COMMONWEALTH of VIRGINIA

Office of the Governor

George Allen
Governor

Becky Norton Dunlop
Secretary of Natural Resources

March 7, 1996

Dear Member of the General Assembly:

It is my pleasure to deliver to you the accompanying report entitled, "Chesapeake Bay and its Tributaries: Results of Monitoring Programs and Status of Resources."

The report is meant to be informative and of use to members of the General Assembly. It is not technical in nature although the underlying technical data is available on request. It provides an explanation of the monitoring programs conducted by the agencies of the Natural Resources Secretariat, and the status of water quality conditions and living resources. I also have enclosed the following attachments: "The State of the Chesapeake Bay, 1995," the Local Government Directive of the Chesapeake Bay Executive Council, the current draft "Virginia's Potomac Basin Tributary Nutrient Reduction Strategy," "A Guide to the Bay Act," the January 1996 "Bay Act Status Report," a list of agency resources and staff participation in Bay-related activities, and educational material about lawn fertilization practices designed to conserve the Bay. These documents will provide you with a good understanding of the improvements to the Bay that have occurred since 1994, and about the new initiatives we have undertaken since 1994 to continue these improvements and to involve Virginians in these efforts.

The Chesapeake Bay is one of Virginia's most treasured and valuable natural resources. The empirical evidence of the monitoring programs shows the estuary, though impacted, is improving and responding to sound conservation management strategies. By summoning the myriad ideas, talents and energy of our citizens, and their community organizations, businesses and local governments, and by calling on their commitment to conservation, we can raise the recognition and understanding of the importance of Virginia's water resources, and proudly bequeath them and all their valuable benefits to the stewards of future generations.

I urge you to become personally involved in the development of tributary strategies with your local officials. Four Potomac tributary strategy assessment meetings have been scheduled from 10 a.m. to 3 p.m. in local communities as follows: March 11 at the 4-H Center in Front Royal, March 18 at Wilkerson's Restaurant in Colonial Beach, March 20 at the Ingleside Resort in Staunton, and April 4 at the Ramada Inn in Manassas. I hope you will avail yourself of these opportunities and join this effort. My office also will ensure that you are notified of future meetings or activities related to the development of the tributary strategies for each of Virginia's tributaries.

Sincerely,

Becky Norton Dunlop

Becky Norton Dunlop

Enclosures

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Listing of Virginia Agency Resources and Staff Participation in Bay-Related Activities

STATE AGENCIES CHESAPEAKE BAY-RELATED PROGRAMS/ACTIVITIES

AGENCY	FTEs	DOLLARS	STATE	FEDERAL
CBLAD	21	2,705,631	2,355,631	350,000
DACS	37	2,769,613	2,344,771	424,842
DCR	37	4,891,625	2,803,457	2,088,168
DEQ	445	80,153,000	37,306,000	42,847,000
DGIF	75	6,466,219	4,565,432	1,900,787
DOF	10	537,940	487,940	50,000
DOH	13	600,000	600,000	0
MRC	129	13,417,950	12,007,617	1,410,333
VIMS	155	12,280,000	6,080,000	6,200,000
TOTAL	922	123,821,978	68,550,848	55,271,130

STATE STAFF PARTICIPATION CHESAPEAKE BAY-RELATED COORDINATION GROUPS

AGENCY	HOURS	DOLLARS
CBLAD	2,460	63,580
DACS	407	9,017
DCR	4,576	93,323
DEQ	6,366	135,000
DGIF	1,566	14,835
DOF	200	5,200
DOH	270	10,300
MRC	3,704	123,965
VIMS	5,504	207,768
TOTAL	25,093	662,988

Chesapeake Bay Program Committees with Virginia Participation

Executive Council

Principals' Staff Committee

Implementation Committee
- Riparian Forest Buffer Policy Panel
- Budget Steering Committee
- Air Quality Coordination Group
- Tributary Strategies Public Participation Workgroup

Communications Subcommittee
- Education Workgroup
- Multi-Cultural Workgroup

Living Resources Subcommittee
- Ecologically Valuable Species Workgroup
- Ecosystem Modeling Workgroup
- Exotic Species Workgroup
- Aquatic Reef Habitat Workgroup
- Fisheries Management Plans Workgroup
- Fish Passage Workgroup
- Habitat Objectives/Restoration Workgroup
- Monitoring Workgroup
- Sav Technical Workgroup
- Fisheries Target Setting Taskforce
- Chesapeake Bay Stock Assessment Committee
- Waterfowl Workgroup
- Wetlands Workgroup
- Communications Workgroup

Modeling Subcommittee

Monitoring Subcommittee
- Data Analysis Workgroup
- Analytical Methods and Quality Assurance Workgroup
- Nontidal Tributaries Workgroup
- Data Management and Aquisition Workgroup
- Citizen Monitoring Workgroup
- Monitoring Coordination Workgroup
- Ad Hoc WG on the Refinement of the Monitoring Program

Nutrient Subcommittee
- Nutrient Management Workgroup
- Tributary Strategies Workgroup
- Point Source Workgroup
- Urban Workgroup
- Forestry Workgroup
- Agriculture Workgroup
- Research Evaluation & Management Workgroup

Land, Growth & Stewardship Subcommittee
- Conference Workgroup
- Local Innovations Publication Workgroup

Toxics Subcommittee
- Toxics of Concern Workgroup
- Directed Toxics Assessment Workgroup
- Pesticides Workgroup
- Pollution Prevention Workgroup
- Regional Focus Workgroup
- Regulatory Program Implementation Workgroup

Advisory Committees: Va Staff Monitors
- STAC - Scientific and Technical Advisory Committee
- CAC - Citizens Advisory Committee
- LGAC - Local Government Advisory Committee

Other Regional Bay/Tributary Water Quality and Resource Groups with Virginia Participation

Chesapeake Bay Commission

Potomac River Fisheries Commission

Atlantic States Marine Fisheries Commission (ASMFC)
- An interstate compact (1942) of Atlantic coastal states (Maine to Florida) which develops interjurisdictional fisheries management plans for fisheries in the 0-3 mile zone

Mid-Atlantic Fisheries Management Council (MAFMC)
- Federal organization established by the Magnuson Act (1976) which develops fishery management plans for fisheries in the 3-200 mile exclusive economic zone

New England Fisheries Management Council (NEFMC)
(Controls the harvest regulations of ocean scallop, the largest landed value fishery of Virginia! Thus our effort!)

