets and implementation plans for the same species were completed.

Legislation was signed in May 1990 that grants the Department complete authority to manage those fisheries for which a management plan is adopted. Project staff helped analyze data, carry out projects and prepare regulations to implement the plans listed above. In addition, draft baywide management plans for bluefish, weakfish, and spotted seatrout were prepared in spring 1990 and are scheduled for adoption in December 1990. Project staff also prepared a rough draft of a Maryland White Perch Management Plan, which will be completed in FY 1991.

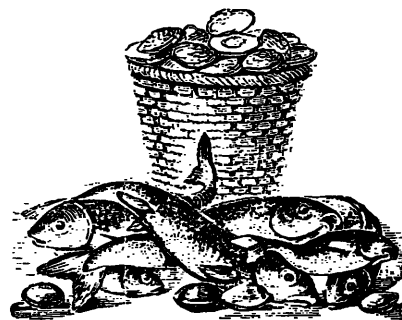
The Marine Project

The Marine Project continued its annual monitoring program for the 18th year. Samples taken from the twenty trawl and twenty seine sites scattered throughout the coastal bays document the health and diversity of an ecosystem faced with increased human use and development. As many as 26 species of fish, including young-of-year of commercial and recreational value, use the bays on a seasonal basis for nursery and forage. Over 110 species have been documented as dependent on the coastal bays. Unusual species such as triggerfish, spotfin butterflyfish, grouper, cornetfish, sea urchins and sea horses have also been encountered.

The marine project is taking a major part in a study of summer flounder in the mid-Atlantic region. Size and abundance data from the existing data base and tagging results will help to define regional movements, seasonal growth and contribute to the management of the stocks. Flounder numbers are still low. Since the resource declined in 1988, recovery has been slow but steady.

Anadromous Alosid Project

Improvement in the upper Chesapeake Bay stock of American shad continued in 1990 as the estimated number of spawning adults increased from 76,000 in 1989 to 126,000 in 1990. The 1990 upper Bay spawning run was dominated by four- and five-year-old males and four-, five- and six-year-old females. The incidence of repeat spawning in the upper Bay remained low as only 2.6% of the adults returned as repeat spawners. Age group composition and spawning history for the upper Bay stock in 1990 was similar to results observed in 1989. Data from the Nanticoke River in 1990 indicates that spawning American shad in this system were composed primarily of age groups IV and V for males and ages V and VI for females with a 13% incidence of repeat spawning. These results vary somewhat from those noted in 1989 in that the 1990 spawning run was composed of older fish for both sexes with a greater number of repeat spawners. The Nanticoke River sex ratio for American shad in 1990 was nearly one male to one female while the sex ratio for upper Bay shad was one male to 0.7 female. Analysis of the 1990 commercial pound net harvest of river herring from the Nanticoke River indicated that these stocks were composed primarily of males ages four to seven and females five to seven years old. Nanticoke River herring stocks appear healthy based on the relatively low total annual mortality rates estimated for 1989 and 1990 even with reported increases in commercial landings since 1987. Juvenile alosid production in the six systems monitored by the alosid project have varied greatly since 1985, with the Nanticoke and Choptank Rivers showing the greatest juvenile recruitment during this six-year period. Upper Bay production of juvenile American shad remains low compared to previous surveys conducted in the 1960s, but an increase in the number of young-of-the-year shad collected from the upper Bay in 1989 and 1990 indicates some improvement in juvenile recruitment.



WATER RESOURCES ADMINISTRATION

The Water Resources Administration is responsible for the protection, management and development of Maryland's water resources and accomplished its mission through the following organization for FY90:

- General direction
- Water and mineral management program including water rights, dam safety, surface mining, and watershed management divisions
- Wetlands and waterways program including tidal wetlands, nontidal wetlands, and waterway permits divisions
- Enforcement and services program including enforcement, technical services, community services, and information services divisions
- Bureau of Mines including abandoned mine lands, coal mine permits, and coal mine inspection and enforcement divisions

GENERAL DIRECTION

The overall direction, supervision and coordination of the policies and operations of the administration are carried out as well as clearinghouse review and liaison with interstate water organizations.

The Water Resources Advisory Commission meets to discuss activities and policies of the Administration.

WATER AND MINERAL MANAGEMENT PROGRAM

Water Rights Division

The goal of the Water Rights Division is to direct the development, management and conservation of the state's water supply resources and to protect the resources while encouraging their greatest feasible use. The division includes two sections: the water appropriation permits section and the planning and engineering section.

