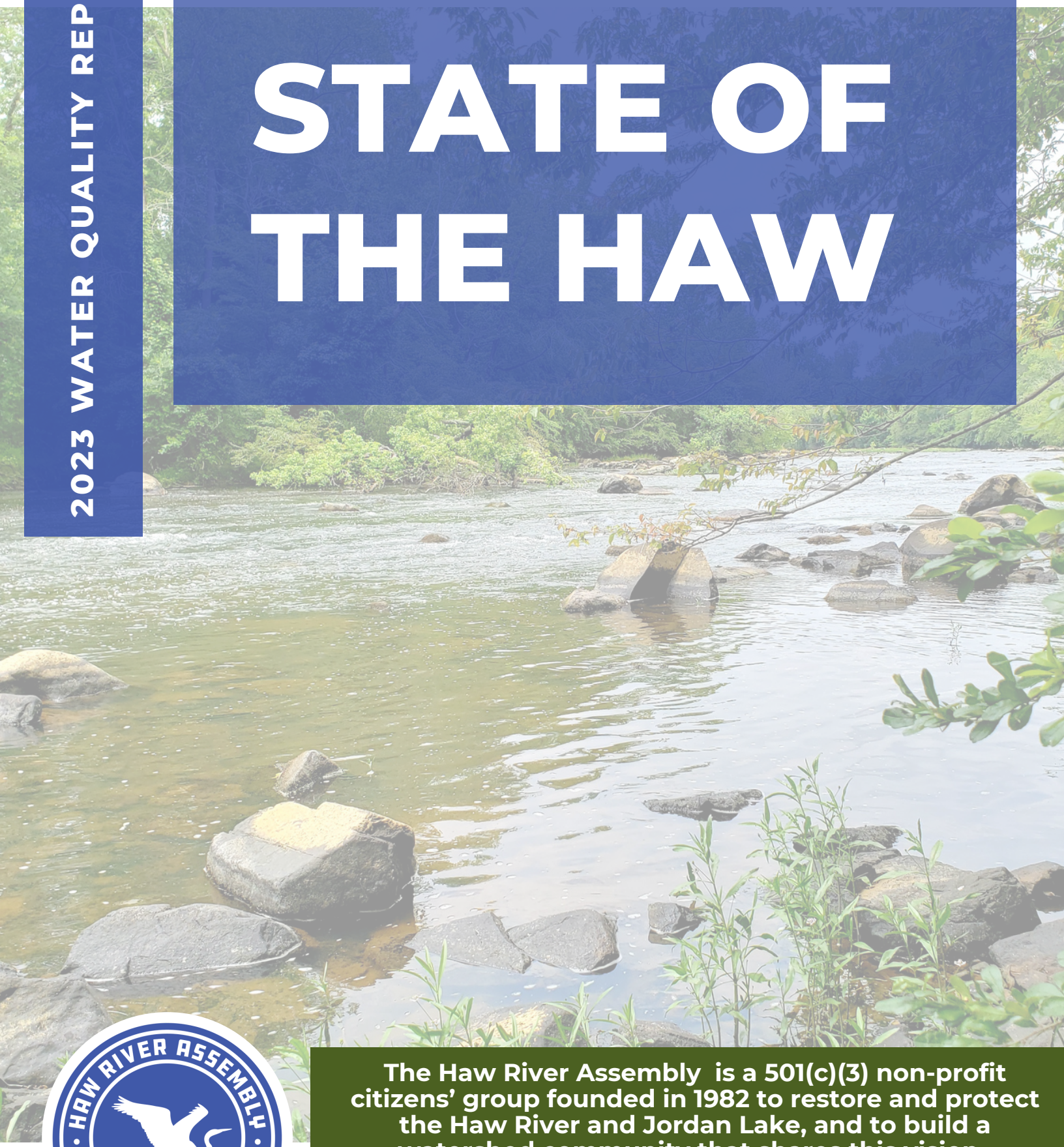
2023 WATER QUALITY REPORT

STATE OF THE HAW



HAW RIVER ASSEMBLY
DEFENDING THE RIVER SINCE 1982

The Haw River Assembly is a 501(c)(3) non-profit citizens' group founded in 1982 to restore and protect the Haw River and Jordan Lake, and to build a watershed community that shares this vision.

This report was made to share our insights about the river's health and water quality with the public.

The Haw River Assembly goals are to promote environmental education, conservation and pollution prevention; to speak as a voice for the river in the public arena and to put into peoples' hands the tools and knowledge they need to be effective guardians of the river.

The scenic 110 mile Haw River is at the headwaters of the Cape Fear River Basin, and includes the Jordan Lake reservoir, providing drinking water and recreation to NC. Tributaries of the Haw River and Jordan Lake flow through Guilford, Rockingham, Caswell, Alamance, Orange, Chatham, Wake and Durham counties. Almost one million people are part of this watershed.

The Haw River Assembly is dedicated to the goal of environmental justice and equality for all people in our watershed. We believe all people should have access to enjoyment of the natural world and a voice in decisions that may affect their environment and/or health.

MISSION

Our mission to protect this watershed for all of our communities and make sure it is done through extensive investigation and monitoring of water quality issues.

WATER QUALITY: WHY WE DO THIS WORK

This report is a result of those investigations on several parameters that threaten the Haw watershed. Investigations begin with citizen complaints, new permit or project proposals, or general scouting patrols done by our Riverkeeper Emily Sutton and staff. We conduct sampling with EPA certified and calibrated meters, macroinvertebrate surveys and partner with certified laboratories for sample results that we can not process internally. For detailed information regarding our monitoring methods and procedures, visit www.healthofthehaw.org.

This data not only informs the public of water quality issues, which can prevent harm from exposure due to swimming, paddling, or drinking water consumption, but also guides our advocacy. When sources of pollution are discovered and properly identified, we work with state agencies and legal firms to uphold the Clean Water Act and hold the polluters accountable. This report also shows us where to prioritize those efforts based on the greatest threats to water quality.

PARAMETERS OF OUR REPORTING:

The health of the Haw River has been impacted by poor development, stormwater and land management practices which pollute and fill streams and rivers with excess amounts of sediment, bacteria, nutrients, industrial toxins, plastics, industrial manufacturing discharges and wastewater treatment plans.

Health of the Haw River Findings Summary

- Poor development practices, lack of buffers, and erosion lead to increased turbidity.
- Excess nutrients, such as nitrogen and phosphorus,are leading to increased pH and hypoxia, meaning a complete lack of oxygen in the water.
- Industrial toxins, PFAS and 1, 4 dioxane, have made their way into our streams through sources of manufacturing in Burlington, Greensboro, and Reidsville. These toxins are known to cause cancers and many other serious health illnesses.
- Macroplastic and microplastic contamination is present in all samples we've collected throughout the Haw River watershed. This results from poor waste management systems, stormwater runoff and plastic manufacturing.
- In our urban waters, macroinvertebrates, small aquatic insects which serve numerous positive functions in our water systems, are overwhelmingly being affected by water pollution.
- In our urban waters, the health of macroinvertebrates, small aquatic insects which serve numerous positive functions in our water systems, was significantly lower than populations in more rural areas, suggesting that these populations are being impacted by stormwater runoff and urban water pollution.

In this report, we have shared data collected over several years from various investigations into pollution sources in the Haw. ***These parameters include sediment, bacteria, nutrients, industrial toxins and plastics. Additionally, we also use populations of macroinvertebrates to determine the health of the Haw.***

Some of the parameters we study occur naturally in riverine ecosystems, such as sediment, bacteria and nutrients. However, poor development, stormwater and land management practices pollute and fill streams and rivers with excess amounts of these pollutants. The pollutants also do not promote the existence of some pollution sensitive macroinvertebrates.

1. SEDIMENT: We measure turbidity. Turbidity answers the question: How clear is the stream? It is a visual characteristic of water and is a measurement of how much light is scattered by material in the water when a light is shined through a water sample.

In North Carolina, the water quality standard in non-trout waters for turbidity, or sedimented water, is no higher than 50 NTU. This standard is set based on a threshold for healthy habitats for aquatic species, including pollution sensitive macroinvertebrates. Poor development practices, lack of buffers, and erosion lead to increased turbidity.

