REPORT OF THE

STATE WATER COMMISSION

TO THE GOVERNOR AND
THE GENERAL ASSEMBLY OF VIRGINIA

DOCUMENT NO. ____

COMMONWEALTH OF VIRGINIA
RICHMOND
2009

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REPORT OF THE STATE WATER COMMISSION

EXECUTIVE SUMMARY

The State Water Commission is a 15-member legislative body established by statute that is charged with (i) studying all aspects of water supply and allocation problems in the Commonwealth, and (ii) coordinating the legislative recommendations of all state entities that have responsibilities with respect to water supply and allocation issues. The Commission met in January 2009 and elected Delegate Harvey Morgan as its chairman and Senator John Miller as vice-chairman. The purpose of the meeting was to receive testimony on the "state of Virginia's water resources." Officials of those state agencies responsible for maintaining adequate supplies of ground and surface waters (water quantity) and protecting the quality of its waters (water quality) outlined the state's efforts to ensure that Virginia's current and future water supplies will be sufficient and of a quality to meet the needs of a growing population.

In 1999 and again in 2002, Virginia experienced severe drought conditions that threatened the state and local governments' ability to provide sufficient water supplies to Virginia's population. These situations provided the impetus for the General Assembly to request the State Water Commission to undertake a study of the effectiveness of the Commonwealth's water policies. Testimony by several experts indicated that at the state and local levels, water supply planning was at best "passive" and "episodic." The response to shortages of water included drought relief measures rather than a long-term planning perspective. The Commission, in conjunction with the executive branch, recommended legislation establishing a comprehensive water supply planning process that would result in the development of local, regional, and state water supply plans.

While Virginia has begun the process of developing water supply plans, an official of the Department of Environmental Quality (DEQ) noted that the state has certain water quantity management tools currently available to it for managing water withdrawals and use. With its passage by the legislature in 2003, the water supply planning program has provided a new tool, in addition to such existing statutes and regulations as the Virginia Water Protection Program, the Ground Water Management Act of 1992, and the water use reporting program, to better manage water withdrawals and use. In June 2005, the State Water Control Board (SWCB) adopted the final water supply planning regulation. Under this regulation all counties, cities, and towns individually or as part of a regional plan, are required to submit a water supply plan to the SWCB. The plan is to contain the following information: a description of existing water sources; a description of existing water use; an assessment of projected water demand; a statement of future need; an analysis that identifies potential alternatives to address projected deficits in

supplies; a description of existing water resources conditions; a description of water demand management actions; and a drought contingency and response plan.

By developing a statewide plan, the DEQ hopes to maximize the economic and environmental potential of Virginia's water resources through water supply planning to meet current and future beneficial uses of water. By creating a planning partnership among state, local, and regional interests, the state would be emphasizing the concept of the interdependence of water uses thereby promoting the wise and optimum use of our water resources.

The dates for submission of a local water supply plan are based on the size of the locality's population, with the larger localities (population greater than 35,000) required to submit their plans by November 2, 2008. If localities are engaged in developing regional plans they are required to submit a letter of intent to develop a regional water plan by the same November date.

The efforts to develop a plan and ensure adequate water supplies in the future face certain challenges. Even as staffing and financial resources become scarcer, it continues to be necessary to collect and analyze water resources data. It is important that the state continue its analysis of ground water availability, promote a range of conservation approaches, and encourage nontraditional sources of supply, including the use of such alternative technologies as desalination.

Protecting the quality of Virginia's waters is primarily the responsibility of DEQ and the Department of Conservation and Recreation (DCR). Water quality management by DEQ for point sources of pollution is a step-by-step process. First, water quality standards are established using the indicators of dissolved oxygen, water clarity, and chlorophyll "a." The agency then determines whether the waters into which wastewater is discharged are meeting the standards. If the particular segments of waters are not meeting water quality standards they are placed on the list of "impaired waters." For those waters that are designated as impaired, DEQ develops total maximum daily load (TMDL). A TMDL study identifies the pollutant sources causing the impairment and determines how much of the pollutant the waters can receive (the "load") and still meet water quality standards. An implementation plan, which is required by Virginia law, is then developed that identifies strategies for reducing the sources of pollution and these strategies are then put in place for the impaired body of water. The goal is to have these waters removed from the impaired waters list (303d).

All of Virginia's water basins are monitored at least once during a six-year cycle to assess the extent to which they are meeting water quality standards. Currently, 5,408 of the total of 15,951 miles of rivers have been assessed, with 10,543 classified as impaired. While it appears that there has been a large increase in river miles impaired, it is not because the rivers are getting dirtier but rather

that more rivers are being monitored and assessed. For 2008, the major cause of impairment to rivers was bacteria from nonpoint sources, wildlife, and failed septic systems.

DEQ has adopted a watershed approach to restoring impaired waters. An annual pollution load is allocated among the various point and nonpoint sources of discharges within a watershed. A determination is made by DEQ as to the pollutant load that a particular reach of a river can assimilate and still meet water quality standards. Through May 2008, TMDLs have been developed for 546 impaired water segments, with an additional 208 TMDLs required to be completed by 2010 in order to meet the federal court's consent decree. Eighty-eight TMDL implementation plans have been completed and 29 are currently being developed. Forty impaired water bodies have received funds for actual implementation of the TMDL plan, with another 28 soon to receive implementation funds. There are approximately 1,500 TMDLs statewide remaining to be developed by 2018. Because the Chesapeake Bay will not achieve water quality standards by 2010, a separate TMDL is being developed for the Bay, by Virginia, working with the Environmental Protection Agency (EPA) and the five other Bay watershed states and the District of Columbia. The goal is for the EPA to issue the TMDL by 2010 because the TMDL must be completed pursuant to a court order no later than May 1, 2011.

The Commission also received a progress report on nutrient trading in the Chesapeake Bay watershed in Virginia. By instituting a nutrient trading regime it is believed that nutrient reductions will be attained in a more cost-effective manner over a shorter period of time. The DEQ estimates that trading will result in savings of 23-33% in capital costs, as some facilities will be able to purchase nutrient credits rather than having to finance costly upgrades to their treatment plants. There is a nutrient trading general permit required to participate in the trading program. Currently, 152 facilities have registered for the permit, with pending registrations for 10 new and expanding facilities and 15 new or expanding facilities that have not as yet registered. The Virginia Nutrient Credit Exchange Association is established by statute to aid wastewater treatment plant owners to obtain credits. The Exchange is striving to keep the price of credits low in order to encourage trading.

A major source for financing the upgrading of nutrient removal technology agricultural cost sharing programs is the Water Quality Improvement Fund (WQIF). As of now, 80 grant applications have been received for construction of nutrient facilities costing approximately $815 million. Agreements have been signed by DEQ and the applicants for 41 projects, reflecting a commitment of $525 million. Another 17 applications are under active processing at a cost of $128 million.

Protecting water quality from nonpoint sources of pollution is the responsibility of the Department of Conservation and Recreation (DCR). Nonpoint sources of pollution include runoff from agricultural lands, forests (streambanks), streets, construction sites, septic tanks, streambanks, over-fertilized lawns, etc. Collectively, nonpoint sources are the major sources of nutrient and sediment pollution in the Chesapeake Bay and it tributaries. Approximately 70% of the nitrogen loadings are from these nonpoint sources; while almost 81% of the total phosphorous loading originated from nonpoint sources. Although agriculture and point sources are decreasing as sources of pollution, the pressures of population growth and development now represent the greatest challenge to restoring and protecting the Bay watershed. Suburban and urban stormwater is currently the only source of pollution that is increasing. From 1990 to 2000, the watershed population grew 8%, while the amount of impervious surfaces increased by 41%.

To address the pollution problem, Virginia developed tributaries strategies for five areas: the Shenandoah/Potomac Rivers, the Rappahannock River, the York River, the James River, and the Eastern Shore. The strategies include various approaches to meet the loading allocation assigned to the state by the Chesapeake Bay Program. In addition to the implementation of the tributary strategies, the General Assembly mandated the adoption of the Virginia Water Clean-up Plan. This plan focused on five elements: land conservation, wastewater treatment plants, agriculture, developed and developing lands, and sources of air pollution. The Commission received testimony regarding two of the plan's elements - agricultural programs and developed and developing lands. To reduce pollution from agriculture, DCR provides financial incentive to farmers using the Voluntary BMP Cost-Share Program. This program is funded through the Natural Resources Commitment Fund. Over the last several years, matching funds have been allocated to five priority practices: cover crops, riparian buffers, conservation tillage, nutrient management, and livestock exclusion from streams. By statute 57% of the moneys are allocated to projects in the Chesapeake Bay, 38% disbursed to projects in the Southern Rivers, and 5% allocated to Soil and Water Conservation Districts

The DCR is responsible for administering three programs to regulate the pollution runoff from developed or developing lands. The objective of the first program, erosion and sediment control, is to control sediment resulting from land disturbing activities occurring during the development process. The DCR oversees 165 locally administered erosion and sediment control programs. The second of these programs, the stormwater management program, is aimed at reducing the long-term impact to water quality resulting from land development. Currently, significant regulatory changes are being instituted that will establish technical standards and require local administration of the programs. The third regulatory program, the Chesapeake Bay Preservation Act applies to 84 coastal plain jurisdictions, located wholly, or in part, east of Interstate 95. The Act empowers localities to examine land conversion projects in environmental sensitive coastal

areas and determine the potential impact such land use activities have on water quality.

The DCR has recently initiated various marketing strategies and a public information campaign to educate the public on the impact of types of land use and development on water quality. The campaign has focused on both the rapidly developing suburban areas, as well as rural lands and has emphasized effective lawn care in suburban areas, sought to change fertilizer behavior, and developed marketing techniques to promote water-friendly agricultural practices, including the installation of a range of best management practices.

While progress is being made in controlling pollution from nonpoint sources, funding to carry out these programs has been unpredictable and dependent upon state surpluses and year-end contributions to the Water Quality Improvement Fund- Nonpoint Account.

Respectfully submitted,

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APPENDIX

Virginia's Water Quantity Management

State Water Commission, 12 January 2009

Quality – Quantity Relationship

- Key concept: both are beneficial uses of available flow or supply
- Water quality beneficial uses include waste or pollution assimilation, fish and wildlife habitat
- Water quantity beneficial uses include water withdrawals for human activities, navigation, and recreation
- These uses sometimes compete for the same gallon
- As available supply decreases the potential for conflict increases

VA Water Quantity Mgmt Tools

- Manage water withdrawals and use through regulatory programs:
  - Virginia Water Protection Program,
  - Ground Water Management Act of 1992,
  - Local and Regional Water Supply Planning Program
  - Water Use Reporting Program
- Other tools like:
  - Potomac Low Flow Allocation Agreement

Water Quantity History in VA

Water Resources Management Milestone[1]	Drought Event
1966 – Comprehensive water policy and planning authority enacted 1971 – New Constitution adopted with natural resources/ environmental provisions 1972 – Water supply and water quality programs consolidated; Natural Resources Secretariat created 1973 – Virginia Groundwater Act of 1973 enacted	1962 - 1971
1977 – State Water (Study) Commission created	
1980s – Water supply river basin plans developed	1980 - 1982
1990s – Increased focus on water quality planning and management/decreased water supply focus	
2003-2007 – Water supply planning and permitting authority changes	1999 - 2002
2008 – Water re-use regulation	

[1] Adapted from Cox, William. Environment Virginia Presentation. 2003.

Water Planning pre-2003

- “Every one for themselves” planning
- “Water has always been there” planning
- “Won’t be a drought worse than the 1930s drought” planning
- Started to plan when water use reached 80% of permitted capacity (VDH)
- Extended drought from 1999-2002 exposed some inadequacies in planning

Activity Since 1999-2002 Drought

- the Local and Regional Water Supply Planning Regulation (2005),
- amendments to the VWPP Regulation (2007),
- legislation addressing consumptive use in the Potomac (2007),
- a Water Reuse Regulation (2008), and
- development of a State Water Resources Plan (~2012).
- New effort looking at Ground Water Program.

Water Supply Planning Regulation

- State Water Commission initiative
- SB1221- enacted by the General Assembly in 2003 - required DEQ to develop criteria for local and regional planning and a preliminary state water resources plan.
- State Water Control Board adopted final regulation June 28, 2005.
- All counties, cities and towns will submit a plan to the board, individually or as part of a region.

Water Supply Planning Regulation

DEQ Vision

Achieve the full economic and environmental potential of Virginia's water resources through sustainable water supply planning to meet current and future beneficial uses of water.

Water Supply Planning Regulation

How are we going to accomplish this vision?

- Promote the interdependence of water users so cooperative regional planning and optimization of common water resources can be achieved; and
- Create a water planning partnership among state, local, regional interests and the public through a comprehensive and continuous planning process for the wise use of our water resources.

Required Elements

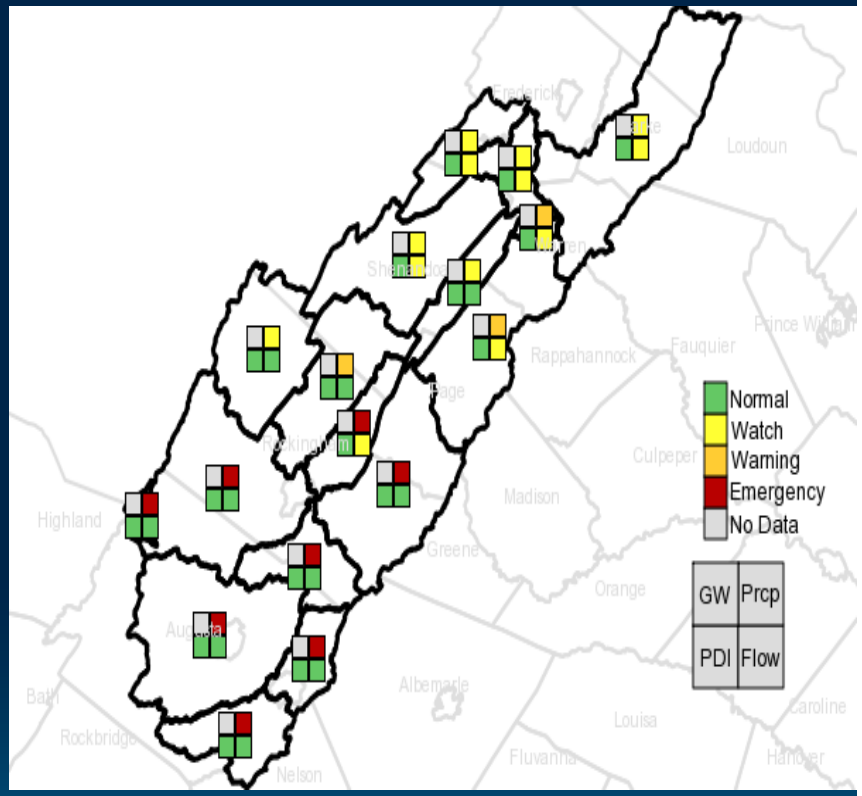
- A description of existing water sources;
- A description of existing water use;
- An assessment of projected water demand;
- A statement of future need;
- An analysis that identifies potential alternatives to address projected deficits in supplies;
- A description of existing water resource conditions;
- A description of water demand management actions;
- A drought contingency and response plan.