One project which involved the entire division was the drilling, testing and evaluation of a deep well at the Eastern Correctional Institution near Princess Anne, Somerset County. Since the project demonstrated that an adequate quantity of potable water was available, a ground water appropriation permit was issued authorizing an annual average withdrawal of 375,000 gallons of water per day from two wells in the Patapsco Formation. Once the wells are operational, the institution will reduce its water use from the Manokin aquifer.

Water Appropriation Permits Section

This section regulates the withdrawal and use of water in the state to protect the quantity of the resource and to provide reasonable protection to other users of the resource. The section evaluates permit applications to ensure that adequate water is available for proposed uses, to protect ground water supplies and instream values during low river flow, and to lessen potential conflicts among water users. There are more than 15,000 water appropriation permits on file. An additional 1,750 surface and ground water appropriation permits are processed annually by the section.

Major FY90 cases handled by the Water Appropriation Permits Section included:

- Issuance of a permit to the Lehigh Portland Cement Company to dewater the proposed New Windsor Quarry, following a detailed analysis and an extensive public involvement process.
- Issuance of ground and surface water appropriation permits for the 408-unit River Run Condominium/Golf Course/Resort Development in West Ocean City.
- Reduction of Delmarva Power & Light Company's Nanticoke River appropriation permit from an annual average of over 1 billion gallons of water per day to five million gallons of water per day (mgd).
- Issuance of a surface water appropriation permit to the Fairfax County (VA) Water Authority for an annual average withdrawal of 100 mgd from the Potomac River for use in a regional community water supply.
- Issuance of a surface water appropriation permit to the Potomac Edison Company for an annual average of 70 mgd from the Potomac River for use at the R. Paul Smith Power Generating Station near Williamsport, Washington County.

Planning and Engineering Section

This section analyzes area-wide effects of collective water appropriation in view of a region's future water supply and demand. The Planning and Engineering Section identifies regional water supply resource problems and formulates management alternatives. The engineers and planners have developed and utilized computer ground water and management models in forming plans for development and conservation of regional water supply resources. Implementation of those plans occurs through the water appropriation permit process.

An important component of the section's work has been establishing and maintaining a water use data system. The system is based on water use reports submitted to the department biannually by all permittees appropriating more than 10,000 gallons a day.

Other responsibilities of the Planning and Engineering Section include: water supply reservoir planning and development; mitigation of consumptive water losses through non-structural and structural techniques; and coordination of water supply planning activities with neighboring states, the US Army Corps of Engineers, the Interstate Commission on the Potomac River Basin and the Susquehanna River Basin Commission.

Major FY90 activities of the Planning and Engineering Section include:

- Evaluation of domestic ground water heat pump use and recharge wells in the coastal plain of southern Maryland.
- Publication of the final draft of the "Water Supply Resources Development and Management Plan, Northeastern Worcester County, Maryland, and Southeastern Sussex County, Delaware."
- Coordination of and participation in the Rays-town Lake and Jennings Randolph Lake detailed feasibility studies for the evaluation of the potential to increase water supply conservation storage.
- Participation in the Chesapeake Bay targeted watershed planning and implementation process.
- Appointment to the Maryland Department of the Environment's (MDE) technical advisory group for the wellhead protection program.
- Evaluation of potential sites for major industrial and commercial development.

Dam Safety Division

The Dam Safety Division is responsible for ensuring the safety of the state's 315 inventoried dams as well as for the permitting of new dams. Other activities include: conducting periodic safety inspections of dams, making construction site visits, assisting local civil defense agencies in the preparation of emergency warning plans, investigating dam safety violations, and providing technical assistance to Maryland dam owners.

In FY90 the division's major efforts included:

- Initiating the design of needed repairs to the Lake Roland Dam.
- Continuing to eliminate fish blockages on the Patapsco River.
- Finalizing many emergency warning plans for high-hazard dams.
- Continuing construction inspections and approving the emergency warning plan for Frostburg's new Piney Creek Dam.

The division completed safety inspections of 84 facilities, reviewed 26 permit applications, and provided technical assistance to 120 dam owners.

Construction is nearing completion on the new 400 million gallon Piney Creek Dam which will serve the Town of Frostburg and surrounding communities. This new dam and reservoir will meet the water supply needs of the Frostburg area as well as provide cold water releases which will dramatically improve the Piney Creek fishery. The project should be completed in late 1990 or early 1991.

Design work for repairs to the Lake Roland Dam, located on Jones Falls in Baltimore County, was initiated on June 15, 1990. This dam is the last remaining "unsafe" dam for Maryland from the US Army Corps of Engineer's National Dam Inspection Program. It is currently estimated that the design and repair will require 21 months.

