Chesapeake Bay Nontidal Network

NUTRIENT AND SEDIMENT

LOADS AND TRENDS

Short-term: 2011 - 2020

ITAT + Factors Retreat: October 25, 2023

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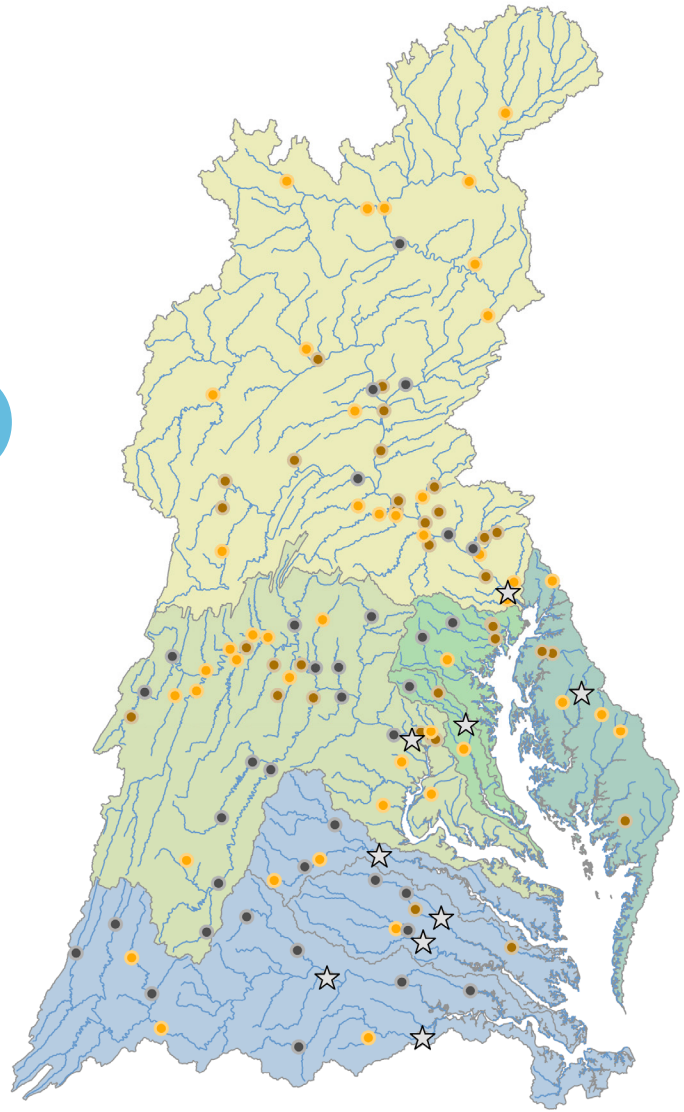

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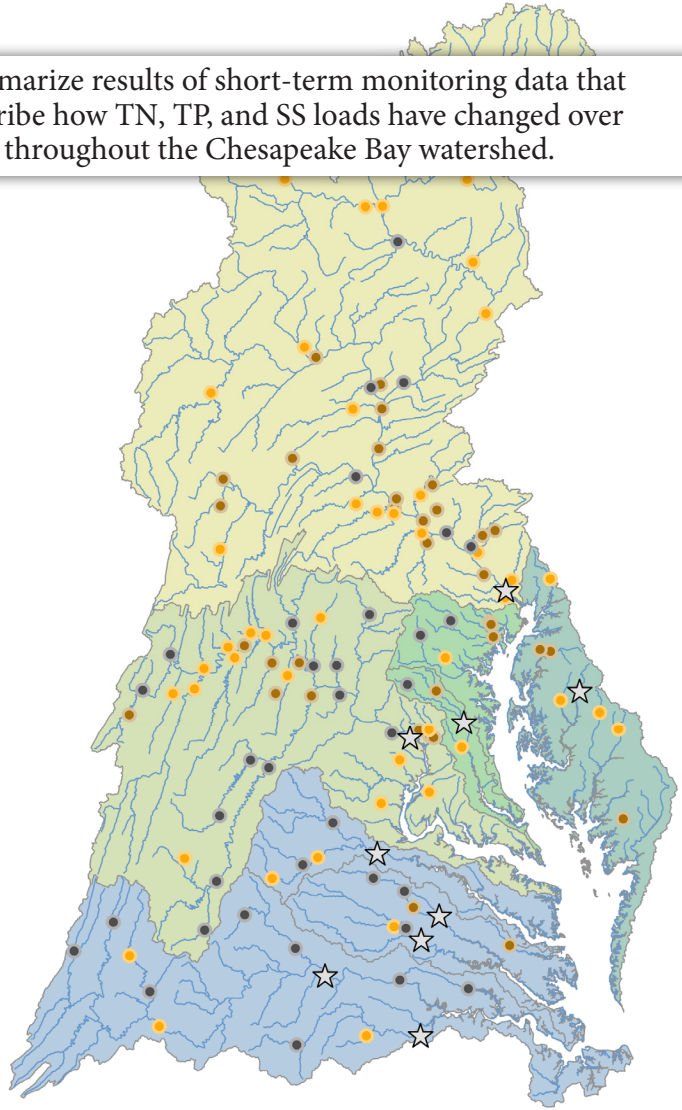
OBJECTIVE