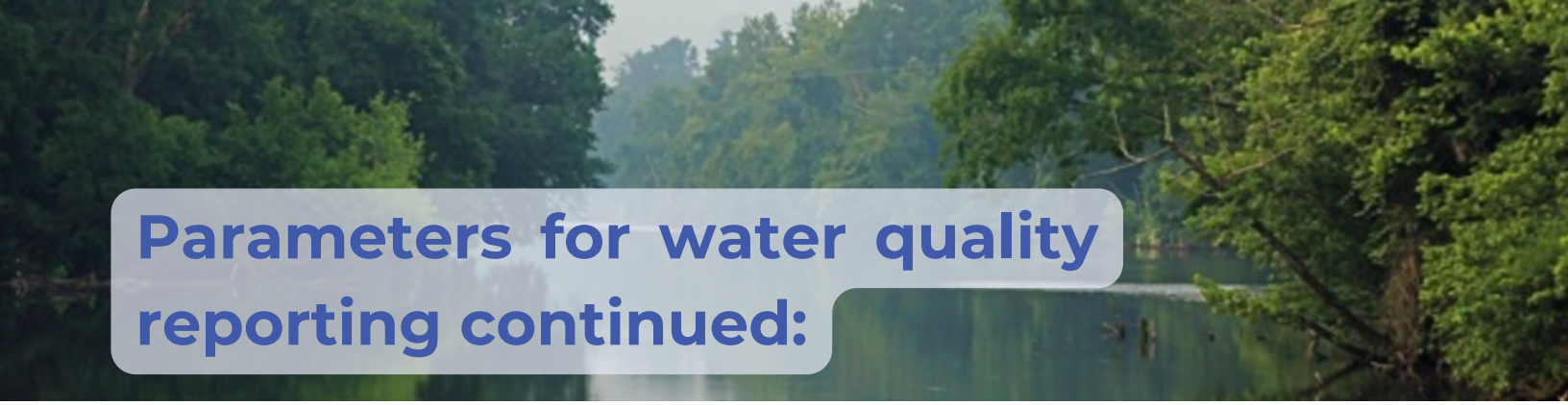
2. BACTERIA: Fecal coliform and E.coli are two bacteria parameters used to evaluate safe levels of exposure in recreational waters. They indicate that the water has been contaminated with the fecal material of humans or other animals.

The EPA has set standards of E.Coli based on a geometric mean of 100 cfu/ 100 mL, which is an average of 5 samples collected within a 30 day period. The EPA has also set a Beach Action Value of 235 cfu/ 100 mL. This is the conservative and precautionary, one time grab sample level that should not be exceeded in order to protect public health. This is the standard we use for our Swim Guide sampling. North Carolina has not yet transitioned to E.Coli standards (from fecal), though the EPA first recommended the change in 2006. North Carolina is one of 4 states that do not use E.Coli as the water quality standard for a bacteria indicator. North Carolina still uses fecal coliform as a bacteria indicator. Similarly to E.Coli, the fecal standard is calculated in a geometric mean, or an average of 5 samples collected within a 30 day period. That standard is no higher than 200 colonies per 100 ml.

3. NUTRIENTS: Nitrogen and phosphorus are natural parts of aquatic ecosystems. Nitrogen is also the most abundant element in the air we breathe. Nitrogen and phosphorus support the growth of algae and aquatic plants, which provide food and habitat for fish, shellfish and smaller organisms that live in water.

When these nutrients are in excess however, they can lead to algal blooms, increased pH and hypoxia (a complete lack of oxygen in the water). This causes fish kills. North Carolina does not have numeric limits for nutrient standards, but rather uses chlorophyll A as an indicator. The EPA is working to set federal numeric nutrient standards.

- For total nitrogen, healthy ranges fall between 2 mg/L and 6 mg/L.
- For total phosphorus the EPA has set a guidance of 0.05mg/L to 0.1mg/L for streams entering lakes.



Parameters for water quality reporting continued:

4. INDUSTRIAL TOXINS: Industrial toxins have made their way into our streams through sources of manufacturing in Burlington, Greensboro, and Reidsville. PFAS, or per and polyfluoroalkyl substances, are a class of toxins used in manufacturing for waterproof, stain resistant, and non-stick materials. These toxins are known to cause cancers and many other serious health illnesses.

The EPA has set a guidance of no higher than **0.002 ppt and 0.04 ppt** for two legacy PFAS: PFOA and PFOS. The class of PFAS chemicals has over 10,000 different compounds, but all have the same “forever chemical” bond that prevents breakdown.

1,4-dioxane is a chemical solvent used in manufacturing practices and has been repeatedly discharged into the Haw by sources in Reidsville, Greensboro, and Burlington. North Carolina has set a narrative standard of **0.35ug/L based** on a 1 in 1 million cancer risk.

Both of these industrial toxins never break down and are incredibly difficult to remove in traditional drinking water processes, resulting in contamination of drinking water supplies.

5. PLASTICS: Macroplastic and microplastic pollution results from poor waste management systems, stormwater runoff, and plastic manufacturing.

Macro and microplastic pollution results from poor waste management systems, stormwater runoff and plastic manufacturing. Microplastics are particles that cannot be seen without a microscope and reach our surface waters through the breakdown of plastic litter. Wastewater effluent contains microplastics that shed from washing clothes made of synthetic plastic materials and other household objects.

According to a study at the University of New Castle in Australia, we consume an average of one credit card’s worth of microplastic each week.

No water quality standards have been set for microplastics and we have yet to collect a sample without microplastic contamination. Our macroplastic sampling is conducted at several litter traps throughout the watershed, where we have volunteers clean out and categorize the litter collected in the trap each month.

Parameters for water quality reporting continued:

6. MACROINVERTEBRATES: Beyond monitoring for these contaminants, we are also investigating ambient water quality and the populations of macroinvertebrates.

Using a YSI meter, we gather ambient water quality data for pH, dissolved oxygen, and conductivity. We expect a range from 6.5- 7.5 for pH, and above 80% dissolved oxygen. Conductivity in healthy freshwater streams can range from 100 to 2000 us/cm. Conductivity is a great indicator of illicit discharges because it calculates salts and minerals in freshwater. Industrial wastewater typically has an average of around 10,000 us/cm conductivity.

In addition to these chemical parameters, we are also collecting data on biological parameters. Macroinvertebrates are small aquatic insects that are greatly affected by water pollution. Based on pollution sensitivity, these insects are given a numeric value. If a diverse population of pollution sensitive macroinvertebrates is present, a macroinvertebrate score will be higher. A score of between 17- 48 is considered healthy. Below 11 is considered poor.

STATE OF THE HAW:

OUR COMPLETE FINDINGS

1. Sediment Pollution

Throughout 2023, HRA has been tracking sediment pollution in streams and wetlands throughout the watershed.

We aim to identify sources of pollution, locate sites with insufficient control measures, collect field data and media, report and document violations and concerns to state and county officials. From a larger perspective, we also hope to communicate the scale of sediment and erosion issues to the public, builders and contractors and decision-makers at various levels. Our goals consist of encouraging consistent and robust enforcement of ordinances and standards, and also greater transparency in regards to planning and permitting.

Sediment is the most common and widespread pollutant in North Carolina rivers, streams, lakes and reservoirs.

General land clearing, streambank erosion, construction, farming, mining and other industrial activities are major contributors to erosion and sediment production, with gravity and water moving sediment into rivers and streams across land or through stormwater systems. Monitoring sediment pollution is critical to protecting state waterways and watersheds as North Carolina is experiencing rapid population growth and urbanization, while the state is making unprecedented investments in new industrial facilities and manufacturing. Water quality impacts of sediment pollution are well-documented. There are major consequences for aquatic life, as feeding and reproduction cycles are disrupted and streams become inundated with dirt or clay and habitats are lost. Sediment in water runoff is also a primary carrier for anthropogenic contaminants like oil, grease, heavy metals, dioxins, nutrients, pesticides, flame retardants, and “legacy contaminants” such as DDT, PCBs and chlordane regularly found in stream, river and lake bed sediment.

Sediment Pollution

In Chatham County, consistently high turbidity levels and discolored streams were identified in areas draining from the Vinfast facility construction.

Sampling sites along Gulf Creek showed turbidity levels of **127 NTU and up to 364 NTU in February and March 2023.** At a site for Shaddox Creek (pictured below) in the same period, turbidity was **60.9 NTU**. More recent sampling found turbidity levels in Shaddox Creek were **> 200 NTUs** and in a tributary feeding Gulf Creek (pictured below), **> 400 NTUs**.

These observations readings had been consistent since at least the end of 2022 and *essentially unchanged* in the first half of 2023. **HRA staff conducted aerial investigations of the site with our partners at Southwings and were able to document conclusively that the VinFast construction site is a source of the sediment pollution.**

HRA staff submitted a report with findings to state environmental officials at NCDEQ, NC Department of Environmental Quality Division of Energy, Mineral and Land Resources (NCDEMLR) and the US Army Corp of Engineers (USACE). This report contained turbidity monitoring data as well as stream photos and aerial photos of the VinFast facility construction in Chatham County. In response to this report, staff from the NCDEQ Department of Energy, Minerals and Land Resources conducted a full inspection of this phase of the project, roughly 230 acres of the 1300 planned acres was open.

Shaddox Creek at Corinth Rd

Their on the ground inspection did not determine that erosion and sediment control measures were failing or insufficient to an extent to serve a Notice of Violation and in practice were essentially functioning as they were intended. Contractors present at the inspection agreed to make some adjustments and employ new approaches to lower the turbidity of water leaving the site into adjacent wetlands and streams.