2008 Emphasis on Drought Response

- Governor's Water Conservation and Drought Forum
- DEQ staff assistance priority
- Create "Drought Ready Communities"
- Bring down to local scale: develop local triggers appropriate to address local water sources and water use mix
- Integrate into state-wide real time web application to monitor local drought conditions

New Drought Assessment Tool

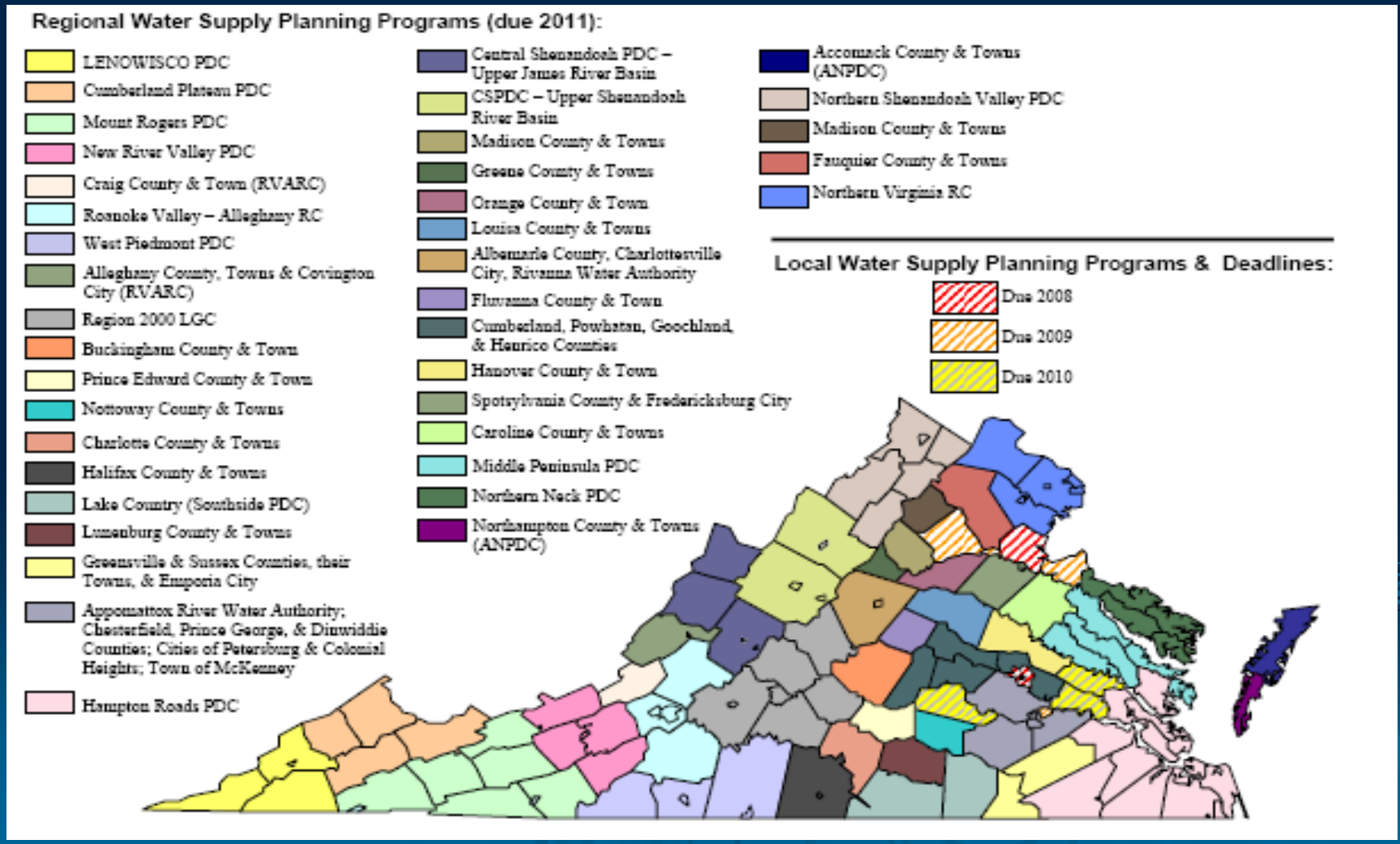
- Based on Virginia Drought Assessment and Response Plan
- Includes deviation from normal values for:
  - Precipitation
  - Streamflow
  - Ground water level (where available)
  - PDSI or Reservoir level (where available)
- Color coded graphs and tables are updated daily with near real-time data
- Charts and data are summarized by GIS shape files, based on watershed, sub-watershed, political, or planning boundaries as desired



Important Dates

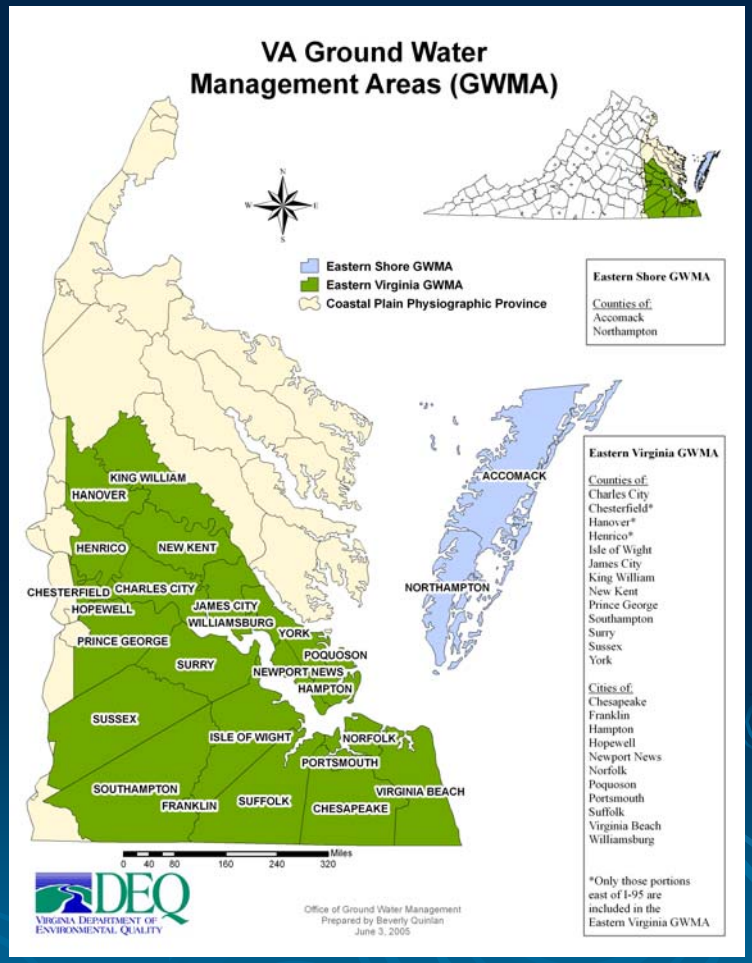
- Population-based deadlines
  - Greater than 35,000 = November 2, 2008
  - 15,000 to 35,000 = November 2, 2009
  - Less than 15,000 = November 2, 2010
  - Regional with LOI = November 2, 2011
- Letter of Intent (LOI) to regionalize due by November 2, 2008
- Localities to review their plans every five years to assess adequacy. Updates required every 10 years.

Current State-wide Progress of Localities



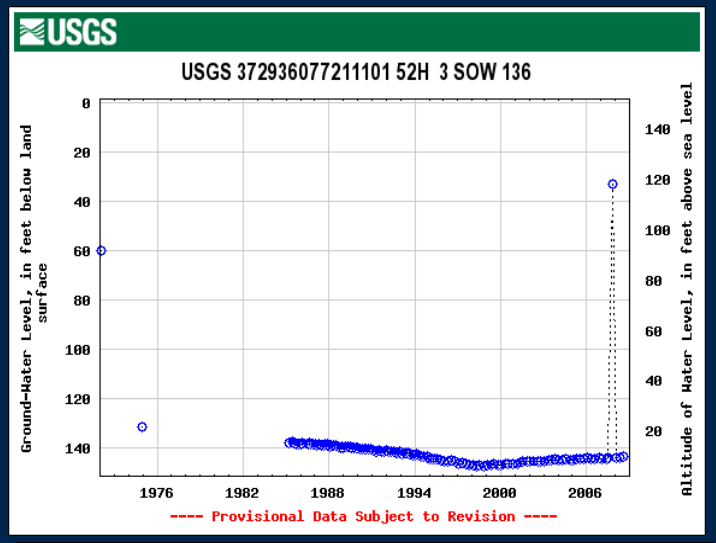
GW Management Areas

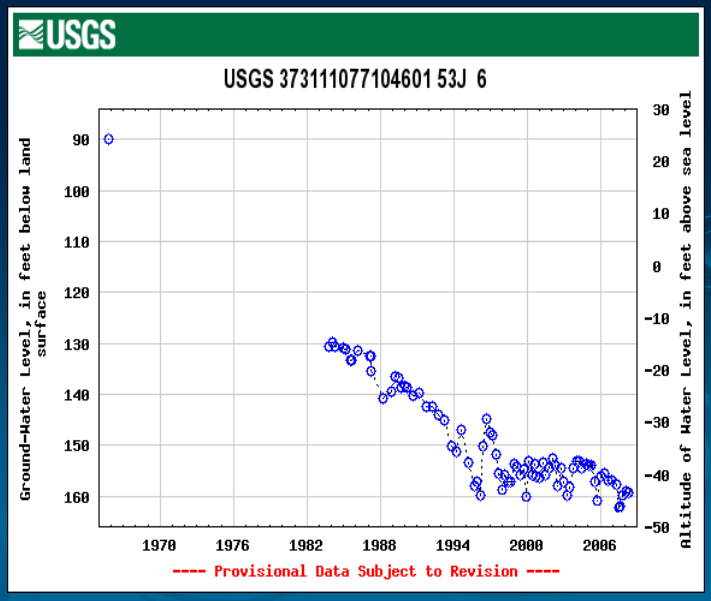
- Covers about 2/3 of the Coastal Plain
- Regulates an estimated 57% of withdrawals >300,000 gpm in CP
- Does not include most single family wells



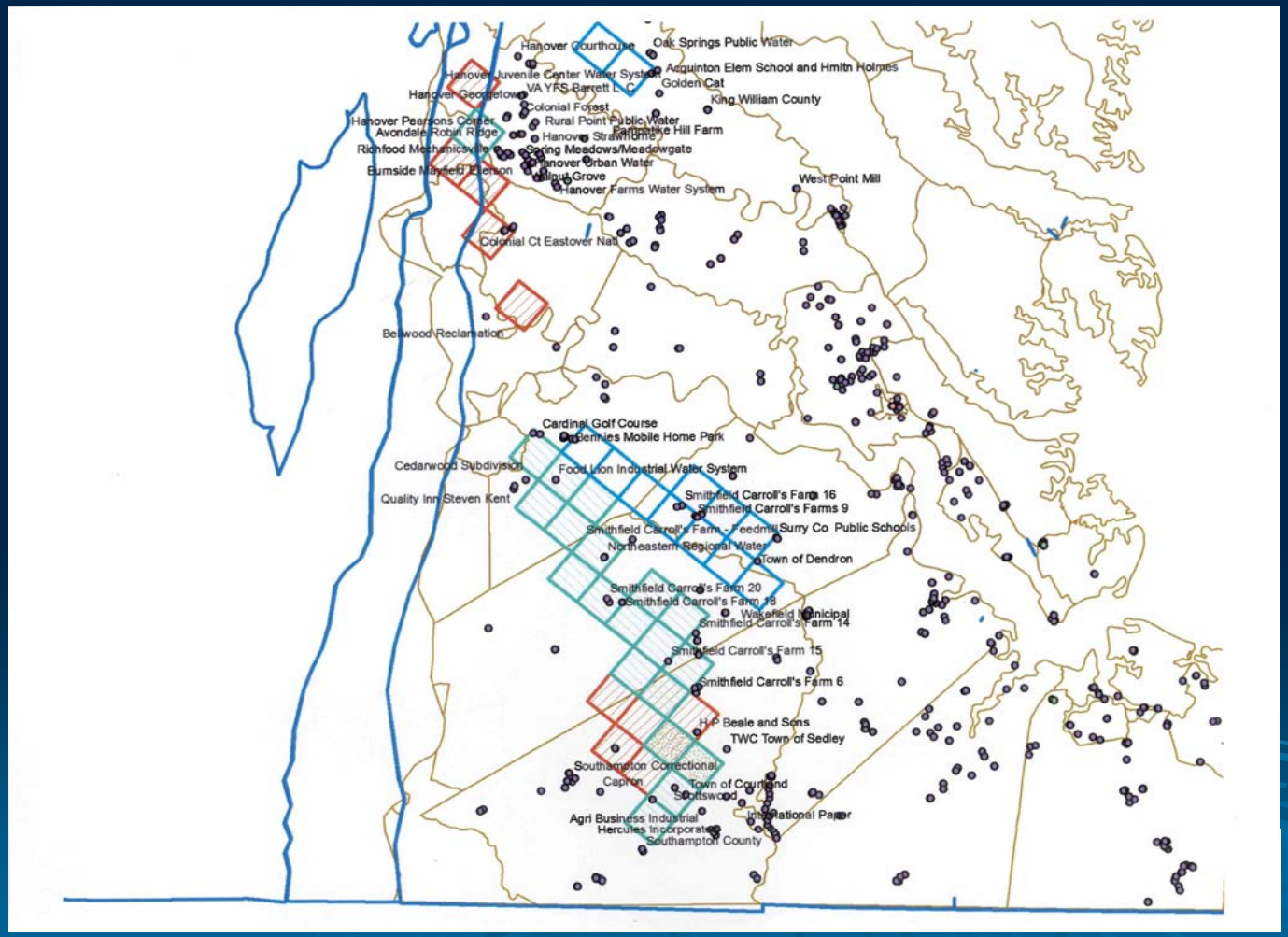
GW Availability Problem Areas

- Ground water has been drawn down significantly in parts of the Coastal Plain.
- Places along the fall line are declining more rapidly than other areas.
- Field data is showing water levels are lower that model predictions in these areas.





Location of Problem Areas



Citizens on Ground Water

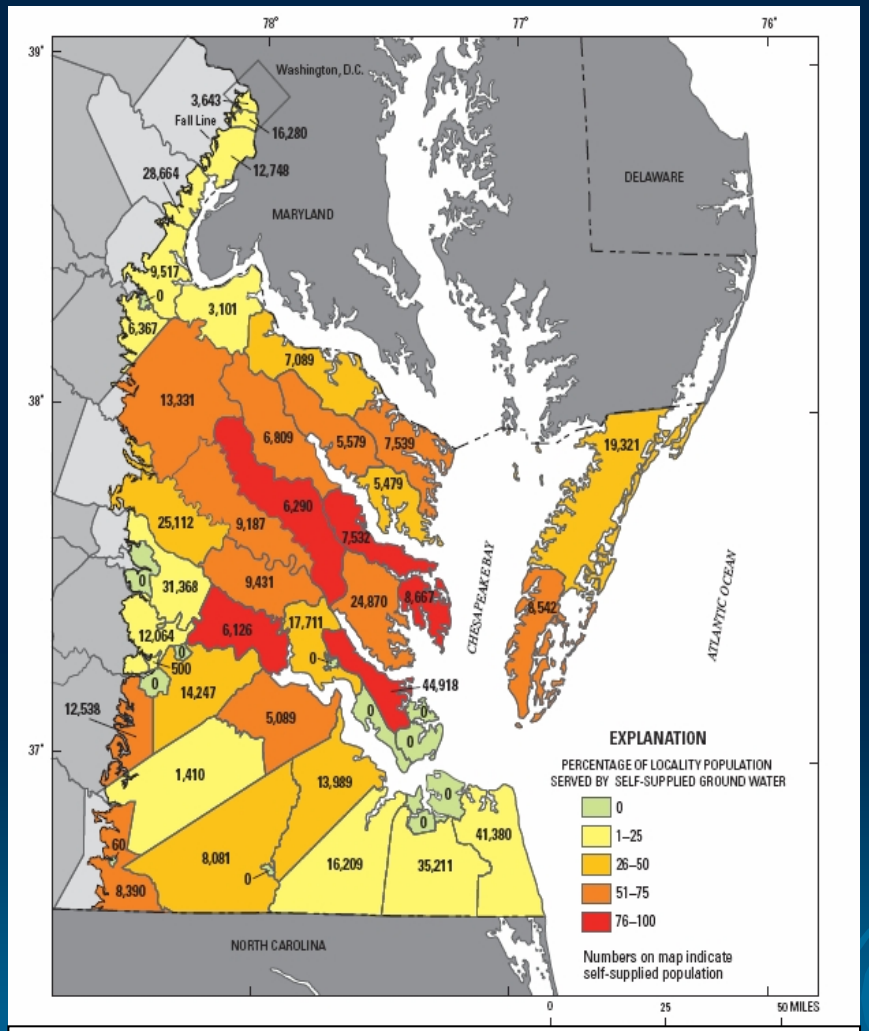
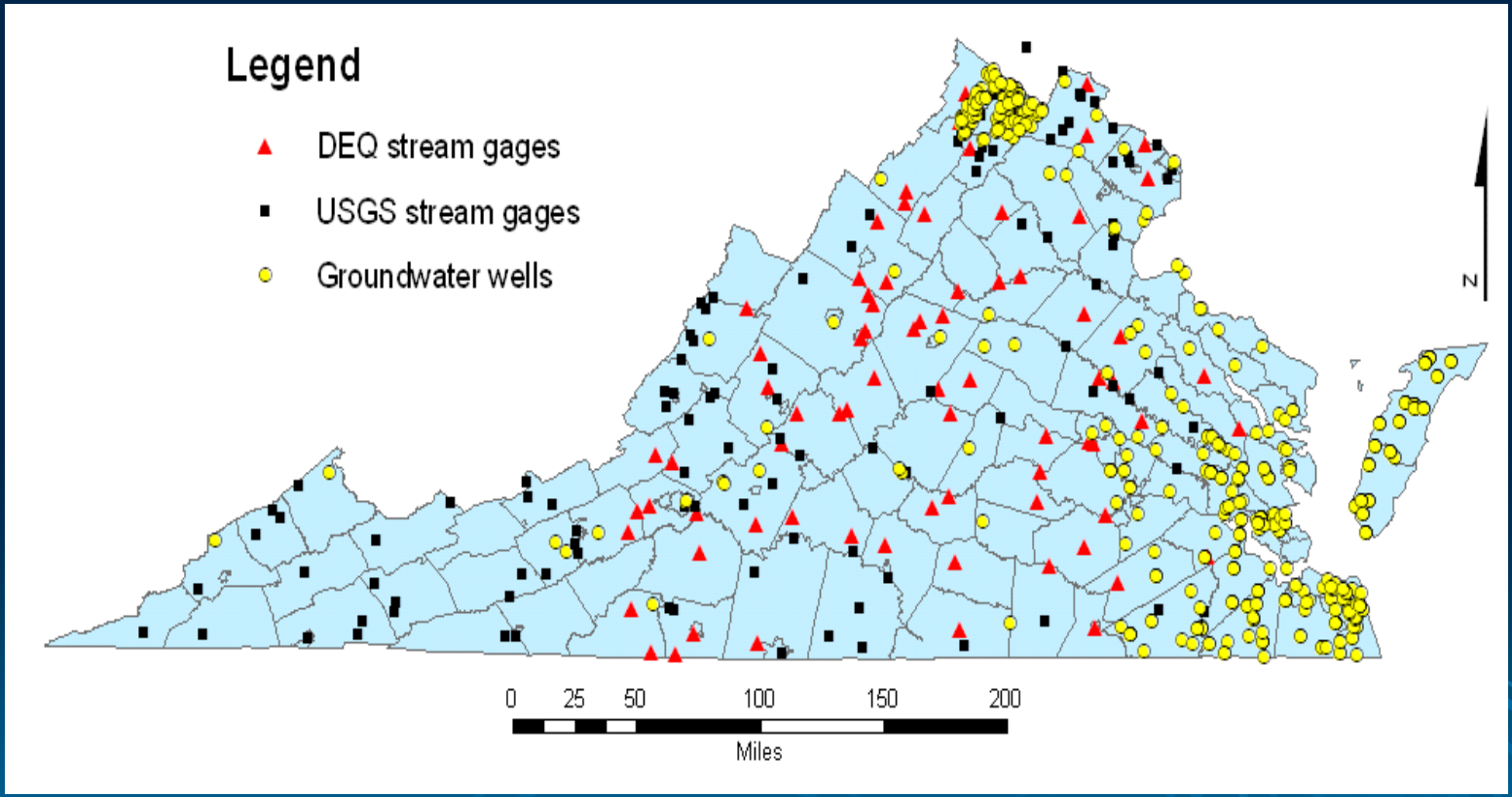
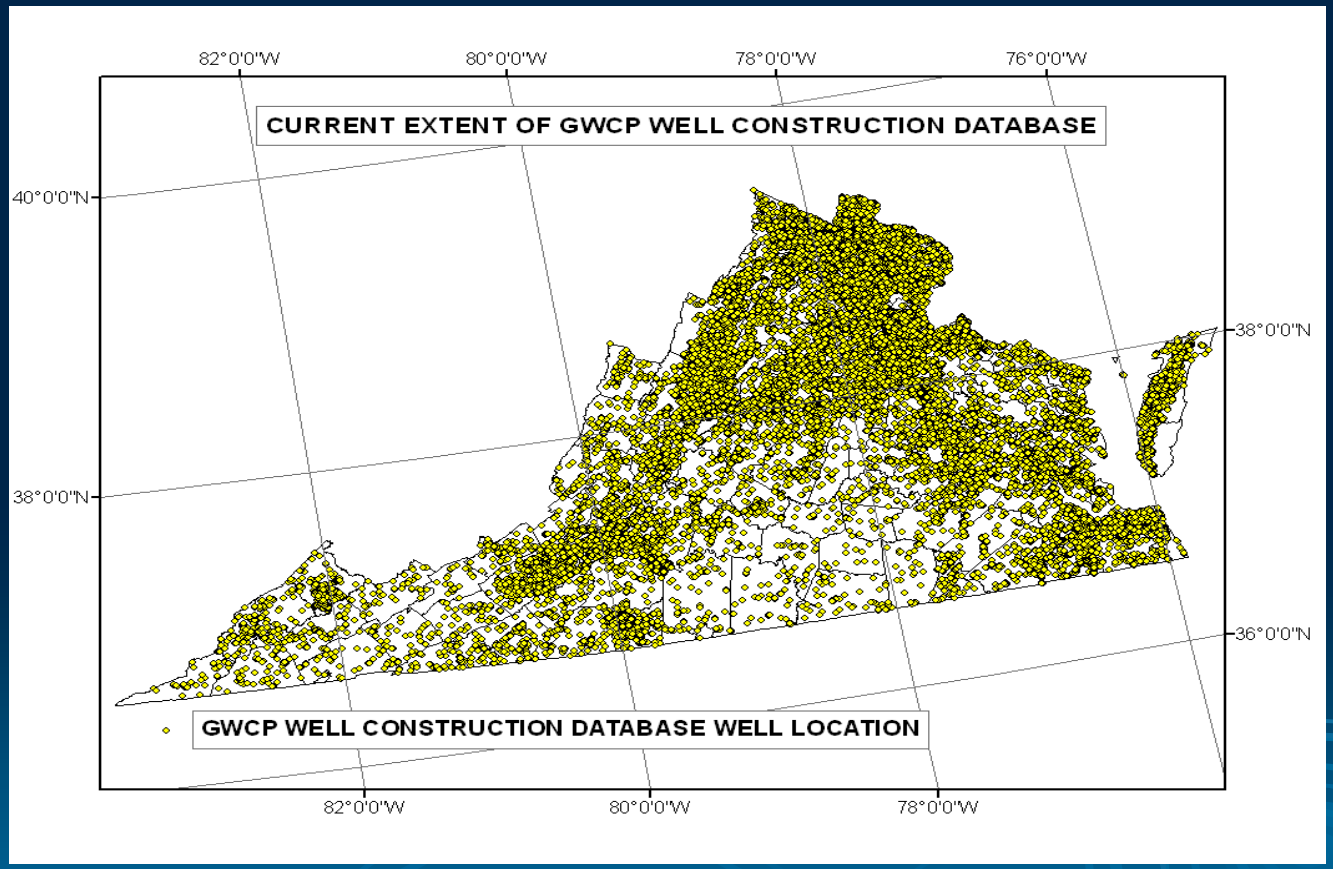


