



STORMWATER steward

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at a
glance

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WETLANDS AND WATER QUALITY

Wetlands sound self-explanatory, in fact, swamps and marshes are the most common images that usually come to mind. The common misconception is that as long as the land is saturated with water, it is considered to be a wetland. However, there are 3 main criteria when it comes to classifying wetlands. Those criteria include the type of soil present, the plant composition, and finally, the hydrology (water source) present in the area. Wetlands have very hydric soils, meaning these soils are either saturated with water for the whole year or only particular seasons. They can also be comprised of all types of vegetation that then work to attract pollinators and wildlife into the habitat. Wetlands are a very special type of habitat and have become more of a public concern due to the roles they play in an ecosystem, especially when it comes to water quality.

Riparian Wetlands

In North Carolina, a very common type of wetland is called a riparian wetland. These areas can be slender and are typically alongside streams. Due to their location, riparian wetlands receive runoff from upland areas. That runoff has to go through these areas before it

can reach the nearby stream or closest water body. This is when wetlands do their part in benefiting water quality. These upland areas can be urban or rural, and the runoff from these areas is typically carrying pollutants such as nitrates, phosphates, oil, and more. Luckily, riparian wetlands have been shown to reduce pollutants that could be entering a stream, such as Nitrate-Nitrogen from agricultural areas. As this flow runs through the riparian wetland, the vegetation present works to filter that runoff. Runoff can carry other pollutants as well, such as sediments from recently developed areas or construction sites. This is considered to be the number one source of pollution in North Carolina's waters. This is due to the fact that sediment can contain excess nutrients, as well as possible chemicals and toxins. This excess sedi-

ment can effect water quality parameters, such as turbidity. Turbidity refers to how clear or cloudy a water body may be, which is dependent on the amount of sediment present. When sediments are being carried with runoff, it is beneficial for a wetland to be more heavily vegetated. Dense growths of vegetation slows down the runoff, therefore allowing more time for the sediment to be deposited into the wetland as opposed to the nearby stream. By slowing down the runoff, wetlands can also reduce the potential of flooding in an area. Overall, wetlands can be viewed as a natural water filtration system for the environment. To learn more about wetlands, visit <https://deq.nc.gov/about/divisions/coastal-management/coastal-management-estuarine-shorelines/wetlands>



By BayLand Consultants & Designers Inc., <http://www.baylandinc.com/services/streams>

Did you Know?

There are only 5 known breeding populations of the Cape Fear Shiner (USFWS)



By Richard G. Biggins, USFWS

There are 300 freshwater mussel species, and 70% are threatened, endangered, or at-risk (USFWS)



By Kevin S. Cummings

BIOINDICATORS: CHECK OUT THOSE TINY CRITTERS!

What are bioindicators, and why are they important? Bioindicators can be processes, organisms, or communities that send a message about the health of an ecosystem. Their reactions to natural or non-natural stressors can tell us about what's affecting the environment. Natural stressors can include anything from a drought to overall climate changes. Non-natural stressors, which are also defined as anthropogenic disturbances, can include pollution (including nonpoint source), increased land development, as well as overfishing. Bioindicators can be as large as a species of fish, or as small as a species of mussel or macroinvertebrate. Freshwater mussels are very intolerant to high levels of pollution, and are therefore seen as bioindicators. Mussels do a great job of filtering out water in rivers and streams,

thus improving the overall water quality. Similar to mussels, macroinvertebrates vary in their tolerance to pollution.



Salamander species

By Stormwater SMART

Certain groups can withstand moderate to high levels of pollution, while other groups cannot. In the waters of North Carolina, pollution and land use changes can have varying effects on the ecosystems and the organisms that inhabit them. Increased amounts of sediment entering water can clog up the gills of a fish, or even suffocate their eggs. The Cape Fear Shiner, which is en-

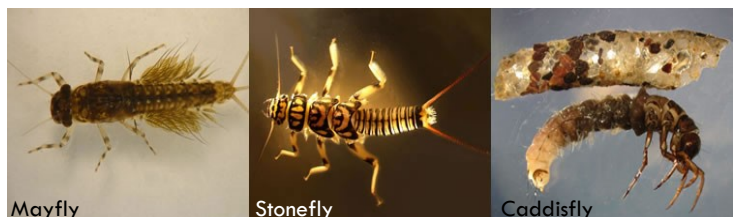
demically to the Cape Fear river basin, is currently listed as federally and state endangered. Due to its specific location, studies have shown that their decrease in population could be linked to the construction of dams or other forms of land use change in the area. Bioindicators tend to be sensitive to changes in water quality parameters that can all be influenced by pollutants being carried with storm water runoff.

These pollutants can include sediment, nitrates, phosphates, trash, and more. With the help of bioindicators, we can assess what is harming our ecosystems and work towards preventing further damage. To learn more about bioindicators, visit: <http://www.nature.com/scitable/knowledge/library/bio-indicators-using-organisms-to-measure-environmentalimpacts-16821310>

THE EPT INDEX

When it comes to analyzing water quality through the use of bioindicators, biologists like to use what is called the EPT Index. This index refers to three specific types of macroinvertebrates that are highly intolerant to water pollution. The EPT Index includes Mayflies, found in the order Ephemeroptera, Stoneflies, found in the order Plecoptera, and Caddisflies, found in the order Trichoptera. Thus, giving biologists the acronym "EPT". These organisms can only be found in water of potentially good quality with little to no pollution. Other factors can affect their presence such as their mobility, feeding

habits, and life spans. If you take a trip out to the closest stream near you, you can check to see if you find any of these tiny critters! Their presence can tell you a lot about the water quality around you.



