Anne Arundel County Maryland

Protecting Watershed Resources and Quality through Utilization of GIS Tools and Models

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KCI TECHNOLOGIES

Project Background

- **Anne Arundel County, MD is developing a comprehensive Watershed Management Master Plan for the Severn River**

- **Project Team: CH2M HILL and KCI Technologies, Inc.**

- **Two Main Parts to project:**
  - traditional watershed management plan activities
  - development of Watershed Management Tool (WMT)

- **Focus of this presentation is on the WMT**

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Project Area

- **Anne Arundel County, MD is feeling development pressures**

- **Severn River Watershed:**
  - includes Annapolis, USNA
  - drains to Chesapeake Bay
  - heavy reliance of community on water resources:
    - tourist industry
    - water recreation / sailing
    - fisheries
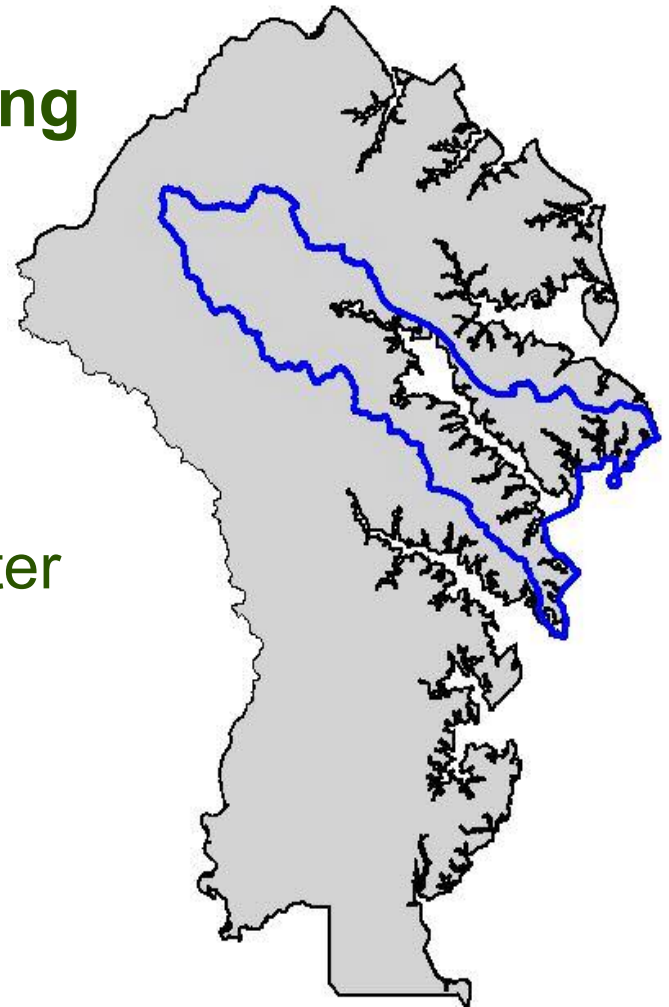
Additional Benefits of the Watershed Master Plan

- ◆ **Balance environment and healthy economy**

- ◆ **Maintain Anne Arundel County's quality of life**

- ◆ **Analyze the land and watershed environments together**

- ◆ **Identify and protect environmentally sensitive areas**

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Vision

The Watershed Master Plan will provide a blueprint and tools to facilitate land use and infrastructure decisions by County Staff and Stakeholders to protect the resources of the Severn River.

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Summary and Overview of Watershed Management Tool