Turbidity and discoloration of adjacent water were noted by DEMLR staff, but crucially this agency branch does not measure turbidity, though they are the state regulating branch for erosion and sediment control. The NCDEQ Division of Water Resources is the branch concerned with water quality violations. NCDEMLR committed to monthly inspections going forward to address sediment or runoff issues. For regulatory context, visit page ___

Sediment Pollution

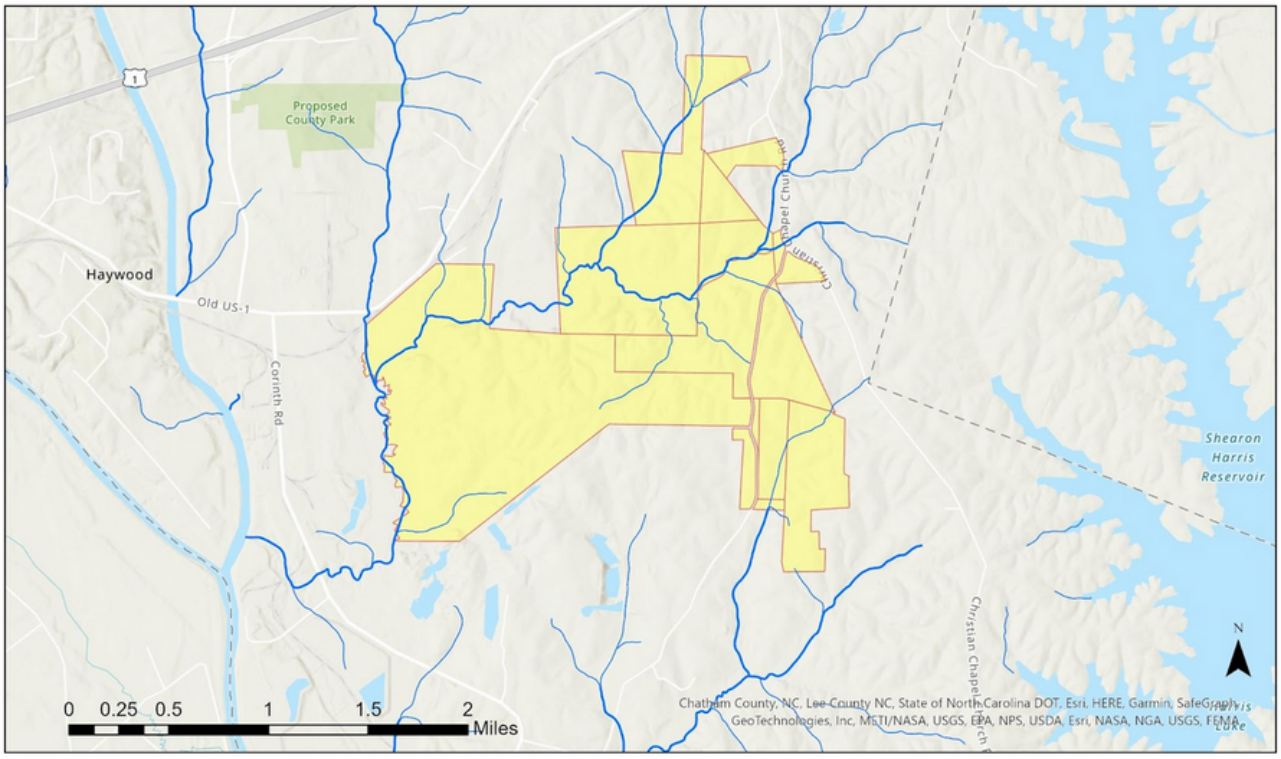
Vinfast Additional Information

An important regulatory context for the VinFast site or any project receiving public money is that jurisdiction for erosion and sediment control falls to NCDEQ, rather than what would be typical oversight by a county or municipal local program, which Chatham County does have.

The permitting process for the VinFast manufacturing facility is still on-going. A 404 permit has not been approved by the US Army Corp of Engineers (ACoE). Also, the state has not granted a 401 permit.

404 refers to Section 404 of the Clean Water Act, which requires authorization from the Secretary of the Army, acting through the Corps of Engineers, for the discharge of dredged or fill material into all waters of the United States, including wetlands.

The 401 permit refers to Section 401 of the Clean Water Act. The North Carolina Division of Water Resources (DWR) is the state agency responsible for issuing 401 water quality certifications. When the state issues a 401 certification (which is required for any federally permitted or licensed activity that may result in a discharge to waters of the U.S.), this certifies that a given project will not degrade Waters of the State or violate State water quality standards (from https://www.deq.nc.gov).



Map of VinFast-owned parcels (yellow) in Chatham County and perennial and intermittent rivers, creeks and streams as defined by Chatham County GIS (blue lines).

Sediment Pollution

HRA is also actively monitoring sites across Alamance County, with particular attention to new residential and commercial developments.

Unlike the rest of the Haw watershed, Alamance County does not have a local program for sediment and erosion control, so this responsibility falls to staff at NCDEMLR, primarily from Winston-Salem office. While NCDEMLR maintains the statewide Erosion and Sediment Control program, the local sediment control programs are a critical pillar for conducting plan reviews and enforcement, and also greatly expands capacity for monitoring and responding to complaints.

Sediment Pollution

Alamance County continued...

In the course of monitoring sediment issues in Alamance County, we found numerous building sites with insufficient or failing control measures, with muddy runoff entering streams and the Haw River, with some sites lacking required sediment and stormwater control plans. A particularly egregious situation was found at a Meritage Homes of the Carolinas development at Old Farm Rd (pictured below), where overflowing retention ponds and downed silt fencing were discharging large amounts of sediment and runoff into Still House Branch. Turbidity readings were 41.1 NTUs upstream of where the runoff entered the stream, 800+ NTUs just after the site of discharge and 688 NTUs ¾ of a mile downstream. The state turbidity standard is 50 NTUs. We submitted photos and data to the NCDEQ Division of Energy, Mineral, and Land Resources and the NC Department of Water Resources.

A comprehensive report of all the sites we have documented and investigated was prepared and submitted to staff at NCDEMLR and NCDWR.

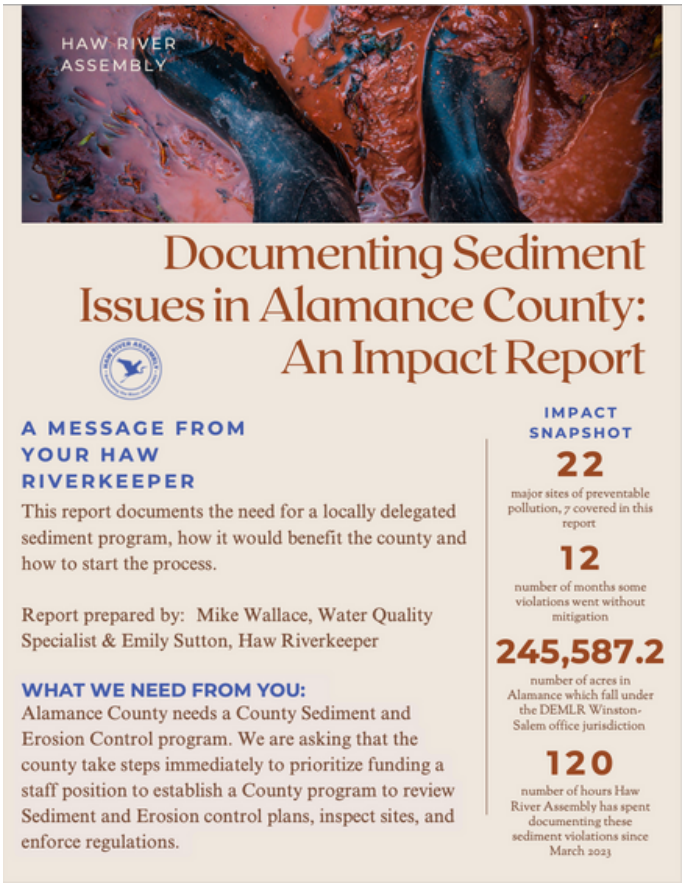
In response, 7 complaints were addressed and site inspections were conducted by DEMLR staff. Conditions and scale of these sites varied widely, but correspondence was issued to a homebuilder who did not submit an erosion control plan, several minor adjustments and additions were made, and inspections of retention ponds, buffers and nearby creeks were completed. These sites represent a fraction of the building activity currently underway in Alamance County, and do not include all of the locations that were previously identified with issues. We will continue to monitor sedimentation, respond to complaints, and collect turbidity data to establish ambient conditions apart from construction or other land disturbance activities.

Stillhouse Farms - Old Farm Rd
County Home Branch (Stillhouse Branch)

Sediment Pollution

In the case of Alamance County, we are specifically pushing for the creation of a local sediment and erosion control program, like those that exist for most counties in our watershed and the City of Burlington.

