



# COAST Toolkit: Delivering Model Results and Information to Chesapeake Bay Stakeholders in an Adaptive-Management Context

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U.S. Department of the Interior  
U.S. Geological Survey

# Outline

- **Chesapeake Online Adaptive Support Toolkit (COAST)**
  - What is COAST?
  - How do we integrate Adaptive Management concepts?
- **Watershed Mapper (Chesapeake Bay SPARROW)**
- **Forested Land Management Mapper**
- **Nontidal Monitoring Tool**
- **Next Steps**

# The Chesapeake Online Adaptive Support Toolkit (COAST)

The screenshot displays the USGS Chesapeake Bay Activities website. At the top, there is a navigation bar with the USGS logo and the text "USGS Chesapeake Bay Activities". Below this, the main content area is titled "Chesapeake Online Adaptive Support Toolkit (COAST)" and includes a sub-header: "Web-based adaptive management tools for the Chesapeake Bay ... a cooperative effort between the USGS and EPA Chesapeake Bay Program".

On the left side, there is a "Navigate COAST" menu with links for Home, Toolkit, and various mapping tools. The "Toolkit" section lists: CB Activities Mapper, Watershed Contribution Mapper, Forested Land Management Mapper, Riparian Buffer Mapper, and Water-quality monitoring results. Below this is a "Learning Resources" section with links for Adaptive Management, EO Interagency Decision Support Hub, and Examples of Current Uses. A "Contacts" section lists COAST Crew and Feedback.

The main content area features "The COAST Mission:" which states: "The Chesapeake Online Adaptive Support Toolkit (COAST) is a decision-support system designed to assist land management and restoration efforts in the Chesapeake Bay watershed. COAST uses an adaptive-management framework to provide access to a diverse suite of spatial information, monitoring data, and supporting scientific research to help Federal, State, and local resource managers better target, implement, and assess the effectiveness of their activities." Below this text is a circular diagram of the "DOI adaptive management cycle" with five steps: Assess problem, Design, Implement, Monitor, and Adjust.

Below the mission statement is the "COAST Toolkit:" section, which includes a small map of the Chesapeake Bay area and a list of tools: "The CB Activities Mapper provides a reference of on going projects and planned work in the Chesapeake Bay Watershed.", "The Watershed Contribution Mapper provides access to the USGS Chesapeake Bay Spatially Referenced Regressions On Watershed (SPARROW) attributes models and a suite of other geospatial layers related to watershed restoration.", "The CB Forested Land Management Mapper provides functionality to weight geospatial data layers and create your own priority areas for land management decision making.", "The Riparian Buffer Mapper is available as a desktop tool for automated riparian buffer delineation and land cover mapping with high resolution imagery (HRI).", and "The Water-quality Monitoring Results web form delivers information from the USGS Non Tidal and River Input".

## Science based Decision-support tool

- WWW based
- Integrated framework of models and information
- Adaptive management

## Implement and assess actions

- Executive Order
- Water quality
- Watersheds (forest management)

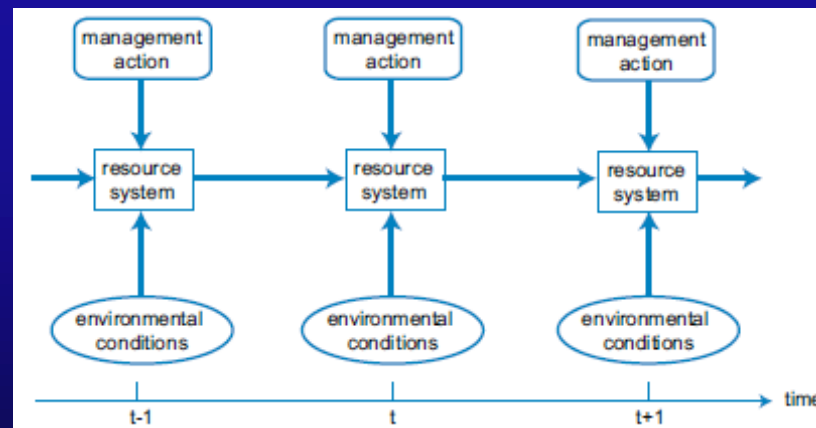
## User groups

- State, federal, local, NGO's



# Adaptive Management

- A specific kind of structured decision making
- Learning by doing and adapting to what is learned
- Improves both the operation of restoration programs and meeting restoration goals



# Executive Order Strategy

## **Supporting Objective:**

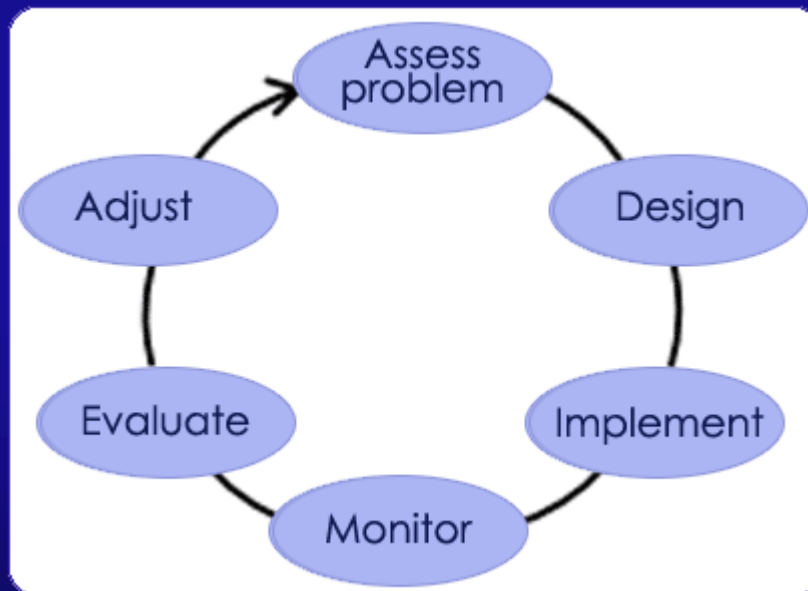
**Better prioritize and adjust management actions by developing decision-support tools and an expanded set of models.**

