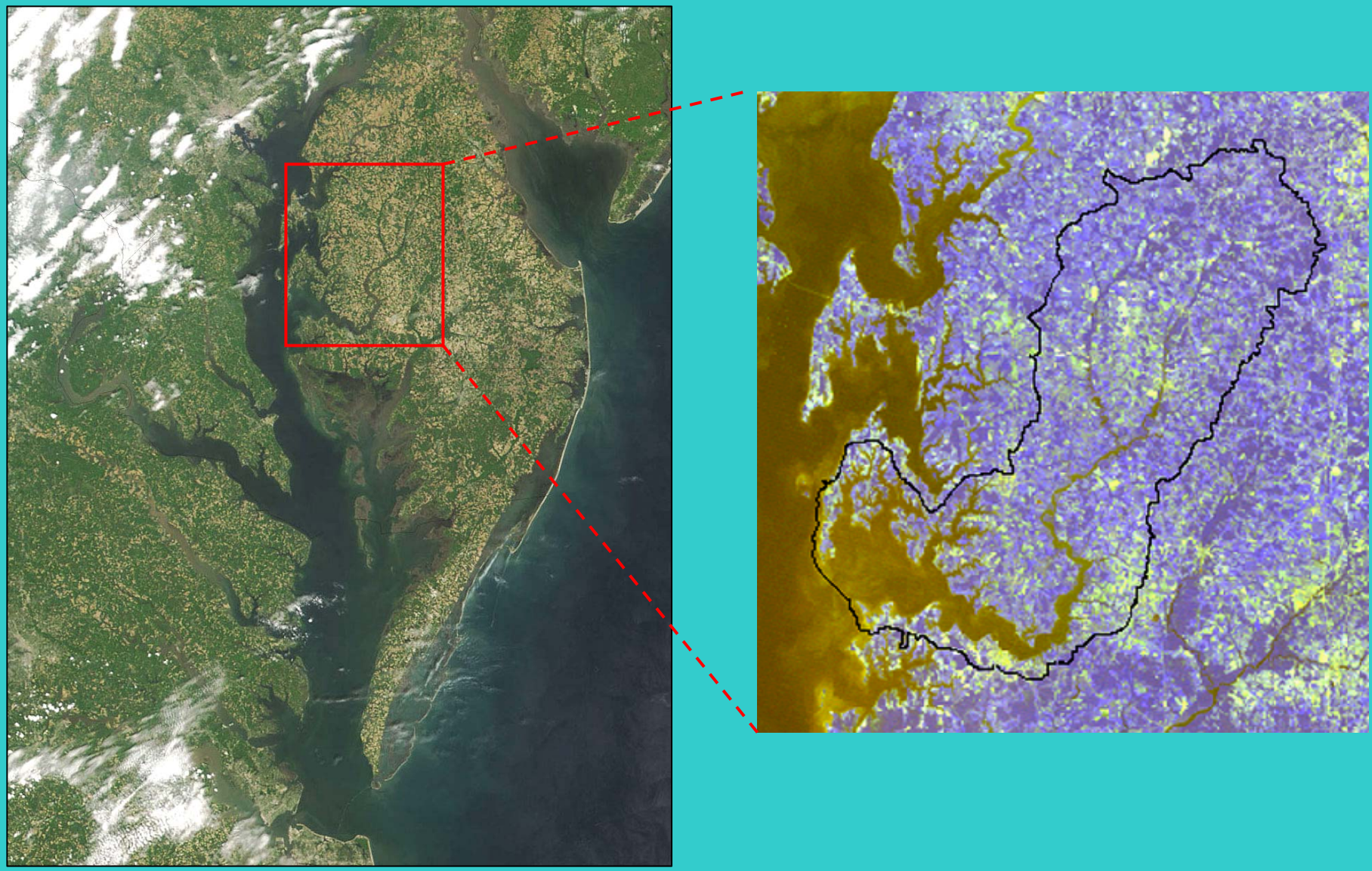
Special Emphasis CEAP Watershed: Choptank River

Greg McCarty
Laura McConnell
Ali Sadeghi
Carrie Graff
Dean Hively
Megan Lang



Unique aspect: Only tidal estuary under study within CEAP

The Washington Post

GAO Denounces Bay Cleanup Efforts Federal Office Overstates Progress, Minimizes Threats, Report Says

By Elizabeth Williamson
Washington Post Staff Writer
Wednesday, November 16, 2005; Page B01