Without a local program of their own, Alamance County has the bare minimum requirements for construction of stormwater and sediment control measures, and those minimum requirements are rarely enforced due to lack of staffing at state offices. This program would be invaluable for the county, not only in terms of increasing needed regulatory staff and structure, but also for pollution prevention as a resource for builders, planners and site supervisors so that inadequacies can be addressed in the planning process, new approaches can be disseminated widely and that proper and up-to-date control measures are utilized and maintained. Again, addressing data gaps, neither the state nor HRA have the capacity to effectively inspect, document and report on sediment and erosion control for all the projects in Alamance County, much less the greater watershed. Local programs are one of the best approaches currently available to monitor sediment and erosion issues.



Conditions from Rogers Road were spotted by the road.

2. Bacteria: E. coli & Swim Guide data

Our main program for tracking and monitoring E. coli levels in the Haw River Basin is through our annual Swim Guide.

We perform weekly sampling at popular swimming and recreation access points throughout the watershed to test levels of E.coli bacteria. Results are then available on the Swim Guide website and app, which is a beach information hub with affiliates throughout the U.S. and international locations.

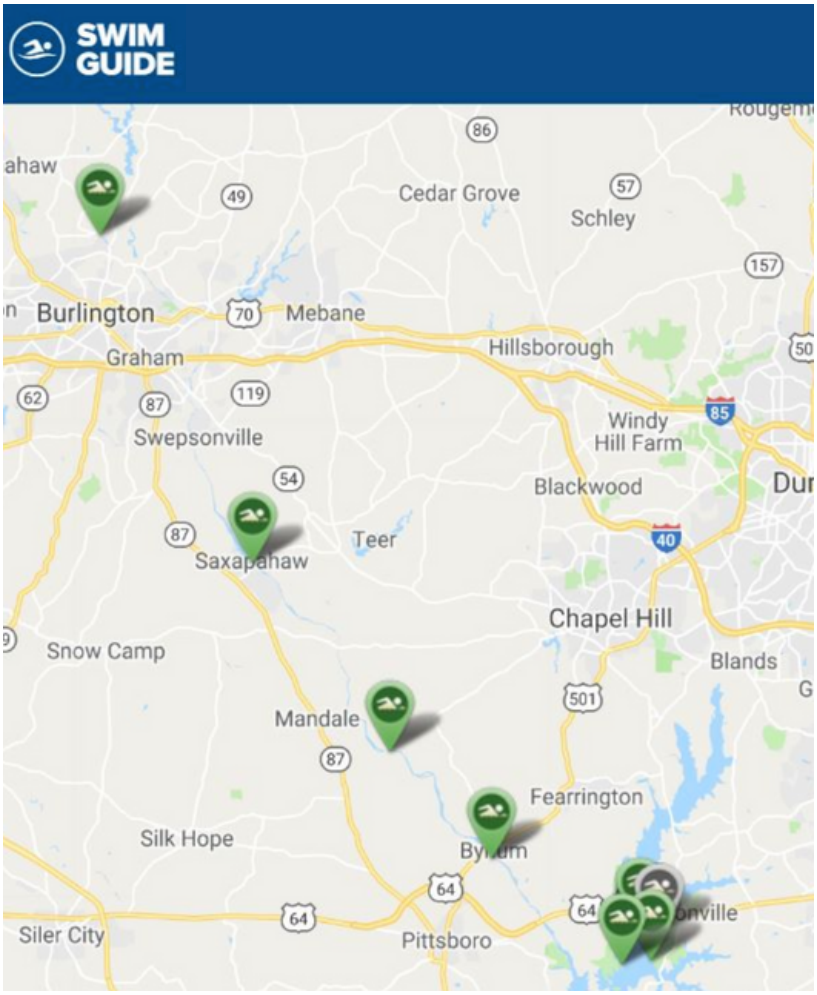
The Swim Guide Hotline for weekly results during swim season is: 833-982-0147

The Swim Guide app can be downloaded to smart phones to see all the recreation accesses and detailed descriptions. Also, we publish the results each Friday in our E-newsletter or look for it on our website or Facebook and Instagram pages. You can also subscribe to text updates by texting HAW to (844) 956-1139.

Our 2023 Swim Guide season was largely successful, with only a few sites ocassionally failing. Four of our sites, Saxapahaw Island, Vista Point, Seaforth Beach Access, and Ebenezer Church Beach Access, passed 100% of the time this summer.

Our Swepsonville site failed twice, but both failing samples had extremely high E.coli levels. The levels were 1986.3 MPN, and 2919.6 MPN compared to EPA's limit of 235 MPN. These levels led us to investigate sources. From this investigation, we discovered a failing septic that was discharging waste directly into a storm drain which flowed into the Haw.

We reported this issue to Alamance County Health Department and NC Department of Environmental Quality to issue corrective measures.



Bacteria: E. coli & Swim Guide data

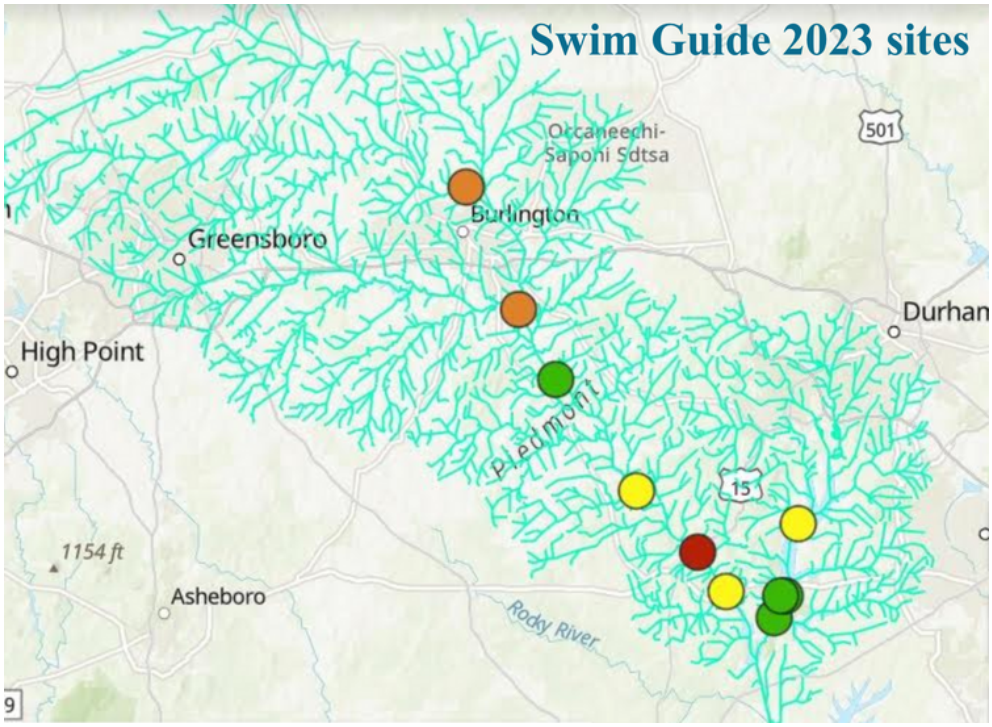
Bacterial contamination is a widespread problem in North Carolina, with every river basin in the state affected.

A staff expansion in 2023 allowed HRA to investigate this recurrence. Streams and tributaries upstream of the failing site were sampled over several months and potential contamination sources were mapped. Although we were unable to find conclusive evidence for the E. coli contamination spikes at our Swim Guide site, we were able to identify other smaller stream sites with elevated levels and further testing revealed human sources. These results add to the overall scale of fecal contamination in our basin and the difficulty of tracing sources and testing as often and as widely as would be necessary to do so.

Though North Carolina does not have an E.coli standard for water quality and instead uses fecal bacteria standards, the EPA has set a beach action value of no more than 235 MPN/100 mL for E.coli in recreational waters in order to protect human health. (North Carolina is one of only 4 states that do not use E.Coli to monitor bacteria.)

Bacteria contamination in water is a threat to our health. Since 1986, the Environmental Protection Agency (EPA) has urged states to adopt E. coli bacteria (Escherichia coli) standards to preserve recreational water quality and better protect public health. North Carolina is one of only a handful of states that has failed to do so. It's past time for the state to adopt the E. coli standard for bacteria in freshwaters.

Looking back on our completed 2022 season for the Haw River and Jordan Lake, there were 4 sites that tested over 235 MPN/100 mL at least once, with one site over this level on 4 separate occasions.



3. Nutrient and Bacteria Pollution:

Terminology:

CAFO: Concentrated Animal Feeding Operation, as defined by the United States Department of Agriculture, is an intensive animal feeding operation in which over 1,000 animal units are confined for over 45 days a year.

TMDL: A total maximum daily load is a regulatory term in the U.S. Clean Water Act, describing a plan for restoring impaired waters that identifies the maximum amount of a pollutant that a body of water can receive while still meeting water quality standards.

In the Haw River Watershed, poultry operations still contribute a substantial amount of nutrient and bacteria pollution in our rural streams.