Decision-support tools will be developed to provide results from models, monitoring and research to better evaluate progress toward goals and improve management decisions. An expanded set of integrated models, validated by monitoring and observations, will be established to more accurately understand the Chesapeake ecosystem, improve the ability to test different management actions and forecast potential future conditions due to population growth and climate change.



# Representing Adaptive Management

The COAST Toolkit provides web map applications to support adaptive management steps.



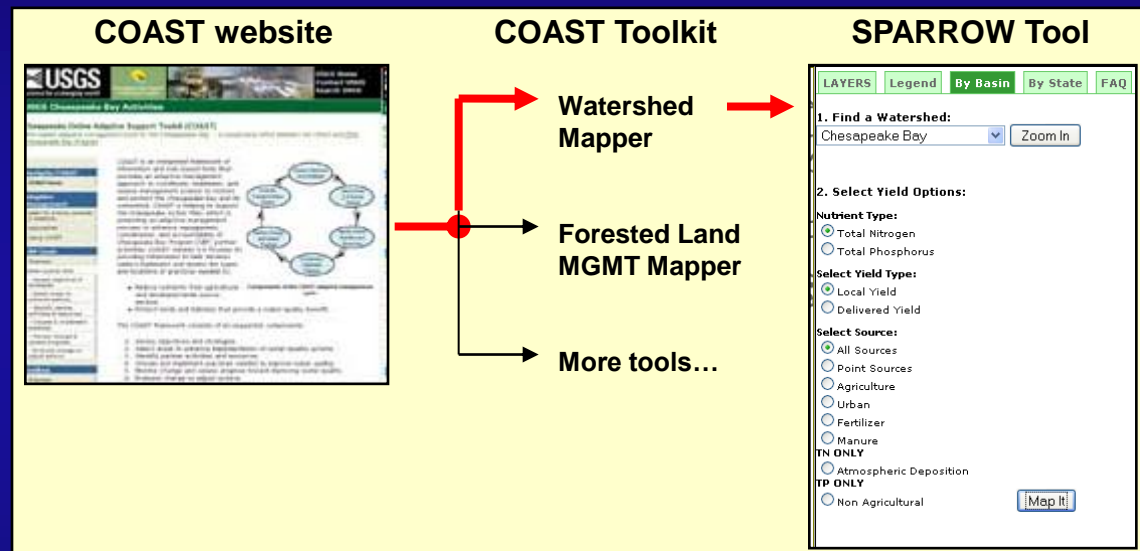
<b>Navigate COAST</b>
Home
<b>Toolkit</b>
CB Activities Mapper
Watershed Contribution Mapper
Forested Land Management Mapper
Riparian Buffer Mapper
Water-quality monitoring results
<b>Learning Resources</b>
Adaptive Management
EO Interagency Decision Support Hub
Examples of Current Uses
<b>Contacts</b>
COAST Crew
Feedback

# Watershed Mapper Tool

**GOAL:** visualize relative contributions of nutrients from watersheds both locally and to the Bay.

## Key Components

- Open Source Framework
- USGS Chesapeake Bay SPARROW v3 Output Datasets for TN and TP and 2000 Sediment
- Dynamic Styling Process



