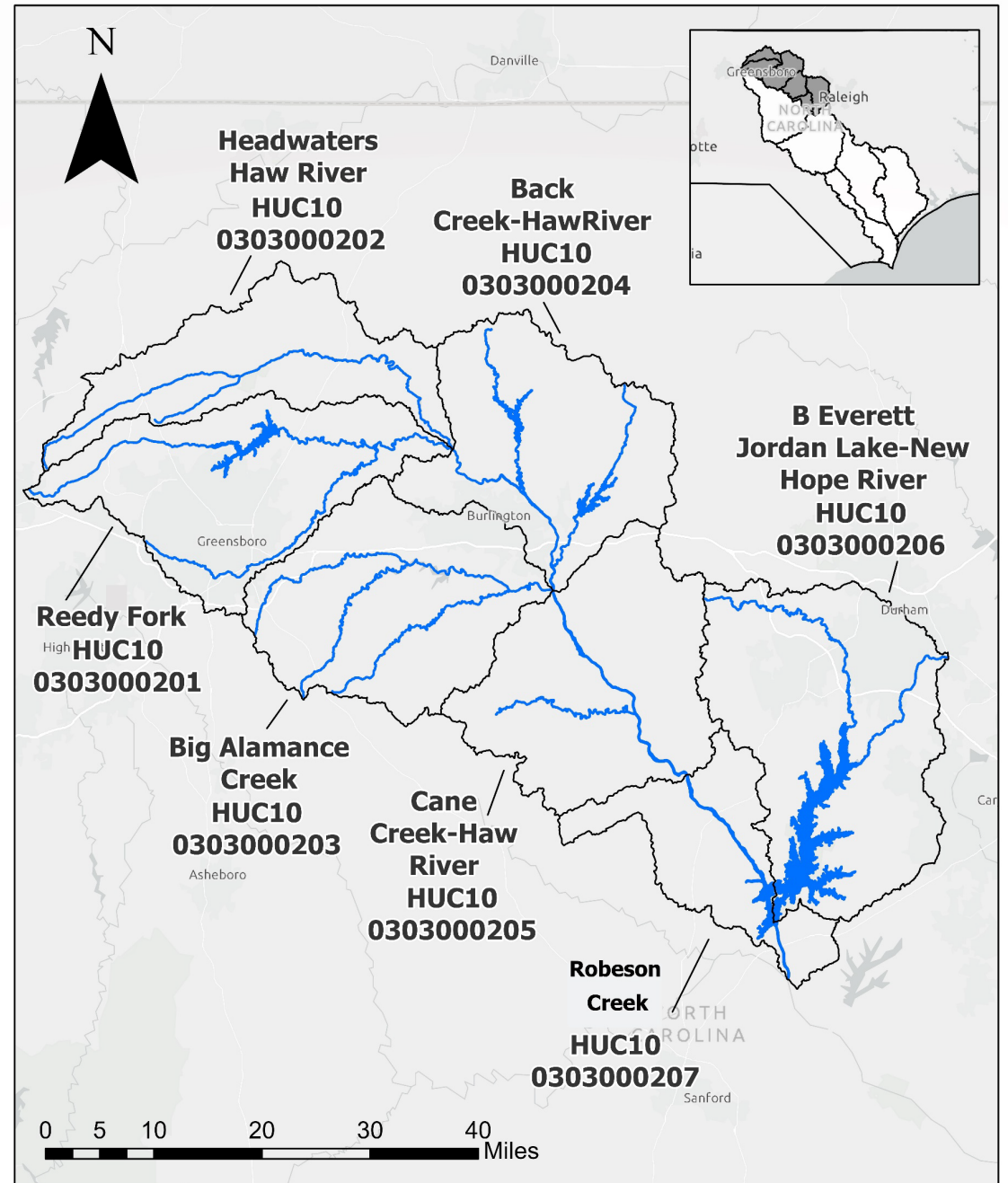


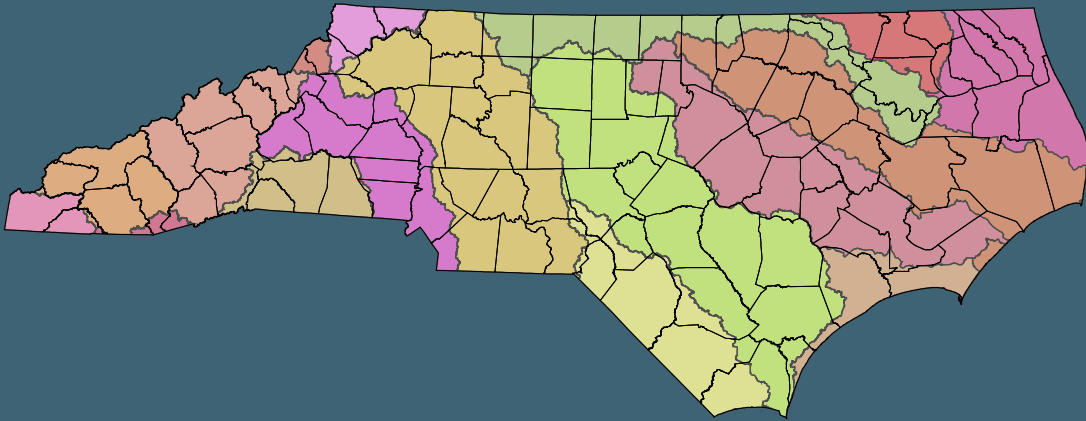
HAW RIVER SUBBASIN

Nora Deamer

DWR, Basin Planning Branch



Basin Planning



General Statute 143-215.8B – *Basinwide water quality management plans*

Watershed-based approach to managing water resources

- Provides a single location to present water quality and quantity related issues
- Considers the cumulative impacts to all activities across a river basin (point and nonpoint sources of pollution)
- Provide that point and nonpoint sources jointly share the responsibility of reducing pollutants to the State's waters
- Report on the goals to reduce nutrients in NSW watersheds
- Basin plan required every 10 years
- **Basin plans are not a rule**

[DWR Basin Planning Branch Website](#)

Basinwide Water Resources Management Plan Outline



Basin Characteristics

- Geography
- Population and land cover
- Pollution Sources



Monitoring Data and Water Quality Assessment

- Overview of biological, chemical and physical parameters



Permitted and Registered Activities

- General descriptions of existing water resource programs



Local Water Quality Initiative and Funding Opportunities

- Descriptions of stakeholder groups and watershed activities



Water Use and Availability

- Summary of water use in the basin



Watershed Chapters (HUC 8)

- Watershed specific information and recommendations



Adding PFAS Chapter



Cape Fear River Basin

Cycle 4 - Water Resources Management Plan

Chapter 6 - Haw River Subbasin

03030002

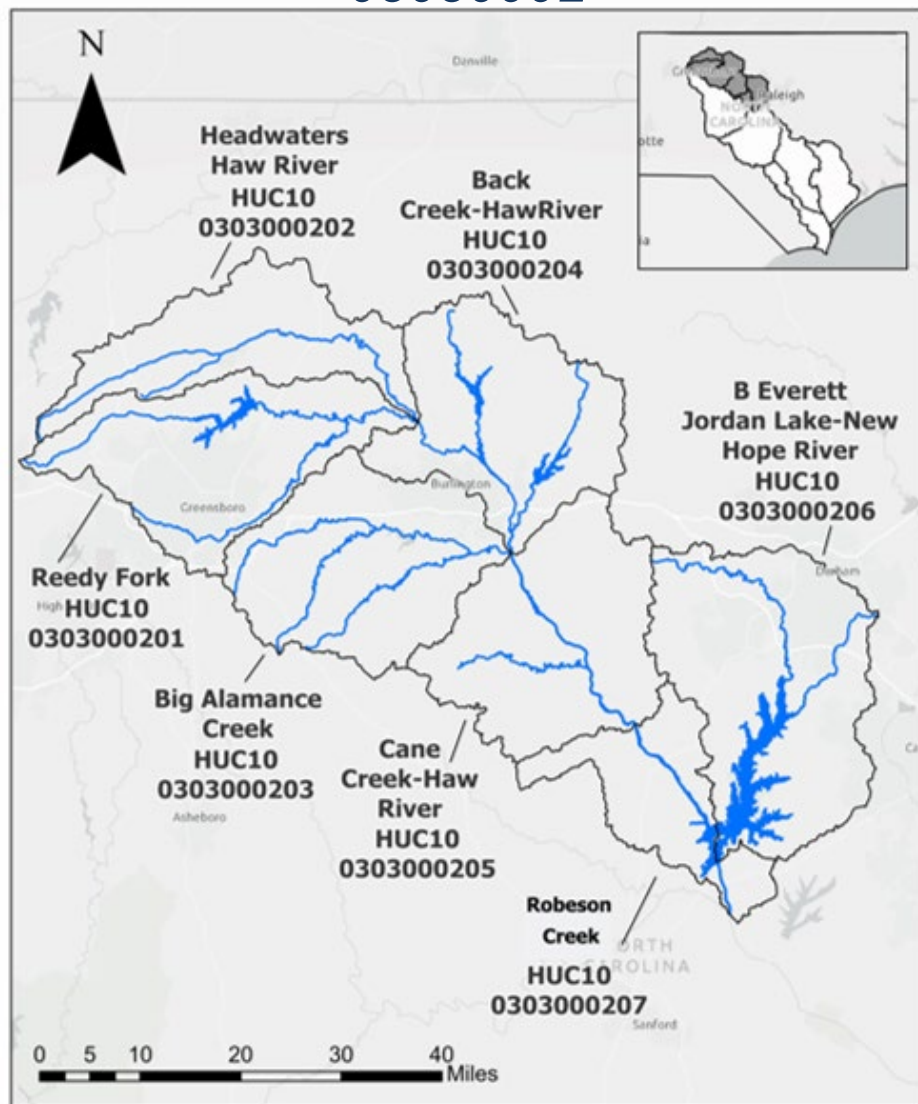
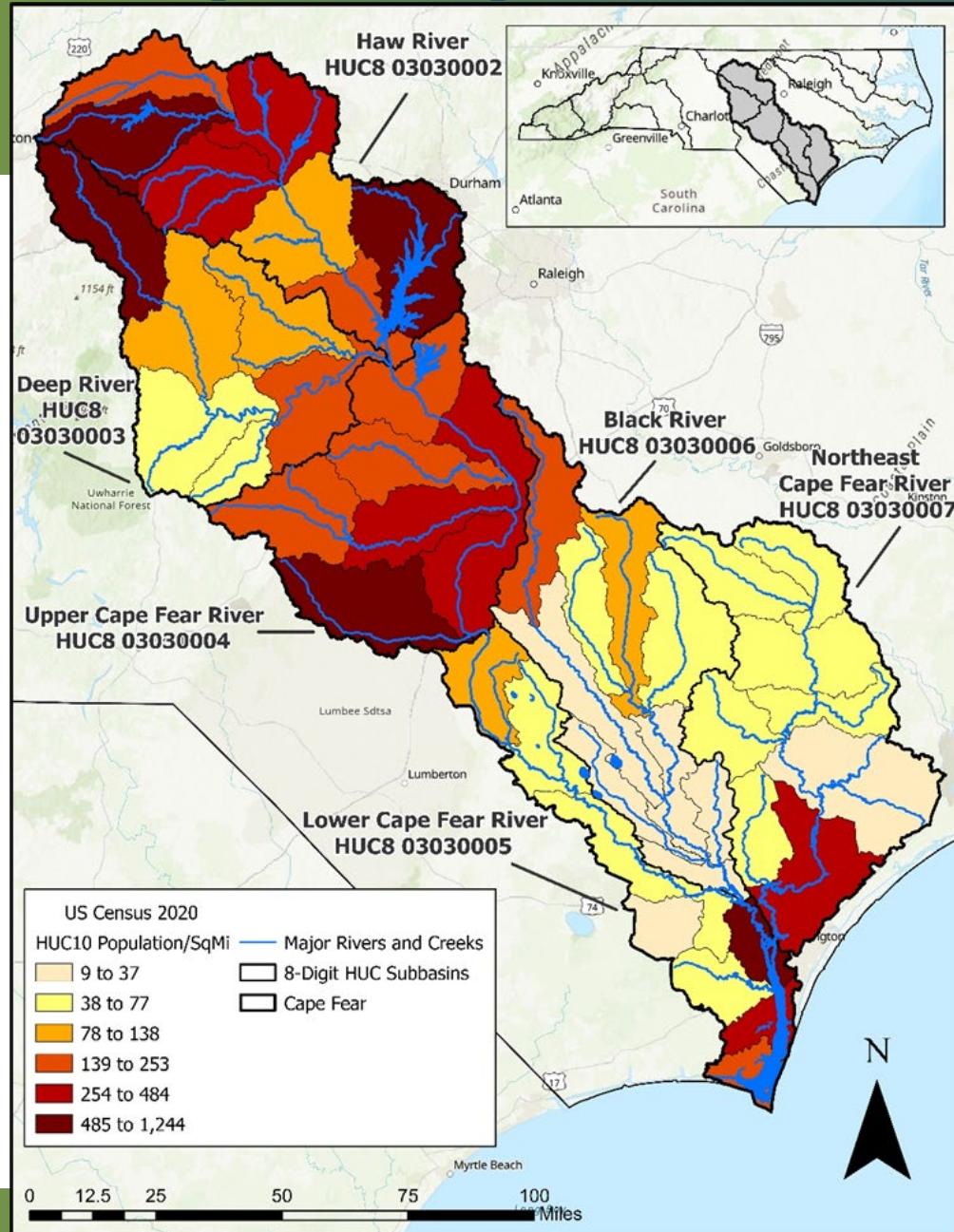