Summarize results of short-term monitoring data that describe how TN, TP, and SS loads have changed over time throughout the Chesapeake Bay watershed.

Outline

- Network Overview
- Trend Results 2020
- Sharing Results



The Chesapeake Bay Nontidal Network (NTN) and River Input Monitoring (RIM) Network

Computing loads and trends of total nitrogen (TN), total phosphorus (TP), and suspended sediment (SS) in nontidal rivers of the Chesapeake Bay watershed (CBW).

EXPLANATION

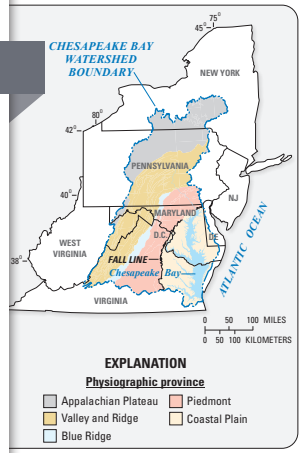
NTN status through water year 2020

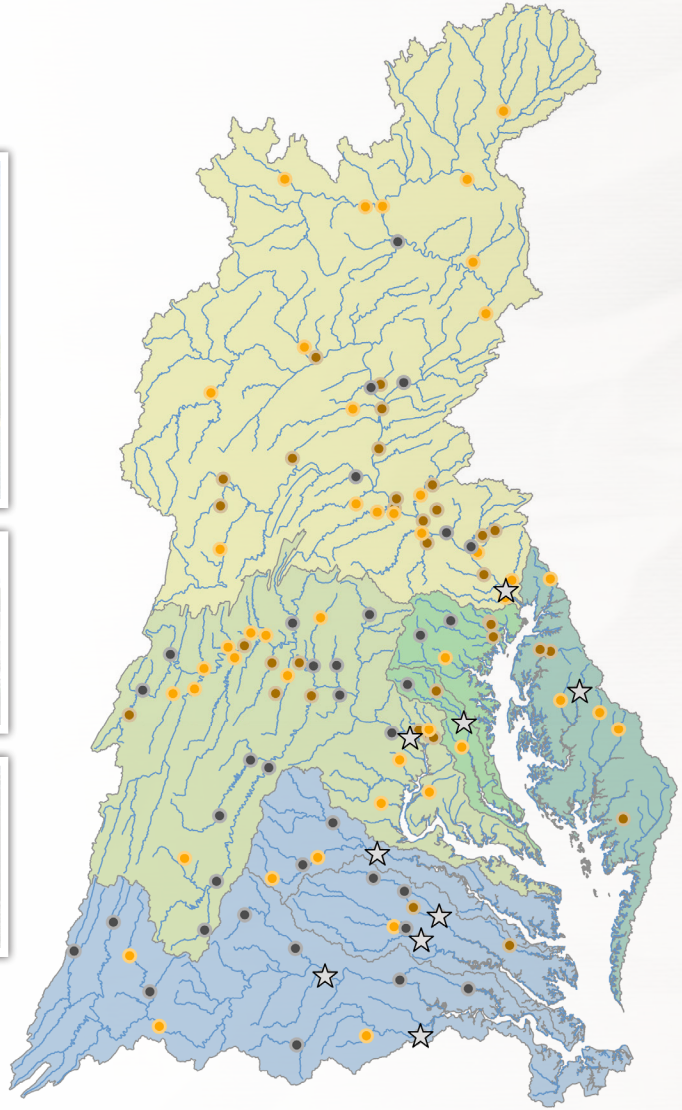
- RIM site
- Long-term site
- Short-term site
- Load-only site
- Streams