◆ **Utilized for:**

- Watershed-Based Land Management
- Land Use Planning
- Development Review
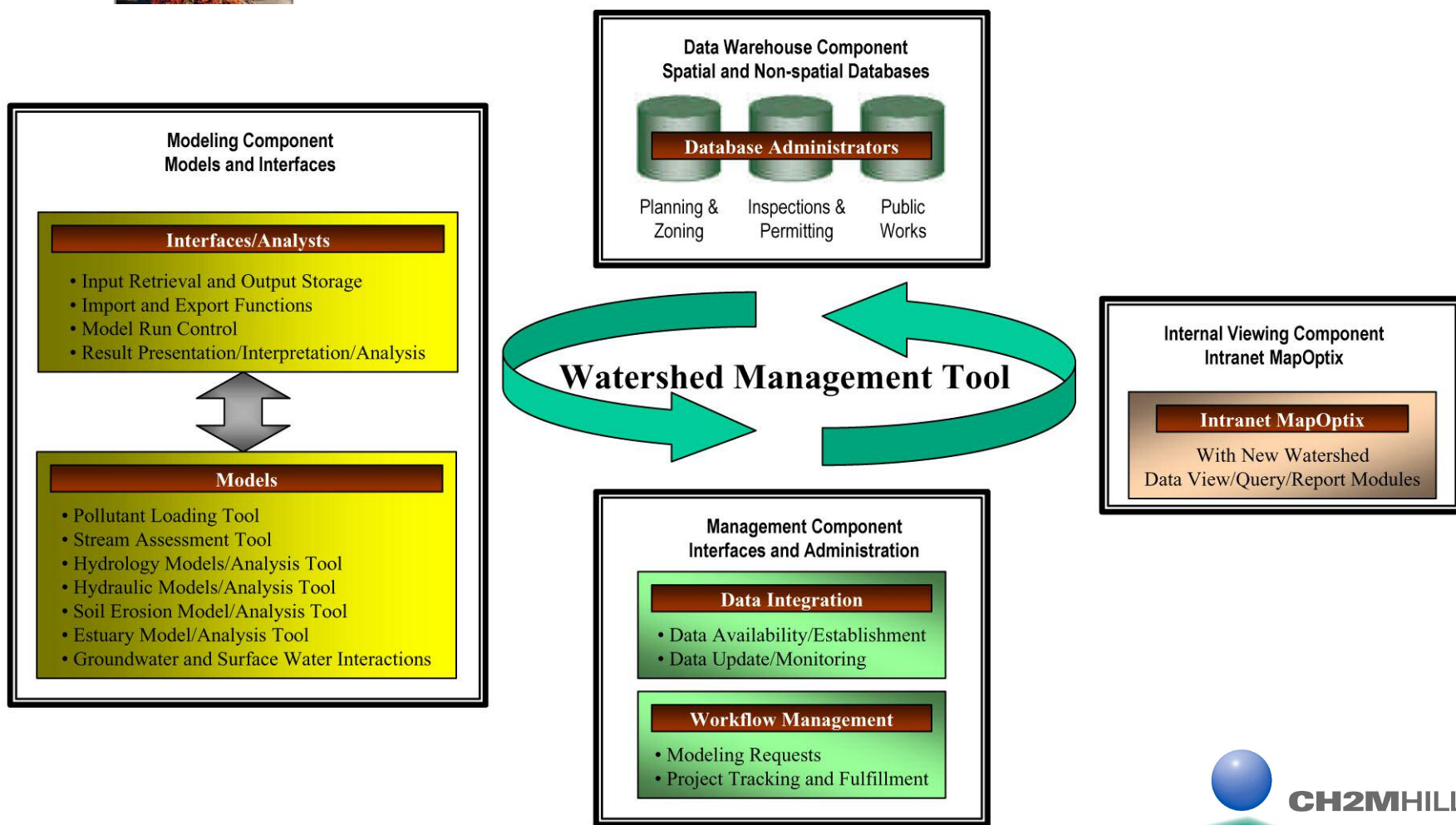- NPDES Compliance and Reporting

◆ **Components include:**

- Comprehensive watershed database of GIS layers and field data

- Visualization tool

- Different models to assess the condition of the watershed in terms of water quality, flow regime, and habitat assessment

WMT Home - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address http://sculptor:81/

WMT
Anne Arundel County — Watershed Management Tool

About

Project Setup

Project Request

Data Repository

WebGIS

It is a collection of GIS and database software, applications, and hardware; data (both spatial data collected in GIS format and time series data collected in tabular format), data collection, and maintenance procedures; analysis and modeling tools; staff; and business processes to facilitate watershed management decision-making and planning activities.

The WMT will leverage existing Anne Arundel County GIS programs, such as CountyView and MapOptix, programs, data, procedures, and staff where available and will enhance these existing resources components where necessary. The WMT is not a single software program or application. Instead, encompasses required resources and processes that the WMT is based upon. Additionally, this definition emphasizes the integration of the WMT with the County's watershed management–related business processes/practices and represents the ultimate expectation of the WMT.

