

Nitrogen, Phosphorus, and Suspended Sediment:

Loads and Trends Measured from the Chesapeake Bay River Intput Monitoring (RIM) Network

An update through water year 2024

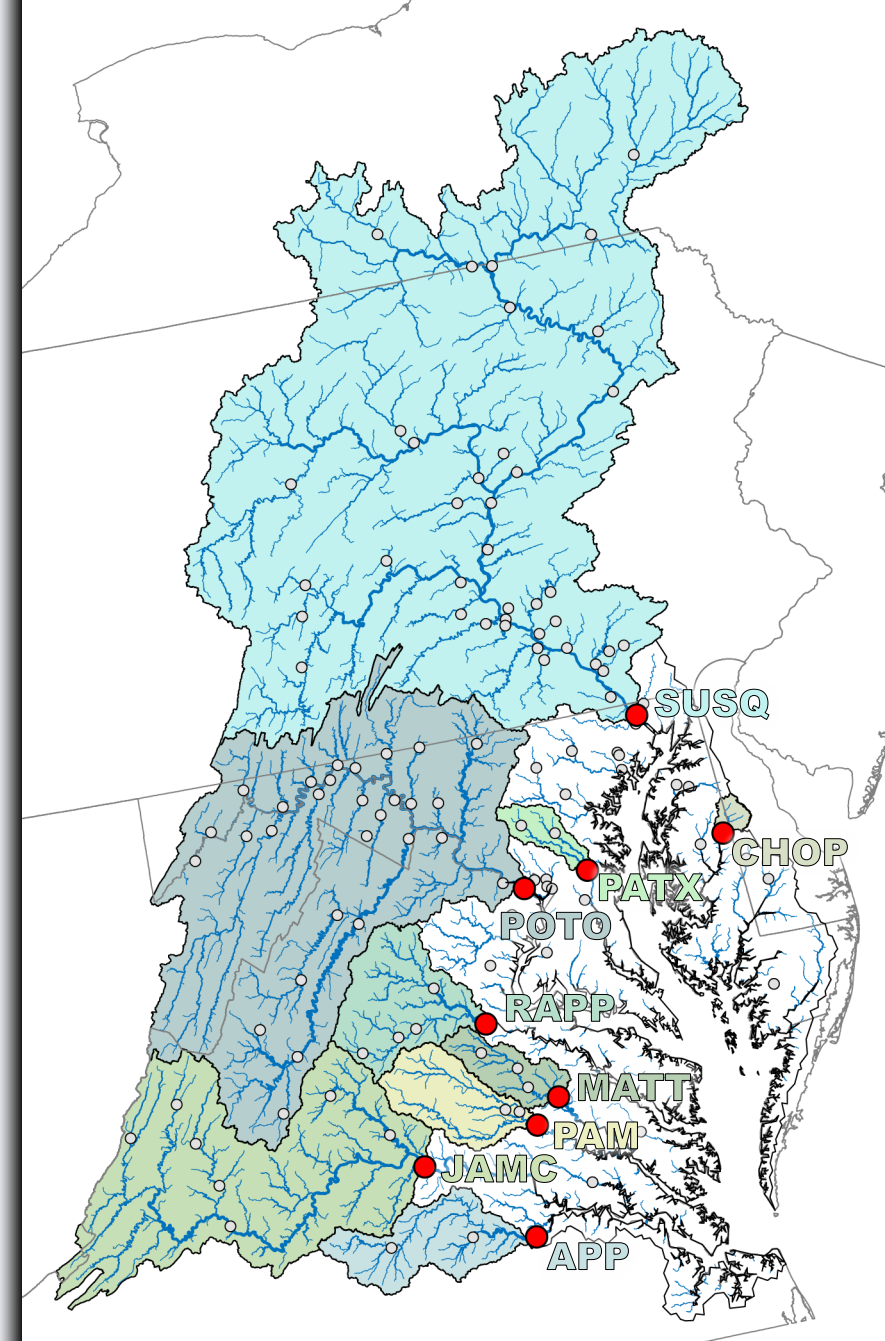
Jimmy Webber, jwebber@usgs.gov Alex Soroka, asoroka@usgs.gov

