



SWIMMING WITH THE FISHES OR LOVING YOUR STREAM TO DEATH

Wendi Hartup, stormwater
manager

DEALING WITH THE PUBLIC

Myths

Active Activities

Passive Activities

Streambank Stabilization Myths

Round-up (herbicide) will beautify and stabilize my creek??



Streambank Stabilization Myths

Dumping scrap concrete, asphalt, etc. will stabilize the creek? Grass clippings will hold the bank right?



CREEK MYTH: CREEKS STAY THE SAME.



- 96 ac watershed
2 small creeks
joining on property
from culverts to a
single culvert

AERIAL TIME LAPSE SPOILER ALERT...NATURE CHANGES!



MYTH... RIPARIAN PLANTS ATTRACT SNAKES!



<https://shoulpix.wordpress.com/>



THANKS FOR LOVING THE CREEK??

These sticks aren't construction stakes???. A parks crew pulled out all the livestock stakes along a small stretch of stream! It was a project of public works but communication is always key.

Had to replace 500-1000; guess who got to help put them back?!!!

Parks mows all the way to edge of stream. Nice and neat with no scary people hiding there.

Buffer rules required a replanting but to compromise...thinned shrubs and chose shorter plants.

ACTIVITIES...

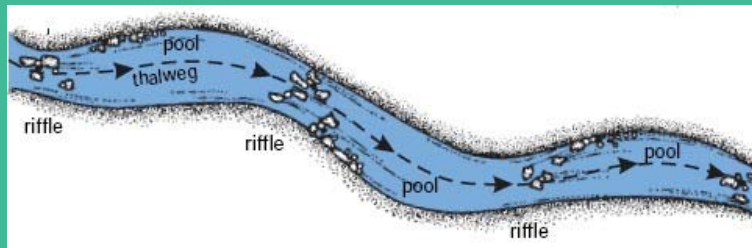
LIVING STREAMS

Intro to Stream Ecology

Macroinvertebrates as bio-indicators

Sample for critters

Discuss impacts on critters



Photos: Dave Penrose

BACKYARD BUFFER





Reedy Fork cleanup = 2680lbs



Planting Party at the Park



Stream Trailer

- 25 organizations involved in County
- 30 events: films, fly-fishing demos, green roof lecture creek crawls, and volunteer service projects.

STREAM SIMULATION TRAILER COMPLETED

11/1/16

CALEB'S CREEK KINDERGARTEN (100)
TOK PUBLIC SERVICES DAY



WE USE IT EVERYWHERE!

PLANT PARTY AT THE PARK

More than 1000 plants planted: *Aesculus pavia*, *Caltha palustris*, *Carex lurida*, *Chionanthus virginicus*, *Cornus amomum*, *Cymophyllus fraserianus*, *Echinacea purpurea*, *Fothergilla gardenii*, *Halesia carolina*, *Halesia diptera*, *Hamamelis vernalis*, *Hamamelis virginiana*, *Hymenocallis caroliniana*, *Iris cristata*, *Iris versicolor*, *Iris virginica*, *Juncus effusus*, *Lobelia elongata*, *Lyonia lucida*, *Packera obovate*, *Pediomelum subacaule*





March 2017



6 months later



April 2018



6 months later



STREAM PROJECTS

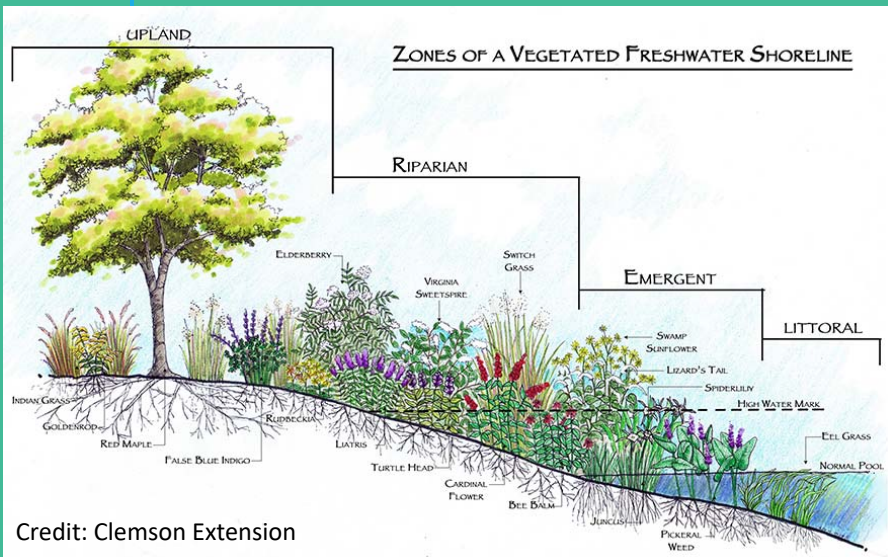
Oct 2016 –AWARDED CWMTF stream restoration grant \$400,000

