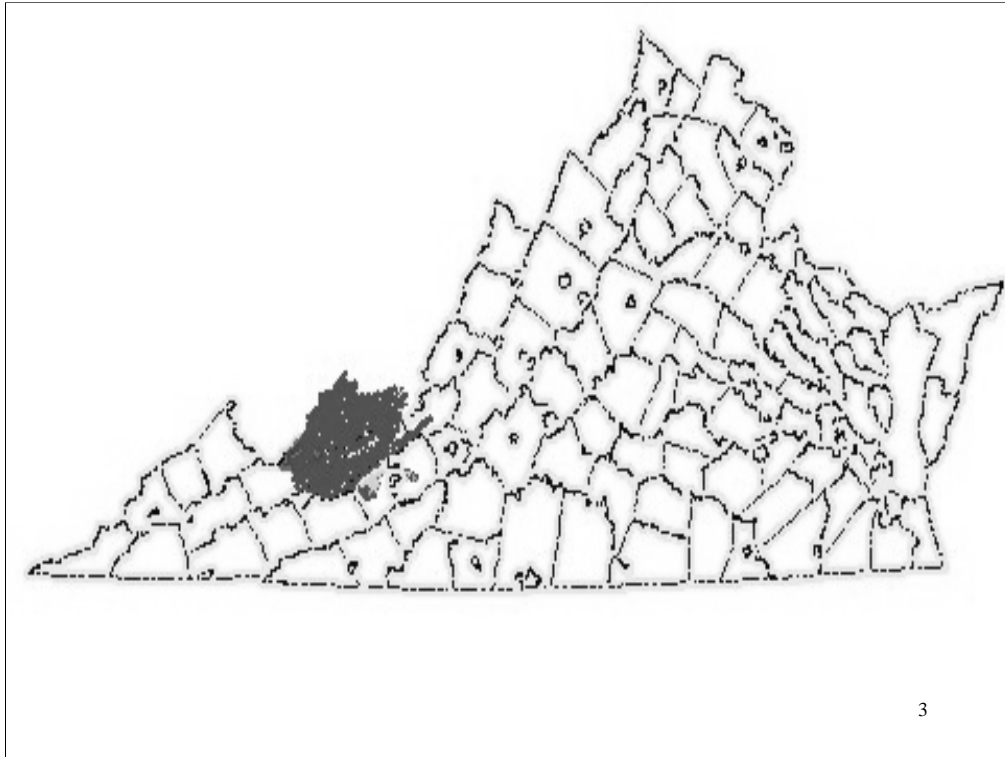


# From SPMD Results to a PCB TMDL in the Bluestone River Watershed



## **Why SPMD testing: History of the Watershed and Virginia's Dilemma**

- **Discovery of PCBs in fish and sediments in the Bluestone River**
- **Timeline**
- **Comparison & Contrast: Old Way versus SPMD Rare Project**
- **Project Implications for Future and Conclusion: What Did We Learn?**



- **Introduction to historical Bluestone River region PCB uses (vector transport issues, multimedia studies, and current VA DEQ PCB TMDL goals)**
- **Historic Data Summary: Fish and Sediments**
- **PCB Impairment - VDH Fish Advisory**
- **Locating PCB Sources**
- **Public meetings and WTP concerns**
- **Rare EPA ORD project: recent sampling, 3 rounds of SPMD Stream Sampling, Innovative SPMDs (High Flow Conditions)**
- **Conclusions and Future Goals**

## **PCB in the Bluestone**

- **DEQ found PCB in the sediment and fish tissue**
  - **PCB binds tightly to the soil and sediment**
  - **Very little chemical degradation**
  - **Transports readily downstream; held up in riparian buffer zones and reservoirs**
  - **Concentrates (Bioaccumulates) in fish tissue**
    - **Carp highest concentrations**
  - **Not found in water column test**
  - **Various sediment grab results disagree.**

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## **DEQ Goals**

- **Ensure that there are no active contributors of PCB to the watershed**
  - **information and input from the stakeholders: bacteria and benthic TMDL meetings and surveys; and**
  - **Strategic Sampling sediment, fish, and SPMDs.**
- **Development of a TMDL for PCBs and evaluate for cleanup in the Bluestone – future, NOW!**
- **Continue to coordinate with WVDEP, WVDHHR, EPA, VDH, and stakeholders, to determine the extent and potential for drinking water contamination from PCBs or Dioxins.**

## **Timeline**

- **Summer 2000 initial fish and sediment samples;**
- **Summer 2002 second fish and sediment samples;**
- **Fall 2003 fish and sediment samples upstream of the WTP;**
- **Spring 2004 DEQ SPMD and EPA, WVDEP, and DEQ sediment testing in the watershed, to determine the contributions from tributaries and specific sources;**
- **Results (except for EPA sediment samples dated spring 2004) are located at <http://www.deq.state.va.us/watermonitoring/>**

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## **VDH Fish Advisory --PCB**

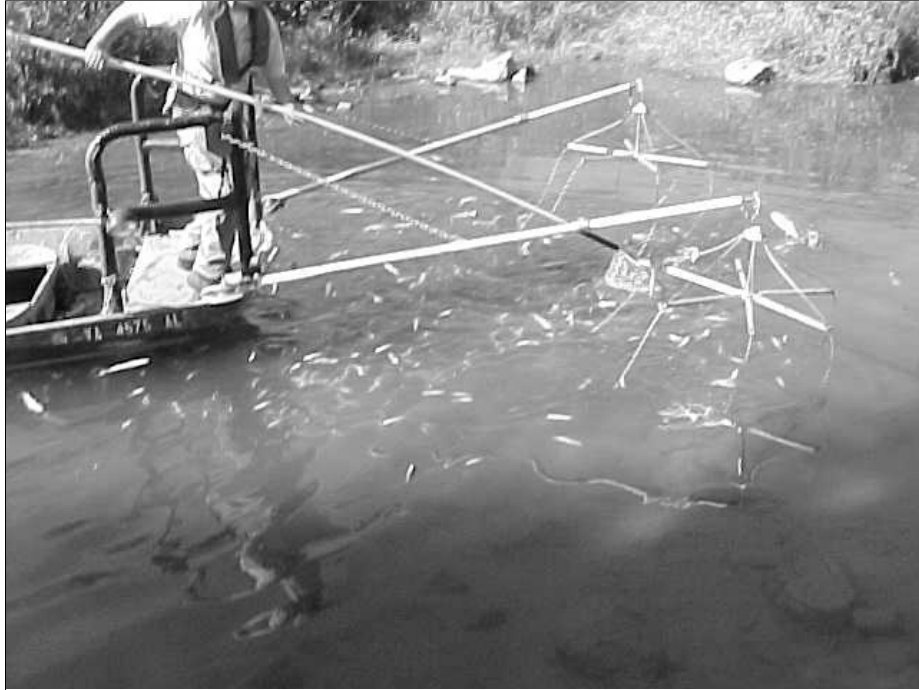
- **Bluestone River** at the Route 460 bridge crossing south of Bluefield downstream to the Virginia/West Virginia state line near the town of Yards in Tazewell County
- Carp caught in these waters should not be consumed. (8/6/01)
- [http://www.vdh.state.va.us/HHControl/fishing\\_advisories.htm](http://www.vdh.state.va.us/HHControl/fishing_advisories.htm)





## **Town of Bluefield Water Treatment Plant**

- Public Concern
- DEQ Ambient Water Quality - Clean Water Act - State Water Control Law- State Water Quality Improvement Act
- VDH - Potable Water - Safe Drinking Water Act



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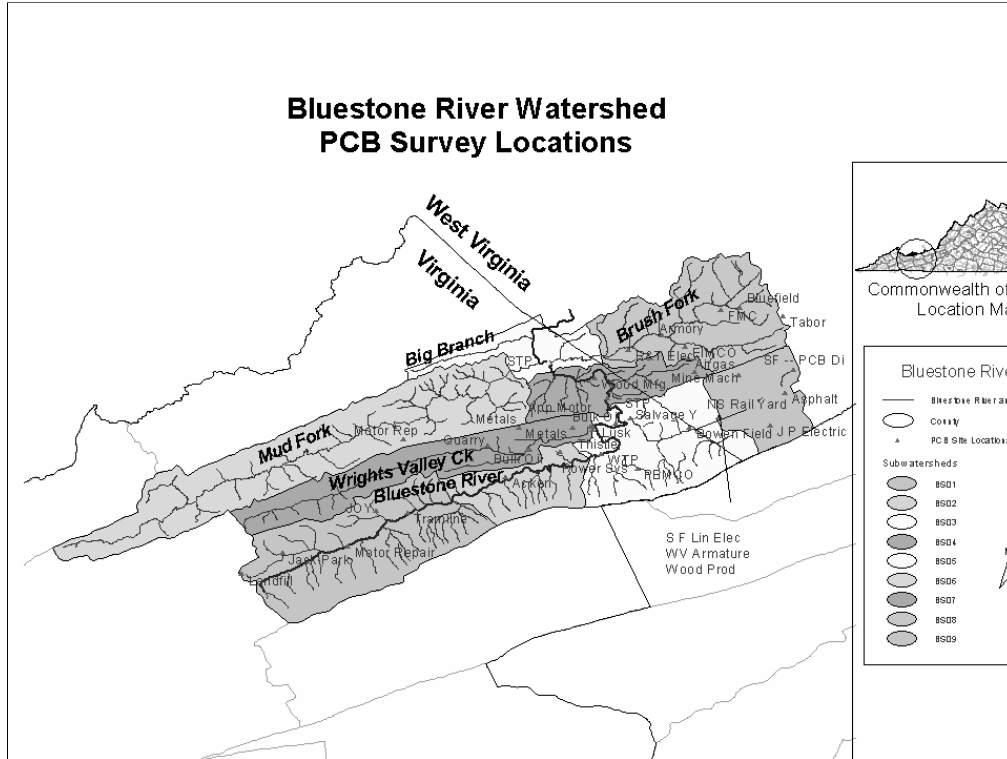
DEQ 1993 - 2002 PCBs in Fish and Sediment in the Bluestone River				
			FISH	SEDIMENT
			ppb <sup>1</sup> (wet weight basis)	ppb <sup>2</sup> (wet weight basis)
Sampling Date	Station name/location/description	Species id	Total PCB <sup>2</sup>	Total PCB <sup>2</sup>
<b>DEQ SCREENING</b>			<b>54 / 600</b>	<b>22.7 / 180 / 676</b>
08/17/00	<i>Bluestone River near Yards, Va</i>	<i>CARP</i>	2369.25	17.23
08/13/02	<i>Bluestone River near Yards, Va</i>	<i>CARP-#2 - Rep 1</i>	2485.78	425.18
Fish Tissue: <b>bold font indicates analyte concentration greater than or equal to DEQ's screening value</b> <b><i>bold italicized font indicates analyte concentration greater than or equal to VDH level of concern</i></b>				
<b>ppb<sup>1</sup></b>	ppb denotes parts per billion (aka - ug PCB /kg Fish or ng PCB /g Fish); wet weight basis, edible fillet			
<b>ppb<sup>2</sup></b>	ppb denotes parts per billion (aka - ug PCB /kg Sediment or ng PCB /g Sediment) dry weight basis			