Chris Mason, camason@usgs.gov Doug Moyer, dlmoyer@usgs.gov

Presentation Outline

1. Overview of the RIM network
2. Per-Acre Loads (“Yields”) at the RIM stations
3. Trends at the RIM stations

Visit our project website to access the most recent water-quality load and trend results:
www.usgs.gov/CB-wq-loads-trends



Overview of the RIM network

The nontidal monitoring network is used to assess water-quality conditions to inform management decisions

The goal of the network is to compute the **load** and **trend**¹ of nitrogen, phosphorus, and suspended sediment delivered to the Bay from nontidal rivers and streams.

Loads and trends are computed from monthly and storm-targeted water-quality samples.



Trends are changes in flow-normalized load over time.

- “**Improving**” = a decrease
- “**Degrading**” = an increase time
- “**No trend**” = no change

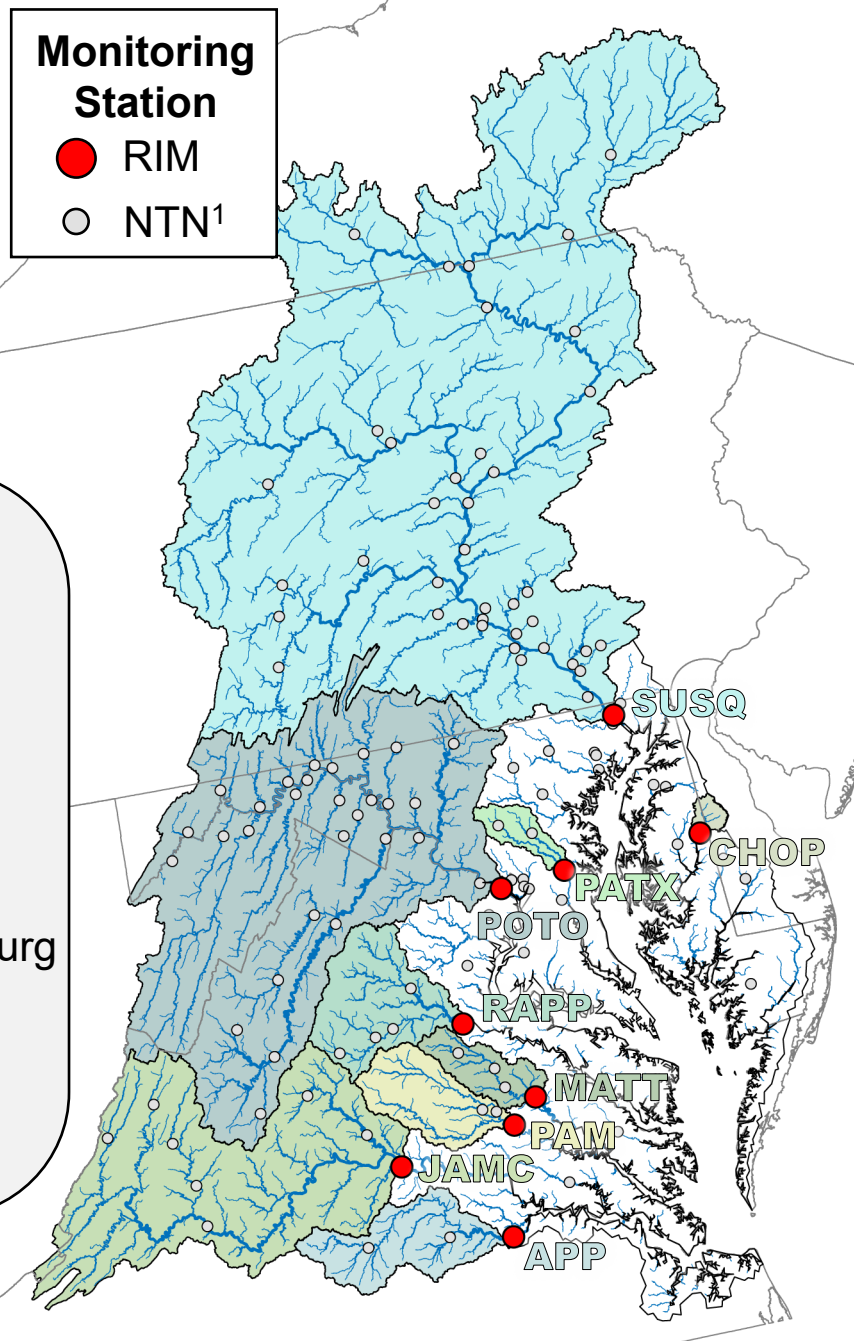
River Input Monitoring (RIM) Stations

Maryland

- **SUSQ**: Susquehanna River at Conowingo
- **CHOP**: Choptank River nr Greensboro
- **PATX**: Patuxent River nr Bowie
- **POTO**: Potomac River at Chain Bridge