- Livestake install, small-scale streambank repair, construction workshop with Cooperative Extension

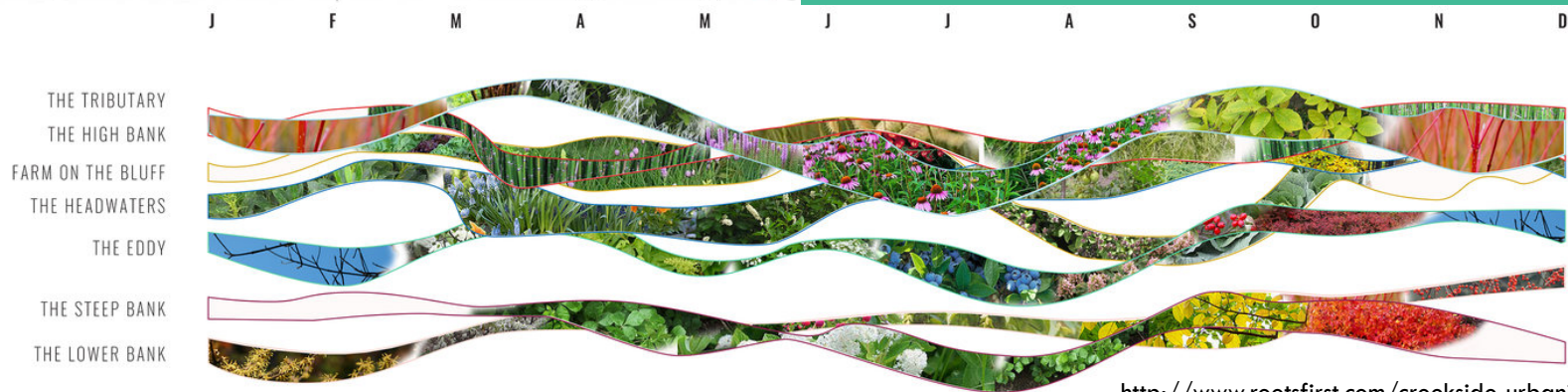
Fall 2018 construction begins for Town's first stream restoration (using design-build team)

GOALS: every project will have an education component and signage

PLAN FOR SEASONAL COLOR IMAGINE DISNEY FILMING AT THE SHORELINE



Credit: Clemson Extension



<http://www.rootsfirst.com/creekside-urbanisim>

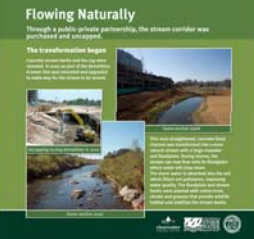
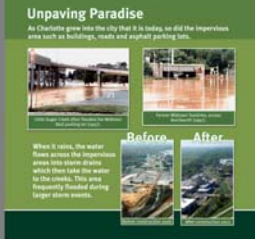
Returning To Nature

The uncapping of Little Sugar Creek was the first step to restoring the living system in the creek. To be healthy, a stream needs sunlight, shade, a clean source of moving water and native plants. Those plants serve as a buffer that filters pollutants and provides protection for wildlife.



Uncapping the Stream

In 1999, Charlottesville Mall opened at this site and became the first enclosed mall in the region. Little Sugar Creek was enclosed with concrete, walk and a parking lot on top of the stream.