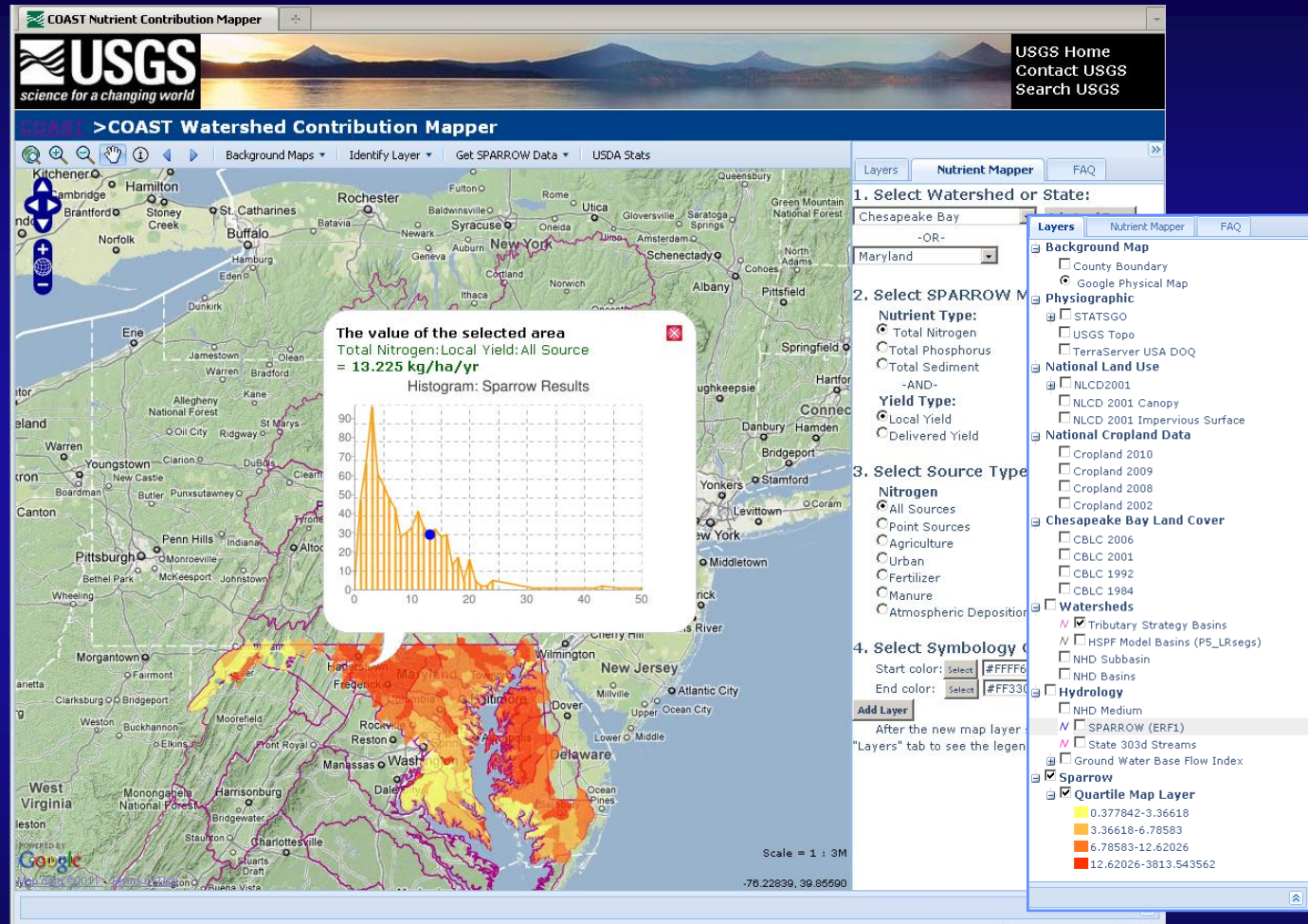
*COAST to SPARROW Tool Architecture*



# Watershed Mapper Interface

## Highlights

- Online Public Access
- Data is visually summarize for easier interpretation
- Original data values are also accessible
- View other related datasets



Direct URL: [http://lcat.usgs.gov/coast/watershed\\_mapper/](http://lcat.usgs.gov/coast/watershed_mapper/)

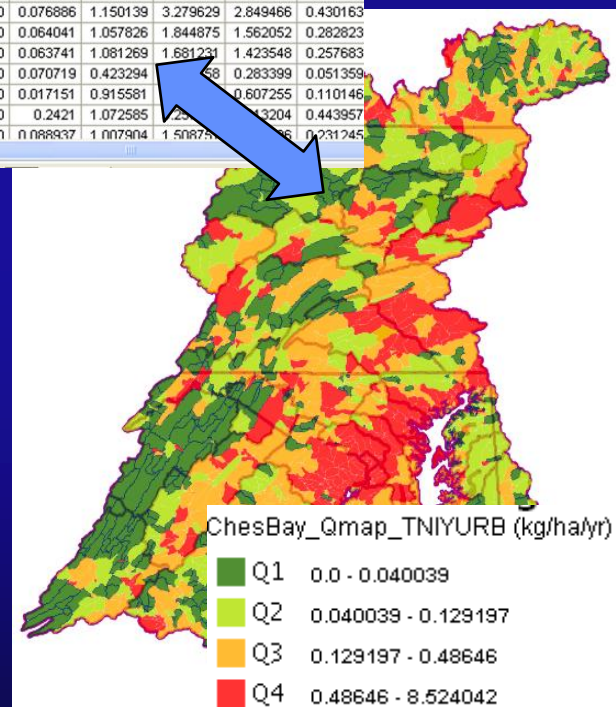
# USGS SPARROW v3 Dataset

## Data Characteristics:

- USGS Spatially Referenced Regressions On Watershed attributes
- Data from the late 1990's Chesapeake Bay Watershed version
- Contains nutrient yield estimates by watershed, contaminant type, delivery destination, and source

