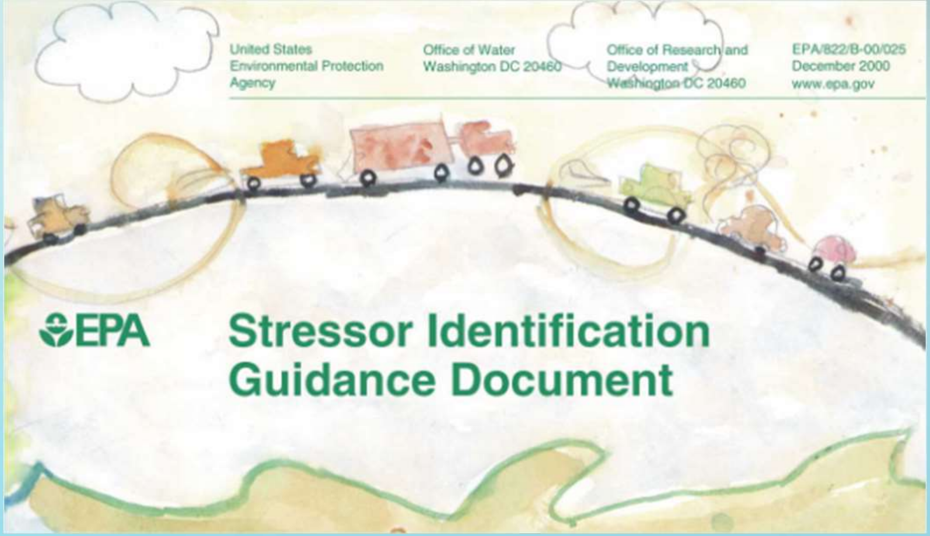
Sand Branch

Sand Branch 7th Technical Advisory Committee Meeting

Map Overview

Sand Branch Impairment Determination

Does anyone disagree that a water feature without flow would not meet the VDEQ macroinvertebrate VSCI score?



Upper (Chantilly) Segment

Upper (Chantilly) Segment

Upper (Chantilly) Segment

Upper (Chantilly) Segment

Upper (Chantilly) Segment

Monitoring Station 1ASAN001.45
*This section of stream had higher VSCI scores in the stressor analysis

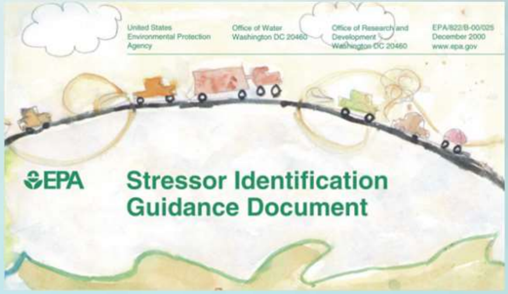
TMDL is technically flawed

- Applies macroinvertebrate parameters to a feature that lacks sufficient flow
- Chantilly hydrology study establishes that the upper segment of Sand Branch is effluent dependent – This is largely recognized in response letters but has never been considered
- DEQ's use of VSCI scores calibrated for perennial flow to determine impairment is technically flawed
- Location in the Triassic Lowland, and this watershed in particular, is very unique, elevated TDS naturally occurring

TMDL Regulations & Guidance

Requires assessment of hydrology, including human induced alterations

- Chantilly's hydrology study results do not support VDEQ's characterization of the entire Sand Branch as perennial
- Recent hydrology study data show Chantilly segment flows only in response to Chantilly discharge and (non-Chantilly) stormwater runoff
- DEQ did not use current land use data that establishes 60% (352 acres) of the 800 acre Sand Branch watershed is developed



uncertainty in the analysis will increase. Information on the location and attributes of sources can be useful surrogates.
This information can be particularly important for stressors that are intermittent in nature (e.g., high flow events), or degrade quickly (e.g., some pesticides). In these cases, source information may be used as a surrogate for the stressors. As sources become larger in scale and more diffuse, information on the sources becomes more difficult to use in site-specific causal evaluation.