Major Basins

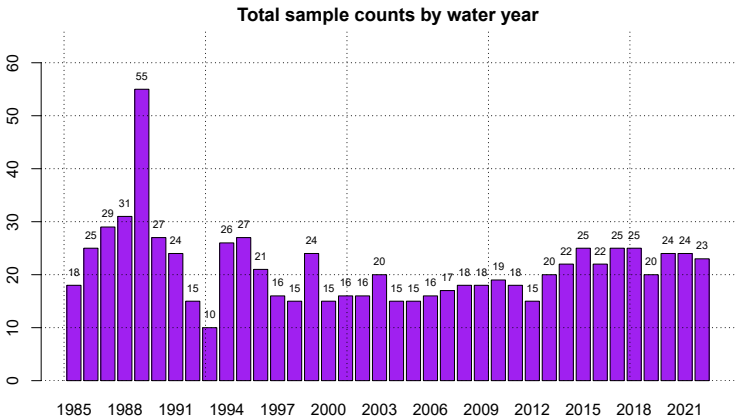
- Eastern Shore
- Potomac
- Susquehanna
- Virginia
- Western Shore

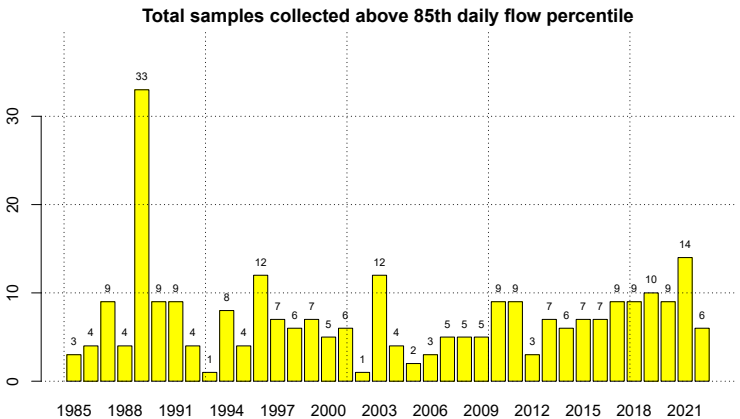
Load is the amount of nutrients or sediment in a river during a period of time (≧ 5 years of data needed). Trend is the change in load over multiple years (≧ 10 years of data needed).





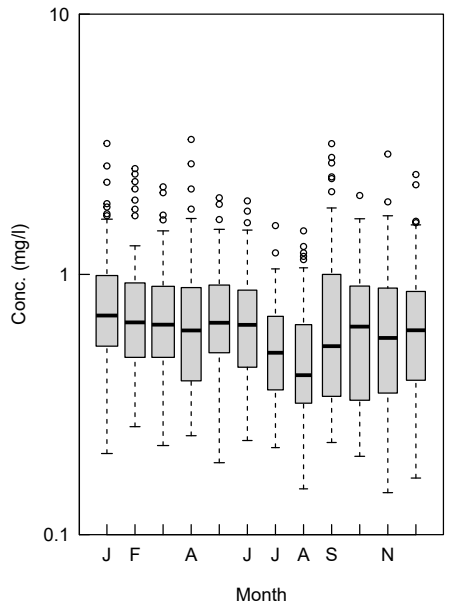
Example of Discrete Sampling Summaries

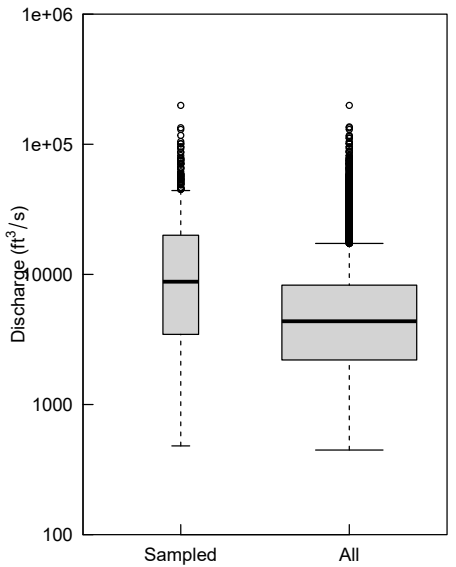




WRTDS uses **observed** data: over 2,400 water quality samples are collected throughout the NTN each year.

The RIM network is a collaborative effort between the USGS, EPA, and agencies in Chesapeake Bay states (MDDNR, VADEQ, SRBC, PADEP, and more).