Contact WMT Administrator if any questions or comments

Done Local intranet

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Overview of Functional Components of WMT

Data Warehouse Component
Spatial and Non-spatial Databases

Database Administrators

| Planning & Zoning | Inspections & Permitting | Public Works |

Modeling Component
Models and Interfaces

Interfaces/Analysts

- Input Retrieval and Output Storage
- Import and Export Functions
- Model Run Control
- Result Presentation/Interpretation/Analysis

Models

- Pollutant Loading Tool
- Stream Assessment Tool
- Hydrology Models/Analysis Tool
- Hydraulic Models/Analysis Tool
- Soil Erosion Model/Analysis Tool
- Estuary Model/Analysis Tool
- Groundwater and Surface Water Interactions

Watershed Management Tool

Internal Viewing Component
Intranet MapOptix

Intranet MapOptix

With New Watershed
Data View/Query/Report Modules

Management Component
Interfaces and Administration

Data Integration

- Data Availability/Establishment
- Data Update/Monitoring

Workflow Management

- Modeling Requests
- Project Tracking and Fulfillment

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Components of the Anne Arundel County Watershed Management Tool

- ◆ **Comprehensive watershed database**
  - GIS layers
  - field inventory data
  - monitoring data
- ◆ **Visualization Tool**
  - graphical presentation of watershed info
- ◆ **Modeling Tool**
  - allows for qualitative and quantitative analyses
  - allows the reviewer to perform what-if scenarios

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Model Categories within WMT

- **Water Quality Modeling - Pollutant Loading**
  - models pollutants coming off land - runoff quality
  - PLOAD and GWLF (Generalized Watershed Loading Function)

- **Hydrologic & Hydraulic Modeling**
  - addresses flooding and changes in flow regime
  - TR-20 and HEC-RAS

Model Categories within WMT

- **Stream Assessment**
  - predicts future stream habitat conditions
  - based on regression analyses
  - WISE (Watershed Improvements through Statistical Evaluation)
  - data visualization tool - allows querying, categorizing
  - Stream Assessment Tool
- **Groundwater / Surface Water Interactions**
  - GWLF
- **Septic System Discharges**
  - GWLF

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Stream Assessment Tool

◆ **data visualization tool**

◆ **querying and categorizing functionality for County to use in their analyses of stream assessment and bioassessment data**

◆ **contains baseline 2002 conditions**

◆ **original version developed in ArcView 3.2 and Access 2000**

◆ **now has been migrated to ArcGIS 8.2**

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Stream Assessment Tool: Watershed Management - Data Visualization