Restoring A Stream

This section of stream was long neglected and overgrown with invasive plants such as kudzu and Japanese Honeylocust. Concrete, bricks and debris in the stream were removed.



Enjoy the benefits of a restored Kelsey Creek!

Cleaner water & more wildlife habitat
The rocks, riffles, and pools in the creek, along with the plants on its edges, help slow down and filter its water. They also provide wildlife habitat in the water and along the streambanks.

Better safety & more fun!
The creek's stabilized streambanks make it safer for us to walk to the water's edge and there is so much more to see and enjoy in a healthy, diverse ecosystem.

BEFORE AND AFTER RESTORATION OF KELSEY CREEK

Restored stream and floodplain eliminate unsafe conditions. Restored vegetated floodplain slows, stores, and cleans water. Restored floodplain provides space for waterfalls to drop out.

NATIVE PLANTS THRIVING ALONG THE RESTORED CREEK

Olive cutthroat, Wild bergamot, Black-eyed Susan, Cardinal flower, Giant bluebell, Hairy woodpecker, Great blue heron, American pond-turtle

LET'S KEEP KELSEY CREEK HEALTHY!

Try to avoid stepping on the vegetation.
The trees, shrubs, grasses and wildflowers along the creek help keep the stream system stable and healthy.

Volunteer!
Look for opportunities to participate in stream clean-ups, plantings, and weed pulling events.

Please pick up after your pets.
Leashed pets are welcome in Kennedy Park, but their waste can pollute the creek.

Reduce or eliminate fertilizers & pesticides.
Rain that flows onto your lawn likely ends up in Kelsey Creek. With it can come any chemicals you apply.

Help keep polluted water from entering the creek.

- Plant native trees, shrubs and wildflowers in your yard to absorb and slow down rain that might otherwise flow into the creek.
- Capture rain from your downspouts in a rain barrel or rain garden.

Logan Center, RAP, NCDWR, The Blue Mountain, hio

All pics provided by friends

Talk Around Town

"I just wanted to thank you for the new signs your group has installed around town naming the creeks. I have thoroughly enjoyed hearing the names of all the little creeks that are in this county as I drive around. My kids and I got a kick out of Bush Creek which we pass on the way to school each day, we never even knew a creek was there."
 —Jenna Nichols, Apple Haulford

"This has been a really fun yet challenging project. I've lived in Santa Cruz almost my entire life and was amazed to learn that there were creeks right near my home that I didn't even know existed, let alone their names."
 —Ange Quast, Conservation Program Specialist, Resource Conservation District

"The City of Santa Cruz, whose drinking water is supplied primarily by surface water from local creeks, has been especially interested in building awareness of our local water resources — not only amongst residents, but also among emergency responders and other natural resource management agencies who are tasked with their day-to-day protection."
 —Chris Searl, Water Resources Manager for the City of Santa Cruz

"It is critical that residents develop appreciation for where their water comes from and where it goes in order to protect water sources and reduce harmful impacts."
 —Katie Miller-Hessman, Director for Santa Cruz County Watershed Health Program

"I've learned so much about the creeks from the nice blue signs that I've seen lately. It's made me more curious so now I wish all of them were labeled."
 —Oliver Davidson, 10-year-old

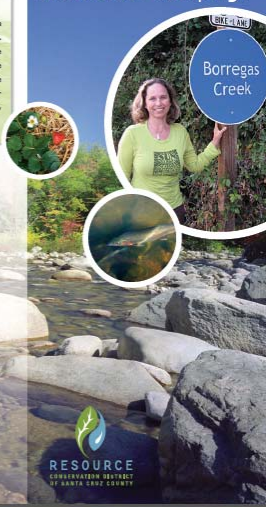
What's a Watershed?

The term watershed describes an area of land in which all water flows downhill to a single point. The water moves through a network of drainage pathways, both underground and on the surface. Generally, these pathways converge into streams and rivers, which become progressively larger as the water moves downstream, eventually reaching the ocean.

