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Backyard Stream Repair – Engaging DIY Homeowners

Your Presenters

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We believe that all people should have access to science-based education.

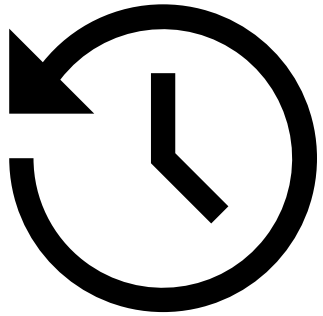
IMAGE CREDIT: FREEPIX.COM

Who We Are

The Penn State Extension team consists of a collection of educators, associates, and faculty that come together when their expertise is needed. Since team members live and work alongside you, they have a vested interest in ensuring our products and services better their communities.

Areas We Cover

Presentation Outline

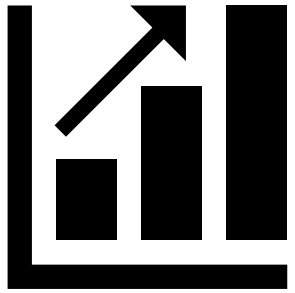


How and Why

A mini-history of our program

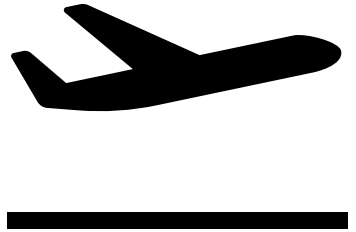
What

Get to know our backyard stream repair products



Impacts

What has been accomplished so far



Applicability

How this program can benefit you

Penn State Extension takes on Backyard Stream Repair

How we got here

- 95,000 acres of riparian forest buffers statewide by 2025
- plant 10 million new trees for the benefit of all Pennsylvanians
- 2,650 acres of forested riparian buffer in developed areas

Few resources to help the little guys

Image credit: Jennifer Fetter, PSU

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We want stream managers to:

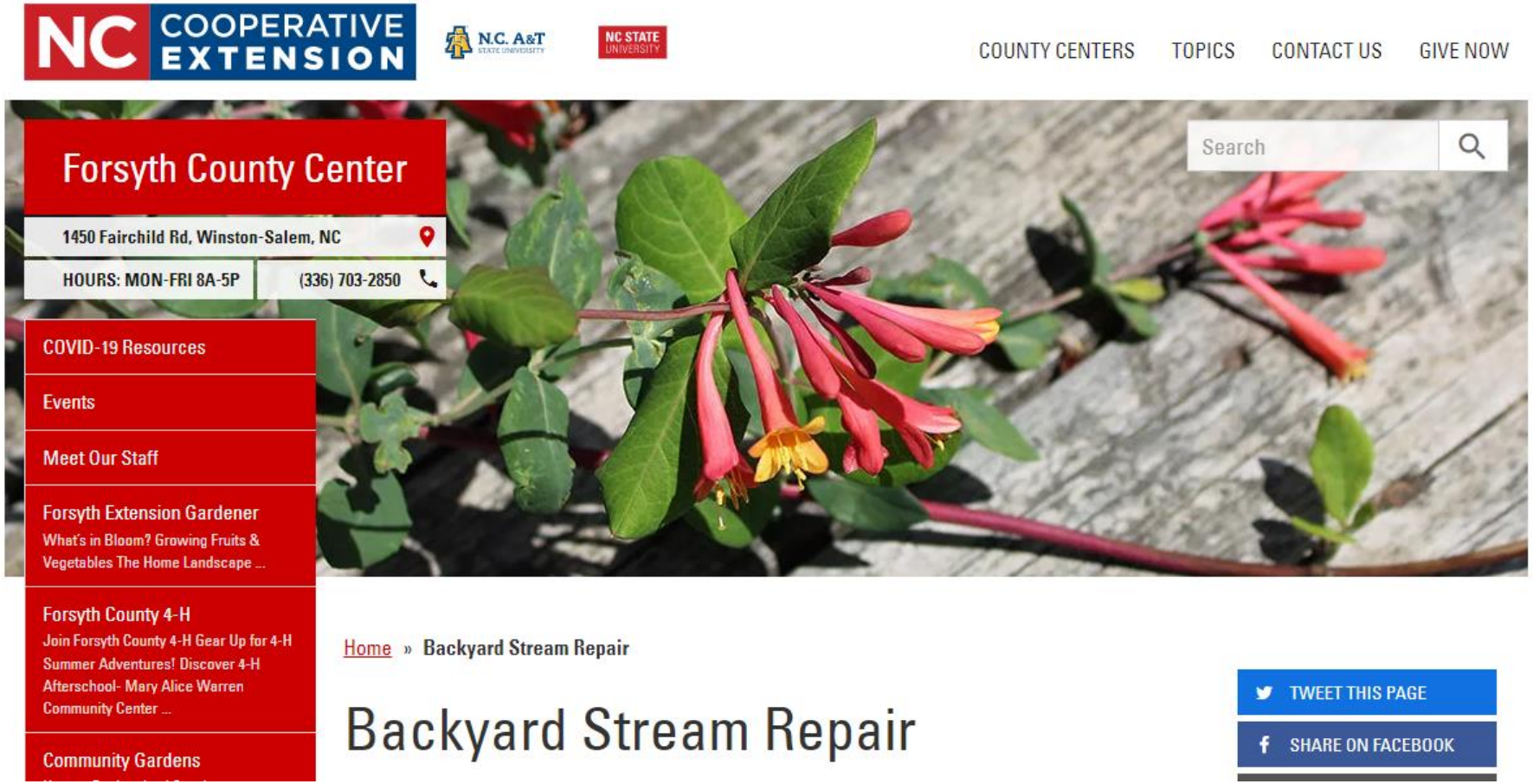
Understand the health of their stream

Be comfortable making decisions about their stream

Know when they need to get a permit

Have the skills and resources to take action.

Seek and Ye' Shall Find!



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Educator Inservice

- Classroom and Hands-on Inservice Training
- Research and Modification of materials to suit Pennsylvania needs

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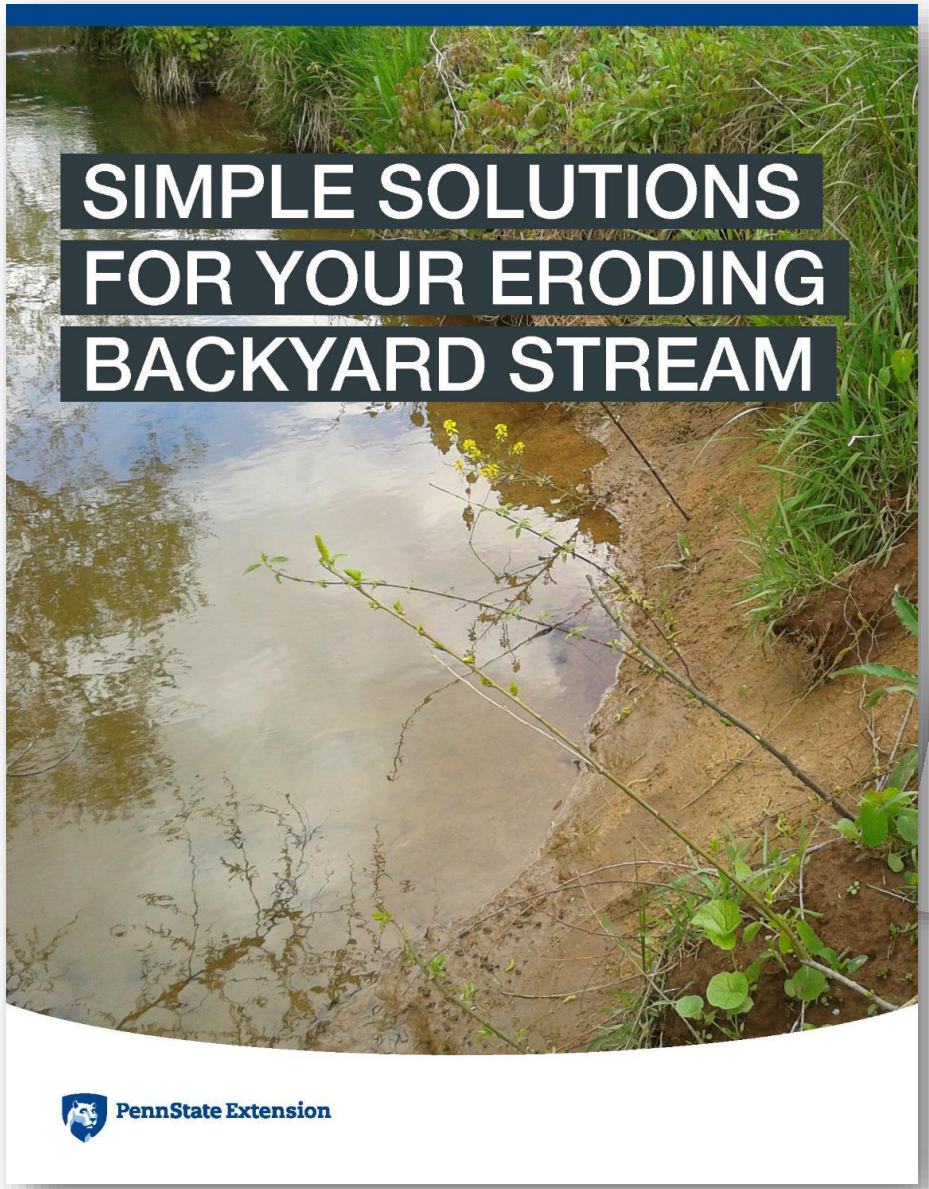
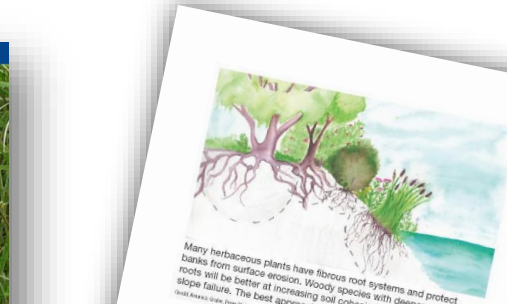




