



Stream Bank Repair in South Carolina
New opportunities to address water quality concerns

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What is the Water Quality in SC?

Water Quality in South Carolina

Table 1. Impairments by Category and Waterbody Type on the Draft 2018§303(d) List

Category	Total Impairments	Lakes	Streams	Estuaries	Shellfish Waters	Beaches
Bacteria	362	5	167	60	116	14
Nutrients, pH, DO	197	197				
Fish Tissue Hg and PCBs	190	190				
Macroinvertebrates	173		173			
Dissolved Oxygen	142		108	34		
Turbidity	92	13	16	63		
Metals	36	4	23	9		
pH	45		40	5		
Ammonia Toxicity	5	1	3	1		

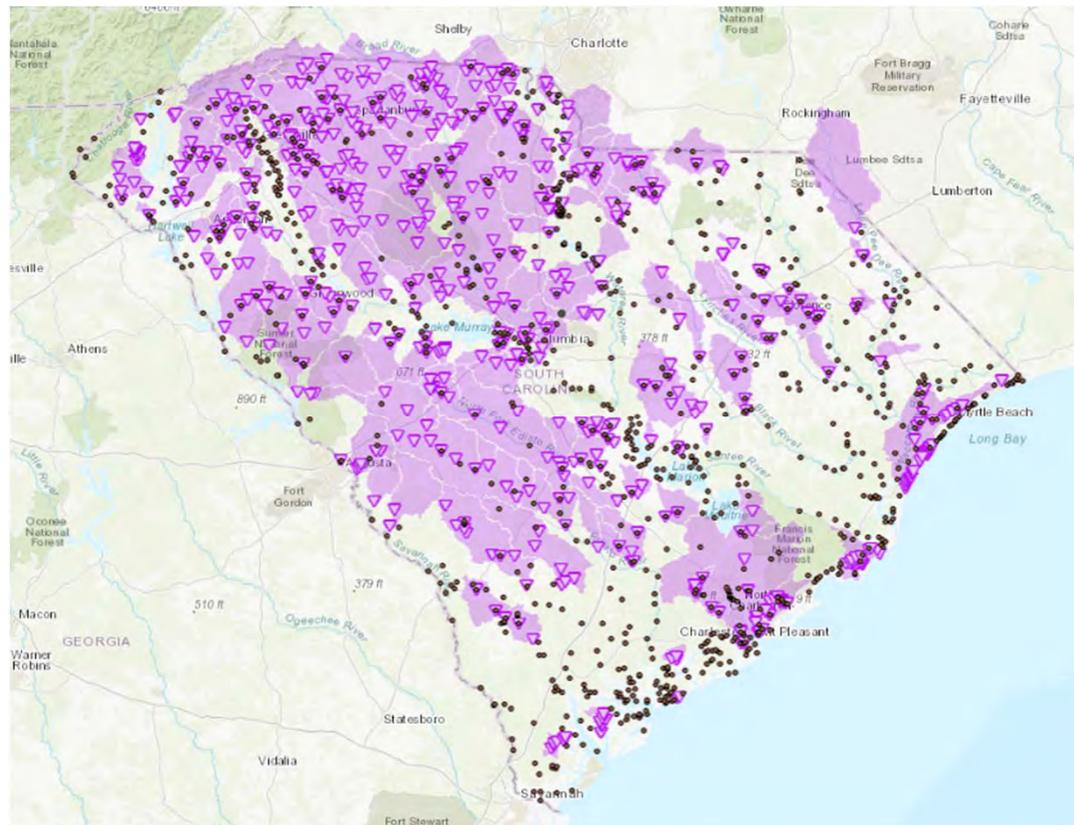
720 streams

1,041 sites

1,242 impairments

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Water Quality in South Carolina