Partners in Flight (Northeast and Southeast Sections)

Barrier Island Avian Partnership

Kiptopeake Banding Station Committee (KESTREL)

The Wildlife Society Nongame Technical Committee (Northeast and Southeast Sections)

Atlantic Flyway Council

WASHCOG Environmental Policy Committee

WASHCOG Regional Wastewater Management Subcommittee

National Estuarine Research Reserve System, Research & Monitoring Advisory Committee

MD and VA SeaGrant Research Review Committees

Virginia Bay Related Groups and Committees

General Assembly

HJR 95
Strategic Plan for Revitalization of Shellfish Industry

HJR 448
Effect of boat discharge on the waters of the Commonwealth and the feasibility of establishing no-discharge zones for boats

HJR 449
Study on organic statues and regulations that may inhibit the development and operation of shellfish Aquaculture facilities

HJR 450
A strategic plan for the revitalization of the shellfish industry in Virginia

HJR 520
Issues of Unclaimed Lands Ownership on Eastern Shore

HJR 640
Virginia Information Network

Chesapeake Bay License Plate Advisory Committee

Other Groups Within Virginia

Virginia Chesapeake Bay Interagency Staff Group
State agencies committee for Bay and tributaries related coordination.

Coastal Subcommittee (DEQ) (CRM subcommittee)
State agency Committee for Coastal Zone Management (CZM) coordination

CBLAD Grant Advisory Committee

Nonpoint Source Advisory Committee (DCR)
State agency committee for nonpoint source issues coordination.

Watershed Planning and Permitting Coordination Task Force

Stormwater Reconciliation staff group

All 6217 staff groups

Virginia Riparian Forest Task Force (DOF)
State agency committee for riparian forest buffer policy coordination.

Fairfax Relief (DOF)

Natural Resources Conservation Service Technical Team

Riparian Restoration Training Project Committee

Silvicultural Water Quality Task Force

Clean Vessel Act Coordination Committee (DOH)
State agency and citizen committee for marine sanitation issues coordination.

Marine Regulations Advisory Committee (DOH)
State agency and citizen committee for review of marine sanitation regulations.

Coastal PDC Environmental Committee

Virginia Coastal Area Committee for Spill Response, USCG

James River Restoration Strategy Group

Colonial Historical National Park Restoration

Hampton Roads Chesapeake Bay Committee

Elizabeth River Project
Citizen, industry and government partnership for restoration of the Elizabeth River.

Norfolk Naval Shipyard Restoration Advisory Board

Yorktown Naval Weapons Station Advisory Board

Fort Eustis Technical Review; Base Restoration

Northampton Sustainable Development Task Force

Interagency Coordination Meeting (DOT)

Interagency Environmental Coordinating Committee (DOT)

Valley Conservation Council

VIMS/VMRC Fisheries Coordination Group
A joint staff meeting which is held monthly to review and discuss fisheries management options and issues

Habitat Management Advisory Committee (MRC)
Citizen advisory committee appointed by Commissioner for Habitat Management related matters

Fisheries Management Advisory Committee (MRC)
Provides recommendations and advice on fisheries issues to the Commission; assists in the development of fishery management plans.

Finfish Subcommittee (MRC)
Provides recommendation on finfish-related issues to the FMAC and Commission

Clam Subcommittee (MRC)
Reviews clam issues and clam fishery status and recommends management actions to the FMAC and Commission

Blue Crab Subcommittee (MRC)

Reviews blue crab fishery and management issues and provides advice on management actions to the FMAC and Commission

Recreational Fishing Advisory Board (MRC)

Advises the Commission in the expenditures of monies in the Saltwater Recreational Fishing Development Fund on projects which enhance and conserve finfish species taken by recreational anglers.

Commercial Fishing Advisory Board (MRC)

Advises the Commission on project Expenditures primarily intended to improve marine fisheries. Expenditures are from the Marine Improvement Fund which consists of fees collected from the registration of commercial fishermen.

Finfish and Shellfish Committees (MRC)

Provides advice on fisheries related issues to the Potomac River Fisheries Commission; assists in the fishery management plan development process; Virginia Seafood Council Reviews seafood industry issues and improvement

Marine Products Board

Mainly, plans and conducts marketing, educational and promotional campaigns and programs for Virginia seafood products

Watermens Associations

Regional collectives of working watermen which addresses fishing industry issues

Coastal Conservation Association

Regional collectives of primarily recreational fishermen or industry members which addresses fishing industry issues

Virginia Charterboat Association

Organization consisting primarily of charterboat and head boat captains which reviews mainly recreational fishing issues, problems, improvements, and opportunities

Aquaculture Advisory Board (DACS)

Chesapeake Bay and its Tributaries:

Results of Monitoring Programs and Status of Resources

1996 Biennial Report of
The Secretary of Natural Resource
to The
Virginia General Assembly

INTRODUCTION

Pursuant to Virginia Code (Ref. 1), I am pleased to provide information to the General Assembly on the status of the monitoring program and the status of resources of the Chesapeake Bay and its tributaries.

The most exciting and promising aspect of the resources of the Chesapeake Bay and its tributaries involves people. People, through their local governments and other citizen groups, are now included in developing the strategies and decisions that will improve the quality and condition of the Bay and its tributaries. Without this local government and citizen involvement, strategies would be mandates from the state and federal governments. With their involvement, strategies will have greater opportunity for success as they reflect expertise, wisdom and perspective brought to the process by Virginians in each affected community.