Many herbaceous plants have fibrous root systems and protect banks from surface erosion. Woody species with deeper or wider roots will be better at increasing soil cohesion and reducing mass slope failure. The best approach is a combination of plant types.

Backyard Stream Repair

Step 1: Evaluate Your Streambank

Take a stroll along your streambank and observe the current conditions. One way to measure your current stream health is to use Penn State Extension's First Investigation of Stream Health (FISH), which you can find online at https://extension.psu.edu/first-investigation-of-stream-health-fish-protocol.

Questions to ask about your stream:

- Does your stream flow year-round, seasonally, or only during rain events?
- Does the stream rise and fall quickly with rainfall events?
- Does the soil along the bank slide off after rain events?
- How deep and wide is the creek?
- Are there any culverts or drainage pipes flowing into your stream?
- Is the stream straight or does it meander through the landscape?
- Does your shoreline have a variety of plant types?
- Do you know if the plants are native versus invasive?
- What kind of root structure do existing plants have?

An example of a highly erosive, unstable streambank.

Step 2: Determine Your Options

There are many different ways to manage streambanks. Choose from one of the following options to stabilize a streambank. (Appendix B provides additional help.)

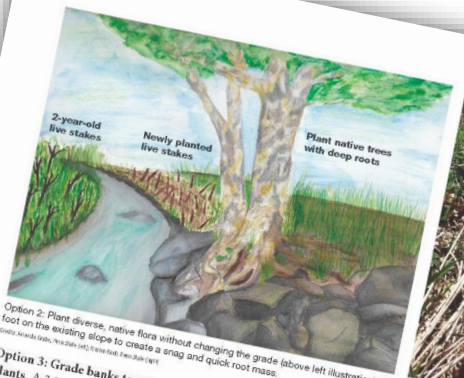
Option 1: Do nothing and let it grow wild as much as 15 feet or more from the water's edge. Allow whatever seeds are in the soil, as well as what washes from upstream neighbors, to establish on the streambank.

- Optimal time of year: This can be done anytime of year.
- Pros: No work and no costs.
- Cons: Undesirable plants (invasive weeds such as Japanese knotweed) can take over the area. It can look weedy and still erode for several years until plants mature. This might violate noxious weed laws or your municipal weed ordinances.
- Next step: Do nothing; you're done with this guide.

Option 1: This landowner is letting vegetation grow 15 feet from the water's edge without mowing.

Option 2: Plant native vegetation without changing the grade of your streambanks. Start planting native trees 5 feet from the edge of bank, regardless of slope (see illustration on next page). Plant live stakes (cuttings of native trees and shrubs; see pages 8–9) every 3 feet along the eroding streambanks. Soil may still slough off, but as plants grow, the root mass will begin to hold the soil together.

- Optimal time of year: Live stakes are best planted in late winter and early spring (dormant season.) Trees and shrubs are best planted in fall and spring.
- Pros: Cost-effective and slows erosion. No permits required to add plants to your stream.
- Cons: May be a temporary fix and land can still be lost. Takes time (years) for results.
- Next step: Skip to plant selection on pages 4–7. Look over maintenance suggestions on pages 14.