Bacteria

Pet waste

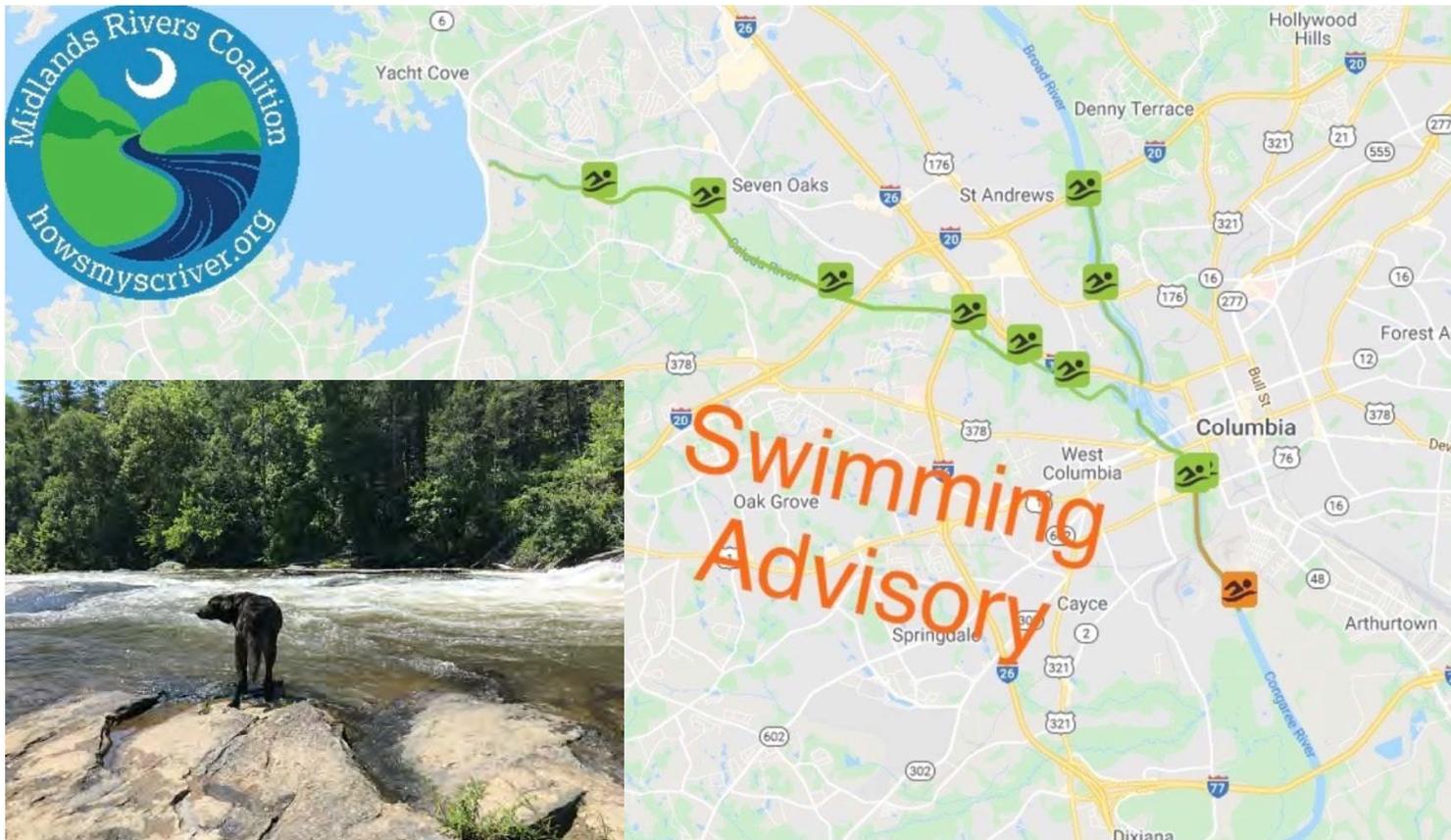
Aging infrastructure

Wildlife

Extreme storm events



Bacteria



Macroinvertebrates

Excess sediment

Low dissolved oxygen

Unstable beds



Macroinvertebrates

Stream processing

Energy subsidies

In-stream food source



Critical in the Food Web

Emerging adults provide energy for:

Bats

Lizards

Insectivorous birds

Salamanders

Beetles

Spiders



Dissolved Oxygen

Warmer temperatures
Nutrient enrichment



Dissolved Oxygen

Aquatic organism metabolism



Healthy Streams Affect...