Contact information:

Resource Conservation District of Santa Cruz County
 820 Bay Ave, Ste 128
 Capitola, CA 95010
 Phone: 831.464.2950
 Fax: 831.475.3215
 Email: info@rcdscantacruz.org
 Web: www.rcdscantacruz.org

Watershed Awareness Campaign



Hope Park Branch Stream Restoration Project

Over time streams can be negatively affected by development and other urban land use practices. Streams erode and change pattern to adapt to changing surroundings. Stream restoration is the process of taking a stream back to its natural condition based on current and future watershed conditions.

An important component of stream restoration is stabilizing the stream banks to reduce soil erosion. The best way to make sure that the stream banks do not erode is to plant lots of vegetation along the banks. The roots of plants grow deep into the soil and hold the soil particles in place. The more vegetation along a stream bank the healthier the stream environment.



Vegetation along stream banks also filters out harmful pollutants from runoff and shades the water in the stream so that fish stay cool. Certain plants can also provide food and shelter for songbirds, butterflies and other wildlife..



What can you do?

- Never dump trash or litter in the stream or down a storm drain.
- Keep vegetation growing naturally along the banks of the stream.
- Call 704-336-RAIN to report blockages or drainage problems.

All pics provided by friends



**Bolin Creek Watershed Restoration Project
 Baldwin Park + Carrboro/Chapel Hill, NC**

Project Description: Funding from EPA 310 grant to the Town of Chapel Hill in partnership with the Town of Carrboro and the NC State University Stream Restoration Program for design, construction, materials, and plants to repair stream erosion, enhance in-stream habitat and dissolved oxygen levels, improve overall water quality in Bolin Creek, and eliminate invasive plant species in the stream buffer. This project is one of three restorations in Carrboro and Chapel Hill to improve water quality in the Jordan Lake Watershed.

BEFORE

Before the project, **EROSION** created large cuts in the streambed and bank, destroying property and sending tons of sediment into Bolin Creek. Sediment hams stream habitat, carries pollutants, clogs gills of aquatic life and can increase water temperatures.

AFTER

A series of in-stream "step-pools" were constructed with large granite blocks to reduce erosion on the banks and to improve in-stream habitat by providing riffles and pools to support a diversity of aquatic life.

BANK RESHAPING angles the banks back to reduce the energy of water during high flows, and prevents further erosion of the banks. After reshaping, stream banks were covered with natural fiber matting to prevent erosion, then planted with native trees and bushes.

Stormwater from the street's drains will flow into a **BIORETENTION CELL**, or engineered rain garden, instead of directly into the creek. This will reduce erosion, slow water, recharge groundwater, and allow pollutants to be filtered through soil and plants.

INVASIVE PLANTS outcompete native trees and vegetation so were removed from the restored area. Native species were planted to stabilize banks, provide shade to reduce water temperature, and offer specific food sources for aquatic life. Native plants will also provide privacy for homeowners while requiring little maintenance.



Besides us, who depends on Kelsey Creek?

This stream, and the forest that exists along its edges, provide habitat-food, protection, and homes for many different animals and insects. Several types of wildlife habitats exist along Kelsey Creek.

Riffles and pools

Riffles (rocks and pebbles across the stream) provide habitat for fish like dace and darters, which like foraging near, and stay riparian animals (macroinvertebrates) they eat. Pools provide protection and shelter for species like sunfish and common bluegill, which prefer still water.

Riparian (streamside) forest

Forests are like wildlife "highways" that help animals travel from one patch of woods to another. Animals and birds depend on the trees and shrubs for food, and shelter, while fish and aquatic insects need the shade and cover they provide. Without these forests, many amphibians and reptiles would not survive.

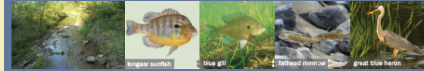
Floodplain and scrub/shrub forest

The floodplain serves along the stream provides a place for water to flow during heavy rains. They also provide critical habitat for fish and wildlife. The benches in the picnic grove, a "floodplain forest," will be dominated by large oaks, shade trees such as cormorant, yucca, and swamp white oak. The benches near the baseball fields is a "scrub/shrub forest." Densely planted with shrub willows and dogwoods, it will provide sought habitat. During floods, both benches provide flood control as well as refuge for fish.