Figure Populations and percentages of populations in Virginia Coastal Plain localities served by self-supplied ground water in 2000 (from Pope, USGS SIR 2007-5250)

Current Monitoring Network



Well Construction Database

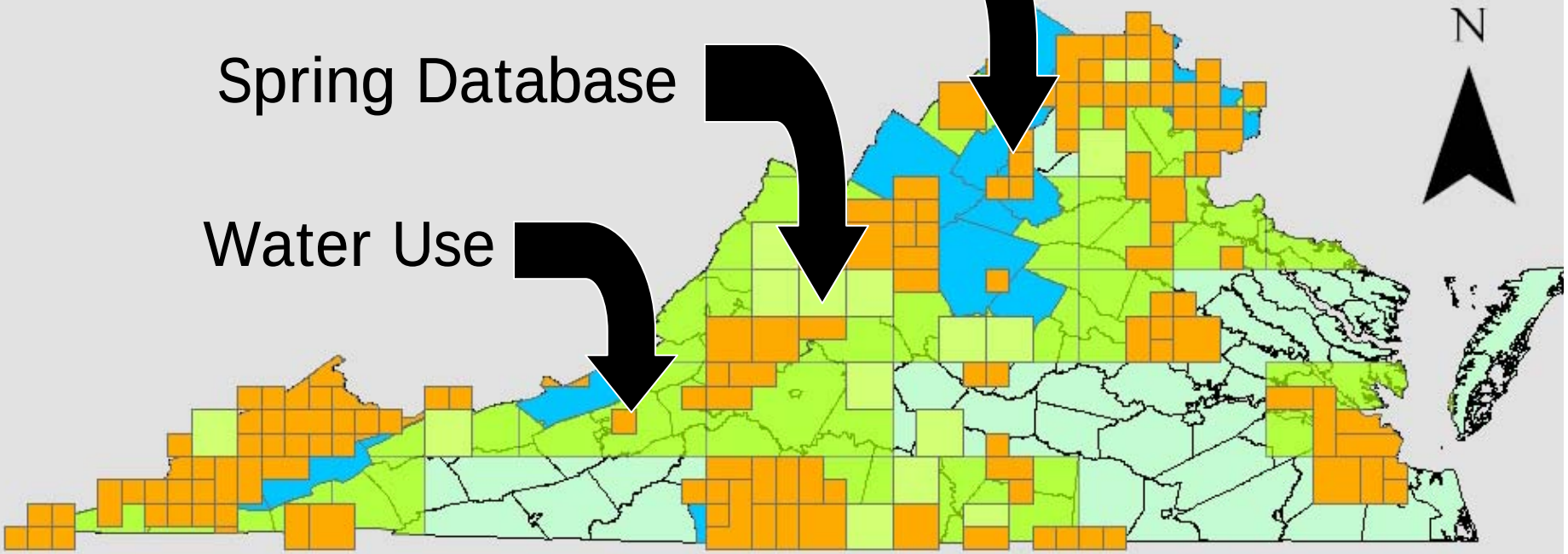


Geologic Mapping available from VGDMR and USGS 2008

Well Database

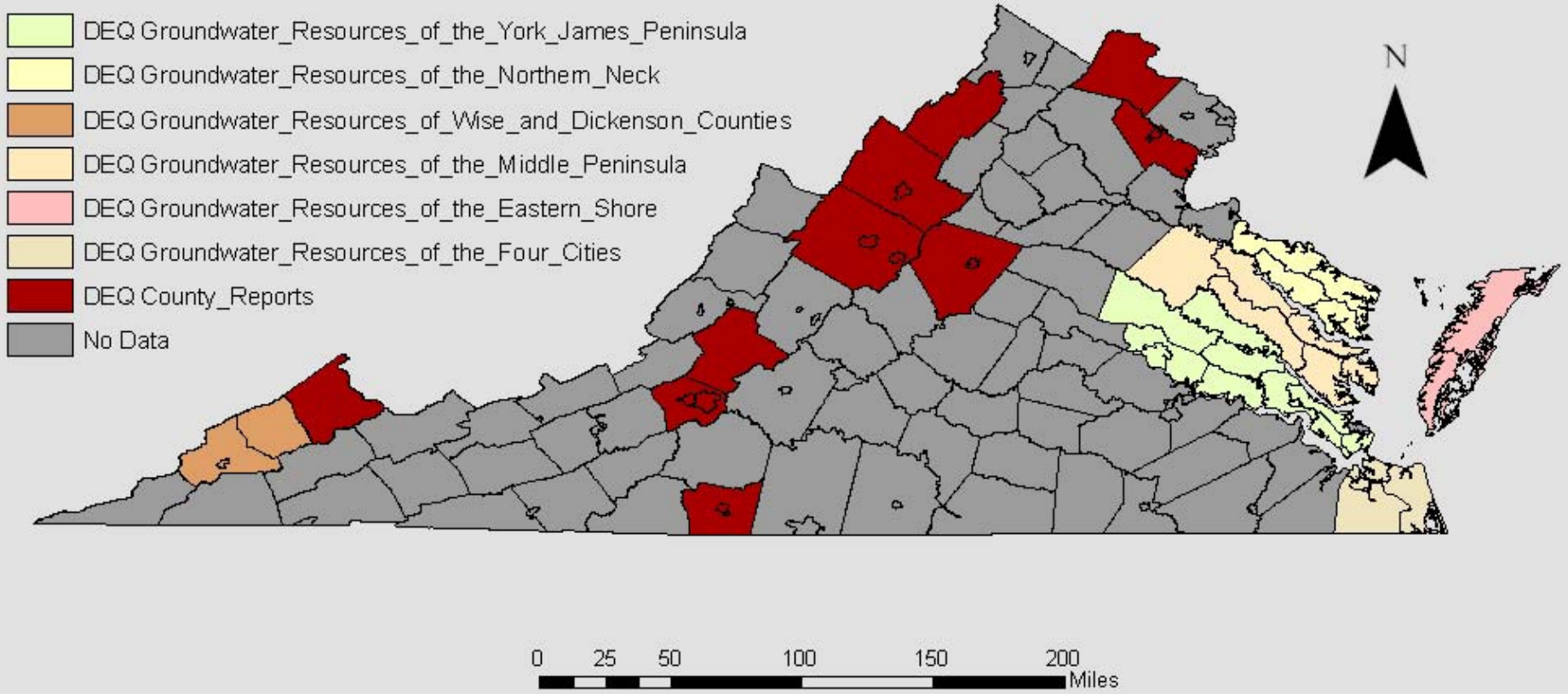
Spring Database

Water Use

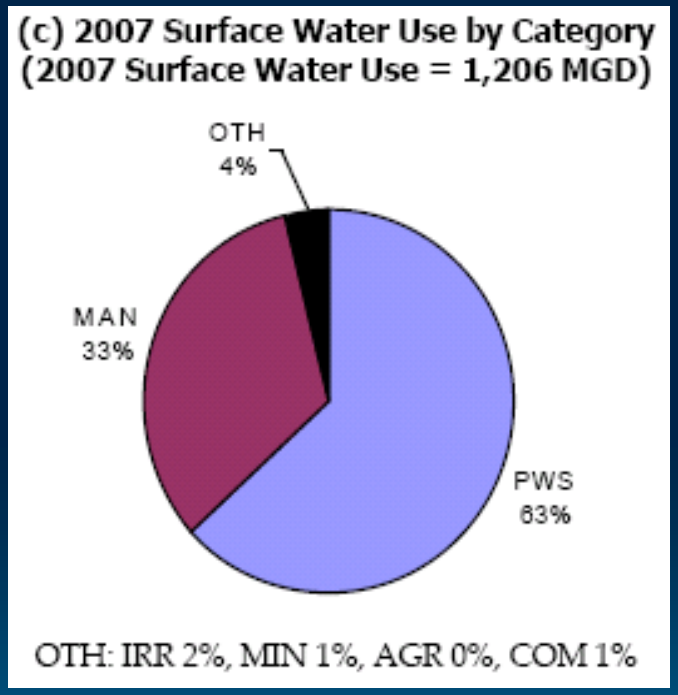


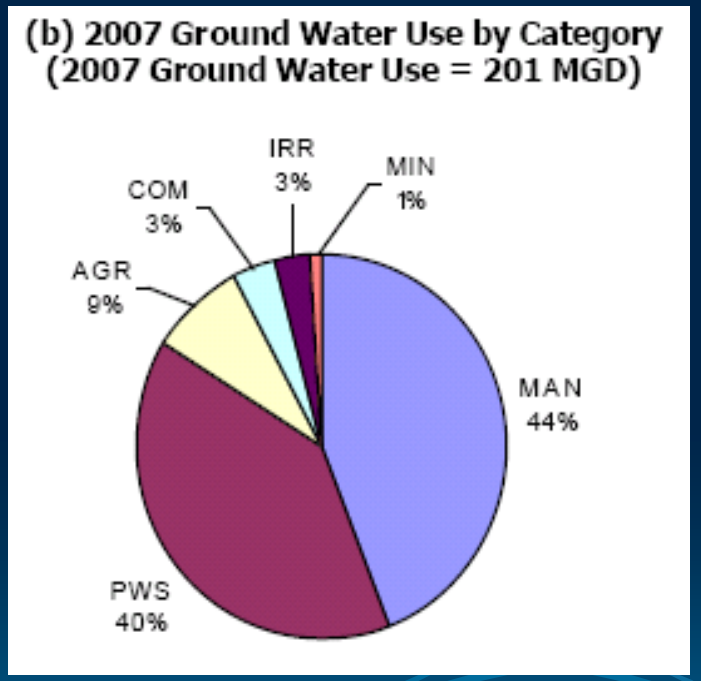
= Hydrologic Mapping

Available Publications about Ground Water Conditions in Virginia Sparse

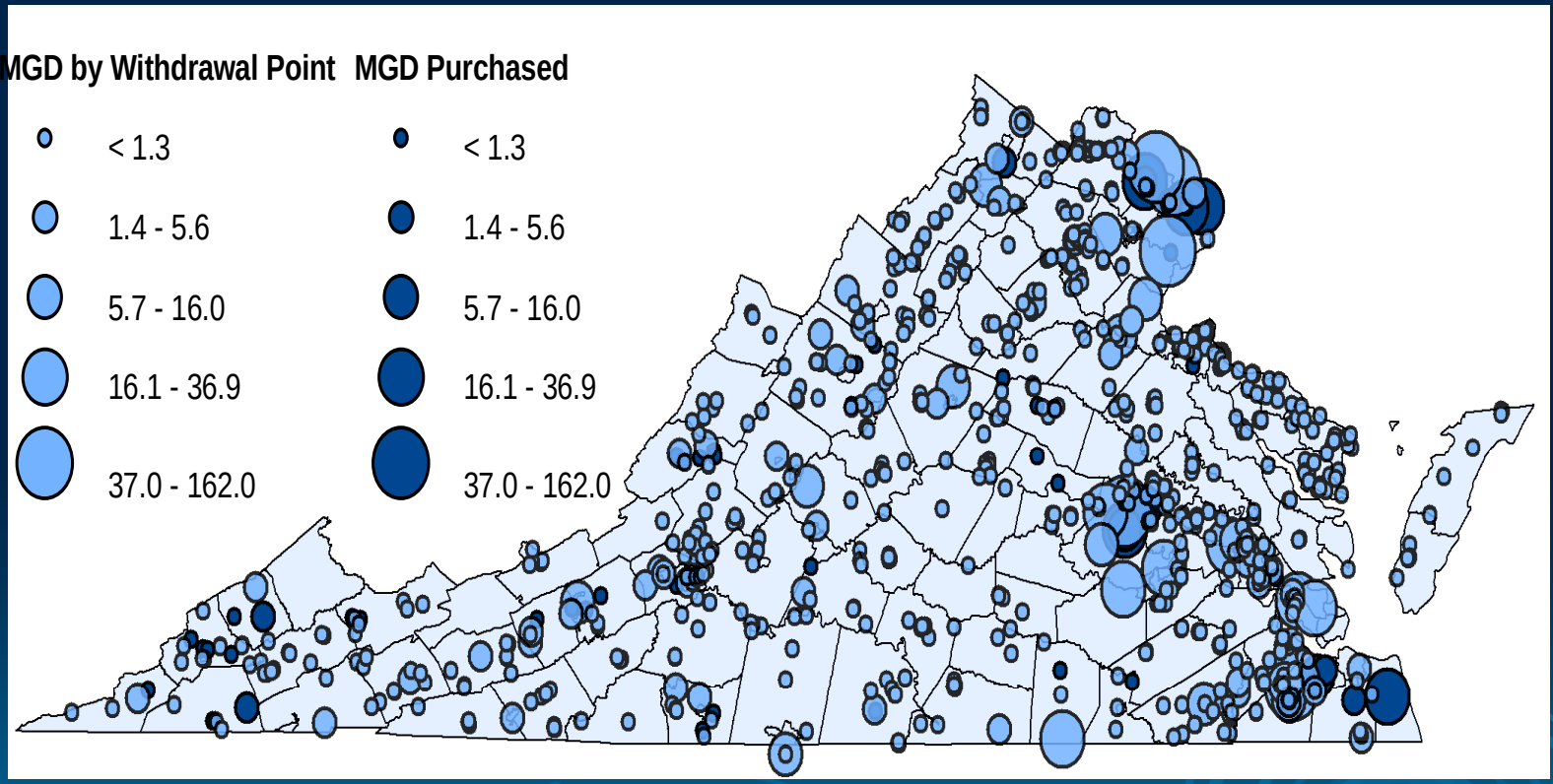


2007 Water Use

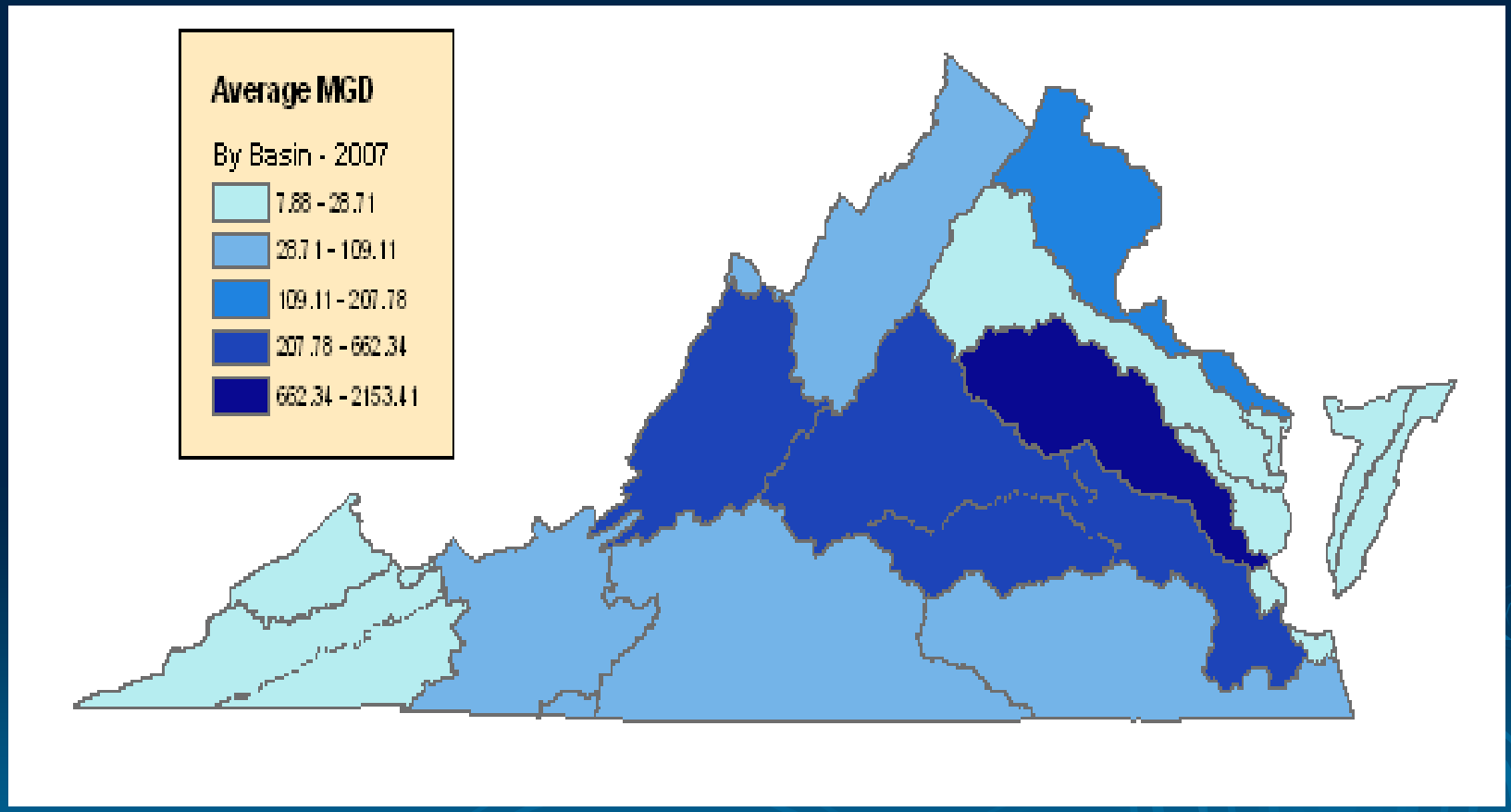




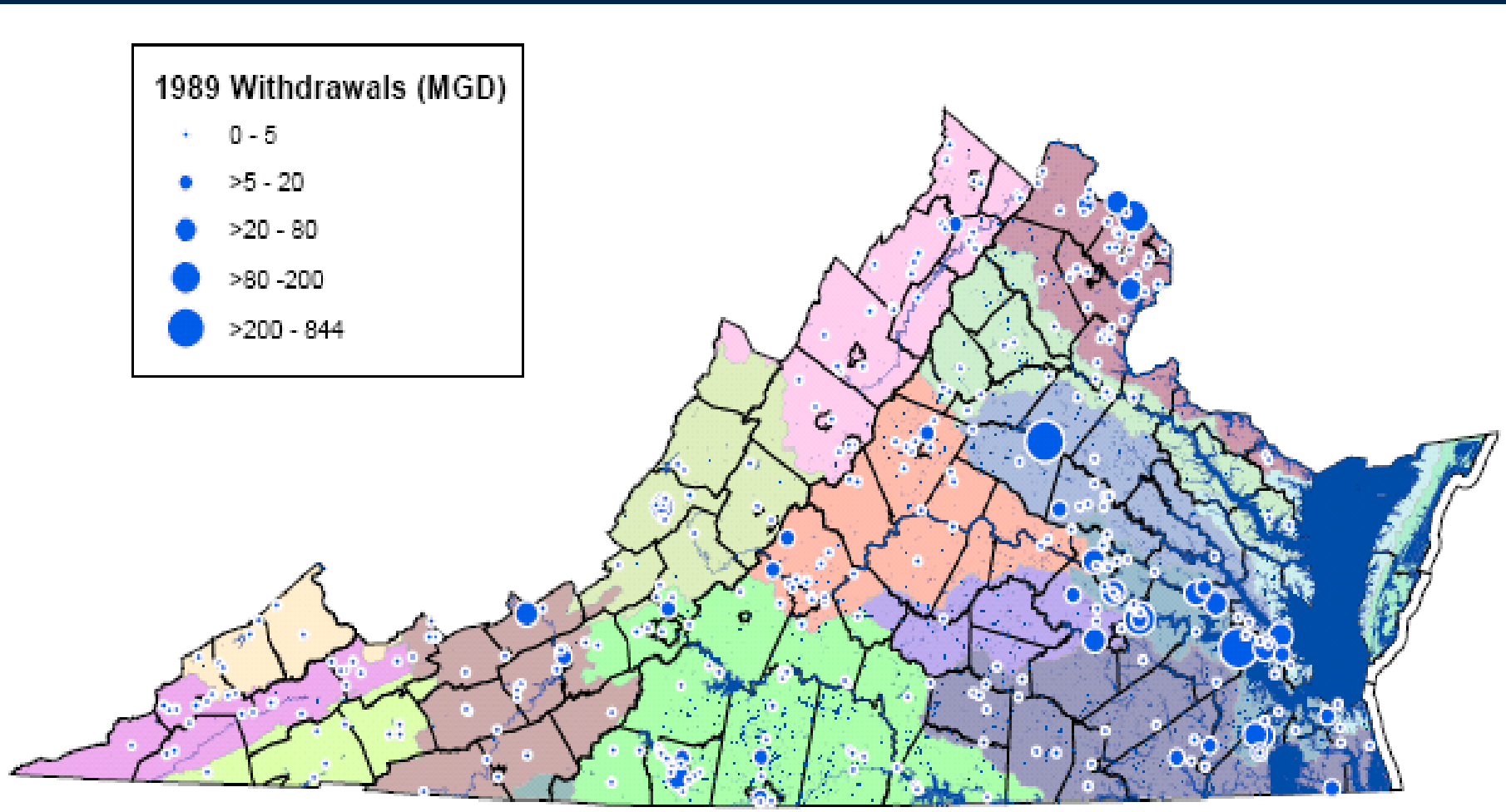
2007 Public Water Supply Water Withdrawals and Purchases



Basins with the Most Water Use



Users Excluded From VWP



What's Next?

- 62.1-44:38 …evaluate, to the extent practicable, the ability of subsurface and surface waters to meet current and future water uses, including minimum instream flows…
- 9 VAC 25-780-140.G says we need to, among other actions, conduct "[a] cumulative demand analysis" and an "evaluation of potential use conflicts among projected water demand and estimates of requirements for in-stream flow."
- How do we meet human needs while maximizing the remainder for other statutorily protected beneficial uses (fish and wildlife habitat, recreation, navigation, assimilative capacity)?

Important New Data/Tools

From WSPs:

1. Amounts withdrawn from various water sources;
2. Amounts of water used for different purposes;
3. Amount of expected new water demand in the planning period;
4. Potential alternative sources and expected amounts of water to address projected deficits.

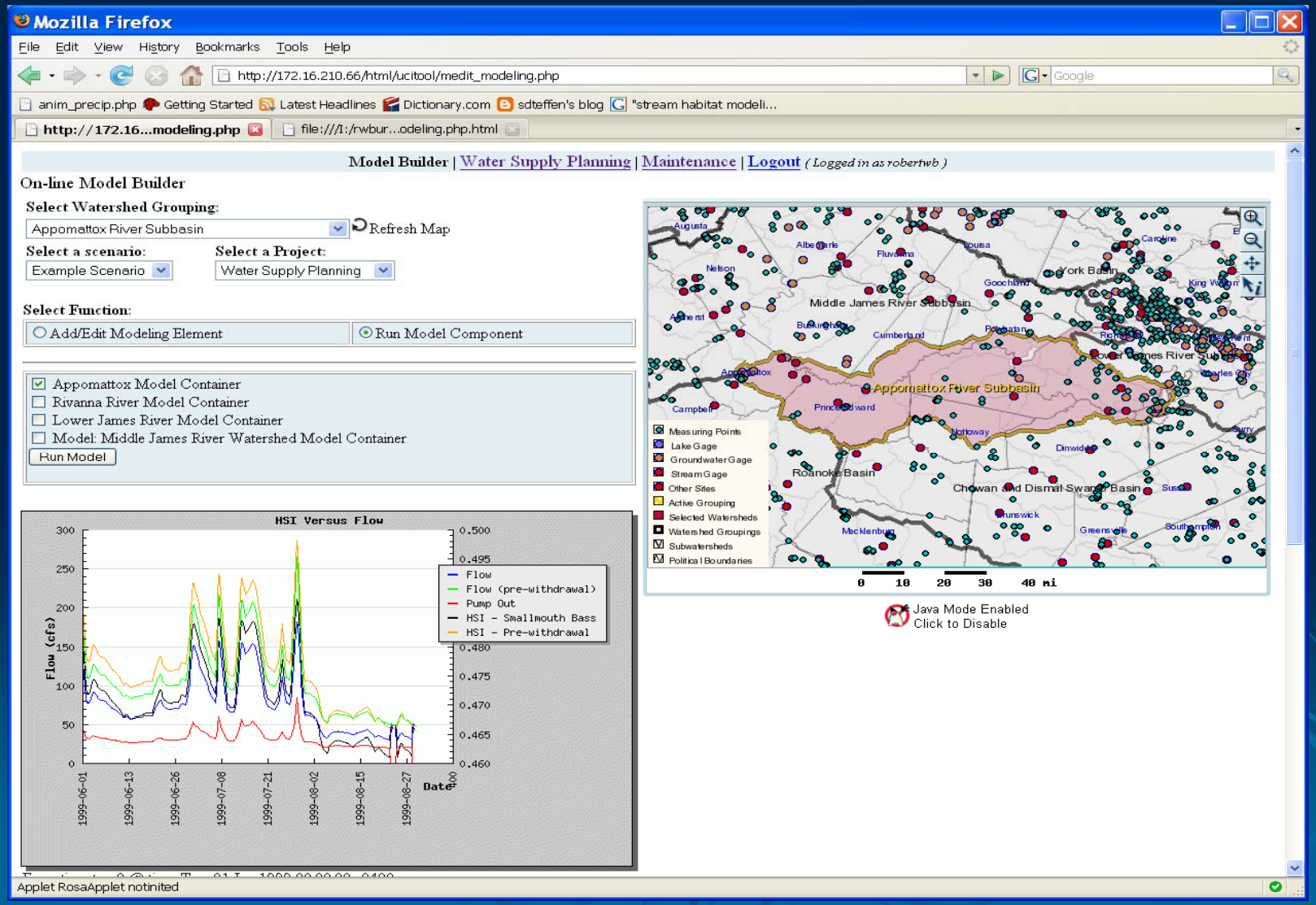
From new VWP requirements:

1. Maximum withdrawal capacity of grandfathered intakes.

From USGS Projects:

1. Ungaged watershed flow statistics
2. River basin model