Surface Mining Division

The Surface Mining Division regulates the operation of non-fuel surface mines to facilitate the removal of valuable sand, gravel and stone deposits while protecting public safety and the environment and ensuring reclamation of the site. Through licenses and permits, the division establishes operating conditions, and reviews and evaluates mining and reclamation plans designed to ensure restoration of the land to a usable condition. Funds received from license and permit fees and other sources are held in the Surface Mined Land Reclamation Fund to be used for reclamation of abandoned pre-law, non-fuel surface mines.

In FY90, the division issued 261 surface mining licenses and permitted mining on 3,123 acres of land. Bonds on 25 permits were released representing 599 acres of land reclaimed in accordance with approved mining and reclamation plans.

Reclamation through the Surface Mined Land Reclamation Fund progressed for the following sites in FY90:

- Magruder-Raulin: Construction activities for the reclamation of a 145-acre site in Prince George's County, known as the Magruder-Raulin tract, are 95% complete. The site, once identified as a major contributor of sedimentation in the Indian Creek Watershed, will be treated with lime-stabilized sludge and then stabilized with vegetation by the fall of 1990.



- **Suitland Bog Addition:** The Maryland National Capital Park and Planning Commission (MNCPPC) will receive a \$92,305 grant to reclaim an abandoned 10-acre sand and gravel mine. The site, located on parkland adjacent to the Suitland Bog, Prince George's County, will be converted into a sports complex. Work will include construction of a temporary sediment basin, which will become a permanent storm-water conveyance; additional sediment control measures; trash and debris removal; and vegetative stabilization. Work will be completed in the fall of 1990.
- **Flemming Tract:** An abandoned sand and gravel mine known as the Flemming Tract will be reclaimed in the fall of 1990 with funds from EPA and MDE, under the Chesapeake Bay Implementation Grant Program. The site is located on DNR property adjacent to Bowie State College, Prince George's County. Project objectives are: installation of sediment controls to abate erosion and sediment transport off-site; improvements to roadways; regrading of unstable highwalls and slopes; vegetative stabilization of disturbed areas; enhancement of an existing pond for wildlife habitat; creation of nontidal wetlands; and removal of abandoned equipment, trash and debris. The State Highway Administration will assist in the reclamation by creating a nontidal wetland area as part of the mitigation requirements for the I-68 project. Upon completion, the site will provide an excellent opportunity for environmental studies and educational programs.
- **Merkle WMA:** This five-acre pre-law site, located on the Patuxent River, near Dunkirk, in Calvert County, is part of the Merkle Wildlife Management Area. A highwall of approximately 30 feet and an adjoining area will be graded to safe, stable slopes, and vegetatively stabilized in the fall of 1991. Unique geologic features, such as lenses of glauconite, a mineral rich in potassium, located under a layer of diatomaceous earth, will remain exposed for student study programs. The project will cost approximately \$200,000. EPA and MDE have provided \$127,000 through the Chesapeake Bay Implementation Grant.

Watershed Management Division

The Watershed Management Division administers the Flood Hazard Management Act of 1976 which mandates comprehensive planning and design of flood management projects, and provides a grant program to aid local jurisdictions in the implementation of projects for mitigating flood hazards. Technical assistance is provided on watershed modeling, flood management planning, methods of mitigating flood hazards and damage, flood warning systems, and local flood management damage assessments.

Since its initiation, the Flood Management Grant Program has been supported with a total of \$27.5 million in bond authorizations by the Maryland General Assembly. State funded technical floodplain

studies have been undertaken for 29 watersheds. Cost-shared capital projects, initiated in 13 jurisdictions, include acquisition, flood warning systems, levees and channel improvements, tidal flood gates, and detention structures. Over 450 flood-prone homes have been removed, resulting in the return of nearly 100 acres of floodplain to natural, open space.

In addition to its Grant Program responsibilities, the Watershed Management Division staff also conducts technical studies. Since 1984, seven in-house studies have been completed and four are in various stages of progress. One of these, the Upper Wicomico, is a large watershed involving interagency cooperative efforts with the City of Salisbury, Wicomico County and the USDA Soil Conservation Service. The division also led design efforts for the Patapsco River flood warning system involving Howard, Baltimore and Carroll Counties and Baltimore City.

The Watershed Management Division funded the following capital projects in FY90:

- Prince George's County - \$68,000: flood warning system, Western Branch.
- Frederick City - \$2,500,000: Carroll Creek structural flood control project.



WETLANDS AND WATERWAYS PROGRAM

Federal Consistency

The federal consistency review process is mandated by Section 307 of the Federal Coastal Zone Management Act (CZMA) of 1972, as amended. The CZMA requires that federal activities affecting the coastal zone be consistent, to the maximum extent practicable, with the state's Coastal Zone Management Program (CZMP).