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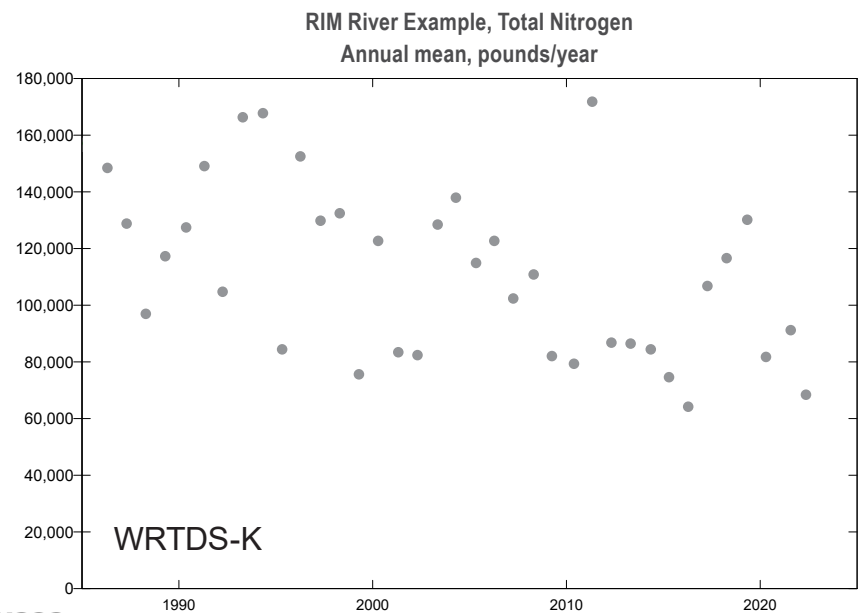
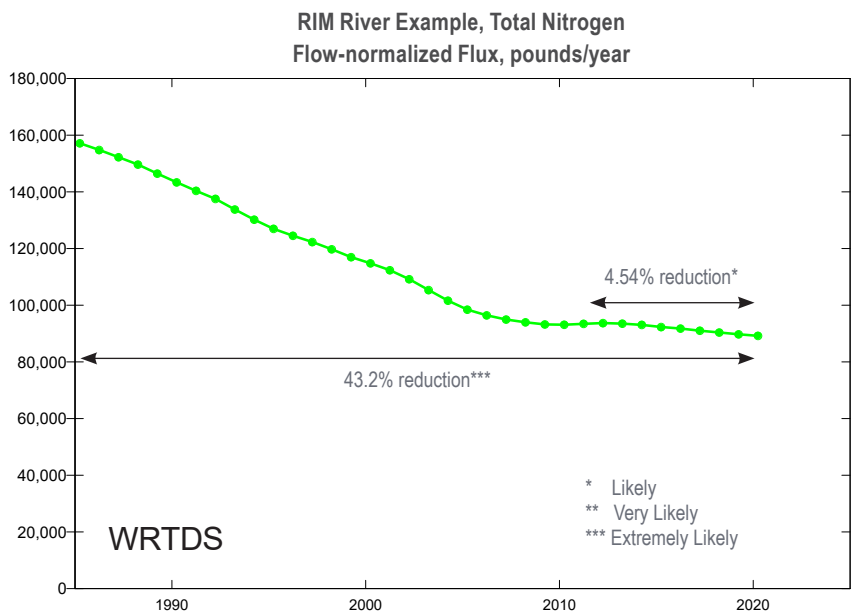
Load and trend results have been computed through 2020 to provide timely information available for decision making

Load is a measure of
the total amount of nutrients or sediment that is mobilized in a given time period (monthly, annually, …). Important for understanding receiving water response

Flow-normalized (FN) loads remove
most of the hydrologic variability associated with loads. Important for understanding water-quality responses to watershed changes

A trend is reported when
the likelihood estimate of a trend existing is greater than 0.67 after at most 100 bootstrap re-samples and a 90% confidence interval