CLEMSON
EXPERIMENT STATION
FW 13 - December 2016
Forestry & Wildlife

\$33.4 billion!

David B. Willis, Clemson University
Thomas J. Straka, Clemson University

**The Economic Contribution
of Natural Resources
to South Carolina's Economy**

One way to address these pollutants is
by repairing banks and riparian areas.

Healthy stream banks mean....

Stable Banks



Stable Banks



Property loss

Stable Banks



Property loss

Stable Banks



Hazardous
Aesthetics
Sediment

Sediment

Sediment has adsorptive properties

Increases in pollutants

pesticides, fertilizers, and bacteria



Floodplain Connectivity



- Slow down water
- Groundwater recharge
- Nutrient exchange

Floodplain Connectivity



Incision

Downcutting

Flow Alterations

Habitat Diversity



Habitat Diversity

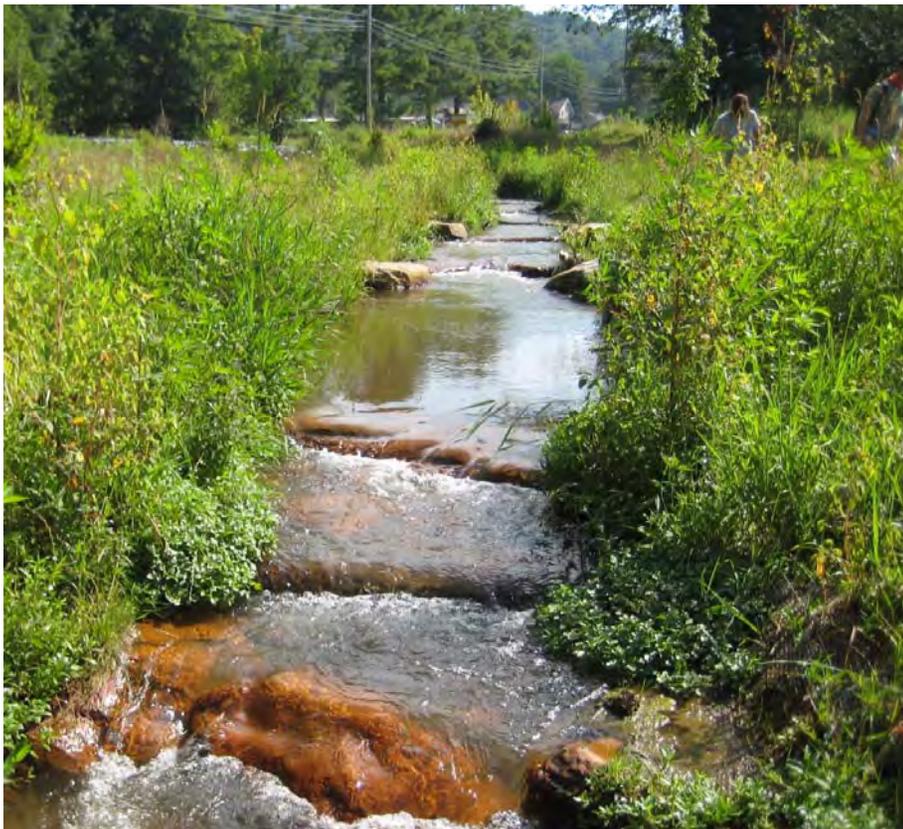


Habitat for organisms

Food resources

Decreases water velocity

Pollutant Filter



Sediments

Nutrients

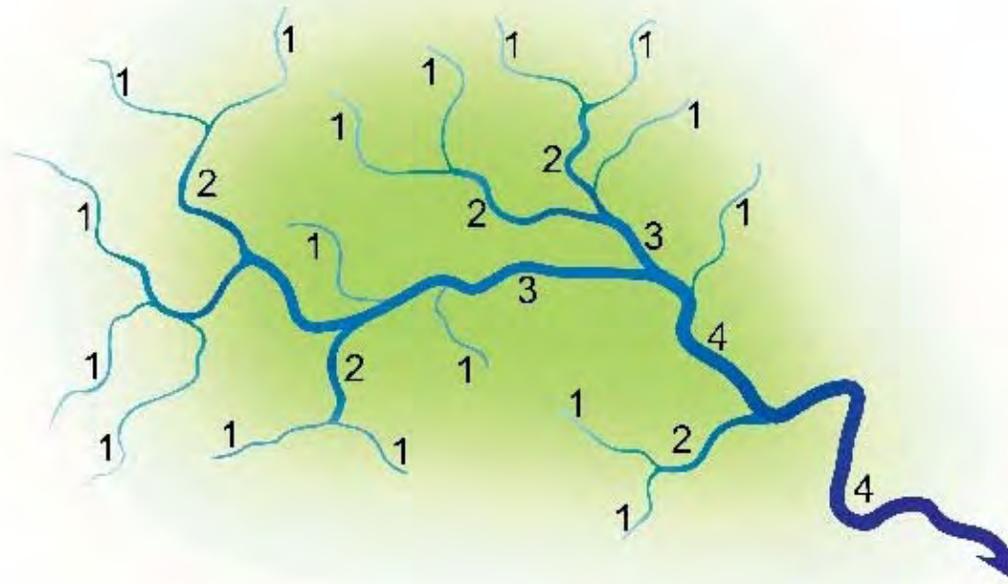
Bacteria

Herbicide

Fertilizers

NC State University Stream Restoration Program

Headwater Streams



EPA Catchment Units

Headwater Streams

79% of the overall river network

Drain 70% of land

Biotic refuge