The types of federal actions required to comply with the federal consistency provisions of the Coastal Zone Management Act (CZMA) include federally conducted or supported activities, including federal development projects; federal licenses and permits, including outer continental shelf exploration, development and production activities; and federal assistance to state and local governments. If the state determines that a proposed activity is inconsistent with the CZMP, the federal agency may not undertake the activity, issue the permit or license, or grant the assistance. During FY89, approximately 900 federal activities were reviewed for consistency with the state's CZMP. Approximately 80 percent consisted of US Army Corps of Engineers' permit applications pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act.

Tidal Wetlands Division

This division issues wetland permits and approvals for the regulation of private wetlands and makes written recommendations to the Board of Public Works on the issuance of wetland licenses for work in state wetlands. Activities regulated include dredging and filling, shore erosion control projects, and storm drain systems outletting into tidal waters.

The permitting and licensing procedures for these activities involve site inspections, technical evaluations, interagency coordination and public hearings. The division also provides advisory services to prospective applicants on modifications or alternatives to proposed works that would minimize adverse effects on the environment.

The division received 1,620 applications requiring state and private wetland licenses. Licenses were granted for 712 projects and authorization letters were issued for another 178 minor projects. On 363 projects, applicants were advised that no license was necessary. Forty-six applications for wetland permits were received.

About 80 percent of the applications received were for shore erosion control projects. Approximately 27 miles of shoreline were authorized to be protected. Approximately 80% of these projects allowed for less than a 10-foot encroachment channelward of the mean high water line. Maintenance projects accounted for 59% of the requests for dredging permits.

In addition to regulating construction in tidal waters, the division administers monitoring of overboard dredge material disposal projects and provides comment on matters affecting wetlands throughout the state. The Tidal Wetlands Division also continues to oversee preparation and conduct of integrated studies assessing the environmental impacts of the Hart-Miller Island containment facility.

In FY89 new legislation signed into law included:

- A revision to the Wetlands Law that will allow the department to update its 2,000 boundary maps that are used to regulate tidal wetlands. The department plans to use new aerial photography and its computerized mapping system to update changes to Maryland's wetland resources which have occurred since the maps were originally prepared in 1971. This process is expected to take two years to complete.
- The Pier Housing Law which prohibits construction of non-water dependent structures on piers in state waters except under very limited circumstances.

Nontidal Wetlands Division

The Nontidal Wetlands Division is responsible for the implementation of the 1989 Nontidal Wetlands Protection Act including:

- Reviewing DNR waterway permits to ensure compliance with wetland protection standards of the law.
- Issuing, after December 31, 1990, nontidal wetlands permits for all regulated activities and ensuring appropriate mitigation requirements.
- Purchasing, restoring and creating nontidal wetlands through the administration of the Department's nontidal wetlands compensation fund.
- Coordinating with other government agencies to streamline and expedite the permit process.
- Preparing guidance maps to help identify nontidal wetlands.
- Developing certification and training programs for wetlands delineation, assessment and mitigation.
- Developing watershed management plans that address nontidal wetland protection, creation, restoration, cumulative impacts, flood protection and water supply concerns.

Activities of the division for FY90 included:

- Conducting town meetings, legislative briefings, presentations, field trips and workshops regarding nontidal wetlands, the proposed and adopted regulations, and status of the state program to government officials, government agency employees, state residents and special interest groups.

- Conducting training workshops for WRA and enforcement personnel regarding nontidal wetlands and the regulations. Separate workshops were held for local, state, and federal agency employees regarding the *Federal Manual for Identifying and Delineating Jurisdictional Wetlands*.
- Working closely with the Corps of Engineers (COE) and the Environmental Protection Agency (EPA) regarding the development of the Maryland General Permit.
- Making changes to the draft regulations and subsequently submitting them to the Maryland Register after evaluating public comments. The final regulations were adopted on December 29, 1989.
- Review of 322 applications and plans for construction in waterways and 100-year floodplains regarding nontidal wetland issues.

Waterway Permits Division

The Waterway Permits Division reviews and issues permits for projects that impact nontidal streams and floodplains. The division also conducts site inspections and performs technical evaluations of hydrologic and hydraulic studies for proposed projects. Activities regulated include bridges, culverts, stream modifications, structures located in the floodplain, small ponds, and temporary stream crossings.

The division may also conduct informational hearings for projects to afford the public an opportunity to comment on the waterway project before making a final decision. Advisory services were provided so that measures could be incorporated into the design that would minimize the adverse impacts on the environment. Interagency coordination with other federal, state and local jurisdictions is an integral function of the division.

The division received 1,434 permit applications for FY90, an increase of approximately 18% over FY89. A total of 569 permits were issued in FY90.