- **Assessed streams**
- **Classification of stream reaches by MPHI category**
- **Ranking of County stream reaches**
- **Development requirements (e.g. floodplains)**
- **BMP locations**
- **Infrastructure locations - including illicit discharges**
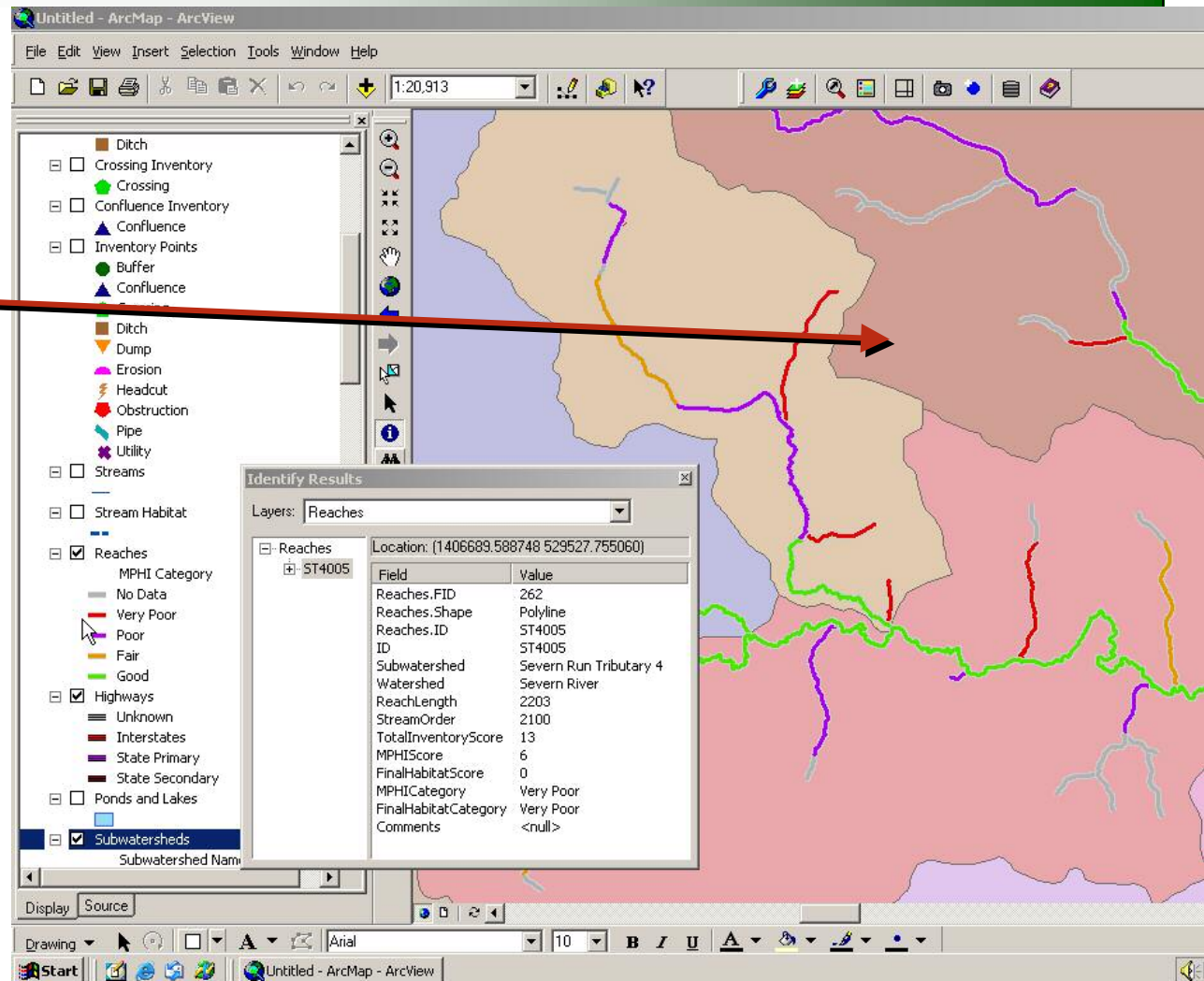
Stream Assessment Tool: Development Review
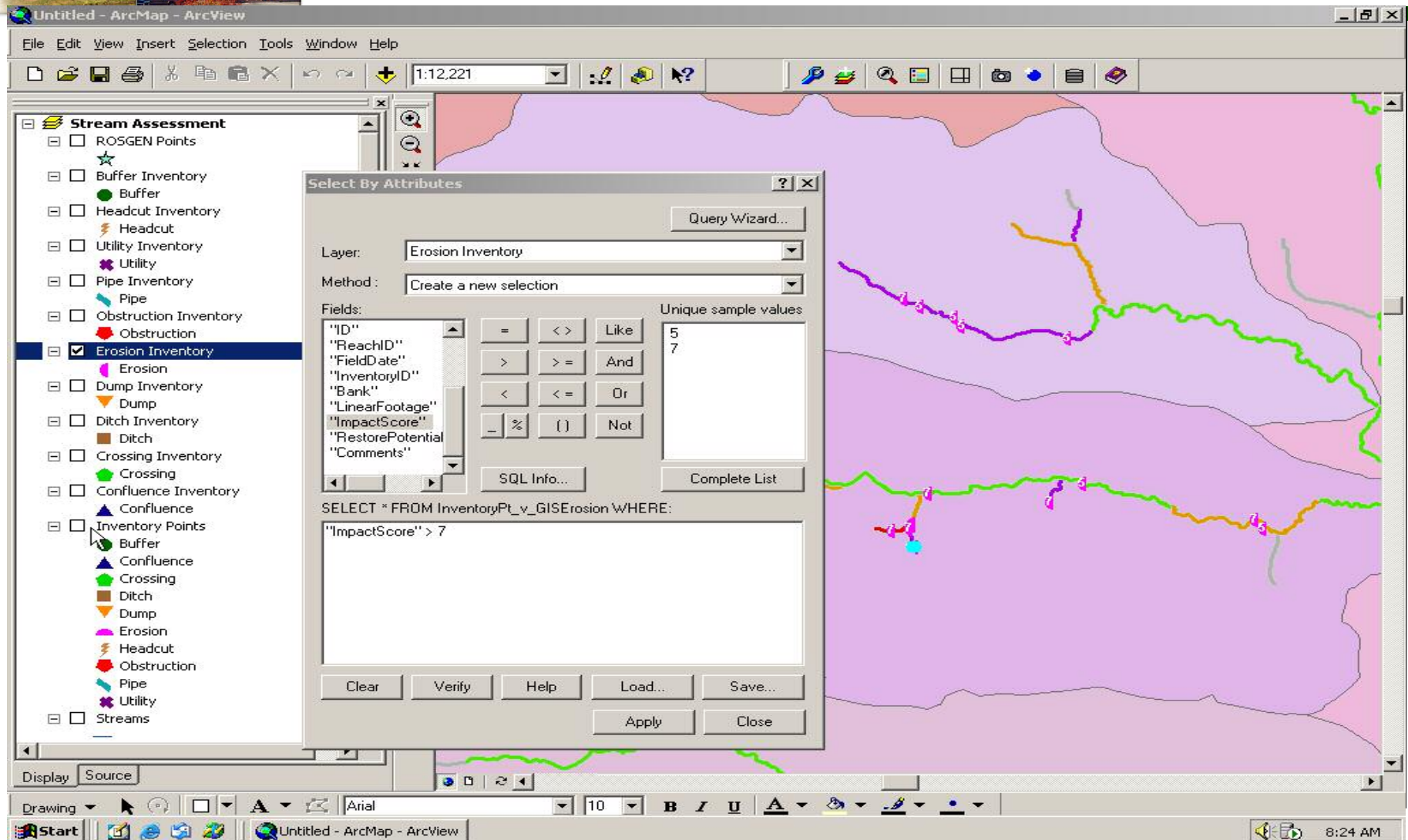
# Stream Assessment Tool: Database Interface