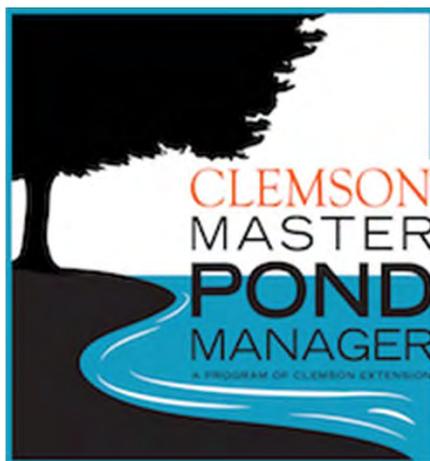
Nutrient reduction

Withhold sediment

Flood mitigation



Clemson Extension



Silt Fence and Beyond



- HOME
- COVID-19 Resources
- Meet the Team
- Carolina Clear
- Compliance-based Trainings
- Events
- Hybrid Training
- Stormwater Ponds
- Residential & Youth Programs
- Research
- Resources

Stream Bank Repair



Clemson's Stream Bank Repair program works with homeowners, land managers, park staff, and landscape professionals to address unhealthy stream banks that are suffering from erosion and instability. Workshops will provide insight on how watersheds function and will identify steps needed to stabilize and revegetate stream banks.

We'd love to hear your feedback on how you have managed streams on your property! This information will help Clemson Extension continue to build meaningful programs to address issues throughout the state. Please fill out the needs assessment below.

[For professionals managing a property that contains one or more streams, click here.](#)

[For homeowners with streams on their property, click here.](#)

Not all streams are ideal for stream bank repair. Take a look at the information below to see if it's right for your site!