Attributes of SPARROW\_Q\_TN

TS2HA	HUC	IYTOT	IYPIIT	IYURB	IYATM	IYAGR	IYFRT	IYMAIL
Susquehanna	2020004	3.899933	0	0.129802	1.080066	2.690066	2.155942	0.534124
Susquehanna	2020004	5.147193	1.325949	0.36518	0.961617	2.494446	2.003116	0.491331
Susquehanna	2020004	3.455413	0	0.077161	1.005471	2.372781	1.916147	0.456634
Susquehanna	2020004	3.455413	0	0.077161	1.005471	2.372781	1.916147	0.456634
Susquehanna	2020004	4.957774	0	0.093564	1.109246	3.754964	3.309157	0.445807
Susquehanna	2020004	1.093857	0	0.017942	0.307504	0.768411	0.624817	0.143594
Susquehanna	2020004	3.408532	0	0.102915	0.932265	2.373352	2.00358	0.369772
Susquehanna	2050101	2.086724	0	0.07291	0.695589	1.318224	1.106218	0.212007
Susquehanna	2020004	4.074131	0	0.126504	0.994679	2.952947	2.499128	0.453818
Susquehanna	2050101	3.408532	0	0.102915	0.932265	2.373352	2.00358	0.369772
Susquehanna	2020004	2.416413	0	0.040467	0.982307	1.393638	1.204559	0.18908
Susquehanna	2020004	2.488266	0	0.183792	0.921406	1.383068	1.171156	0.211912
Susquehanna	2050101	3.882329	0	0.283498	1.168434	2.430396	2.022776	0.40762
Susquehanna	2020004	4.506653	0	0.076886	1.150139	3.279629	2.849466	0.430163
Susquehanna	2050101	2.966744	0	0.064041	1.057826	1.844875	1.562052	0.282823
Susquehanna	2050101	2.826241	0	0.063741	1.081269	1.681231	1.423548	0.257683
Susquehanna	2050101	0.828772	0	0.070719	0.423294	0.828772	0.283399	0.051359
Susquehanna	2020005	1.650134	0	0.017151	0.915581	0.607255	0.607255	0.110146
Susquehanna	4140202	4.571846	0	0.2421	1.072585	1.3204	0.443957	
Susquehanna	2050101	2.605593	0	0.088937	1.007904	1.50875	1.0231245	



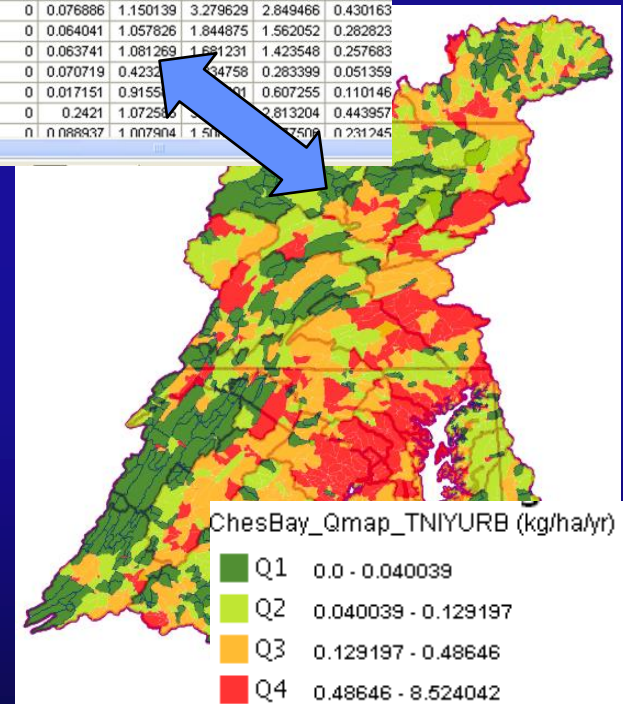
# USGS SPARROW v3 Dataset

## Data Characteristics:

- Watershed = 8 – 12 digit HUC
- Nutrients = Nitrogen, Phosphorous
- Delivery destination = local watershed or Chesapeake Bay