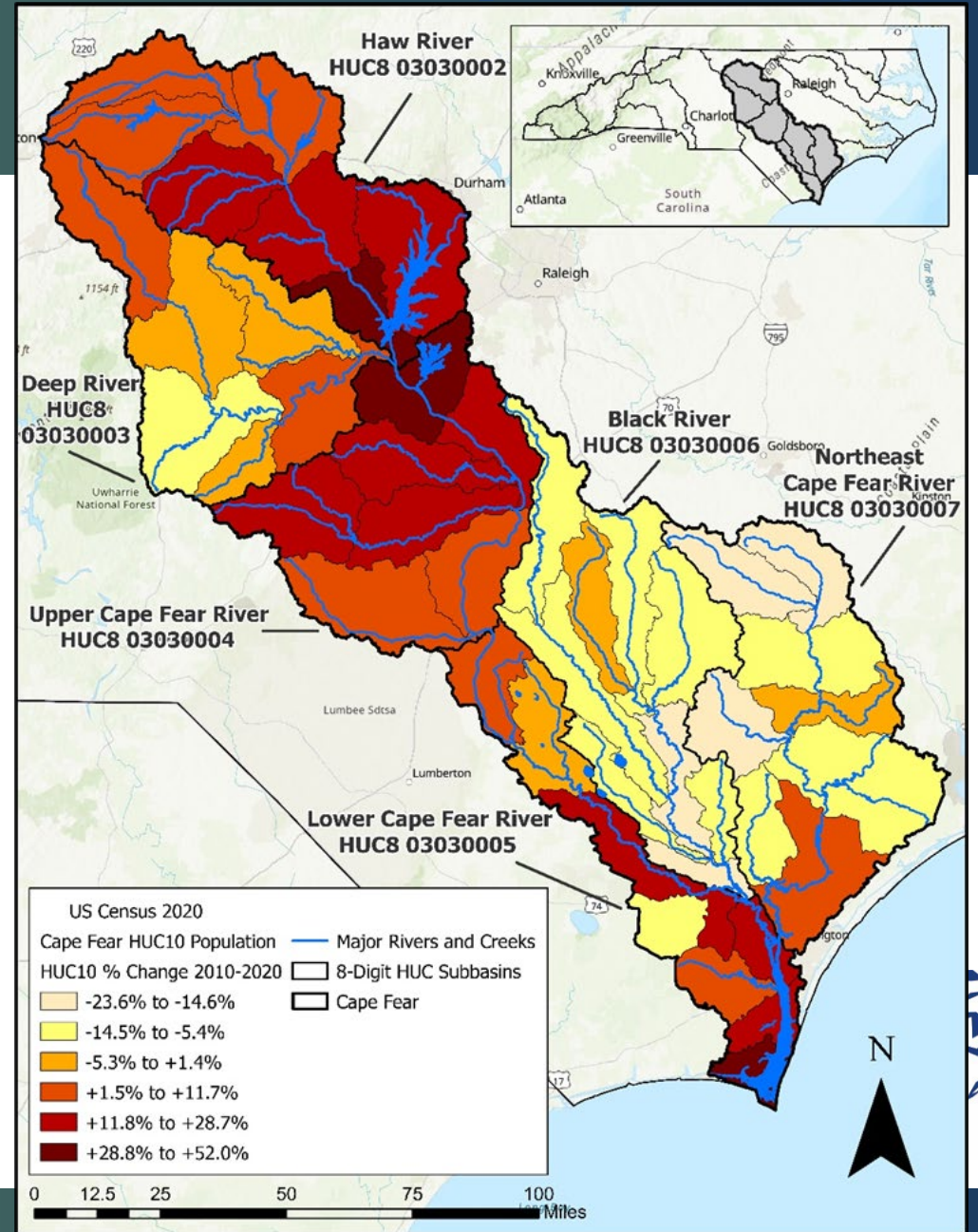
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2020 Census HUC-10 Population/ Square Mile



2020 Census HUC-10 2010-2020 Population Change



Cape Fear River Basin Estimated HUC 8 Subbasin Population

US Census population estimates

8-Digit HUC	Subbasin	2000 Population	2010 Population	2020 Population	2000 - 2010 Pop. Change	2010 - 2020 Pop. Change	Area (Mi ²)	2020 Population per Mi ²
03030002	Haw	696,110	846,200	1,000,759	150,090	154,559	1,708	586
03030003	Deep	265,578	299,359	311,579	33,781	12,220	1,450	215
03030004	Upper Cape Fear	443,889	510,529	577,652	66,640	67,123	1,630	354
03030005	Lower Cape Fear	102,467	139,273	165,663	36,806	26,390	1,061	156
03030006	Black	104,395	111,987	104,199	7,592	-7,788	1,574	66
03030007	Northeast Cape Fear	138,385	167,203	164,048	28,818	-3,155	1,741	94
Total		1,750,824	2,074,551	2,323,900	323,727	249,349	9,165	Ave = 253.6

61% of the 2010-2020 growth occurred in the Haw River Subbasin

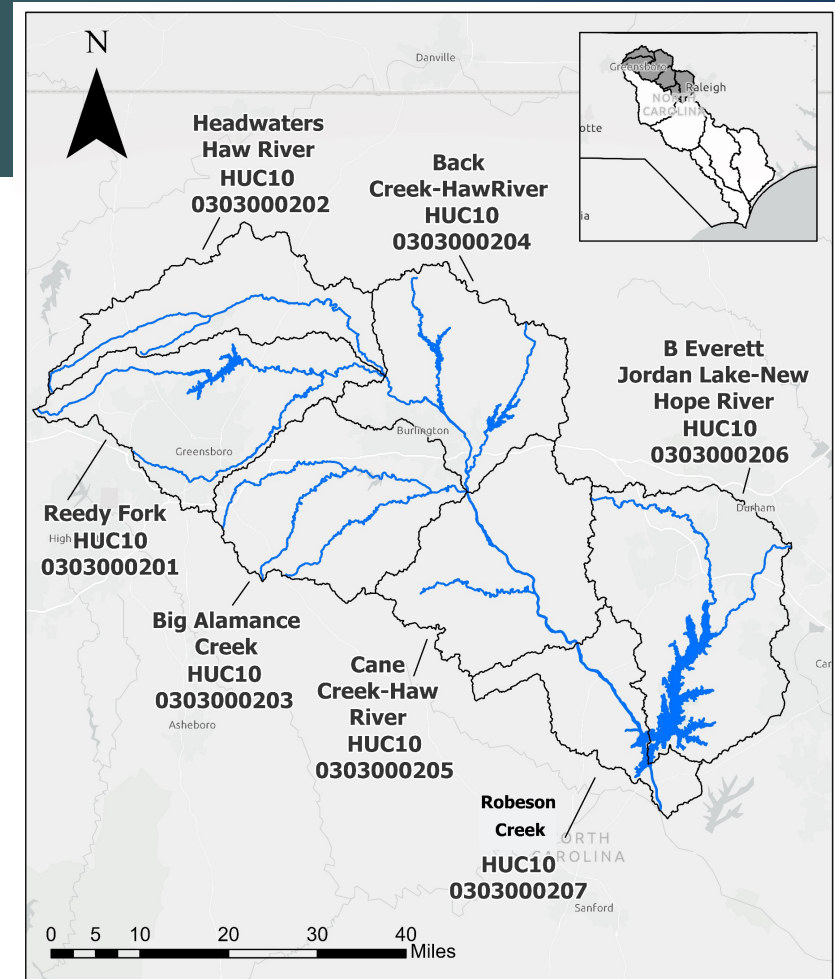
The Haw River Subbasin population makes up 43% of the total Cape Fear River Basin population