Decision Support System



Financial and Staff Resources

- Collecting GW/Geologic data, managing databases, and developing County GW Reports = 4
- Collecting SW data, keeping gages maintained = 7
- Assisting localities with water supply planning = 5
- Water use data, SW/GW modeling = 4
- WSP Planning Aid to Localities: FY06 = $300,000; FY07 = $500,000; FY08 = $300,000; FY09 = $200,000; FY10 = $100,000 ?
- SW/GW Monitoring = $500,000

Future Challenges and Opportunities

- Water resource data needs.
- Water reuse/desal opportunities need to become mainstream alternatives.
- Climate change is mostly about impacts to water.
- Population growth continues in areas without sufficient water resources.
- Current system promotes inequity.

Water Quality Programs and Regulating Point Source Pollution

Presentation to the
State Water Commission
January 12, 2009

Ellen Gilinsky, PhD
Director, Water Division
Virginia Department of Environmental Quality

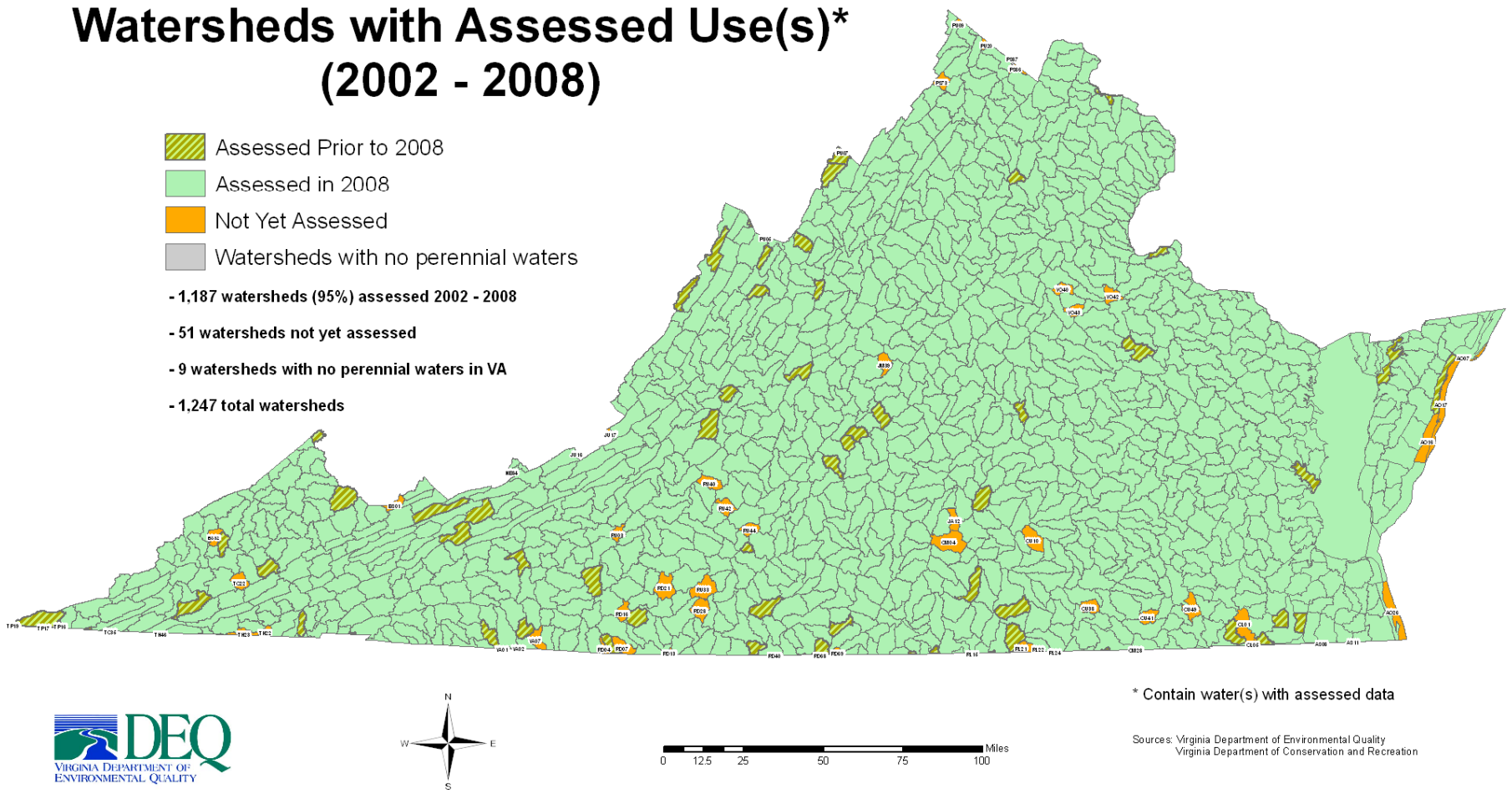
Presentation Outline

- Steps In Water Quality Management
- Water Quality Assessment
- Total Maximum Daily Loads – TMDLs
- Permits for Point Source Discharges
- Reducing Nutrient Loads to the Chesapeake Bay
  - Trading and the Watershed General Permit
  - Funding
  - Progress

Steps in Water Quality Management Process

- Establish Water Quality Standards to protect uses
- Monitor waters and assess data
- Place Impaired Waters on 303(d) List if Standards not attained
- Develop TMDL - Total Maximum Daily Load - for Impaired Waters
- Develop TMDL Implementation Plan
- Implement TMDL Plan
- Remove Waters from 303(d) List when monitoring shows Water Quality Standards attained

Assessments within 95% of Watersheds in 2002 – 2008 305(b) Reports



2008 Assessed Area

Waterbody Type	Total	Assessed	Attained Use	Impaired
Rivers (miles)	51,016	15,951[1]	5,408	10,543
Lakes (acres)	115,835	112,310	18,266	94,044[2]
Estuaries (sq. miles)	2,305	2,305	123	2,182

