

Tributary Summaries: *Overview*

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Tributary Summaries are a large collaborative ITAT effort coordinated by:

Breck Sullivan (USGS), Vanessa Van Note (EPA)

Rappahannock Tributary Summary:

A summary of trends in tidal water quality and associated factors, 1985-2018.

June 7, 2021

Prepared for the Chesapeake Bay Program (CBP) Partnership by the CBP Integrated Trends Analysis Team (ITAT)



This tributary summary is a living document in draft form and has not gone through a formal peer review process. We are grateful for contributions to the development of these materials from the following individuals: Jeni Keisman, Rebecca Murphy, Olivia Devereux, Jimmy Webber, Qian Zhang, Meghan Petenbrink, Tom Butler, Zhaoying Wei, Jon Harcum, Renee Karrh, Mike Lane, and Elgin Perry.

Purpose of the Tributary Summaries

- As a readily-available one-stop-shop on **background** for change over time observed with monitoring data.
- To answer questions such as:
 - *Have water quality indicators in my river been improving or degrading over time?*
 - *How have landscape factors that drive water quality change in my watershed changed over time?*
 - *What clues do they provide that might explain observed water quality change (or lack of change)?*
 - *What should I target to turn a degrading trend around or maintain improvements for future water quality and living resource conditions?*
 - *What should scientists focus our analyses on to provide better answers in the future?*

What are the Tributary Summaries?

A compilation of information by tributary or region on:

- Tidal water quality and trends

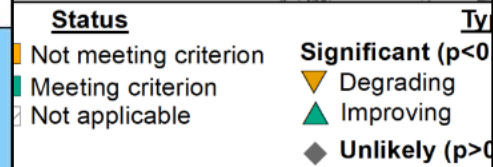
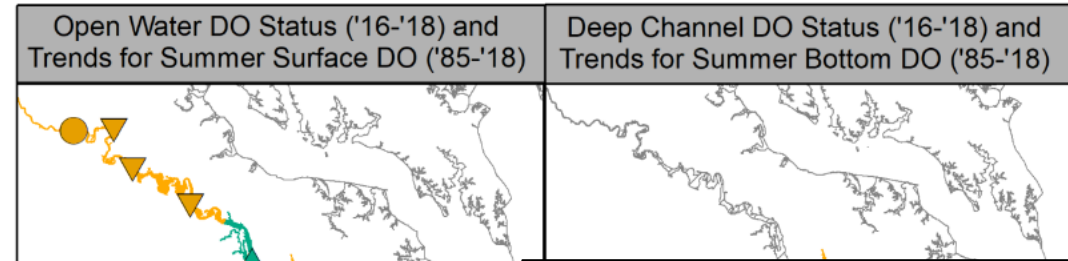
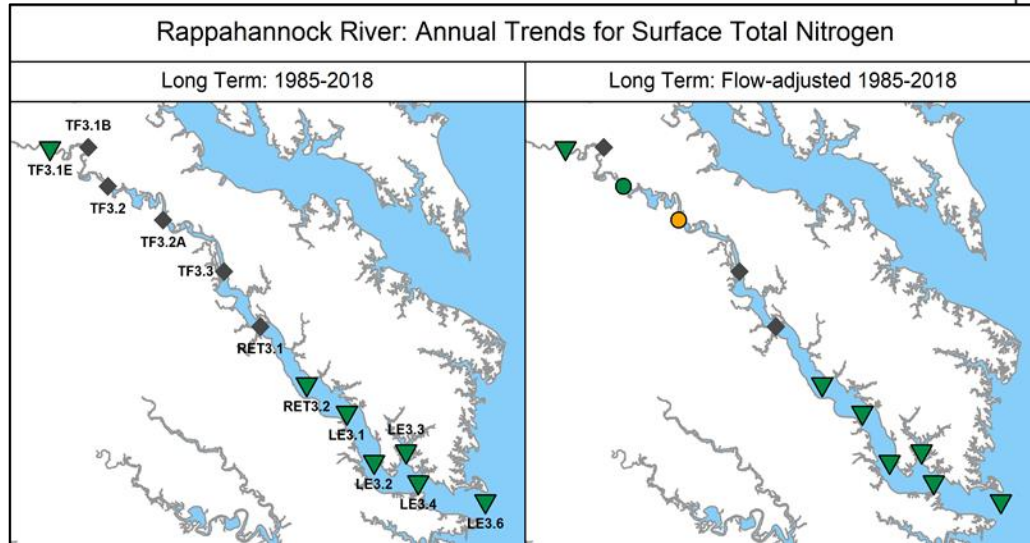
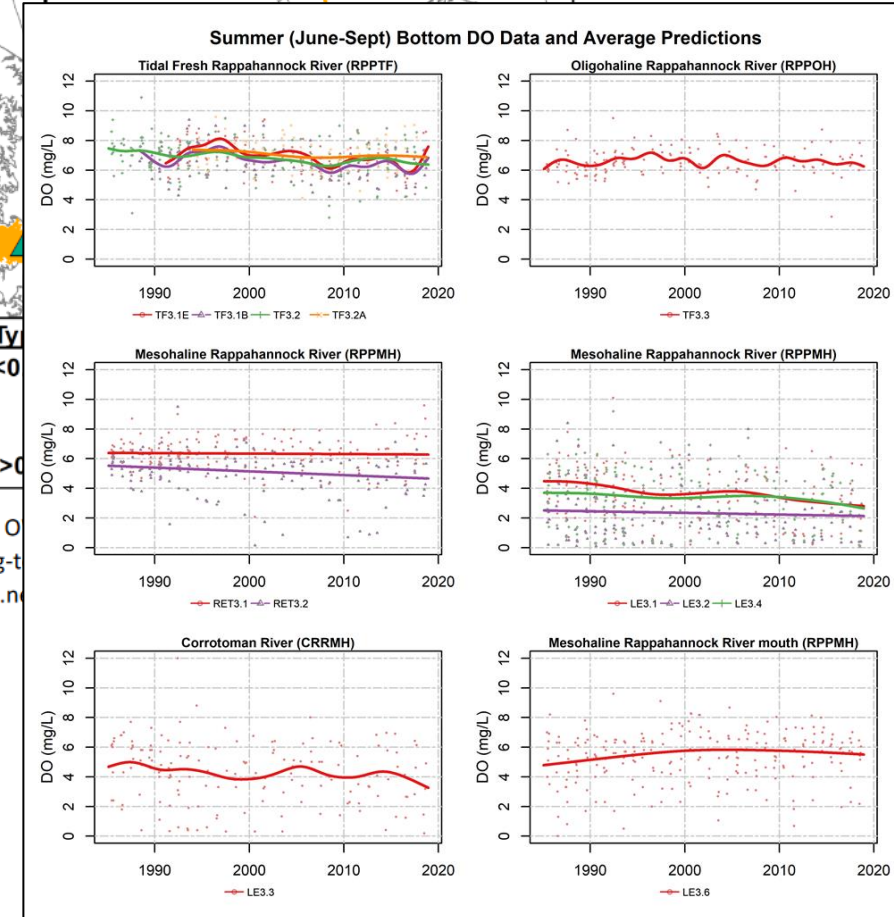


