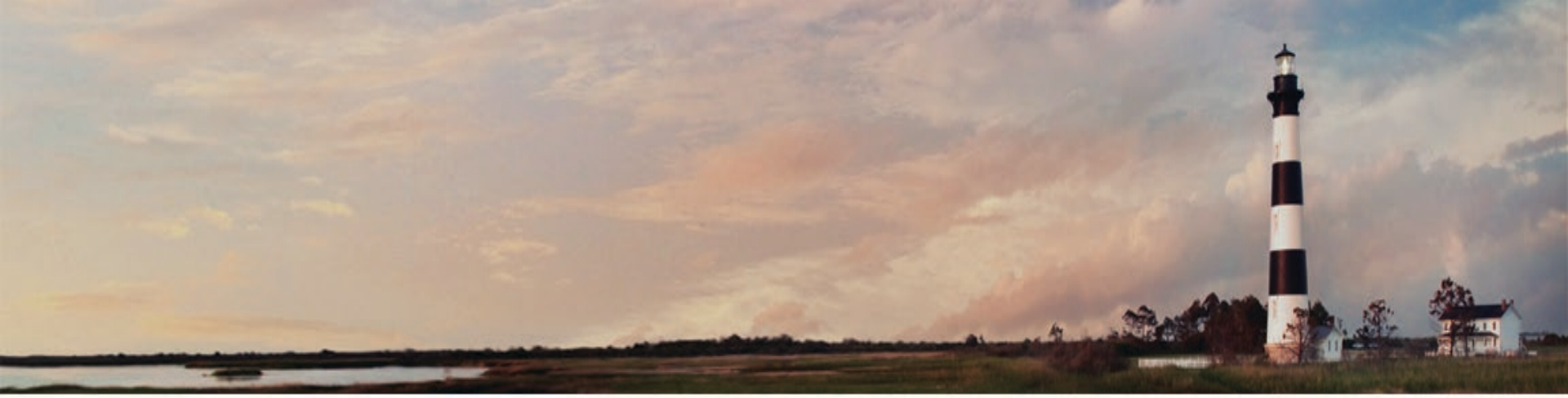


DWR Update: 2023 PFAS Sampling of NC Public Water Systems

October 4, 2023

Rebecca Sadosky, Ph.D.

2023 PWS Section Sampling Effort

Department of Environmental Quality
Division of Water Resources

2023 PWS Sampling Effort

- 655 systems included in this round of sampling
  - Privately owned community water systems (excludes those owned by Aqua NC and Carolina Water)
  - Privately owned school and daycare non-transient non-community water systems
  - 3 systems previously sampled by the PFAST Network as requested by SSAB

2023 PWS Sampling Effort

- 1 round of sampling
- 1 sample from 1 entry point for each system
- Analyze for same 57 PFAS as our 2022 sampling
  - Using modified Method 537.1

Hazard Index = (GenX conc/10ppt) + (PFBS conc/2000ppt) + (PFNA conc/10ppt) + (PFHxS conc/9.0ppt)

2023 PWS Sampling Effort

- **433** Systems sampled through 10/03/2023
  - Have data for 286 systems sampled through 8/31/2023
  - 55 systems are scheduled to be sampled
  - 65 systems have declined sampling

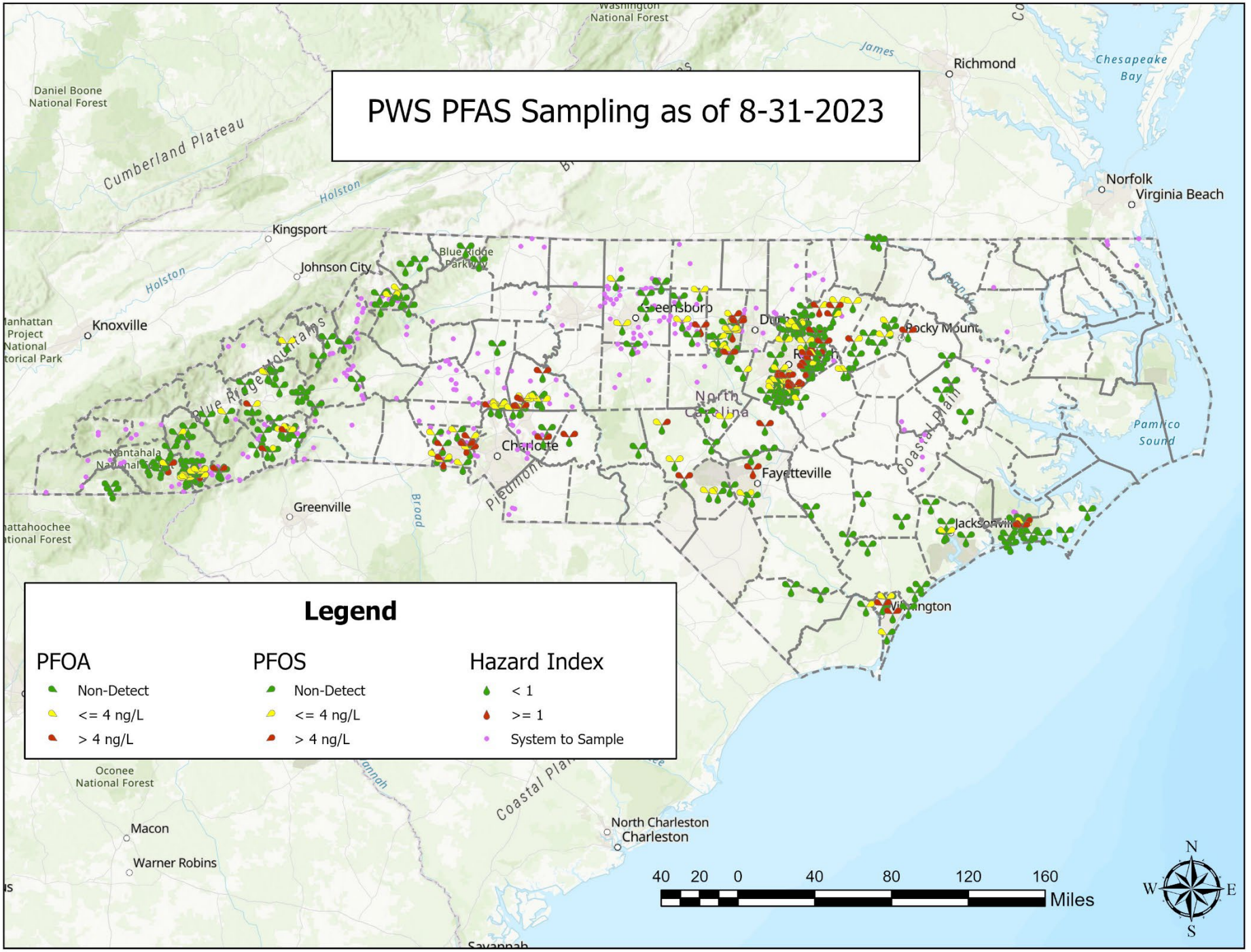
- 61 Systems (21%) had PFOA, PFOS, and/or HI above proposed MCL
  - 52 Systems (18%) had PFOA > 4ppt
  - 39 Systems (14%) had PFOS > 4ppt
  - 15 Systems (5%) had HI > 1
    - Driven by PFHxS (14 systems)