In 2022, we conducted a focused sampling investigation targeting three poultry operations that were directly adjacent to streams. Poultry operations often pile spent poultry litter, or manure, in piles outdoors. When these piles are adjacent to streams, the concentrated levels of bacteria and nutrients in those piles contaminate streams through wind and rain.

In North Carolina, the fecal coliform standard for freshwater is 200 colonies per 100 milliliters (ml) of water based on at least five consecutive samples taken during a 30-day period, not to exceed 400 colonies per 100ml in more than 20 percent of the samples during the same period. As you can see from our data, these three poultry sites caused a major exceedance of that standard. This data was submitted to the state and these three streams will be listed as impaired in the next cycle of impaired waterways list.

Site Name	x coord	y coord	Lab Code	Date collected	Fecal
GBOCH	35.898714	-79.457	92612264001	6/29/22	1100
GBOCH	35.898714	-79.457	92610823001	6/21/22	1500
GBOCH	35.898714	-79.457	92611272001	6/22/22	740
GBOCH	35.898714	-79.457	92610089001	6/16/22	780
GBOCH	35.898714	-79.457	92609860001	6/15/22	1040
Milesville	36.280986	-79.418703	92595157002	03/24/22	640
Milesville	36.280986	-79.418703	92595157002	03/15/22	270
Milesville	36.280986	-79.418703	92595157002	03/17/22	1910
Milesville	36.280986	-79.418703	92595157002	04/06/22	1040
Milesville	36.280986	-79.418703	92595157002	04/07/22	333
Sylvan	35.8469	-79.45844	92595157001	03/24/22	2600
Sylvan	35.8469	-79.45844	92595157001	03/15/22	510
Sylvan	35.8469	-79.45844	92595157001	03/17/22	5000
Sylvan	35.8469	-79.45844	92595157001	04/06/22	5800
Sylvan	35.8469	-79.45844	92595157001	04/07/22	880

Nutrient and Bacteria Pollution:

Nutrient deposition in surface waters is a natural and necessary process and tends to fluctuate seasonally.

In the summer and fall, when there is more tree canopy and less leaf litter falling into streams, nutrient levels decline. These fluctuating levels of nutrients help to maintain a balanced ecosystem. However, irresponsible agricultural practices and increased stormwater runoff from fertilized lawns and urban areas increase nutrients far beyond what our streams can manage. In urban areas, wastewater and stormwater treatment facilities must meet nutrient criteria before effluent is discharged into surface waters. That nutrient criteria is often set far too high, assuming dilution and mixing will occur downstream.

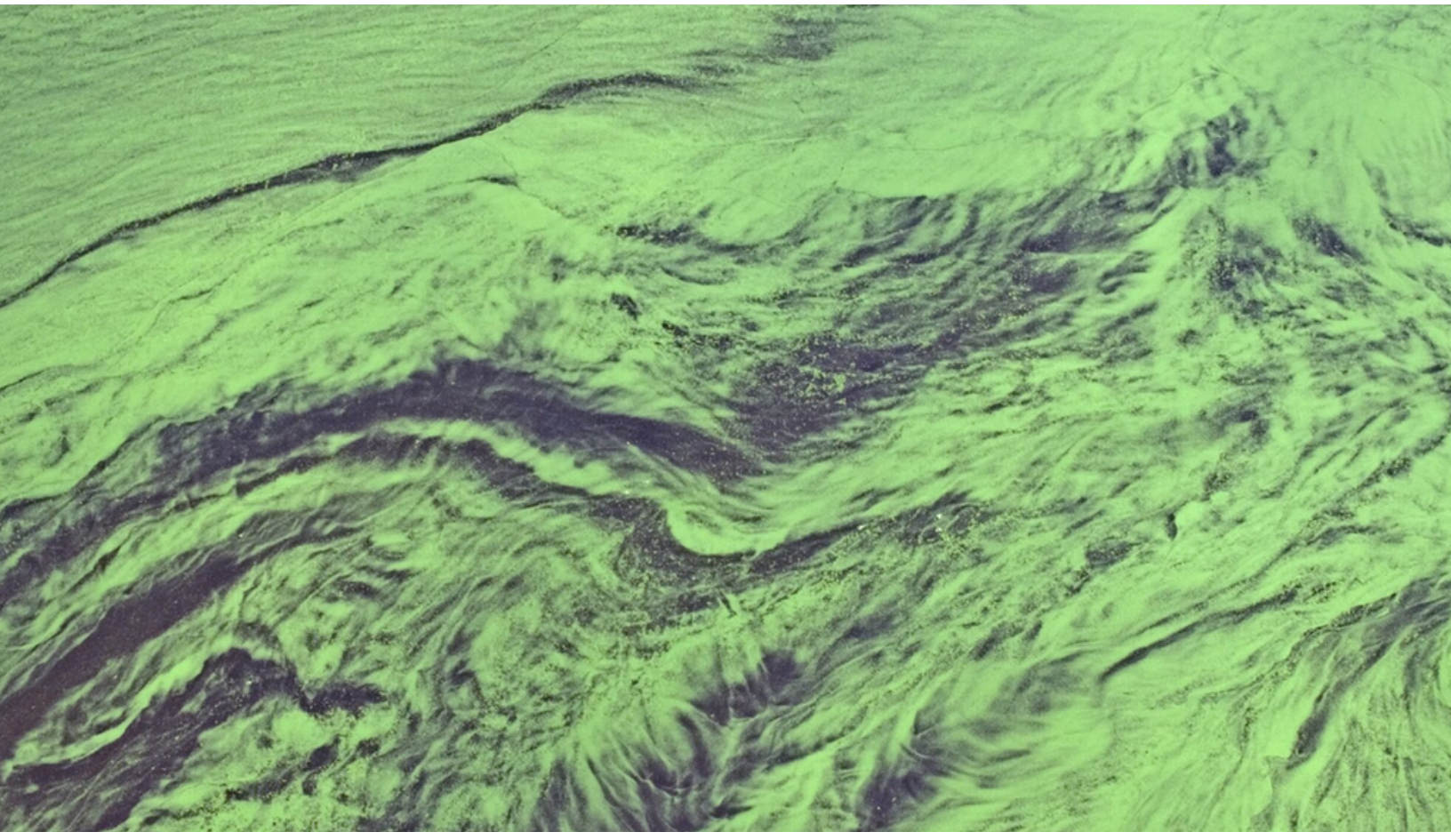
However, if the receiving waters are also plagued with high levels of nutrients from fertilizer runoff, construction sediment and untreated stormwater, our streams can not self regulate. In rural areas too, construction sediment transports high loads of nutrients in the soils. Additionally, poultry operation facilities dump unchecked loads of poultry litter filled with ammonia, nitrogen, and phosphorus on agricultural fields or in large piles, often next to streams. When this poultry litter, or manure, is exposed to wind and rain, our streams become overwhelmed with nutrient levels.

Nutrient and Bacteria Pollution:

Excess nutrient levels can lead to algal blooms, which limits sunlight from reaching aquatic life and plant life in the streams.

Algal blooms also release bacteria that consume oxygen as they die. When that oxygen is depleted, a stream can become hypoxic, meaning it has little to no oxygen in the water. This in turn results in massive fish kills and destruction of a living aquatic ecosystem. We identify algae to check for toxins.

Jordan Lake continuously has excess nutrient loads, which is typical of any unnatural lake that was meant to be a free flowing river. Agricultural inputs are a major source of those nutrients. Excess stormwater runoff, sedimentation, and wastewater effluent also contribute to the problem.



4. Industrial Toxins

The Haw River watershed has seen decades of industrial pollutants from its legacy of textile production.

Before the Clean Water Act was enacted in 1962, the Haw was a dumping ground for industrial wastes. The river notoriously flowed in whatever color the textile factories were producing for the day. The fish were sick and unsafe to eat. After the Clean Water Act, the federal and state government put limits on what could and could not be discharged into surface waters and put regulatory limits on the amounts of discharge pollutants. However, the process for including new pollutants in that regulatory framework is inadequate. Those permits contain pollutants that have been identified as a contaminant through years of academic and health studies, stakeholder processes, and bureaucratic negotiations to establish limits. That process can take over a decade to get new contaminants into regulation.

When we first began focused PFAS sampling with NC State University in 2018, levels in the Haw in Bynum reached 1076.1 ppt. For reference, the EPA has set a limit of 70 ppt for two of these compounds, and many states are lowering that level even further to no higher than 10. Treated drinking water in Pittsboro had levels of 740 ppt at the time.

Other sources we continue to investigate include Greensboro's wastewater treatment plant, Greensboro's White Street Landfill, Reidsville's wastewater treatment plant, and South Durham's wastewater treatment plant.