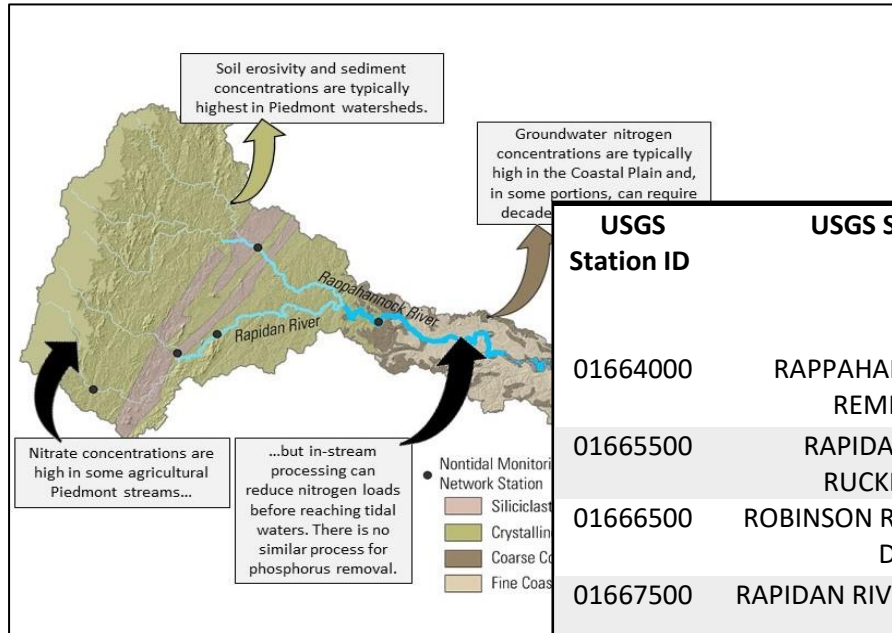
Figure 5. Pass-fail DO criterion status for 30-day O₂ in Rappahannock segments along with long-term trends in the Chesapeake Bay Program, www.chesapeakebay.net