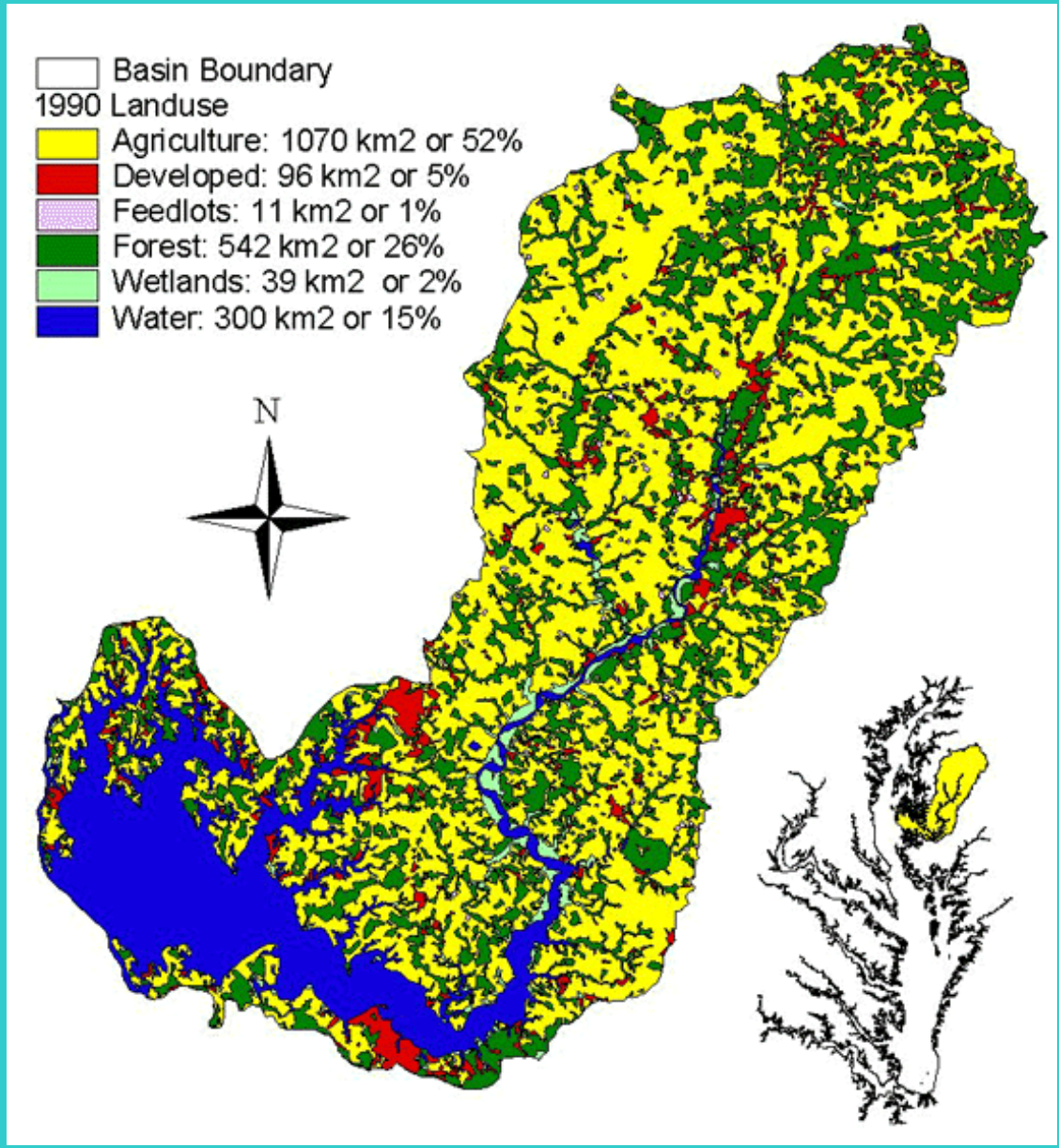
The government agency leading the cleanup of the Chesapeake Bay has consistently overstated its progress while minimizing threats to the bay and its own failures to address them, according to a federal oversight report released yesterday.

A Government Accountability Office review found that the Chesapeake Bay Program Office -- an arm of the Environmental Protection Agency -- has no coordinated, comprehensive plan for cutting pollution in the bay, even after nearly $6 billion in state and federal money has been devoted to the effort in the past decade.

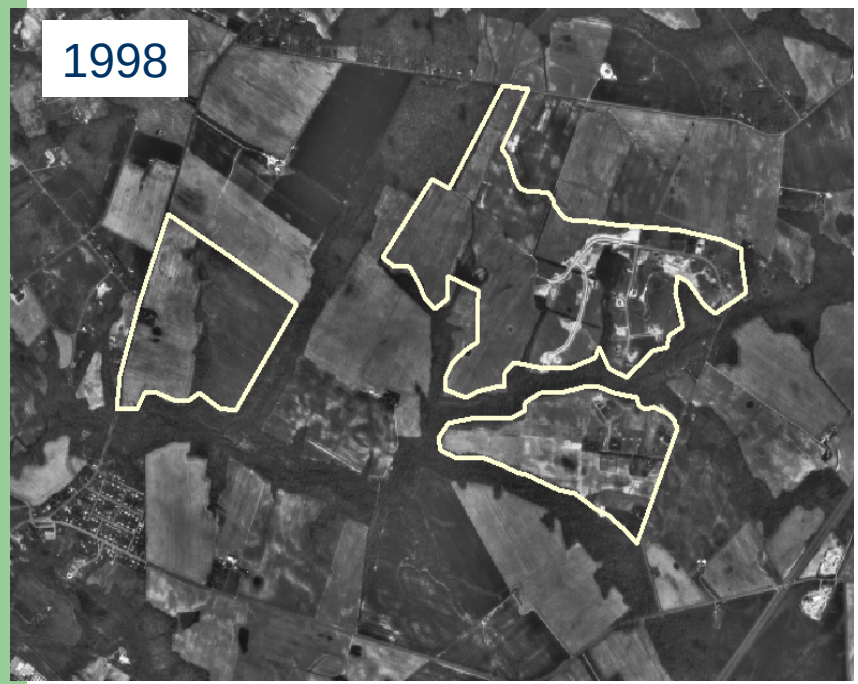
Watershed Characteristics:

- The Chopank River is an estuary in the larger Chesapeake Bay system (sub-watershed 1756 km^2).
- Agriculture is the primary land use category in the Choptank River Watershed (58%)
- Extensive ditch drainage
- Portions of the Choptank River have been identified as “impaired waters” under Section 303(d) of the Federal Clean Water Act due to high levels of nutrients and sediments.
- A vast amount of water quality and ecological data has been collected within the Choptank River watershed over the last 20 years.