Prior to 1994, commitments were made by Virginia state government officials to achieve certain goals regarding the Bay and its tributaries, but the very citizens most directly affected by these commitments – and who pay the bills for implementing strategies to achieve these commitments – were left out of the decision-making process. Consequently, locally elected officials were often times surprised and shocked to learn in 1994 and 1995 about the tributary strategies mandated by the Chesapeake Bay Executive Council and Virginia state government and the state's commitment to reduce nutrients by 40 percent by the year 2000.

The Allen Administration's commitment to work toward these goals is underpinned by a commitment to work with locally elected officials and their staffs to develop the strategies. This emphasis was complemented and highlighted by the Chesapeake Bay Executive Council's initiation and approval of the Local Government Directive (enclosed), signed during Governor Allen's term as Chairman of the Council. Localities now must be included in all future goal setting and implementation strategies related to the resources of the Chesapeake Bay.

Such increased involvement by the citizens of the Commonwealth may effect the timetable for development of specific strategies, but it increases the likelihood that these locally developed strategies will be implemented successfully.

Numerous meetings with Potomac River watershed communities were held in the past 12 months as the Potomac strategy was developed. Regional team meetings will be held in March and April of 1996 to further this process as we strive for a final strategy to be agreed upon in the fall.

Teams for the Rappahannock and the York Rivers have been appointed and they will begin meeting with the local communities on these rivers soon. Modeling to ascertain the proper goals for these rivers is underway also.

Information about activities currently in place on the James River and other tributaries is solicited in anticipation of team work beginning later this year.

Virginia has worked with its partners in Maryland, Pennsylvania, the District of Columbia and the federal Environmental Protection Agency to benefit from lessons they learned as they developed their plans and programs. Both Maryland and Pennsylvania have stated that they are unlikely to achieve the stated goal of a 40 percent reduction in nutrients by the year 2000 but that they, like Virginia, intend to continue to work toward this goal.

This office reported in late 1995 to the Chesapeake Bay Partnership Council on the breadth and depth of state resources invested in Chesapeake Bay activities. Enclosed is the listing of committees and interagency meetings which have commanded a considerable amount of resources in past years. Such meetings have been required to coordinate the considerable number of state, interstate, federal and local agencies and state personnel that engage in Bay related activities.

Results of the Commonwealth's monitoring programs and the status of the living resources in the Bay and its tributaries were published in the accompanying document entitled "The State of the Chesapeake Bay, 1995". Recent findings and studies from the Natural Resource agencies have been included in this report to assure you the benefit of the most up-to-date information.

PROGRAMS MONITORING BAY RESOURCES

Several agencies in the Natural Resources Secretariat conduct monitoring of the Chesapeake Bay, its tributaries and its living resources. A summary of these programs follows:

- The Department of Environmental Quality (DEQ) participates as a key member in the Federal-Interstate Chesapeake Bay Monitoring Program, a nationally recognized example of coordinated environmental monitoring of a multi-state body of water. This monitoring program is an important component of the scientific basis to demonstrate that the many millions of dollars being spent on Bay restoration efforts are having a positive impact.

  One component of this monitoring focuses on water quality. This component monitors key abiotic qualities of the water such as nutrient concentrations, water clarity, salinity levels, dissolved oxygen concentrations and pH. The DEQ monitors these parameters monthly at 65

locations throughout the Bay mainstem and tidal tributaries (i.e. tidal portions of the James, Rappahannock, York, and Elizabeth Rivers).

A second component of the DEQ Bay monitoring program focuses on the status of ecologically important non-commercial biological communities. The DEQ monitors these communities at a sub-set of the water quality stations so that analysts can study and understand the linkages between water quality and biological communities. Benthic communities (i.e. bottom dwelling invertebrate organisms) are monitored quarterly at 21 stations. Planktonic communities (i.e. small plants and animals in the water) are monitored monthly at 14 stations.

The third component of the DEQ Bay monitoring is the "River Input" component. This component measures the amounts of nutrients and sediments entering the Bay from it's watershed. Intensive water quality sampling for this program is done at one site each in the James, Rappahannock, Mattaponi, Pamunkey, and Appomattox Rivers. This monitoring component will be of major importance in determining the Commonwealth's progress toward the goal of 40% reduction of nutrient inputs to the Chesapeake by the year 2000.

- The Virginia Marine Resources Commission (VMRC) conducts two programs involved in the collection of fisheries information in the Bay. The Commercial Fisheries Harvest Reporting program assembles data on commercially valuable species harvested from Virginia waters and nearby oceanic waters. Harvest or landings of over 50 species taken by dozens of fishing methods are analyzed on a monthly basis. These data are used to develop conservation and management strategies and to determine the benefits and impacts of proposed measures.

  VMRC's Stock Assessment Program collects information concerning the biological attributes of various fish populations. These data are, in turn, used in population models to assess the health of the resource and the impacts of various levels of fishing.

  Effective fisheries management is currently dependent upon reliable and timely measures of the levels of harvest and the ability to detect significant changes in the fish populations. VMRC's Harvest Reporting Program and Stock Assessment Program provide these services. The Harvest Reporting Program, which replaced a voluntary program, has served as a model for the development of similar programs in other Atlantic coastal states. Information from the program is used as a basis for fishery management decisions at the state, inter-state, and federal levels. The quality of the data ensure that decisions affecting Virginia's fishermen will be based upon good science.

- The Department of Game and Inland Fisheries (DGIF) performs in-depth game and non-game surveys throughout the Bay watershed. Since the 1950's, the DGIF has implemented waterfowl management and research programs on public and private lands and waters and has conducted both Warmwater Stream and Coldwater Stream Management Projects within the basin. The Warmwater Streams Project is an effort to survey existing aquatic resources, enhance game fish populations, improve recreational access and opportunities, and protect critical habitat.