Wet meadow

Wet meadows are wetlands where the soil is typically moist, but for most of the year, there is no standing water. Many water-loving wildflowers, grasses, reeds and sedges that thrive in these wetlands are habitat for insects, pollinators, and ground birds.

RIFFLES AND POOLS WILDLIFE



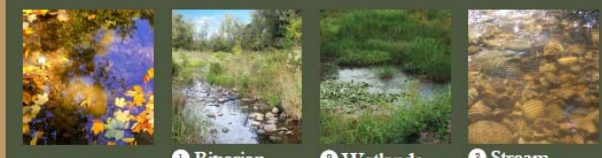
RIPARIAN (STREAMSIDE) FOREST WILDLIFE



FLOODPLAIN AND SCRUB/SHRUB FOREST WILDLIFE



WET MEADOW WILDLIFE



1 Riparian

The riparian area is the land adjacent to the stream. Riparian areas are important for many reasons. They provide habitat for many species of plants and animals. They also provide shade and cover for the stream, which helps to keep the water cool and oxygenated.

2 Wetlands

Wetlands are areas of land that are saturated with water. They provide habitat for many species of plants and animals. They also provide shade and cover for the stream, which helps to keep the water cool and oxygenated.

3 Stream

The stream is the body of water that flows through the riparian and wetland areas. It provides habitat for many species of fish and aquatic insects. It also provides shade and cover for the stream, which helps to keep the water cool and oxygenated.



ROSE RUN STREAM RESTORATION RIPARIAN ENHANCEMENTS



1 Dam Removal

Dam block fish migration, promote the buildup of sediments, and negatively impact aquatic habitat and water quality. Removal of the dam restores natural water flow and stream habitat in McKenna Creek.

2 Pools

Pools are typically found on the lower edge of stream meanders. They provide deeper areas with slower currents. Fish seek refuge and feed in the shaded, slower moving waters of the pools.

3 Riffles

Riffles form in shallow, straight areas between pools. The first current making over the rocks helps oxygenate the water. Riffles provide refuge for insects, and provide feeding and spawning habitat for fish.

4 Riparian

The riparian habitat is the vegetated area along the stream. This area serves as a natural filter for pollutants and provides wildlife habitat. Pollinating and ground birds also benefit from the shade and cover provided by the trees and shrubs.

5 Wetlands

Wetlands are commonly found in floodplains and provide important habitat for amphibians, birds and other wildlife. Wetlands improve water quality by filtering and absorbing sediment and pollutants from runoff.



The objective of the McKenna Creek Dam Removal and Stream Restoration Project was to restore, enhance and protect McKenna Creek for the benefit of the environment and the community.

MCKENNA CREEK RESTORATION



Restoring Kelsey Creek

A healthy stream has lots of riffles, steps, and pools. Riffles are shallow areas where water runs fast over pebbles and rocks. Steps, stable miniature waterfalls, are found in steeper areas. Pools, which are deeper, slow down fast moving water giving sediment a chance to settle to the bottom. These features, along with woody debris, boulders and native plants, create many different kinds of wildlife habitat.

Why does Kelsey Creek need to be restored?

Human impacts on the Kelsey Creek Watershed have caused the stream to lose much of its natural function. Increases in the amount of impervious area, such as pavement and buildings, have caused increased storm runoff. This has resulted in severely eroded, dangerously steep streambanks. There is little habitat here, and very little opportunity for stream water to seep to floodplains and slowly seep into our groundwater, where it is needed.

Restoration = cleaner water, improved habitat, stable banks, and natural beauty.

Adding riffles, pools, and other natural streambank features to the stream helps slow down the water and prevent the banks from eroding. The water will be clearer as sunlight will reach aquatic plants, and fish underwater rocks will become homes for aquatic insects, rather than eroding soil. With new pools and floodplains the stream "holds" more water, which can seep into the ground and be used by plants instead of rushing past.

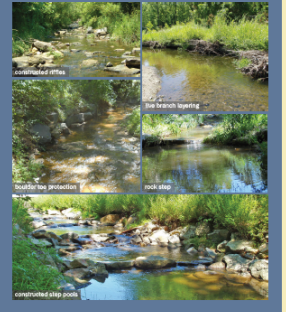
A HEALTHY STREAM NEEDS A HEALTHY FOREST!