Location	Date	Total PFAS
South Durham Water Reclamation Facility	1/12/23	3.70
Reidsville WWTP	11/16/22	43.70
White Street Landfill	1/27/23	94.3
Eastside WWTP	3/9/23	99.50
Greensboro WWTP	10/11/22	1746.3
Greensboro WWTP	2/17/22	570
Greensboro WWTP	5/22/22	463
Shallowford	8/12/18	285.5
Saxapahaw	8/12/18	545.9
Bynum	8/12/18	1076.1
Jordan	8/12/18	148.6
Pittsboro Library	8/12/18	740
Apex Library	8/12/18	66.7
East Burlington Upstream	1/16/19	51.01
East Burlington Downstream	1/16/19	107.91
South Burlington Upstream	1/16/19	26.38
South Burlington Downstream	1/16/19	18.26
Graham WWTP upstream	1/16/19	33.14
Graham WWTP Downstream	1/16/19	44.75
Bynum	1/16/19	60.30
Jordan Lake	1/16/19	61.37

Industrial Toxins

PFAS or per- and poly-florylalkyl substances and 1,4-dioxane are considered emerging contaminants.

Though every contaminant discharged is regulated by the Clean Water Act, that regulation only requires a disclosure of contaminants. Federal and state laws set narrative or numerical limits on those contaminants. North Carolina does not yet have numeric limits on discharges for surface water for PFAS. 1,4 dioxane has a narrative standard in North Carolina of **0.35ug/L** in water supply watersheds.

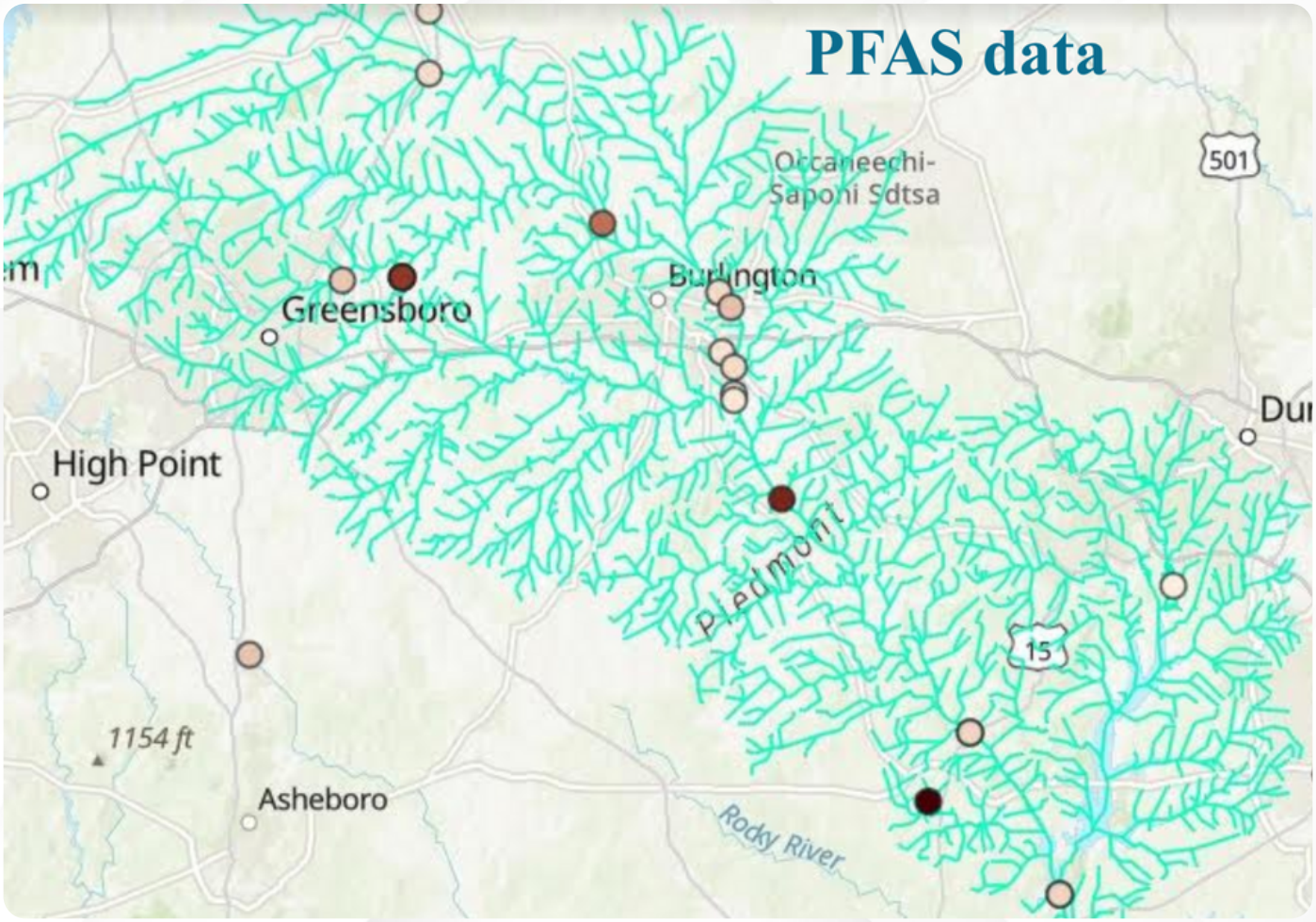
1,4 dioxane is a known carcinogen that is released in industrial manufacturing processes. Levels in our own sample data throughout the watershed have ranged from non detectable limits to 18.27 ug/L, but other lab data has shown releases as high as 1130 ug/L in samples that have managed to capture a slug of 1,4 dioxane passing through the system. North Carolina's surface water standard for 1,4 dioxane is 0.35ug/L based on the Toxic Substances Act, which prohibits the release of toxins at a rate exceeding a 1 in 1 million cancer risk.

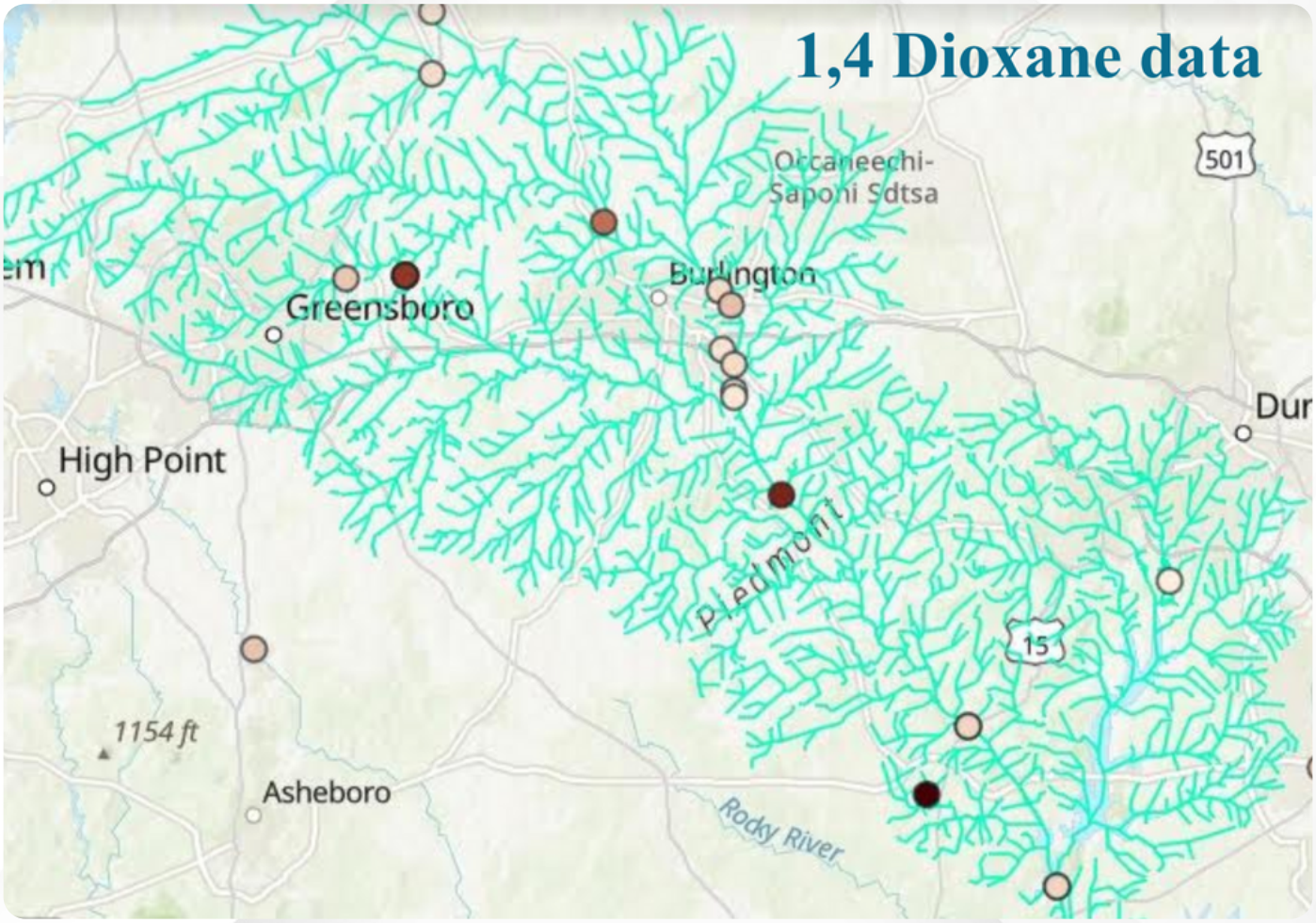
PFAS contaminants are used in a variety of productions for anything waterproof, fire resistant, stain resistant, or non-stick, such as teflon, cosmetics, textiles, and food wrapping.