Haw River HUC-10 Estimated Population

HUC10 Watershed Name	HUC10	Land Area (mi ²)	Population 2010	Population 2020	Population Density 2020 (pop/mi ²)	2010 - 2020 Pop. Change
Reedy Fork	0303000201	255	289,956	317,346	1,244	+27,390
Headwaters Haw River	0303000202	189	38,246	41,423	219	+3,177
Big Alamance Creek	0303000203	262	97,745	114,243	436	+16,498
Back Creek-Haw River	0303000204	251	79,245	88,529	353	+9,284
Cane Creek-Haw River	0303000205	270	31,333	37,292	138	+5,959
B Everett Jordan Lake-New Hope River	0303000206	343	294,770	379,273	1,106	+84,503
Roberson Creek-Haw River	0303000207	137	14,905	22,653	165	+7,748
Haw River Subbasin Total		1,707	846,200	1,000,759	586	+154,559

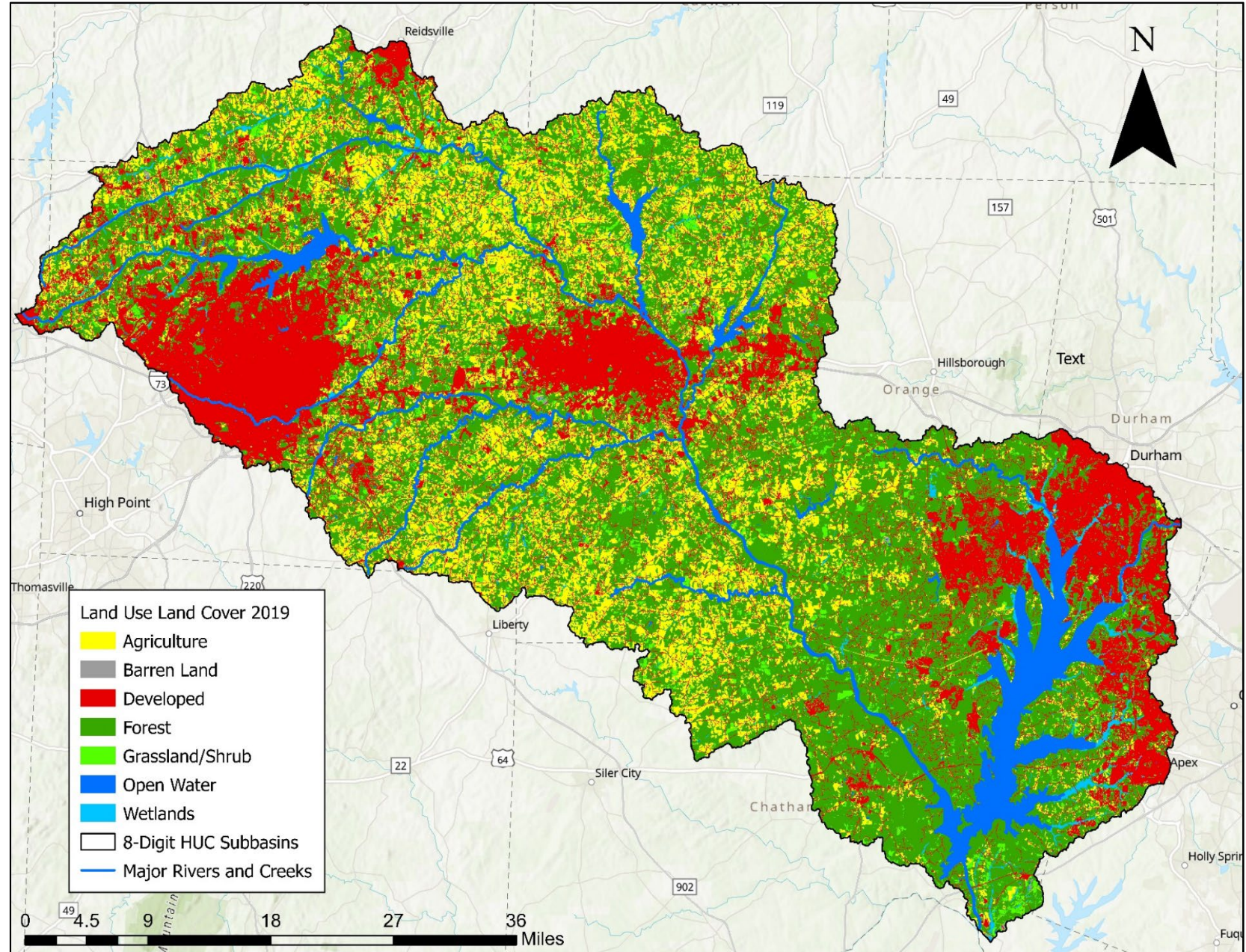
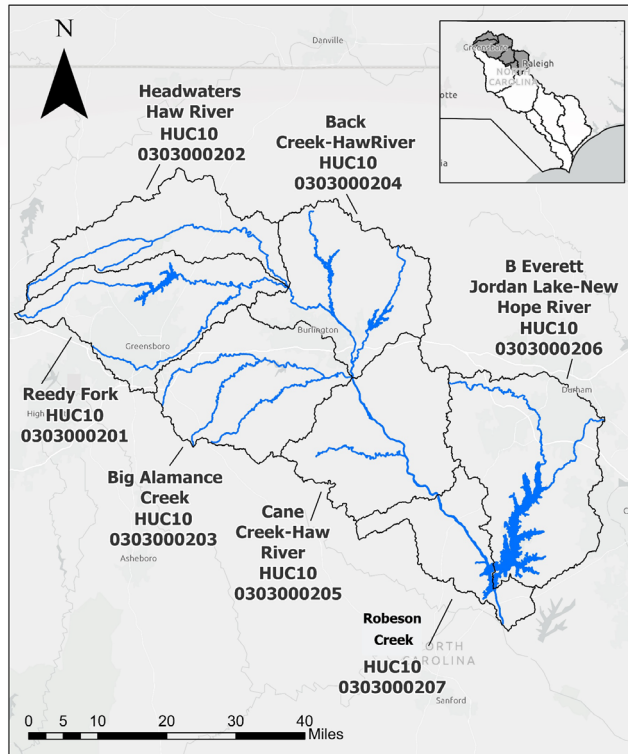
Table data is from NC One Map US Census Block Data for 2010 and Esri Living Atlas for 2020 USA Census Redistricting Blocks processed for Cape Fear River Basin HUC10s.



54.7% of the growth in the Haw River Subbasin occurred in the New Hope/Jordan Lake subwatershed

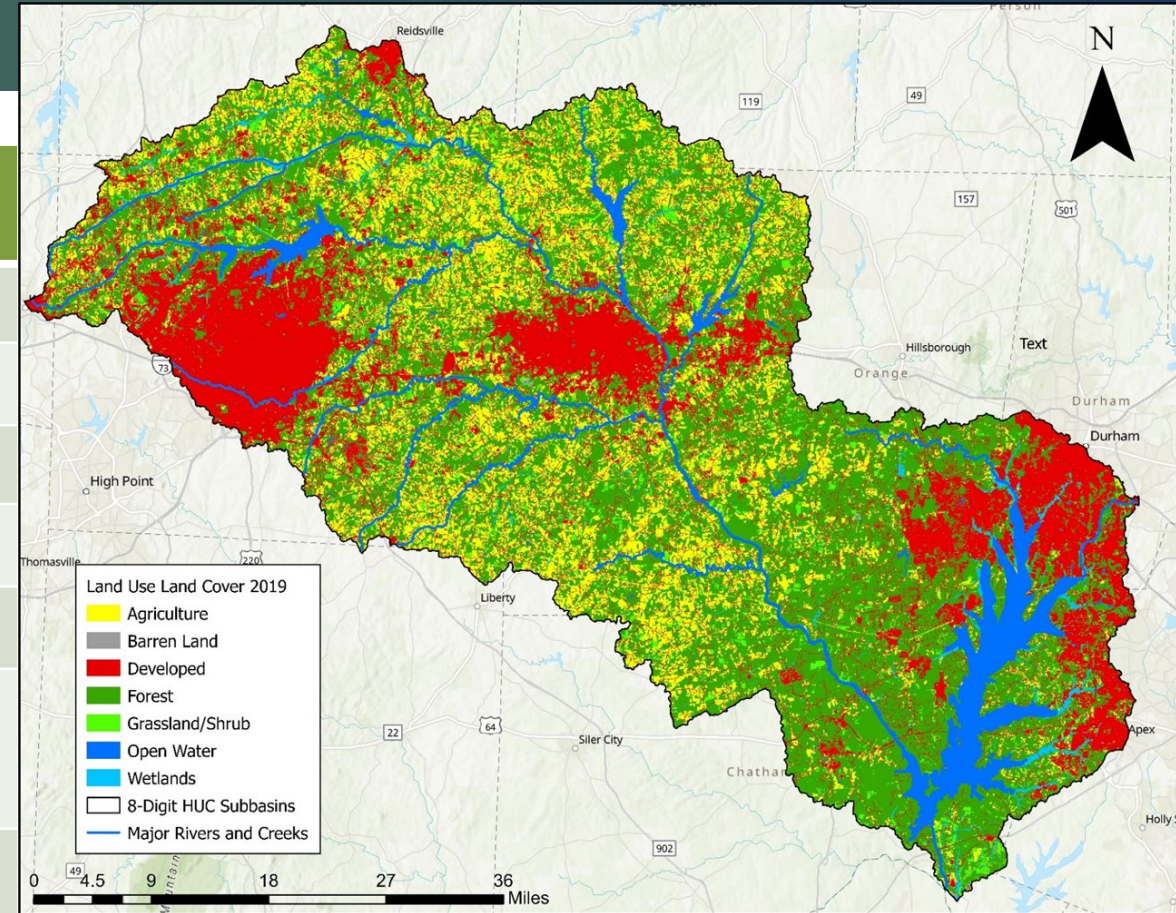
Land Cover Change: 2001-2020

- 3.3% *increase* in **Developed**
- 3% *decrease* in **Forest**
- 2% *decrease* in **Agriculture**
- 1.5% *increase* in **Grassland**



Land Use Land Cover (2019 NLCD)

Watershed	Land Area (mi ²)	Agriculture	Barren Land	Developed	Forest	Grassland Shrub	Open Water	Wetlands
Reedy Fork	255	15.9%	0.0%	47.2%	30.8%	2.7%	2.3%	1.1%
Headwaters Haw River	189	30.7%	0.1%	15.2%	44.6%	4.1%	1.7%	3.7%
Big Alamance Creek	262	26.6%	0.1%	23.3%	44.6%	3.6%	1.4%	0.4%
Back Creek-Haw River	251	28.1%	0.1%	19.1%	46.5%	4.0%	2.0%	0.4%
Cane Creek-Haw River	270	27.4%	0.0%	9.3%	57.5%	4.4%	1.1%	0.3%
B Everett Jordan Lake-New Hope River	343	4.7%	0.2%	34.4%	46.6%	2.6%	6.4%	5.1%
Roberson Creek-Haw River	137	7.5%	0.2%	10.9%	72.1%	5.7%	2.5%	1.1%



¹Data was downloaded from the Multi-Resolution Land Characteristics NLCD website and processed for each Cape Fear River Basin HUC8s in 2022.