Option 2: Plant diverse, native flora without changing the grade (above left illustration). Above right photo shows live stakes installed every 1 foot on the existing slope to create a snag and quick root mass.

Option 3: Grade banks to a gentle slope and add plants. A 3:1 slope is most ideal for a stable bank. Take time to plan whether you will do the work yourself or hire someone, select type of plants you want (or copy the design on page 12), and determine how you will maintain the appearance you want (tips on page 14).

- Optimal time of year: Dormant season to allow for live staking and additional plantings soon after grading.
- Pros: Safer, stable banks; not losing land; and more attractive.
- Cons: Financial investment and potential soil compaction from heavy equipment. Requires a preapproved permit regardless of project size in Pennsylvania.
- Next steps: Skip to grading section on pages 15–17. Pay special attention to permit requirements.

Option 3: A repaired stream site where the landowner's home is less than 20 feet from the water with 2-to-3-foot vertical banks (above left photo). Above right photo shows the now graded, stabilized, and planted bank.

Pennsylvania Permit Requirements

All of these things and more are regulated by 25 PA Code Chapter 105. A General Permit 3 (GP3) is required for grading work on less than 500 feet of continuous streambanks and/or adding rock or other nonpolluting structures to the streambank or channel.

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Program Design

- Five-part webinar series
  - Evaluating Your Stream
  - Determining Your Options
  - Choosing Plants for Your Stream
  - Live Staking and Grading Your Stream
  - Maintaining Your Stream Repair Project & Next Steps
- Optional in-person field days for webinar attendees

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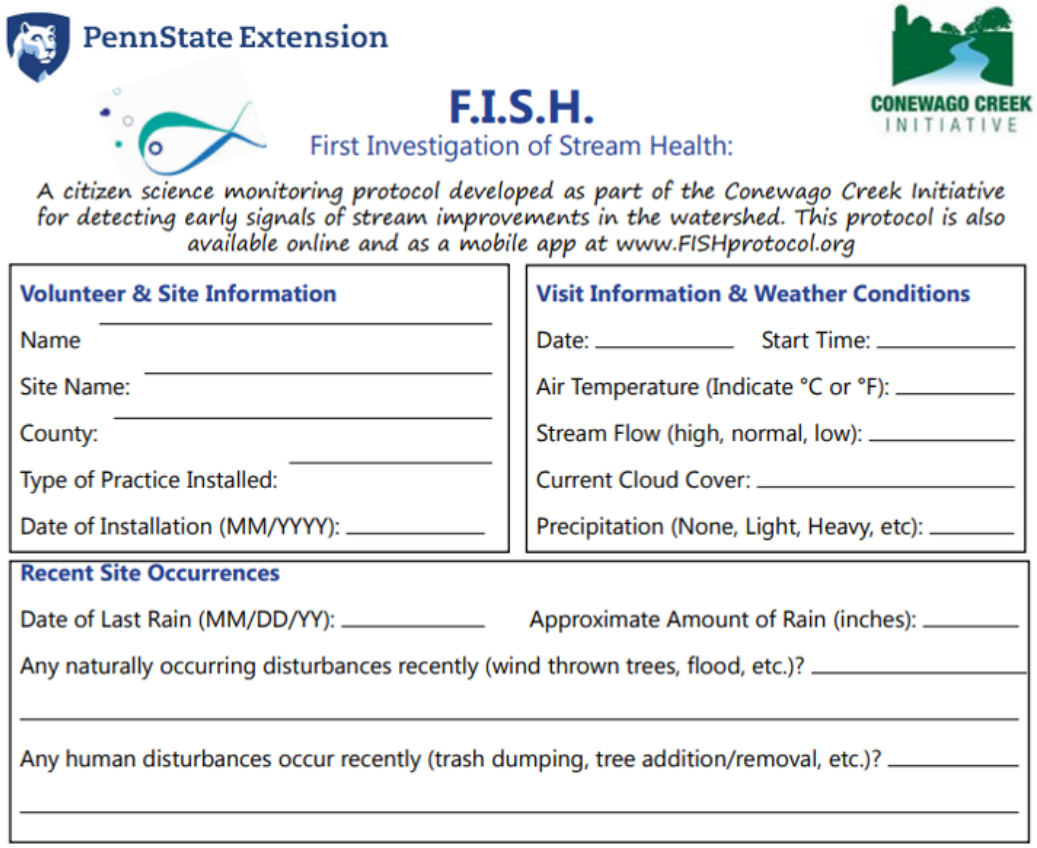
Session 1