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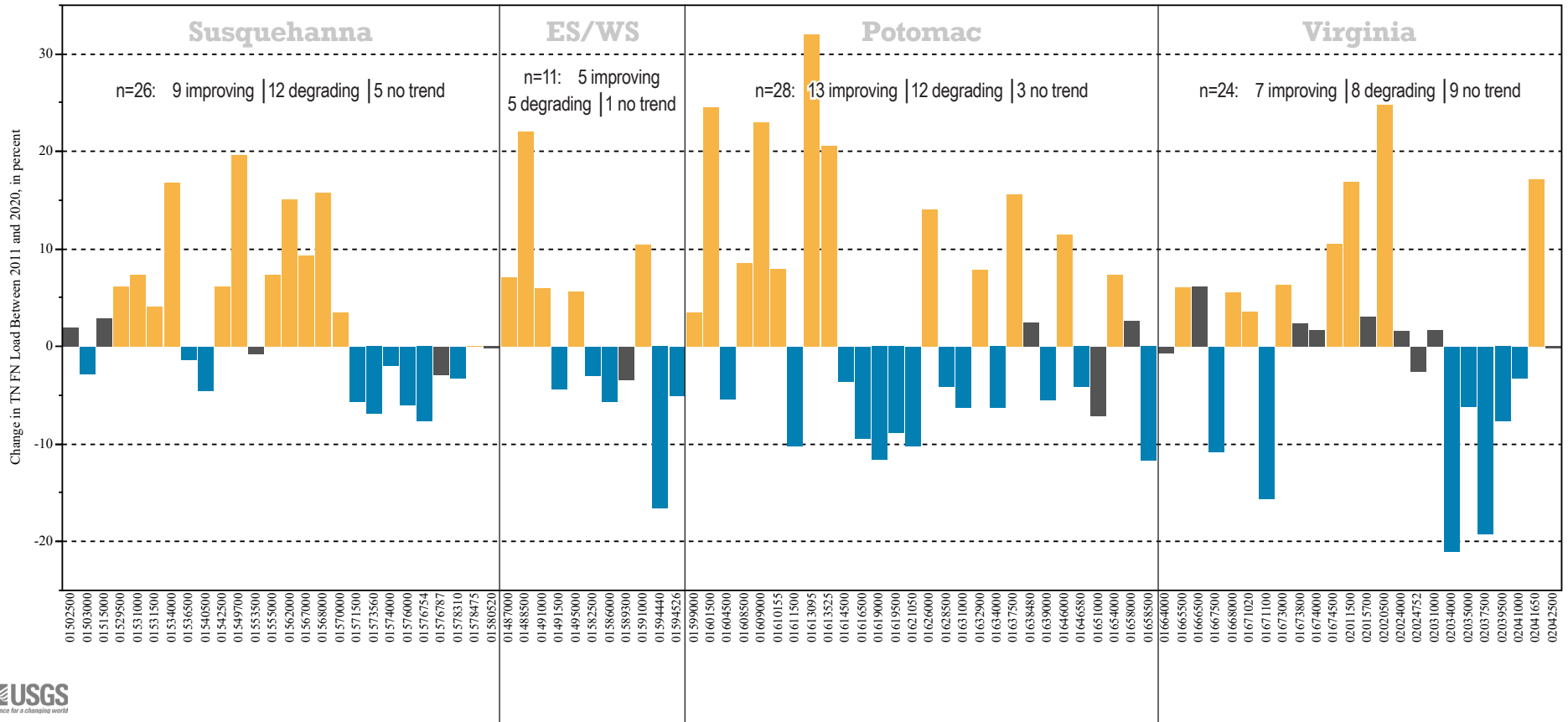
Total Nitrogen (TN) Trends in FN Loads 2011-2020

34 of 89 stations (38 percent) have improving trends | 37 of 89 stations (42 percent) have degrading trends | 18 of 89 stations (20 percent) show no statistical change



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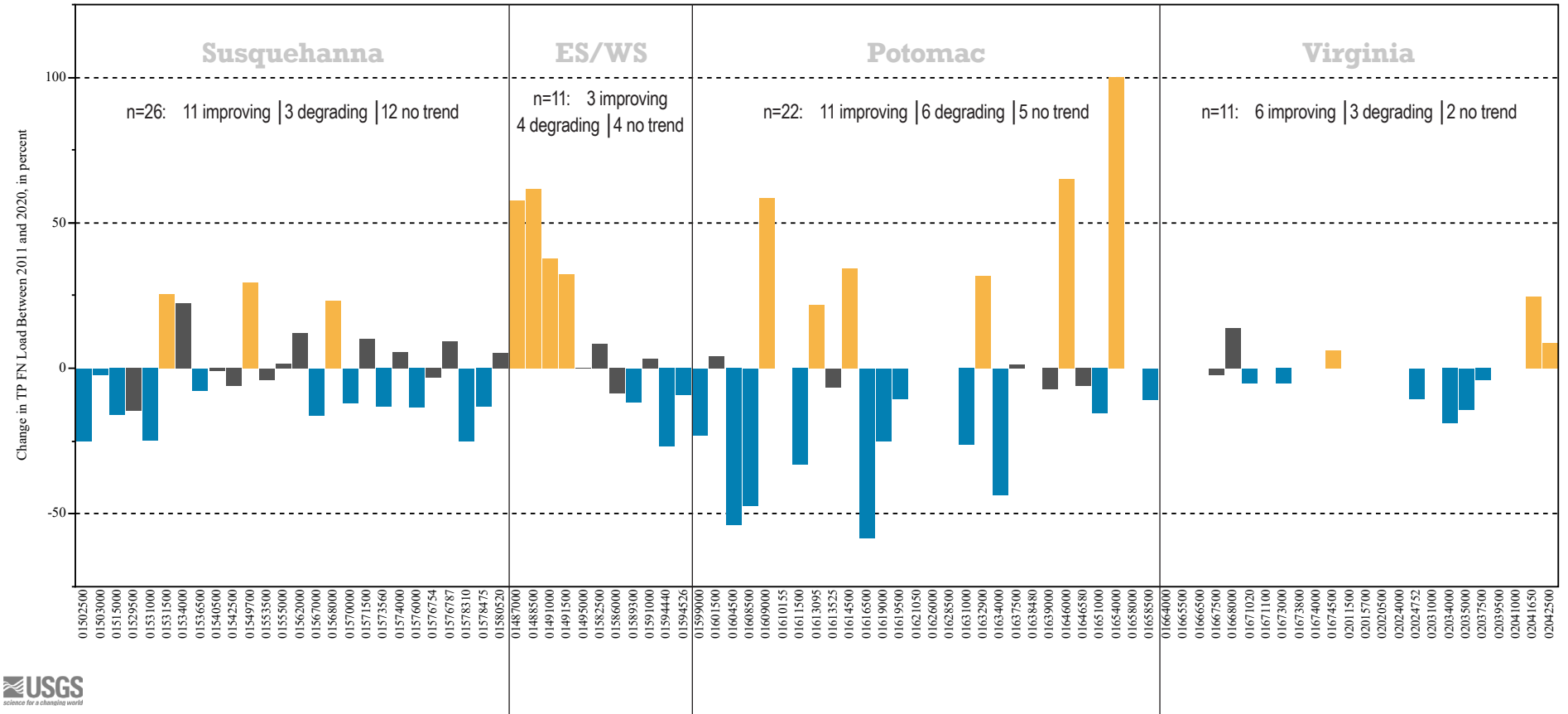
Total Phosphorus (TP) Trends in FN Loads 2011-2020