² Barren Land is a catch-all category for tilled land, new development, cutover, bare rock areas.



Permits, as of May 2022:

- **274 NPDES wastewater**

- 11 Majors
- 54 Minors
- 209 Single Family (not shown on map)

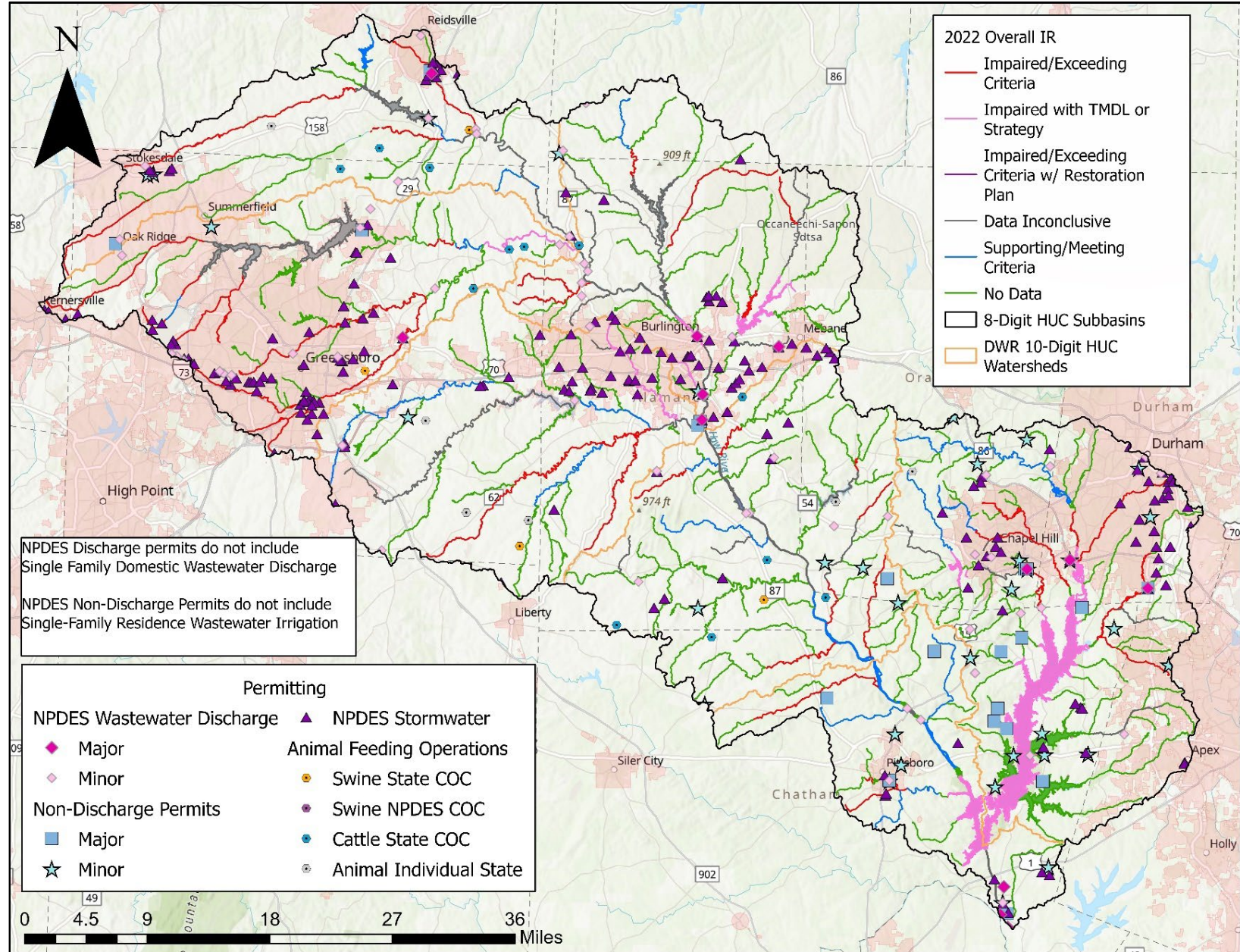
- **276 non-discharge and land application**

- 21 Majors
- 33 Minors
- 222 Single Family (not shown on map)

- **202 NPDES stormwater**

- **49 state stormwater** (not shown on map)

- **23 animal feeding operation**



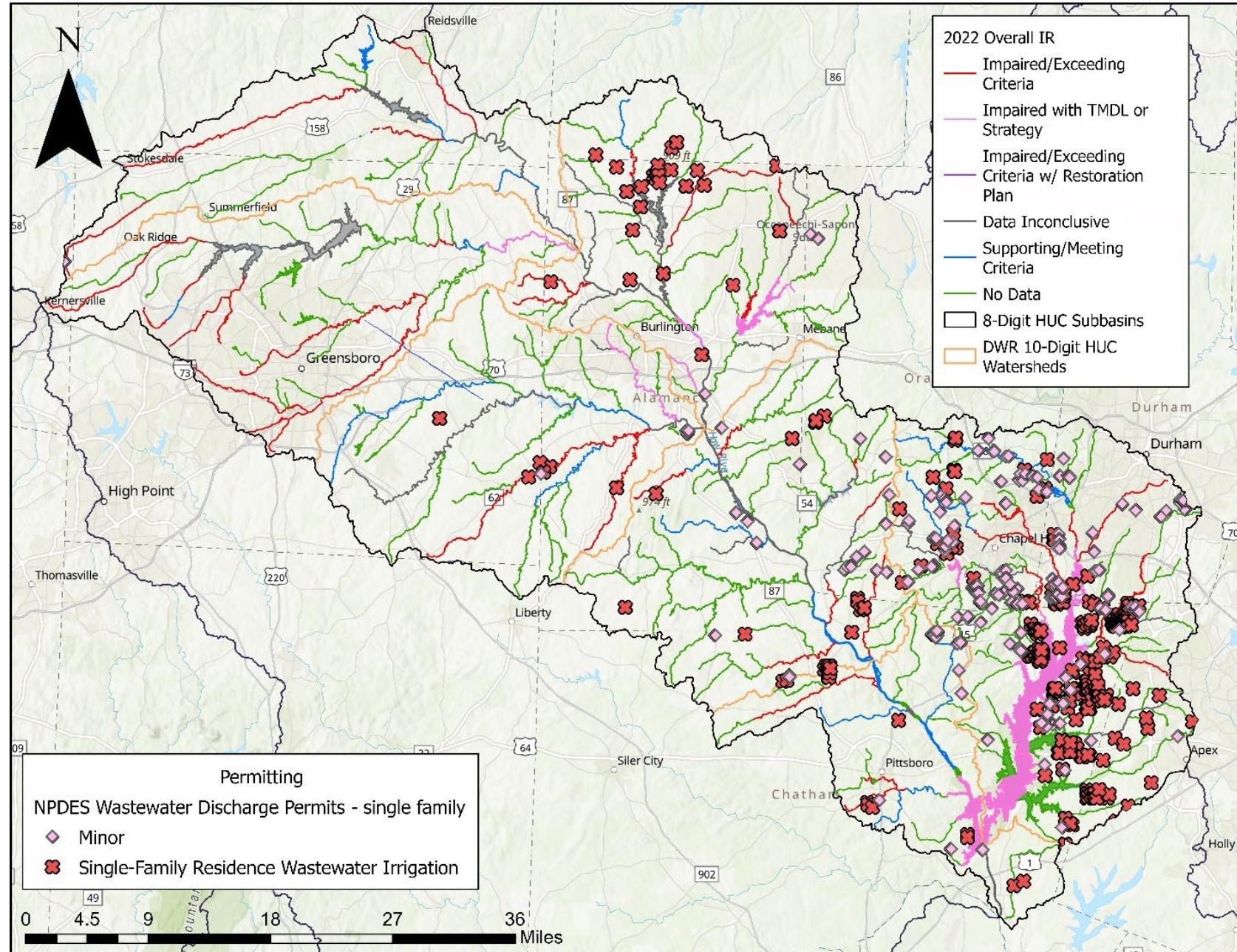
Permits, as of May 2022:

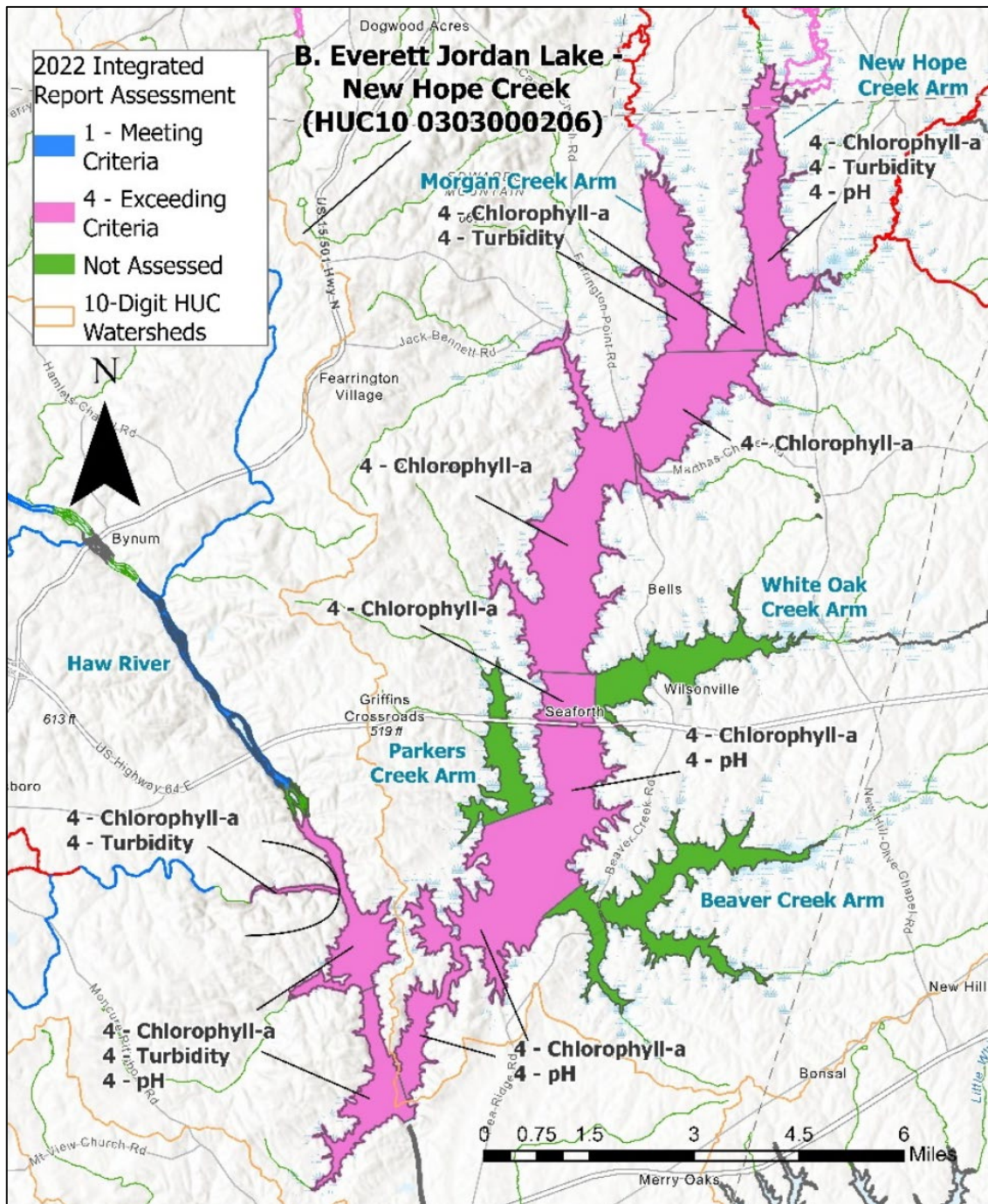
- **274 NPDES wastewater**

- 11 Majors (not shown on map)
- 54 Minors (not shown on map)
- 209 Single Family (◇)

- **276 non-discharge and land application**

- 21 Majors (not shown on map)
- 33 Minors (not shown on map)
- 222 Single Family (✕)





- Jordan Lake exceeding criteria for Chlorophyll-*a*, pH, and Turbidity



- Due to water quality concerns, the EMC declared Jordan lake as nutrient sensitive waters (NSW) in 1983.
- Jordan Lake has been consistently classified as Eutrophic or Hypereutrophic.

- The 2022 IR found over **50%** of the monitored **FW miles** (308.5 miles) and **71%** of the monitored **FW acres** (11,376 acres) **were exceeding NC surface water criteria.**
- Many of the impairments were associated with urban areas, although several impairments also occurred in more rural areas.

Assessment Unit ¹	Map Color	FW Miles	FW Acres
Total	All Colors Combined	1,307.0	19,144.2
Total Monitored	Combined Blue, Gray, Red, and Pink	582.7 (44.8%)	16,034.5 (83.8%)
Not Monitored	Green	724.3	3,109.7
Meeting Criteria (Category 1)	Blue	139.5	176.4
Data Inconclusive (Category 3)	Gray	134.7	4,482.3
Exceeding Criteria 303(D) (Category 5)	Red	277.0	107.2
Exceeding Criteria with TMDL (Category 4)	Pink	31.5	11,268.6
Exceeding Criteria (Combined Category 4 and 5)	Combined Red and Pink	308.5	11,375.8
% Exceeding of Monitored Exceeding (Combined Category 4 and 5)	Combined Red and Pink / Total	52.9%	70.9%

¹All waterbodies in North Carolina are impaired for Fish Tissue Mercury and are not included on this table.

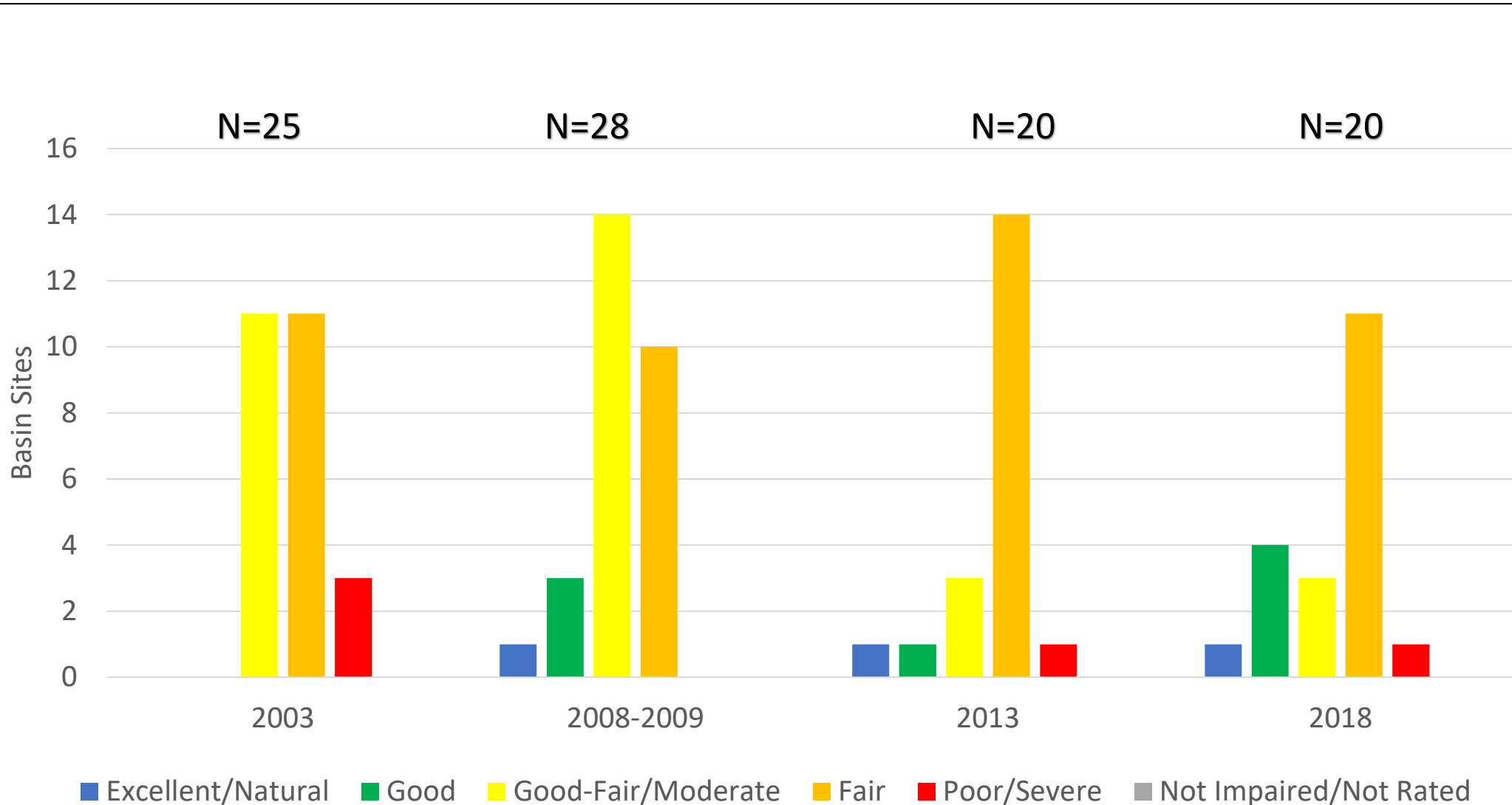
2022 IR PARAMETER (Category 4 and 5 Combined)	FW Miles	FW Acres
Aquatic Passage	8.6	0.0
Benthos (Nar, AL, FW)	222.6	0.0
Chlorophyll <i>a</i> (40 µg/l, AL, NC)	11.3	11,460.5
Copper (7 µg/l, AL, FW)	25.7	0.0
Copper Dissolved Chronic (Calculated, AL, FW)	5.6	0.0
Dissolved Oxygen (4 mg/l, AL, FW)	7.0	0.0
Fecal Coliform Bacteria (GM 200/400, REC, FW)	56.1	0.0
Fish Community (Nar, AL, FW)	70.8	0.0
Hydraulics	8.6	0.0
pH (9.0, AL, FW)	0.0	2,761.9
Total Nitrogen	0.0	11,375.9
Total Phosphorus	0.0	11,375.9
Total Suspended Solids	3.9	3,644.9
Turbidity (25 NTU, AL, FW acres)	0.0	3,752.1
Turbidity (50 NTU, AL, FW miles)	14.8	0.0
Zinc (50 µg/l, AL, FW)	14.6	0.0

Biological Data for Watershed Health

- Biological communities are highly sensitive to changes in water quality and **can reflect both long- and short-term environmental conditions.**
- Survey results and the presence of pollution tolerant and/or intolerant benthos species are used to calculate an **Index of Biotic Integrity (IBI) score.**
 - Benthos and fish community survey information is collected on species richness (i.e., diversity), abundance, and composition, as well as site specific conditions, such as stream habitat, physical water quality parameters, stream width, and flow regime.