Evaluating Your Stream



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F.I.S.H.
First Investigation of Stream Health:

CONEWAGO CREEK INITIATIVE

A citizen science monitoring protocol developed as part of the Conewago Creek Initiative for detecting early signals of stream improvements in the watershed. This protocol is also available online and as a mobile app at www.FISHprotocol.org

Volunteer & Site Information

Name _____

Site Name: _____

County: _____

Type of Practice Installed: _____

Date of Installation (MM/YYYY): _____

Visit Information & Weather Conditions

Date: _____ Start Time: _____

Air Temperature (Indicate °C or °F): _____

Stream Flow (high, normal, low): _____

Current Cloud Cover: _____

Precipitation (None, Light, Heavy, etc): _____

Recent Site Occurrences

Date of Last Rain (MM/DD/YY): _____ Approximate Amount of Rain (inches): _____

Any naturally occurring disturbances recently (wind thrown trees, flood, etc.)? _____

_____

Any human disturbances occur recently (trash dumping, tree addition/removal, etc.)? _____

_____

- Healthy vs Poor Stream Health
- Methods of Evaluating Stream Health

extension.psu.edu/FISH

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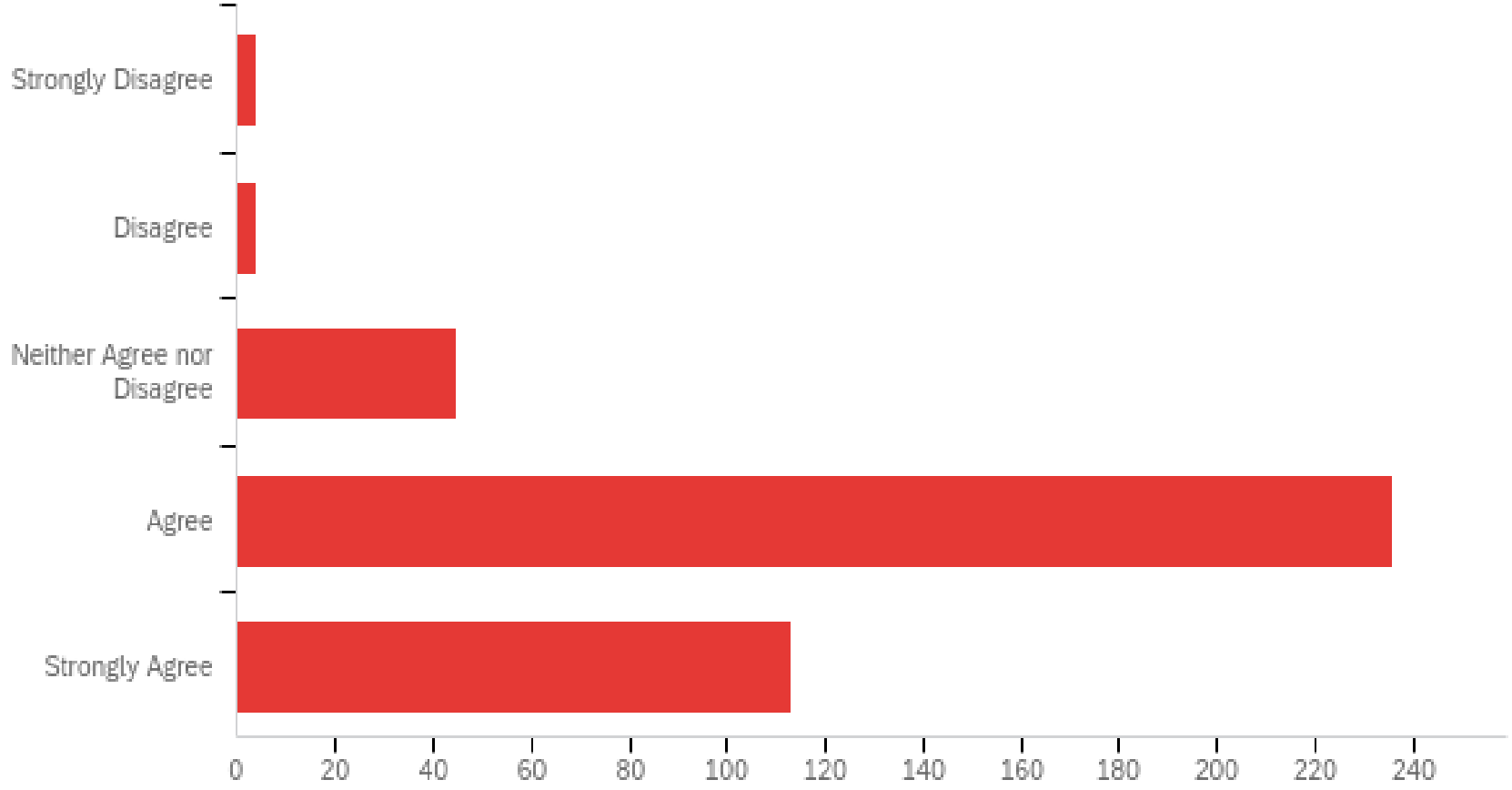
I feel confident that I can accurately evaluate my stream using the First Investigation of Stream Health protocol or some other visual assessment technique