Virginia

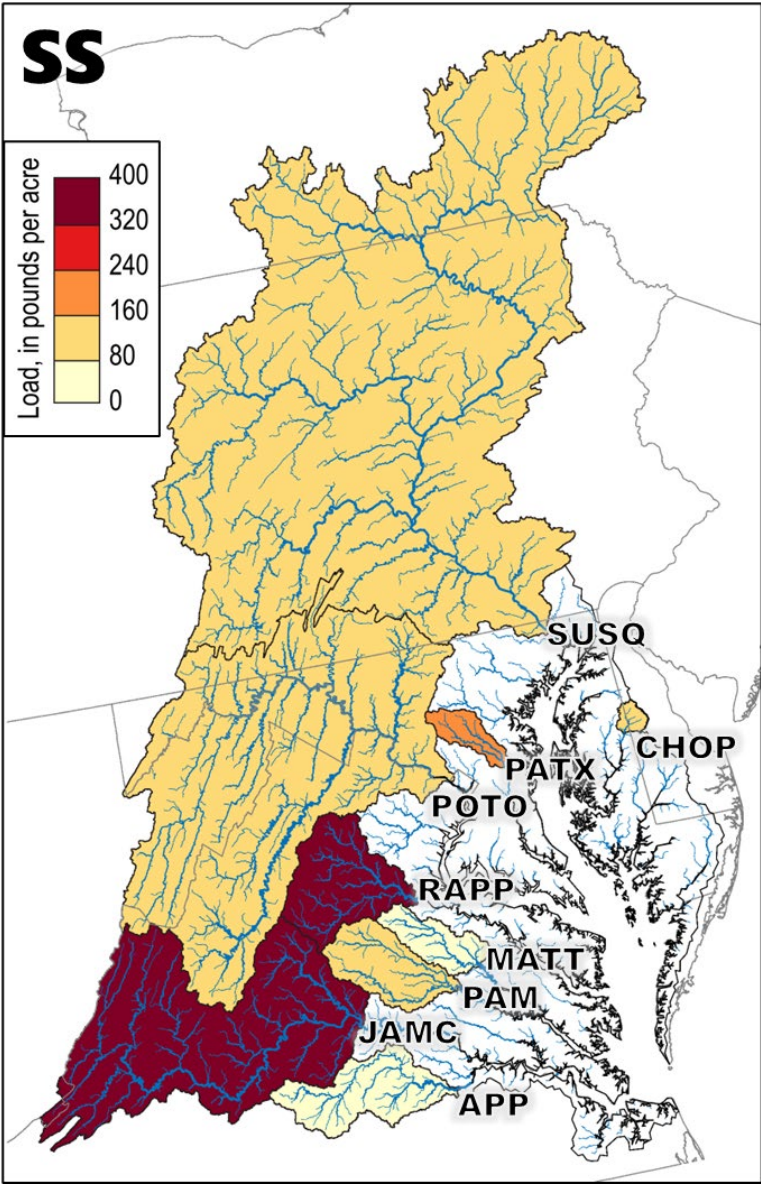
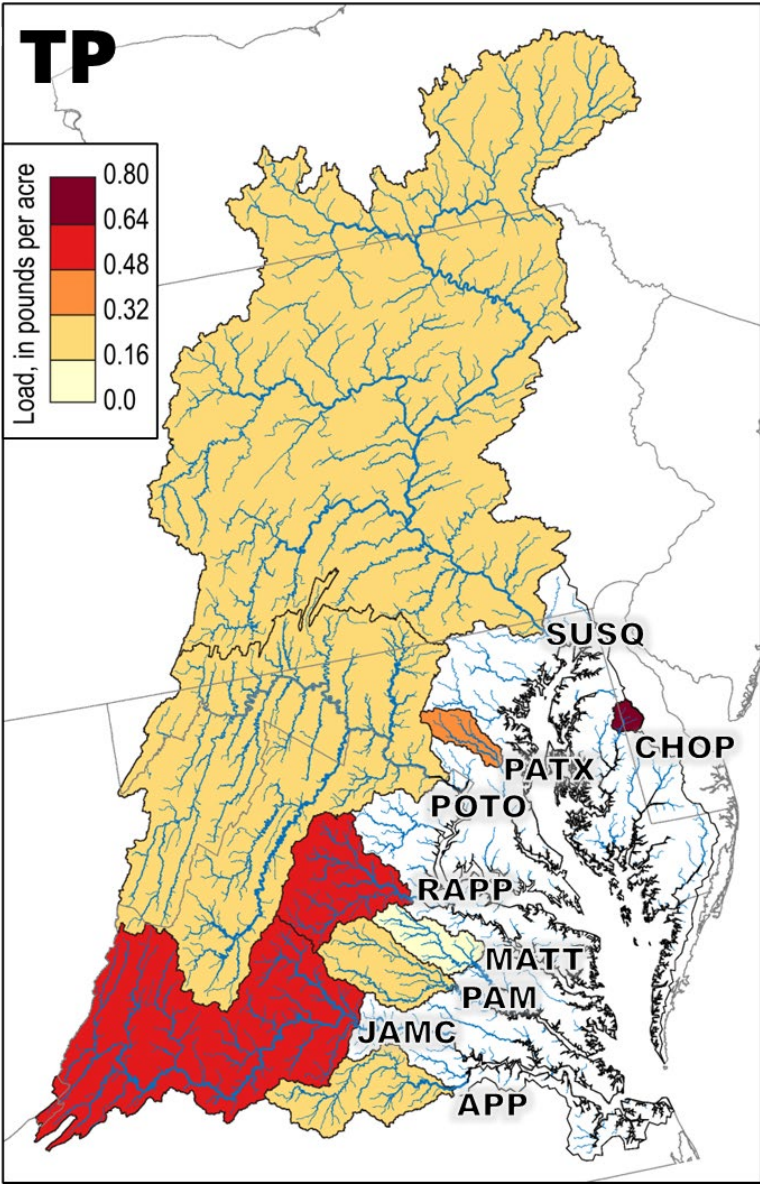
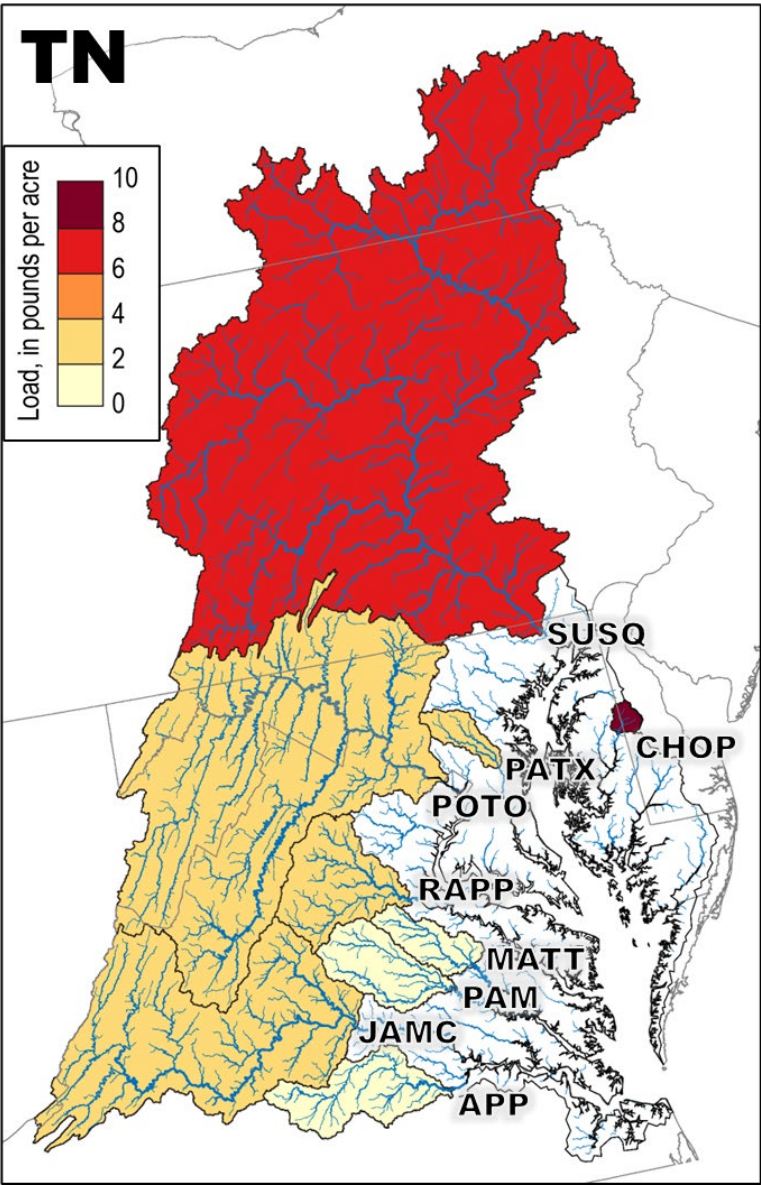
- **RAPP**: Rappahannock River nr Fredricksburg
- **MATT**: Mattaponi River nr Beulahville
- **PAM**: Pamunkey River nr Hanover
- **JAMC**: James River at Cartersville
- **APP**: Appomattox River at Matoaca