CEDS VaDEQ Results leading to PCB SPMD study. Sediments don't agree with each other from year to year, sample types were organically fines between cobbles from same stream area by same sampler. Range of PCBs in fish results did not change much.



EPA EnviroMapper 2003

## Bluestone River Watershed PCB Survey Locations

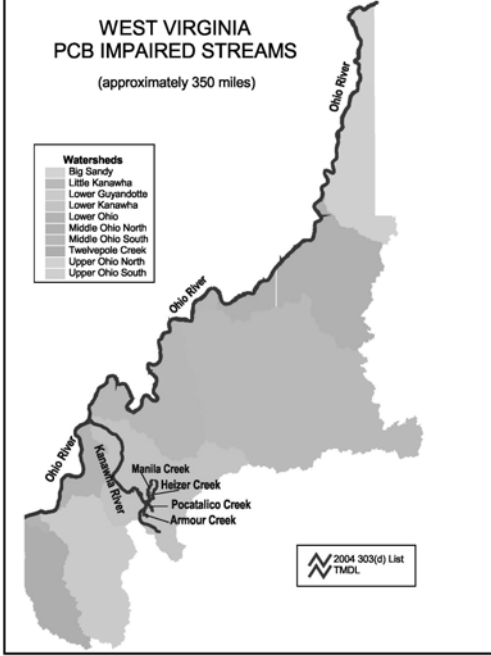


## **Proposed Project**

- **VA PCB Source Assessment (TMDL Loading)  
Sample existing or similar 9 SPMD sites in VA  
during low flow conditions, Winter 2004-05.**
- **Coordinate WV and VA PCB and dioxin  
source assessment, with WV DEP and EPA to  
sample six to nine SPMD sites in WV during  
low flow conditions and 11 SPMD sites in VA.**

WEST VIRGINIA  
PCB IMPAIRED STREAMS  
(approximately 350 miles)

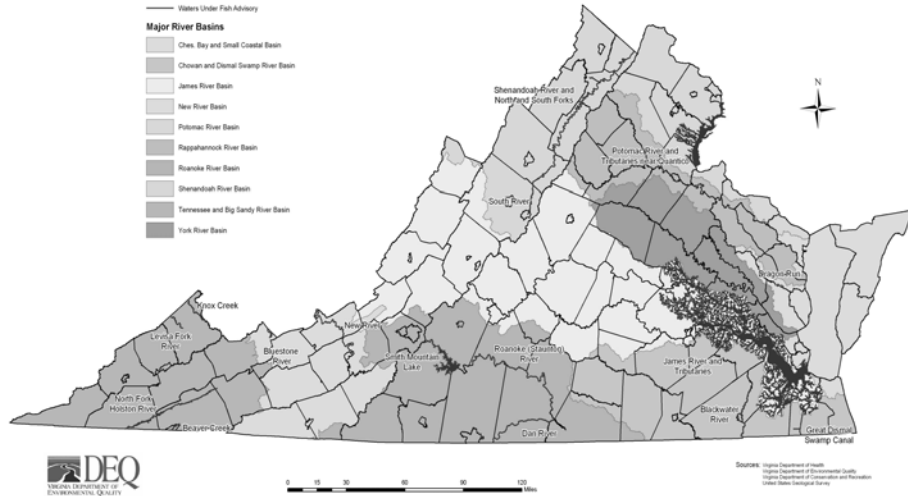
- Watersheds**
- Big Sandy
  - Little Kanawha
  - Lower Guyandotte
  - Lower Kanawha
  - Lower Ohio
  - Middle Ohio North
  - Middle Ohio South
  - Tewahposia Creek
  - Upper Ohio North
  - Upper Ohio South