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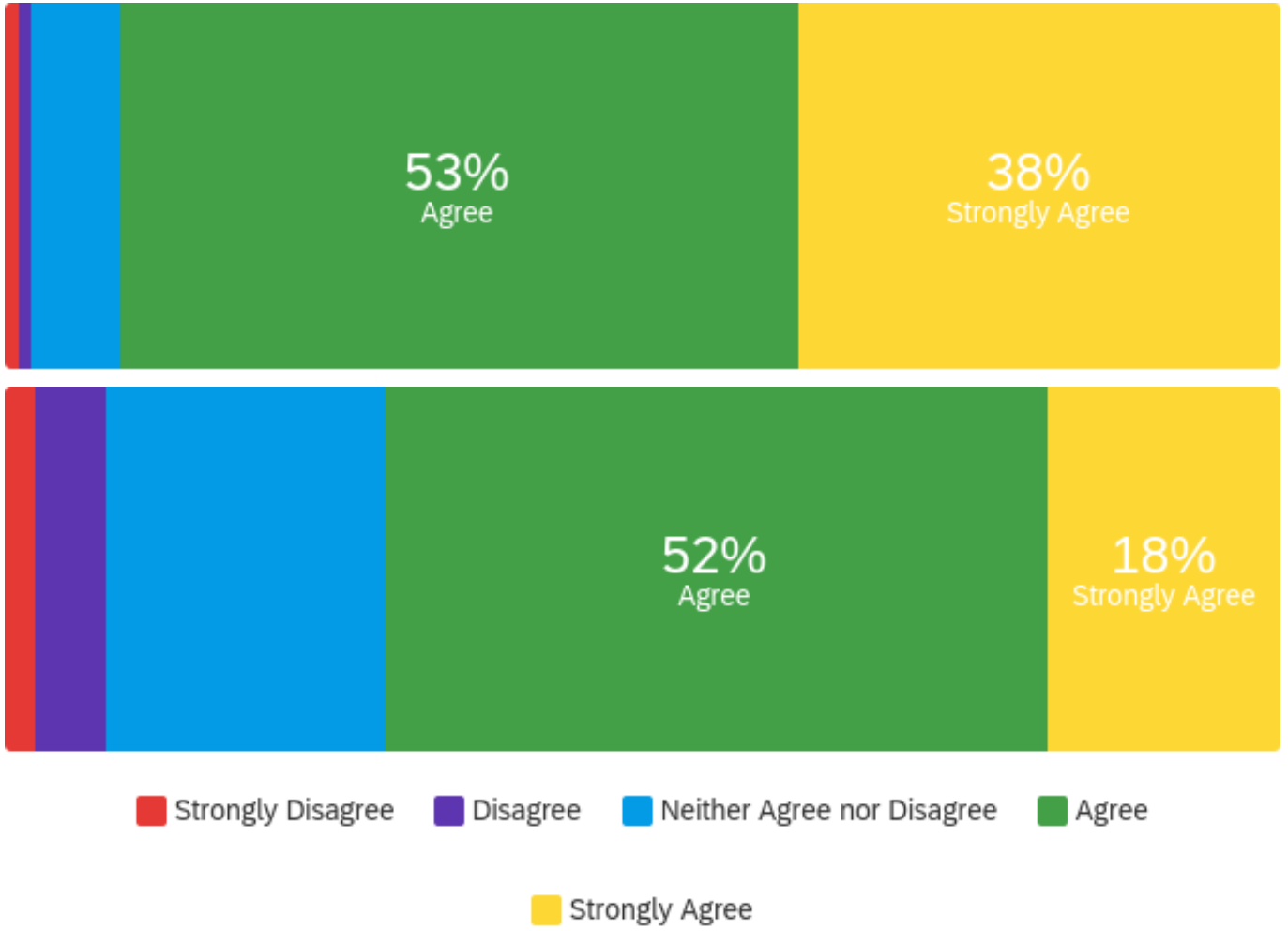
Determining Your Options