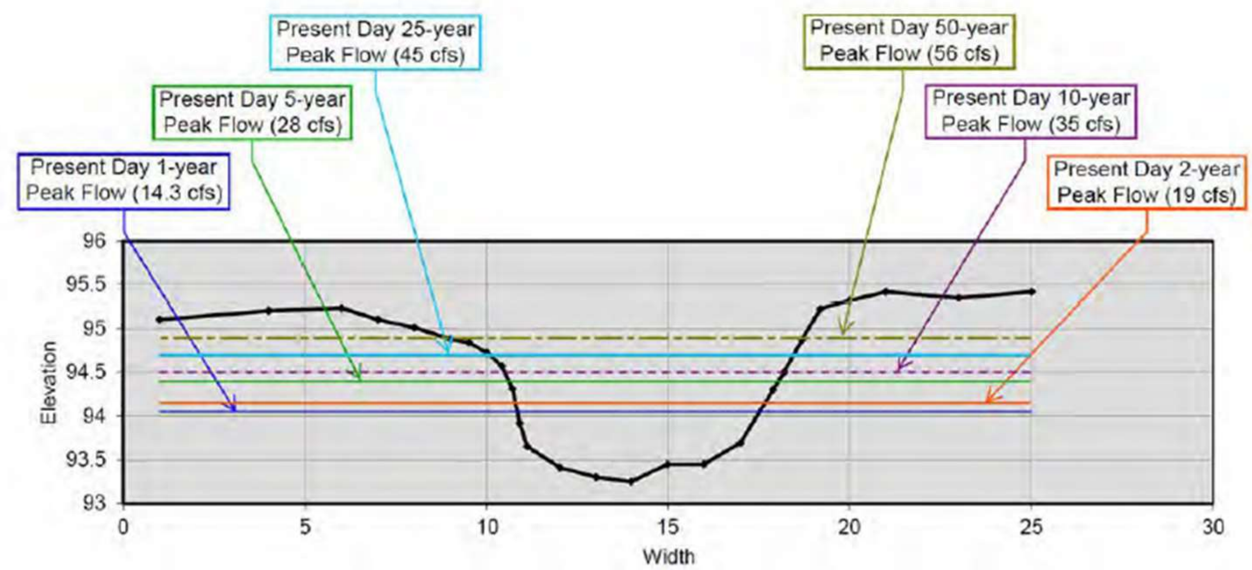
Hydrology

Table 2. Historic and Present-Day Peak Discharge Estimates of the Sand Branch Analysis Cross Section

Storm Event (yr)	Scenario 1 Historic (1956)	Scenario 2 Present Day
	Peak Discharge (cfs)	Peak Discharge (cfs)
1-yr	7.6	14.3
2-yr	11.6	19
5-yr	19.2	28
10-yr	26.5	35
25-yr	38.5	45
50-yr	49.6	56
100-yr	62.4	66

Hydrology

Diagram 1. Present-Day Peak Discharge Flows within the Sand Branch



Hydrology

6.7.2 Continuous Monitoring

During a two-week period in August 2020 and from December 2020 – February 2021, conductivity was monitored continuously at the downstream station (1ASAN000.34). Specific conductance was measured at 15-minute intervals and total rainfall, measured in one-hour increments, was measured at Dulles International Airport. In August 2020, specific conductivity ranged from 395.2 to 981.3 µS/cm and averaged 852.2 µS/cm (Figure 6-17). In December 2020 to February 2021, specific conductivity ranged from 308 to 3371 µS/cm and averaged 1034 µS/cm (Figure 6-18). During these two time periods, it was obvious that conductivity levels were greatly influenced by storm events. This was evident from

May 18, 2021 47

What Changed?

Development!

5,768,788.39 sq ft of impervious surfaces….