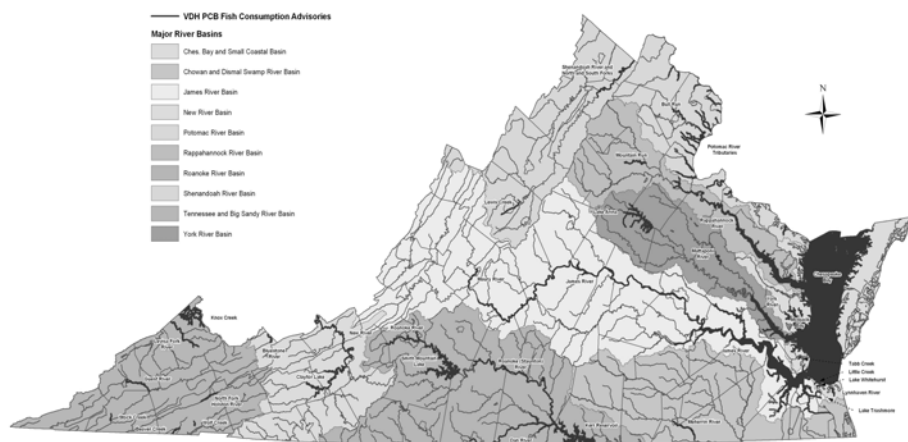
# Waters Under VDH Fish Advisory

Identified in 2004 305(b)/303(d) Water Quality Integrated Report



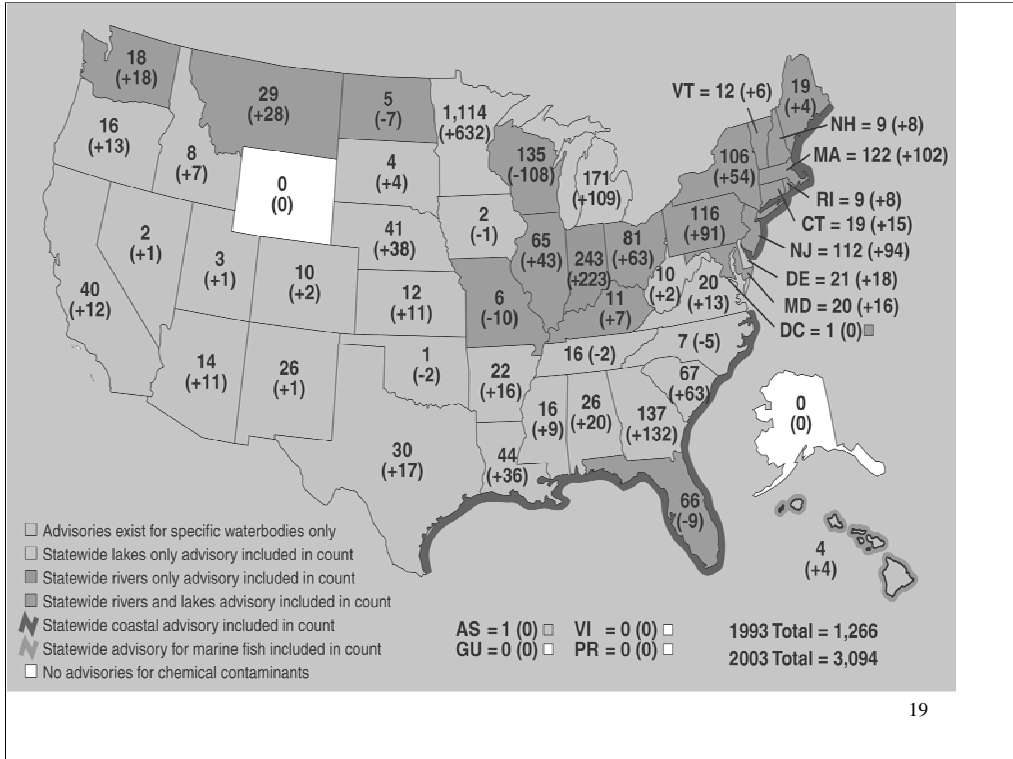
# VDH PCB Fish Consumption Advisories

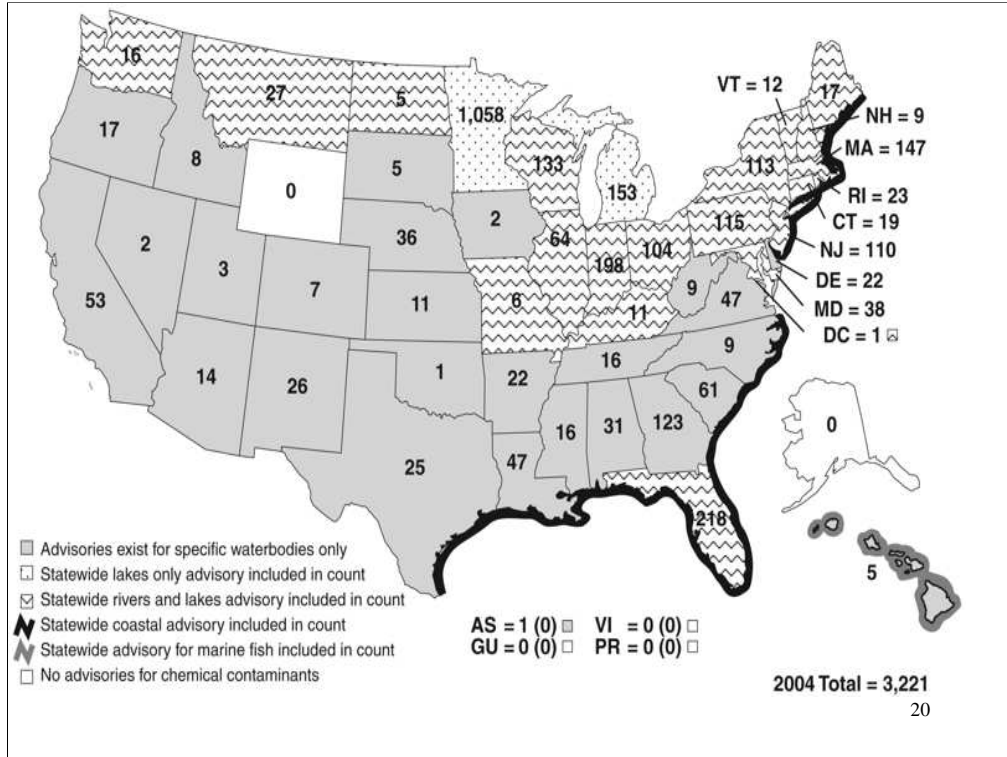
(December 2004)



SOURCES: Virginia Department of Environmental Quality  
 United States Geological Survey  
 Virginia Department of Transportation and Transportation  
 Virginia Department of Game Inland Fisheries  
 Virginia Department of Marine Resources

Revised January 20, 2005





**2004 National Listing of Fish Advisories  
Fact Sheet (September 2005)**

<http://www.epa.gov/waterscience/fish/advisories/fs2004.html#figure1>



Westside Sewage Treatment Plant, Bluefield, VA serves Sanitary Board of Bluefield (WV and VA).



SPMD Retrieval



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Securing the SPMD cages to the bank so that they would not wash away or up onto the bank. (Sampling air is not the same as sampling water).

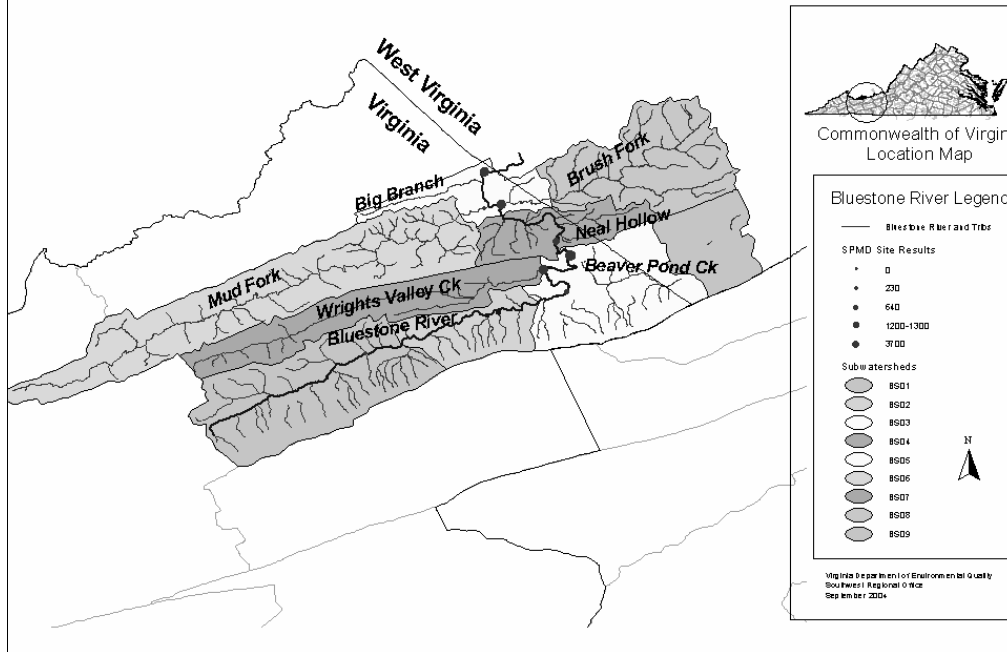


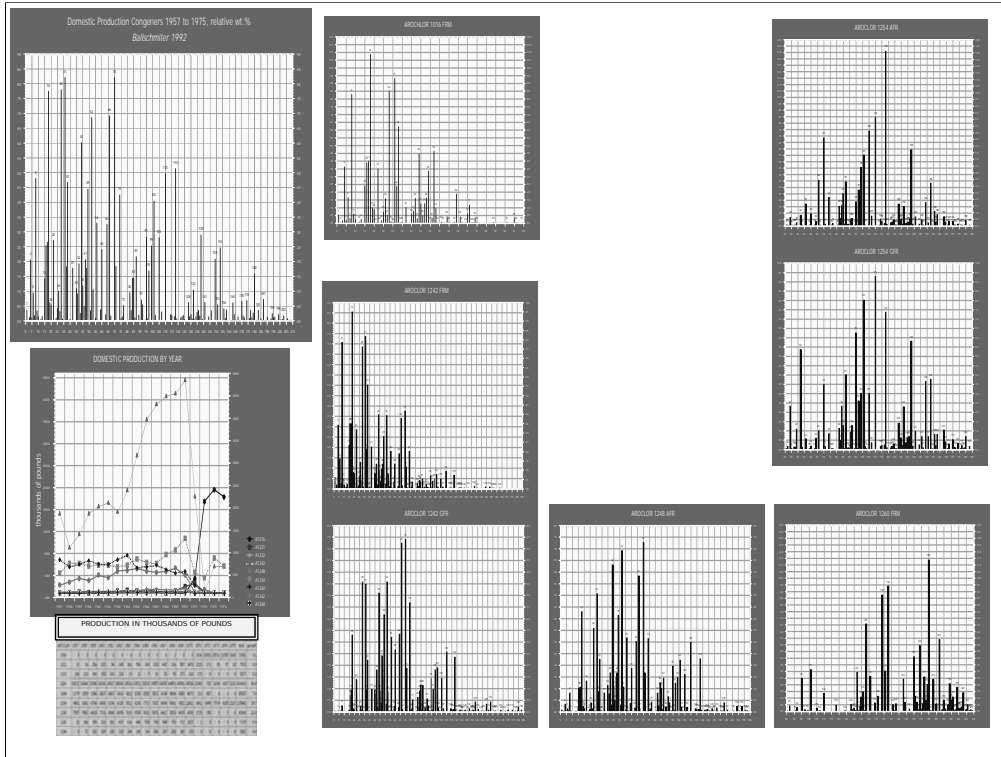
24

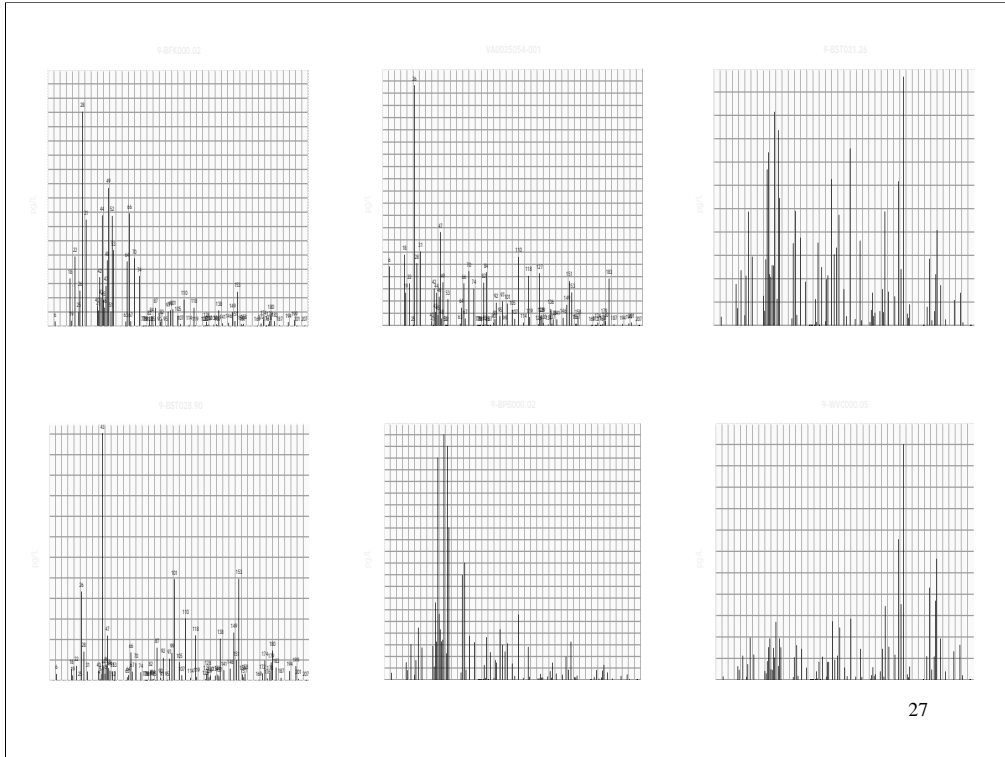
Some cages required tying to both banks or using rebar to secure them in the substrate.