- Plants vs Permits
- Understanding the DEP permitting process

I fully understand When and How to apply for a permit

When

How



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Session 3

Choosing Plants

- Benefits of riparian vegetation
- Native vs non-native/invasive species
- Plant selection criteria
- Developing a planting plan

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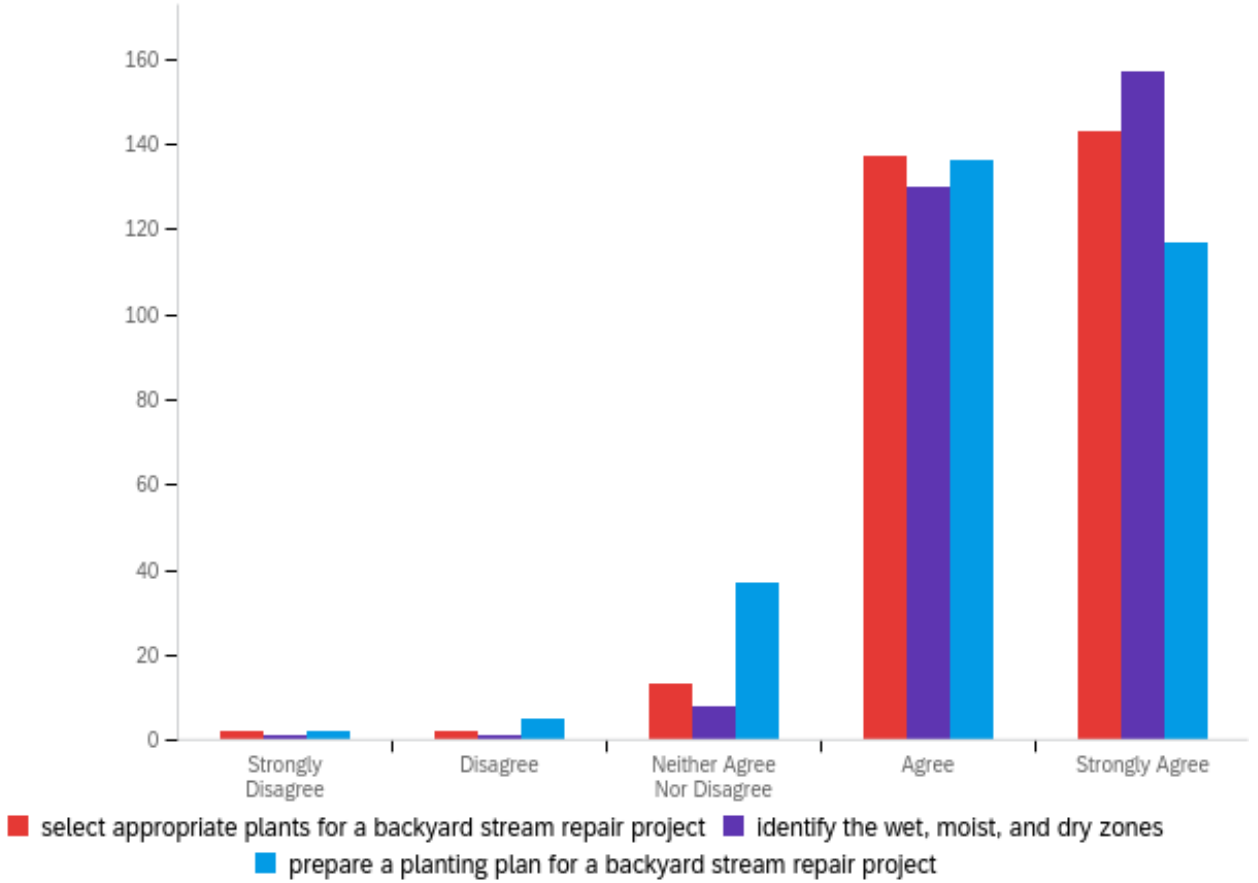
Confidence levels for planting activities