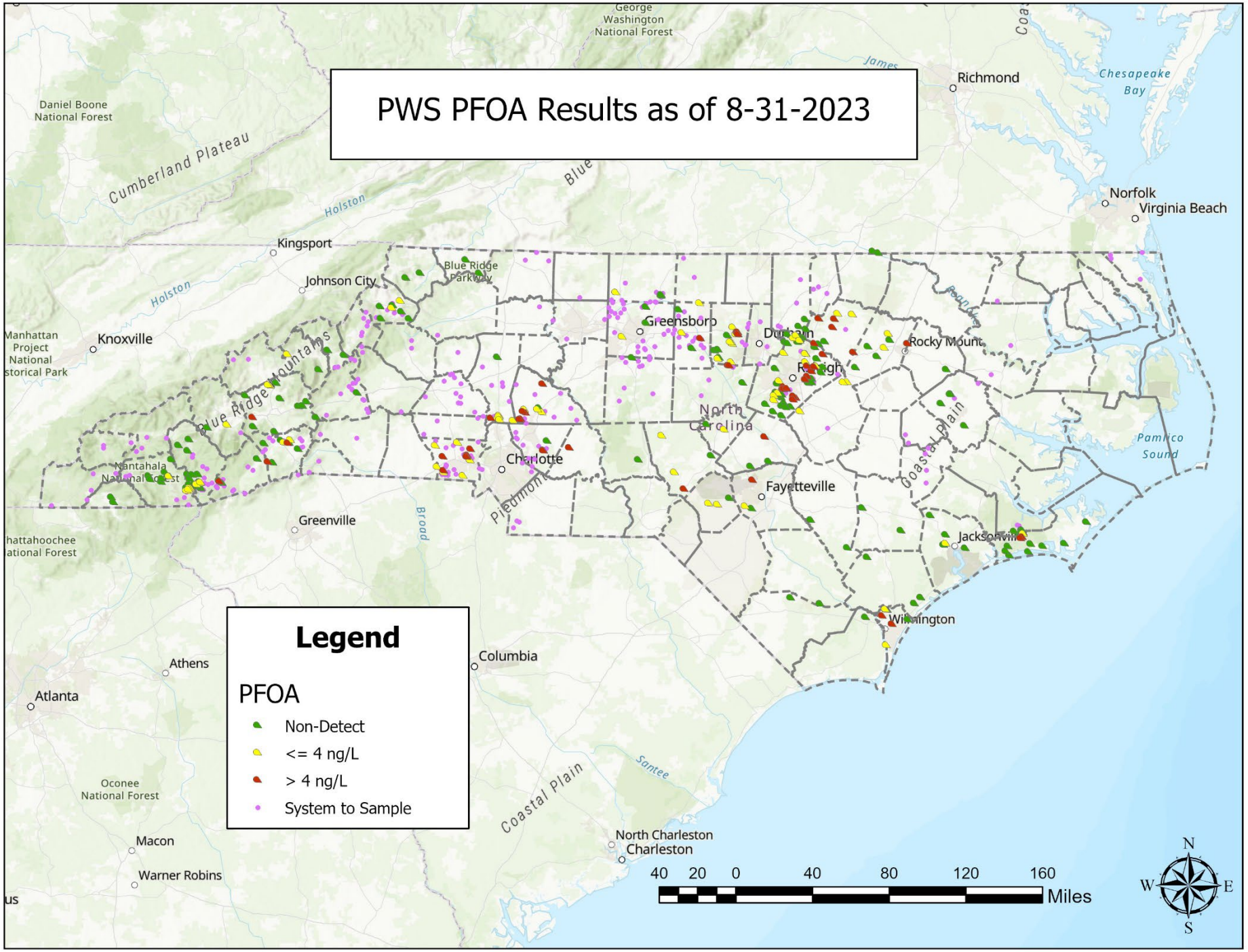
- 80 Systems (28%) have all Non-Detect measurements for PFAS