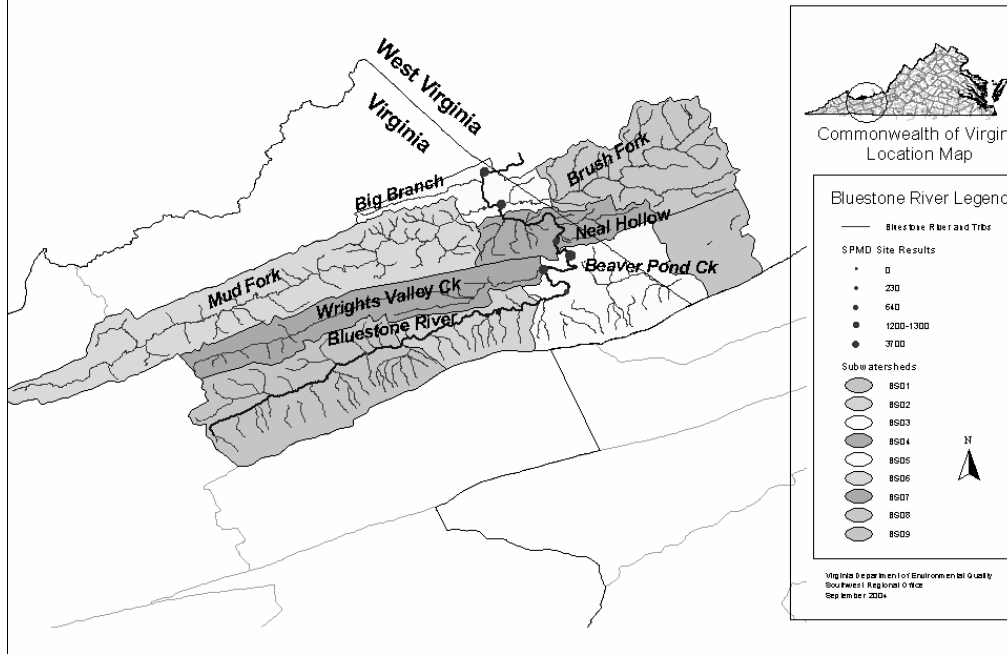
# Bluestone River Watershed Spring 2004 SPMD Site Results





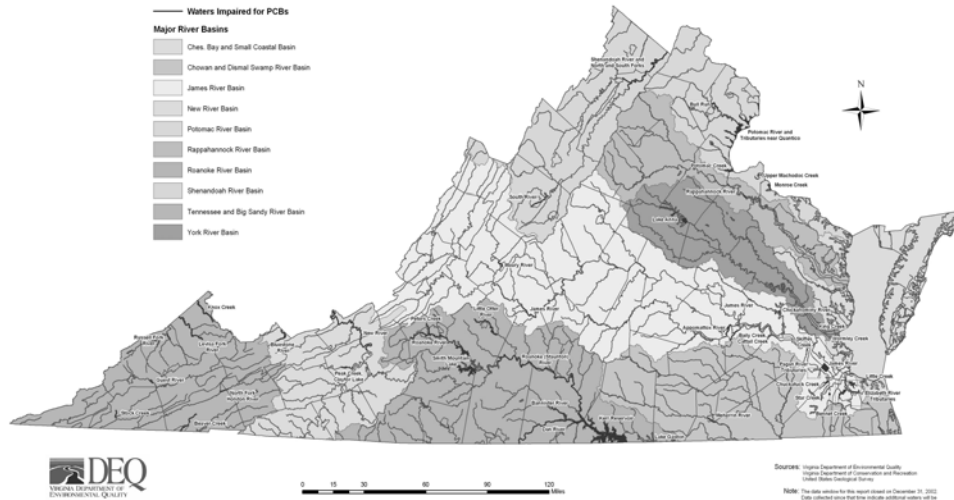


# Bluestone River Watershed Spring 2004 SPMD Site Results



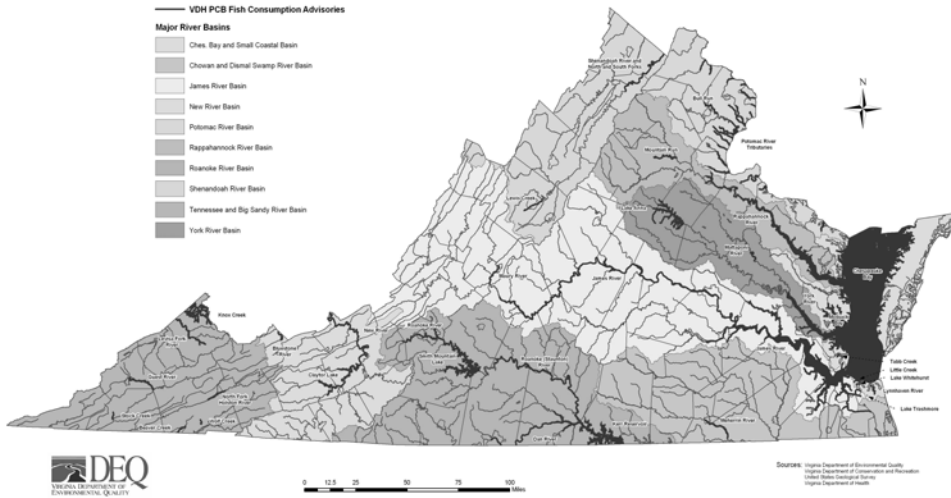
# Waters Impaired for PCBs

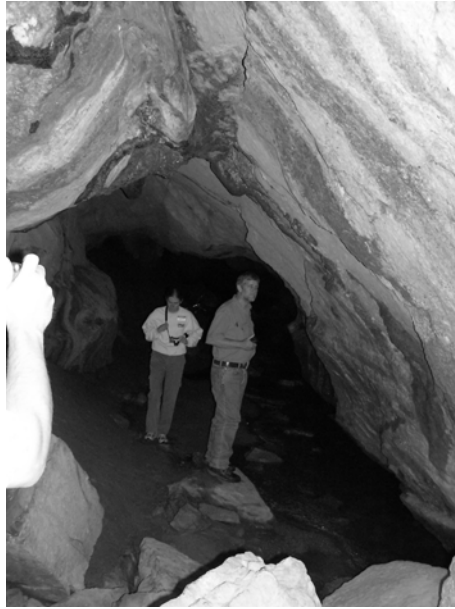
## Identified in 2004 305(b)/303(d) Water Quality Integrated Report



# VDH PCB Fish Consumption Advisories

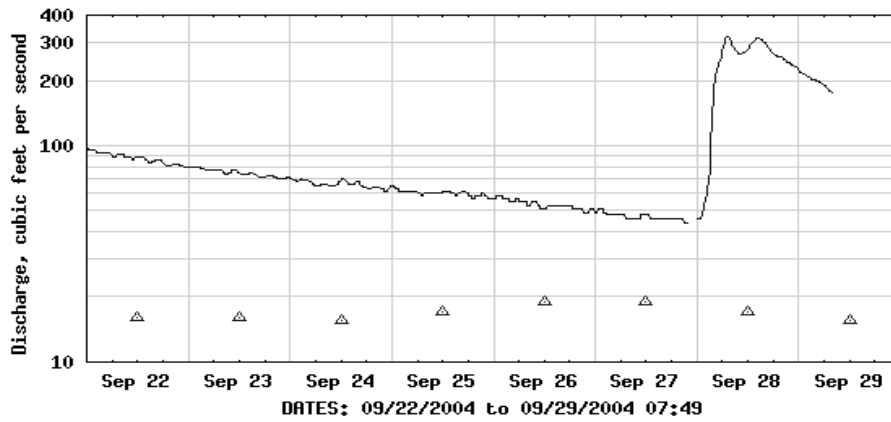
(December 2004)







