Evaluation of Per- and Polyfluoroalkyl Substances (PFAS) in Fish from Multiple River Basins in Virginia from 2023 & 2024

Multiple River Basins Statewide
Big Sandy River, Chowan and Great Dismal Swamp,
James, Roanoke, Rappahannock, and Shenandoah

VIRGINIA

September 11, 2026

Virginia Department of Health
Office of Environmental Health Services
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September 11, 2026

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Dear Gabriel Darkwah,

Thank you for providing the per- and polyfluoroalkyl substances (PFAS) fish tissue concentrations results for fish collected in 2023 and 2024 from multiple waterways in Virginia. The Virginia Department of Health (VDH) has finished reviewing the results for public health implications as requested.

BACKGROUND

The 2023 and 2024 annual routine statewide fish tissue monitoring primarily targeted contaminants in fish from the following river basins: Chowan and Great Dismal Swamp, James River, Potomac River, Shenandoah River, Rappahannock River, Roanoke River, and the Big Sandy River Sub Basin. PFAS concentrations were measured in edible fish fillet as part of the statewide monitoring. Perfluorooctane sulfonate (PFOS) is one PFAS that has been identified as a contaminant of concern in fish in waterways across the United States, and more recently in the Chickahominy Watershed (James River Basin). In 2024, pursuant to § 32.1-248.01 of the Code of Virginia, VDH developed PFOS fish consumption advisory guidelines that went into effect in 2025. PFOS concentrations in fish tissue samples from the Chickahominy Watershed have been evaluated in a separate letter health consultation (LHC).

This document focuses on PFOS in fish sampling results from the Chowan and Great Dismal Swamp Basin, James River Basin, Shenandoah River Basin, Rappahannock River Basin, Roanoke River Basin, and Big Sandy River Sub Basin. No fish tissue data from the Big Sandy River Sub Basin, Shenandoah River Basin, or Rappahannock River Basin exceeded VDH's lower screening value (10 parts per billion (ppb)), see **Map A** in the Appendix. Multiple samples of fish from the Potomac River Basin exceeded VDH's lower screening value for PFOS and will be discussed in a separate LHC. See **Map B** for state-wide sampling locations with PFOS concentrations in fish tissue exceeding VDH's lower screening level.

The 2023 dataset reviewed includes 1039 edible fish tissue samples, which were tested for PFAS as part of the Virginia Department of Environmental Quality's (DEQ's) statewide sampling and analyses of residual chemical contaminants in fish tissue. Out of the 1039 fish tissue samples, 124 of the samples had elevated PFOS concentrations. See **Table 1** for the elevated fish tissue samples from the Chowan and Great Dismal Swamp Basin, James River Basin, and Roanoke River Basin. The 2024 dataset reviewed includes 976 edible fish tissue fillet samples, and 255 samples had elevated PFOS concentrations. See **Table 2** for the elevated samples from the Roanoke River Basin. See **Map 1** for the 2023 – 2024 sampling locations from the Chowan and Great Dismal Swamp Basin, James River Basin, and Roanoke River Basin with PFOS concentration exceeding VDH's lower screening value.

DISCUSSION

The 2023 and 2024 fish tissue data that *exceeded* VDH's lower screening value (10 parts per billion (ppb)) are in **Table 1** and **Table 2**. The number of fish, size, species, and frequency of exceedance of the screening value were considered in determining the need for a PFOS fish consumption advisory. Some fish species tested already have a mercury or polychlorinated biphenyls (PCBs) consumption advisory in effect for the sampling location.

Table 1. 2023 Fish tissue PFOS concentrations exceeding VDH's lower screening value.*

Sample Location	Species Name	No. of Fish	Length Range (cm)	Concentration (ppb)
Chowan and Great Dismal Swamp Basin				
Nottoway River near Rt. 613 – Gills Bridge	American Eel	3	48.2-63.8	17.9
James River Basin				
Lake Prince 20m from Spillway Lake Prince (Suffolk City)	Largemouth Bass	3	35.8-41	12.9
Roanoke River Basin				
Lake Gaston near NC-VA State Line	Bluegill Sunfish	6	15.4-17	17.7
Mason Creek near Â A.R. Burton Technical	Bluehead Chub	6	13.5-17.1	23.4
Mason Creek near Â A.R. Burton Technical	Redbreast Sunfish	10	10.9-11.6	15.3
Roanoke River near BUS Rt. 29 bridge at Altavista	Golden Redhorse Sucker	5	42.2-52.4	11.1
Roanoke River near Rt. 11 bridge (Ghent Park)	Northern Hogsucker	4	28-32	13.1
Smith Mountain Lake – SML upstream of Dam	Carp	4	55.5-67.9	14.2
Smith Mountain Lake – SML upstream of Dam	Largemouth Bass	5	36.8-47.7	13.4