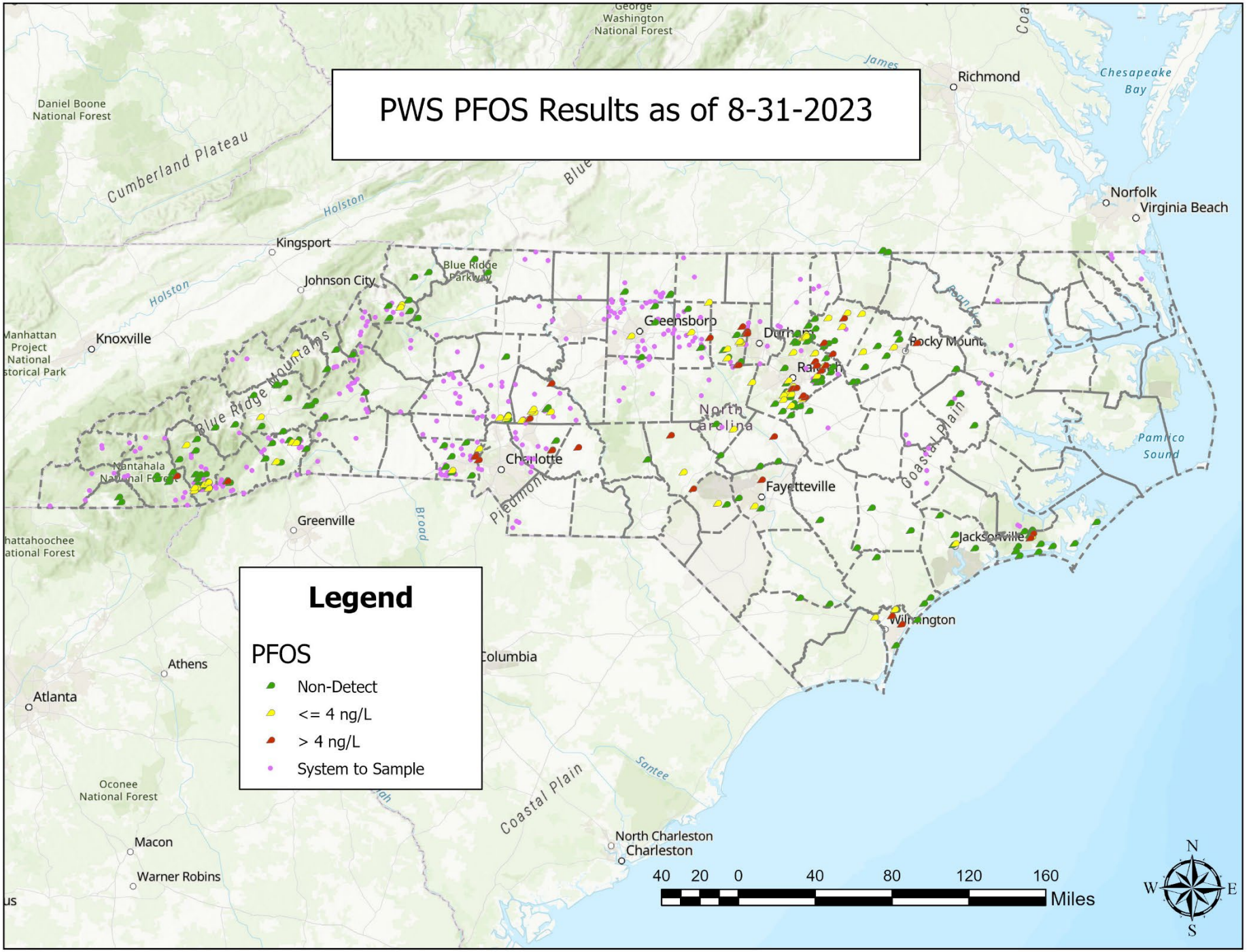
2023 PWS Sampling Effort

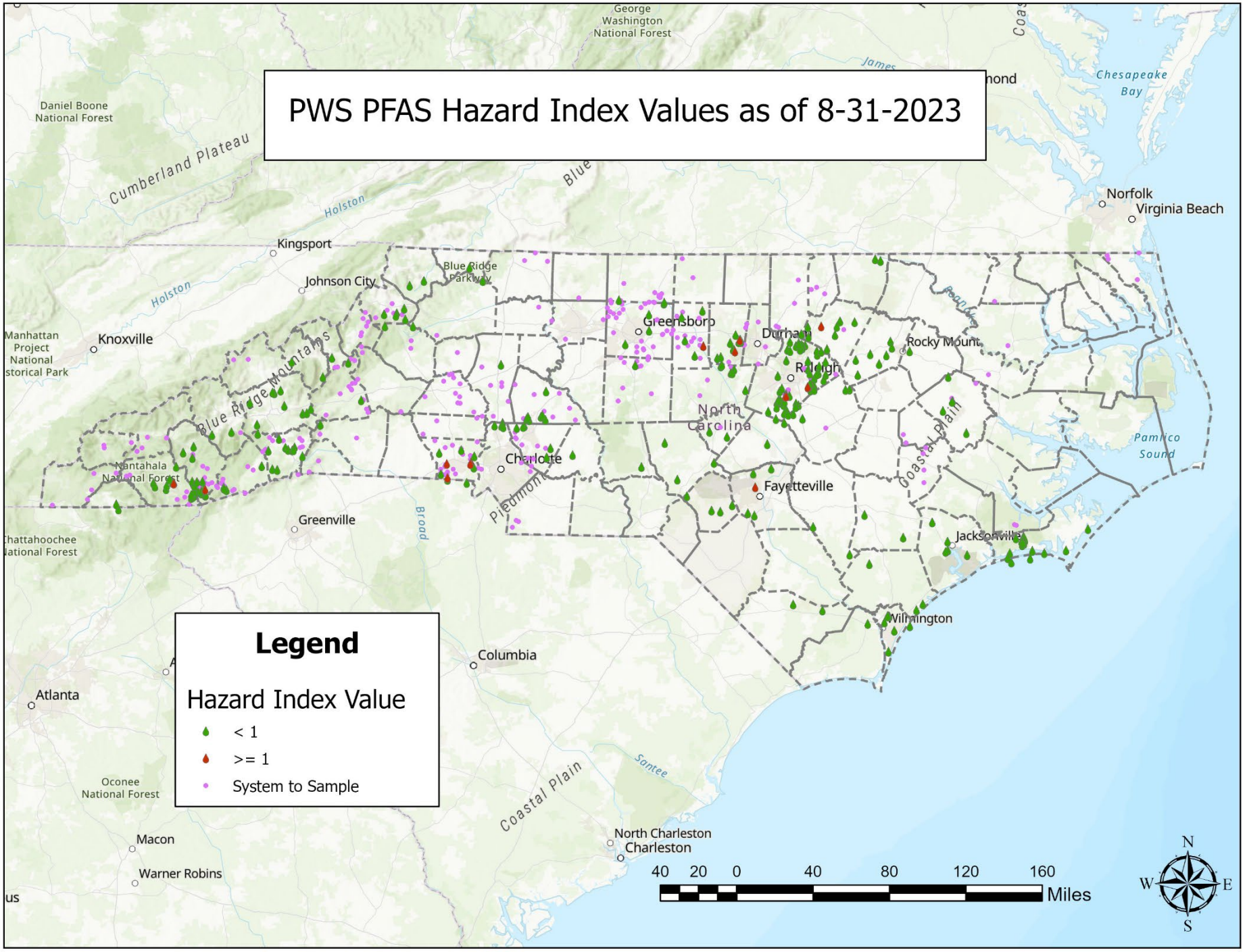
Analyte	# PWS w. detections	% PWS w. detections	Proposed Regulation	Range (ppt)	
				Min	Max
PFOA	123	43%	Yes	0.75	33.9
PFBS	119	42%	Yes	0.57	31.3
PFOS	108	38%	Yes	0.83	46.7
PFBA	87	30%	No	0.73	17.8
PFHpA	87	30%	No	0.55	15.3
PFPeA	73	26%	No	0.63	26.3
PFHxA	68	24%	No	0.706	21.9
PFPrA	66	23%	No	7.1	31.8
PMPA	53	19%	No	0.177	7.48
PFPeS	36	13%	No	0.56	23.1
NVHOS	29	10%	No	0.18	2.44
PFO2HxA	24	8%	No	0.17	13.1
PFMOAA	22	8%	No	0.19	44.7
GenX	18	6%	Yes	0.181	1.58
PFNA	15	5%	Yes	0.64	9.55
PFHxS	14	5%	Yes	9.11	62.9
PFHpS	6	2%	No	0.63	1.38
PFDA	6	2%	No	0.7	1.99
PEPA	4	1%	No	0.19	0.65
PFO3OA	2	1%	No	0.786	3.36
PFO5DA	1	0%	No	0.234	0.234
PFO4DA	1	0%	No	0.315	0.799
PFMOPrA	1	0%	No	0.239	0.239