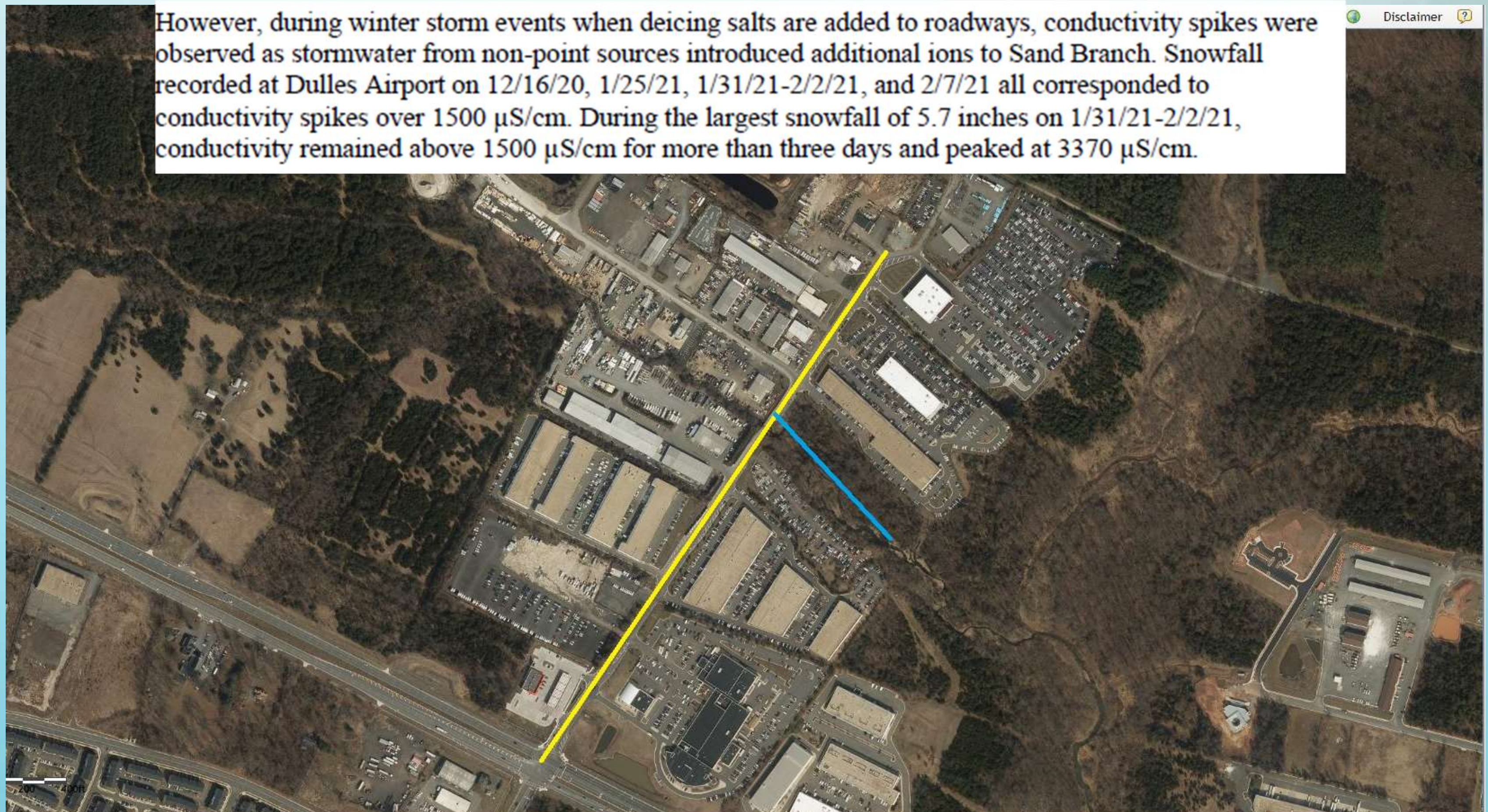
2002

2020

2002

2018

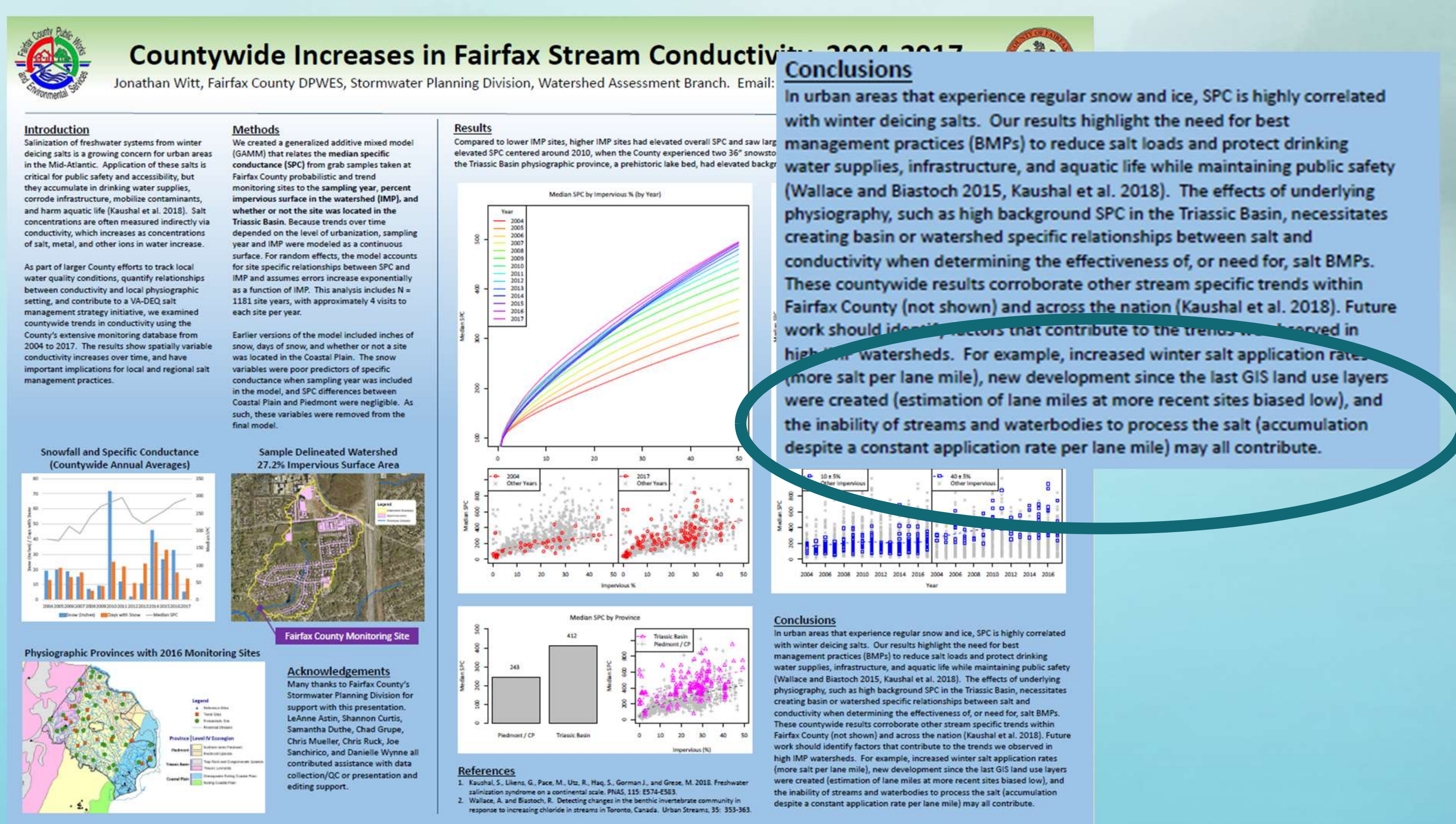
2018



However, during winter storm events when deicing salts are added to roadways, conductivity spikes were observed as stormwater from non-point sources introduced additional ions to Sand Branch. Snowfall recorded at Dulles Airport on 12/16/20, 1/25/21, 1/31/21-2/2/21, and 2/7/21 all corresponded to conductivity spikes over 1500 µS/cm. During the largest snowfall of 5.7 inches on 1/31/21-2/2/21, conductivity remained above 1500 µS/cm for more than three days and peaked at 3370 µS/cm.