Mayfly

Stonefly

Caddisfly

DUKE COAL ASH SPILL: WHERE ARE WE NOW?

On February 2, 2014, coal ash waste began spilling from one of the coal ash ponds at Duke Energy into the Dan River near Eden, North Carolina. Coal ash is what is left-over after coal is burned for energy. It contains chemicals such as arsenic, mercury, and lead, all of which are harmful if they enter our waters and come into contact with the environment (EPA). It was estimated that 39,000 tons of coal ash and other chemicals were spilled, contaminating up to 70 miles of the Dan River. The source of the spill was pinned down to the collapse of a rugged metal stormwater pipe that ran under the ash ponds at Duke Energy. Eventually, the spill was plugged up with concrete and the clean up of the aftermath ensued. When coal is



By Appalachian Voices



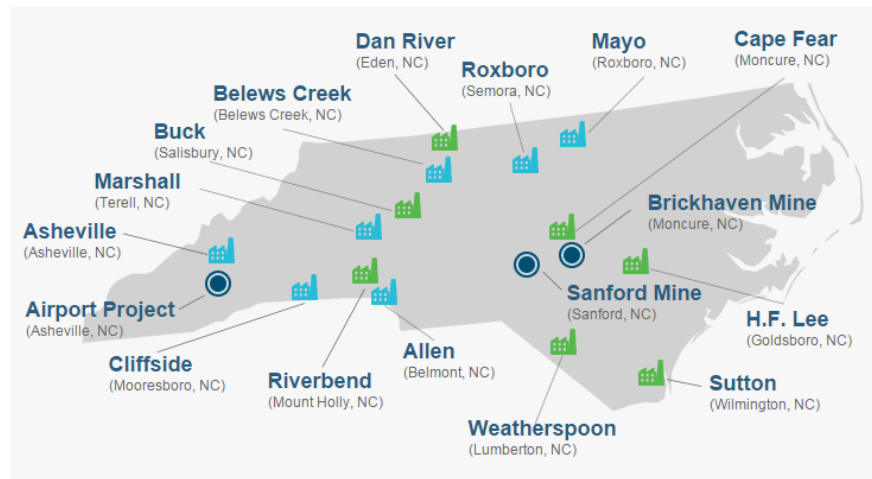
By Waterkeeper Alliance

combusted, it becomes what's called fly ash and bottom ash (Matthew Cully). Both of these forms of coal ash can be stored as dry ash in a landfill, or stored in water in ash basins, similar to the ones at Duke Energy.

Time has passed and it's almost 3 years later, but where are we now? Due to the spill, a law was passed by the General Assembly that requires Duke Energy to close all of its coal ash ponds statewide by the year 2029. In July of 2016, a Clean up Bill was passed that applies to 7 out of the 14 plant sites within the state. This bill requires Duke Energy to provide drinking water to residents living nearby those plants, while simultaneously drying out their coal ash ponds and "capping them in place" (Utility Dive). Duke Energy was also fined for

being in violation of the federal Clean Water Act. Now as for Dan River, it has improved and is no longer being tested for threats to human health from contaminants of the coal ash spill. However, there is no way to definitively remove all of the coal ash from the Dan River. By this time, the coal ash has spread along many miles and mixed in with sediments, but there is no longer any imminent threat to humans or wildlife residing in the area. Steps are also being taken to regulate more storage areas of power plants in North Carolina to avoid another occurrence like this from happening. To learn more about the Duke coal ash spill, visit: <https://www.epa.gov/dukeenergy-coalash/frequently-asked-questions-faqs-about-duke-energy-coal-ash-spill-eden-nc>

Look at the map below to see where all 14 Duke Energy plant sites are located in North Carolina. The sites in **green** are retired plant sites, and those in **blue** are still operating plant sites.



By Duke Energy

GET INVOLVED: HAW RIVER CLEAN UP

Davidson County
Randolph County
Rockingham County
Archdale
Asheboro
Burlington
Elon
Gibsonville
Graham
Green Level
Haw River
Lexington
Mebane
Oak Ridge
Summerfield
Randleman
Reidsville
Thomasville
Trinity

Calling all volunteers! Coming up on March 18, Stormwater SMART will be taking part in the 27th Annual Haw River Clean-up. The purpose of this clean-up is



By Haw River Assembly

to improve various sites throughout the Haw River watershed. We encourage you to bring your family and friends, the more, the merrier! Groups can create their own team or join an existing one. There's nothing more satisfying than physically seeing how much you're improving your watershed. If you want to make it a competition,

you can try and see who can collect the most trash! So come on out and join Stormwater SMART and the Haw River Assembly and help defend and clean the Haw River. You can visit <http://hawriver.org/projects/river-cleanup/> for more information about the event, or you can contact emily@hawriver.org directly for further details. We hope to see you out there!



By Haw River Assembly

LOOK FOR STORMWATER SMART AT AN EVENT NEAR YOU

March 18 - Haw River Clean Up

March 23 - Lexington Rain Garden Workshop

April 19 - Earth Day Event Sponsored by Lexington High School's Planet Earth Club

April 22 - Earth Day at the Zoo

April 22 - Mebane Dogwood Fest

May 2017 - Summerfield Founders' Day

June 3 - Oak Ridge RidgeFest

July 30 - August 4 - STEM X Camp



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Stormwater SMART was created by the Piedmont Triad Regional Council (formerly Piedmont Triad Council of Governments) to help Phase II communities comply with National Pollution Discharge Elimination System (NPDES) and Jordan Lake Public Education and Outreach requirements. Stormwater SMART is supported through dues paid by member governments.