ENFORCEMENT AND SERVICES PROGRAM

Enforcement Division

The division, with 15 inspectors, is responsible for ensuring compliance with WRA permits including waterway construction and small pond permits, wetlands licenses and permits, surface mining permits and water appropriation permits.

The division conducted 7,300 inspections on job sites in FY90, investigated 1,031 citizen complaints and issued 338 notices of violation. Criminal charges were filed in 46 cases involving violations of waterway construction, tidal wetlands and surface mining activities.

The Attorney General's Office developed a 100 percent success rate in prosecution of cases referred by this division. In these cases \$31,950 in fines and/or settlements have been imposed against the violators.

Major activities of the division for FY90 included training inspectors in the delineation of nontidal wetlands prior to full implementation of the Nontidal Wetlands Program.

Technical Services Division

The Technical Services Division provides various services and support to WRA and other DNR agencies. During FY90 the workload was split 51% for the Water Resources Administration, 31.4% for the Capital Programs Administration and 17.6% for Maryland Geological Survey projects.

One section of the division is the surveying and drafting team. Surveys are conducted for clarification of boundaries for permitting and enforcement of WRA permits and licenses; development of site plans for construction of parks and buildings; for as-built drawings of existing structures; plans for reclamation of surface mining sites; and collection of data for computer models used in flood studies. This unit also works closely with the well drilling crew in locating and mapping elevations and distances of monitoring wells.

The drilling section of the division is assigned responsibility for drilling test borings and constructing monitoring and observation wells. These services are requested by other WRA divisions and DNR units in connection with monitoring seepage at dams, determining the extent of ground water contamination, collecting data on soil suitability for building construction, obtaining soil samples, conducting aquifer yield tests and monitoring water table fluctuations.

All division personnel have been trained in use of water distribution leak detection equipment. The division has been called upon to perform leak detection surveys on municipal water distribution systems throughout the state.

Major FY90 activities of the division included:

- Completed monitoring of bottom profiles and soil distribution at five demonstration beach protection sites for the Capital Programs Administration, Shore Erosion Control Program.
- Took delivery of new Failing F-7 drilling rig which greatly increases the capability to drill the deeper, larger diameter wells required for aquifer monitoring.
- Completed a comprehensive survey of the Cranberry Run watershed to obtain data for a detailed computer model of the watershed.
- Installed a set of five monitoring wells at Quiet Waters Park for the Maryland Geological Survey to be used for monitoring water table fluctuations and saltwater intrusion into the aquifer.

- Performed leak detection surveys on the water distribution systems of Denton, Taneytown and Montrose.
- Continued monthly and quarterly monitoring of eight dams for the Dam Safety Division.

Community Services Division

This division provides information on all WRA programs and permits to the general public, technical professionals and local governments. Information is distributed through brochures, fact sheets, newsletters, audio-visual productions and workshops. Creation and coordination of educational projects are this Division's responsibility, also.

Community Services also coordinates the National Flood Insurance Program and administers the Community Assistance Program. Technical assistance and administrative advice is provided to local governments to help with the implementation of federal land development and construction standards.

Through the highly successful Water Conservation Program, Community Services provides technical assistance, information and guidance to local jurisdictions in the following areas: retrofitting existing homes; revising plumbing codes; obtaining a leak detection survey of distribution systems; and using and promoting Xeriscape (low water-use landscaping).

Major projects in FY90 included:

- Initiated new programs in Baltimore County, Harford County, Havre de Grace, Mount Airy, Salisbury, Westminster and Worcester County.
- Created a conservation landscaping booklet for developers in cooperation with the Anne Arundel County Department of Utilities. A second version - for homeowners - is being produced.
- Initiated a program to provide distribution leak detection services to small communities. This service has been provided to six local water utilities.
- Provided assistance to Aberdeen to develop and manage a large-scale retrofit effort which will include installation of state-of-the-art water closets (1.5 gallons/flush) in 300 low-income

homes in Aberdeen. Estimated household savings are \$300/year. Funding is being provided by Community Development Block Grant (CDBG) and the Aberdeen Conservation Program.

- Implemented a cooperative program with Baltimore Gas and Electric to provide free water conservation kits to homeowners participating in the BG&E Energy Manager Program. Plans call for distribution of 5,000 kits.
- Provided assistance to the Chesapeake Bay Trust to plan and implement distribution of 5,000 water saving aerators at Bayfest '90.
- Cooperative assistance efforts have been developed with the Maryland Center for Environmental Training and the Department of Housing and Community Development.
- Produced 14 fact sheets explaining various aspects of the Water Resources Administration's programs.
- Increased the National Flood Insurance Program grant request by 13% for federal FY91.
- Conducted 35 community assistance visits in various counties and municipalities in the state.
- Implemented the public education portion of the "Pit Boss" program, designed to teach children about the dangers of quarries and gravel pits. "Pit Boss," a cartoon character, is featured in a video, workbook, posters, stickers and signs.