2020

Conductivity Spike



Impairment data is flawed

- Guidance considers data greater than five years old – 2016 data- to be 'not reflective of current conditions'
- Not enough Data - two biological monitoring events. VDEQ typically has at least 7 years of spring/fall VSCI data and at least 5 years of water quality data.
- March (too early to obtain representative) and August (too late)
- Under VSCI, only 1.2% March samples are representative, March samples are outliers and invalid for evaluating impairment – this builds a very high statistical error rate into DEQ's impairment determination
- Because the impairment determination is based solely on old macroinvertebrate assessment at outlier seasons, the listing is not justifiable scientifically or legally

Consolidated Assessment and Listing Methodology

Toward a Compendium of Best Practices

First Edition

July 2002

Prepared By:
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, and Watersheds

With Assistance From:
EPA Regional Offices
Office of Science and Technology
Office of Research and Development
Office of Ground Water and Drinking Water
Office of Wastewater Management
Office of Environmental Information
Office of General Counsel

Spatial and temporal representativeness
Low spatial and temporal coverage: • Quarterly or less frequent sampling with limited period of record (e.g., 1 day) • Limited data during key periods or at high or low flows (critical hydrological regimes)[b] • Data are >5 years old and are not reflective of current conditions

Table 3-2. Description of data in 62 Virginia non-coastal classification/development Reference sites (247 samples).

A. Number of Reference Sites and Samples by Ecoregion

	#45 Piedmont	#64 Northern Piedmont	#66 Blue Ridge	#67a & #67f Limestone valleys	#67 Ridge & Valley w/o Limestone Valleys	#69 Central Appalachians
# Sites	4	7	8	15	23	5
# Samples	22	48	22	64	82	9

B. Number of Reference Sites and Samples by DEQ Administrative Region

	1 Southwest	2 West Central	3 Valley	4 Northern	5 Piedmont
# Sites	23	10	19	9	1
# Samples	57	63	59	62	6

C. Number of Reference Samples by Month and Year Sampled

	1994	1995	1996	1997	1998	ALL
January				1		1
February						0
March		1		1	1	3
April	1	5	6	6	4	22
May		20	22	16	10	68
June			4	1	12	17
July		1			1	2
August				3		3
September	2	2		7	5	16
October	20	14	12	19	11	76
November	8	5	5	4	7	29
December	1	3		6		10
ALL	32	51	49	64	51	247