31 of 70 stations (44 percent) have improving trends | 16 of 70 stations (23 percent) have degrading trends | 23 of 70 stations (33 percent) show no statistical change



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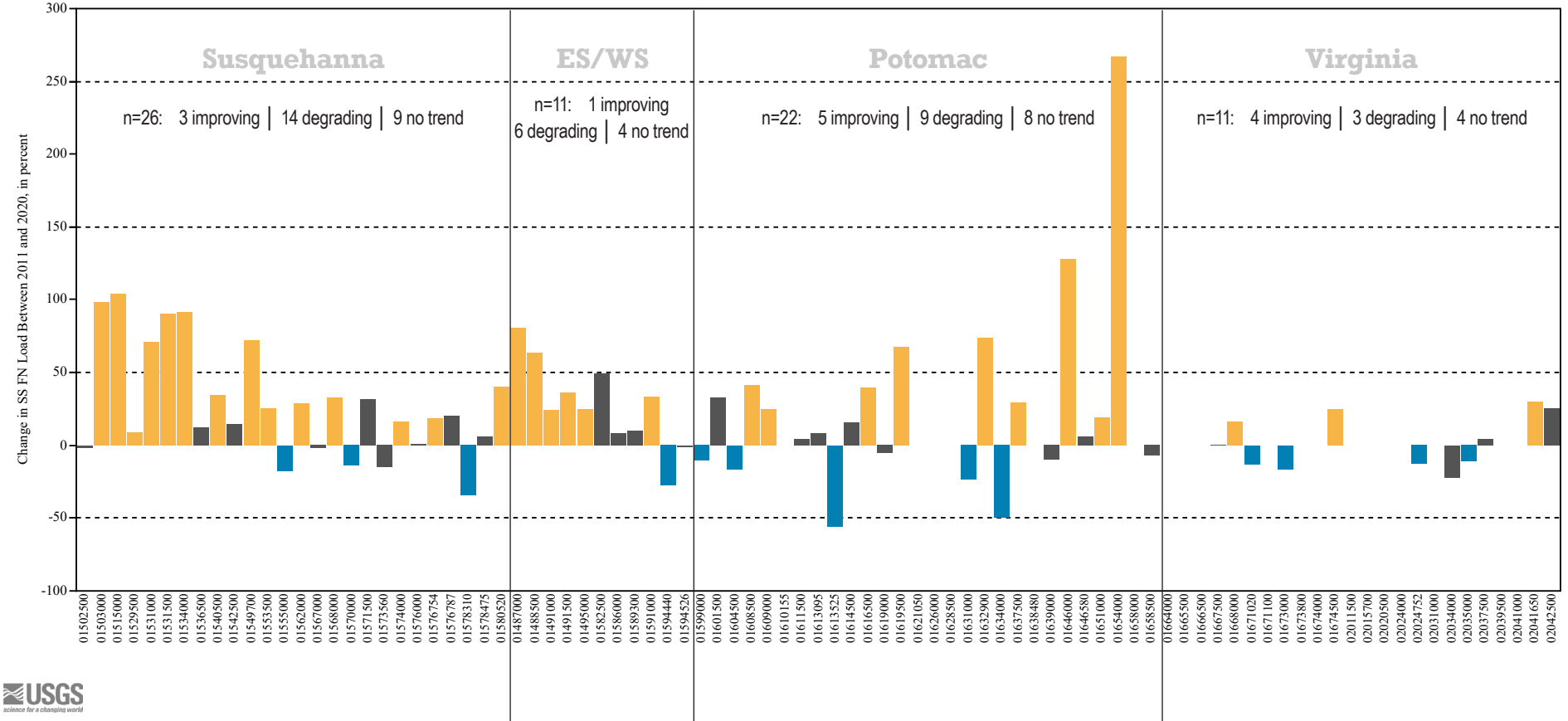
Suspended Sediment (SS) Trends in FN Loads 2011-2020