[1] River/stream miles assessed increased to a record 31%

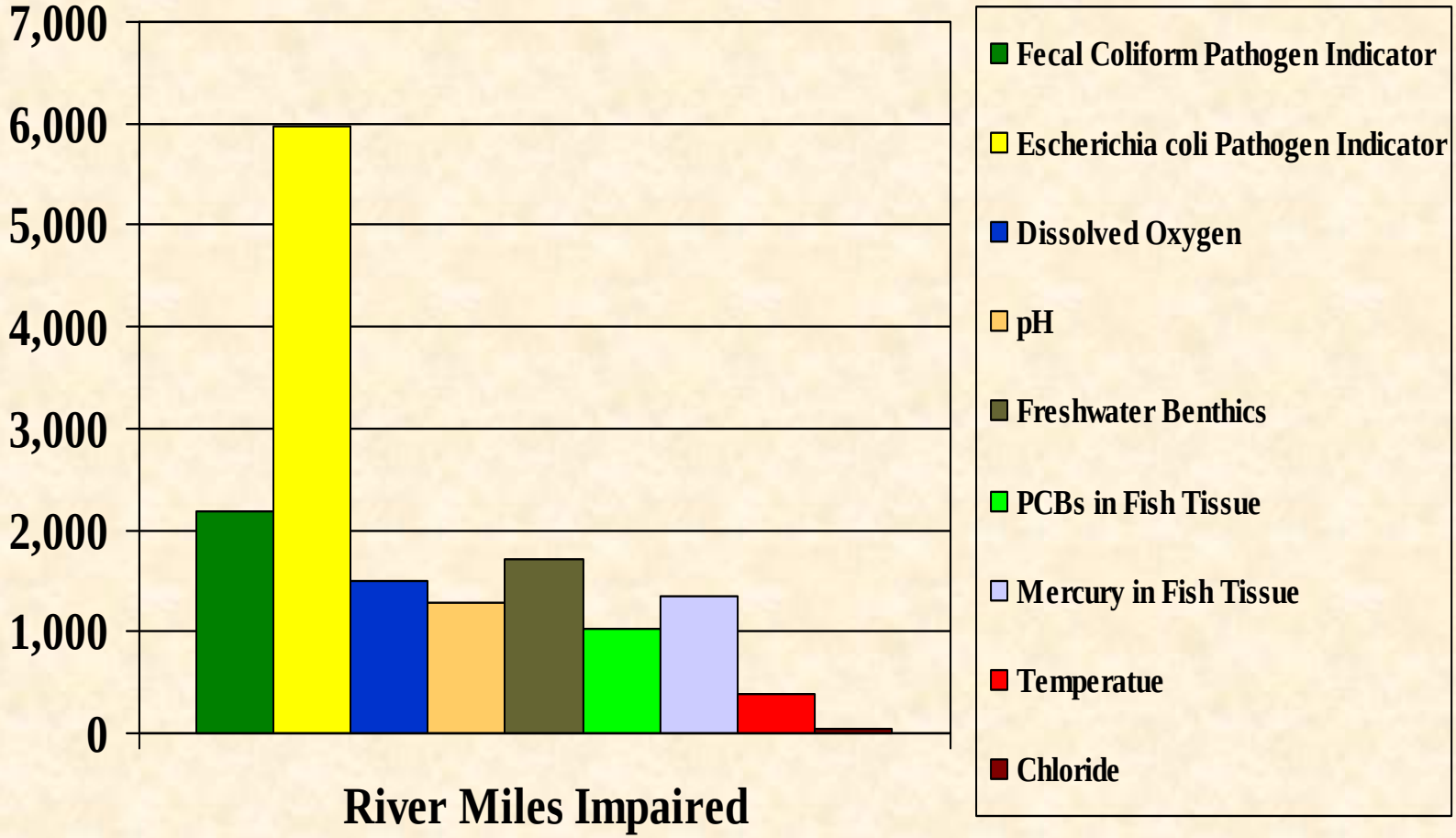
[2] Lakes no longer monitored for DO on the bottom

Impaired Area Identified Per Assessment Cycle by Waterbody Type

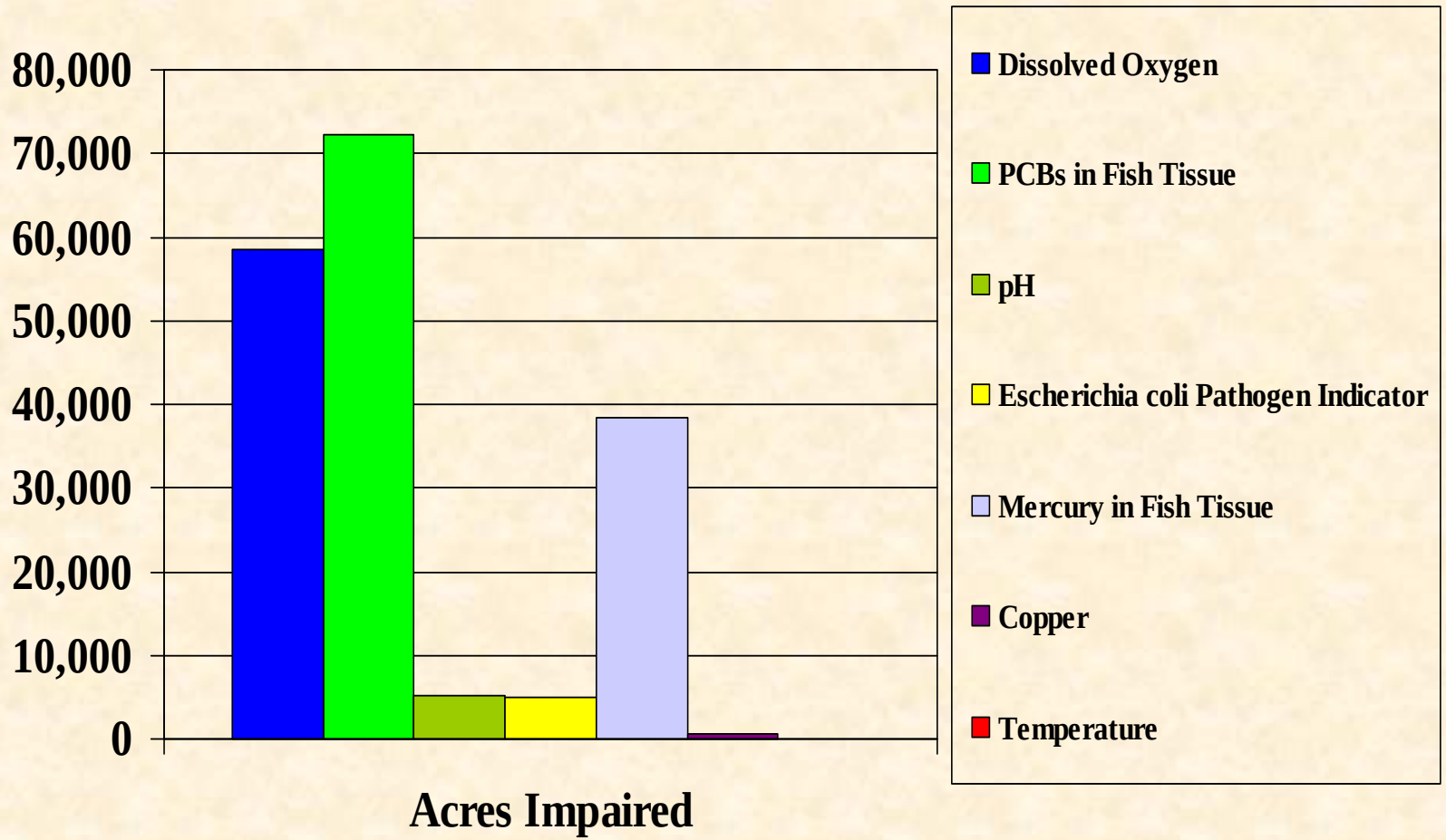
Waterbody Type	1998	2002	2004	2006	2008
Rivers 51,016 (miles)	2,611	4,838	6,931	9,002	10,543
Lakes 115,835 (acres)	0	115,558[1]	89,834	109,201	94,044
Estuaries 2,305 (sq. miles)	437	1,689	1,907	2,212	2,182

[1] Area included lakes shared by Virginia and North Carolina. 25,724 acres determined to be in North Carolina and removed from Virginia's 2004 total impaired acreage.

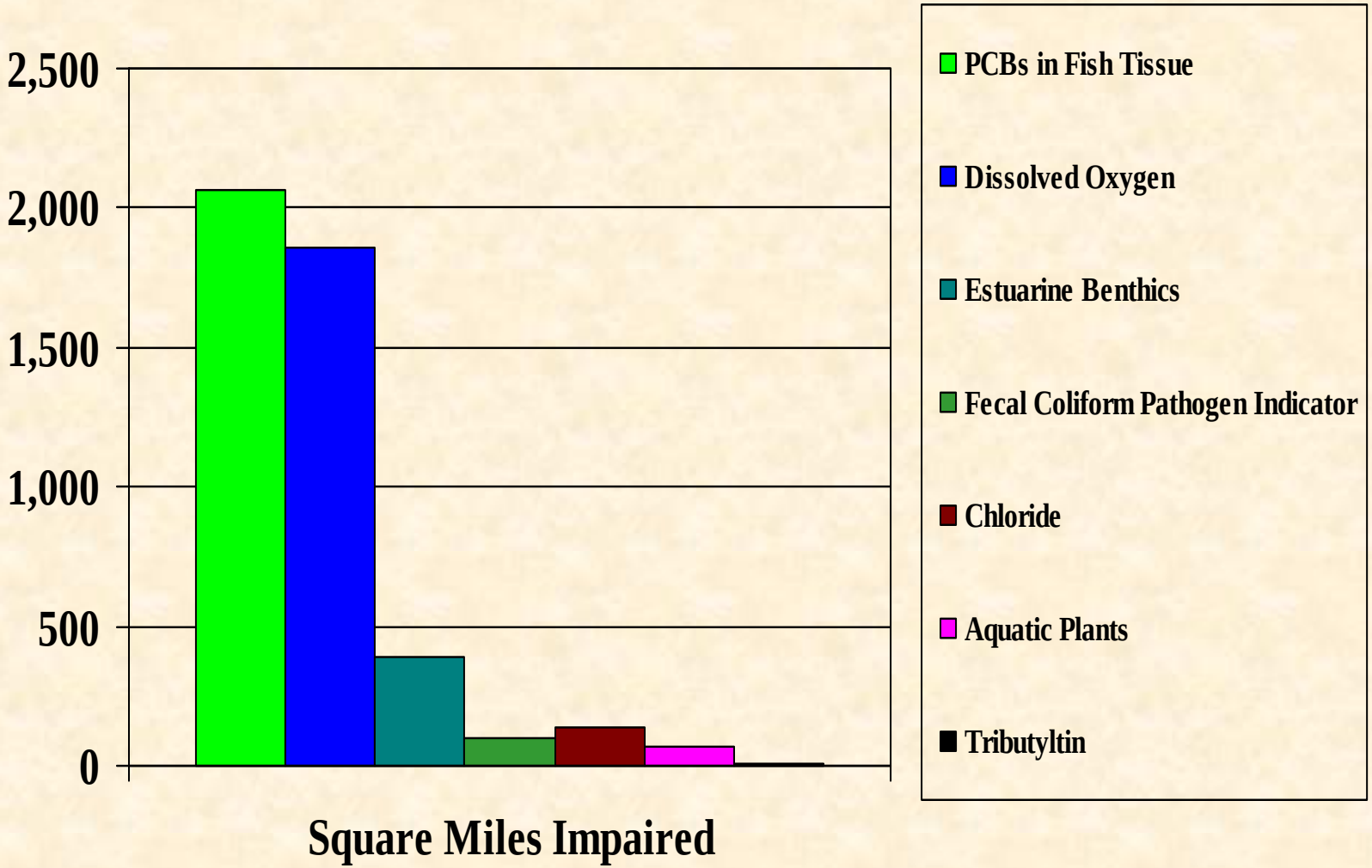
2008
Impairment Causes for Rivers



2008
Impairment Causes for Lakes



2008
Impairment Causes for Estuaries



Total Maximum Daily Loads

- TMDLs set a loading cap for a specific pollutant
- TMDL must be developed for each impaired water
- Watershed approach to restoring impaired waters
- TMDLs are expressed in terms of:
  - Daily and annual mass loading or other appropriate units
- Annual load is allocated among sources of pollutants within contributing watershed:
  - point sources – Waste Load Allocation (WLA)
  - non-point sources – Load Allocation (LA)
  - margin of safety (MOS)
  - TMDL = WLA + LA + MOS

TMDL Implementation Authorities

- State law directs DEQ to:
  1. develop TMDLs for impaired waters
  2. develop plans to implement TMDLs
  3. implement TMDLs
- WLAs - implemented through VPDES permits (DEQ, DMME, & DCR)
- LAs – develop implementation plans for non-point sources (DCR)
  - implement through cost share & other non-regulatory incentives
  - WLAs not included in TMDL IPs
- Under federal and state law, no additional regulatory authority created under a TMDL to implement non-point source actions

Status of TMDL Process

[through May 2008]

- TMDLs Developed for Impaired Waters
  - Covering 546 impairments
- TMDL Implementation Plans Developed
  - 88 completed; 29 more in progress
- Implementation underway
  - 40 received funds; 28 soon will
  - Seen water quality improvements, but standards not yet attained

Future of TMDL Development

- Virginia's TMDL program completes Consent Decree (CD) schedule in 2010
- Demand for TMDL development does not decrease after 2010
  - about 1,500 TMDLs statewide remaining to be developed by 2018 - based in 2006 listing
- EPA plans to replace the CD with a MOU containing a TMDL development schedule
  - plan to start MOU discussions in late 2008
- DEQ prefers some shift in resources towards implementation, not just further TMDL development

Need To Develop Chesapeake Bay TMDL

- Bay will not achieve water quality standards by 2010 so TMDL is needed
- VA working with EPA and five other Bay watershed states [and DC]
- TMDL is opportunity to assess progress and make adjustments in implementation
- Goal is for EPA to issue TMDL by end of 2010; under federal court schedule must be done by May 1, 2011
- Expect initial public meetings later this year to inform citizens of the process; draft TMDL should be noticed for public comment during summer of 2010

Permitting Point Sources Discharges

Virginia Pollutant Discharge Elimination System Permits

VPDES Permits

- Required when there is a point source discharge of pollutants to surface waters
- Permit includes:
  - Effluent limitations
  - Self monitoring and self reporting requirements
- Agencies involved:
  - DEQ – wastewater
  - DMME – mining
  - DCR – municipal storm water

Point Sources: Wastewater Treatment Plants

Point Source Discharges

- Focus DEQ resources through:
  - General Permit coverage (3,700 facilities)
  - Individual Permit issuance (1,100 facilities)
- Establish Priority Permits to be reissued each year - majors and discharges to impaired waters (TMDL)

Municipal & Industrial Discharge Permits

- **Effluent Limitations** in compliance with Water Quality Standards and Federal Effluent guidelines.
- **Antidegradation** – maintain existing high quality waters.
- **Antibacksliding** - no less stringent than previous permit.
- **Toxicity Testing** required where reasonable potential for standard violation.
- **Pretreatment** requirements for industrial discharges to municipal treatment plants.

Progress Report on Nutrient Trading in the Chesapeake Bay Watershed of Virginia

Chesapeake Bay Watershed Nutrient Credit Exchange Program adopted by VA General Assembly in 2005

DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Chesapeake Bay Watershed Point Source Regulations

- **Water Quality Management Planning Regulation** (9 VAC 25-720): effective 1/11/06
  - Sets nutrient waste load allocations for 125 significant discharges
- **Regulation for Nutrient Enriched Waters and Dischargers Within the Chesapeake Bay Watershed** (9 VAC 25-40): effective 11/16/05
  - Sets technology-based nutrient concentration limits for dischargers
- **General VPDES Watershed Permit Regulation** (9 VAC 25-820-10): effective 11/01/06
  - Implements the Chesapeake Bay Watershed Nutrient Credit Exchange Program
  - Will aid in meeting PS nutrient load caps cost-effectively and as soon as possible; and, will provide foundation for market-based incentives to achieve NPS nutrient load goals

Why Trading?

- Achieve nutrient reductions more cost-effectively and sooner
  - Compliance dates of January 1, 2011 for each river basin
- Means to maintain loading cap in the future
  - Est. savings of 23 – 33% in capital costs

General Permit Registrations

Nutrient Trading General Permit Effective January 1, 2007

124	"Significant" facilities
8	Bubbled "non-significant" facilities
20	New or expanding facilities currently registered
152	Current registrants

10	Pending registrations for new or expanding facilities
15	New or expanding facilities that have not registered

VA Nutrient Credit Exchange Assoc.

- Established under VA Code to aid wastewater treatment plant owners
- The “Exchange” is striving to keep the price of credits low in order to encourage trading

Class A “promised” buyers

Price - $4/lb TP and $2/lb TN

Sales to Exchange participants to meet unexpected requirements

If available, Price = 1.5 x Class A = $6/lb TP and $3/lb TN

Non-participants

If available, beyond Exchange participant needs, Price = 2 x Class A = $8/lb TP and $4/lb TN

Compliance Plans

Initial Compliance Plans submitted August 1, 2007

104 Facilities included in NCEA submittal

Updated Compliance Plans submitted February 1, 2008

111 Facilities included in NCEA submittal

How Does a Facility Grow Under Nutrient Caps?

- Upgrade to more advanced treatment
- Purchase additional point source allocations
- Reclamation and Reuse
  - Irrigation and industrial uses
- Non-Point Source Offsets
  - Agricultural and urban storm water BMPs
- Other reductions as approved by DEQ on a case-by-case basis
  - Taking septic systems off line (?)
  - Aquaculture (?)
  - Algal production and harvesting (?)
  - Others (?)