NORTH CAROLINA
Department of Environmental Quality


PWS PFAS Sampling as of 8-31-2023
Legend
PFOA
Non-Detect
<= 4 ng/L
> 4 ng/L
PFOS
Non-Detect
<= 4 ng/L
> 4 ng/L
Hazard Index
< 1
>= 1
System to Sample
Daniel Boone National Forest
Cumberland Plateau
Holston
Kingsport
Johnson City
Knoxville
Blue Ridge Mountains
Blue Ridge Parkway
Greensboro
Durham
Raleigh
Rocky Mount
North Carolina
Charlotte
Piedmont
Fayetteville
Coastal Plain
Greenville
Broad
Richmond
James
Chesapeake Bay
Norfolk
Virginia Beach
Pamlico Sound
Jacksonville
Wilmington
Oconee National Forest
Macon
Warner Robins
North Charleston
Charleston
40 20 0 40 80 120 160
Miles
N
W
E
S


PWS PFOA Results as of 8-31-2023
Legend
PFOA
Non-Detect
<= 4 ng/L
> 4 ng/L
System to Sample
Miles
40 20 0 40 80 120 160
N
W
E
S
George Washington National Forest
Daniel Boone National Forest
Cumberland Plateau
Richmond
Chesapeake Bay
Norfolk
Virginia Beach
Kingsport
Johnson City
Blue Ridge Parkway
Holston
Knoxville
Manhattan Project National Historical Park
Blue Ridge Mountains
Greensboro
Durham
Raleigh
Rocky Mount
North Carolina
Charlotte
Piedmont
Coastal Plain
Pamlico Sound
Fayetteville
Greenville
Broad
Jacksonville
Wilmington
Columbia
Athens
Atlanta
Oconee National Forest
Macon
Warner Robins
Santee
North Charleston
Charleston


PWS PFOS Results as of 8-31-2023
Legend
PFOS
Non-Detect
<= 4 ng/L
> 4 ng/L
System to Sample
George Washington National Forest
Daniel Boone National Forest
Cumberland Plateau
Richmond
Chesapeake Bay
Norfolk
Virginia Beach
Kingsport
Johnson City
Blue Ridge Parkway
Holston
Knoxville
Manhattan Project National Historical Park
Blue Ridge Mountains
Greensboro
Durham
Rocky Mount
Raleigh
North Carolina
Charlotte
Piedmont
Coastal Plain
Pamlico Sound
Fayetteville
Greenville
Jacksonville
Wilmington
Nantahala National Forest
Chattahoochee National Forest
Athens
Atlanta
Columbia
Oconee National Forest
Macon
Warner Robins
North Charleston
Charleston
Santee
40 20 0 40 80 120 160
Miles
N
W
E
S


PWS PFAS Hazard Index Values as of 8-31-2023
Legend
Hazard Index Value
< 1
>= 1
System to Sample
Miles
40 20 0 40 80 120 160
N
W
E
S
George Washington National Forest
Daniel Boone National Forest
Cumberland Plateau
Holston
Kingsport
Johnson City
Blue Ridge Parkway
Knoxville
Manhattan Project National Historical Park
Blue Ridge Mountains
Nantahala National Forest
Greenville
Chattahoochee National Forest
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Piedmont
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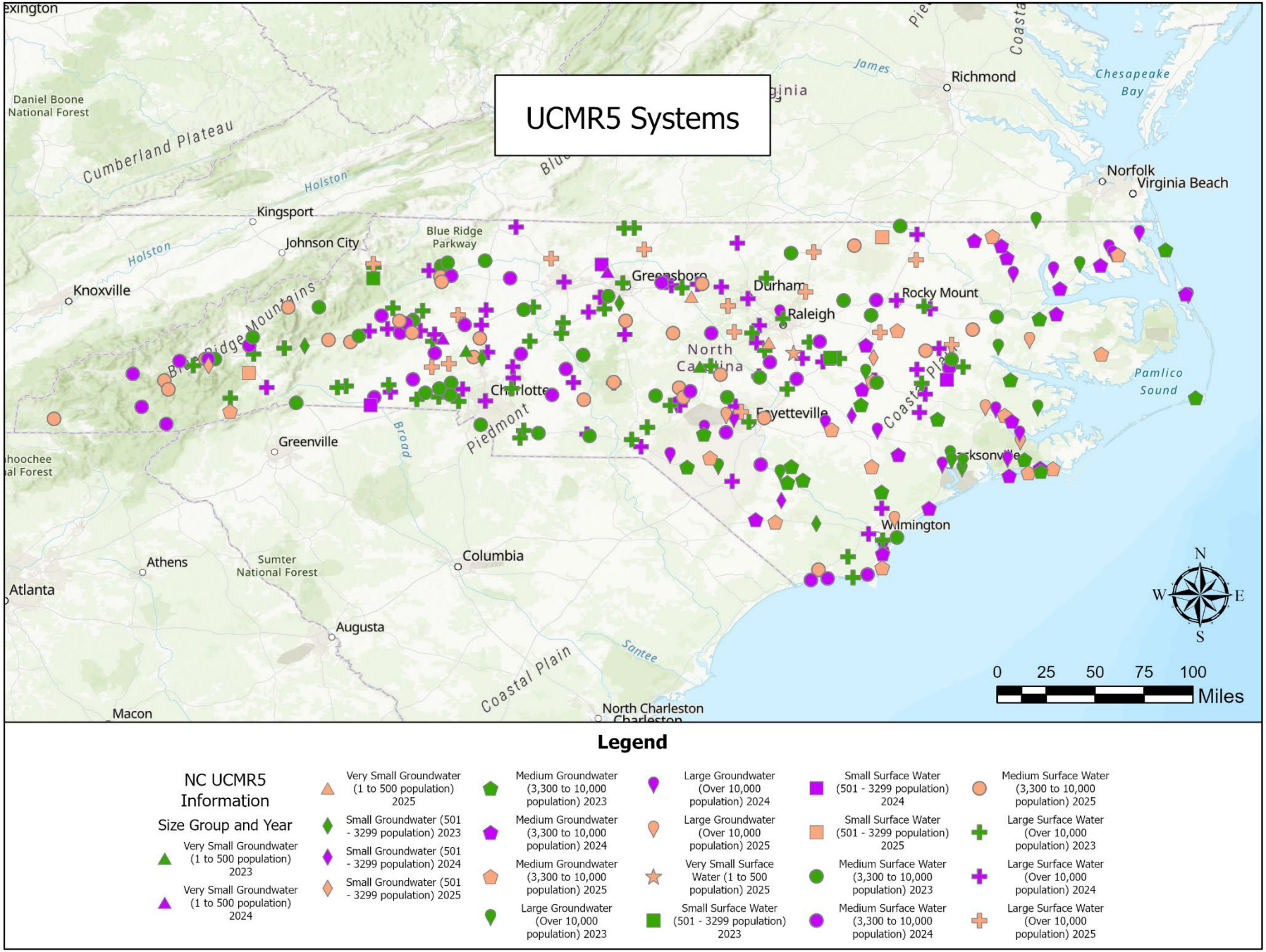
Raleigh
Rocky Mount
North Carolina
Coastal Plain
Fayetteville
Pamlico Sound
Chesapeake Bay
Norfolk
Virginia Beach
Jacksonville
Wilmington
Columbia
Atlanta
Oconee National Forest
Macon
Warner Robins
Santee
Coastal Plain
North Charleston
Charleston