Per-acre loads (yields) at the RIM stations

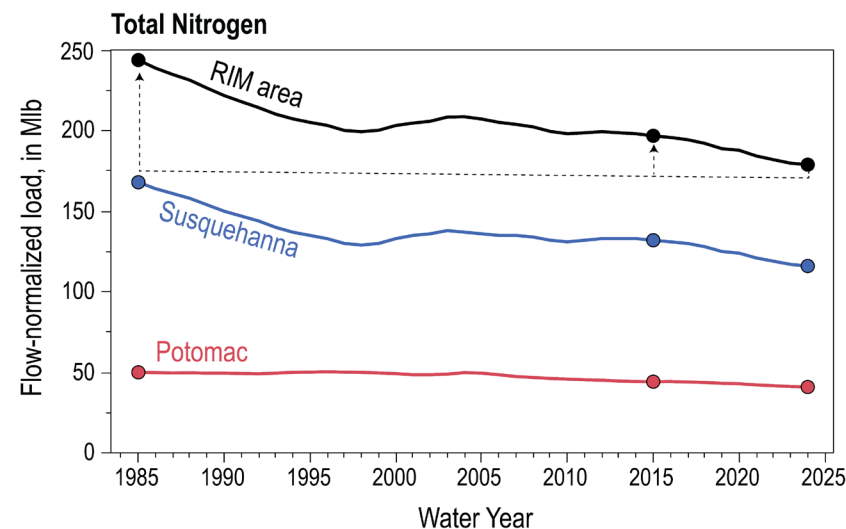
Per-Acre Loads: 2020 – 2024 Average (most recent 5 years of data)