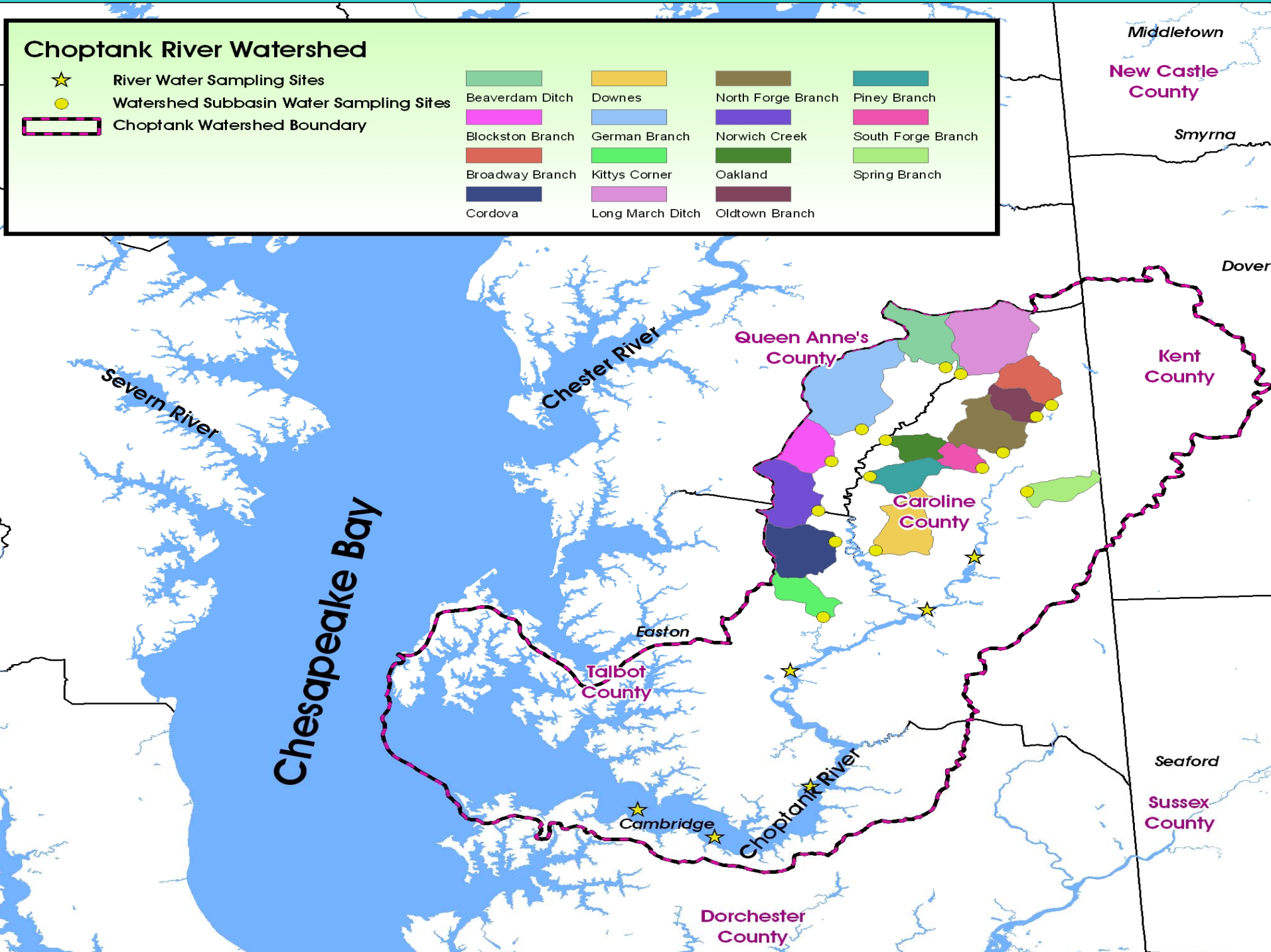
Year 2000 Land-use Data for Watershed



Preserve Agriculture on the Eastern Shore of the Chesapeake Bay



Urbanization pressures


Choptank River Watershed
River Water Sampling Sites
Watershed Subbasin Water Sampling Sites
Choptank Watershed Boundary
Beaverdam Ditch
Blockston Branch
Broadway Branch
Cordova
Downes
German Branch
Kittys Corner
Long March Ditch
North Forge Branch
Norwich Creek
Oakland
Oldtown Branch
Piney Branch
South Forge Branch
Spring Branch
Middletown
New Castle County
Smyrna
Dover
Kent County
Queen Anne's County
Caroline County
Talbot County
Dorchester County
Sussex County
Seaford
Easton
Cambridge
Chesapeake Bay
Severn River
Chester River
Choptank River

Primary Project Goal:

Establish a watershed-scale assessment of NRCS/FSA Conservation Programs in the Choptank River Watershed

- Evaluate the role conservation practices common in the Choptank Watershed for nutrient reductions (Cover crops; Controlled drainage; Riparian buffers).

- Determine which conservation practices or combination of practices in time and space can be used to achieve specific load reductions.