Reclamation and Reuse

Single largest opportunity to accommodate growth!

Non-point Source Nutrient Offsets

Virginia's first non-point source nutrient bank approved in August 2008:

- Wildwood Farm – Appomattox Co.
- Chesapeake Bay Nutrient Land Trust, LLC

Next Steps for Point Sources in Chesapeake Bay watershed

- Maintaining the nutrient caps is the long term challenge
- Nutrient loads discharged from WWTPs are limited – Growth is not
- Lots of creative possibilities
- Growth will only be limited if we refuse to change the manner in which we have grown in the past

Deposits to VA Water Quality Improvement Fund – Point Sources

- WQIF established in 1997 to provide grants for nutrient removal and other water quality projects.
- DEQ - point sources
- DCR – non-point sources
- 2007 General Assembly authorized up to an additional $250 million in bonds for PS nutrient projects.

Period	WQIF Funds for Bay Point Source Projects (Million Dollars)
FY 1998	$10.00
FY 1999	$37.10
FY 2000	$25.24
FY 2001	$10.30
Interest earned (through FY04)	$11.71
FY 2005	$13.25
Interest earned (FY05)	$0.29
FY 2006	$67.21
Interest earned (FY06)	$1.57
FY 2007	$197.33
Interest earned (FY07)	$8.46
FY 2008	$5.00
TOTAL DEPOSIT =	**$387.46**

Water Quality Improvement Fund Status for Point Sources

- 80 grant applications received by DEQ for construction of nutrient facilities
  - About $815 million requested
  - 74 applications from significant dischargers for projects to reduce nutrients
  - 6 applications from smaller dischargers to hold the line on nutrient load

- Have signed grant agreements for 41 of these projects
    - $525 million commitment

- Another 17 applications under active processing
    - $128 million requested

- Remaining facilities to finalize applications or request $ later as upgrades are needed

Timeline For Use of Bond Proceeds

- WQIF balance as of 6/30/08 = $228.0 M
- Mandatory FY09 Deposit = +$ 0.5 M
- Expected FY09 expenditures = - $210.8 M
- Projected balance as of 6/30/09 ~ $ 17.7 M

- Expect current funds in WQIF for point source projects to be depleted by Sept. ’09

- For FY10, expect to need approx. $176 M in bond proceeds to meet WQIF obligations

- Entire Bond Authorization estimated to be expended before the end of FY2011; presently have an anticipated funding gap of $103 million.

WQIF Funds Needed To Meet and Maintain Nutrient Caps

- Projects operating by 2011 to meet cap
  - 44 projects - $458 M
- Projects operating 2012 or later to maintain cap
  - 36 projects - $351 M
  - 24 projects - $144 M [est. - not yet applied]

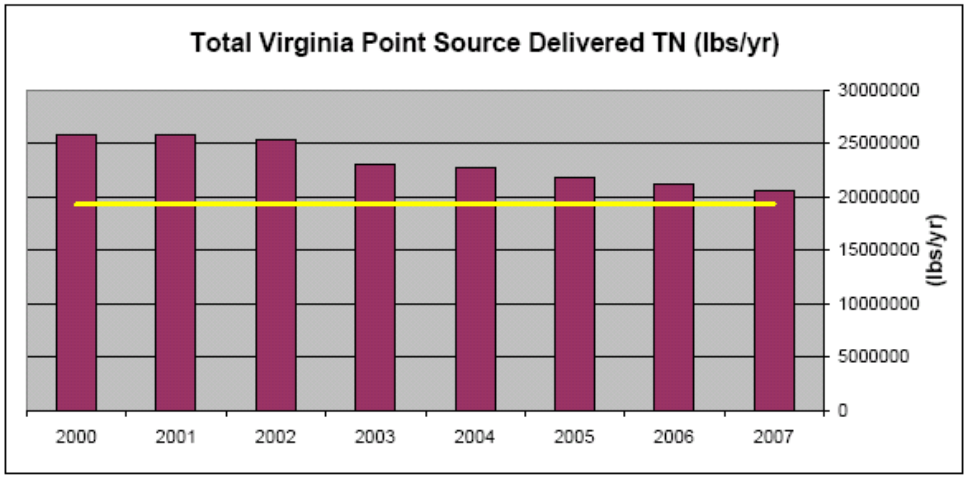
Revolving Loan Fund

Funds Provided from 2004-2009

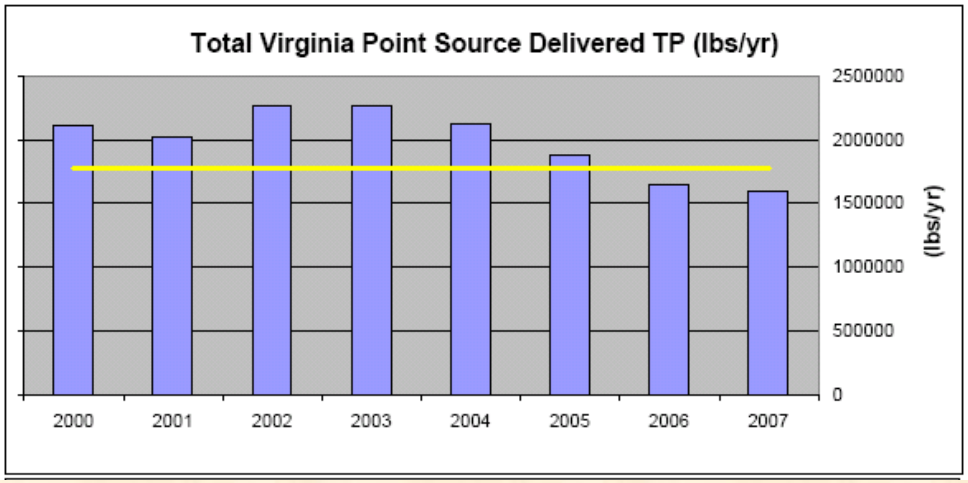
Year	Total Funds (million $)	Ches Bay Nutrients (million $)
2004	$195.29	$133.57
2005	$62.49	$13.75
2006	$103.79	$39.06
2007	$339.97	$298.79
2008	$247.57	$216.47
2009	$260.69	192.31
Totals	$1,209.82 (103 projects)	$893.95 (36 projects)

Progress in Nutrient Reduction Wastewater Point Sources - 2007

- Virginia PS nitrogen loads are less than 6% over loading cap
- All five river basins still over their caps
- Most of reduction to date in the Potomac basin



- Virginia PS phosphorus loads below total cap
- Two river basins have met their cap [York and James] and three still over



Point Source Nutrient Loads 2007 vs. Nutrient Load Caps

[Million Pounds/Year]

River Basin	Number of Significant Dischargers	**Total Nitrogen Delivered Load**		**Total Phosphorus Delivered Load**	
		2007	CAP	2007	CAP
Shenandoah-Potomac*	44	3.62	3.41	0.269	0.188
Rappahannock	25	0.52	0.50	0.057	0.042
York	11	1.41	0.96	0.140	0.162
James	39	14.13	13.90	1.115	1.352
Eastern Shore	5	0.18	0.03	0.004	0.002
TOTALS =	**124**	**19.87**	**18.80**	**1.585**	**1.745**

*Note: figures do not include VA Portion of Blue Plains

Presentation to the State Water Commission

"Reducing Nonpoint Source Pollution"

January 12 , 2009

Joseph H. Maroon, Director
Virginia Department of Conservation and Recreation

***State Parks * Soil and Water Conservation * Natural Heritage**
*** Outdoor Recreation Planning * Land Conservation**
*** Dam Safety and Floodplain Management**
*** Chesapeake Bay Local Assistance**

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Virginia Department of Conservation & Recreation

Presentation Overview

- Nonpoint Source Pollution Loads by Source
- Tributary Strategies Overview
- Nonpoint Source Implementation
  - Agricultural Sources
  - Developed and Developing Lands
- Nonpoint Source Innovations
- Nonpoint Challenges and Future Directions

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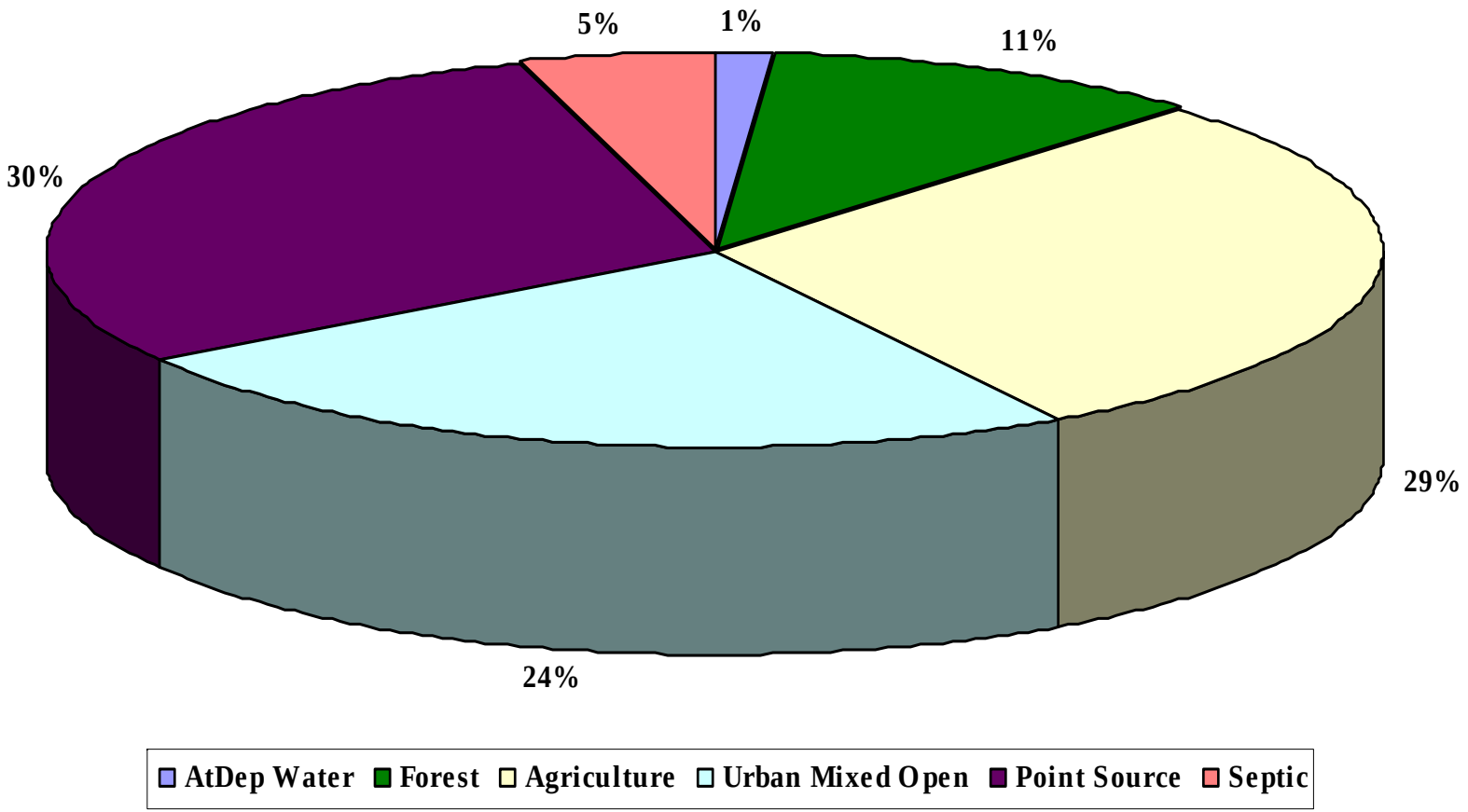
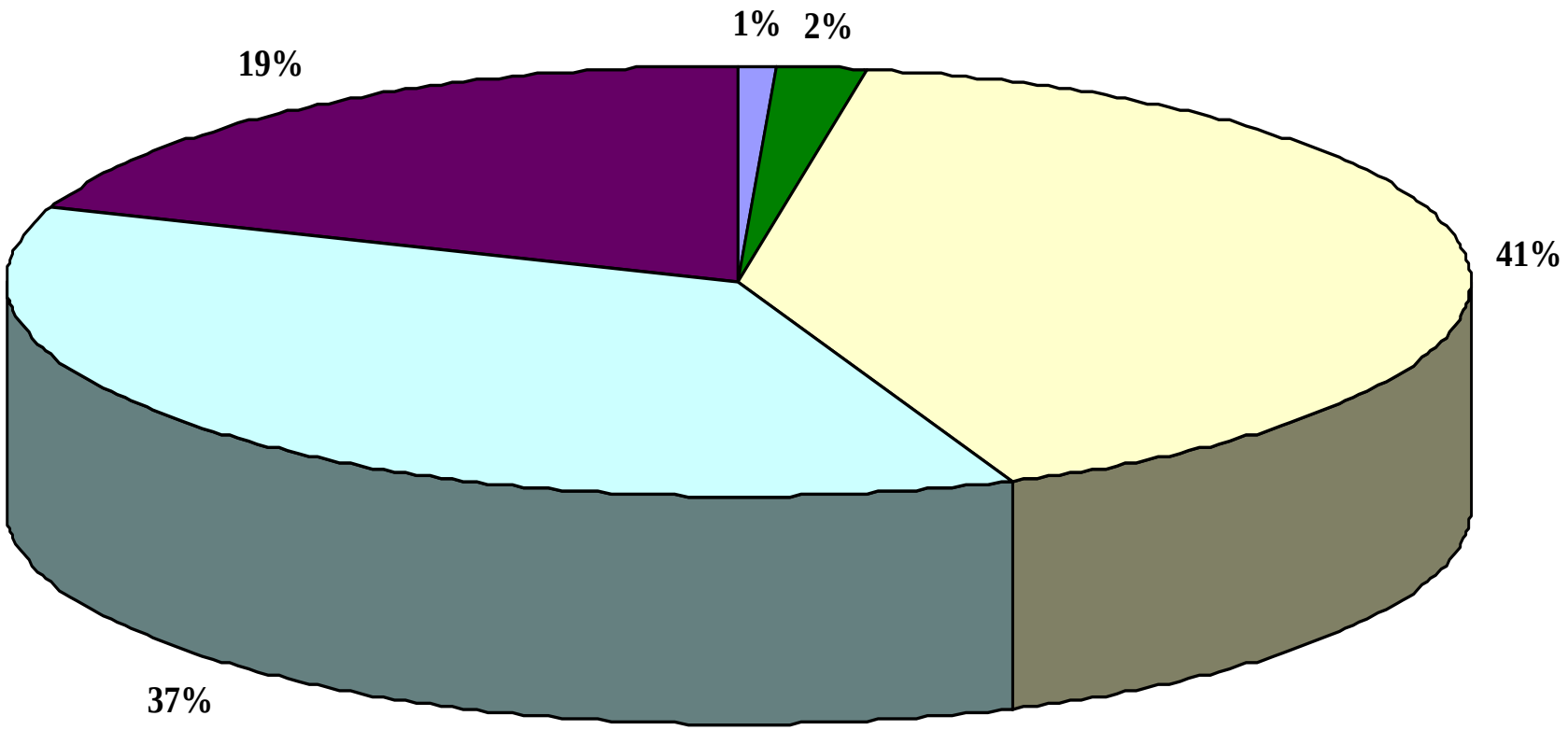
Virginia Department of Conservation & Recreation

2007 Virginia Total Nitrogen Relative Loadings by Source (point and nonpoint)



2007 Virginia Total Phosphorus Relative Loadings by Source (point and nonpoint)



Summary of Nonpoint Loadings

(Loading Estimates from Chesapeake Bay Program Watershed Model)

Nitrogen:

- Agriculture Sources: 46%
- Urban or Suburban Sources: 38%
- Forest: 16%

Phosphorus:

- Agriculture Sources: 52%
- Urban or Suburban Sources: 46%
- Forest: 3%

Sediment

- Agriculture Sources: 40%
- Forest: 28% (Note: Watershed is still predominately forested, however on a per acre basis forest loads are the smallest)
- Urban or Suburban Sources: 23%

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STATE OF THE
CHESAPEAKE BAY PROGRAM
Summary Report to the Chesapeake Executive Council
November 20, 2008

"The pressures of population growth and development are the greatest challenge to restoring and protecting the Chesapeake Bay and its watershed. Suburban and urban stormwater runoff is the only source of pollution that is increasing. From 1990 to 2000, the watershed population grew 8 percent, while impervious surface rose by 41 percent."