Information Services Division

The Information Services Division (ISD) provides support for all areas of data processing within the Water Resources Administration. ISD maintains programs and data on three types of computers: micro, mini and mainframe.

Major activities during FY90 included:

- Began implementation of the RAMS (Regulatory Analysis and Monitoring System) computer system. This system is being installed in cooperation with the Corps of Engineers to use as a tracking system for applications, permits and their associated actions. RAMS is being installed on a network to provide a central collection point for data and to allow multiple users controlled access to the system.
- Modified and installed the budget preparation system used by Water Resources in FY89 for use by all of DNR for the FY92 budget preparation. This included providing user training and support.
- Began the systems analysis, design and coding for the centralized database system for the Bureau of Mines, located in Frostburg. The system has been designed with input from the federal Office of Surface Mining to ensure their desires and requirements were met.
- Installed numerous specialized hardware and software packages, including a computer-aided design (CADD) system for the Surface Mining Division. This specialized system will be used for preparation of surface mine reclamation plans and projects.



BUREAU OF MINES

Abandoned Mine Lands Division

This division promotes the reclamation of all abandoned coal mine areas that have been left in an inadequately reclaimed condition and continue to endanger the health or safety of the public, degrade the quality of the environment, or diminish the beneficial use of land and water resources.

The bureau administers two programs to reclaim abandoned coal mines in Maryland. The programs are similar in scope and goals, but utilize separate funding sources, expending both state and federal funds. In the state funded program, monies collected from a surcharge on coal mined in Maryland are used for reclamation of abandoned mines which cause severe environmental problems. In the federally funded program, grants are used for reclamation of the adverse impacts of past coal mining practices. Construction was conducted on nine federally funded projects costing \$1,557,572 during FY90.

Abandoned Mine Reclamation Projects Under Construction During FY 1990

Reclamation Project Description	County Project Cost
Staub Run Allegany Seal streambed to prevent water loss into underlying deep mine workings.	\$244,761
Squirrel Allegany Seal streambed to prevent Neck Run water loss into underlying deep mine workings.	\$496,890
Eckhart Coal Allegany Stabilize coal waste to Waste eliminate hazards posed by Stabilization flooding.	\$519,640
Hill Run Allegany Reclaim abandoned sur- face mine land.	\$ 71,671
Midland Allegany Barri- cade abandoned deep Drainage Tunnel mine portal to prevent access.	\$ 7,692
Koontz Coal-Garrett Reclaim abandoned sur- face Buffalo mine land.	\$ 99,876
Lostland Run Garrett Reclaim abandoned coal refuse.	\$ 73,435
Lonaconing Garrett Seal abandoned deep Mine Opening mine portal to prevent unauthorized access.	\$ 6,016
Austin Kelly Garrett Reclaim surface mine III	\$ 37,591



Coal Mine Permits Division

The division reviews applications and issues permits for surface and underground coal mining operations. Applications include legal and resource information, detailed engineering design plans, and geologic and hydrologic assessments of the permit and adjacent area. The division ensures that proposed coal mining operations are planned in a manner that prevents or mitigates potential adverse environmental impacts.

Field reviews of the proposed sites are conducted in conjunction with other interested agencies, public comments are solicited, and in-depth technical reviews are performed. Permit applicants are required to respond to deficiencies in the application and concerns about the operation prior to a decision on the application. Upon approval of an application, the applicant is required to post a reclamation bond with the state prior to permit issuance. A variety of permitting actions occur each year ranging from adding a fraction of an acre to an existing permit to permitting a new mine in a previously undisturbed area.

FY90 permitting activities included:

- Decisions on four original permit applications with issuance of three permits and one pending bond submittal.
- Decisions on three major amendments to existing permits; three amended permits were issued.
- Decisions on four minor amendments to existing permits; two amended permits were issued and two are pending bond submittal.
- Processing of five original and two major amendment applications which should reach the decision stage later in 1990.



Coal Mine Inspection and Enforcement Division

The division is responsible for the inspection and enforcement of all surface coal mining and deep coal mining permits to ensure compliance with the Maryland regulatory program.