NC UCMR5



Legend

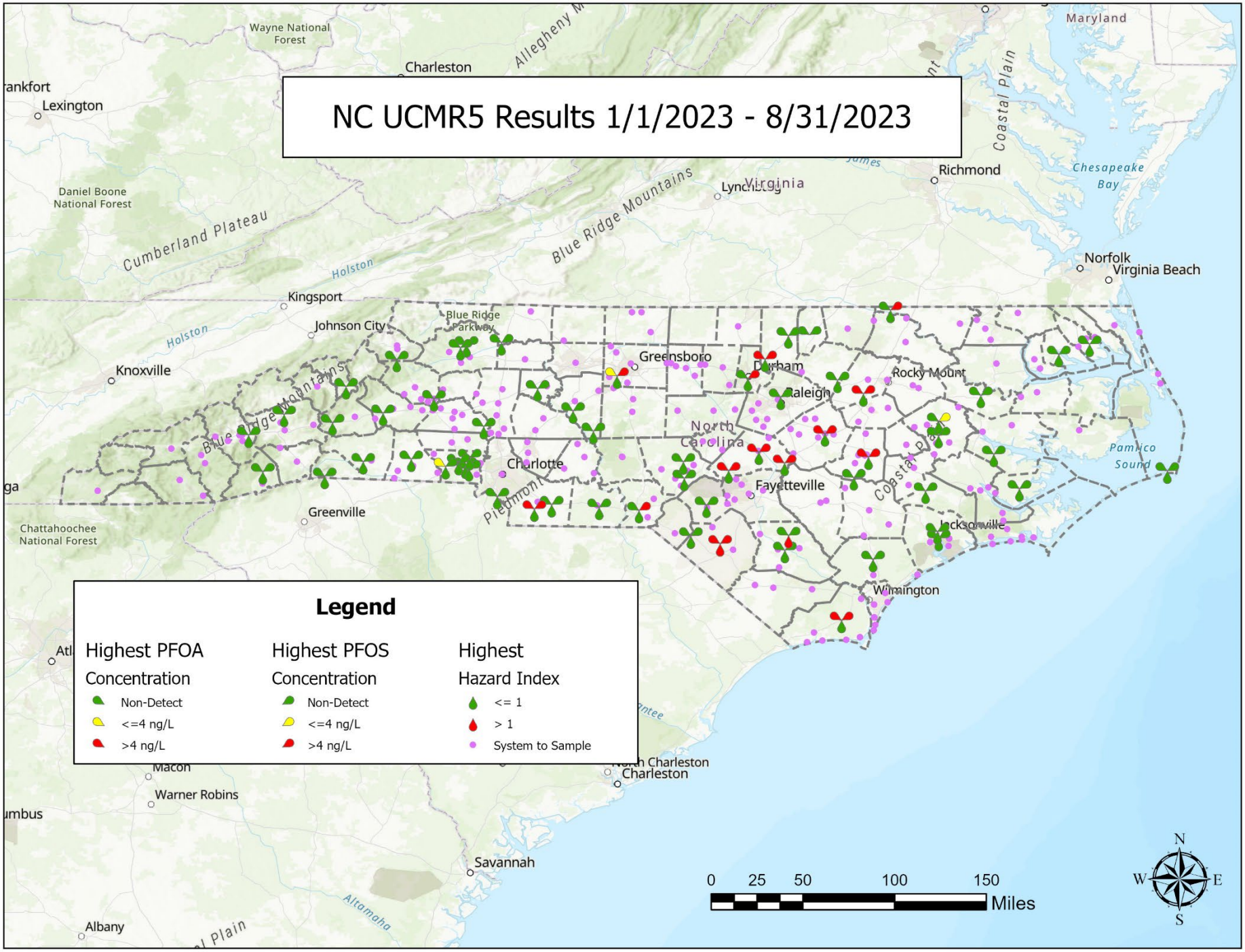
NC UCMR5 Information

Size Group and Year

- Very Small Groundwater (1 to 500 population) 2023
- Very Small Groundwater (1 to 500 population) 2024
- Very Small Groundwater (1 to 500 population) 2025
- Small Groundwater (501 - 3299 population) 2023
- Small Groundwater (501 - 3299 population) 2024
- Small Groundwater (501 - 3299 population) 2025
- Medium Groundwater (3,300 to 10,000 population) 2023
- Medium Groundwater (3,300 to 10,000 population) 2024
- Medium Groundwater (3,300 to 10,000 population) 2025
- Large Groundwater (Over 10,000 population) 2023
- Large Groundwater (Over 10,000 population) 2024
- Large Groundwater (Over 10,000 population) 2025
- Very Small Surface Water (1 to 500 population) 2025
- Small Surface Water (501 - 3299 population) 2023
- Small Surface Water (501 - 3299 population) 2024
- Small Surface Water (501 - 3299 population) 2025
- Medium Surface Water (3,300 to 10,000 population) 2023
- Medium Surface Water (3,300 to 10,000 population) 2024
- Medium Surface Water (3,300 to 10,000 population) 2025
- Large Surface Water (Over 10,000 population) 2023
- Large Surface Water (Over 10,000 population) 2024
- Large Surface Water (Over 10,000 population) 2025

- 298 NC systems to sample between 2023 and 2025
- Results for 79 systems (as of 9/30/23)
- PFAS
  - 24 Systems (30%) have a result exceeding a proposed MCL or Hazard Index
  - 51 Systems (65%) have all Non-Detect measurements for PFAS
  - 17 of the 29 PFAS have not yet been detected in any samples
- Lithium
  - 15 Systems (19%) have a lithium detection
  - 12 Systems (15%) have a lithium result greater than 10ppb
  - Max lithium result 60.3ppb

Analyte	# PWS w. detections	% PWS w. detections	Proposed Regulation	Range (ppt)	
				Min	Max
PFOS	20	25%	Yes	4	31.3
PFBA	20	25%	No	5.1	11.3
PFPeA	18	23%	No	3.3	29
PFHxA	17	22%	No	3	25
PFOA	16	20%	Yes	4	30
PFBS	15	19%	Yes	3	8.8
Lithium (ppb)	15	19%	No	9	60.3
PFHxS	9	11%	Yes	3	14.2
PFHpA	7	9%	No	3.2	16
GenX	2	3%	Yes	13.6	34
6:2 FTS	2	3%	No	5	7.2
PFPeS	1	1%	No	4.4	4.7