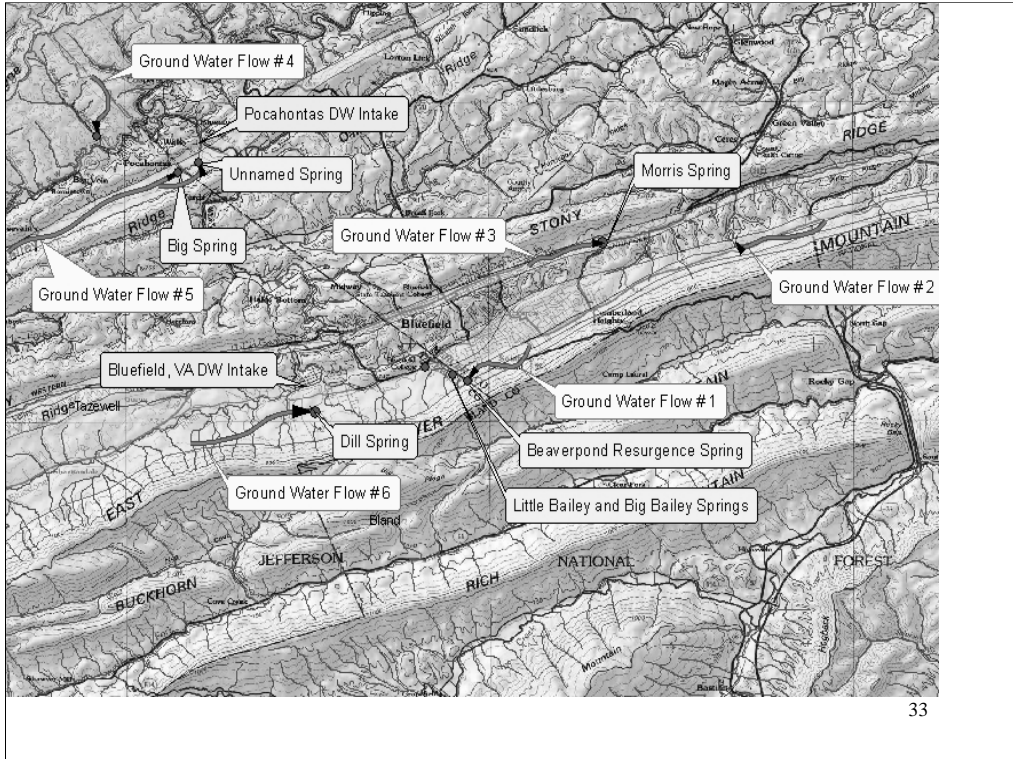
### USGS 03177710 BLUESTONE RIVER AT FALLS MILLS, VA

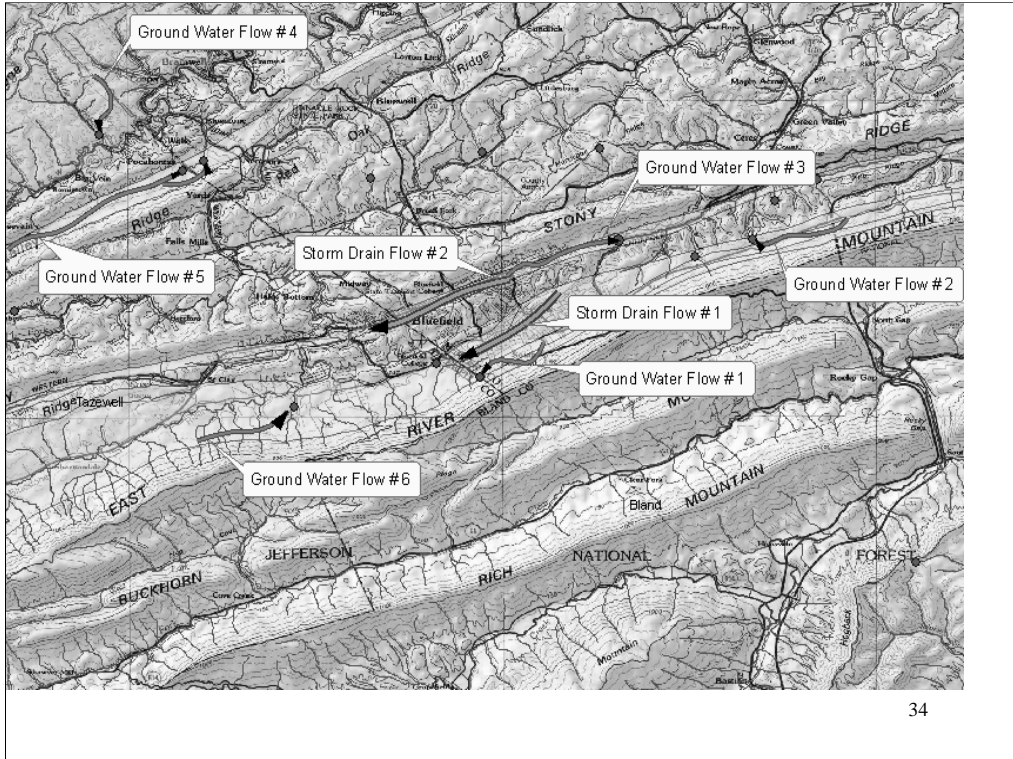


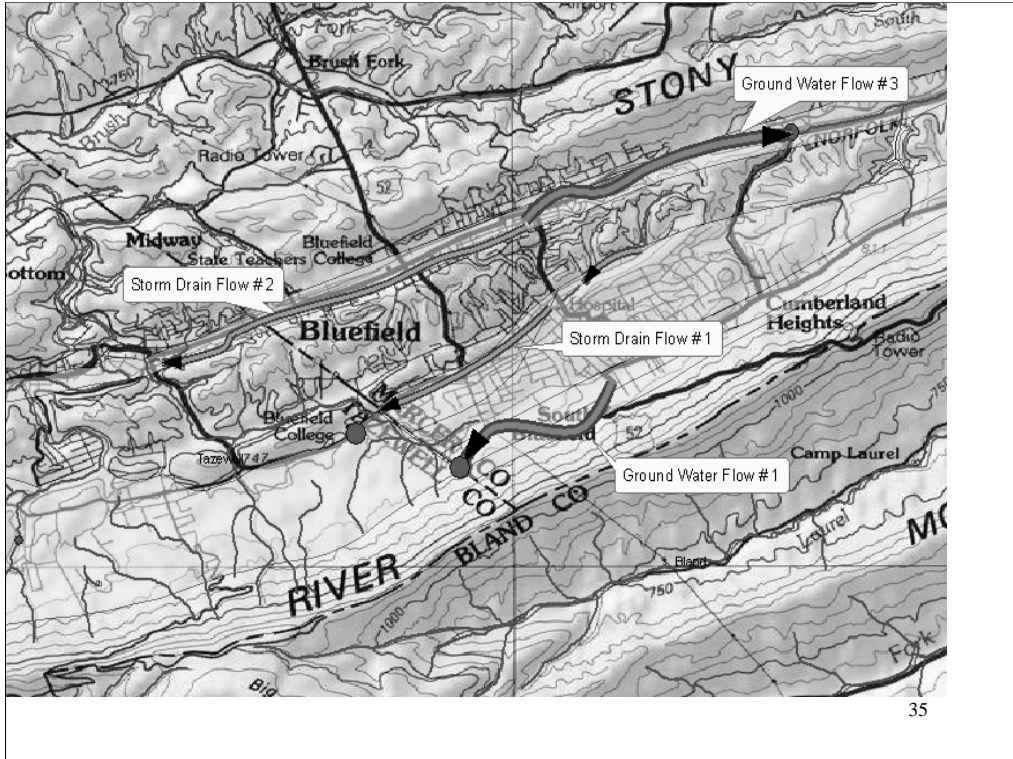
- EXPLANATION**
- DISCHARGE
  - △ MEDIAN DAILY STREAMFLOW BASED ON 16 YEARS OF RECORD