13 of 70 stations (18 percent) have improving trends | 32 of 70 stations (46 percent) have degrading trends | 25 of 70 stations (36 percent) show no statistical change



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Trend Direction, 2011-2020

Degrading

Improving

No Trend

Percent change in flow-normalized load at the nontidal network

Constituents from left-to-right: TN (total nitrogen), N+N (nitrate plus nitrite), TP (total phosphorus), DIP (orthophosphate), SS (suspended sediment).

White space denotes less than ten years of data.

Bold colored stations represent the nine River Input Monitoring stations. Each region is ordered from top-to-bottom in a downstream direction.

EASTERN SHORE

	TN	N+N	TP	DIP	SS
01487000	7.05	8.96	57.6	-11.8	80.8
01488500	22	24	61.7	62.6	63.6
01491000	5.98	1.7	37.8	51	24
01491500	-4.33	-7.64	32.3	38.9	36.2
01495000	5.6	3.98	0.112	-16.8	24.7

WESTERN SHORE

	TN	N+N	TP	DIP	SS
01582500	-2.97	-2.46	8.36	-26.1	49.5
01586000	-5.62	-4.17	-8.61	-12.8	8.42
01589300	-3.4	9.24	-11.6	-27.9	9.72
01591000	10.4	9.83	3.26	17.2	33.1
01594440	-16.6	-18.8	-26.8	-20.4	-27.4
01594526	-5.03	9.34	-9.17	-6.51	-0.887

SUSQUEHANNA

	TN	N+N	TP	DIP	SS
01502500	1.97	15.7	-25	-45.3	-1.55
01503000	-2.81	1.31	-2.19	-54.5	98.2
01515000	2.88	5.13	-16	-41.8	104
01529500	6.16	21	-14.6	-57.2	8.94
01531000	7.38	13.2	-24.8	-60.1	70.8
01531500	4.05	5.49	25.6	-53.3	90.4
01534000	16.8	21.4	22.3	25.7	91.7
01536500	-1.36	5.07	-7.64	-41.7	12.2
01540500	-4.54	0.516	-0.901	-54	34.6
01542500	6.1	17.3	-6.02		14.3
01549700	19.6	43	29.5		72.2
01553500	-0.754	5.03	-3.97	-34	25.3
01555000	7.33	11	1.47	12.1	-17.5
01562000	15.1	18	12.1	2.08	28.7
01567000	9.36	15.6	-16.2	-19.7	-1.89
01568000	15.8	15.5	23.1	22.8	32.8
01570000	3.45	2.96	-11.8	-12	-13.9
01571500	-5.65	-8.92	10.1	16	31.6
01573560	-6.9	-9.61	-13.2	-18.6	-15
01574000	-1.97	-7.3	5.67	9.52	16.1
01576000	-6.01	-1.64	-13.4	-13.2	0.774
01576754	-7.65	-9.25	-3.17	-13.3	18.7
01576787	-2.9	-5.45	9.15	-10.4	20
01578310	-3.24	7.64	-25	-14.1	-34.4
01578475	0.0561	0.929	-13.2	-23	5.87
01580520	-0.173	0.773	5.19	-29	40.2