Division biologists conduct detailed surveys of the Bay's tidal and freshwater resources and assist in drafting fisheries management and species restoration targets documents. The Coldwater Streams Project will continue to manage Virginia's coldwater stream habitats, many of which are in the Chesapeake Bay watershed, through research, habitat development and surveys, and recreational fisheries management.

- The Chesapeake Bay Local Assistance Department (CBLAD) manages a water quality monitoring program in Polecat Creek, a tributary of the Mattaponi River. This program was designed to determine the efficacy of land use regulations developed in response to the Chesapeake Bay Preservation Act. CBLAD monitors physical, chemical (dissolved oxygen, nutrients, sediment and bacteria), and biological communities, as well as changes in land use patterns. It has provided useful information.

  CBLAD also funds monitoring projects for local governments in the Coastal Zone. In 1995, CBLAD funded one such project for Chesterfield County. The objective of this Best Management Practice (BMP) Monitoring Project is to determine the pollutant removal efficiency of a representative BMP facility (detention basin and wet retention basin) within the County. The County monitors total phosphorus, total nitrogen, and total suspended solids in this project. This type of facility holds great promise for those citizens who seek creative solutions.

- The Department of Conservation and Recreation (DCR) conducts water quality monitoring on two predominately agricultural watersheds to study the effectiveness of agricultural Best Management Practices (BMPs) Comprehensive surface, groundwater, land use and climate monitoring has continued at Nomini Creek (Westmoreland County) and Owl Run (Fauquier County) for over 10 years beginning in 1985 in both pre and post BMP phases in order to best address the needs of the tributary strategies for the Chesapeake Bay. The DCR also inventories rare and endangered species of plants and animals of the Bay and its watershed.

STATUS OF WATER QUALITY CONDITIONS

The Chesapeake Bay Agreement states that the improvement and maintenance of water quality is the single most critical element in the overall restoration and protection of the Chesapeake Bay. Water is the medium in which all living resources of the Bay live, and their ability to survive and flourish is directly dependent on it. The following subheadings summarize several key water quality issues, including excessive levels of nutrients and their impact on water quality, strategies to reduce the input of excess nutrients, and impacts from toxic chemicals in regions with existing or potential problems.

Nutrients

Excessive nutrients (phosphorus and nitrogen) remain the primary water quality problem affecting the living resources of the Bay. High nutrient levels lead to algal blooms and low levels of

dissolved oxygen, which have severe negative impacts on the Bay's ecology. The Bay mainstem in Virginia has lower nutrient concentrations in comparison to the northerly portions in Maryland due in part to the proximity of inputs of oceanic water. The Bay tributaries in Virginia show a mix of nutrient levels and sources. Nutrient levels in the James are quite high due largely to inputs from municipal and industrial point sources. The Rappahannock also has elevated nutrient levels though largely due to non-point source inputs. The York has somewhat lower nutrient levels than either the James or Rappahannock, and inputs are more equally balanced between both point and non-point sources. The Potomac also has quite high nutrient levels which result from inputs from both point and non-point sources.

Trends for nutrient levels are favorable in some areas. Phosphorus levels are decreasing throughout the Bay proper. The James River shows decreasing levels of nitrogen and phosphorus at several monitoring sites. The Rappahannock River is also showing encouraging reductions in nitrogen levels. Despite these favorable trends, nutrient levels in many other areas continue to increase, and the levels throughout the Bay and tributaries still need to be further reduced.

Dissolved Oxygen

Levels of dissolved oxygen in the water are of importance to all living organisms in the Bay and are greatly influenced by the Bay's nutrient enrichment. Nutrient enrichment stimulates the excessive growth of plants (e.g. algae) and the subsequent decay of this algae depletes the oxygen. Because of the intermixing of oceanic waters, the Bay mainstem has much better oxygen conditions than the Northern portion of the Bay. The James River is also benefited by its proximity to the ocean and shows better oxygen conditions than would be expected in a river with its level of nutrient enrichment. The worst regions of oxygen depletion are at the mouth of the Rappahannock and portions of the mid-York River. Oxygen conditions seem to be worsening throughout the tidal area of the Rappahannock, but no trends have been observed in other areas of Virginia's Bay and Tributaries.

Tributary Strategies

Reduction of nutrients through Virginia's tributary strategy program is a high priority. The Commonwealth is committed to achieving substantial nutrient reductions from the drainage basins of the Potomac River and other Bay tributaries. Much progress has been achieved in reducing phosphorus loadings as a result of the phosphate detergent ban, various state programs, and actions taken by citizens and local governments throughout the watershed. The effectiveness of the nutrient reduction efforts is monitored and tracked by state agencies and the Chesapeake Bay Program.

Virginia's tributary initiative currently focuses on the Potomac. This effort involves citizens, local governments, and interest groups across the Potomac basin in pursuing nutrient reduction activities that are cost effective, practical, and equitable. At the same time, water quality monitoring and modeling are used to help determine appropriate nutrient reduction goals for Virginia's more

southerly tributaries, which have been shown to have a much smaller impact on the Bay's nutrient problems. Tributary teams for the Rappahannock and York Rivers begin meeting with local officials in March.

This past year efforts were expanded to involve locally elected officials in the Potomac Strategy process. Public meetings were held across the basin as well as technical workshops on biological nutrient removal, nutrient trading and other issues related to the Strategy.

Furthermore, in November 1995, Governor Allen and the other members of the Chesapeake Bay Program's Executive Council signed a Local Government Partnership Initiative Directive to achieve greater hands-on involvement by local government officials in all aspects of the Chesapeake Bay program. Water quality improvements occur at the local level, and this action to involve those elected officials who are closest to the people will offer greater opportunities for improvements than will centrally imposed regulations.

Virginia's agricultural community made significant contributions to nutrient reduction by adopting good stewardship practices to reduce nonpoint source pollution. The preliminary findings of a recent survey by Virginia Tech of 5,850 farmers in Virginia's portion of the Chesapeake Bay drainage basin suggest that a large number of agricultural producers have implemented farming Best Management Practices (BMPs) voluntarily, often without cost share. The results indicate that the number of BMPs being implemented without cost-share assistance may exceed those implemented through cost-share funding by a ratio of 2 to 1. This speaks very well of Virginia's farmers' commitment to sustainable agriculture and improving water quality.