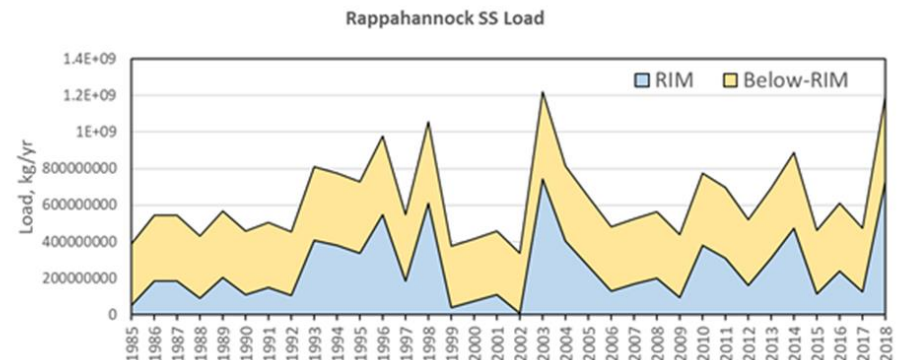
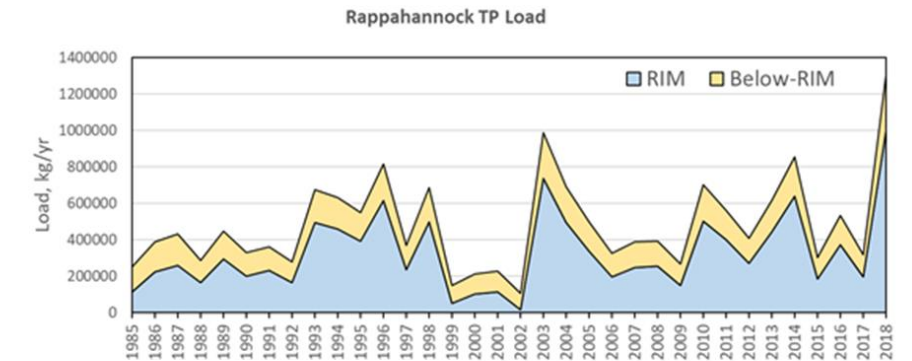
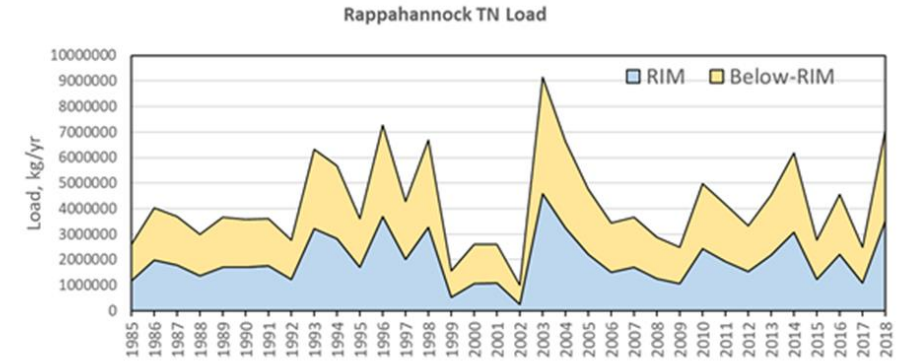
What are the Tributary Summaries?

A compilation of information by tributary or region on:

- Tidal water quality and trends,
- **Watershed characteristics and changes**



USGS Station ID	USGS Station Name	Trend start year	Percent change w
			TN
01664000	RAPPAHANNOCK RIVER AT REMINGTON, VA	1985	24.4
		2009	15.4
01665500	RAPIDAN RIVER NEAR RUCKERSVILLE, VA	2009	-5.1
01666500	ROBINSON RIVER NEAR LOCUST DALE, VA	1985	2.5
		2009	3.5
01667500	RAPIDAN RIVER NEAR CULPEPER, VA	2009	-8.9
01668000	RAPPAHANNOCK RIVER NEAR FREDERICKSBURG, VA	1985	-12.7
		2009	6.3



What are the Tributary Summaries?

A compilation of information by tributary or region on:

- Tidal water quality and trends,
- Watershed characteristics and changes,
- **Landscape drivers.**