Smith Mountain Lake – SML upstream of Dam	Largemouth Bass	7	32.6-36.6	11.5
Smith Mountain Lake – SML upstream of Dam	Bluegill Sunfish	5	14.3-18.4	10.8

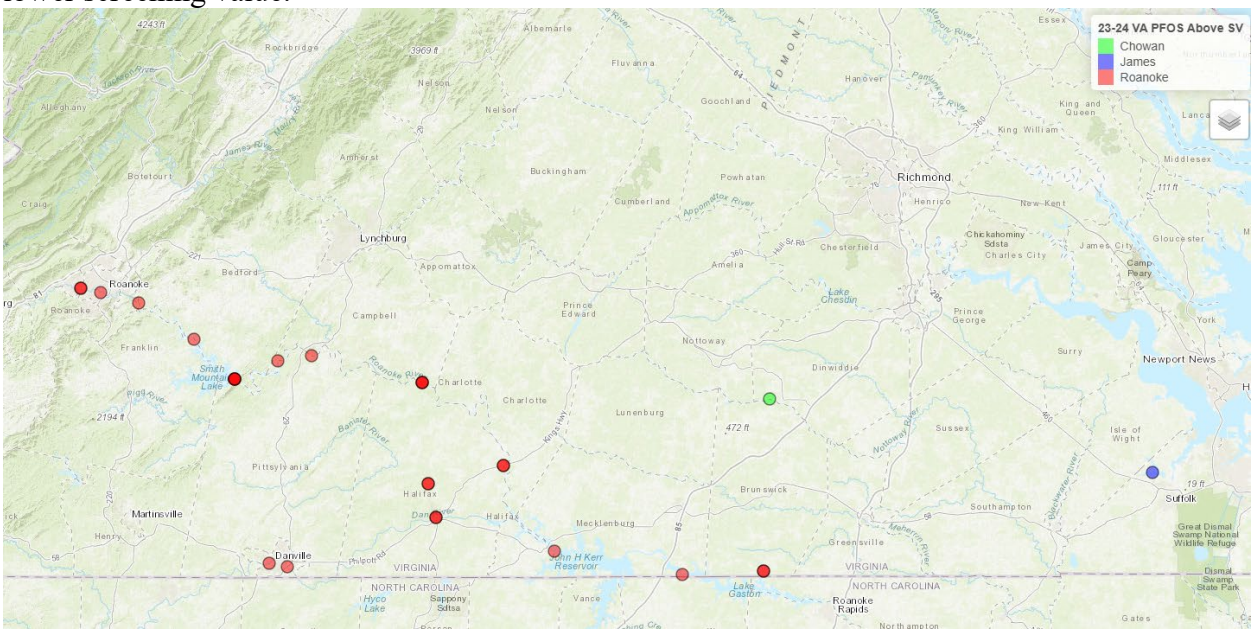
*Fish analyzed individually or as composite samples. **ppb** = parts per billion. **cm** = centimeters

Table 2. 2024 Fish tissue PFOS concentration exceeding VDH's lower screening value.*