[Criteria for a Stream Bank Repair Site \(PDF\)](#)

Needs Assessment

Professionals

Have you experienced any issues with the health or stability of stream banks? **Yes, 95%**

Do you feel prepared to handle issues? **No, 84%**

Do you receive questions about eroding/failing stream banks from clients or the public? **Yes, 89%**

Do you have the knowledge or resources to answer them? **No, 71%**

What's the maximum amount of workshop time you'd like? **5-6 hrs, 74%**

Needs Assessment

Homeowners

There are signs of serious erosion. **50%**

There are signs of minor erosion. **40%**

Do you feel prepared to handle issues? **No, 80%**

Are you likely to handle stream bank issues yourself? **Yes, 90%**

Would you attend a SBR workshop? **Yes, 90%**

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clemson.edu/extension/water/stream-bank-repair.html

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Criteria for a Stream Bank Repair Site (PDF)

Stream Bank Repair in South Carolina

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Frequently Asked Questions (FAQs)

What is Stream Bank Repair?	+
What does "riparian" mean?	+
Why is erosion bad?	+
What can you do?	+
Is repair the same as restoration?	+
What is the Ordinary High Water Mark?	+
When are these workshops offered?	+

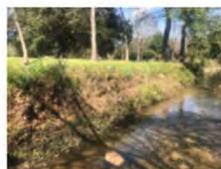
What are the signs of unhealthy stream banks?



Example of Incision



Example of Exposed Roots



Example of Turf grass in the Riparian Area



Example of Turf grass in the Riparian Area

Other Resources



Other Resources



Extension Needs Assessment

Is there a need for SBR in your area (county or region)? **Yes, 72%**

Is there an interest in stream bank repair in your area (county or region)? **Yes, 72%**

Which of the following stream bank repair resources would be useful in your area?

Professional workshop **76%**

Homeowner workshop **65%**

Stream Bank Repair

Address impairments and improve water quality

Homeowners education

Professional education

Address MCMs 1 & 2



What is Stream Bank Repair?

Stream Bank Repair is not...