D. Number of Reference Sites and Samples by Stream Order

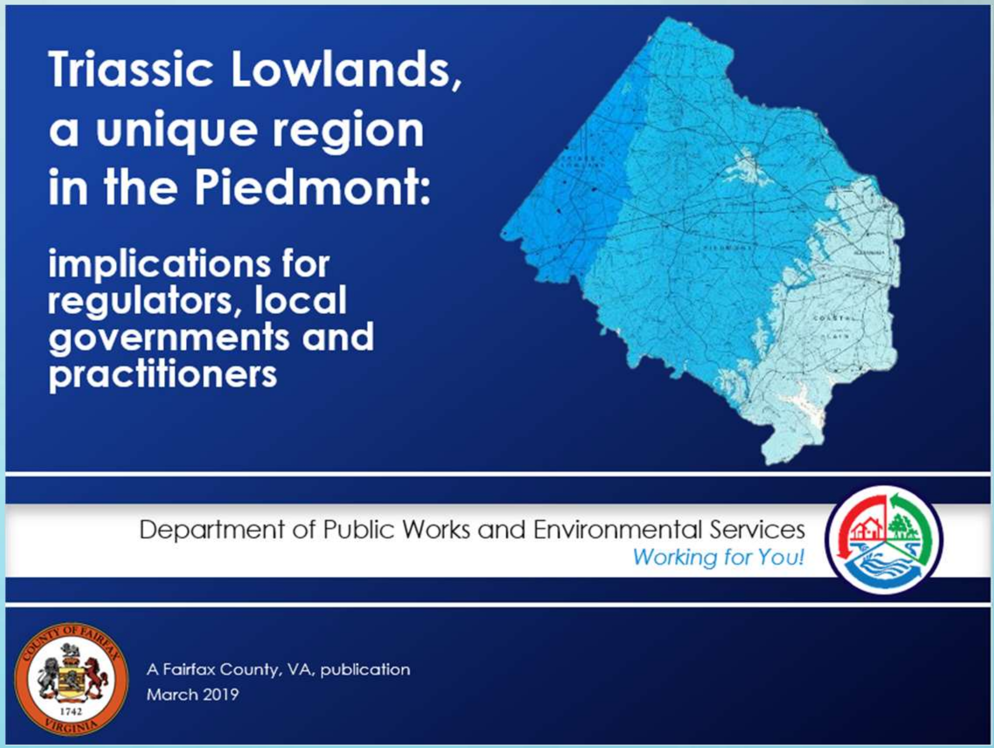
Order:	1	2	3	4
# Sites	3	11	25	23
# Samples	23	46	94	84

E. Number of Reference Sites and Samples by Alkalinity/Gradient

	High Alk, Low Grad	High Alk, High Grad	Low Alk, Low Grad	Low Alk, High Grad
# Sites	15	8	18	21
# Samples	52	26	79	90

Triassic Lowlands

- Sand Branch is located in the Triassic Lowlands, which are Mesozoic sedimentary basins (basically ancient lake beds) formed during the breakup of Pangaea, where topography is mostly low relief with Jurassic-era trap rock. Soils are not very permeable and comprised of sedimentary siltstones, shales, conglomerates and diabase formed when sea levels were much higher than today. Nonpoint surface runoff into floodplains and streams is dominant fate of precipitation.
- Fairfax County's (FC) Stormwater Planning Division notes in a March 19 2019 presentation by LeAnne Astin that Triassic Lowlands are a unique region in the Piedmont of Virginia.



Triassic Lowlands

- Where the area is unique and should not be compared to other Piedmont Streams and basin due to the following unique characteristics:
  - Triassic streams differ from Piedmont streams geomorphically/ geochemically/hydrogeologically/ecologically
  - Minimal groundwater infiltration, perched water table, epiaquic conditions in buffer
  - Lower order streams may periodically dry up, sometimes unexpectedly
  - FCs' data show that the average SC for Triassic reference streams is around 170-190 micro-siemans
  - FC has USGS data from '70s (pre-urbanization) showing SCs up to 4500 micro-siemans in this basin
  - High conductance is due to natural Total Dissolved Solids (TDS) that are the result of lower sea levels and water and sediment being trapped in low relief areas that formed ponds.
  - Stream substrate erodes easily
  - WQS Provisions for background concentrations of naturally occurring substances and natural level of conductance should be considered.
  - Current benthic index of biotic integrity consistently rates Triassic streams more poorly than Piedmont streams
  - Triassic reference sites similar to Coastal Plain refs but different from Piedmont refs
  - Triassic streams often rated poorly by benthic index

Conclusions

- Available data now shows no legal basis to perform a TMDL
- No justification for impairment of Sand Branch
- Hydrology study and stream assessments show that the real stressor to the stream is the uniqueness of the Triassic region and heavy development (pollution NOT pollutants)
- DEQ should propose to delist the Sand Branch
  - Recategorize to 4C - DEQ's list of naturally impaired waters, no TMDL needed.

Tennessee and Big Sandy River Basins continued...