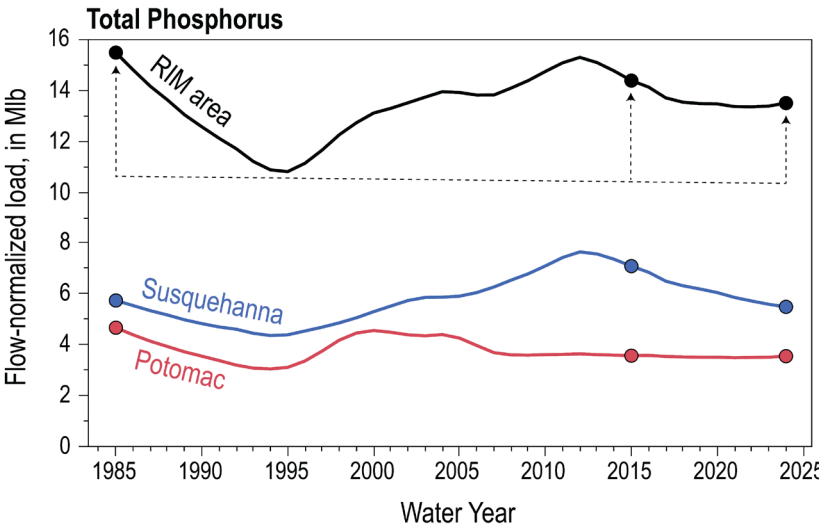
A wide-angle photograph of a river at sunrise. The sun is a bright, glowing orb on the horizon, casting a long, shimmering reflection down the center of the calm water. The sky is a pale, hazy blue with soft, wispy clouds. The riverbanks are lined with bare, dark trees, their silhouettes reflected in the water. In the lower right foreground, a stone structure, possibly a dam or bridge pier, is partially submerged, with some debris and small trees growing on it.

Trends at the RIM stations

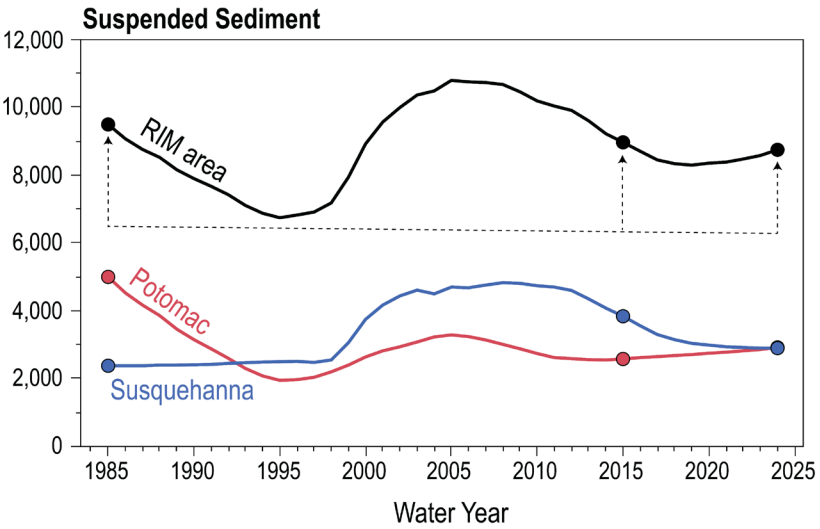
FN nutrient and sediment loads have decreased from the RIM watershed area over time



RIM FN total nitrogen loads
-9% from 2015 – 2024
-33% from 1985 – 2024



RIM FN total phosphorus loads
-6% from 2015 – 2024
-14% from 1985 – 2024



RIM FN suspended sediment loads
-3% from 2015 – 2024
-8% from 1985 – 2024

The Susquehanna and Potomac are the largest RIM watersheds. FN loads from these two stations typically represent 70 – 90% of the total RIM FN load.

The RIM network has a similar number of improving and degrading trend results

Trend Summary

- 13 trends have improved and 11 have degraded since 1985.
- 8 trends have improved and 12 have degraded since 2015.

Good News

- All trends improved at Susquehanna since 2015.
- TN trends improved at all MD RIM stations since 2015.

Concerns

- The Choptank has the highest TP per-acre load and a large TP increase since 2015.
- Other than the Pamunkey, loads were higher in 2024 than 2015 at all Virginia RIM stations.