Pollutant Loading Model: PLOAD

- ◆ **Developed by CH2M HILL in 1999**

- ◆ **Now included in the EPA BASINS package - linked to ArcView 3.2**

- ◆ **Has been migrated to ArcGIS 8.3**

- ◆ **New version includes a scenario wizard and personal geodatabase to better manage the input and output data associated with a model run scenario**

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Pollutant Loading Model: PLOAD

- ◆ **Models runoff quality using Simple Method**

- ◆ **Event Mean Concentration literature review performed, MDE and NURP data used among others**

- ◆ **BMP point coverage developed during this project from County database**

- ◆ **Point source coverage developed with County and utilized EPA Permit Compliance System data**

- ◆ **Current conditions modeled to date, future conditions in process, then additional scenarios coordinated with County**

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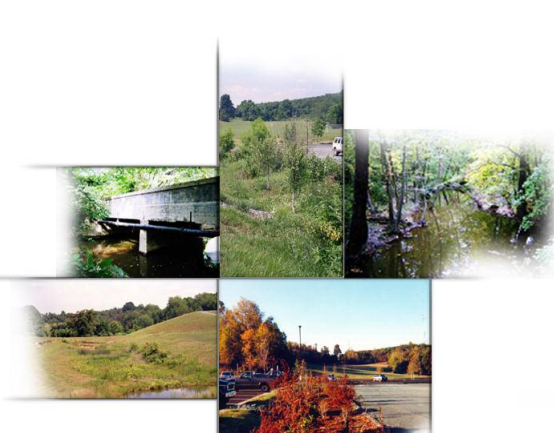
Modeling Tool: Pollutant Load Modeling
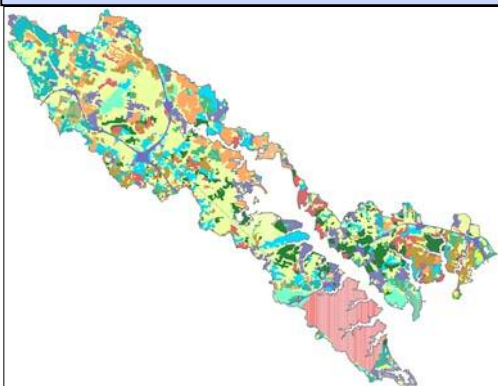
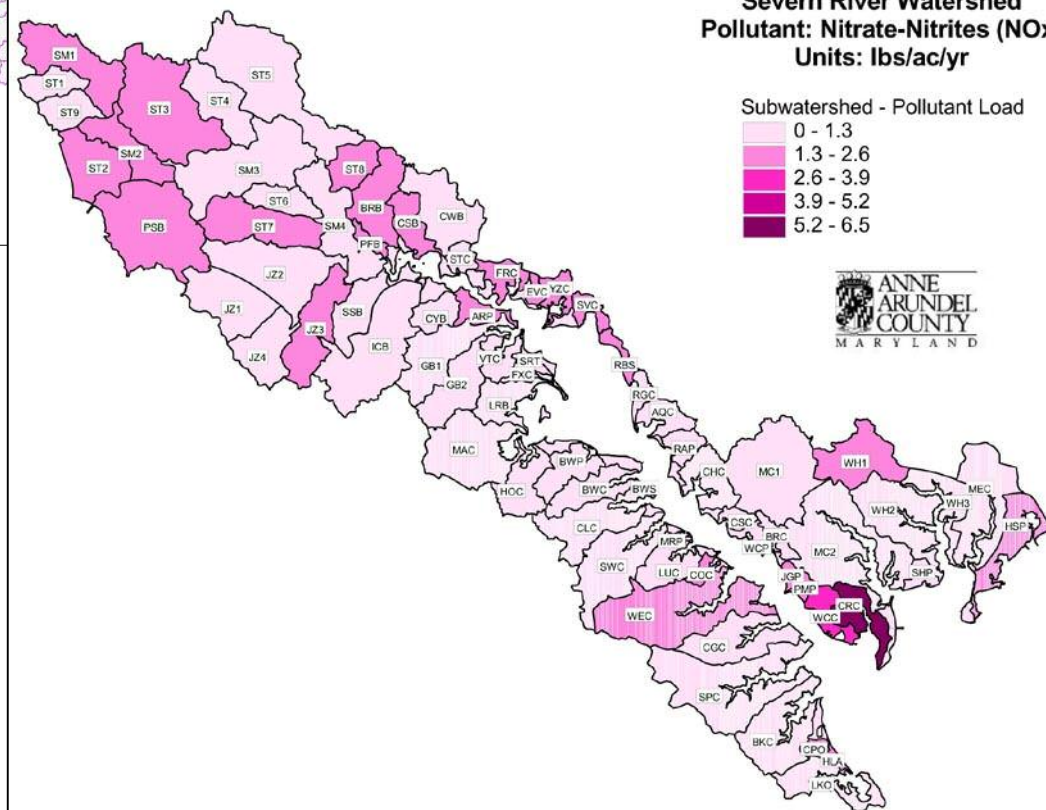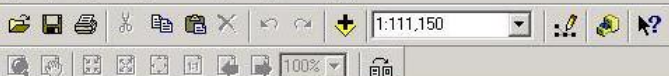| Land use	Subwatersheds	BMPs