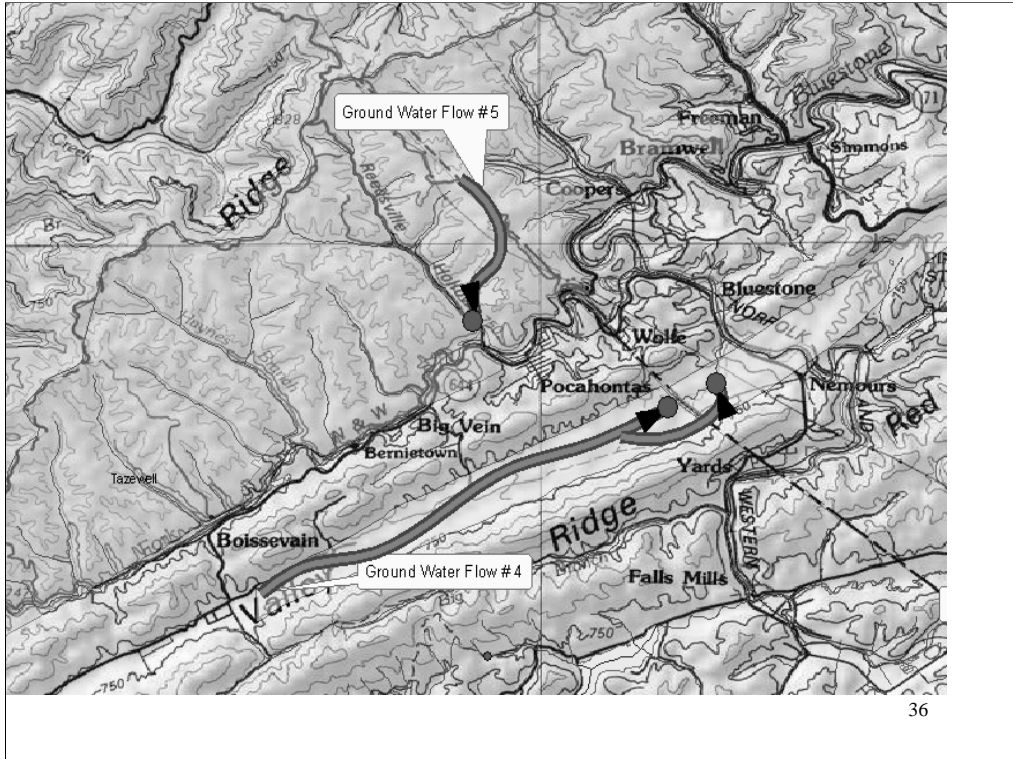
Provisional Data Subject to Revision







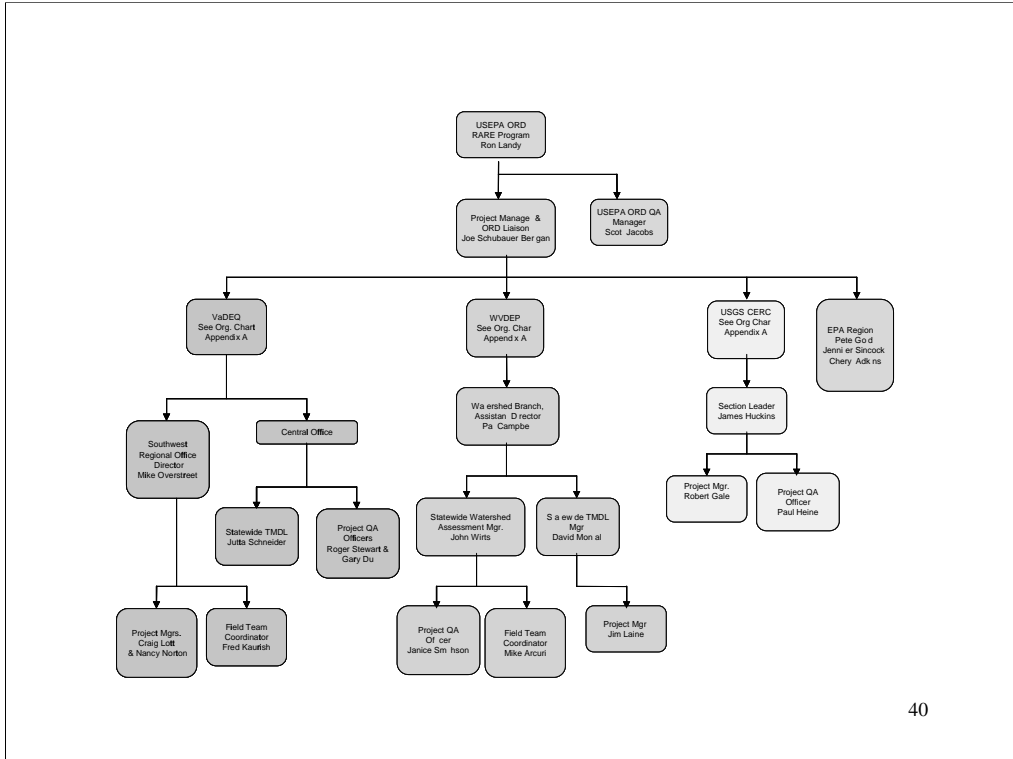
















Biofouling which occurred in winter below one of the drinking water intakes in the watershed.



November retrieval of duplicate SPMD samples at Abbs Valley River below Pocahontas drinking water treatment plant during RARE project with WVDEP, USGS, and USEPA.

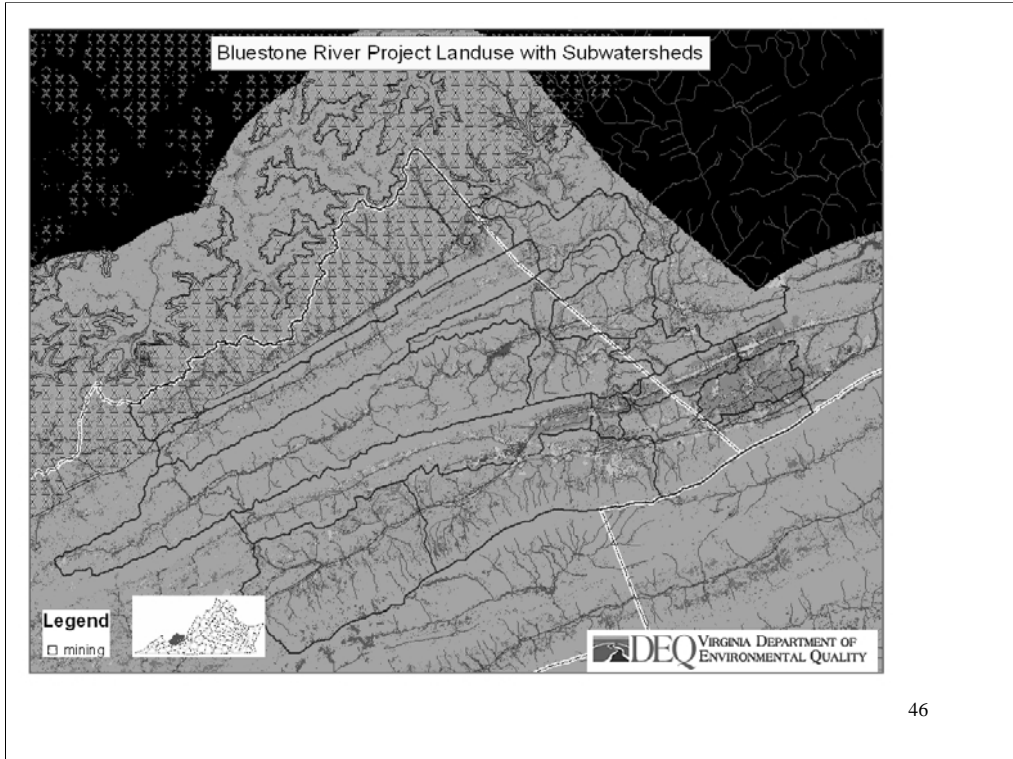


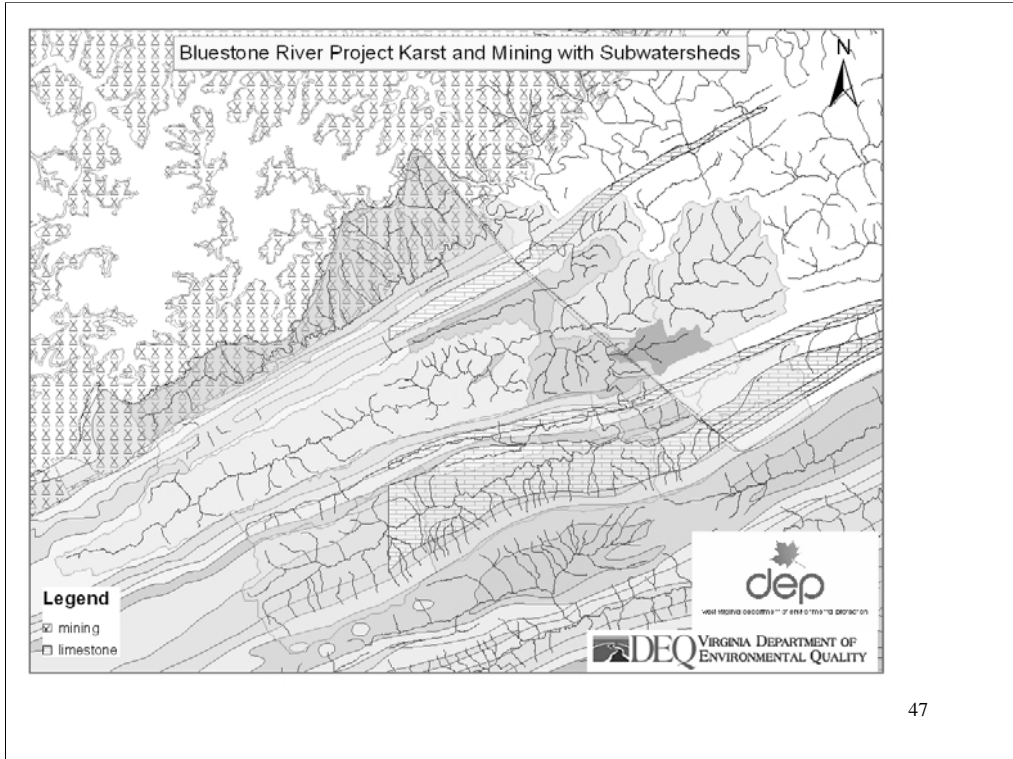
Same day retrieval of SPMD from Westside Sewage Treatment Plant chlorine contact tank just before dechlorination.

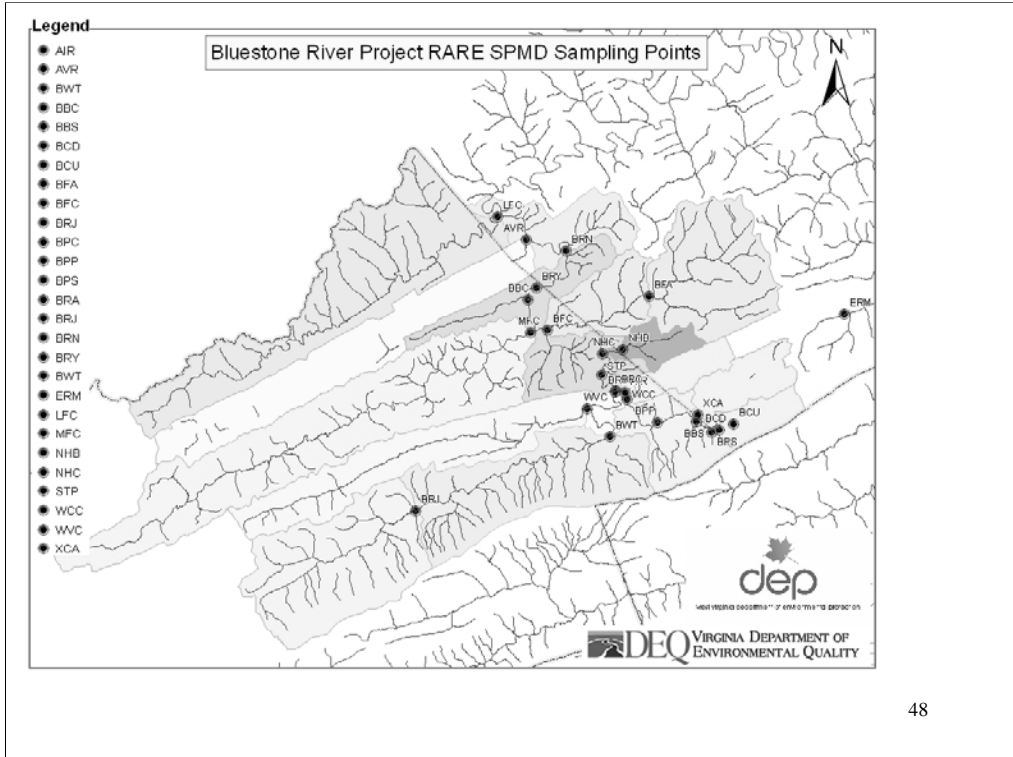


Photo showing deployment of an SPMD cage in old stream channel in an unnamed tributary to Beaver Pond Creek along College Ave.