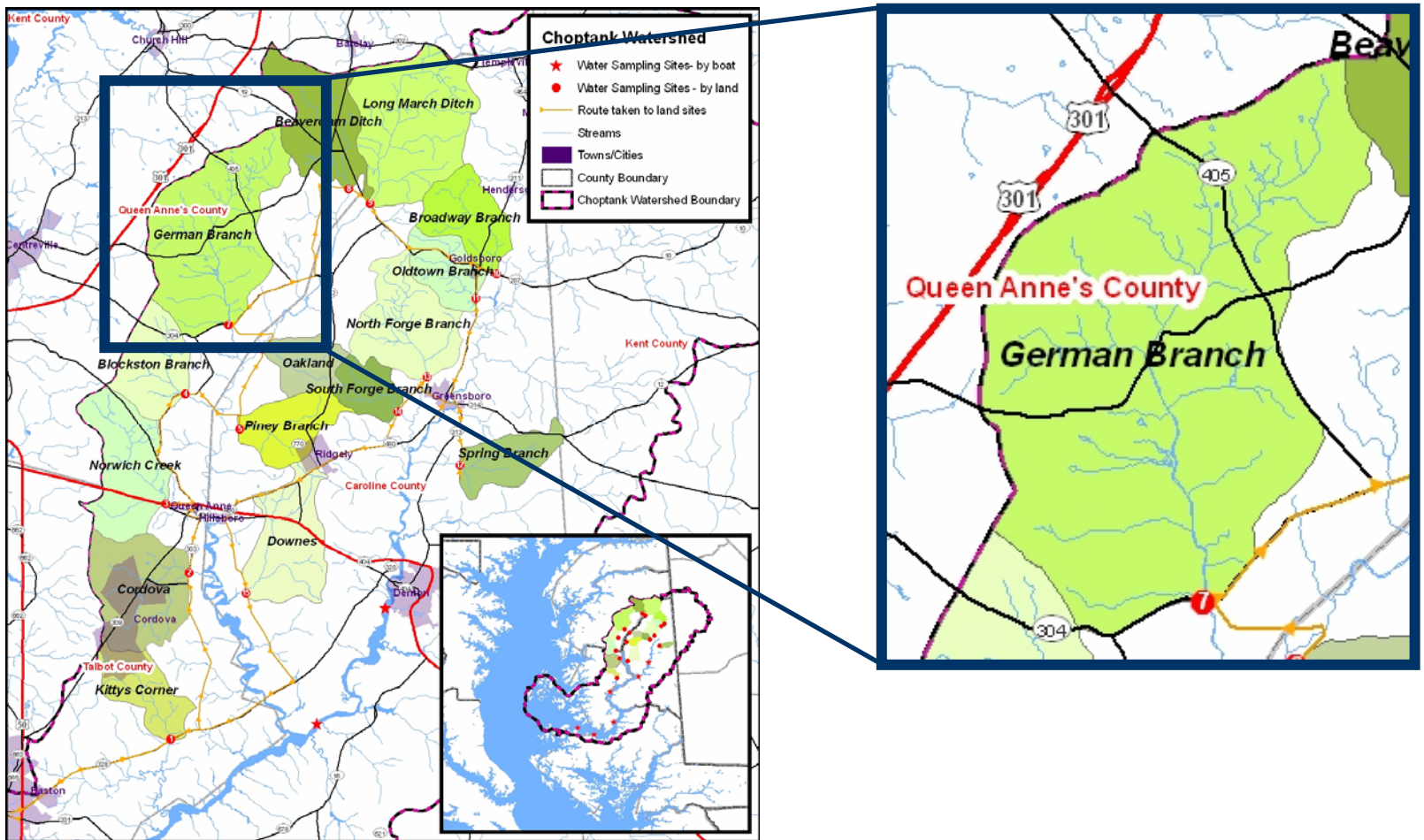
Data Acquisition Objectives

- Support the evaluation of farm management, land use, hydrology, and nutrient transport
- Provide accurate model input datasets
  - AnnAGNPS, REMM, SWAT
- Evaluate the effect of cover cropping on nutrient dynamics

University of Maryland – Horn Point

- Historic and ongoing sampling of water quality at 15 Choptank subwatersheds (nutrients, metals, pesticides)
- Digital mapping of:
  - 2000 land use
  - Stream networks
  - Subwatershed boundaries

University of Maryland – Horn Point



NOAA

- Interest in terrestrial/ocean interface
- Funding for Quickbird image acquisition
- Ongoing collaborative sampling of nutrients, metals, and pesticides at 7 locations on the Choptank River

MD Department of Natural Resources

- MD Geospatial Data Gateway website
  - Ortho-imagery
  - SSURGO soils
  - Critical areas and floodplains
  - Wetlands
  - CREP eligible areas
  - Historic water quality data for German Branch sub-watershed