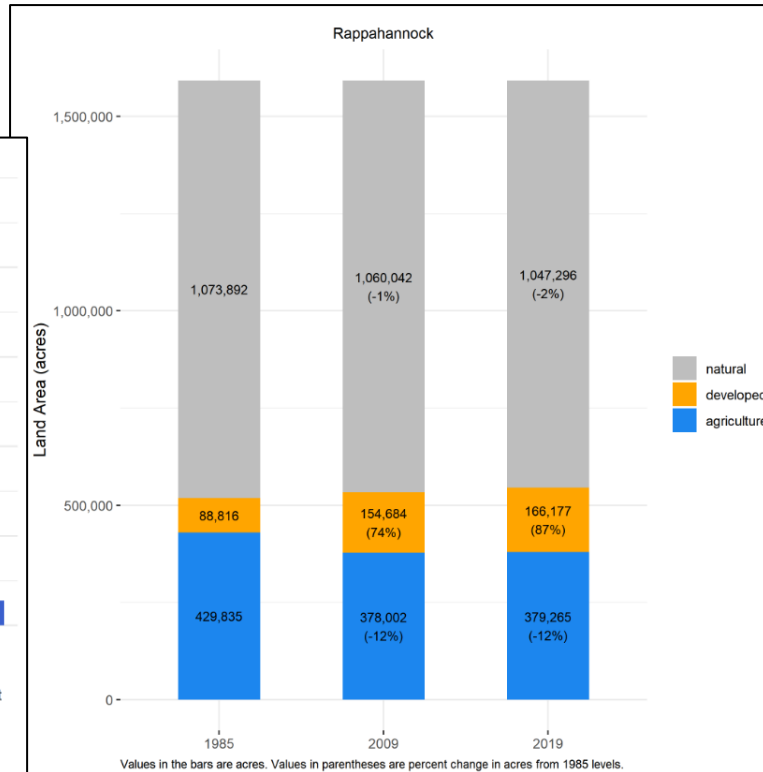
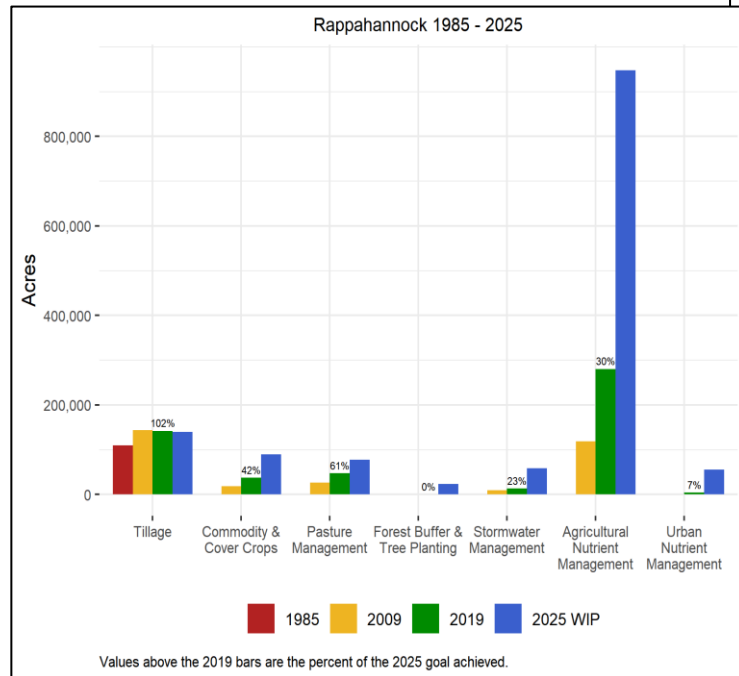
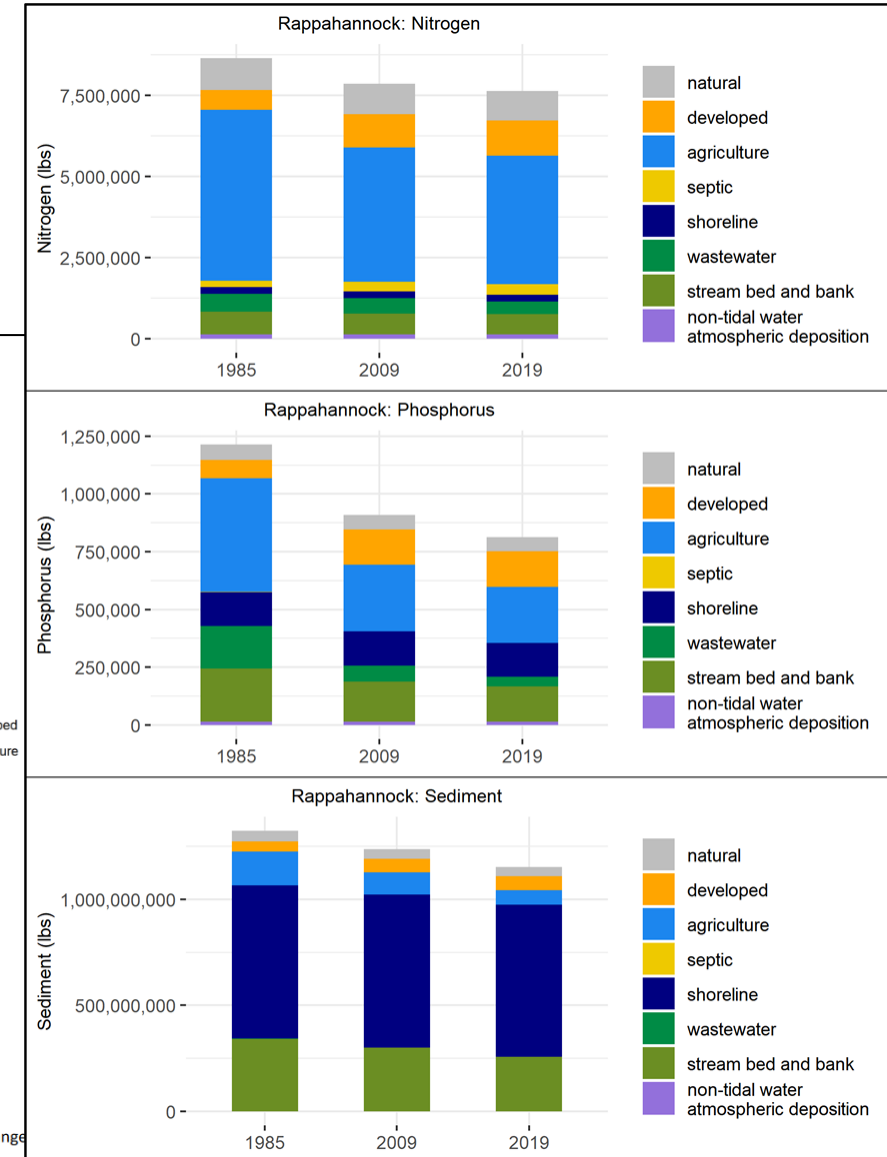


Figure 2. Distribution of land uses in the Rappahannock watershed. Percentages are the percent change from 1985 for each source sector.



Why do they exist?

- Reports had previously been compiled with tidal trend information from the states,
- But with new analyses of monitoring data, a new design was possible.
- Thus, these summaries put much information in one place as a technical resource.