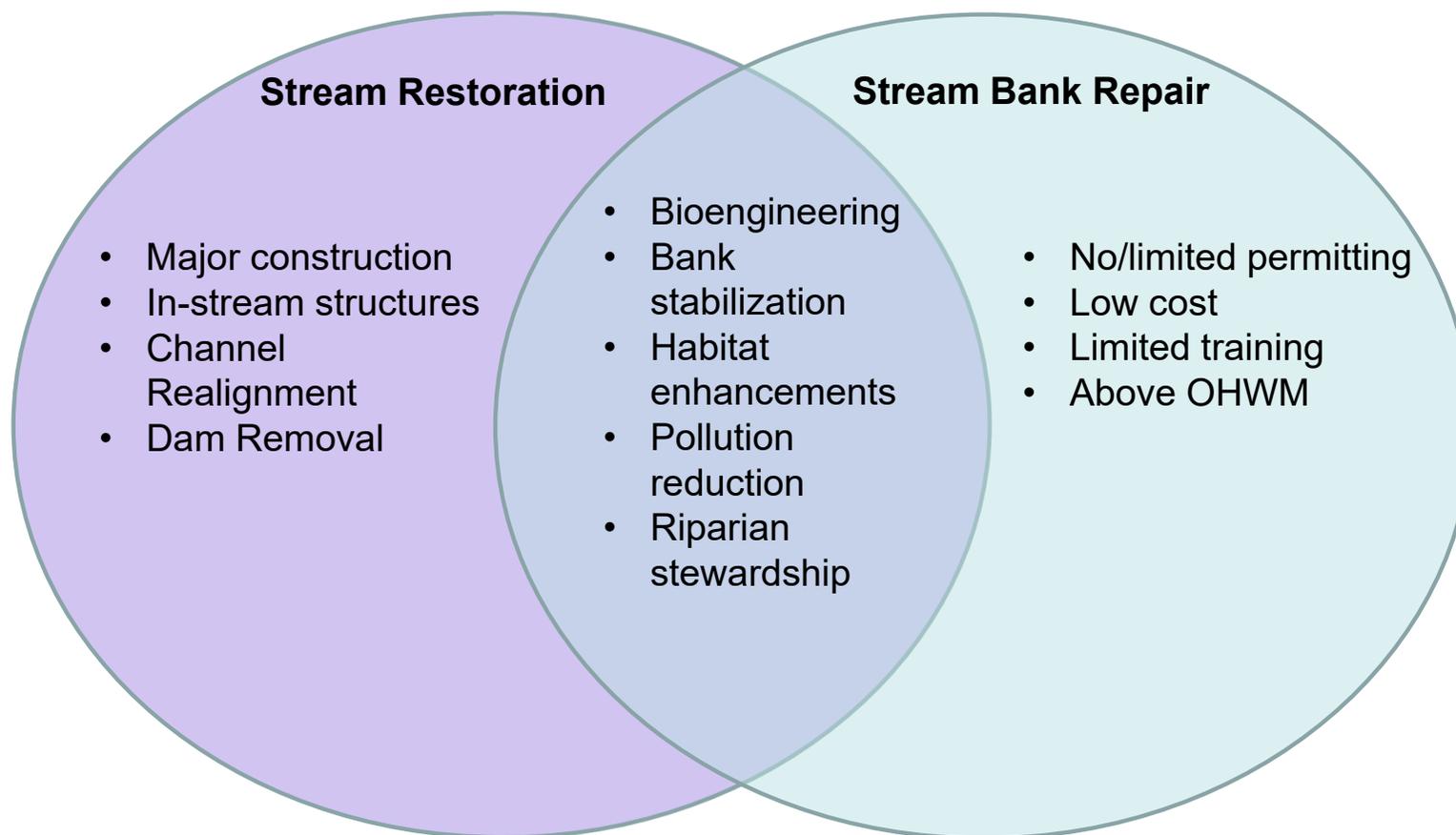


SBR is not: a cure-all for stream issues

- Pair with upland BMPs
- Know when bank repair is not enough



Repair vs Restoration



SBR is not: right for every site



SBR is not: right for every site



Photo credit:
Steve Adams,
Minnesota DNR

SBR is not: the same at every site

Option 1: No mow zone

Option 2: Native plants without grading banks

Option 3: 3:1 slope, erosion control matting, native plants (**preferred option**)



So what is Stream Bank Repair?



Ordinary High Water Mark (OHWM)