Natural Resources Conservation Service

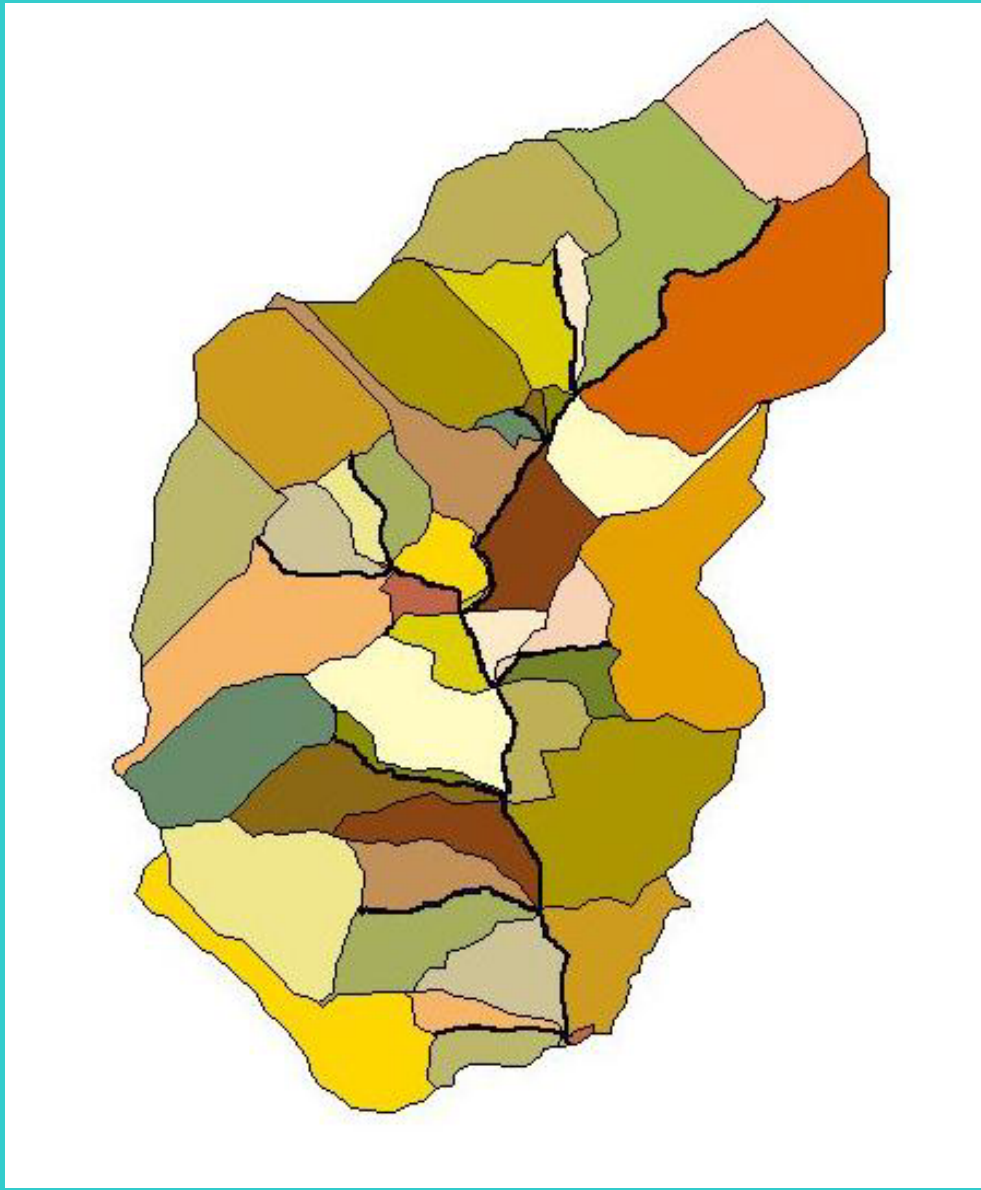
- We are partnered with the state NRCS office through CEAP ‘Special Emphasis Watershed’ project funding
  - Pre-release SSURGO soils data for Talbot County
  - LIDAR digital elevation datasets
  - Ortho-imagery
  - Conservation Security Program Watershed
  - Access to datasets at the county offices

Maryland Department of Agriculture

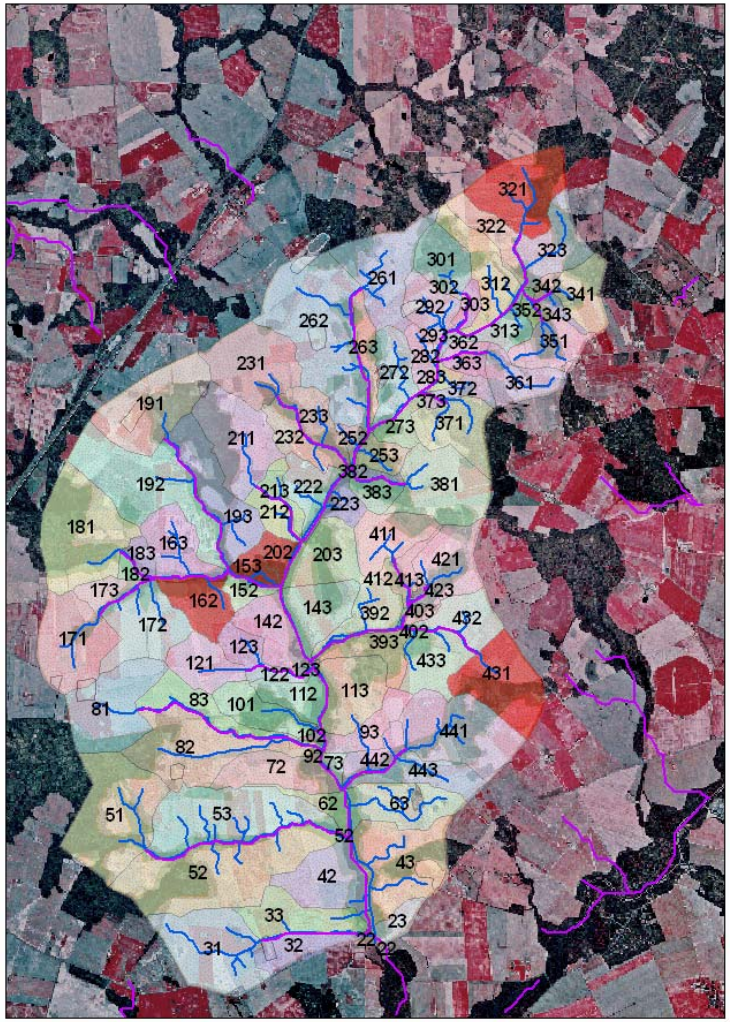
- **Cover crops**
  - Annual maps of fields enrolled in the state cost share program
  - Collaborative evaluation of cover crops and winter groundcover
- **Controlled drainage structures on ditches**