Technical managers within jurisdiction agencies
Local watershed organizations
Federal, state, and academic researchers

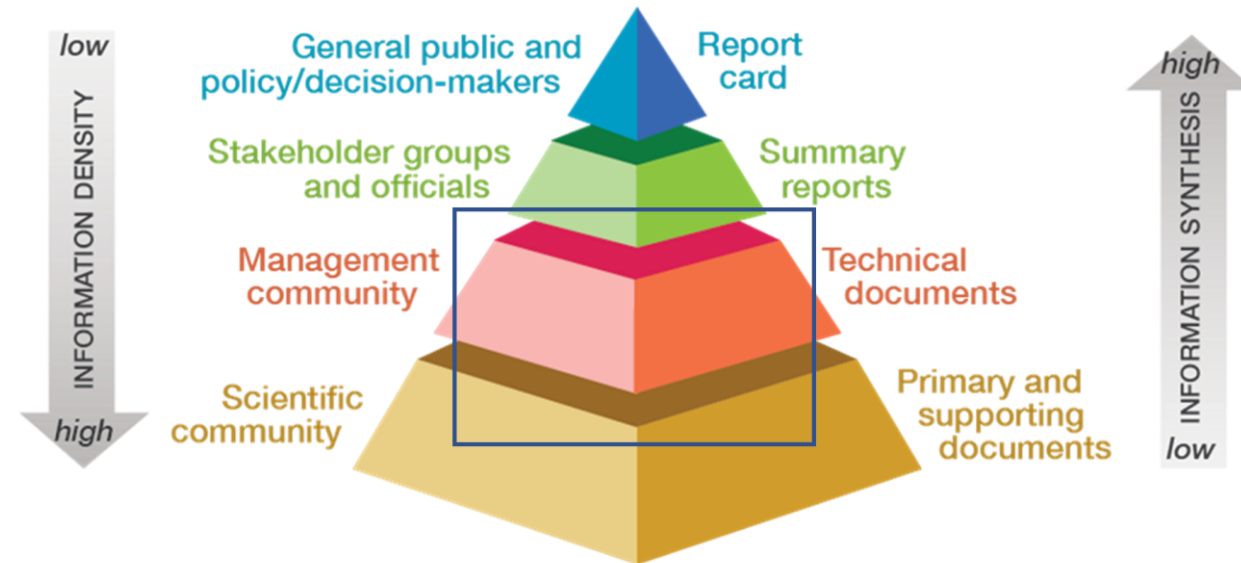
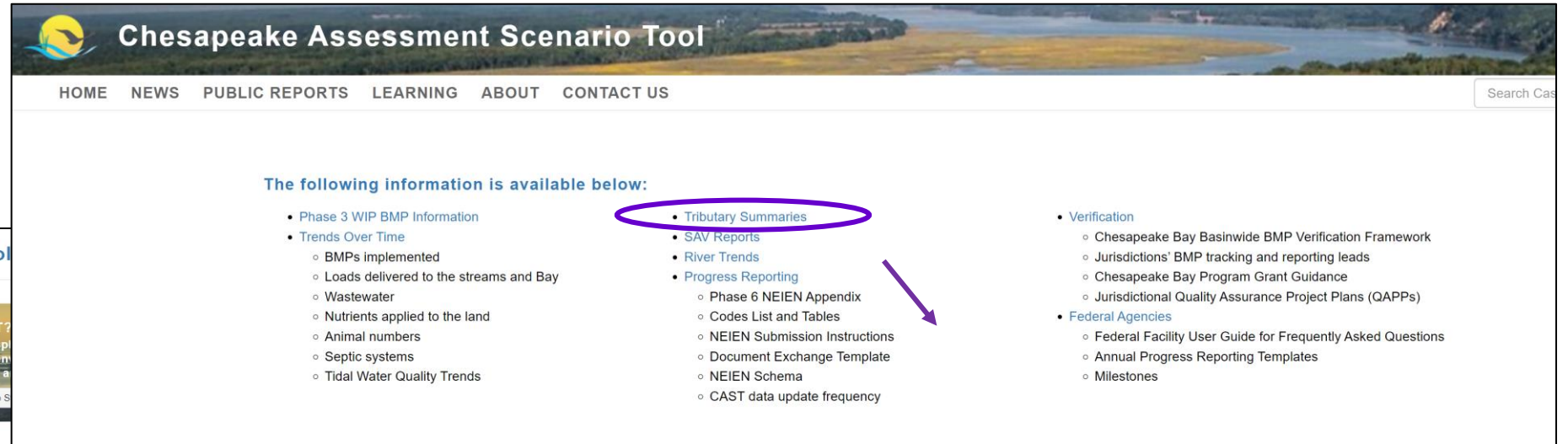


Figure courtesy UMCES Integration and Application Network, ian.umces.edu

Where to access?



The screenshot shows the homepage of the Chesapeake Assessment Scenario Tool. The navigation bar includes links for HOME, NEWS, PUBLIC REPORTS, LEARNING, ABOUT, and CONTACT US. A search bar is located on the right. The main content area features a heading "The following information is available below:" followed by three columns of links. The first column lists "Phase 3 WIP BMP Information" and "Trends Over Time" with sub-links for BMPs implemented, loads delivered, wastewater, nutrients, animal numbers, septic systems, and tidal water quality trends. The second column lists "Tributary Summaries" (circled in purple), "SAV Reports", "River Trends", and "Progress Reporting" (with sub-links for Phase 6 NEIEN Appendix, Codes List and Tables, NEIEN Submission Instructions, Document Exchange Template, NEIEN Schema, and CAST data update frequency). The third column lists "Verification" (with sub-links for Chesapeake Bay Basinwide BMP Verification Framework, Jurisdictions' BMP tracking and reporting leads, Chesapeake Bay Program Grant Guidance, and Jurisdictional Quality Assurance Project Plans (QAPPs)) and "Federal Agencies" (with sub-links for Federal Facility User Guide for Frequently Asked Questions, Annual Progress Reporting Templates, and Milestones). A purple arrow points from the circled "Tributary Summaries" link to the "Tributary Summaries" page screenshot below.