NC UCMR5 Results 1/1/2023 - 8/31/2023
Legend
Highest PFOA Concentration
Non-Detect
<=4 ng/L
>4 ng/L
Highest PFOS Concentration
Non-Detect
<=4 ng/L
>4 ng/L
Highest Hazard Index
<= 1
> 1
System to Sample
0 25 50 100 150
Miles
N
W
E
S
Wayne National Forest
Charleston
Lexington
Daniel Boone National Forest
Cumberland Plateau
Blue Ridge Mountains
Virginia
Lynchburg
Richmond
Maryland
Coastal Plain
Chesapeake Bay
Norfolk
Virginia Beach
Holston
Kingsport
Johnson City
Blue Ridge Parkway
Knoxville
Greensboro
Durham
Rocky Mount
Raleigh
North Carolina
Charlotte
Fayetteville
Pamlico Sound
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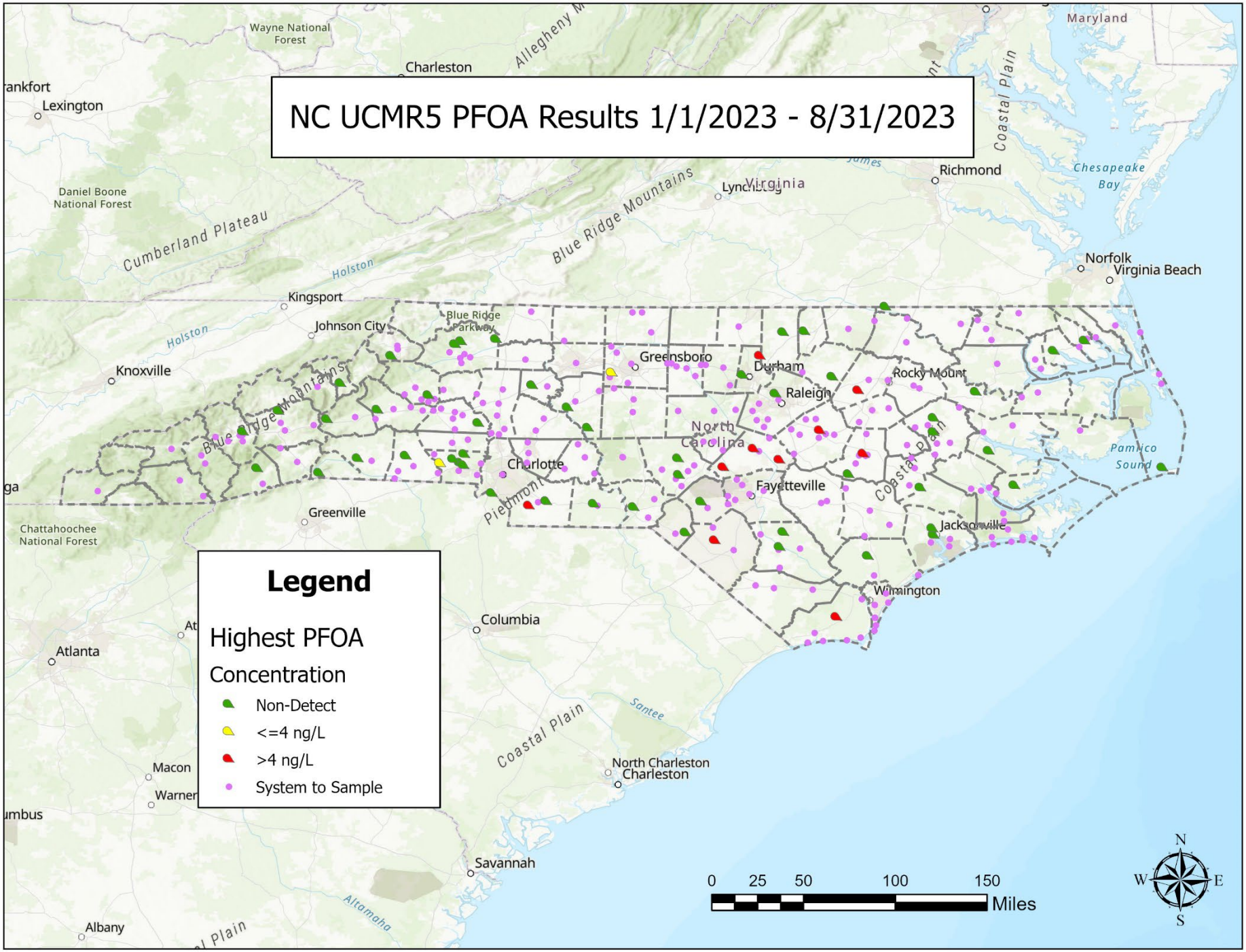
Greenville
Chattahoochee National Forest
Jacksonville
Wilmington
Macon
Warner Robins
Charleston
Savannah
Altamaha
Albany