Model Coupling

German Branch AnnAGNPS Cells



Generate ‘Risk’ Map to Identify ‘Critical’ Cells



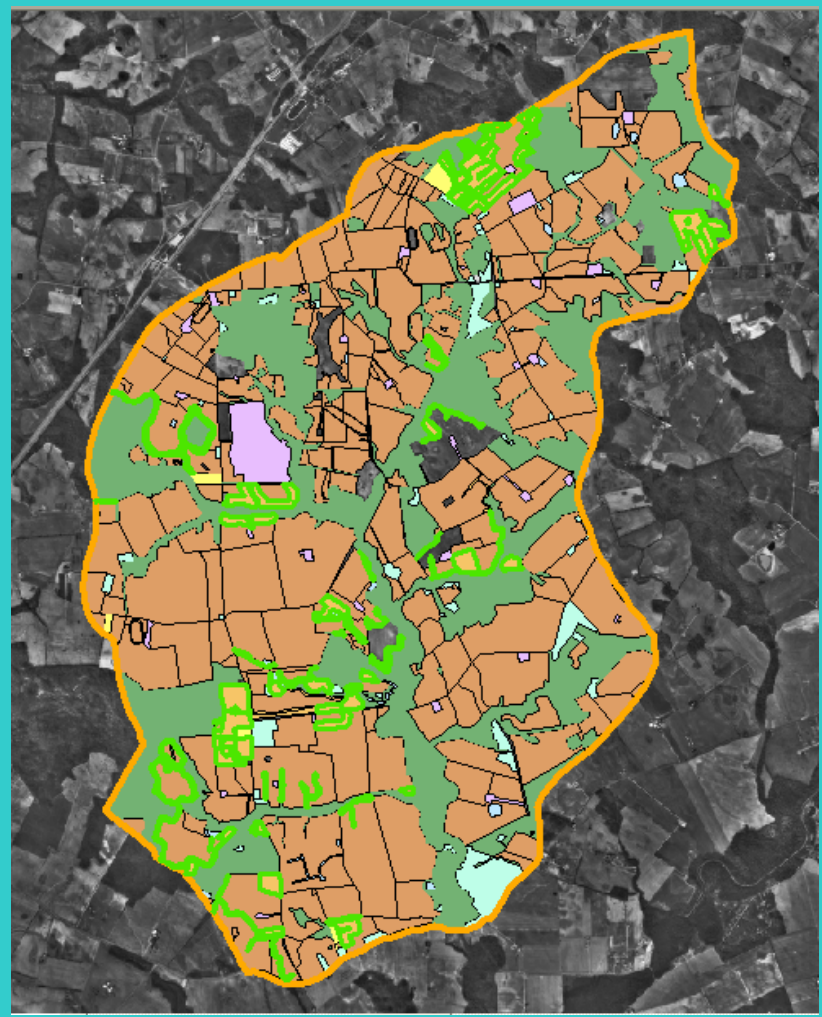
Evaluating Current Practices

- Utilizing NuManPro program (U of MD College of Ag) to develop ‘likely’ nutrient management scenarios.
- Utilizing MDA cover crop information.
- Complete access to spatial information on location of CRP & CREP within sub-watersheds.

Maryland Department of Agriculture

Cover crop enrollment

Digitizing Conservation Practices and Land Use



Leveraged Research Efforts

- NOAA Funding
- CSREES NRI grant to partners
- EPA Targeted Watersheds Program
- MDA Winter Cover Crop Program
- Conservation Security Program

On Farm Research: CSP Contracts

- Annual stewardship component
- Annual existing practice component
- One time new practice component
- **Enhancement component**

Enhancement Component

- Participation in an on-farm conservation research, demonstration or pilot project

- Implementation of assessment and evaluation activities relating to practices including water quality sampling at field edges, drilling monitoring wells and collecting data.

Future Directions

EPA Targeted Watersheds Program

- Pilot program by MDA for Commodity Cover Crops will increase winter cover by 6000 acres.
- Controlled flow structures on drainage ditches
- Monitoring BMPs for improved estimates for nutrient reduction efficiencies.

In-stream Processing for Tidal Environments

- EPA Targeted Watersheds Grant
- National Center for Computational Hydroscience & Engineering, UM, Oxford MS
- CCHE1D-WQ: Enhanced model for in-stream processing
- Calibrate tidal component of model for Choptank River conditions.
- For use with AnnAGNPS under tidal conditions

BMP Planning Tool

- Working with MDA and State NRCS
- Based on AnnAGNP's
- GUI for action agency use
- Calibrated for important BMPs
- BMP placement and scenarios
- Useful for TMDL purposes

Commodity Cover Crops Program

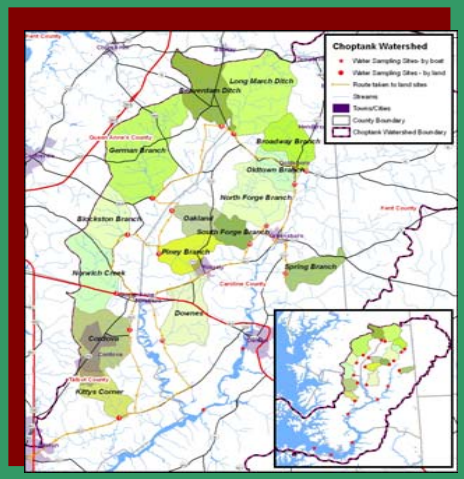
- Working with MDA and State NRCS
- Use CSP as mechanism to fund farmers
- Strip trails on farms within the watershed
- Monitor yields and winter nutrient uptake