Attributes of SPARROW\_Q\_TN

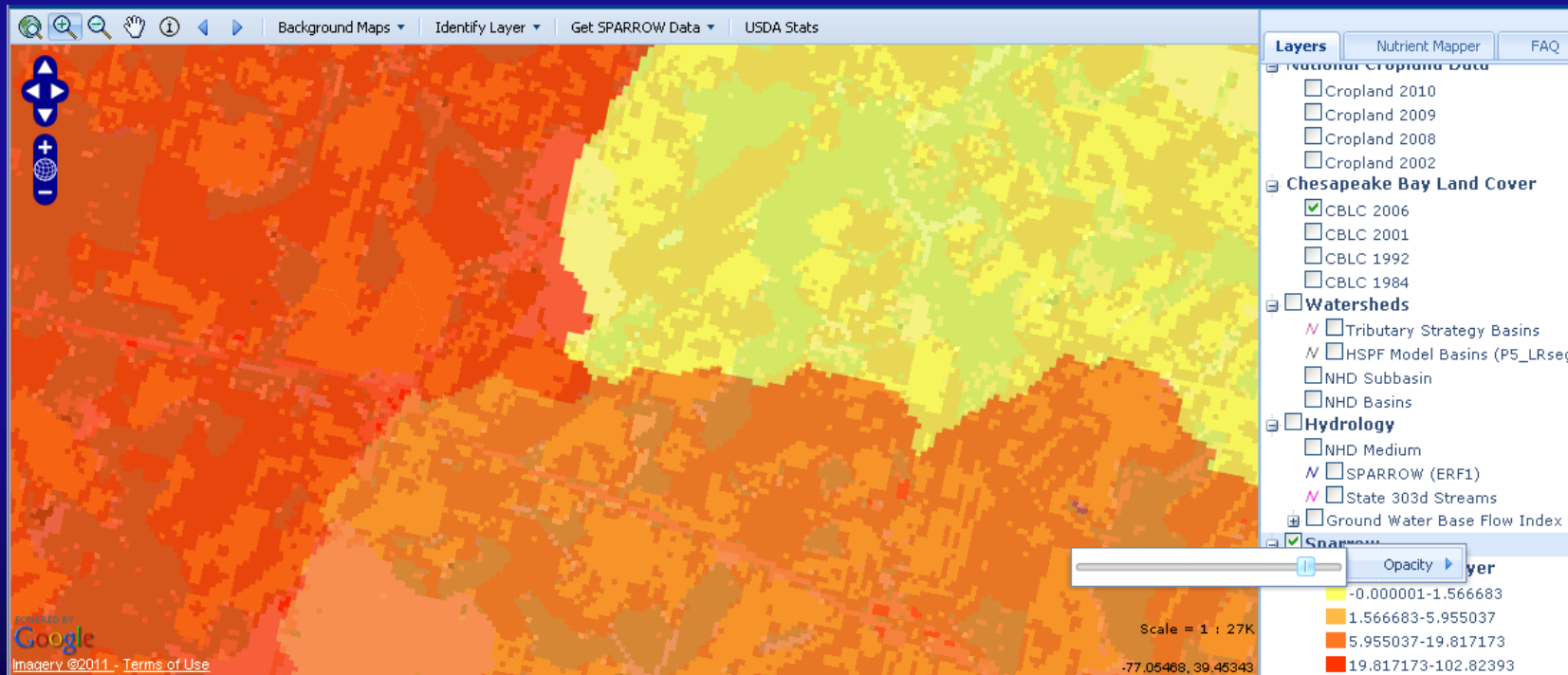
TS21IA	HUC	IYTOT	IYPHT	IYURB	IYATM	IYAGR	IYFRT	IYMAH
Susquehanna	2020004	3.899933	0	0.129802	1.080066	2.690066	2.155942	0.534124
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Susquehanna	2050101	2.826241	0	0.063741	1.081269	1.691231	1.423548	0.257683
Susquehanna	2050101	0.828772	0	0.070719	0.4232	0.4758	0.283399	0.051359
Susquehanna	2020005	1.650134	0	0.017151	0.9155	0.91	0.807255	0.110146
Susquehanna	4140202	4.571846	0	0.2421	1.072504	1.072504	0.813204	0.443957
Susquehanna	2050101	2.605593	0	0.088937	1.007904	1.507904	1.275004	0.231745



# USGS SPARROW Sediment Dataset

## Data Characteristics:

- Published FY11, Data characterizes early 2000's
- Regional and local perspective on sediment sources and transport
- Sources: small stream channels, agricultural, impervious surface, forested areas



# COAST and SPARROW Use Cases

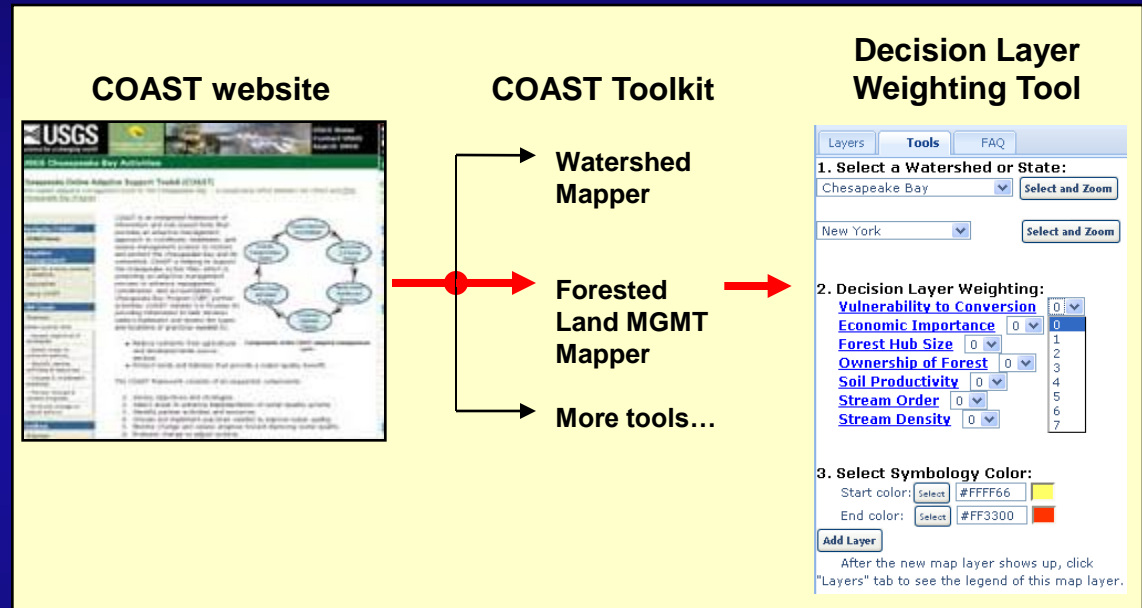
1. The USDA Natural Resources Conservation Service (NRCS) used COAST to identify priority agriculture areas within the Chesapeake Bay watershed to enhance funding from the 2008 Farm Bill.
2. The U.S. Environmental Protection Agency and states in the Bay watershed used information from COAST to help select projects to reduce nutrients from urban areas utilizing funds from the 2009 Stimulus Bill.
3. The Chesapeake Bay Foundation and the Maryland Bay Trust Fund have also used information from COAST to help identify areas in which to focus and assess efforts to reduce nutrients from agricultural and urban areas.