Virginia's four major poultry processing corporations in the valley voluntarily committed to incorporating nutrient management planning into the operations of their producers. To assist with this commitment, the DCR will provide increased technical assistance and personnel to write the nutrient management plans. In recognition of its effort, Governor Allen presented a "Friend of the Bay" award to the Virginia Poultry Federation at the 1995 Chesapeake Executive Council meeting.

Commonwealth agencies are promoting sound fertilization practices to non-farmers by distributing educational materials (enclosed) for homeowners through twelve major retailers (Alliance Fertilizer Corporation; Culpeper Farmers Cooperative, Inc; County Farm Service, Inc; Hydro/Kirby, Inc; Mays Farm Service; Rockingham Cooperative; Pohligs Toro; Southern States Cooperative, Inc; Winchester Cooperative; Southern States Williamsburg Service; Venable Seed Company; Pro Seed and Turf Supply, Inc). The DCR is also finalizing voluntary regulations to govern a nutrient management training and certification program to increase the number of persons providing nutrient management technical assistance to farmers and other landowners.

The Virginia Forest Riparian Task Force was formed by the Secretary of Natural Resources in December of 1994 to lead Virginia's efforts to educate the public about and promote the benefits of riparian buffers, particularly forest buffers. The Virginia Task Force is made up of agencies that

can contribute to this effort. The purpose of this group is to recommend program and policy actions Virginia can promote to encourage forested riparian areas. Governor Allen has stated his commitment for this effort in his remarks at the recent November 30, 1995 Chesapeake Bay Executive Council meeting.

The Task Force held four meetings. Both the Chesapeake Bay and Virginia groups recognize that riparian forest buffers provide the most benefits to water quality and wildlife habitats. However, forests may not be feasible in every location, so buffer restoration efforts need to be flexible. The Virginia group has stressed a practical approach geared to local government and landowner involvement. Continued discussion will occur through 1996 with a final report in December 1996.

Toxics

The 1994 Basinwide Toxics Reduction and Prevention Strategy summarized current conditions of toxic contamination in the Chesapeake Bay: *"In some locations, toxics problems exist in the Chesapeake Bay. The nature, extent, and severity of toxic impacts vary widely throughout the Bay: a few well-known areas have serious, localized problems; and some other regions that were previously thought to be uncontaminated have shown some toxic effects. No evidence was found of severe, systemwide responses to chemical contaminants similar in magnitude to the observed effects throughout the Bay due to excessive levels of nutrients, such as declines in underwater grasses and widespread low dissolved oxygen conditions. Existing programs are reducing inputs of chemical contaminants to the Chesapeake Bay. Concentrations of some chemical contaminants in fish, shellfish, wildlife and their habitats are on the decline although elevated levels are observed in several urbanized regions. Widespread areas have low levels of chemical contaminants below thresholds associated with adverse effects on the Bay's living resources, but elevated above natural background levels. The long term effects from these low levels remain unclear. Much remains to be done to address the known and potential problems identified by the reevaluation."*

Virginia is committed to implementing the four components of the above Toxics Strategy: 1) improvements in Regions of Concern, for which Virginia will complete a regional action plan for the reduction of toxics in the Elizabeth River; 2) research on the above-described low level toxics, including their extent, sources and living resource implications; 3) reduction of chemical loadings and releases via existing state and federal statutes; and 4) reduction of chemicals at their source via voluntary pollution prevention by all sectors.

In October 1995, DEQ held a pollution prevention roundtable meeting for industry and attracted strong participation, a key step in the basinwide process of developing a Chesapeake Bay Pollution Prevention Program.

The Chesapeake Executive Council designated the Elizabeth River as a Region of Concern due to a consistently observed pattern of aquatic contamination and biological impacts. At the community level a nonprofit citizen group called the Elizabeth River Project (ERP) arose to

restore the river's environmental health to the greatest extent practical. ERP, whose members include a substantial cross-section of citizens, business and industry leaders, environmentalists and scientists, completed a consensus-based risk ranking in 1994 and by early 1995 had initiated development of a risk management strategy. In March 1995 the Secretary of Natural Resources signed the following Statement of Purpose with ERP:

ERP will:

Assemble a Toxics Reduction Team (TRT), which will utilize technical assessments by the DEQ and its own work to provide to DEQ recommendations on:

- Goals, objectives, milestones for reducing toxics impacts in the Elizabeth River.
- Recommended action items, with estimates of costs, benefits, responsible parties and funding mechanisms.

DEQ will:

- Retain primary responsibility for plan development and submission to the EC.
- Develop and provide comprehensive and objective technical assessments of:
  * Geographical distribution of chemical contamination and potential effects.
  * Identification by category of probable sources of these chemical contaminants.
  * Complete range of possible control options, with some cost-benefit data.
- Consider recommendations by the TRT [together with those of the full Watershed Action Team] and other public input in developing plan.

Throughout 1995, DEQ utilized its EPA Bay Program grant to provide to ERP direct funding, facilitation services, and technical assessments. After evaluating management options for effectiveness, affordability and acceptability to the community, ERP will present its final report at a public conference in the spring of 1996. By the summer of 1996, DEQ will have completed a draft Elizabeth River Regional Action Plan for Toxics Reduction which will be presented for public comment. Each recommended action will include: relationship to identified problems with goals, objectives and milestones; estimated costs and financing mechanisms to be used; time and other resources required; responsible parties; an aggressive, realistic schedule for completion; and progress-tracking mechanisms. Plan implementation will begin in 1996.