Haw River **Benthos** (Benthic Macroinvertebrates)

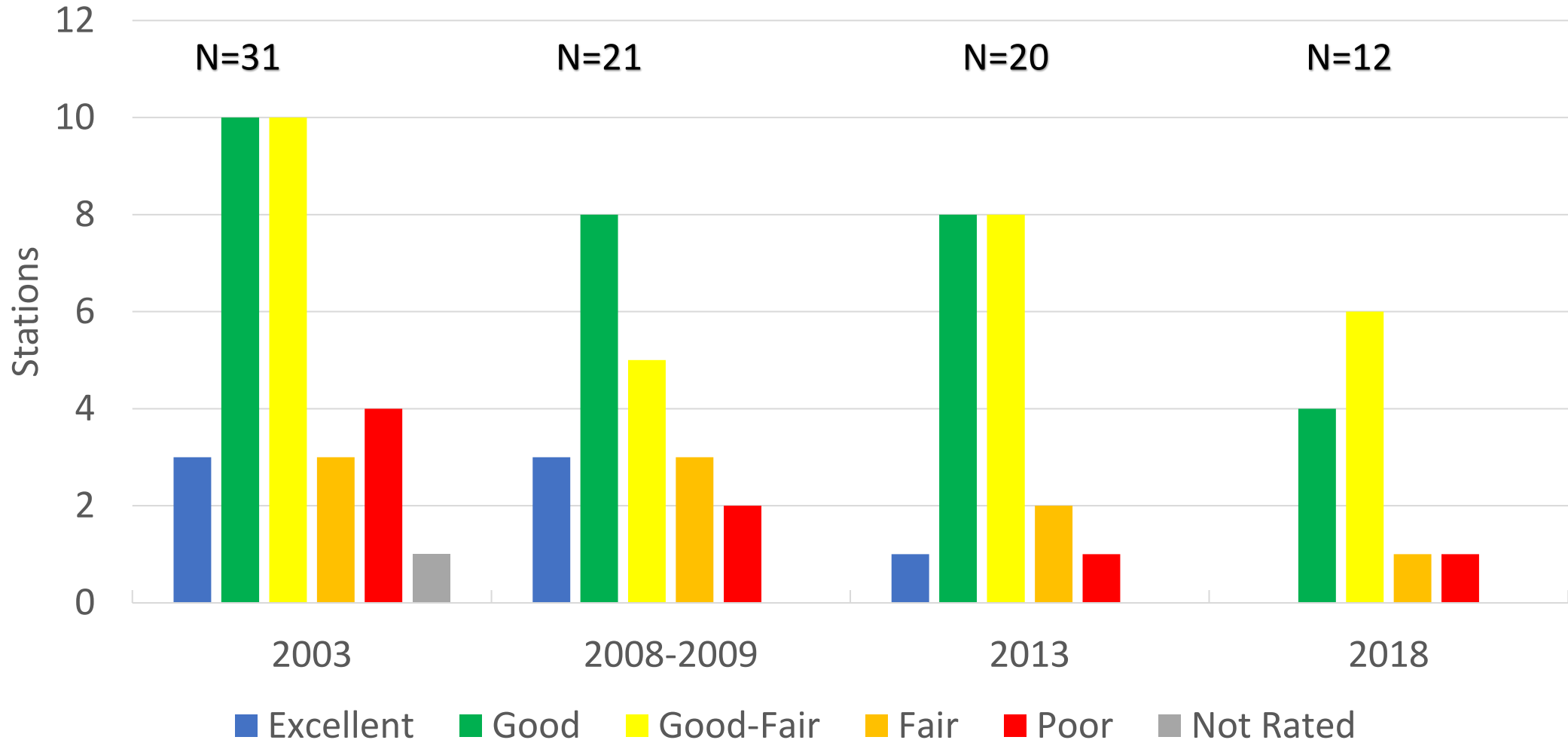
Bioclassification Ratings 2003, 2008-2009, 2013, and 2018 for Basin Sites



223 miles
Impaired
for
Benthos in
the Haw
River
Subbasin
-
57% of
total CFR
Basin

Haw River Fish Community

Bioclassification Ratings 2003-2004, 2008-2009, 2013, and 2018



70.8 miles
Impaired
for Fish
Community
in the Haw
River
Subbasin
-
55% of total
CFR Basin

Haw River Watershed Water Quality Means for 2016-2020 (2022 IR period)

(DWR and Coalition ambient surface water data)

Watershed HUC 10	Watershed Name	Number of Stations [^]	pH	DO (mg/L)	Conductivity (µS/cm)	NH3 (mg/L)	TKN (mg/L)	NOx (mg/L)	TN (mg/L)	TP (mg/L)	Turbidity (NTU)	TSS (mg/L)	Fecal Coliform (cfu/100 mL)
Highest HUC 8 in Cape Fear River Basin					711	0.09	0.92	1.34	2.10	0.21	20.19	22.90	1,093
Highest HUC 10 in Cape Fear River Basin					1,413	0.27	1.44	2.62	3.48	0.38	26.63	26.64	2,478
03030002*	HUC8 Haw River Watershed	35	7.20	8.27	222	0.06	0.77	1.34	2.10	0.13	20.19	22.90	749
0303000201	Reedy Fork	7	7.23	8.47	270	0.10	0.84	2.53	3.35	0.19	12.92		947
0303000202	Headwaters Haw	6	6.95	8.30	110	0.04	0.58	0.40	0.98	0.06	20.76		429
0303000203	Big Alamance Creek	2	7.07	7.62	164	0.04	0.73	0.45	1.19	0.11	20.85		1,056
0303000204	Back Creek-Haw	8	7.31	8.57	248	0.07	0.84	1.39	2.23	0.16	21.38		983
0303000205	Cane Creek-Haw	2	7.38	9.01	217	0.04	0.89	1.23	2.12	0.11	23.61		848
0303000206	B Everett Jordan Lake-New Hope	6	7.11	7.52	275	0.05	0.75	1.45	2.19	0.14	26.63	26.64	732
0303000207	Robeson Creek-Haw*	7	7.41	8.61	176	0.05	0.82	0.80	1.61	0.09	17.27	15.85	313
Healthy Piedmont Stream [#]													
					12-90	0.05		0.30	0.80	0.05			
EPA Nutrient Criteria - Piedmont ⁺													
									0.70	0.038			

The data means do not include DWR-ISB lake station data. Robeson Creek watershed includes an AMS station in the backwaters of Jordan Lake.

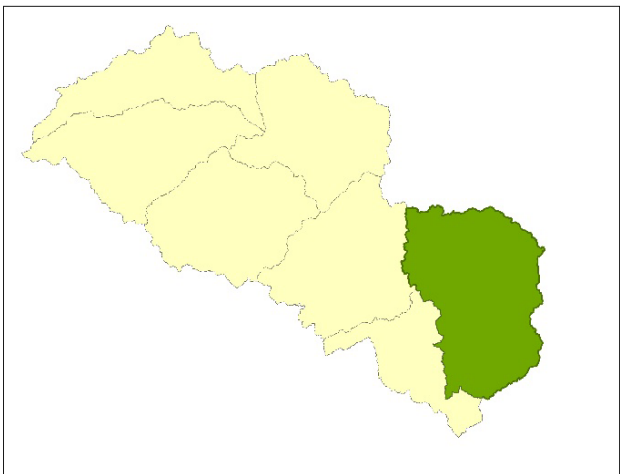
Haw River Subbasin Watershed Plans

HUC8	HUC12	Watershed Plan	Plan Year	Plan Developer(s)
03030002	0603	Bolin Creek Watershed Restoration Plan	2012	Town of Chapel Hill, Town of Carrboro
03030002	0602	Durham Third Fork Creek Watershed Management Plan	2012	City of Durham
03030002	0703	Robeson Creek Watershed Restoration Plan	2013	Robeson Creek Watershed Council
03030002	0604, 0605	Northeast and Crooked Creek 9-Element Checklist	2013	City of Durham
03030002	0404, 0303, 0302	Little Alamance, Travis and Tickle Creek 9-Element Checklist	2015	Piedmont Triad Regional Council
03030002	0607, 0303	Morgan Creek and Little Creek 9-Element Plan Checklist	2015	NC Ecosystem Enhancement Program, Triangle Council of Governments
03030002	0601, 0603, 0604	New Hope Creek & Little Creek Watershed Improvement Plan	2021	City of Durham
03030002	0701	Dry Creek Watershed Plan	2023	Triangle J Council of Governments

Total Maximum Daily Loads - [TMDL Webpage](#)