Similarly, 1,4 dioxane is a compound used in plastics manufacturing, and used as a solvent for metal production, but is also found in detergents like shampoo and laundry soap. Though these toxins do get into our bodies and into our water supplies from regular household use (laundering fabrics, food wrapping, shampoo) the major pathway of contamination is from industrial users dumping massive loads of these toxins into surface water through their wastewater streams.

In the Haw River watershed, PFAS pollution has been a major concern for decades.

In 2015, we worked with researchers at EPA and NC State to identify sources of PFAS in rural areas, which led us to land applied sludge fields. Sludge is the solid waste produced in the treatment process for wastewater systems. This sludge contains mainly organic material, and is often used as free fertilizer for surrounding agricultural fields. However, when this sludge is sourced from wastewater plants that also receive industrial waste, the toxins cling to the sludge and contaminate the soil, groundwater, and adjacent streams.


PFAS data
Occaneechi-
Saponi Sdtsa
501
Greensboro
Burlington
High Point
Piedmont
15
1154 ft
Asheboro
Rocky River


1,4 Dioxane data
Occaneechi-
Saponi Sdtsa
501
Greensboro
Burlington
High Point
Piedmont
15
1154 ft
Asheboro
Rocky River

Industrial Toxins

In 2016, we expanded that research to test surface water levels throughout the Haw River basin for PFAS levels.

We tested locations in **Glencoe, Altamahaw, Saxapahaw, Pittsboro, and Jordan Lake.** We found incredibly high levels in Saxapahaw and Pittsboro.

Pittsboro is the only municipality that pulls drinking water directly from the Haw and serves over 6,000 customers through the utility. This became an urgent concern and we began working with laboratories to identify suspected sources between Altamahaw and Saxapahaw. **We found that the City of Burlington's East wastewater plant was discharging levels of over 30,000 ppt directly into the Haw.** We worked with Southern Environmental Law Center to file a notice of intent to sue the City of Burlington regarding these PFAS discharges. *That lawsuit, settled in early August of 2023, allowed us to identify the three major sources within the system and eliminate two of them.* UniChem no longer has production facilities in North Carolina and Shawmut Fabrics has transitioned to an entirely closed loop system. Elevate Textiles will transition to a closed loop system for the products that require PFAS in their medical and military productions lines and will phase out PFAS production in other production lines by 2025 with a minimization plan for the next year.

Levels leaving Burlington's wastewater plant are now around 500 ppt, which is a 600% decrease in just over three years.

Burlington is not the only source of PFAS however, and we have continued to conduct monitoring throughout the watershed to investigate sources.

In a study conducted earlier this year, we sample six locations throughout the watershed for total PFAS. We found levels of 1746.3 ppt total PFAS in South Buffalo Creek, directly below the City of Greensboro's wastewater discharge. Also in Greensboro, we detected levels of 94.3 ppt total PFAS from a stream draining the White Street Landfill in Greensboro. This stream flows into South Buffalo Creek. Other sources include Reidsville's wastewater plant at 43.7 ppt, and Triangle RTP wastewater plant at 67.8 ppt.

We continue to advocate for regulatory action and legislative policy to control these discharges. Until that is accomplished, we continue to investigate suspected sources, monitor known sources, and work with the legal team at Southern Environmental Law Center to uphold the Clean Water Act.

5. Plastics and Microplastics

Microplastics are small plastic pieces less than five millimeters long which can be harmful to waterways and aquatic life. As plastics break down over time into microplastics, they are an environmental and public health issue. Microplastics are so small that they are not picked up by water filtration and are often eaten by fish, birds, and other aquatic animals, negatively impacting their health.
The sad reality is plastic is everywhere. Plastic particles and pollution flow from our cities to our rivers and our lakes to our oceans. Every waterway in North Carolina is impacted by plastic pollution. This study will measure how big of a problem microplastics pose.

Once the trash has entered the water, it will begin the process of photodegradation. Whereby the petroleum based products such as plastics begin to break into smaller pieces known as microplastics. These tiny pieces of trash are in some instances consumed by wildlife with the majority of this debris will go on a journey that will take it through several states and rivers before finally ending up in our oceans.

Trash Traps are purpose-built stormwater litter traps. These traps sit in urban creeks and streams keeping man-made trash from entering main waterways. These devices are built to withstand the rigors of flashy rain events, yet passive enough not to harm the local fauna. Roadside littering accounts for approximately 75% of the trash in our nations waterways. Each time it rains, trash is funneled through our storm drain systems directly into our creeks. No filters or other mechanisms are in place to keep the trash from entering our waterways.

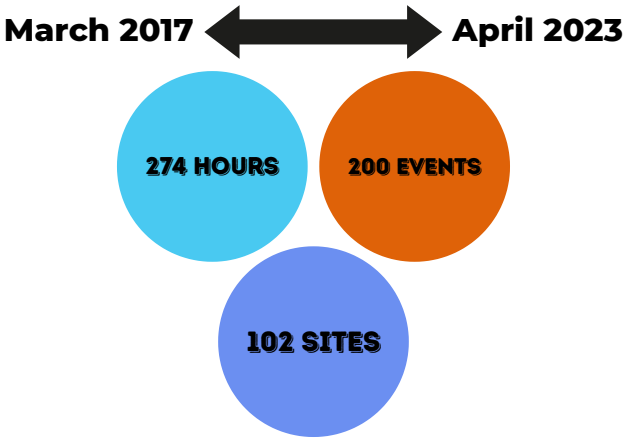
6. River Watch Project & Macroinvertebrates

The Haw River Watch Project gives us a clearer picture of the health of the Haw River by determining the type and location of pollution sources. By conducting four seasonal "snapshot" surveys per year, River Watch volunteers document water quality across the tributaries and riverbanks of the Haw.

Haw River Assembly coordinates and trains River Watch teams throughout the year across the Haw Watershed.

These teams collect valuable data on benthic macroinvertebrate populations, metrics such as pH, dissolved oxygen percentage (DO%), conductivity, air and water temperature, flow as well as report conditions such as presence of foam, odor, and erosion estimates. Benthic macroinvertebrate counting and sampling is a crucial aspect of the River Watch program, as it is a reliable and predictable indicator of biological condition, which is the most comprehensive measure of waterbody health. While state and local agencies collect this data periodically within their jurisdictions, the River Watch program collects data from a wider range of stream sites with more frequent sampling.

Between March 2017 through April 2023, there were 102 sampling sites and 200 sampling events. That represents 274 hours of river monitoring!



105 of the samples were taken from streams within municipal boundaries, and 95 were taken from streams outside of municipal boundaries. These sites monitor 54 distinct streams or river sections. 65 samples were from streams appearing on the 2018 303d list of impaired waters. 68 monitoring events reported total macroinvertebrate scores of <11 or "Poor." Of these sites with total scores <11, 65% were at sites within municipal boundaries or classified as urban.

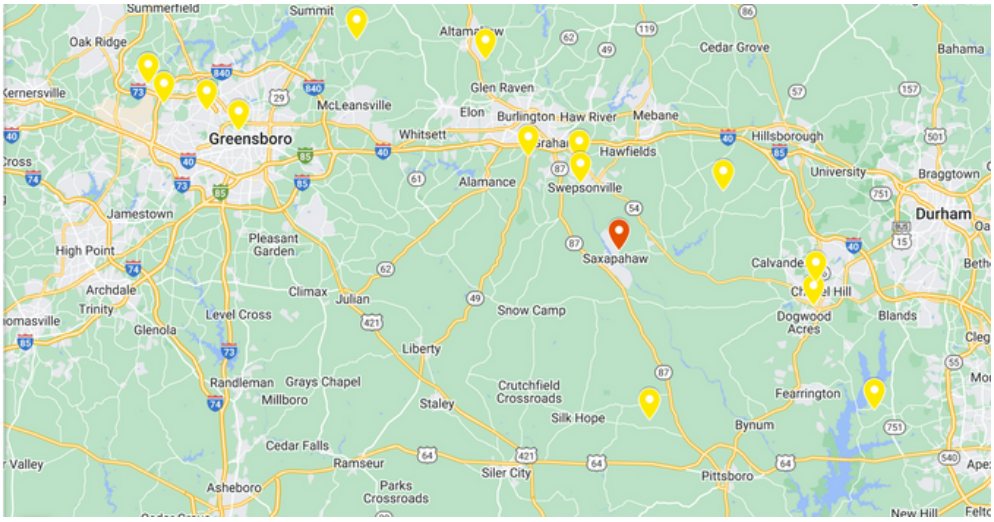
River Watch Project & Macroinvertebrates

In 2021, there was only a single stream site with score below 11, at Folkner Branch, a creek which joins the New Hope River at Jordan Lake. It is outside municipal boundaries, and classified as rural for the purposes of this report.