Riparian (streamside) forests do important work. They shade and cool the water, help keep soil in place, provide wildlife habitat, and filter and clean our water. Restoring native plants and ecosystems will help the forest get back to work providing these services to our community.



HOW DO YOU "RESTORE" A STREAM?

Having a degraded stream requires some very special construction techniques.



SYCAMORE RUN STREAM RESTORATION



The Sycamore Run Stream Restoration project was a joint effort of a partnership between the City of Columbus and the Columbus Watershed Commission. The project was funded by the City of Columbus and the Columbus Watershed Commission. The project was a joint effort of a partnership between the City of Columbus and the Columbus Watershed Commission.

CLOVER GROFF RUN STREAM RESTORATION



A HEALTHY STREAM IS CONNECTED TO A BALANCED ECOSYSTEM. THE RESTORED CLOVER GROFF RUN STREAM CORRIDOR INCLUDES SEVERAL KEY FEATURES:

- RESTORE:** Remove stream bank trees that are dead or dying to improve water flow and reduce sediment input.
- WETLANDS:** Install bank and streambank vegetation to help stabilize banks and improve water quality.
- FLOODPLAIN:** Install bank and streambank vegetation to help stabilize banks and improve water quality.
- PROTECT:** Install bank and streambank vegetation to help stabilize banks and improve water quality.
- HABITAT:** Install bank and streambank vegetation to help stabilize banks and improve water quality.

All pics provided by friends

DON'T BE AFRAID TO USE EYE-CATCHING SIGNAGE



FACT SHEETS & BROCHURES

THE DO'S AND DON'TS WITHIN STREAM BUFFERS

YOU DON'T NEED A PERMIT TO...


- Do ordinary maintenance of yards (i.e. mowing an existing lawn but no clearing vegetation to sod a new lawn)
- Plant and maintain home gardens (however, if clearing of vegetation is required to prepare area for garden, a permit must be obtained)
- Do agricultural production and management (where agriculture is a permitted use)
- Cut firewood for homeowner's personal use (i.e. fewer than two cords per year) provided that no live trees are removed within 25 feet of bank
- Do routine repairs and maintenance of existing driveways and utilities.

YOU DO NEED A PERMIT TO...

- Construct a home, an addition to a home, and/or accessory structures like detached garages, storage buildings, etc.
- Construct new drives, parking or utilities.
- Construct decks, pools, patio areas, fences and walls.
- Excavate and/or fill an amount of dirt that equals or exceeds 10 cubic yards (a standing clothes washing machine roughly represents the volume of 1 cubic yard).
- Clear any vegetation which alters the nature and characteristics of the site's existing vegetation, even if the purpose is to clear invasives and/or restore a natural vegetated buffer.


YOU SHOULD NEVER...

- Remove living trees within 25 feet of the bank, except to construct a permitted stream crossing.
- Install septic tanks or septic tank drain fields.
- Handle or store hazardous or agricultural wastes.
- Apply fertilizers or pesticides.



The stream buffer is protected for 75 feet from the top of the bank on both sides of the stream. Measure this length by placing a stake at the very top of the stream bank. From there, tightly pull a measuring tape horizontally out to 75 feet. If you have any questions about an activity within the stream buffer, call the Athens-Clarke County Planning Department at (706) 613-3515.


<https://www.athensclarkecounty.com/3105/Stream-Buffers>




Blenheim

Storm Drainage Improvement Project


June 2018




1 month
post construction



6 months
post construction



1 year
post construction



2 years
post construction

Dear Resident,

Construction for the Blenheim Storm Drainage Improvement Project is complete and all outstanding items have been addressed. We will continue to monitor the project during the next 12 months as part of the warranty phase.

As part of the project, vegetative stream buffers and a wetland area were created. These natural areas remove pollutants, sediments and excess nutrients from stormwater runoff. They improve surface water quality and provide habitat for a variety of wildlife including birds, snakes, turtles, frogs and insects. Please read below for more information on buffers.