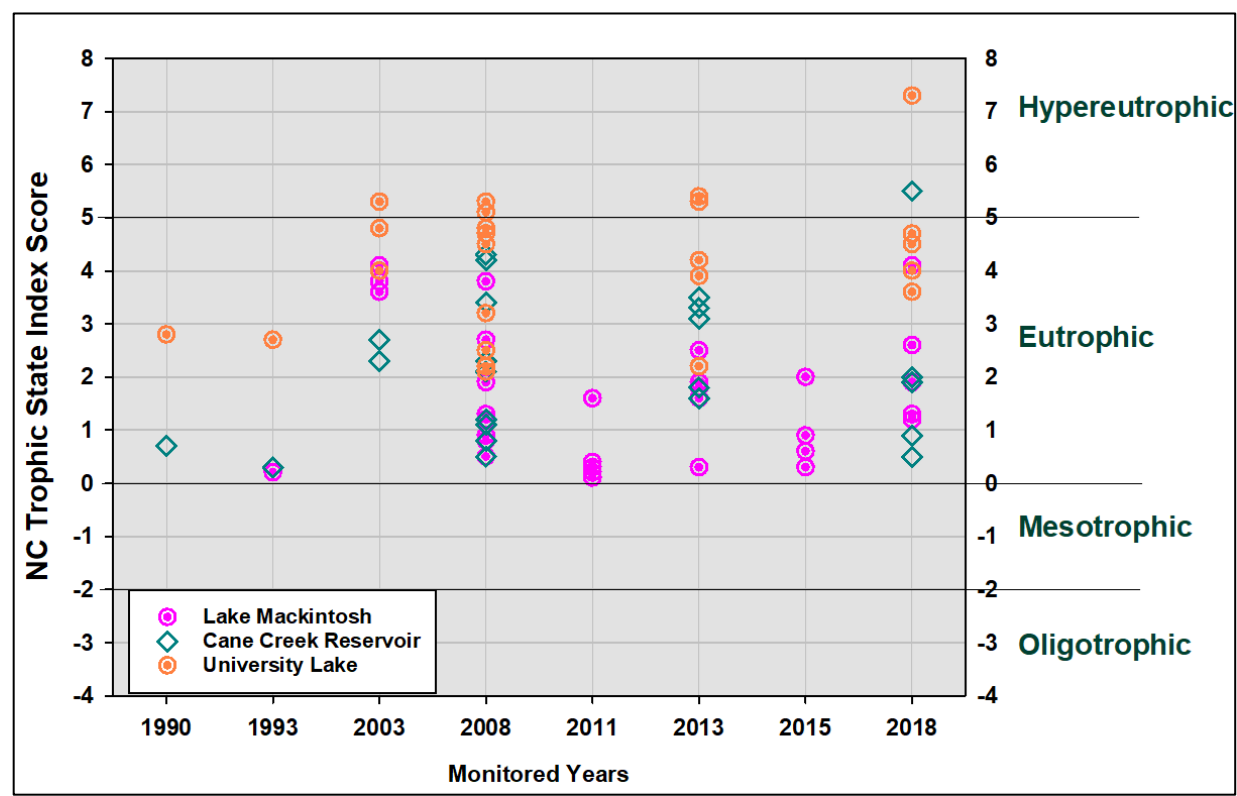
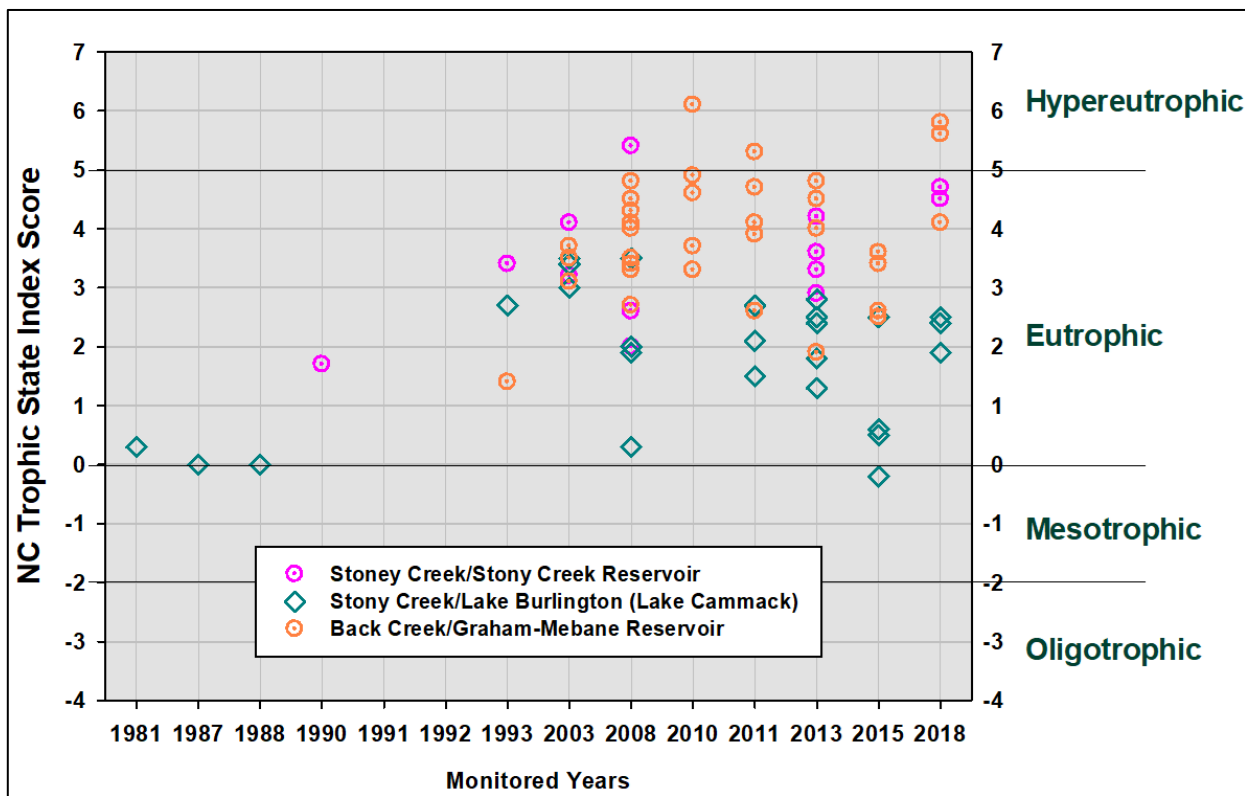
HUC 10 Watershed 0303000 +	Stream Name	Assessment Unit #	Parameter of Concern	Percent Reduction	Date Approved	Stream Length (mi/ac)	Classification + NSW
201 (Reedy Fork)	Reedy Fork	16-11-(9)b	Fecal Coliform	77	7/9/2018	8.6	WS-V
	North Buffalo Creek	16-11-14-1b	Cyanide	*	9/16/1997	8.1	WS-V
	North Buffalo Creek	16-11-14-1a1, 16-11-14-1a2	Fecal Coliform	MS4-96; NPS-93	4/28/2004	8.7	WS-V
	South Buffalo Creek	16-11-14-2c	Fluoride, Cyanide, Selenium	*	9/16/1997	4.8	WS-V
202 (Headwaters Haw River)	Haw River	16-(10.5)b formerly # 16-(1)d1	Fecal Coliform, Turbidity	77 61	1/11/2005	1.3	WS-V
	Little Troublesome Creek	16-7-(1)b 16-7-(2)	Cyanide, Lead, Cadmium, Chromium, Total Residual Chlorine, Fluoride, Methylene-Blue-AS (MBAS)	*	9/16/1997	5.9	WS-V; WS-IV
	Little Troublesome Creek	16-7-(1)a, 16-7-(1)b, 16-7-(2)	Fecal Coliform	40	5/17/2002	9.5	WS-V; WS-V; WS-IV
204 (Back Creek)	Haw River	16-(10.5)c, 16-(10.5)d	Fecal Coliform, Turbidity	77 61	1/11/2005	1.3	WS-V
	Back Creek (Graham- Mebane Reservoir)	16-18-(1.5)a1, 16-18-(1.5)a2a, 16-18-(1.5)a2b, 16-18-(1.5)b	Total Phosphorus, Total Nitrogen	TN-8; TP-5	9/28/2010		WS-II, HQW, CA
	Town Branch	16-17	Fecal Coliform		9/16/2002		WS-V
205 (Cane Creek)	Cane Creek (Cane Creek Reservoir)	16-27-(2.5)b	Total Phosphorus, Total Nitrogen	TN-8; TP-5	9/28/2010		WS-II, HQW, CA
207 (Robeson Creek)	Roberson Creek	16-38-(5), 16-(37.5)b	Total Phosphorus	71	1/13/2004	0.6	WS-IV, CA

Total Maximum Daily Loads



HUC 030300206 Jordan Lake/New Hope Watershed Stream Name	Assessment Unit #	Parameter of Concern	Percent Reduction	Date Approved	Stream Length (miles)	Classification + NSW
Third Fork Creek	16-41-1-12-(2)	Turbidity	53	1/11/2005	3.6	WS-IV
Jordan Lake	16-(37.3), 16-(37.5)a, 16-(37.5)b,	Total Phosphorus, Total Nitrogen	TN-8; TP-5	9/20/2007		WS-IV, B, CA
Jordan Lake	16-41-(0.5), 16-41-(3.5)a, 16-41-1-(14), 16-41-2-(9.5)	Total Phosphorus, Total Nitrogen	TN-35; TP-5	9/20/2007		WS-IV, CA
Jordan Lake: Haw River area	16-(37.3), 16-(37.5)a, 16-(37.5)b,	High pH,	TN-8; TP-5	4/3/2014		WS-IV, B, CA
Jordan Lake: Morgan Cr. Area	16-41-2-(9.5)	High pH,	TN-35; TP-5	4/3/2014		WS-IV, CA
Jordan Lake: Haw River area	16(37.3), 16-(37.5)a, 16-(37.5)b,	Turbidity	TN-8; TP-5	4/3/2014		WS-IV, B, CA
Jordan Lake: Morgan Cr. area New Hope Cr. Area	16-41-1-(14), 16-41-2-(9.5)	Turbidity	TN-35; TP-5	4/3/2014		WS-IV, CA
Morgan Creek (University Lake)	16-41-2-(1.5)	Total Phosphorus, Total Nitrogen	TN-35; TP-5	9/28/2010		WS-II, HQW, CA
Northeast Creek	16-41-1-17-(0.7)a, 16-41-1-17-(0.7)b1, 16-41-1-17-(0.7)b2	Fecal Coliform	92-94	9/12/2003	7.4	WS-IV

Eutrophication occurring in other reservoirs in the Haw River watershed



Questions



Nora Deamer

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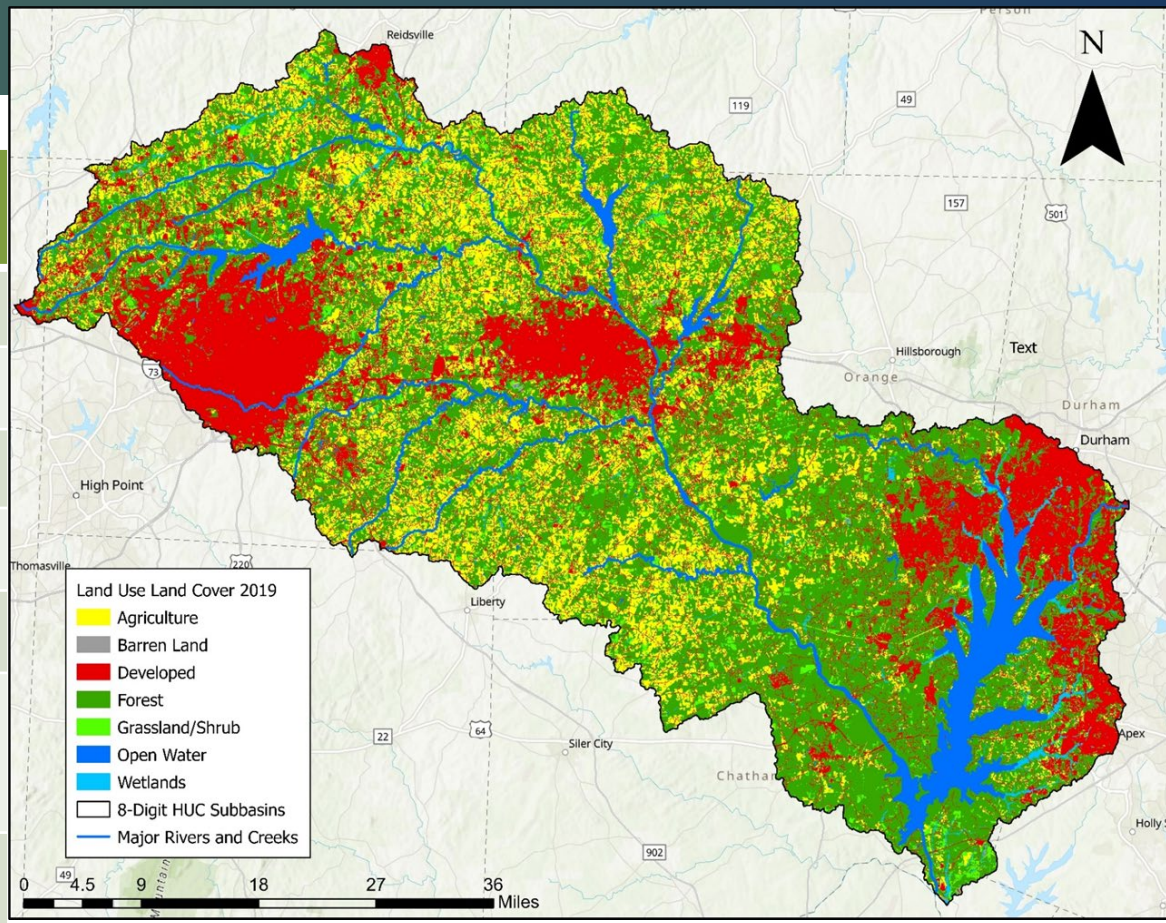
919-707-9116



- End.