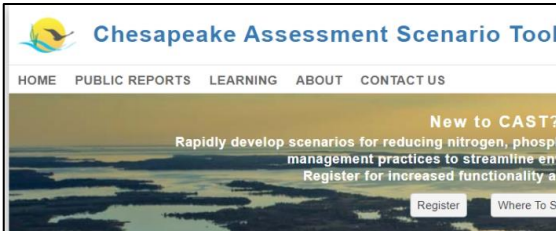
Chesapeake Assessment Scenario Tool

HOME NEWS PUBLIC REPORTS LEARNING ABOUT CONTACT US

Search Cas...

The following information is available below:

- Phase 3 WIP BMP Information
- Trends Over Time
 - BMPs implemented
 - Loads delivered to the streams and Bay
 - Wastewater
 - Nutrients applied to the land
 - Animal numbers
 - Septic systems
 - Tidal Water Quality Trends
- Tributary Summaries
- SAV Reports
- River Trends
- Progress Reporting
 - Phase 6 NEIEN Appendix
 - Codes List and Tables
 - NEIEN Submission Instructions
 - Document Exchange Template
 - NEIEN Schema
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- Verification
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 - Chesapeake Bay Program Grant Guidance
 - Jurisdictional Quality Assurance Project Plans (QAPPs)
- Federal Agencies
 - Federal Facility User Guide for Frequently Asked Questions
 - Annual Progress Reporting Templates
 - Milestones



The screenshot shows the homepage of the Chesapeake Assessment Scenario Tool. The navigation bar includes links for HOME, PUBLIC REPORTS, LEARNING, ABOUT, and CONTACT US. A search bar is located on the right. The main content area features a heading "New to CAST?" followed by a sub-heading "Rapidly develop scenarios for reducing nitrogen, phosphorus, and sediment management practices to streamline environmental assessment." Below this is a "Register" button and a "Where To S..." button.

Chesapeake Assessment Scenario Tool

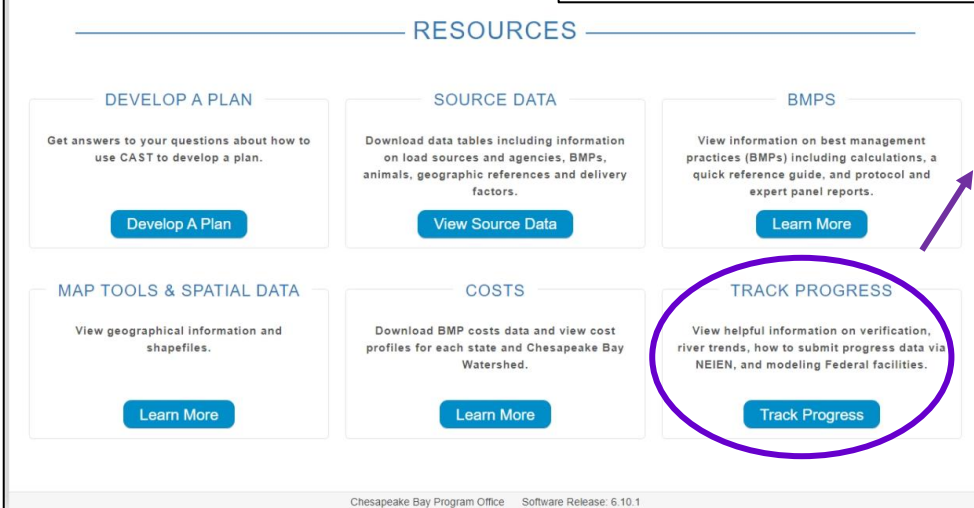
HOME PUBLIC REPORTS LEARNING ABOUT CONTACT US

Search Cas...

New to CAST?

Rapidly develop scenarios for reducing nitrogen, phosphorus, and sediment management practices to streamline environmental assessment.

Register Where To S...



The screenshot shows the Resources page of the Chesapeake Assessment Scenario Tool. The page is titled "RESOURCES" and features six main sections: "DEVELOP A PLAN", "SOURCE DATA", "BMPs", "MAP TOOLS & SPATIAL DATA", "COSTS", and "TRACK PROGRESS" (circled in purple). Each section has a brief description and a "Learn More" button. The "TRACK PROGRESS" section includes a sub-link for "Track Progress". A purple arrow points from the "Tributary Summaries" link in the previous screenshot to the "TRACK PROGRESS" section.

RESOURCES

DEVELOP A PLAN

Get answers to your questions about how to use CAST to develop a plan.

Develop A Plan

SOURCE DATA

Download data tables including information on load sources and agencies, BMPs, animals, geographic references and delivery factors.

View Source Data

BMPs

View information on best management practices (BMPs) including calculations, a quick reference guide, and protocol and expert panel reports.

Learn More

MAP TOOLS & SPATIAL DATA

View geographical information and shapefiles.

Learn More

COSTS

Download BMP costs data and view cost profiles for each state and Chesapeake Bay Watershed.