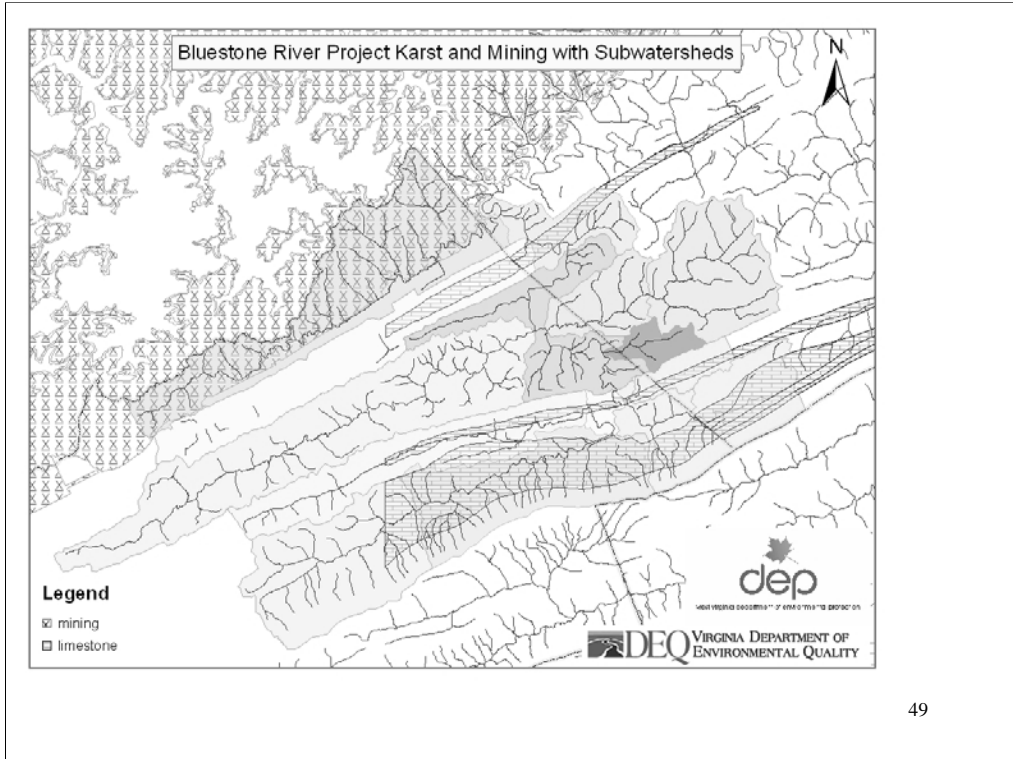


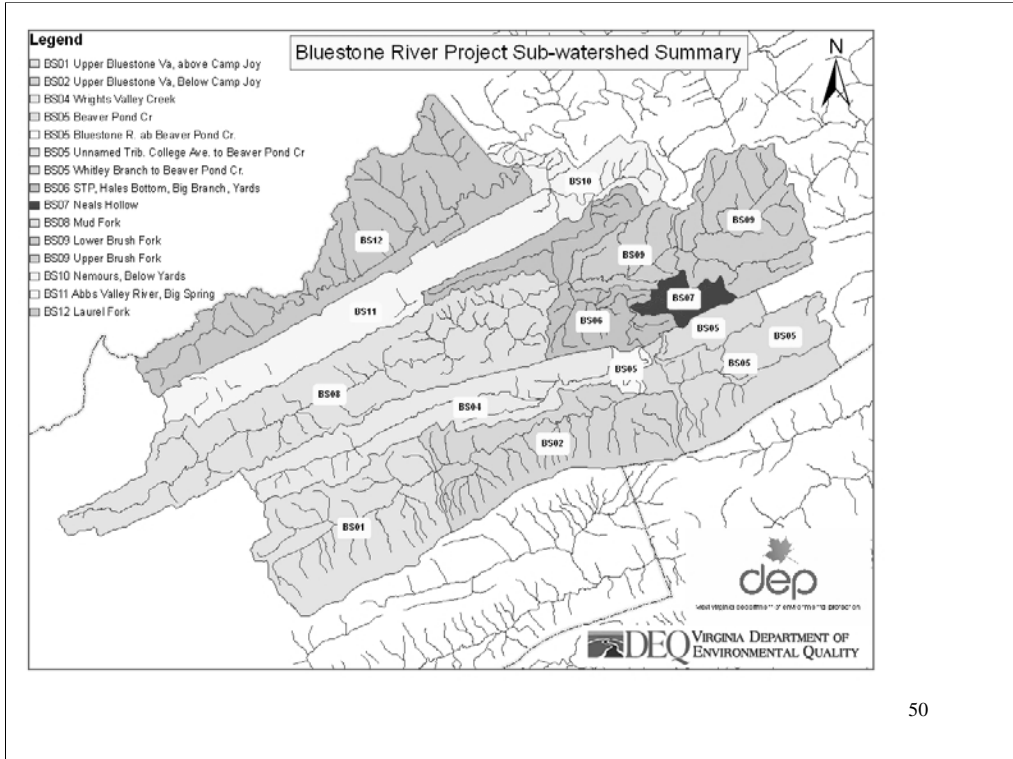


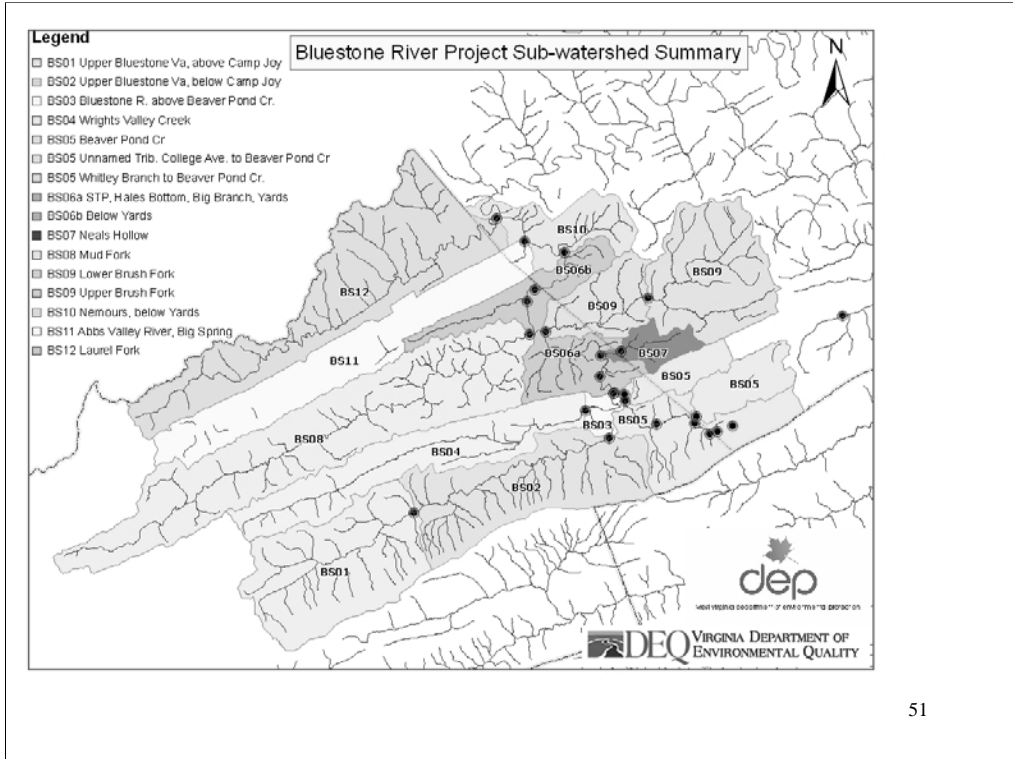


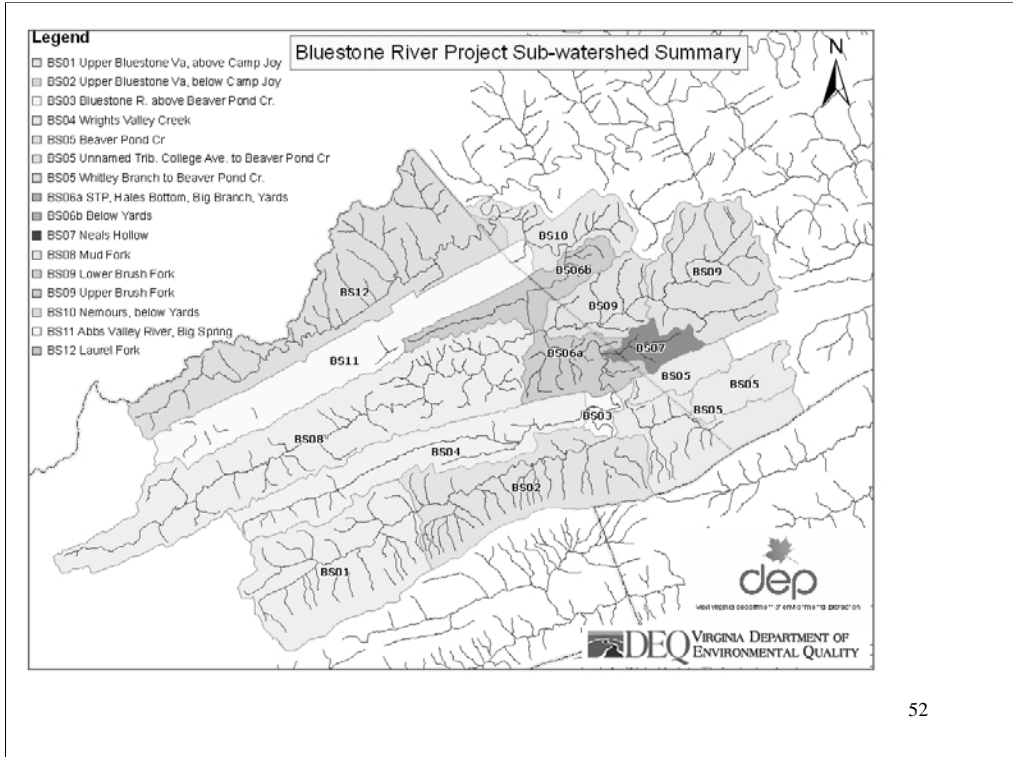




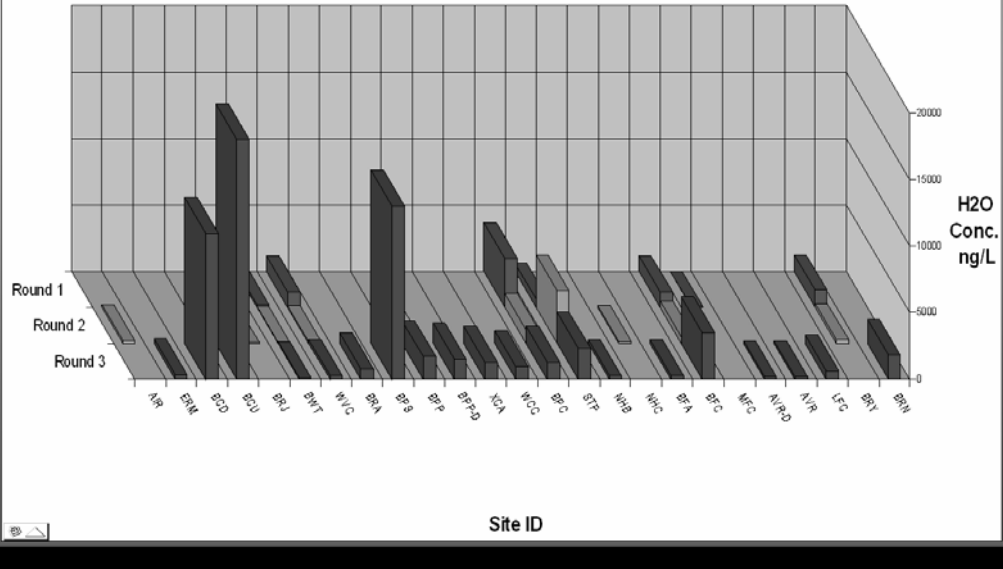




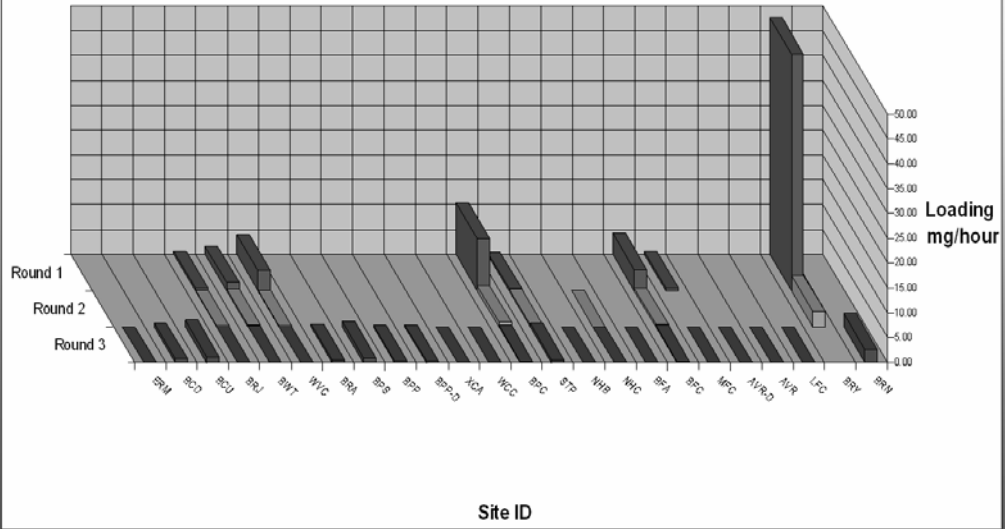




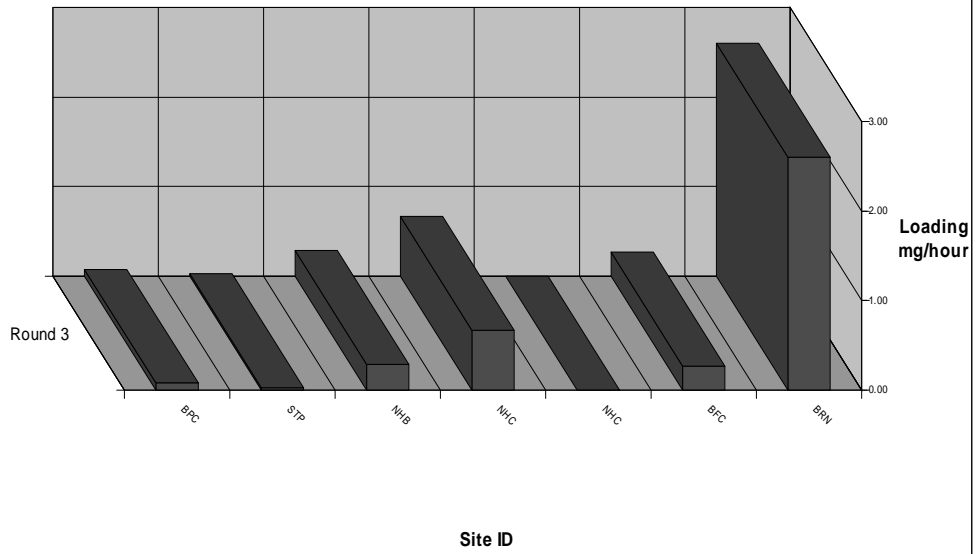
### DRAFT PCB Estimated H2O Conc. In Bluestone R. Watershed



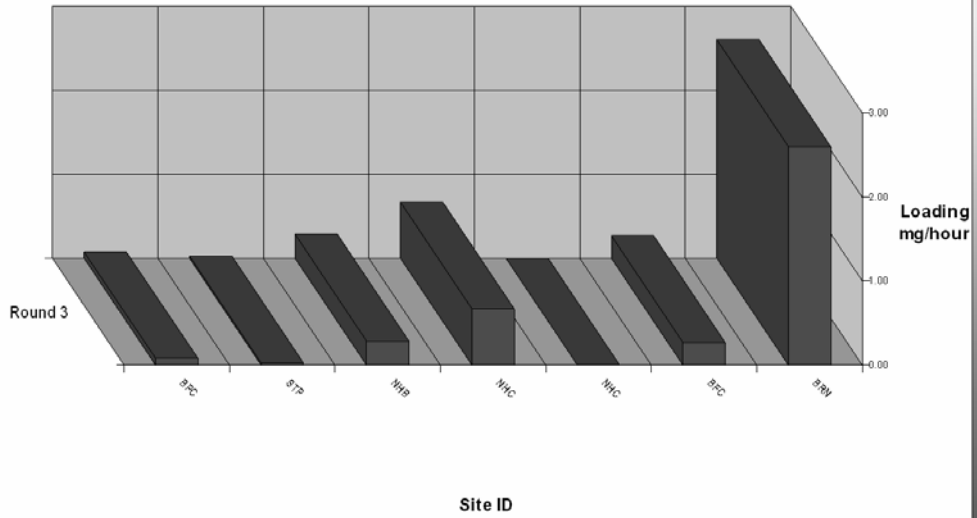
### DRAFT PCB Estimated Loading in Bluestone R. Watershed



### DRAFT PCB Estimated Loading Round 3 Bluestone



### DRAFT PCB Estimated Loading Round 3 Bluestone





Conclusions:

QC QC QC

multiple PRCs agreed, remarkably  
in extremely low flow conditions, sampling rates were  
achievable, and in our non-photosensitive  
targets, independent of some light and air  
exposure. More Robust than expected.

Very good “loading additivity.” Great agreement when  
combined with appropriate sampling plan,  
QAPP, and accurate flow monitoring.

**If a grab sample is a snapshot, what is  
a passive sample?**

## **Acknowledgements**

- **VaDEQ, Coworkers & management**
- **WVDEP**
- **WVDHHR**
- **EPA ORD**
- **EPA Clu-In**
- **USGS CERC**

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Abingdon, VA**