Chesapeake Bay Program
A Watershed Partnership

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Virginia Department of Conservation & Recreation

Virginia's Tributary Strategies

- **Published in 2003 for Virginia's Chesapeake Bay tributaries:** Shenandoah/Potomac, Rappahannock, York, James and Eastern Shore
- **Includes point and nonpoint source provisions** expressed as "input decks" of treatment levels and BMPs for evaluation by the Ches. Bay Program model
- **Designed to meet loading limits (allocations)** assigned through the Chesapeake Bay Program (6 states, DC and EPA) to meet water quality standards in tidal waters (dissolved oxygen, water clarity and chlorophyll "a")
- **Next Generation** of "strategies" (implementation plans) will be designed to meet allocations assigned in bay-wide TMDL

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Tributary Strategies (con't)

- Current Tributary Strategy implementation guided by Chesapeake Bay and Virginia Waters Clean-up Plan ("HB 1150")

  Plan Elements:
  - Land Conservation
  - Wastewater Treatment Plants
  - Agriculture
  - Developed and Developing Lands
  - Air

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Clean-up Plan Implementation - Agricultural Programs

- **Voluntary BMP Cost-Share Programs (Financial Incentives)** Funded by the WQIF "Natural Resources Commitment Fund" - Chesapeake Bay (57%); Southern Rivers (38%); Soil and Water Conservation Districts (5%) ($20 million proposed in FY 2010 by Governor with 8% to Districts)
- **Targeted 5 Priority Practices:** Cover Crops, Riparian Buffers, Conservation Tillage, Nutrient Management, Livestock Exclusion (Fencing livestock out of streams and installation of watering systems)
- **Existing Nutrient Management Requirements**: CAFO; Poultry Operations; Biosolids Application sites; State owned lands.
- **Strategic livestock initiatives**: Voluntary poultry litter transport program; use of feed additives ("phytase") to reduce nutrients at beef/dairy operations and poultry farms
- **Implementation of TMDL** (impaired waters) clean-up plans in Southern Rivers watersheds

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Developed and Developing Lands

- **Erosion and Sediment Control (statewide)**
  - DCR oversees 165 locally administered programs (82% are currently consistent with State Law & Regulations).
- **Stormwater Management (statewide)**
  - Reduce long-term impacts to water quality & quantity resulting from land development & prevent downstream flooding
  - Significant regulatory changes underway that will establish technical standards and local administration
- **Chesapeake Bay Preservation Act (applies only to 84 "Tidewater"/coastal plain jurisdictions)**
  - Key elements: bmp inspection and maintenance, septic pumpout, code and ordinance review

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Nonpoint Source – New Technologies and Innovation

- Innovative Market research and outreach

“Chesapeake Club”

  - Focused on lawn care in suburban areas
  - Sought to change fertilizing behavior through “social marketing campaign” first in NoVA, then Richmond and Hampton Roads
  - Pre and post campaign surveys show it to be an effective methods of reaching consumers and homeowners

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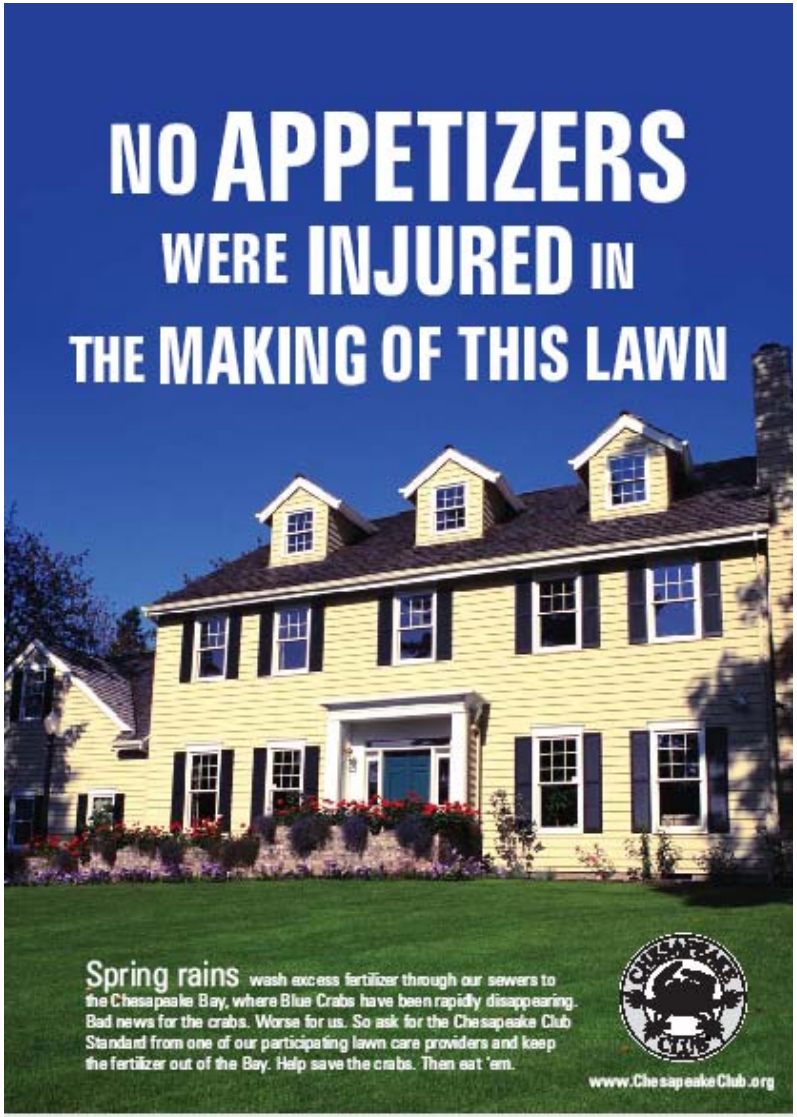
NO APPETIZERS WERE INJURED IN THE MAKING OF THIS LAWN



Participating providers in the Greater Richmond area:

Rio Grande Landscape Management, Mechanicsville (804) 569-1935 • R.J. Davis Lawn Care, Glen Allen, (804) 798-0492 • Lin's Landscaping Service, Mechanicsville (804) 746-3737 • Mike's Services, Bumpass, (540) 872-7232 • Maroon's Mowing, Bon Air (804) 555-2121 • Hokie Hi-Grass Services, Short Pump (804) 555-1212 Jack's Lawn Care, Hanover (804) 555-2222 • Blue-Green Lawns, Ashland (804) 555-5454 • Lawns-R-Us, Chesterfield (804) 555-3232 • Evergreen Lawn and Landscape, Sandston (804) 555-4141

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Nonpoint Innovation - Agriculture

- **Agricultural Marketing**
  - Strategies based on direct research with farmers and others in the agricultural community
  - Developed marketing methods based on “trusted” sources and need to emphasize production
  - Pilot in Shenandoah Valley Soil and Water Conservation Districts aimed at reaching more farmers and increasing participation
  - Marketing materials made available to all Soil and Water Conservation Districts
  - Results: Increased use of cost share dollars in targeted districts

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Nonpoint Innovation - Stormwater

- Developing the web-based Stormwater BMP “clearinghouse” (with VT Water Resources Center and expert committee).
- Promotion of “LID” (Low Impact Development) methods as part of proposed stormwater regulations.
- Regional approach (with Chesapeake Bay states and EPA) to evaluate of BMP effectiveness and innovative approaches.

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Virginia Stormwater BMP Clearinghouse

VWRRC Pages
Search VWRRC GO

Search World Wide Web

- Virginia Stormwater BMP Clearinghouse
- Virginia Stormwater Management Program
- Virginia Department of Conservation and Recreation

- Virginia Stormwater Regulatory Programs
- Stormwater BMP Selection
- BMP Standards and Specifications
- BMP Costs
- Operation Inspection and Maintenance
- BMP Evaluation and Certification
- References and Tools
- FAQ's

DCR Department of Conservation & Recreation

Virginia WATER RESOURCES Research Center

References and Tools

References:

- Relevant articles, papers, handbook, etc (.pdf)
- Useful Web Sites
  - List of web links

Useful tools:

- BMP cost calculator tool
- BMP selection tool (Kibler/Young)
- BMP performance bond calculator (cwf)
- Other (?)

Nonpoint Innovation

Rainwater “Harvesting” is a form of reuse that collects and stores water for nonpotable uses.

Legislative Authority: 10.1-603.4. 9. *Promote the reclamation and reuse of stormwater for uses other than potable water in order to protect state waters and the public health and to minimize the direct discharge of pollutants into state waters;* **(adopted by 2008 GA)**

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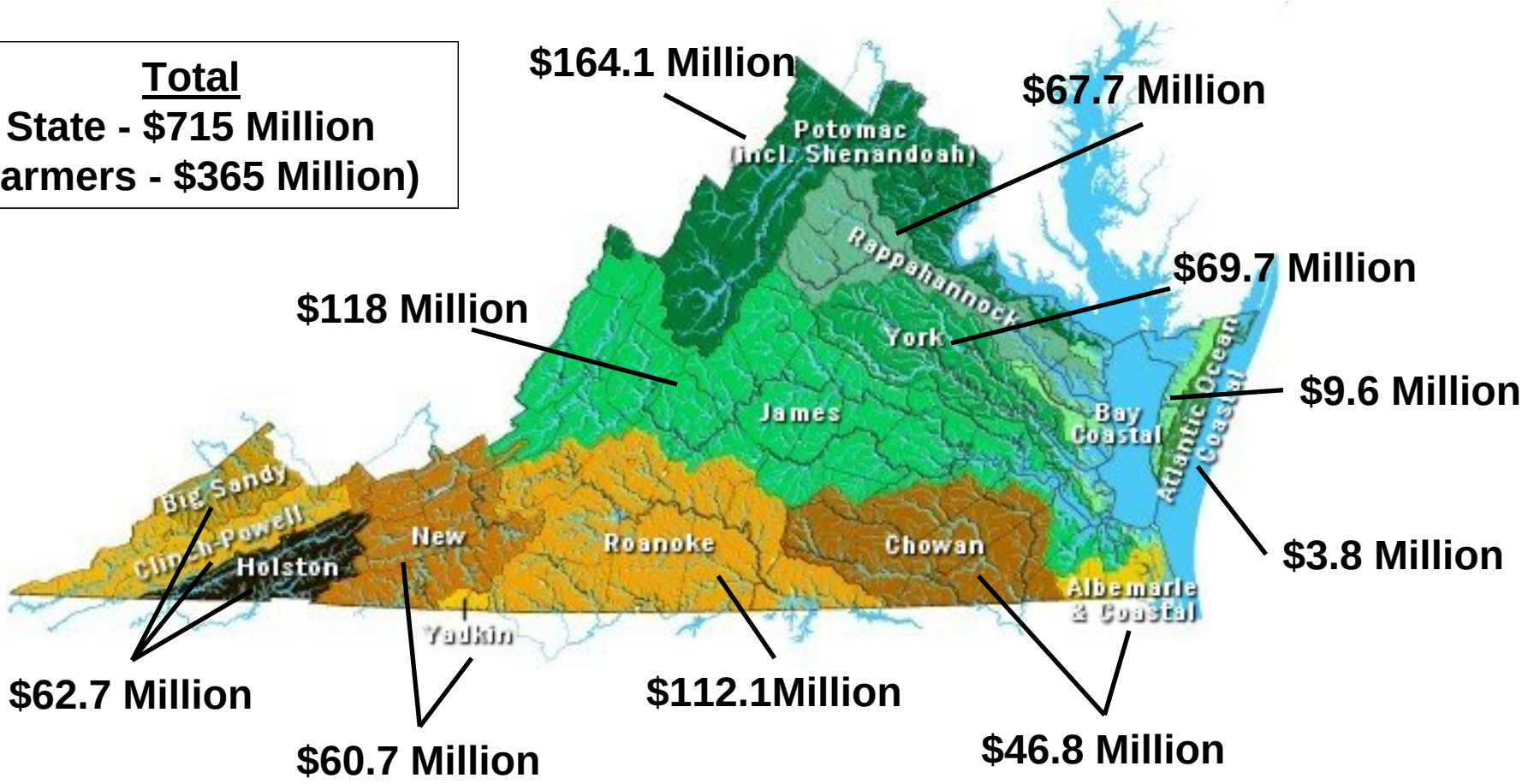
Nonpoint Source Challenges and Future Directions

- Nonpoint sources difficult to address: Thousands of diffuse sources; impacts of a changing climate; ongoing maintenance
- Determining the appropriate mix of incentive and regulatory programs
- Need for on-the-ground technical assistance system (Soil and Water Conservation Districts and DCR staff)
- Stormwater runoff from developed and developing lands is increasing while pollution from wastewater and agriculture have declined.
- Baywide TMDL – Establishing and meeting interim goals, need for "reasonable assurance" for nonpoint reductions, high levels of reductions (likely beyond tributary strategy levels")
- Agriculture "Champion" – Governor Kaine, in cooperation with the Chesapeake Bay Program partners has committed to accelerating agriculture reductions
- Working with Federal partner (NRCS) to target Ches. Bay. Farm Bill funds to Virginia priorities (areas and practices).
- Lack of sustained and reliable funding for incentive-based programs

6-Year State Funding Needs for Agricultural BMPs

Total
State - $715 Million
(Farmers - $365 Million)



10/10/2008

History of WQIF Funding - Nonpoint Source

Funding has been unpredictable and dependent upon state surpluses and year-end contributions to the Water Quality Improvement Fund – Nonpoint account.

- FY 02 – No funding
- FY 03 – No funding
- FY 04 – No funding
- FY 05 – $ 9.4 M
- FY 06 – $ 69.7 M
- FY 07 – $ 3.8 M (added in caboose bill during 2007 session)
- FY 08 – No funding
- FY 09 - $ 20 M (Ag. BMPs only 5% to districts for technical assistance)
- FY 10 - $ 20 M (Ag. BMPs proposed in Governor's Budget – 8% to districts for technical assistance)

Water Research and Public Policy

Stephen H. Schoenholtz

Presentation to State Water Commission
12 January 2009

Virginia
WATER RESOURCES
Research Center

At Virginia Tech since 1965
210 Cheatham Hall (0444), Blacksburg, VA 24061
(540) 231-5624 | www.vwrrc.vt.edu | water@vt.edu

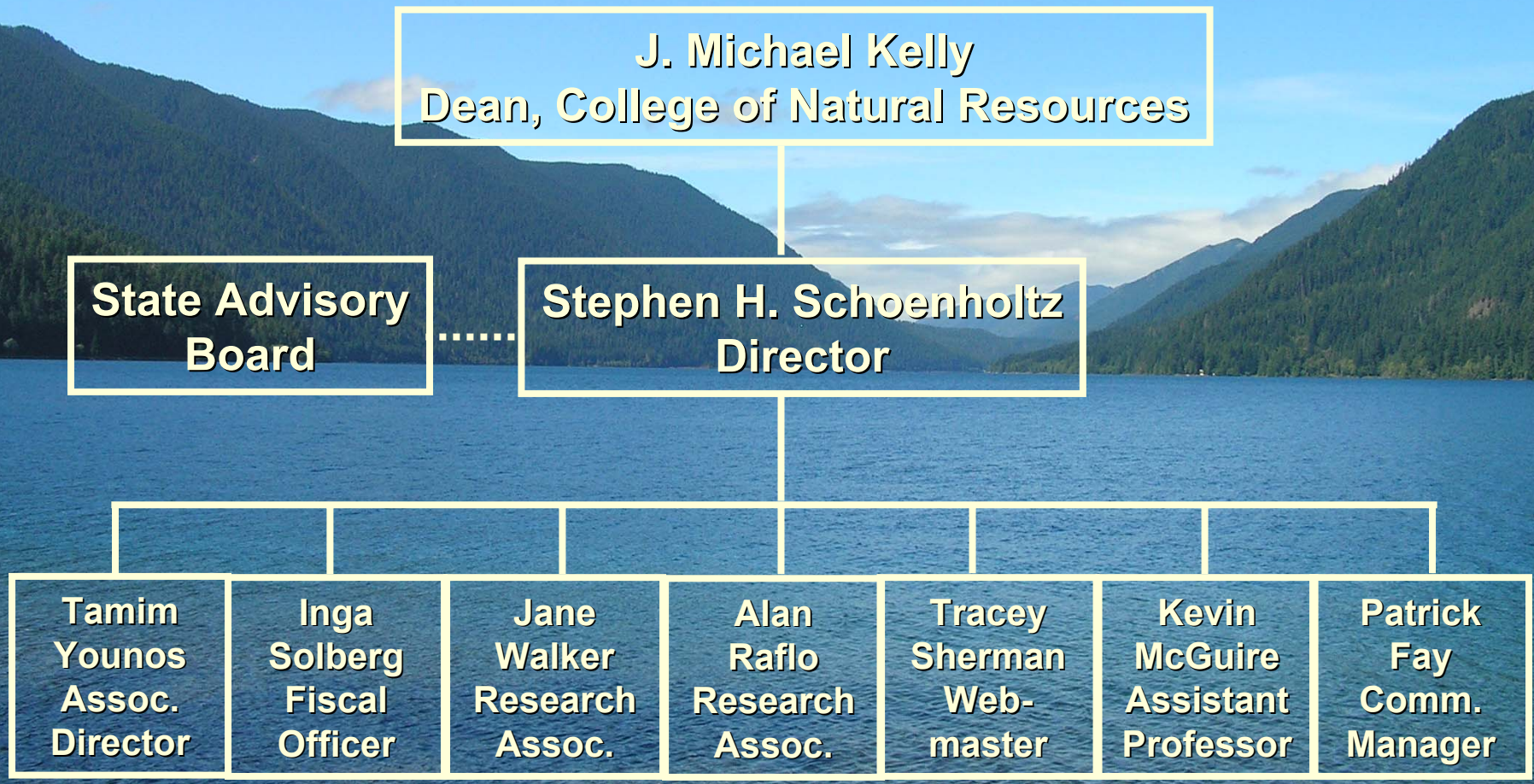
History

- Federal Water Resources Research Act of 1964 - promote water research and education
- Virginia Water Center established at Virginia Tech in 1965
- Authorized in 1982 as a state agency by the Virginia General Assembly
- Joined VT College of Natural Resources in July 2005

Mission

- ✓ Provide research & educational opportunities to future water scientists
- ✓ Encourage studies of practical solutions to water-resources problems
- ✓ Facilitate transfer of water-resources information to policy- and decision-makers