Controlled Drainage Structures

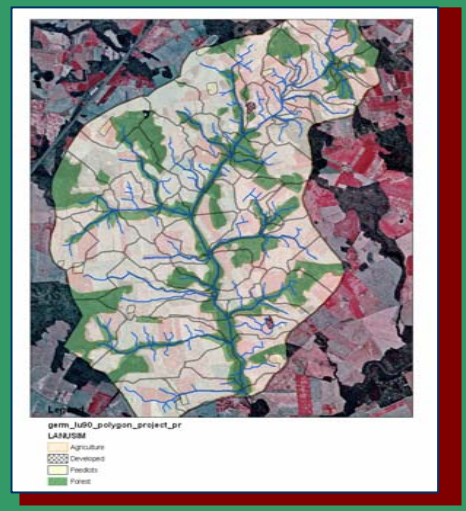
- Targeted Watersheds Grant
- Use CSP as mechanism to fund farmers
- Use of dissolved gas and delta ^{15}N to assess denitrification
- Improved nutrient reduction efficiencies for model input

Posters

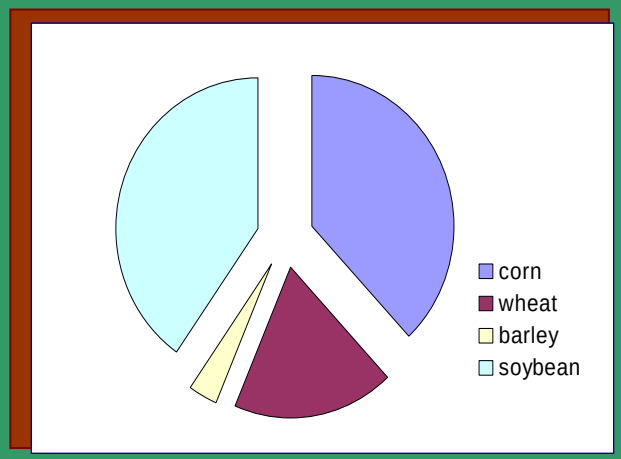
Modeling Nutrient Load Reductions in the German Branch Sub-basin in the Choptank River Watershed using AnnAGNPS



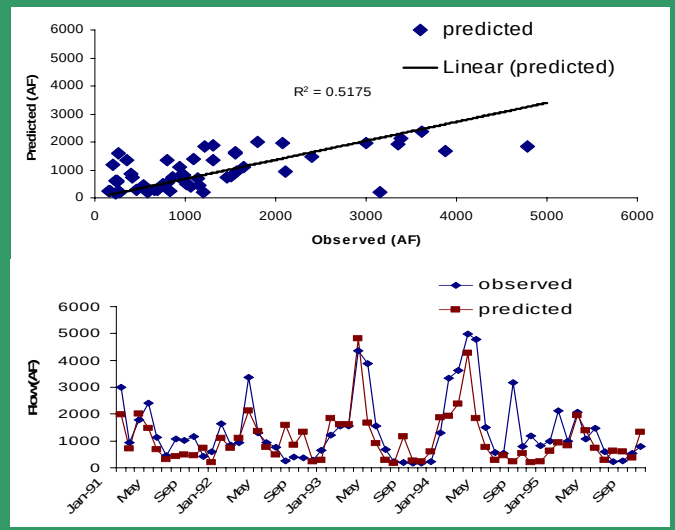
Sub-basins under study



Landuse/BMP locations



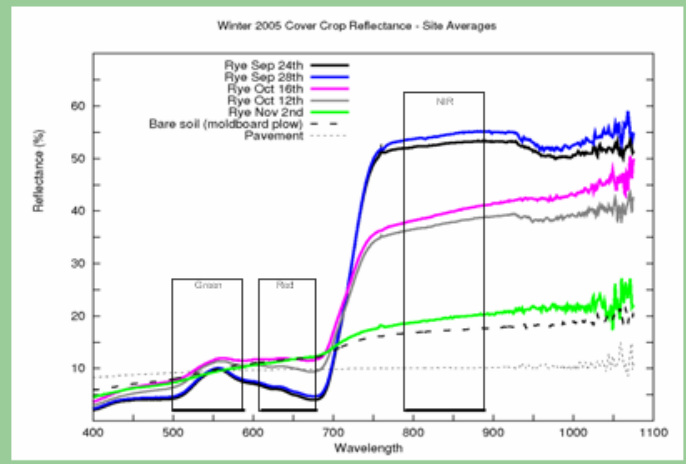
Crop data



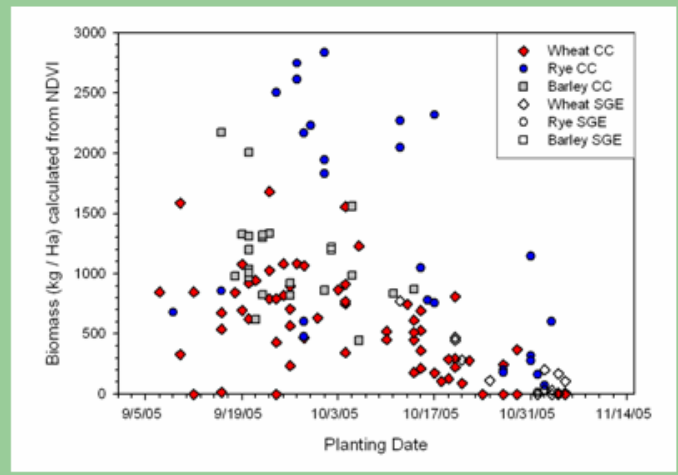
Calibration data

EVALUATING COVER CROP NUTRIENT UPTAKE EFFICIENCY ON A LANDSCAPE SCALE

W. Dean Hively, Megan Lang, Gregory McCarty, Jason Keppler, and Laura McConnell



Correlation of biomass and reflectance



Apparent differences in biomass attributable to species, planting date, and planting method