# Forested Land Management Tool

**GOAL:** Allow users to rank important environmental indicator datasets to create their own priority maps

## Key Components

- Open Source Framework
- Common datasets that are used in forest preservation decision making
- User customization



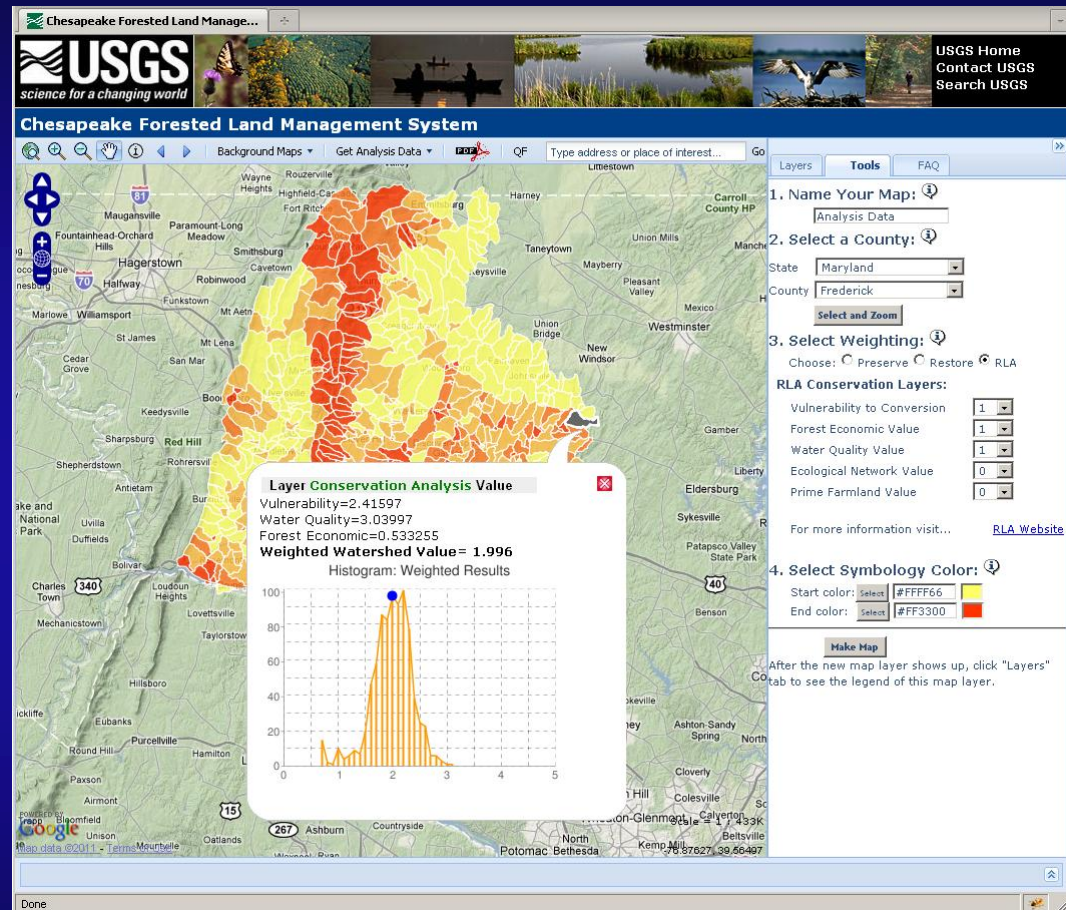
*COAST to FLM Tool Architecture*



# Forested Land Management Interface

## Highlights

- Online Public Access
- User creates prioritization
- Source data sets are viewable
- View other related datasets
- Released in FY12