Major activities for this division for FY90 included:

Inspectable Units	103*
Inspections	1,620
Notices of Violation Issued	37
Cessation Orders Issued	15
Civil Penalties Collected	\$ 2,030
Citizen Complaints	25
Permits Revoked	0
Permits Forfeited	0

* 87 Surface Mines; 4 Deep Mines; 12 Preparation Plants

Other Reclamation Activity

The Bureau of Mines staffed the state Land Reclamation Committee which reviewed 13 permit applications and nine abandoned mine projects, and conducted annual mining progress reviews on 59 permits. Also, the committee evaluated the revegetation on 77 sites and voted to release bond on 383 acres from a total of 405 eligible acres and to reduce bond on 454 acres from a total of 607 eligible acres.

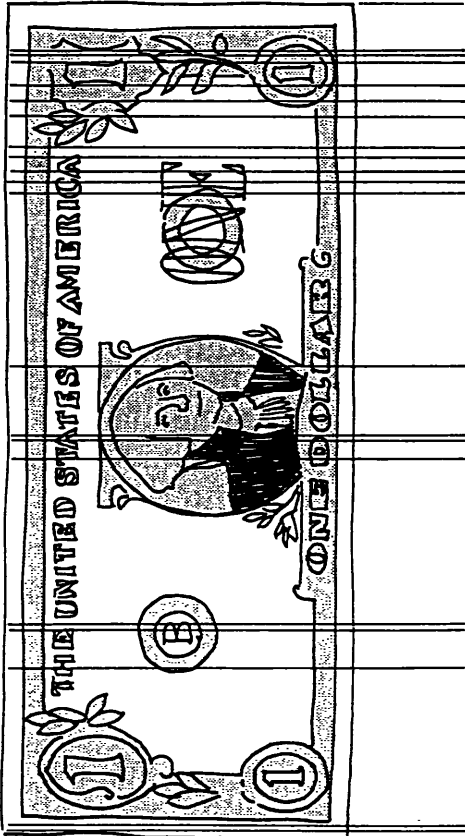
The bureau and the committee, through a joint effort, are promoting tree and shrub planting on reclaimed mined areas. During the year, 285 acres were planted; and during the last three years, 775 acres have been planted.

The bureau's revegetation crew accomplished the following projects during 1990:

- Reclamation of eight areas covering eight acres, including portions of three lawns and five AML projects.
- Repair and maintenance on 12 AML projects covering 93 acres.
- Construction of four wetlands and enhancement of six wetland systems to help abate acid mine drainage.
- A special project using the chemical treatment Pro-Mac to alleviate acid production.

STATE OF MARYLAND BUDGET 1990

TOTAL \$10,091,983,473



Public Safety and Correction...597,174,168
 General Services...48,508,186
 State Reserve Fund...107,500,000
 Financial & Revenue Administration...259,040,477
 Executive & Administrative Control...207,610,855
 Legislative and Judicial...188,010,404
 Public Debt...395,116,887
 Civil Divisions...123,217,850
NATURAL RESOURCES...182,142,358
 Housing & Community Development...118,074,852
 Economic & Employment Development...143,234,538

Transportation and Highway...2,107,575,290

Human Resources...777,657,912

Agriculture...47,004,072
 Licensing and Regulation...208,528,816

Health and Mental Hygiene...1,997,774,894

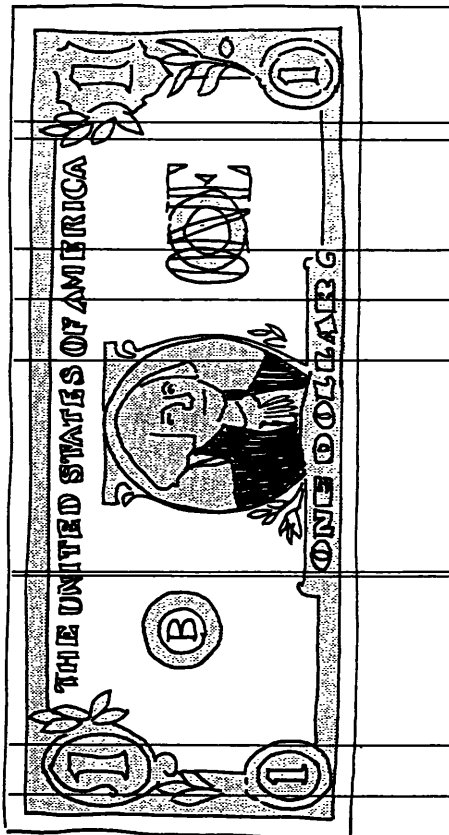
Budget and Fiscal Planning...8,599,289
 Personnel Administration...448,639,569