Sample Location	Species Name	No. Of Fish	Length Range (cm)	Concentration (ppb)
Roanoke River Basin				
Banister Lake (Halifax Reservoir)	Largemouth Bass	5	31-33.4	35.1
Banister Lake (Halifax Reservoir)	Black Crappie	5	24.3-29.9	28.7
Dan River above Schoolfield Dam	Largemouth Bass	3	30.8-38.8	11.0
Dan River near Anglers Park	Flathead Catfish	1	102	24.5
Dan River near Rt. 501 below South Boston	Freshwater Drum	5	35-39.9	11.2
Dan River near Rt. 501 below South Boston	Walleye	2	45.2-50.7	12.7
Kerr Reservoir near Clarksville – Sta #B-18 Buoy 18	Largemouth Bass	2	39.4-40	19.3
Leesville Lake	Largemouth Bass	5	34-39	11.2
Pea Hill Creek arm of Lake Gaston near Rt. 626 bridge	Spotted Bass	3	40.2-41.4	18.5
Pea Hill Creek arm of Lake Gaston near Rt. 626 bridge	Largemouth Bass	3	39.8-42	14.7
Roanoke River near Explore Park	Largemouth Bass	3	28-39	12.1
Roanoke River near Rt. 360 bridge, East of Clover	Freshwater Drum	3	37.5-41.3	31.6
Roanoke River near Rt. 360 bridge, East of Clover	Walleye	2	43.6-46.9	11.4
Roanoke River near Rt. 501, Brookneal	Striped Bass	4	51-57.5	14.95
Roanoke River near Rt. 501, Brookneal	Walleye	3	46-50.9	13.3
Roanoke River near Rt. 501, Brookneal	White Perch	9	22-27.7	14.2
Smith Mountain Lake near Rt. 122, Hales Ford bridge	Largemouth Bass	3	30.5-32.3	11.2

*Fish analyzed individually or as composite samples. **ppb** = parts per billion. **cm** = centimeters

Map 1. 2023 – 2024 Sampling locations from the Chowan and Great Dismal Swamp Basin, James River Basin, and the Roanoke River Basin with PFOS concentration exceeding VDH's lower screening value.*



Source: DEQ data presented using the R Studio mapping program. *Elevated Chickahominy Watershed and Potomac River Basin data are presented in separate LHCs.

CONCLUSIONS

VDH cannot currently conclude if consuming PFOS contaminated fish from the Roanoke River Basin could harm people's health. Additional sampling would be needed to determine if a PFOS fish consumption advisory is warranted.

VDH concludes that consuming fish from the Shenandoah River Basin and Rappahannock River Basin and the Big Sandy River Sub Basin is not a health concern because the concentration of PFOS does not exceed VDH's lower screening value.

RECOMMENDATION

VDH recommends additional fish sampling along the Roanoke River Basin focusing on the Kerr Reservoir, including major tributaries; Smith Mountain Lake; and the Dan River and its tributaries between South Boston and the Roanoke River.

Please let us know if you have any questions or other information to consider.