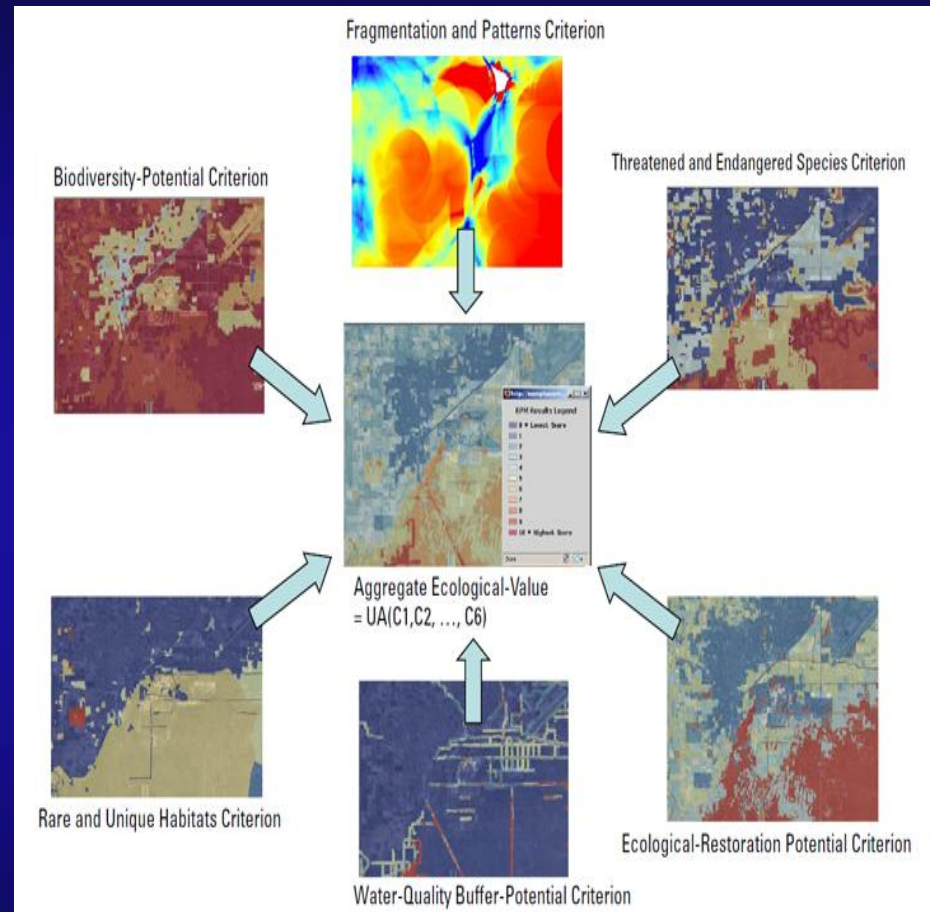


Direct URL: <http://lcat.usgs.gov/coast/cbflm/>

# Forested Land Management Tool

## Aggregate Value Mapping

- Can be used to prioritize land areas for many purposes
- Transparency: All source data clearly identified, documented, and quality-assured
- Simplicity: Avoids complex models
- Flexibility: User-applied weighting factors can reflect preferences of different stakeholders



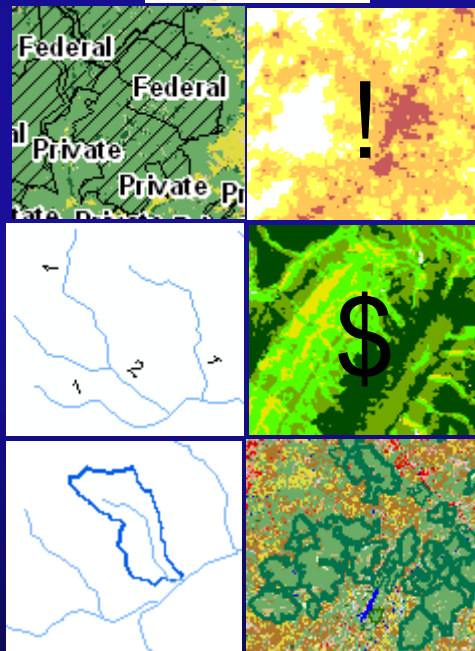
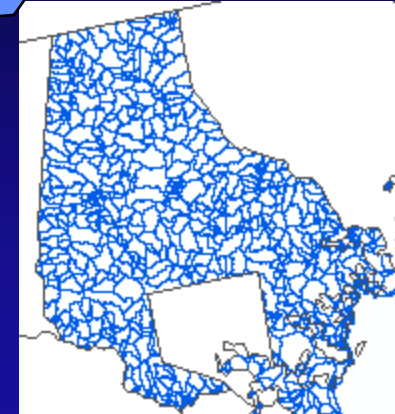
# Forested Land Management Data

LAYER	SOURCE	YEAR	CELL SIZE	VALUE RANGE
Vulnerability to Conversion	RLA	2000	30 meter	1 - 4
Economic Importance	RLA	2000	30 meter	1 -100
Forest Hub Size	RLA	2000	30 meter	170.6 -1376538.2 acres
Soil Productivity	SSURGO.Site_Index_r	2010	10 meter	25 - 110 years
Stream Order	NHDplus	2005	10- 12 HUC	Strahler Order 1 -7
Stream Density	NHDplus	2005	10- 12 HUC	0.000011 - 0.154414
Soil Moisture	SSURGO.Soimoistdept_r	2010	10 meter	0 - 200 meters
Adjacent Landcover	CBLC 2006	2006	30 meter	Land cover classes 21- 95
Slope	NHDplus	2005	10 meter	0 - 109 %
Impaired Streams	EPA	2002 -2006	10 - 12 HUC	Yes (1) or No (0)

# Forested Land Management Data

## Data Characteristics:

- Data list determined by COAST Forest Test Case subject experts
- Analysis by County units
- Spatial scale = NHDplus catchment



COMID	den	ECO	HUB	OWII	VUL	sor	sin
8087583	1	0	4	4	1.55454	4	1
8088137	1	0	4	0	2.29073	1	1
8087581	2	0	4	0	1.39527	4	1
8087551	1	0	4	4	2.20914	4	1
8088959	1	0	4	4	1.52152	4	2
8087597	1	0	4	0	2.03409	4	2
8088957	2	0	4	4	1.71849	4	2
8088147	1	0	4	4	2.25166	1	2
8088529	1	0	4	4	1.37143	4	2



# Nontidal Monitoring Tools

**GOAL:** Provide access to trends in sediment and nutrient concentrations transported by nontidal rivers to evaluate progress toward restoration goals

## ■ Key Components

- Contains RIM and NT program data
- 2007 information on Stream Flow, Loads, and Trends
- Query Page, No mapping component
- New development in FY12

Changes in Streamflow and Water Quality in Selected ...