Education...1,986,908,005

Environment...51,937,805
 Juvenile Services...90,427,246

DEPARTMENT OF NATURAL RESOURCES BUDGET 1990

TOTAL APPROPRIATION \$182,142,358



Boating Administration...25,404,570

Maryland Geological Survey...4,129,877

Tidewater Administration...23,618,962

Office of the Secretary...11,464,279

Natural Resources Police...13,358,156

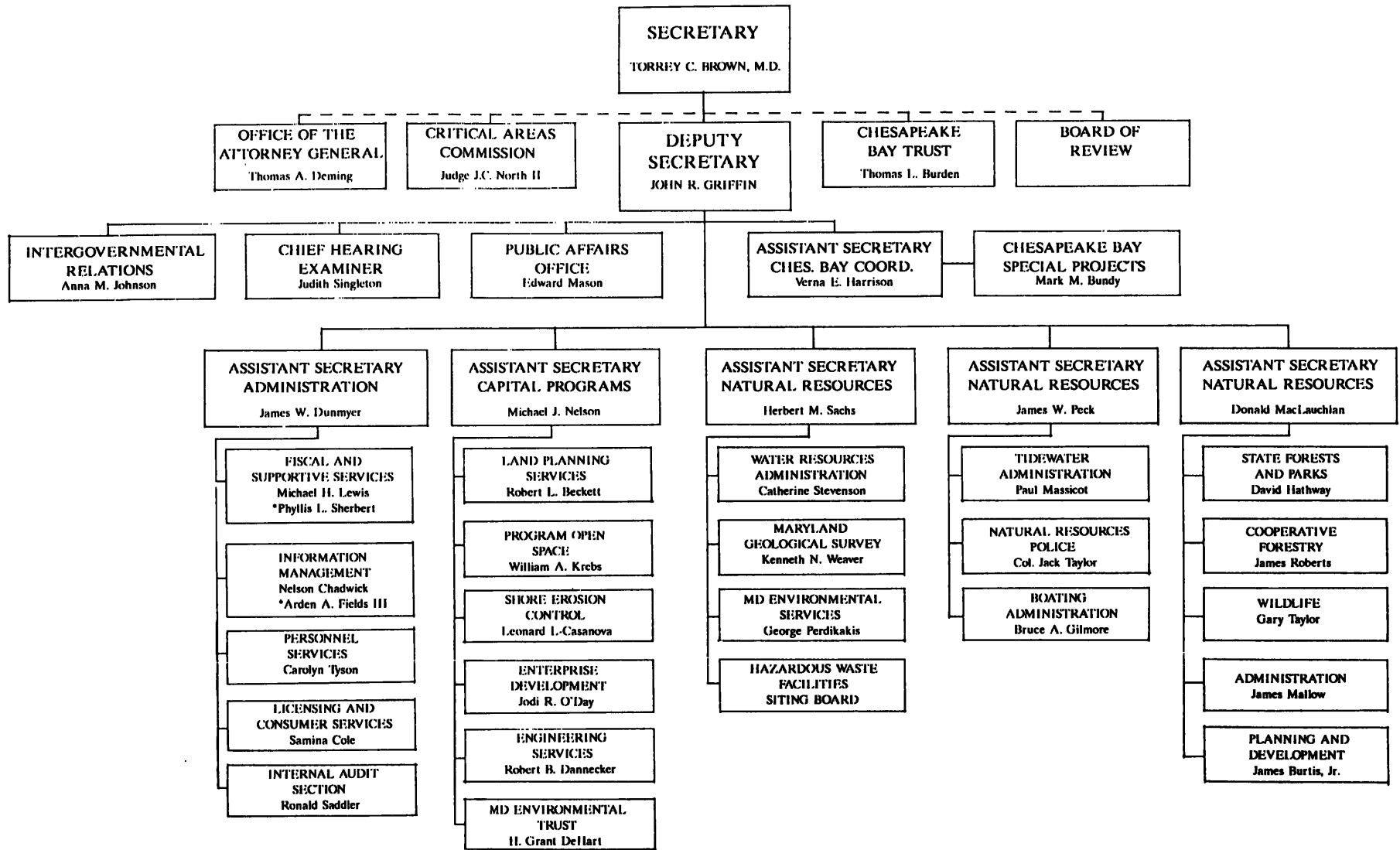
Capital Programs Administration...48,945,114

Maryland Environmental Trust...366,833

Forest, Park and Wildlife Service...37,481,296

Water Resources Administration...9,586,816

Maryland Environmental Service...7,786,455



**In a Natural Resources Emergency or for assistance,
telephone (301) 267-7740, (301) 974-3181 or 1-800-628-9944
twenty-four hours a day.**

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Annual activities report.

MARYLAND DEPARTMENT OF NATURAL RESOURCES
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Return Material Promptly



Restoring The Chesapeake