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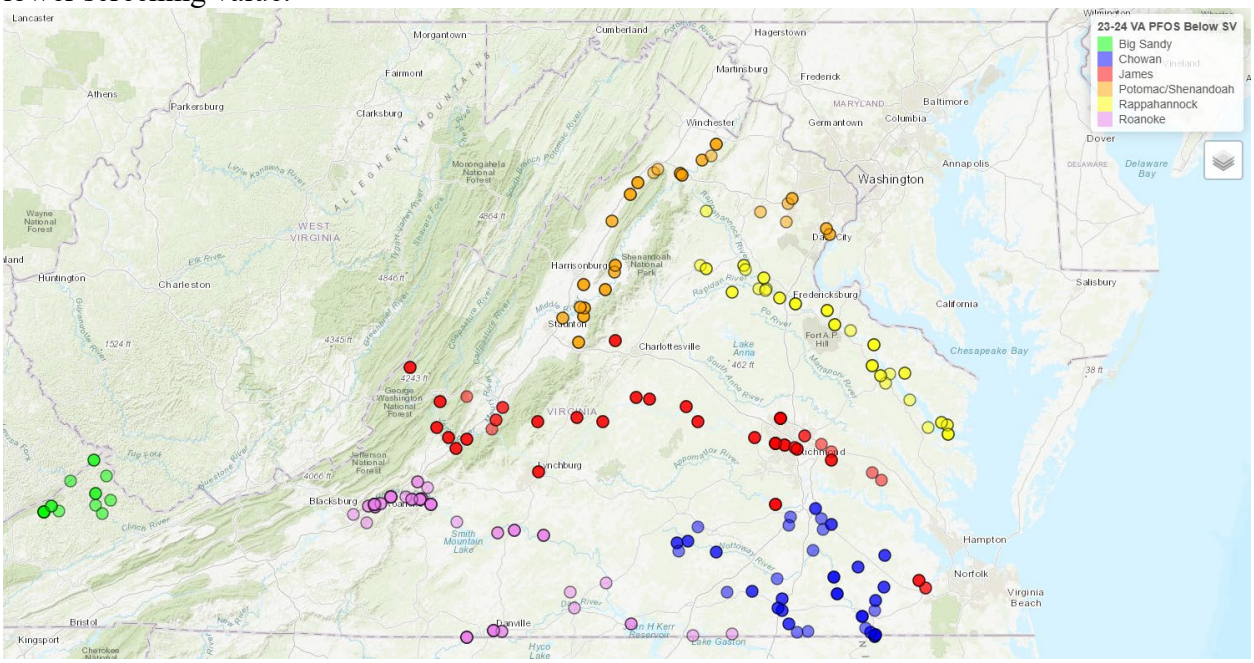
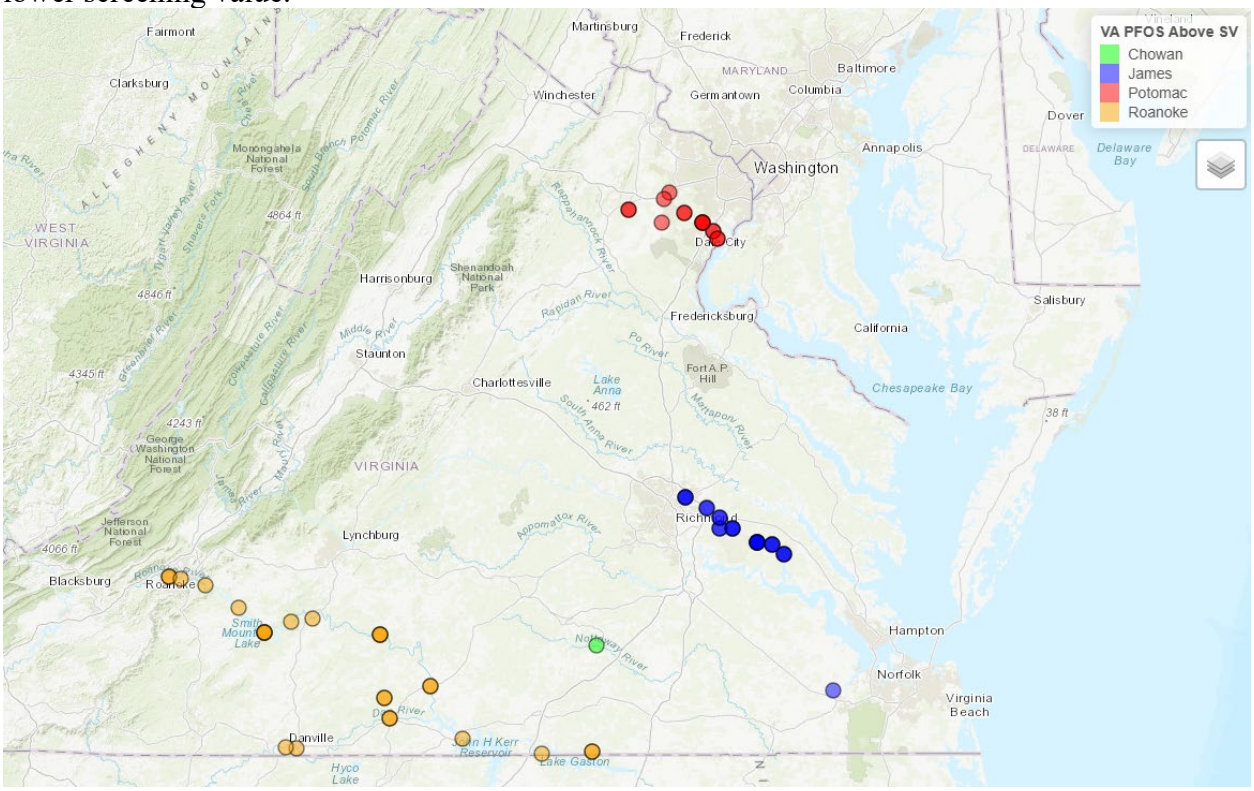
Appendix

Map A. 2023 – 2024 Statewide Sampling Locations with PFOS concentration below VDH's lower screening value.



Source: DEQ data presented using the R Studio mapping program.

Map B. 2023 – 2024 Statewide sampling locations with PFOS concentration exceeding VDH's lower screening value.



Source: DEQ data presented using the R Studio mapping program. *The Chickahominy (James River Basin) and Occoquan Watershed (Potomac River Basin) data are evaluated further in separate LHCs.

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