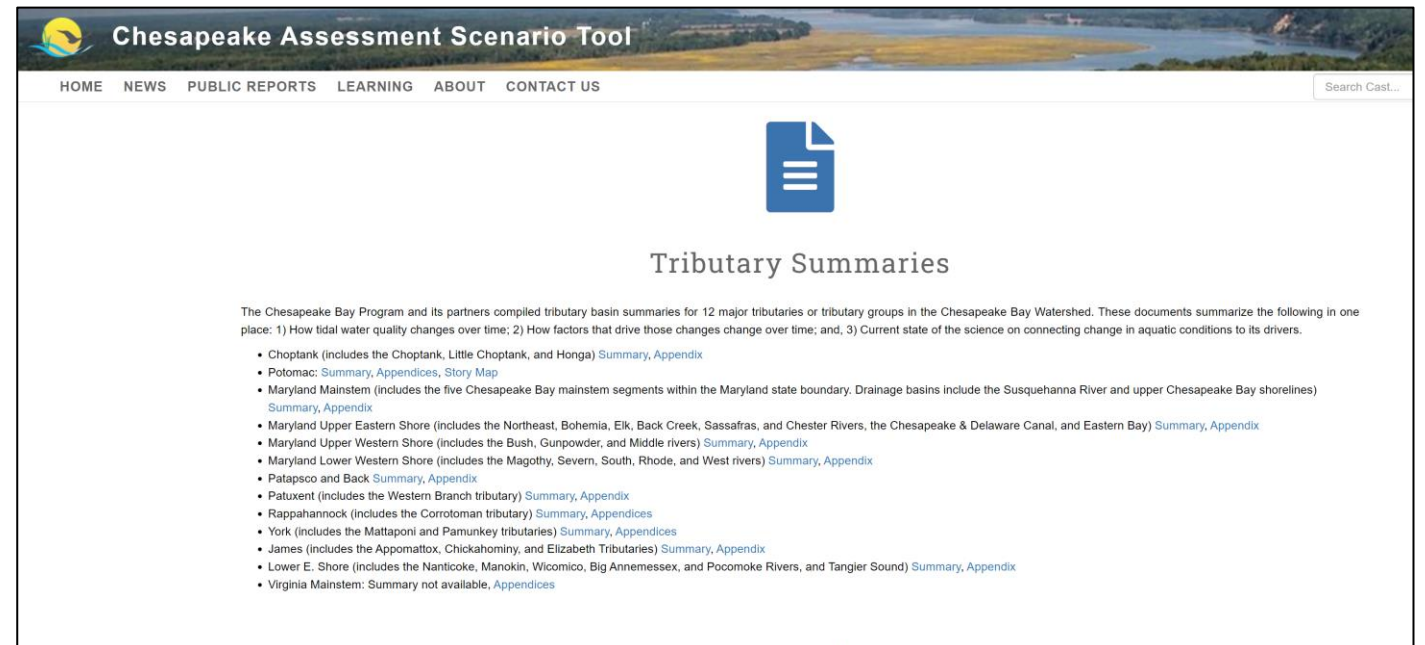
Learn More

TRACK PROGRESS

View helpful information on verification, river trends, how to submit progress data via NEIEN, and modeling Federal facilities.

Track Progress

Chesapeake Bay Program Office Software Release: 6.10.1



The screenshot shows the Tributary Summaries page of the Chesapeake Assessment Scenario Tool. The page is titled "Tributary Summaries" and features a large blue document icon. Below the icon is a paragraph describing the summaries and a list of links for each tributary group. The list includes links for Choptank, Potomac, Maryland Mainstem, Maryland Upper Eastern Shore, Maryland Upper Western Shore, Maryland Lower Western Shore, Patapsco and Back, Patuxent, Rappahannock, York, James, Lower E. Shore, and Virginia Mainstem. Each link is followed by "Summary, Appendix" or "Summary, Appendices".

Chesapeake Assessment Scenario Tool

HOME NEWS PUBLIC REPORTS LEARNING ABOUT CONTACT US

Search Cas...