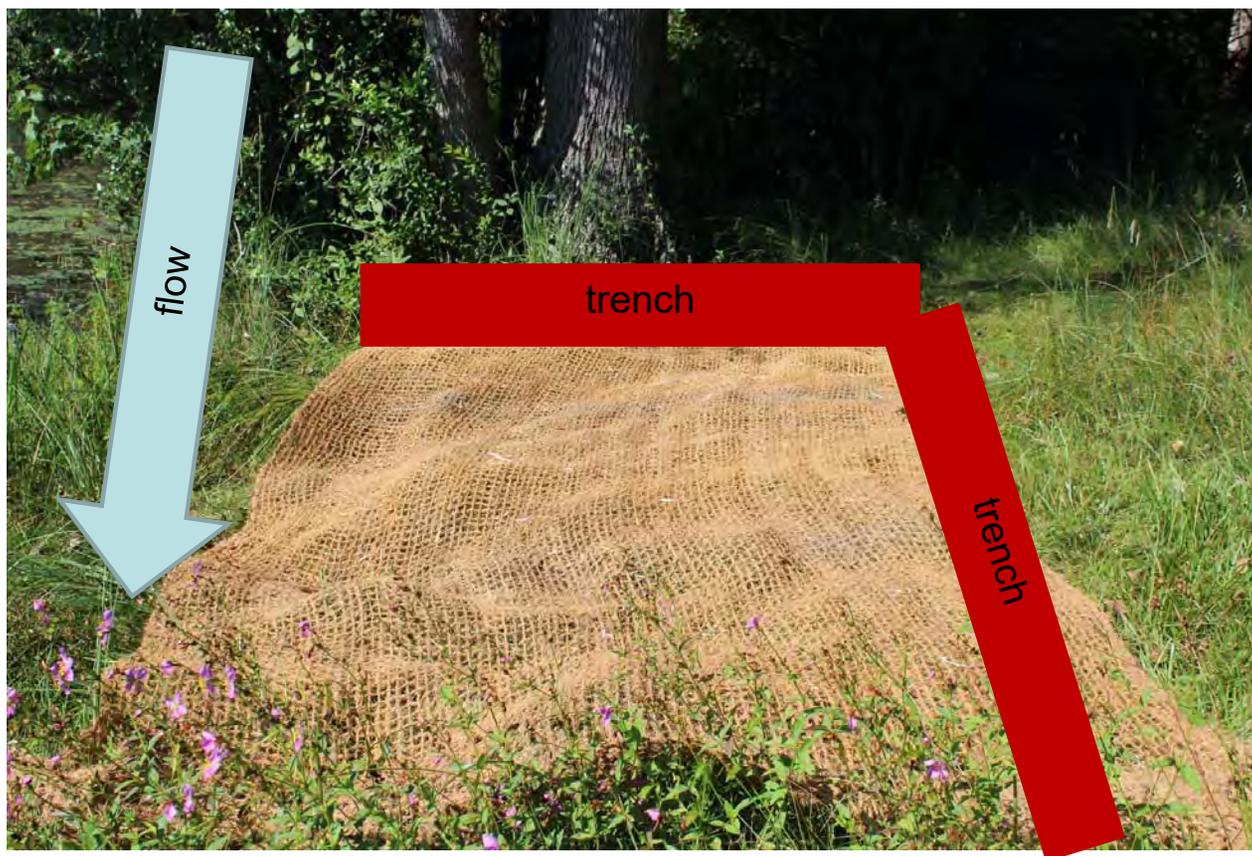
Pull back banks to 3:1 slope



Erosion control matting



Erosion control matting



Erosion control matting



Erosion control matting



Livestakes



Livestakes



Livestakes



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Stream Bank Repair in South Carolina
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- Erosion control matting (natural fibers)
- Secured with wood stakes
- Livestakes installed through matting



Stream Bank Repair in South Carolina
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Short term:
Native, herbaceous
plants establish from
seed mix



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Mid-term:
Livestaked shrubs
grow



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Long-term:
Riparian shrub species
establish from livestakes



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Stable banks, better aesthetics



Demonstration Sites

Stream Bank Protection

Maintaining a buffer of native plants

Protecting stream banks

DID YOU KNOW that small streams have a large impact on water quality? They also provide drinking water and recreational opportunities to South Carolina residents. You can protect your stream banks and improve the overall health of your stream by maintaining a buffer zone of native plants. When selecting and planting vegetation along your stream, remember to avoid invasive species, stay above the average water height, and select plants that are well adapted to wet soils.

What can I find in a stream? Many organisms depend on healthy streams for survival! Some organisms you might find while exploring a stream include bottom-dwelling invertebrates (creatures with no backbone), amphibians that live in or near the water, and birds that feed on emerging insects.



FLAT-HEADED MAYFLY LARVA
Found in fast moving streams on the underside of rocks



NET-SPINNING CADDISFLY LARVA
Found on top of rocks in flowing water



DUSKY SALAMANDER
Found in partially wooded habitats



NORTHERN WATERTHRUSH
Use slower moving areas of the stream during migration



BARRED OWL
Feasts on stream organisms such as crayfish and amphibians.



ACADIAN FLYCATCHER
Feed on insects emerging from freshwater streams

Why should I maintain a stable stream bank?

- PREVENT erosion
- PROTECT trees on the edge of the stream
- Improve AESTHETIC VALUE of property
- SLOW stormwater runoff
- Intercept UNWANTED POLLUTANTS
- Regulate stream TEMPERATURE
- Provide HABITAT for wildlife

Streamside vegetation

There are numerous species of trees, shrubs, and perennials that work well along stream banks. The root systems of streamside vegetation will hold sediment in place and prevent property loss from erosion!



SILKY DOGWOOD
Cornus amomum



ELDERBERRY
Sambucus nigra



BUTTONBUSH
Cephalanthus occidentalis



CARDINAL FLOWER
Lobelia cardinalis



For more information on this topic and other water-related information, please visit CLEMSON.EDU/EXTENSION/WATER

THANK YOU!

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clemson.edu/extension/water/stream-bank-repair.html