STATUS OF LIVING RESOURCES

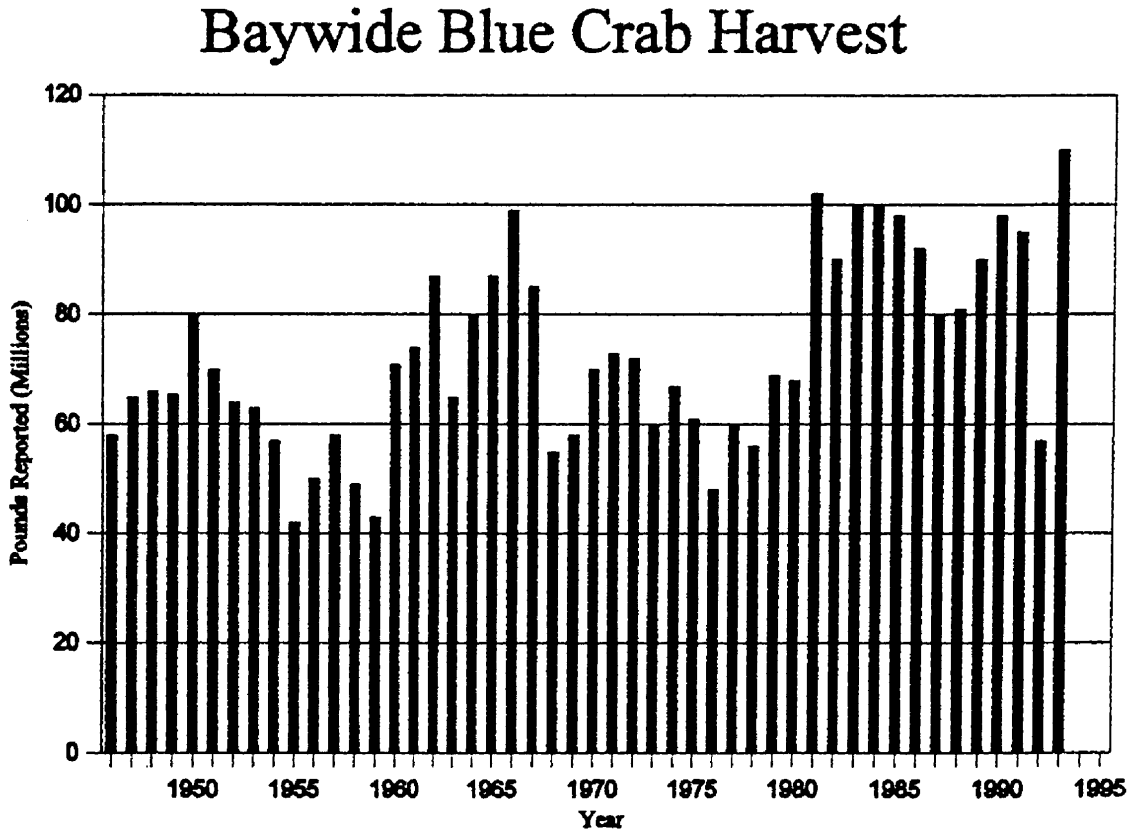
The Chesapeake Bay Agreement states that the productivity, diversity and abundance of living resources are the best ultimate measures of the Chesapeake Bay's condition. These living resources are the main focus of the restoration and protection efforts. The following subheadings summarize the most recent information on the status of Virginia shellfish, finfish, and other living resources, along with a review of the management actions underway to restore and conserve them.

Blue Crab

Over the last three years, the Chesapeake Bay blue crab population has been in a low phase of population abundance following very high levels throughout the 1980's. However, biologists note the blue crab has demonstrated a remarkable ability to rebound from declines; a single female is capable of bearing millions of fertilized eggs. Similar periods of low abundance occurred in the late 1950's and again in the 1970's, with peak abundance occurring in the mid 1960's and throughout the 1980's (Figure 1).

Historical information suggests a long-term shift in blue crab population abundance caused by Tropical Storm Agnes in 1972. Studies by the Virginia Institute of Marine Science suggest the storm caused a dramatic loss of seagrass habitat and food for the blue crab within Chesapeake Bay. With the expansion of seagrasses since 1972, similar increases have occurred in juvenile blue crabs, but not adult crabs.

Figure 1) Long term blue crab Harvest (approximated).



In response to these conditions, the Virginia Marine Resources Commission implemented a seven-point plan in October, 1994. The plan, described below, was designed to limit harvest and fishing effort to manageable levels and to reverse the recent declines in population abundance.

7-Point Crab Management Plan

1) Expanded the 98,000 acre blue crab spawning sanctuary by an additional 48,000 acres, providing protection for spawning female crabs during the summer spawning season in lower Chesapeake Bay. The spawning sanctuary is closed from June 1 - September 15.
2) Established a new winter crab sanctuary of 14,500 acres in Hampton Roads to protect overwintering crabs from the winter dredge fishery. Over 1.1 million pounds of crabs are protected by this sanctuary.
3) Limited crab dredges to a width of 8 feet preventing further expansion of the gear used in this fishery.
4) Required two escape rings in each crab pot. The escape rings allow 6 percent of all legal male crabs and 17 percent of all legal female crabs to escape from crab pots.
5) Required four escape rings in each peeler trap allowing escapement of peeler crabs less than 3 inches.
6) Established a crab pot season from April 1 through November 30 reducing annual harvest be up to 425,000 pounds.
7) Limited peeler crab traps to 400 per fishermen.

On Jan. 23, 1996, the Virginia Marine Resources Commission adopted four additional conservation measures that will take effect this spring. These measures establish a 3 1/2-inch minimum size limit for soft crabs, a prohibition on the possession of late stage sponge crabs (egg bearing females), stricter limits on the sale of crab pot licenses, and tighter restrictions on the number of crab pots that may be set by each fishermen. The Commission also agreed to undertake the establishment of measures to limit entry into the crab fishery for 1997 and beyond.

In part, the Commission based its most recent actions on a Chesapeake Bay blue crab stock assessment performed by the National Oceanic and Atmospheric Administration. This study of 40 years of Bay blue crab data found no evidence whatsoever of overfishing of the blue crab. Natural cycles determine the blue crab's abundance, it concluded, and the population is currently in a low phase but not in danger of collapse.