+

Severn River Watershed
Pollutant: Nitrate-Nitrites (NOx)
Units: lbs/ac/yr

Subwatershed - Pollutant Load
- 0 - 1.3
- 1.3 - 2.6
- 2.6 - 3.9
- 3.9 - 5.2
- 5.2 - 6.5

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MARYLAND

Edit View Insert Selection Tools Window Help

1:111,150

Scenario6(Base Data Frame)
- lu_m
  - KCI_LU
  - CIT
  - COM
  - IND
  - OPS
  - R11
  - R12
  - R14
  - R18
  - R21
  - RWD
  - SRC
  - TRN
  - WAT
  - WDS
- subsheds_m

PLoad Toolbar

Tools

PLOAD Data Import

File Edit View Help

All_LUTs
- **Imperv**
- EMCs
- BMPs OLD Test
- BMPs_New
- PointSourceInfo_New
- PointSourceInfo_Old

Please select the dataset range.
Test subcaption

Land Use Code	Land Use	Imperviousness	Source
COM	Commercial	85	TR-55
IND	Industrial	72	TR-55
OPS	Open Space	0	TR-55
R18	Residential 1/8 Acre lots	34	Severn measurem
R14	Residential 1/4 Acre lots	20	Severn measurem
RS12	Residential 1/2 Acre lots	18	Severn measurem
R11	Residential 1 Acre lots	13	Severn measurem
R21	Residential 2 Acre lots	13	Severn measurem
RWD	Residential, wooded lots	6	Severn measurem
SRC	Single Row Crop	0	TR-55
TRN	Transportation (paved open section)	75	TR-55
WAT	Water	100	TR-55
WDS	Woods	0	TR-55
RWT	Receiving Water	0	
CIT	City of Annapolis	0	
Severn River, Ann			

Cancel   Done

play Source

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In conclusion:
General Advantages of the WMT

- ◆ **Better access and use of existing mapping and related data throughout the County**

- ◆ **Ability to make more informed decisions**

- ◆ **More consistent review and analysis**

- ◆ **Supports existing business practices and software (MapOptix)**

- ◆ **Provides an overall watershed perspective**

- ◆ **Dynamic tool**

- ◆ **Win-win situation for the environment and the economy**

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Questions & Answers

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