**USGS** science for a changing world

Chesapeake Bay Program  
A Watershed Program

USGS Home  
Contact USGS  
Search USGS

### USGS Chesapeake Bay Activities

#### Summary of Nutrient and Sediment Loads and Trends at Selected Nontidal Monitoring Stations for the Chesapeake Bay Watershed, 1985 to 2007

**Navigate Menu**

- Home

**Background**

- Introduction
- Highlights
- Methods
- Glossary
- Related Publications

**RIM Network**

- General Information
- Results Summary
- RIM Data and Results

**Nontidal Network**

- Stream Flow
- Loads and Trends

**Contacts**

- USGS Chesapeake Activities
- Technical Contacts
- Web Administrator

Welcome to the web site for the:

- Chesapeake Bay River Input Monitoring Program (RIM)
- Chesapeake Bay Nontidal Water-Quality Network Monitoring Network (NT)

The objective of both programs is to understand the trends in sediment and nutrient concentrations transported by nontidal rivers throughout the Chesapeake Bay Watershed.

Methods, data, results, and interpretations from both programs are available for:

- In-stream sediment and nutrient concentrations
- Sediment and nutrient loads (only for the 9 RIM stations)
- Sediment and nutrient trends in concentration
- Stream Flows

The site is updated through the 2007 water year and will be further updated annually with expanded sediment and nutrient results for subsequent water years. The information provided here is based

**EXPLANATION**

- Site location and number
  - Multi-agency site
  - RIM site
- Streams
- State boundaries
- Chesapeake Bay boundary
- Susquehanna River
- Chesapeake Bay
- Western Shore
- Choptank River
- Potomac River
- Rappahannock River
- Mattaponi River
- Pamunkey River
- James river
- Appomattox River

0 25 50 100 Miles  
0 40 80 160 Kilometers

# Nontidal Monitoring Tools

Changes in Streamflow and Water Quality in Selected ...

USGS science for a changing world

Chesapeake Bay Program A Watershed Program

USGS Home Contact USGS Search USGS

USGS Chesapeake Bay Activities

## Chesapeake Bay Watershed Trends: River Input Monitoring Network

[About Streamflow and Water Quality Data](#)

Select a Watershed:  
potomac river at chain bridge, md

Concentration and Load  
Loads

Constituent:  
TN

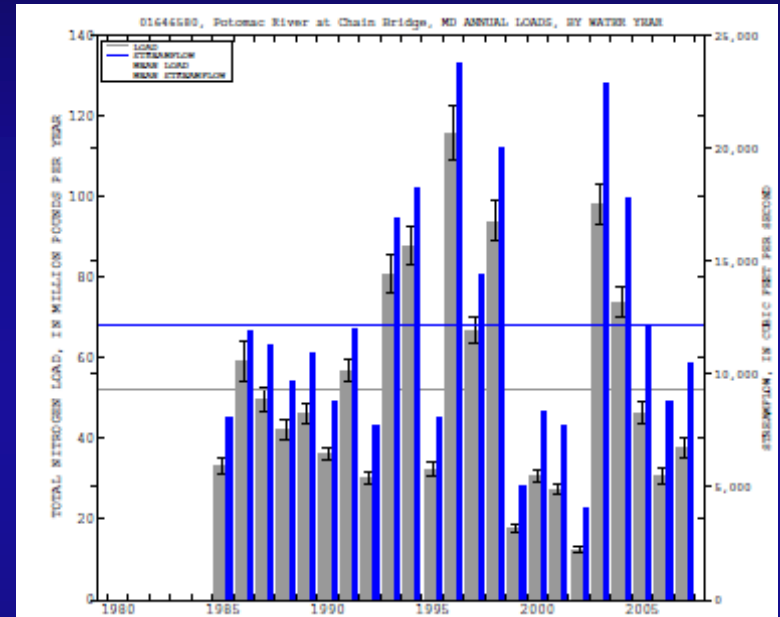
Display Save All Results

Trends:  
[Click Here](#)

EXPLANATION  
Subbasins  
Susquehanna  
Potomac  
James  
Rappahannock  
Appomattox  
Pamunkey  
Mattaponi  
Choptank  
Chesapeake Bay drainage area boundary  
Rivers and streams  
River Input Monitoring Station

Location of River Input Monitoring Stations in the Chesapeake Bay Basin.

Accessibility FOIA Privacy Policies and Notices  
U.S. Department of the Interior | U.S. Geological Survey



**Direct URL:**

**<http://md.water.usgs.gov/gis/trends/>**

# Next Steps

## ■ COAST in FY12

- Continue to make the COAST SPARROW mapper available as a resource for historic SPARROW data and 2000 sediment results.
- Demonstrate and facilitate use of the COAST Forested Lands Management mapper.
- Provide Non Tidal Network and River Input Monitoring data in a dynamic map interface.
- Start new work on developing a Data Portal for USGS Chesapeake Bay Studies data.



# Questions and Contacts

## COAST Website URL:

- <http://chesapeake.usgs.gov/coast/>
- Keywords: USGS COAST

## U.S. Geological Survey Contacts:

- Cassandra Ladino, [ccladino@usgs.gov](mailto:ccladino@usgs.gov)
- Paul Hearn – EGSC Apps Team Leader
- Scott Phillips – Chesapeake Bay Studies Coordinator