Striped Bass

Striped bass continue their remarkable recovery to historically high levels and now support healthy commercial and recreational fisheries. Since the fishing moratorium of 1989-90, the commercial quotas have increased from 211,000 pounds (1990-94) to 876,940 pounds in 1995. Continued growth and improvement of the stock will allow a quota of 1,384,000 pounds in 1996.

The limited entry fishery supports 492 commercial fishermen each assigned a share of the commercial quota. The quota-based tag system assigns each fisherman a predetermined number of tags based upon his share of the quota. Then, prior to marketing, each fish must be tagged to identify it as a legal and saleable product. The limited entry and tagging system have had many positive impacts on the commercial fishery. The annual quota protects the spawning stock while the limited entry system provides the benefits of harvest to those with a history in the fishery. The commercial harvest season, once lasting just two days, now occurs over 11-1/2 months, preventing market gluts, improving dockside prices paid to watermen, and reducing the volume of striped bass taken as by-catch in other fisheries.

Recreational fishermen enjoy a 107-day striped bass fishing season with an additional two-week spring trophy season and a 10-1/2 month ocean fishing season. Recreational harvests more than quadrupled since the 32 day season of 1990, with anglers taking over 870,000 pounds of rockfish in 1994. Weekend sales of fishing tackle and boat ramp usage during the fall rockfish season now rival sales and usage during most summer weekends.

Migratory Fish

Spring runs of American shad, hickory shad, blueback herring, and alewife in the Bay are currently depressed. The Commonwealth is undertaking efforts to restore these fish populations through the American shad restoration and fish passage programs.

A major component of restoring migratory fish populations to historic levels includes providing passageways allowing fish to reach their historic spawning grounds. The Virginia Department of Game and Inland Fisheries' Fish Passage Program identifies blockages to fish migration and facilitates the design and construction of fishways. Sources of funding to date for these activities have included the Virginia Fish Passage Grant and Revolving Loan Fund, from both recreational saltwater and freshwater fishing license funds, private donations, and from Chesapeake Bay Program Habitat Restoration Funds distributed to the Bay States by the Fish Passage Workgroup. There are currently seven completed fish passage facilities on Chesapeake Bay tributaries in Virginia (Table 1).

The opening of the lower four dams on the James River in Richmond has successfully permitted the passage of American shad, striped bass, and river herring up to the base of Bosher Dam.

The fish ladder installed on Walkers Dam in the Chickahominy River has been successful in passing river herring and striped bass.

No herring have been documented using the fish passage facility on Harrison Lake Dam yet. DGIF and the U.S. Fish and Wildlife Service initiated a trap and transport program for river herring in 1994. Pre-spawn adult herring captured from the Chickahominy River and stocked into Harrison Lake were later observed spawning in the lake. The resulting juveniles were captured downstream

of the dam in 1994. Hopefully, these fish will be imprinted on Herring Creek and will return to the creek starting in 1998 and utilize the ladder.

Table 1) Fish passage facilities on Chesapeake Bay tributaries in Virginia.

Date Passed	Dam Name	River	Type	Approx. Cost
1970's or 80's	Hollywood/ Belle Island	James	Breach (natural)	$0
1989	Manchester	James	Breach	$89,500
1989	Browns Island	James	Breach	$89,500
1989	Harrison Lake	Herring Creek	Denil	$90,000
1989	Walkers	Chickahominy	Denil	$45,504
1993	Williams Island	James	Notch	$125,000
1995	Chandlers Mill	Cat Point Creek	Denil	$75,000

The fish passage facility on Chandlers Millpond Dam was completed in the spring of 1995. This spring, fisheries staff will monitor the fish passage facility and the creek for herring and develop a fish passage management plan for the creek.

Construction of a fishway at Boshers Dam in Richmond will open up about 140 miles of historical James River spawning habitat for migratory fish. The City of Richmond has the lead on this project.

In 1994 and 1995, the Virginia Department of Game and Inland Fisheries, in conjunction with various federal and state agencies and Virginia's inland commercial watermen, coordinated efforts to restore American Shad stocks in the James River and, to a lesser extent, the York River watersheds. This project was funded by Virginia Fish Passage Grant and Revolving Loan Fund money and the Marine Fishing Improvement Funds of VMRC in 1994. VMRC appropriated $100,000 in 1995. In 1994, 1.56 million fry were released in the James River and over 500,000 fry were released into the Pamunkey River. American shad releases in 1995 increased to 5 million in the James River and 2.4 million in the Pamunkey River. In 1996, this project will operate on funds generated from the sale of commercial and recreational fishing licenses. VMRC's license boards appropriated $186,540 for restoration activities. The 1996 goals call for the production and release of 7 million fry in total. Current American shad stocking efforts are hopefully producing shad that will be imprinted on the upper reaches of the James River. These fish are expected to readily use

the fish passage facilities upon their return from the ocean to reach the historical spawning grounds where they were released. Once restored, the American shad fishery will again be a valuable component of Virginia's fishing-related economy and will provide a valuable resource for anglers.

Oysters

Populations of oysters, which provide great economic and ecological benefits to the Bay region, are very low. Reasons for the decline have been related to historic overfishing, habitat degradation, poor water quality, and more recently, oyster diseases. New management actions were initiated, including habitat restoration, harvest restrictions, research in development of disease resistant oysters and the development of oyster aquaculture since 1992. The six oyster reef restoration projects produced some benefits, including increases in oyster population levels and increases in reproductive success in association with the reefs. VMRC has worked with private industry to build an additional reef (AMOCO) and to investigate new oyster clutch materials (Virginia Power). In addition, two artificial reefs were constructed through the efforts of a citizen conservation organization, the Rappahannock Preservation Society, and set aside as oyster sanctuaries and for research. In collaboration with the Virginia Institute of Marine Science (VIMS), stock assessment methods were improved and oyster aquaculture was introduced and encouraged for traditional oyster fishermen. An increase in the oyster harvest in the 1994-95 oyster season resulted from oyster replenishment efforts and careful management of harvesting activity. However, weather conditions during the summer of 1995, including an unusual surge of fresh water from the upper James River to the tidal portion of the James in late June and drought conditions from July through September, stymied some of the positive benefits that resulted from these initiatives.