POTOMAC

	TN	N+N	TP	DIP	SS
01599000	3.46	16.3	-23	-42.6	-10.3
01601500	24.5	33	4.03	-33.1	33
01604500	-5.39	-0.852	-53.8	-34.5	-16.4
01608500	8.52	3.26	-47.2	-83.5	41.5
01609000	23	34.1	58.5		24.8
01610155	7.94	36.2			
01611500	-10.2	-14.2	-33.1		4.36
01613095	32	41.1	21.7		8.43
01613525	20.6	18.4	-6.51	-38.8	-55.7
01614500	-3.56	-8.07	34.4	-1.34	15.6
01616500	-9.42	-7.05	-58.2	-78.5	39.5
01619000	-11.6	-14.8	-24.9	-43.7	-5.16
01619500	-8.86	-14.1	-10.5	-41.6	67.4
01621050	-10.2	-10.5			
01626000	14	29.7			
01628500	-4.09	1.67			
01631000	-6.26	9.86	-26.2	-23.9	-23.6
01632900	7.83	8.11	31.7	-22.4	73.9
01634000	-6.27	10.4	-43.5	-38.4	-49.7
01637500	15.6	21.6	1.33	-13.3	29.6
01638480	2.49	13.7			
01639000	-5.49	5.45	-7.23	2.34	-9.79
01646000	11.5	21.2	65	43.6	128
01646580	-4.14	3.64	-6.06	-30.6	6
01651000	-7.09	12.9	-15.4	-1.26	19.1
01654000	7.32	-7.64	99.9	37.9	267
01658000	2.66	-8.19			
01658500	-11.7	-6.14	-10.7	27.5	-6.94

VIRGINIA

	TN	N+N	TP	DIP	SS
01664000	-0.681	7.25			
01665500	6.08	21.7			
01666500	6.13	21.8			
01667500	-10.8	5.15	-2.21	14.2	0.557
01668000	5.5	14.8	13.7	6.77	16.1
01671020	3.57	48.2	-5.08		-13.1
01671100	-15.6	5.19			
01673000	6.29	22.7	-5.22	-10.3	-16.4
01673800	2.36	16.7			
01674000	1.68	28.3			
01674500	10.5	45.7	6.24	-0.538	25
02011500	16.9	28.1			
02015700	3.06	17.7			
02020500	24.8	39.8			
02024000	1.55	18.5			
02024752	-2.53	19.4	-10.5	-12.2	-12.6
02031000	1.7	22.4			
02034000	-21	-14.7	-18.8	-19.2	-22.1
02035000	-6.17	3.86	-14.2	-11.1	-11
02037500	-19.2	6.41	-4.01		4.49
02039500	-7.66	23.2			
02041000	-3.22	12.8			
02041650	17.1	28.4	24.5	48.3	29.7
02042500	-0.175	144	8.75		25.5

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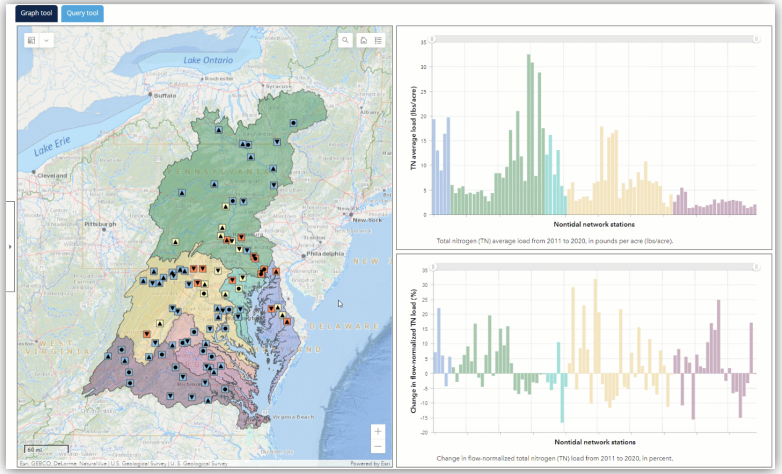
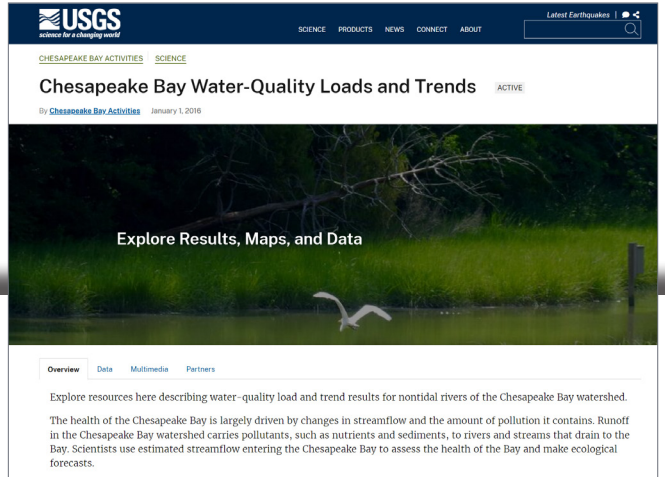
USGS data release
doi.org/10.5066/P96H2BDO



USGS interactive geonarrative
va.water.usgs.gov/geonarratives/ntn



USGS monitoring website
usgs.gov/CB-wq-loads-trends

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