NC UCMR5 PFOA Results 1/1/2023 - 8/31/2023
Legend
Highest PFOA Concentration
Non-Detect
<=4 ng/L
>4 ng/L
System to Sample
0 25 50 100 150
Miles
N
W
E
S
Wayne National Forest
Charleston
Lexington
Daniel Boone National Forest
Cumberland Plateau
Holston
Kingsport
Johnson City
Knoxville
Blue Ridge Parkway
Blue Ridge Mountains
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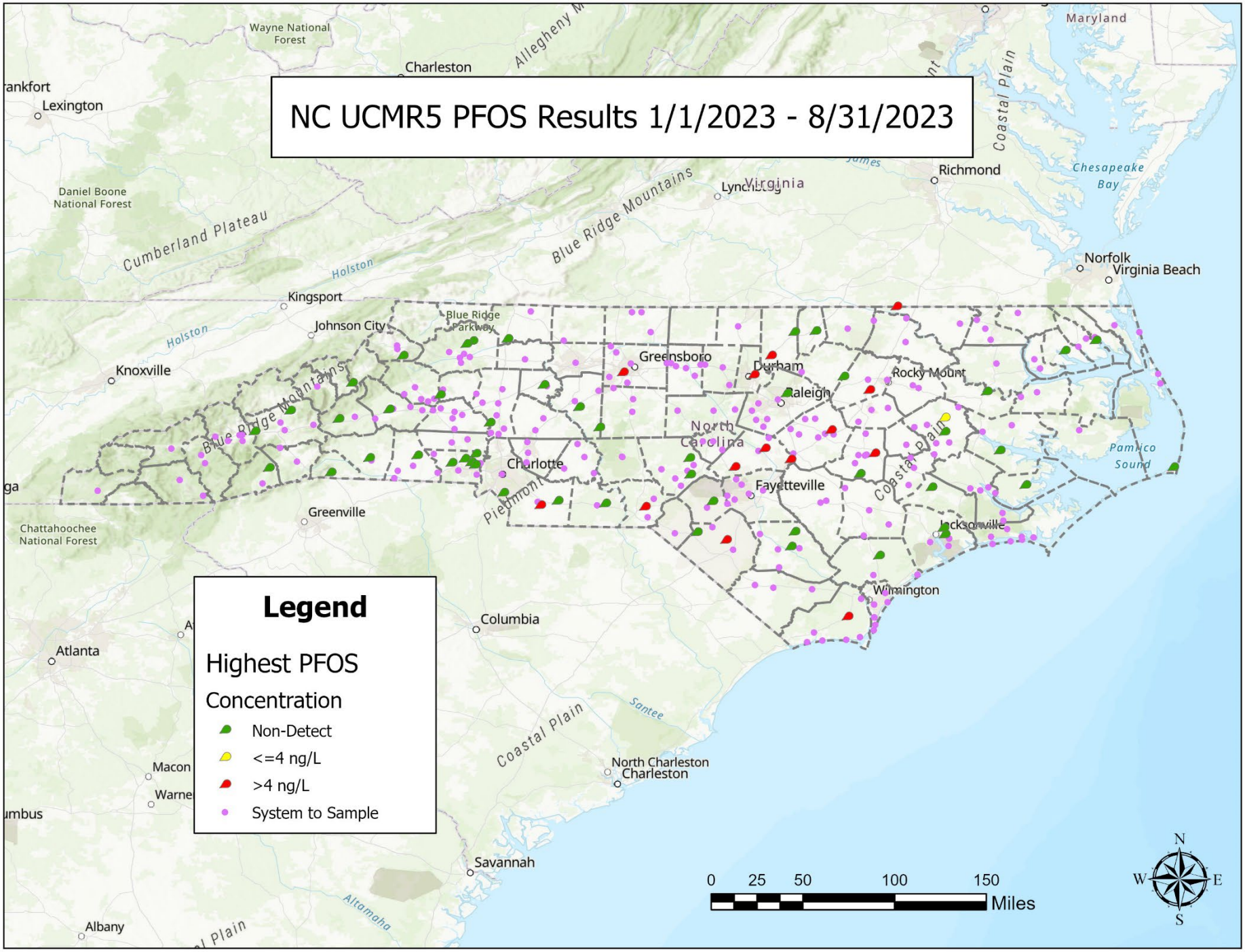
Rocky Mount
North Carolina
Charlotte
Fayetteville
Piedmont
Coastal Plain
Greenville
Chattahoochee National Forest
Columbia
Atlanta
Macon
Warner
Santee
North Charleston
Charleston
Savannah
Altamaha
Albany
Virginia
Lynchburg
Richmond
Chesapeake Bay
Maryland
Norfolk
Virginia Beach
Pamlico Sound
Jacksonville
Wilmington