Biomass (estimated from imagery)
X
Nutrient Content (estimated from sampling)
=
Estimated Nutrient Uptake by cover crops

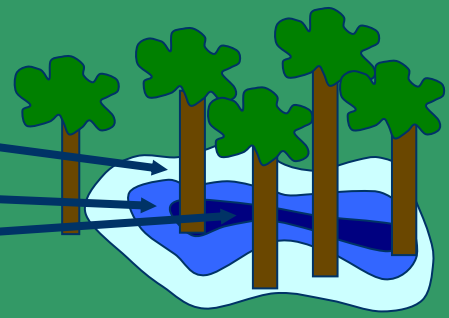
		N uptake (lb/acre)		
	%	min	max	average
wheat	56	0	36	11
rye	20	2	60	35
barley	22	9	46	23
triticale	2	0	17	8

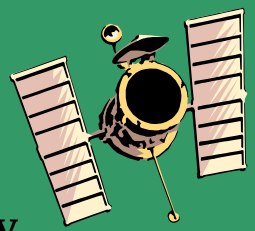
RADAR MONITORING OF HYDROLOGY IN MID-ATLANTIC FORESTS: NEW INFORMATION FOR IMPROVED WATER QUALITY MANAGEMENT

Year of High Precipitation

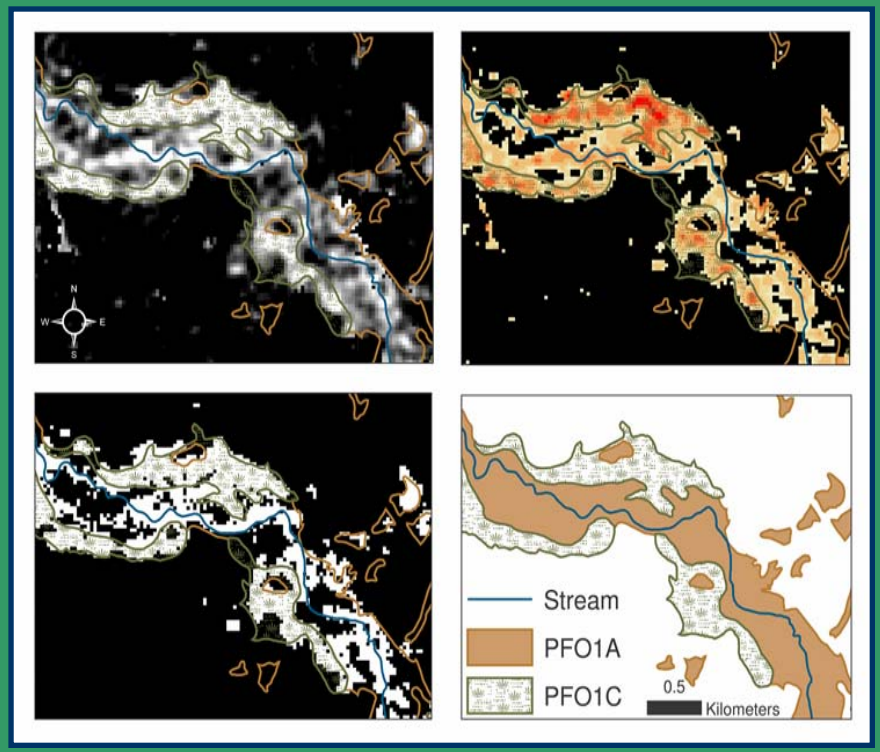
Year of Medium Precipitation

Year of Low Precipitation





Forest hydrology provides information concerning chemical transformations (denitrification) and physical processes (sedimentation).



This and other parameters, derived from remotely sensed data, will be included in future water quality models.

Atmospheric Transport and Deposition of Pesticides within the Choptank River Watershed and the Role of Riparian Buffers in Pesticide Delivery to Streams

L McConnell, C Rice, C Hapeman, A Goel, A Torrents, K Bialek and G McCarty
USDA-ARS, Beltsville, MD & University of Maryland, College Park, MD

Air & Rain Concentrations Respond to Agricultural Activity

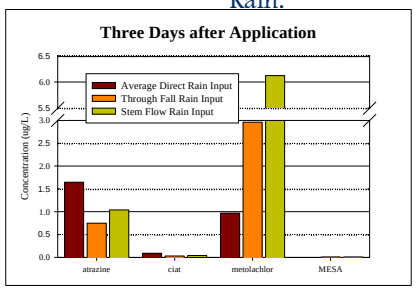
- Atmospheric concentrations respond rapidly to pesticide use in the watershed
- Atrazine and metolachlor are detected in the air and rain throughout the year.
- Concentrations are influenced by a combination of immediate drift followed by slower volatilization from surfaces.

Air and Rain Samplers

Sampling Media

Riparian Buffers Act as Traps for Pesticide Drift

- Concentrations in Stem Flow and Through Fall Rain were generally higher than Direct Rain.



How Do Atmospheric Processes Influence Riparian Functionality within the Watershed?

Research Approach

- Pesticide inputs to subwatershed streams will be determined. Data collection is underway (see below).
- Passive air samplers will be deployed in each subwatershed to measure pesticide and other important VOC concentrations.
- The data sets will be coupled with modeling efforts to further calibrate and validate REMM and to discern the atmospheric inputs of pesticides to the watershed.

Expected Outcomes

- Evaluate the effectiveness of riparian areas in mitigating pesticide and VOC inputs from drift and volatilization.