Assessment Unit ID / Waterbody Name / Size / Uses Partially or Fully Restored / Parameter	Delisting Summary
-VAS-P12R_DEV01A02 -Devil Fork -4.40 Miles - Aquatic Life -Benthic Macroinvertebrates Bioassessments	PARTIAL DELIST 2022 VSCI: 11/14/2019 = 64.0, 4/9/2019 = 64.8, 10/18/2016 = 58.7, 4/5/2016 = 65.5.
-VAS-P17R_BLK01A96 -Black Creek -3.12 Miles - Aquatic Life -Alkalinity	Most probable stressor identified in TMDL.
-VAS-P17R_BLK01A96 -Black Creek -3.12 Miles - Aquatic Life -Manganese	Most probable stressor identified in TMDL.
-VAS-P17R_CAL01A98 -Callahan Creek -1.68 Miles - Aquatic Life -Total Dissolved Solids (TDS)	Most probable stressor identified by TMDL.
-VAS-P17R_CAL01B04 -Callahan Creek -3.64 Miles - Aquatic Life -Total Dissolved Solids (TDS)	Most probable stressor as identified by TMDL study.
-VAS-P17R_PIG01A06 -Pigeon Creek -2.51 Miles - Aquatic Life -Benthic Macroinvertebrates Bioassessments	DELIST 2022 VSCI at 6BPIG001.58: 11/17/2020 = 71.2, 5/11/2020 = 62.2. Biologists note increases in the frequency of riffles and bank stability, as well as an increase in vegetative protection. Past DEQ sampling at this site had a VSCI score of 64.5 in 2010. If delisting for this segment is not approved, it will be submitted as a nesting candidate for the Powell River and North Fork Powell River Watersheds TMDL, Project #0130.
-VAS-P18R_PLL01A02 -South Fork Powell River -1.98 Miles - Aquatic Life -Benthic Macroinvertebrates Bioassessments	PARTIAL DELIST 2022 VSCI at 6BPLL004.40: 11/17/2020 = 68.1, 5/11/2020 = 61.9. This segment was incorrectly listed as impaired in the 2004 cycle. Recent benthic data shows this segment is fully supporting.
-VAS-P21R_TRA01A12 -Trading Creek -4.96 Miles - Aquatic Life -Benthic Macroinvertebrates Bioassessments	DELIST 2022 VSCI: 10/27/2020 = 69.3, 5/4/2020 = 67.4, 5/2/2015 = 62.7, 5/27/2015 = 55.0.

Tennessee and Big Sandy River Basins continued...

Assessment Unit ID / Waterbody Name / Size / Uses Partially or Fully Restored / Parameter	Delisting Summary
-VAS-Q04R_CAR01B02 -Garden Creek -6.02 Miles - Aquatic Life -Total Dissolved Solids (TDS)	Total dissolved solids was identified as the most probable stressor in the TMDL.
-VAS-Q12R_RPC01A96 -Russell Prater Creek -11.72 Miles - Aquatic Life -Total Dissolved Solids (TDS)	Most probable stressor identified in TMDL.
-VAS-Q13R_PNK01A00 -North Fork Pound River tributaries -10.25 Miles - Aquatic Life -Benthic Macroinvertebrates Bioassessments	DELIST 2022 - 10.25 miles Original listing is incorrect. This segment was previously incorrectly assigned as Class V was assessed using data for 6APNK000.08, which is not on this segment. In addition, this segment has also been identified as failing to meet the Aquatic Life Use using data from 6APNK000.08. North Fork Pound Lake separates this segment and the next downstream segment, Q13R_PNK01A96, which is the location of 6APNK000.08.
-VAS-Q14R_CNR01A00 -Cranesnest River -12.93 Miles - Aquatic Life -Benthic Macroinvertebrates Bioassessments	PARTIAL DELIST 2022 VSCI at 6ACNR019.47: 11/10/2020 = 64.4 and at 6ACNR021.72: 10/31/2018 = 73, 4/24/2018 = 70.4, 11/6/2017 = 63.4.