NC UCMR5 PFOS Results 1/1/2023 - 8/31/2023
Legend
Highest PFOS Concentration
Non-Detect
<=4 ng/L
>4 ng/L
System to Sample
0 25 50 100 150
Miles
N
W
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S
Wayne National Forest
Charleston
Lexington
Daniel Boone National Forest
Cumberland Plateau
Holston
Kingsport
Johnson City
Knoxville
Blue Ridge Parkway
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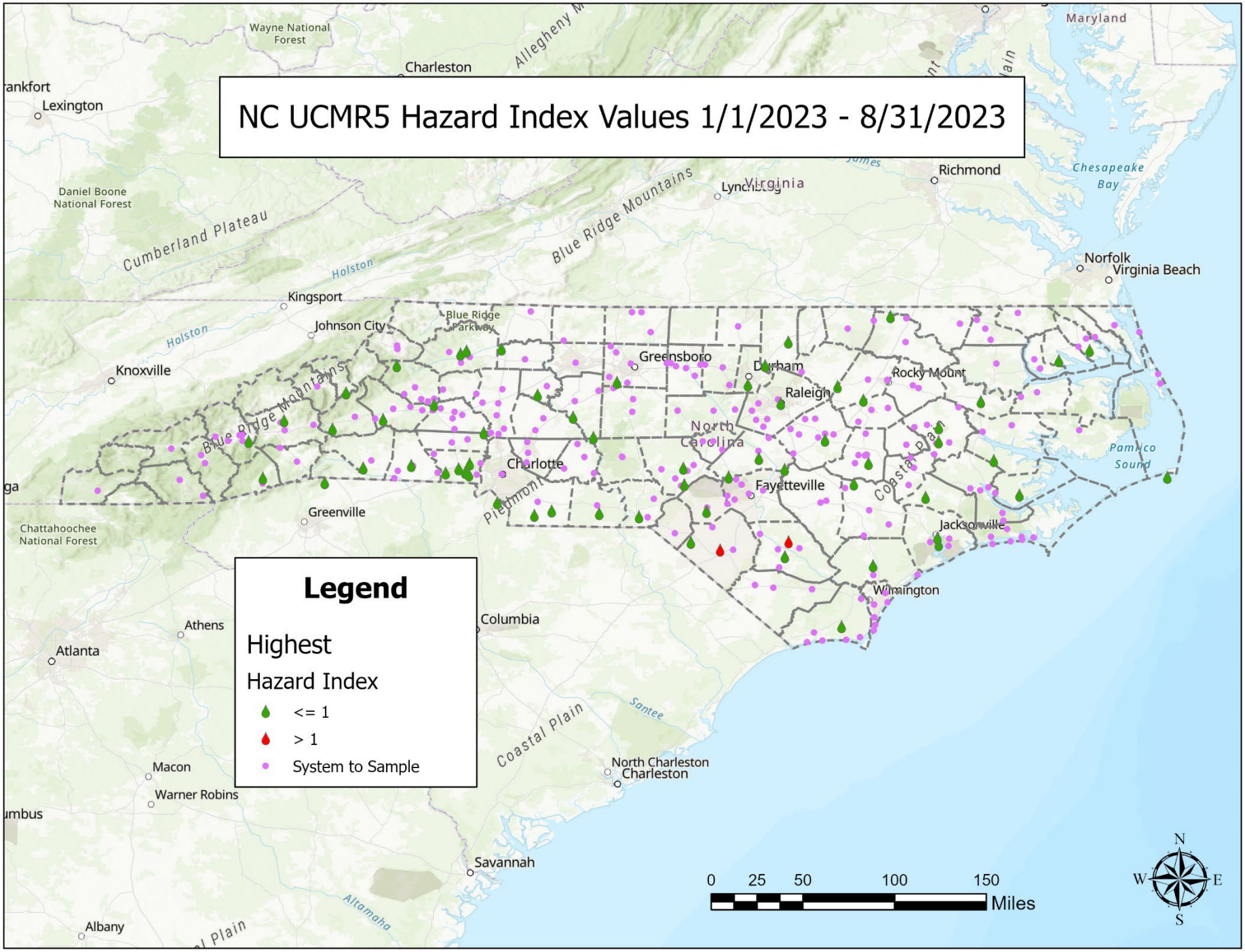
NC UCMR5 Hazard Index Values 1/1/2023 - 8/31/2023
Legend
Highest
Hazard Index
<= 1
> 1
System to Sample
0 25 50 100 150
Miles
N
W
E
S
Wayne National Forest
Charleston
Lexington
Daniel Boone National Forest
Cumberland Plateau
Blue Ridge Mountains
Virginia
Lynchburg
Richmond
Chesapeake Bay
Maryland
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Virginia Beach
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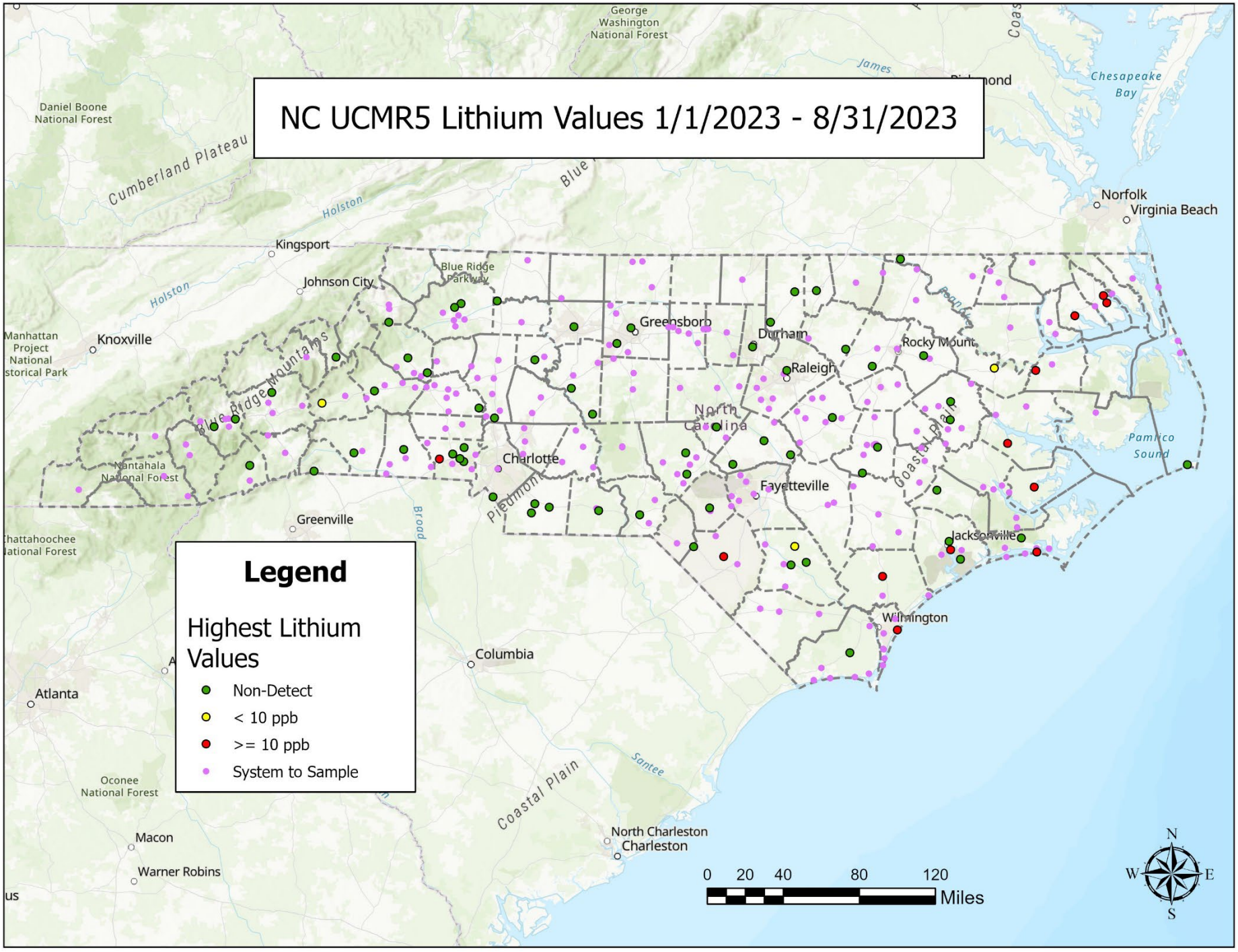
NC UCMR5 Lithium Values 1/1/2023 - 8/31/2023
Legend
Highest Lithium Values
Non-Detect
< 10 ppb
>= 10 ppb
System to Sample
George Washington National Forest
Daniel Boone National Forest
Cumberland Plateau
James
Chesapeake Bay
Norfolk
Virginia Beach
Holston
Kingsport
Johnson City
Blue Ridge Parkway
Knoxville
Manhattan Project National Historical Park
Blue Ridge Mountains
Greensboro
Durham
Raleigh
Rocky Mount
Pamlico Sound
Nantahala National Forest
Charlotte
Piedmont
Fayetteville
Coastal Plain
Greenville
Broad
Jacksonville
Wilmington
Columbia
Atlanta
Oconee National Forest
Santee
Macon
Warner Robins
North Charleston
Charleston
0 20 40 80 120
Miles
N
W
E
S

General Summary of all NC Data

- ~20% of the privately owned systems have results greater than a proposed MCL or HI
- ~30% of the systems sampled in UCMR5 have results greater than a proposed MCL or HI
- We are seeing some exceedances of the HI
- We are finding PFAS other than the 6 contaminants in the proposed regulation

Thank You!

Rebecca Sadosky, Ph.D.

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Department of Environmental Quality
Division of Water Resources

NORTH CAROLINA
Department of Environmental Quality

Proposed MCLs

March 2023: Proposed Maximum Contaminant Levels (MCLs)
Expected to be finalized in late 2023, in effect in 2026.

Compound	**Proposed MCLG**	**Proposed MCL (enforceable levels)**
PFOA	Zero	4.0 parts per trillion (ppt) (also expressed as ng/L)
PFOS	Zero	4.0 ppt
PFNA	1.0 (unitless) Hazard Index	1.0 (unitless) Hazard Index
PFHxS		
PFBS		
HFPO-DA (commonly referred to as GenX Chemicals)		

Proposed MCLs

The proposed rule would also require public water systems to:

- Monitor for these PFAS
  - Community and Non-Transient Non-Community
  - Entry Points (similar to SOCs, VOCs)
- Notify the public of the levels of these PFAS
  - CCR
  - Tier 2 PN
- Reduce the levels of these PFAS in drinking water if they exceed the proposed standards.
  - Running Annual Average

Hazard Index formula:

Hazard Index = (GenX conc/10ppt) + (PFBS conc/2000ppt) + (PFNA conc/10ppt) + (PFHxS conc/9.0ppt)