Land Use Land Cover (2019 NLCD)

Watershed	Land Area (mi ²)	Agriculture	Barren Land	Developed	Forest	Grassland Shrub	Open Water	Wetlands
Reedy Fork	255	15.9%	0.0%	47.2%	30.8%	2.7%	2.3%	1.1%
Headwaters Haw River	189	30.7%	0.1%	15.2%	44.6%	4.1%	1.7%	3.7%
Big Alamance Creek	262	26.6%	0.1%	23.3%	44.6%	3.6%	1.4%	0.4%
Back Creek-Haw River	251	28.1%	0.1%	19.1%	46.5%	4.0%	2.0%	0.4%
Cane Creek-Haw River	270	27.4%	0.0%	9.3%	57.5%	4.4%	1.1%	0.3%
B Everett Jordan Lake-New Hope River	343	4.7%	0.2%	34.4%	46.6%	2.6%	6.4%	5.1%
Roberson Creek-Haw River	137	7.5%	0.2%	10.9%	72.1%	5.7%	2.5%	1.1%



¹Data was downloaded from the Multi-Resolution Land Characteristics NLCD website and processed for each Cape Fear River Basin HUC8s in 2022.
² Barren Land is a catch-all category for tilled land, new development, cutover, bare rock areas.



Land Cover Change in the Haw River Subbasin

Land Cover ¹	2001	2011	2019	% Change 2001-2019	mi ² Change 2001-2019	Total mi ² 2019
Agriculture	21.78%	20.28%	19.85%	-1.93%	-32.99	338.89
Barren Land ²	0.08%	0.09%	0.10%	0.02%	0.29	1.67
Developed	21.05%	23.42%	24.38%	3.34%	56.95	416.33
Forest	50.39%	47.53%	47.46%	-2.94%	-50.13	810.38
Grassland/Shrub	2.18%	4.24%	3.68%	1.49%	25.48	62.79
Open Water	2.65%	2.56%	2.70%	0.05%	0.89	46.06
Wetlands	1.87%	1.88%	1.84%	-0.03%	-0.48	31.47
Total mi²						1,707.59

¹Data was downloaded from the Multi-Resolution Land Characteristics NLCD website and processed for each Cape Fear River Basin HUC8s in 2022.

²Barren Land is a catch-all category for tilled land, new development, cutover, bare rock areas.



Haw River Subbasin 2022 Integrated Summary

Assessment Unit ¹	Map Color	FW Miles ²	FW Acres ²
Total	All Colors Combined	1,307.0	19,144.2
Total Monitored	Combined Blue, Gray, Red, and Pink	582.7	16,034.5
Not Monitored	Green	724.3	3,109.7
Meeting Criteria (Category 1)	Blue	139.5	176.4
Data Inconclusive (Category 3)	Gray	134.7	4,482.3
Exceeding Criteria 303(D) (Category 5)	Red	277.0	107.2
Exceeding Criteria with TMDL (Category 4)	Pink	31.5	11,268.6
Exceeding Criteria (Combined Category 4 and 5)	Combined Red and Pink	308.5	11,375.8
% Exceeding of Monitored Exceeding (Combined Category 4 and 5)	Combined Red and Pink / Total	52.9%	70.9%

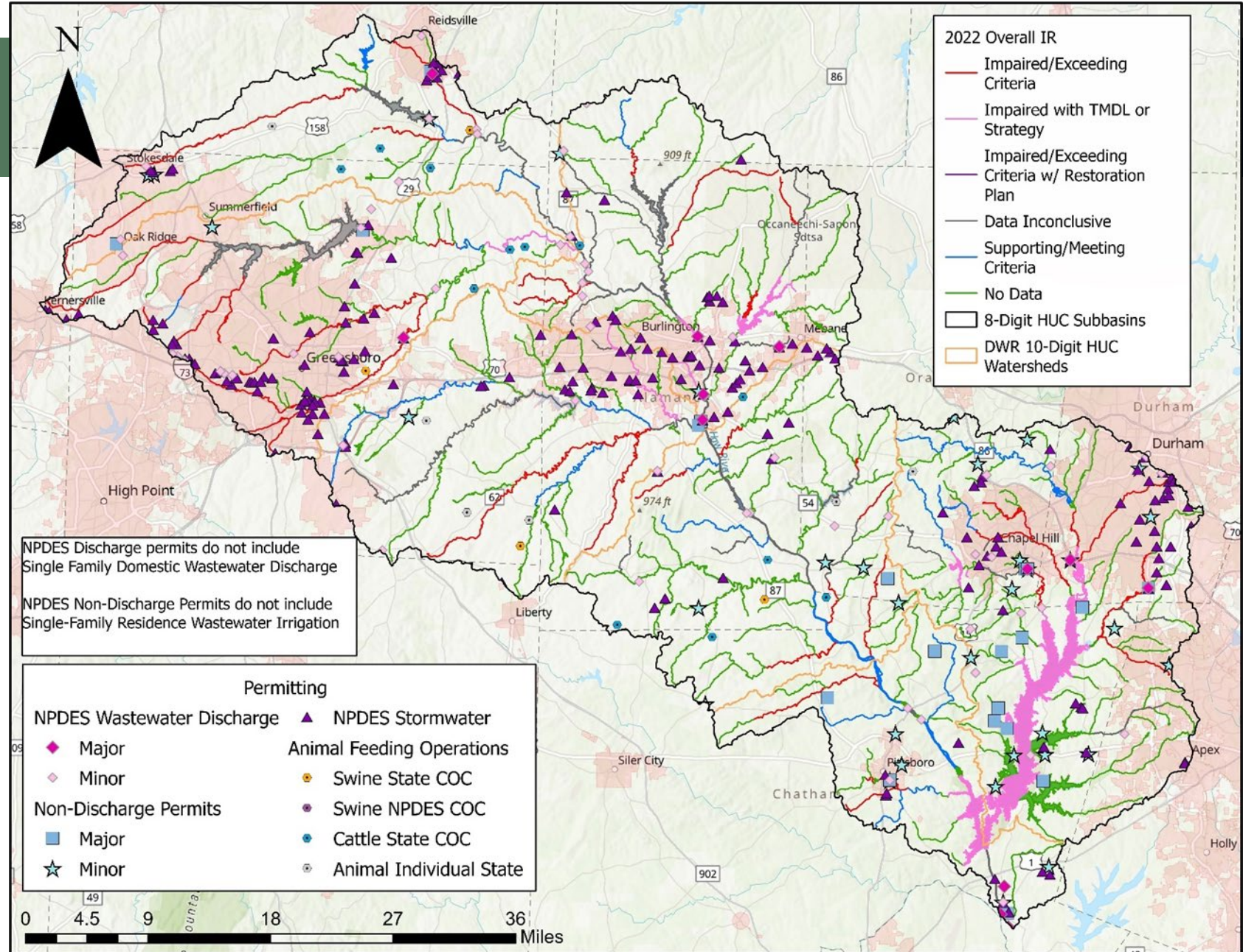
¹All waterbodies in North Carolina are impaired for Fish Tissue Mercury and are not included on this table.

²FW - Freshwater



Haw River Subbasin Permits

Number of Permits ¹		Permit Information ¹	
NPDES Wastewater Discharge²			
Major	Minor	Permitted As-Built (MGD)	
11	54	146.73	
Single-Family Domestic Wastewater Discharge			
Number of Permits		Permitted As-Built (MGD)	
209		0.06	
Non-Discharge and Land Application³			
Major	Minor	Field Number	Field Acres
21	33	671	6,218.3
Single-Family Residence Wastewater Irrigation			
Number of Permits		Field Number	Field Acres
222		223	70.0
Stormwater			
State	NPDES	NPDES Outfalls	
49	202	431	
Animal Feeding Operations			
Number of Permits		Allowable Headcount	Allowable Weight
23		10,057	6,004,810



- There have been several water resource-related issues highlighted in the Haw River subbasin which occurred during the timeframe of this plan, 2002 to 2020:
 - • Development of many Total Maximum Daily Loads (TMDL) for fecal coliform bacteria, turbidity/TSS and nutrients due to ongoing water quality concerns (sections 6.4, 6.6.6.9.1 and reviewed throughout the HUC-10 watershed writeups).
 - • Development of many Watershed Action Plans for several watershed in the Haw River subbasin to address ongoing water quality concerns and impairments (section 6.5 and throughout the HUC-10 watershed writeups).
 - • Little Alamance Creek EPA approve 4b demonstration/TMDL alternative to address benthic macroinvertebrate impairment (sections 6.6.3, 6.6.3.2).
 - • 1,4-Dioxane discovered in surface waters and special study was initiated (sections 6.6.2.3, 6.3, 6.6.6.13).
 - • City of Greensboro T.Z. Osborne SOC to address 1,4-Dioxane contamination (section 6.6.1)
 - • City of Greensboro requested an emergency potable water supply intake on the Haw River (section 6.6.2.3)
 - • Reidsville moved discharge from Little Troublesome Creek to Haw River mainstem (section 6.6.2)
 - • Nutrient enriched waters is a major concern throughout the entire Haw River subbasin (all watersheds discuss this issue).
 - • NC Policy Collaboratory Jordan Lake Study (section 6.6.6.9.3)
 - • Jordan Lake rules readoption (section 6.6.6.9.4, 6.6.6.9.4)
 - • Point source TN and TP discharge compliance (section 6.6.6.9.6)
 - • Jordan Lake round-4 water supply allocation (section 6.7.2)