Using publicly available data from NCDEQ and county sources, there is a minor non discharge permit and also a non discharge land application field permit within or adjacent to the area that Folkner Branch drains.

A larger study and more robust testing would help determine if these sources we identified are affecting conditions at Folkner Branch, but it is understood that even relatively small amounts of pollution can impact aquatic life in smaller waterways.

- Shallowford Trail
- Folkner Branch
- Team Raven
- Splash Puppies
- Eric Kirk
- Stephanie Willis
- Piedmont Plateau Group Sierra Club
- Piedmont Plateau Group Sierra Club
- Moes creek
- Stansberry
- NC- Where I Belong
- NC- Where I Belong
- Bug Finders
- Little Alamance at Maple
- Kernodle



2022 River Watch results differed from the previous year, not only in the amount of data but in geographic coverage and water bodies monitored.

24 of the 37 stream sites within municipal boundaries, urban areas, had total macroinvertebrate scores below 10, while 7 of the 23 stream sites outside of municipal boundaries had scores below 10.

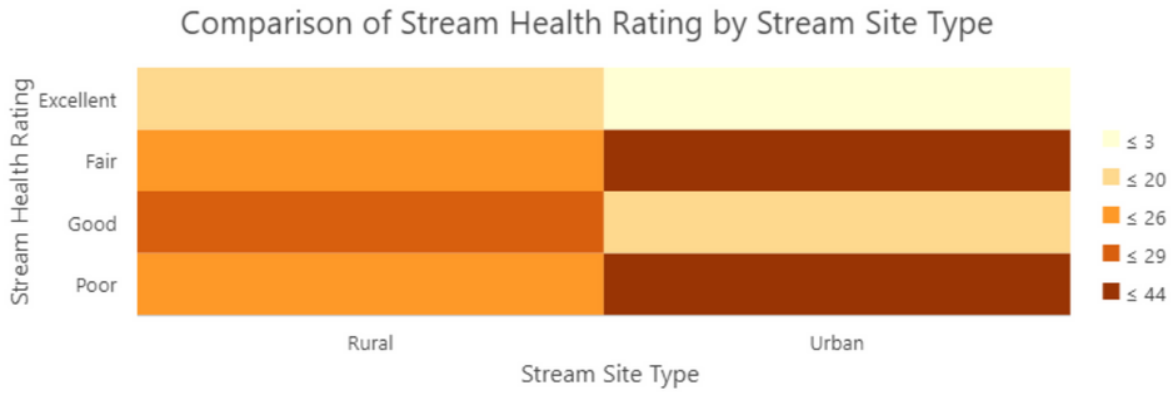
An example case of a lower scoring stream in 2022 was Bolin Creek. This waterway runs through Carolina North Forest and is largely a residential area, but is just south and partially downstream of Horace Williams Airport. The creek also flows near a coal ash dump site which has yet to be properly remediated. We believe the coal ash is likely from the UNC Power Plant. This area was used between the 1950s-1970s. *Contaminated groundwater at the site was found in 2014 and eventually this groundwater will infiltrate into Bolin Creek and elsewhere.* Again, a larger, longer-term study and more robust testing could provide conclusive evidence of contamination, but the River Watch program can indicate where such testing could take place or the streams most in need of restoration or remediation.

River Watch Project & Macroinvertebrates

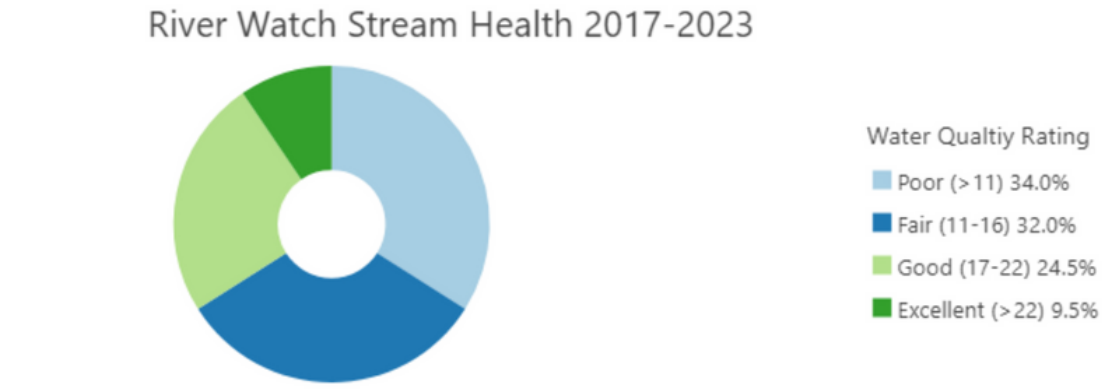
At the other end of the spectrum, the stream sites with the highest total macro scores varied among urban or rural settings. These were all relatively distant and never near any concentration of known contamination sources as listed by NCDEQ.

This was true for sites that were near a major road or state highway. Once again, *a series of larger studies could likely find correlation or potentially causation between these total macroinvertebrate results and proximity to these various contamination sources.* River Watch is limited as a program by equipment, laboratory access, time and many other factors, but as an indication of general stream health, it is very useful and collects more data at more times of the year at more sites than is possible for state or municipal agencies to collect. This data can help guide new restoration efforts or point to areas where deeper study would be beneficial.

Below, this graph indicates the health of streams located in rural areas vs urban areas. The darker colors indicates poorer health of the stream.



Based on our macroinvertebrate surveys of streams between years 2017 to 2023, less than 10% of those streams were rated with excellent health. 34% of those streams were in poor health.



Water quality rated using total index value of macrointertebrate count at sampling event.

HAW RIVER ASSEMBLY SOLUTIONS: OUR PROGRAMS



- **Educating the Public & Strong Local Advocacy**
- **Community Collaboration and Coalition Building**
- **Monitoring and Evaluation of Progress**
- **Providing Opportunities for Public Social and Civic Engagement**

SOLUTIONS: OUR PROGRAMS

Riverkeepers, non-governmental environmental organizations and concerned private citizens have long been integral to monitoring and addressing sediment pollution and erosion issues in the state of North Carolina.

Landowners and community members are often the first people to notice localized impacts while conservation and water quality groups conduct periodic and on-going sampling throughout the year. This is especially important for smaller streams, tributaries, drainage areas or retention basins that may not be part of regular county or state sampling and monitoring plans and where sediment issues can initially develop. HRA responds to community member tips and complaints, tracks and investigates various sites and submits reports to regulators and decision-makers.

Many of the water quality issues in the Haw watershed are complex and require legislative mandates, regulatory agency enforcement and strong local advocacy to remedy. Haw River Assembly continues to work on policy efforts with state and local community members. ***This is an invaluable role for communities in our watershed to play.***

SOLUTIONS: OUR PROGRAMS

We have expanded our litter trap program.

With our Trash Trap program, we install litter traps in urban streams, capture the litter to prevent it from reaching the Haw and breaking down into microplastics and analyze the litter we collect to use those metrics for advocacy work.

From June 2022 to June of 2023, we collected **15383 pieces of styrofoam** from our litter trap in Third Fork Creek in Durham. This accounted for 85% of trash we collected. In North Carolina, many bills have been introduced to ban styrofoam in food packaging, but none have passed. This information shows us what local or state governments could do to curb the majority of the trash that we see in our streams. We now have 10 traps throughout the watershed. This program depends on volunteers to help us with the clean outs.

Additionally, there is so much that we can do to monitor and improve water quality on our own.

Haw River Assembly works with parks, conservation organizations and private landowners to conduct stream restoration projects. These projects allow us to give a stream access to a floodplain, plant native plants into stream banks to establish root structure and prevent erosion and replace invasive plants with natives to provide habitat for wildlife. By hosting these projects for our watershed, we are also improving water quality. The plants hold in sediment and nutrients, allowing sensitive macroinvertebrates to thrive in the newly protected aquatic habitats.

THANK YOU!

The work we do could not happen without our members and supporters in the watershed. We look forward to continuing our work to make the Haw River better than we found it, together.

Whether it's cleaning up the river in our Spring Clean-Up-A-Thon, lobbying in Raleigh, taking a stroll or run in our annual 5k Island Ramble or monitoring streams across the watershed, we would love for you to join our efforts to restore and protect the Haw River and Jordan Lake watershed.

Haw River Assembly relies on our members, our volunteers and our communities to protect the watershed through volunteer programs, watershed stewardship projects, through advocacy works and paid membership and donations.

Please consider becoming a member and taking an active role in protecting these places we love.

Please sign up for our weekly newsletter “Voice of the Haw” and become a member to get the latest news on how to make your voice heard on behalf of the Haw River.