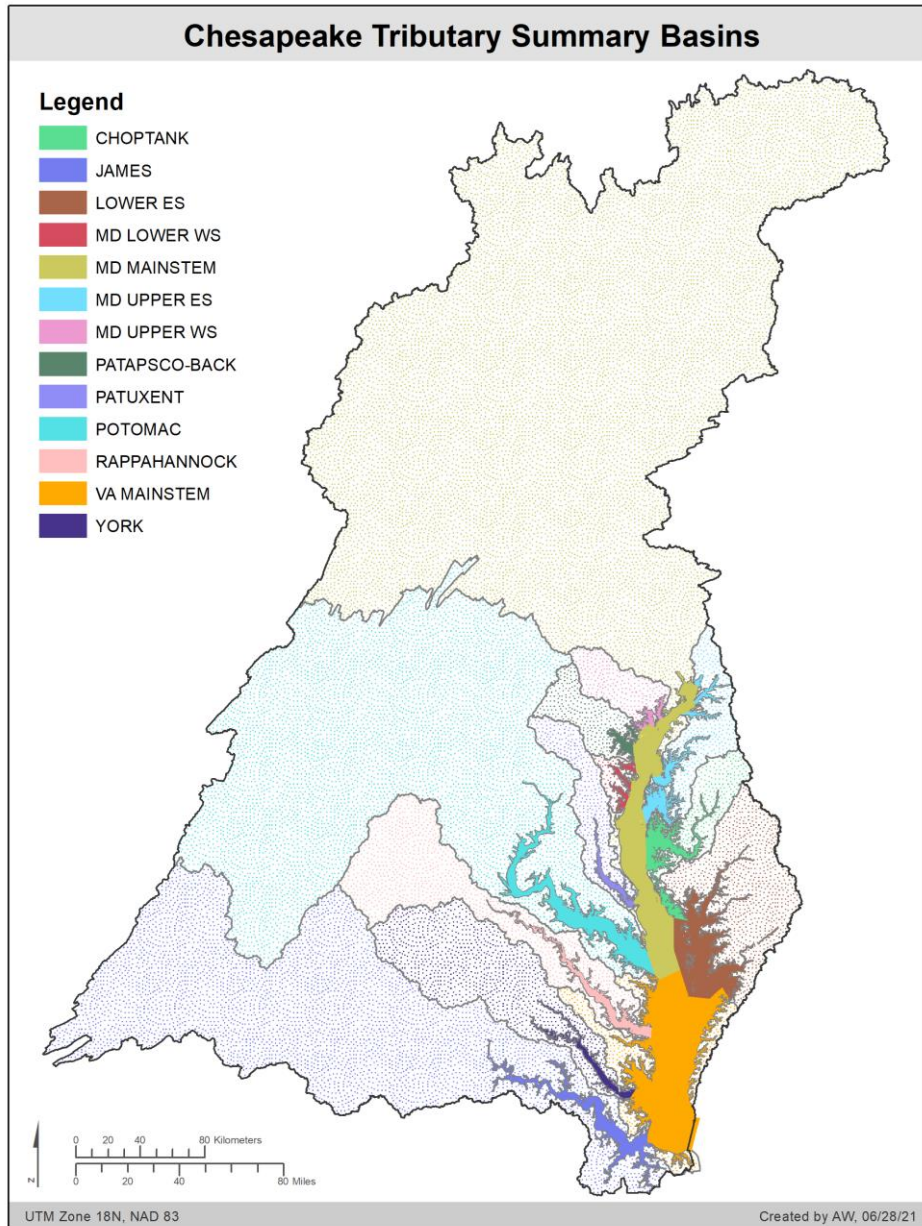
Tributary Summaries

The Chesapeake Bay Program and its partners compiled tributary basin summaries for 12 major tributaries or tributary groups in the Chesapeake Bay Watershed. These documents summarize the following in one place: 1) How tidal water quality changes over time; 2) How factors that drive those changes change over time; and, 3) Current state of the science on connecting change in aquatic conditions to its drivers.

- Choptank (includes the Choptank, Little Choptank, and Honga) [Summary, Appendix](#)
- Potomac: [Summary, Appendices, Story Map](#)
- Maryland Mainstem (includes the five Chesapeake Bay mainstem segments within the Maryland state boundary. Drainage basins include the Susquehanna River and upper Chesapeake Bay shorelines) [Summary, Appendix](#)
- Maryland Upper Eastern Shore (includes the Northeast, Bohemia, Elk, Back Creek, Sassafras, and Chester Rivers, the Chesapeake & Delaware Canal, and Eastern Bay) [Summary, Appendix](#)
- Maryland Upper Western Shore (includes the Bush, Gunpowder, and Middle rivers) [Summary, Appendix](#)
- Maryland Lower Western Shore (includes the Magothy, Severn, South, Rhode, and West rivers) [Summary, Appendix](#)
- Patapsco and Back [Summary, Appendix](#)
- Patuxent (includes the Western Branch tributary) [Summary, Appendix](#)
- Rappahannock (includes the Corrotoman tributary) [Summary, Appendices](#)
- York (includes the Mattaponi and Pamunkey tributaries) [Summary, Appendices](#)
- James (includes the Appomattox, Chickahominy, and Elizabeth Tributaries) [Summary, Appendix](#)
- Lower E. Shore (includes the Nanticoke, Manokin, Wicomico, Big Annemessex, and Pocomoke Rivers, and Tangier Sound) [Summary, Appendix](#)
- Virginia Mainstem: Summary not available, [Appendices](#)

CAST: <https://cast.chesapeakebay.net/>

13 Tributary Trend Summaries



- **Maryland Mainstem** (*The 5 Chesapeake Bay mainstem segments within the MD state boundary. Drainage basins include the Susquehanna River and upper Chesapeake shorelines*)
- **Maryland Upper Eastern Shore** (*The Northeast, Bohemia, Elk, Back Creek, Sassafras, and Chester Rivers, the C&D Canal, and Eastern Bay*)
- **Choptank** (*the Choptank, Little Choptank, and Honga*)
- **Maryland Upper Western Shore** (*Bush, Gunpowder, Middle Rivers*)
- **Maryland Lower Western Shore** (*Magothy, Severn, South, Rhode, and West*)
- **Patapsco & Back Rivers**
- **Patuxent** (*includes the Western Branch tributary*)
- **Potomac**
- **Rappahannock** (*includes the Corrotoman tributary*)
- **York** (*includes the Mattaponi and Pamunkey tributaries*)
- **James** (*includes the Appomattox, Chickahominy, and Elizabeth tributaries*)
- **Lower E. Shore** (*includes the Nanticoke, Manokin, Wicomico, Big Annemessex, and Pocomoke rivers & Tangier Sound*)
- **Virginia Mainstem** (*no summary but Appendices are provided*)

Next Steps

- Incorporate 2021 data into tributary summaries and/or associated products.
- New additional sections will be added with climate change relevant information and trends (rainfall, temperature, etc).
- Ongoing work to share the summaries and get insights from local groups in different tributary regions.

Contact Information

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