The landscaping maintenance plan includes limited and periodic mowing in designated areas. On May 31, the contractor mowed areas along Blenheim Road on the City-owned properties, as well as an area along the property boundaries of 4128 Welling Avenue and 4116 Blenheim Road.

What is a buffer?
A natural area located next to streams and rivers that consists of trees, shrubs and ground cover.

Buffers serve several important functions:

- Slow down and filter storm water
- Prevent erosion
- Provide habitat for wildlife.

How do they grow?
Buffers grow and change slowly over time. Starting out as mostly grasses, as trees grow and provide shade buffers eventually transform into a forest.

Let buffers grow...

- No mowing or cutting down vegetation
- No excessive fertilizer or herbicide
- No structures

Did you know?
Streams and wetlands play a critical role in providing clean drinking water. Keeping surface waters clean reduces the cost of drinking water treatment.

StormWater.CharMeck.org

Project Team

For more information please call or email:

Steven McCraney Project Manager 704-432-0967 SMcCraney@CharlotteNC.gov	Charllotte Drzewiecki Construction Inspector 704-361-7597 CDrzewiecki@CharlotteNC.gov
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ADVERTISING

STREET SWEEPERS

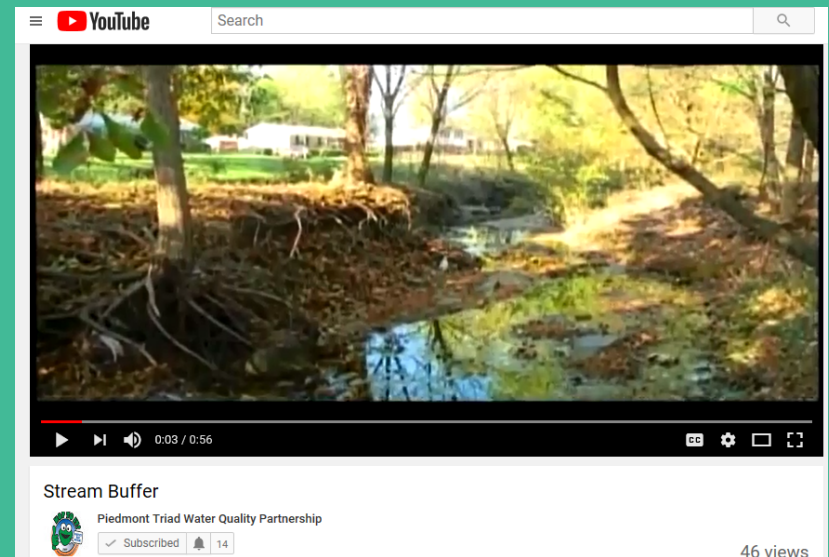
479 SWEEPING HOURS IS GREAT FOR EDUCATION BANNER

PIEDMONT TRIAD WATER QUALITY PARTNERSHIP

USED FOR TV, RADIO, FACEBOOK, TWITTER, YOUTUBE

ANNUAL THEME: LITTER 2017-2018

LENNY THE LIFEGUARD



OTHER IDEAS

- If Kville were more trashy... Zombie Trash Pickup (race to fill your bag). If it hits the street, it's in the creek!
- Geocaching!
 - Excellent example is Athens-Clarke County GA
 - <https://www.athensclarkecounty.com/CivicSend/ViewMessage/message?id=23165>



You might just find some prizes waiting for you inside our caches!
[Photo submitted by Geocacher WolfWife336]

WHEN WORKING WITH PUBLIC

Listen to people's needs/worries

Dispel myths (weeds = snakes)

Provide access to the water.

Limb up or thin shrubs. Don't use grasses often confused with weeds (sorry VA Wildrye, Gamagrass); use ones that change colors: Little Bluestem, Purple Lovegrass, Switchgrass

Discuss the plant with vision (plant in groupings, attract pollinators, seasonal color)

Hands on learning with small install projects (don't wear out volunteers! THANK THEM! Offer them food in return for volunteering.)

“Food is always an easy hook” –Eve Brantley, opening session!

Partner with other communities/engineering firms/nurseries/Cooperative Extension/Soil & Water Conservation Districts