		RIM Monitoring Station	Long term: 1985 - 2024			Short term: 2015 - 2024		
			TN	TP	SS	TN	TP	SS
Maryland	RIM stations	SUSQ	-31.2%	-4.6%	+21.5%	-12.4%	-22.8%	-24.8%
		CHOP	-2.5%	+77.4%	-34.3%	-4.5%	+20.2%	-7.5%
		PATX	-69.5%	-66.8%	-44.0%	-21.0%	-5.5%	-4.5%
		POTO	-18.4%	-24.3%	-41.7%	-7.6%	-1.0%	+13.1%
Virginia	RIM stations	RAPP	-15.6%	+31.2%	+50.0%	+7.3%	+7.6%	+1.7%
		MATT	-6.4%	+6.4%	+8.6%	+1.7%	+8.9%	+26.9%
		PAM	-1.3%	+59.2%	+36.3%	-3.9%	+1.0%	-9.9%
		JAMC	-8.0%	-22.1%	+40.3%	+11.2%	+25.8%	+20.9%
		APPO	+6.4%	+99.5%	+44.2%	+5.4%	+23.4%	+38.9%

Trend Direction

Improving

Degrading

No trend

Watershed loads likely explain some tidal trends

Total Nitrogen

Total Phosphorus

Watershed Area

- RIM Watershed
- Chesapeake Bay

RIM Trend: Load

2015 – 2024

Flow Normalized

- Increase
- Decrease
- No Trend

The tidal trends team:

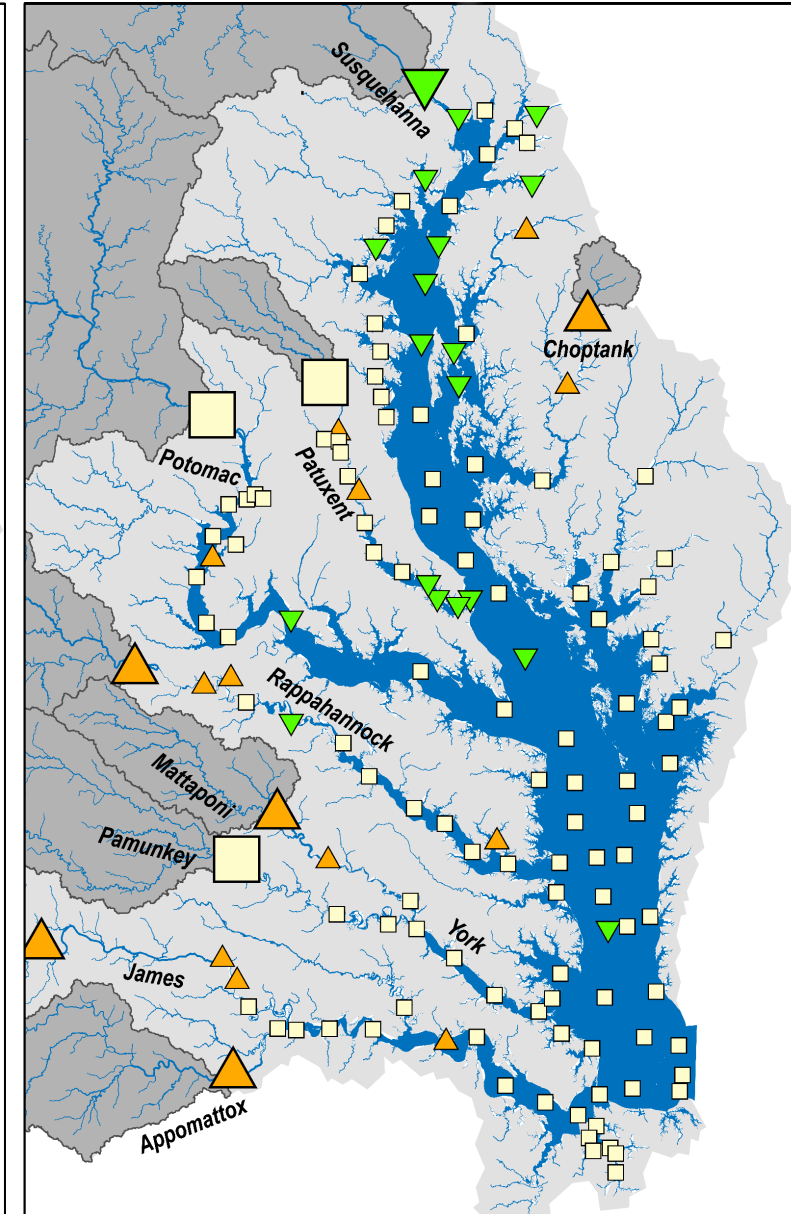
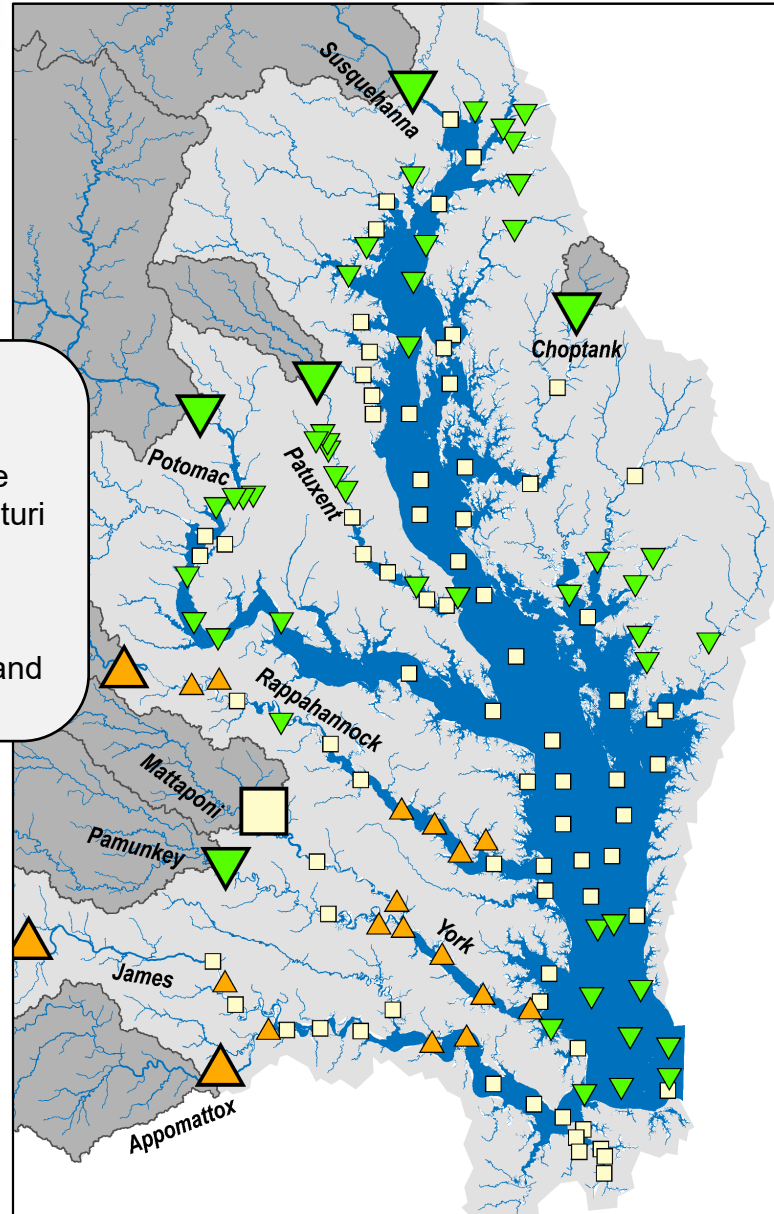
Rebecca Murphy (UMCES/CBP), Renee Karrh (MDDNR), Mike Lane (ODU), Cindy Johnson (DEQ), Efeturi Oghenekaro, Blessing Edje and George Onyullo (DOEE); Mukhtar Ibrahim (MWCOG), Breck Sullivan (USGS), Kaylyn Gootman (EPA), and Gabriel Duran (CRC)

Tidal Trend¹: Surface Concentration

2015/16 – 2023/24

Non-linear with Flow Adjustment

- Significant increase
- Significant decrease
- Possible or unlikely change



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