Current regulations of the VMRC limit the harvest of oysters to areas within the James River and along the seaside of the Eastern Shore. All other areas of the Chesapeake Bay and it's tributaries are closed to the harvest of oysters. Those areas remaining open to harvest are managed by time limits, gear restrictions, and quotas which limit the overall harvest to safe levels.

Most recently, the VMRC endorsed a VIMS plan to test the introduction of non-native oyster species in Virginia. In recent years, the scientific community has convincingly demonstrated the significant role a flourishing oyster resource once played in maintaining water quality in the Chesapeake Bay. These great populations of oysters, in addition to supporting large fisheries, were capable of filtering the waters of the Bay in a few days. Their value to the Chesapeake Bay and Virginia simply can not be overstated. The research plan, now approved, includes field tests of the resistance of non-native oysters to the oyster disease MSX, which has decimated native stocks. The identification of a viable alternative oyster species may solve the oyster crisis that has plagued the Commonwealth for decades.

Waterfowl

Virginia is enjoying the rebound of many Atlantic Flyway duck populations, allowing the state to expand the duck season to fifty days and to liberalize bag limits. On the other hand, the migratory

Canada goose population has shown a precipitous decline largely due to over-harvest and poor reproductive success. However, biologists are confident that the implementation of sound management techniques, such as the current season closure, will restore populations as they were restored in the Mississippi Flyway in recent years. The resident goose population continues to increase rapidly in Virginia, leading to expanded hunting opportunities required to manage the species.

The Virginia Department of Game and Inland Fisheries Wildlife Division has several on-going programs that emphasize the enhancement and restoration of the Bay watershed's habitat and waterfowl. These efforts include the Wetland Technical Assistance Program and the Waterfowl Management Program. The voluntary Wetland Technical Assistance Program targets farm landowners with prior converted wetlands, sportsman's clubs, and a few corporate landowners, and offers them technical expertise to restore wetland areas for waterfowl and other wildlife. The wetland restoration practices also assist in nutrient and soil retention improvements. Virginia currently ranks number two on the Atlantic coast in wetland areas restored. The Waterfowl Management Program offers technical assistance to landowners wanting to improve waterfowl habitat on their property. These improvements may involve habitat creation or enhancement, or the installation of wood duck nest boxes or goose nesting platforms.

Seagrasses

Underwater grasses, known as Submerged Aquatic Vegetation (SAV), are recognized as a key biological indicator of the Bay's health. Populations of SAV have been intensively monitored since 1978. They have increased throughout the Bay by 72% since 1984 but are still well below levels known to have been present as recently as the early 1960's. Their complete recovery continues to be inhibited by poor water quality conditions in many areas.

In Virginia, much of the mainstem of the Bay has shown moderate increases in SAV but the tributaries (i.e. James, York, and Rappahannock Rivers) show very little improvement. Tributary teams for these rivers will focus on restoration of SAV as one of the goals to be achieved.

Benthic Communities

Benthic communities are the bottom dwelling organisms living in or on the sediments at the bottom of the Bay. They are a food source for many fish and waterfowl species and are sensitive overall indicators of the Bay's health. Their populations can be effected by both toxic contaminants and low dissolved oxygen levels.

Monitoring indicates that these communities are presently below optimal levels in the down-river portion of the Rappahannock River and in an area of the middle James River. Other portions of the Virginia tributaries and the Bay mainstem seem to have healthy benthic communities.

Trend analysis reveals that further degradation does not seem to be occurring, and some improvement has been observed. Development and implementation of the Tributary Nutrient Reduction Strategies and the Toxics Reduction Strategy are expected to improve water quality conditions sufficient to further improve benthic communities.

Plankton Communities

Phyto- and Zoo-plankton communities are microscopic plant and animal organisms that form the base of the Bay's food web. Zooplankton communities are depressed by toxic contaminants in the Elizabeth River and show somewhat abnormal population fluctuations in other areas of Virginia's Bay. The widespread nutrient enrichment continues to stimulate high and increasing growth of phytoplankton ("algae") in many areas of the Bay and tributaries. Development and implementation of the Tributary Nutrient Reduction Strategies will improve the condition of these living resources.

CONCLUSION

The "health" of an ecosystem such as the Chesapeake Bay is a multi-faceted issue. The Bay is a resilient ecosystem which, though impacted, is still quite healthy and responds relatively quickly to management changes. Through monitoring efforts, Virginians are increasing our understanding of the complex relationships between man's activities and the Bay. Efforts to conserve and enhance the Bay will succeed only by involving citizens. Individuals, local elected officials, local government staffs, businesses and community organizations who recognize and understand the importance and value of their water resources can best determine how to manage them and ensure they are available for future generations.

There is a growing number of citizens who have participated in various forms, all with the goal of helping to bring a tributary strategy that will work into being. From all levels of government to all walks of life, a sense of commitment and community and cooperation is emerging.

All of us in the Natural Resources Secretariat and the many other agencies of government participating in efforts to improve the Bay appreciate your support.

References:

1) **§2.1-51.8:2. Duty to monitor and report on water and resources of Chesapeake Bay and its tributaries.**-- The Secretary of Natural Resources shall cooperate with appropriate state and federal agencies in the development and implementation of a comprehensive program to monitor the quality of the waters and the living resources of the Chesapeake Bay and its tributaries. The Secretary shall report biennially in even-numbered years to the General Assembly on the results of this monitoring program and the status of the resources of the Chesapeake Bay and its tributaries. (1984, c. 183; 1986, c. 492)