Who we are

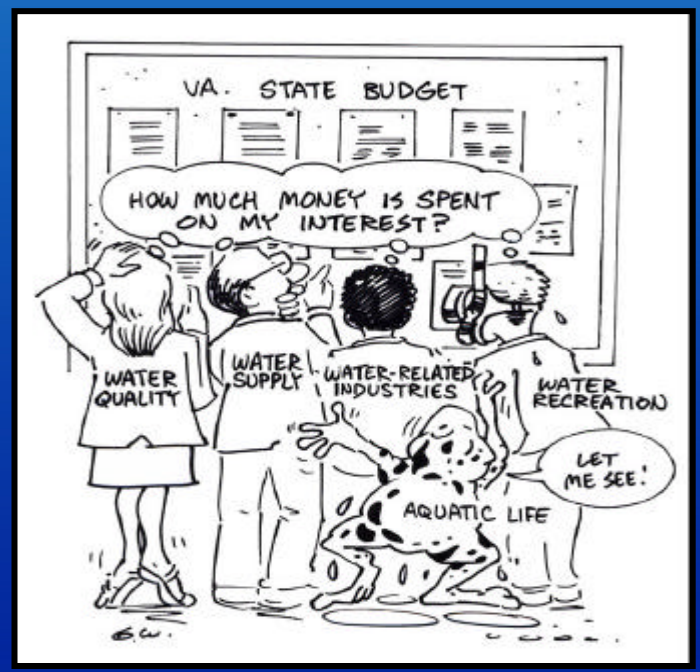

J. Michael Kelly
Dean, College of Natural Resources
State Advisory Board
Stephen H. Schoenholtz
Director
Tamim Younos
Assoc. Director
Inga Solberg
Fiscal Officer
Jane Walker
Research Assoc.
Alan Raflo
Research Assoc.
Tracey Sherman
Web-master
Kevin McGuire
Assistant Professor
Patrick Fay
Comm. Manager

Find YOUR Water Issue…

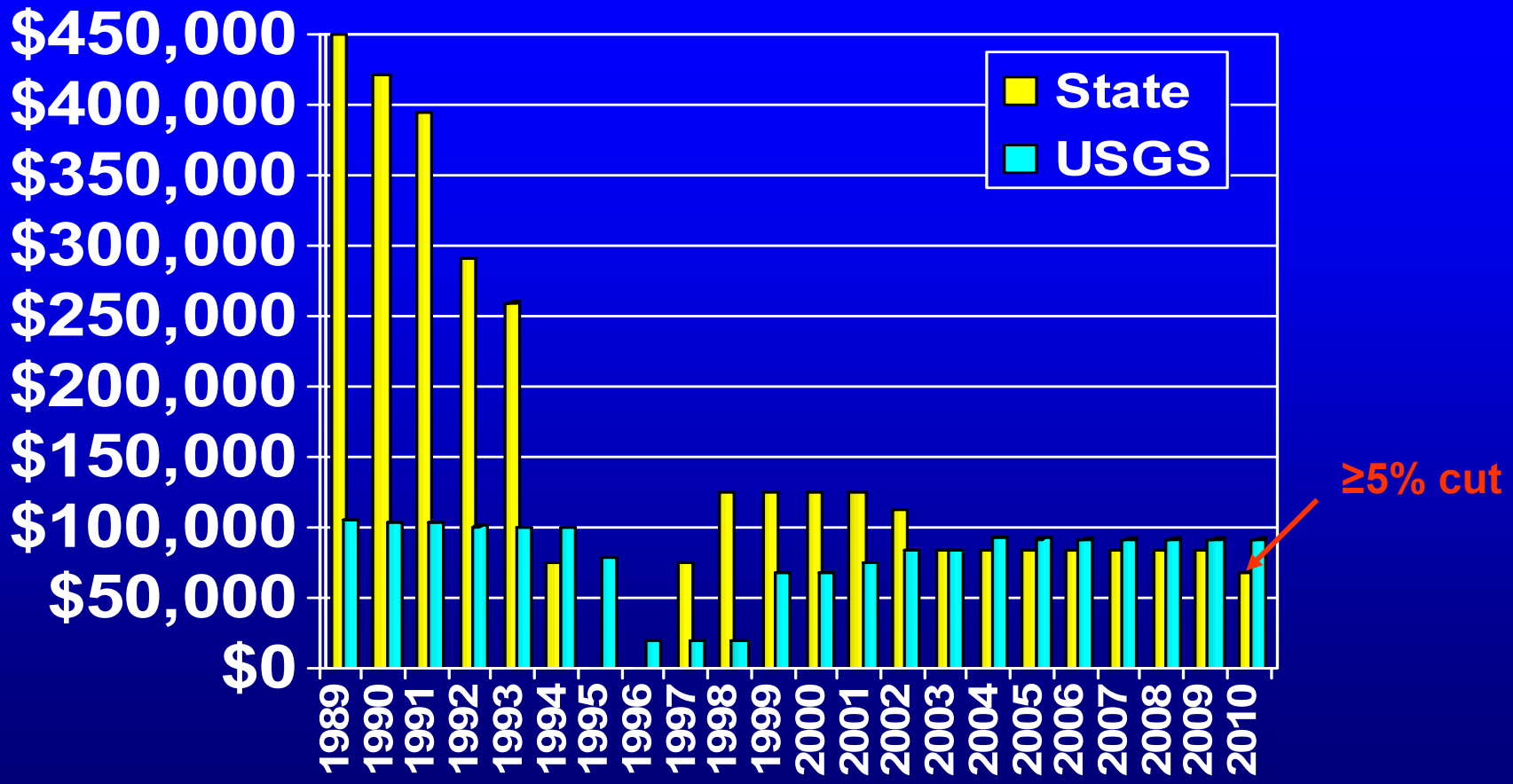
- Drought
- Energy and Water
- Climate Change
- Federal, State, and Local Budgets
- Water Infrastructure Funding
- Safe Drinking Water Act
- Source Water Assessment/Protection
- Water Supply Planning
- Water Supply Capacity and Reliability
- Water Supply Regulations
- Groundwater Quantity
- Groundwater Quality
- Desalination
- Wastewater Treatment Regulations
- Wastewater Treatment Capacity
- Biosolids
- Clean Water Act
- TMDLs
- Wetlands
- Chesapeake Bay
- Transboundary Water Transfers
- Southern Rivers
- Floods
- Biofuel Production
- Mining
- Stormwater
- Nutrient Management
- Erosion/sediment Control
- Water Quality Trading
- Water Quality Monitoring
- Fish Kills
- Beach Water Quality
- Bacteria
- Watershed Planning and Management
- Stream Restoration
- Tropical Storms
- Marine Fisheries and Policies
- Riverfront Development
- Non-native Species
- Solid Waste Management
- Electronic Waste
- Emerging Contaminants

Sources of Support

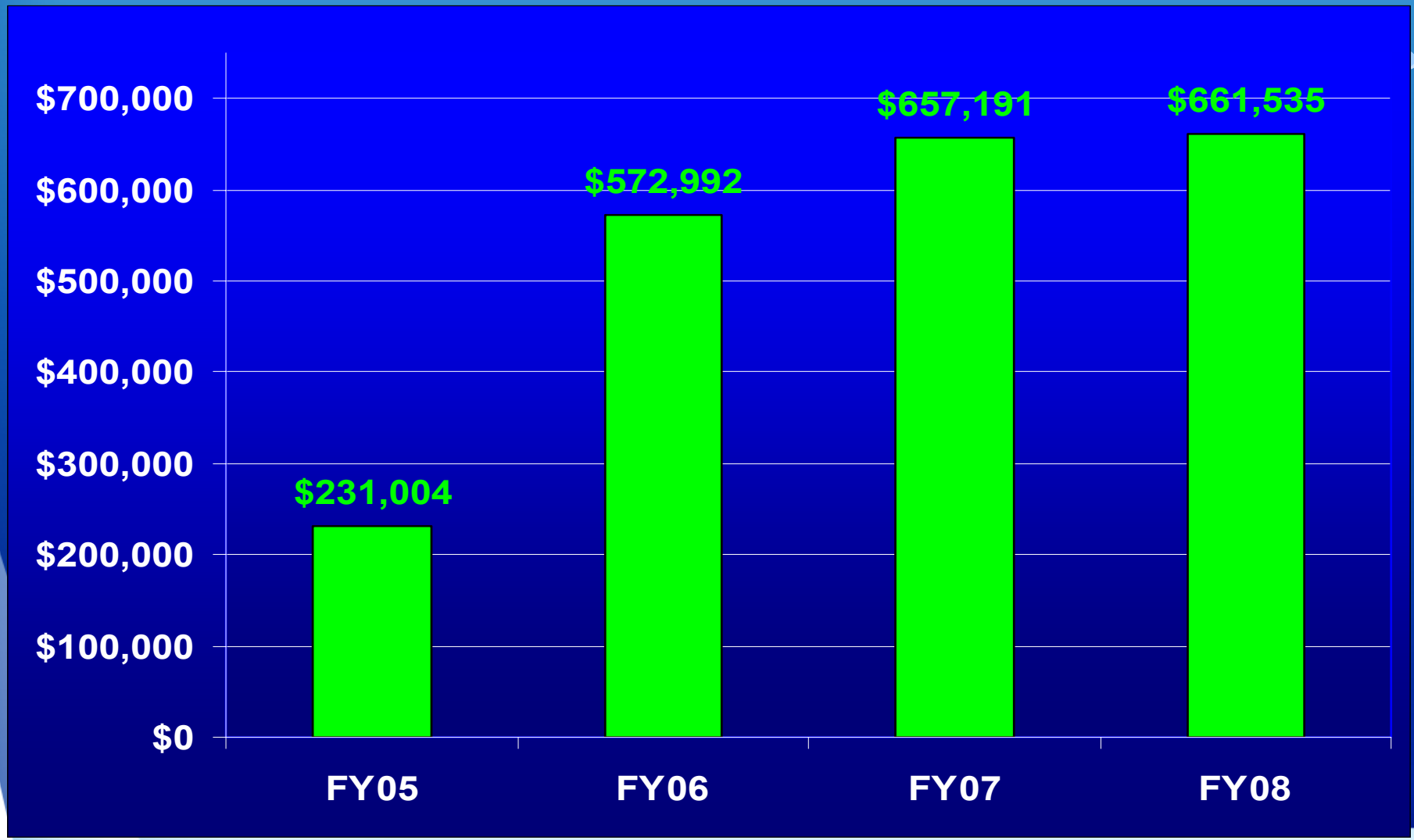
- USGS Base Grant (Federal)
- State Appropriation
- Virginia Tech
- External Grants



History of Base Support

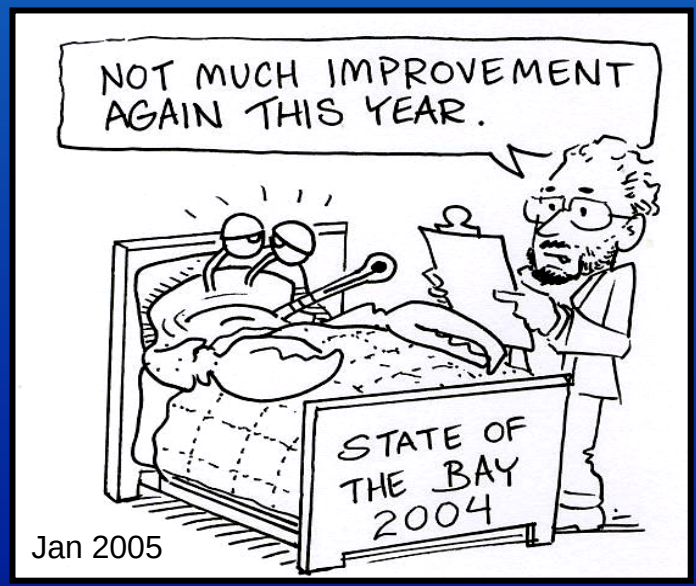


Recent External Support



Water Center Programs

- ✓ Research
- ✓ Education – Student Support
- ✓ Collaboration
- ✓ Outreach



Research

- Competitive Grants Program
- Facilitated and Collaborative Grants

Competitive Grants Program

- Microtopography effects on vegetative and biogeochemical patterns in created wetlands (GMU)
- Ecology of mycobacterial striped bass pathogens in water and sediments of the Rappahannock River (VIMS)
- Molecular assessment of the fate of pathogenic organisms in dairy manure (VT)

Currently Funded Research Projects

- Dissolved C & N retention & transport in forested catchments (USFS)
- TDS water quality standard for coalfield streams (DEQ, DMME, PRP)
- Coalfield stream restoration assessment (VT ICTAS)

Currently Funded Research Projects

- Stormwater BMP optimization (EPA)
- Rainfall harvesting for stormwater management (DCR)
- Decentralized energy/water systems (VT ICTAS)
- Nutrient criteria for wadeable streams (EPA)

Education – Student Support

- William R. Walker Graduate Fellowship
- Graduate assistantships
- Undergraduate research assistantships & internships (USGS-JMU)
- NSF REU – summers 2007, 08, 09

Collaboration

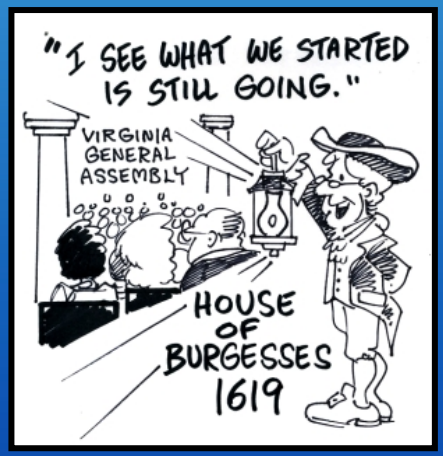
- Academic Advisory Committee (DEQ)
  - Nutrient criteria for VA's freshwaters
- Virginia Water Monitoring Council
- DCR Stormwater BMP Clearinghouse
- Clinch-Powell Clean Rivers Initiative

Outreach

- Website (*vwrrc.vt.edu*)
  - Legislative & water news updates
  - Online publications
  - Homepage for other programs
    - (VWMC, Stormwater BMPs, CPCRI)
- *Water Central* Newsletter
- Symposia, Seminars, Workshops

Website Assistance

Water Status Pages



Virginia Water Legislation

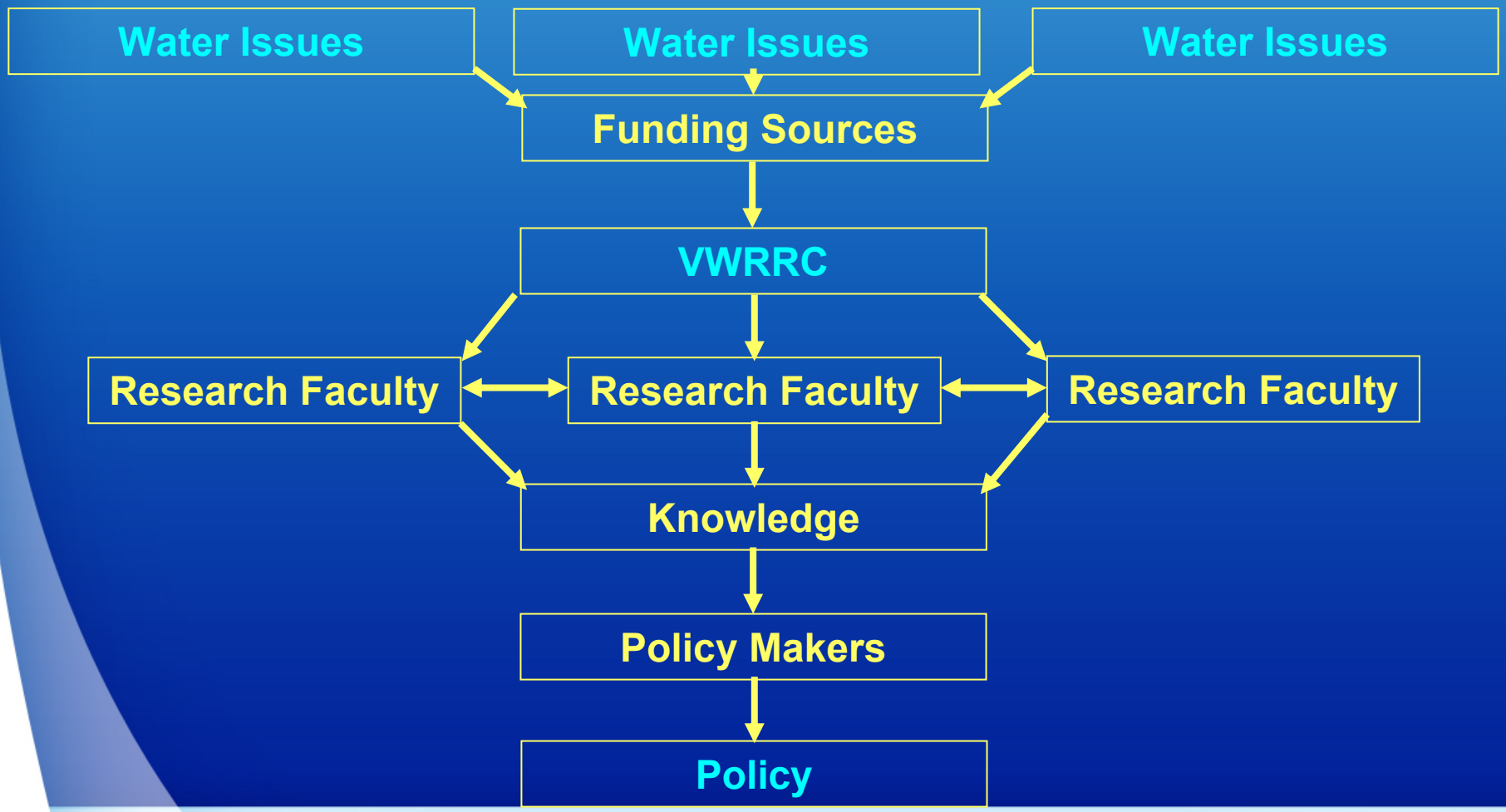
Annotated News Articles

Plus:

Virginia water conferences, workshops, and other events.

Ask a water question!

Research-Policy Connection: VWRRC Role



VWRRC Vision

- Strengthen linkages between Water Center and govt. agencies, industry, NGOs, academia, water-users
- Provide a clearinghouse for water information, tools, expertise, management
- Increase base funding and external funding

VWRRC Vision

- Promote annual water symposium
- Advance multi- & interdisciplinary approaches
- Collaborate with researchers at institutions across the Commonwealth

Thank you

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Illustrations by George Wills

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