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Session 4

Live Staking and Grading

- Benefits of live staking
- How to harvest and plant live stakes
- Pros and cons of grading your streambank
- Steps to grading your streambank

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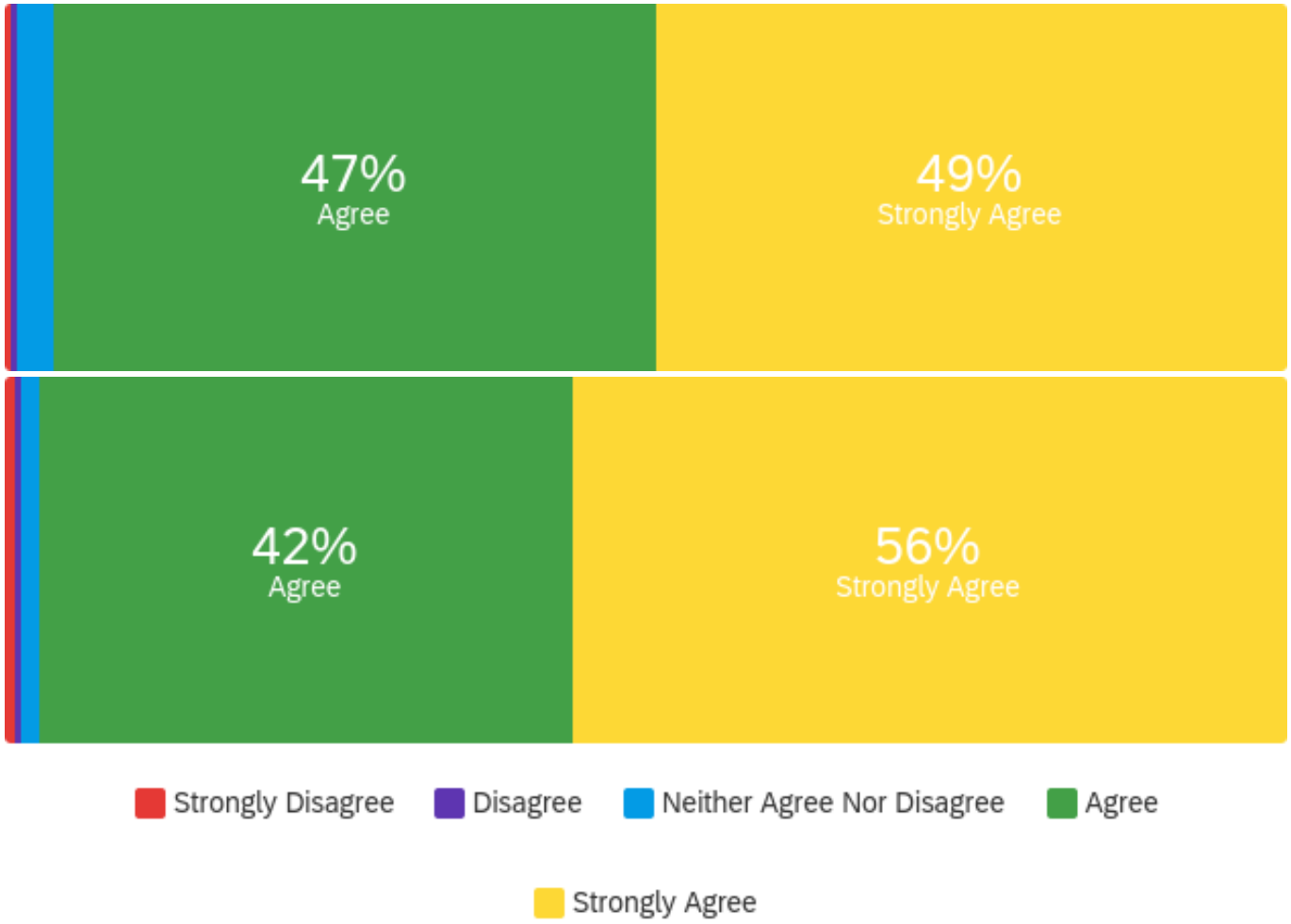
I feel confident that I can harvest and plant live stakes

Harvest

Plant



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Session 5

Maintaining Your Backyard Stream Repair Project

- Maintenance requirements: short term and long term
- Proper herbicide use
- Other resources

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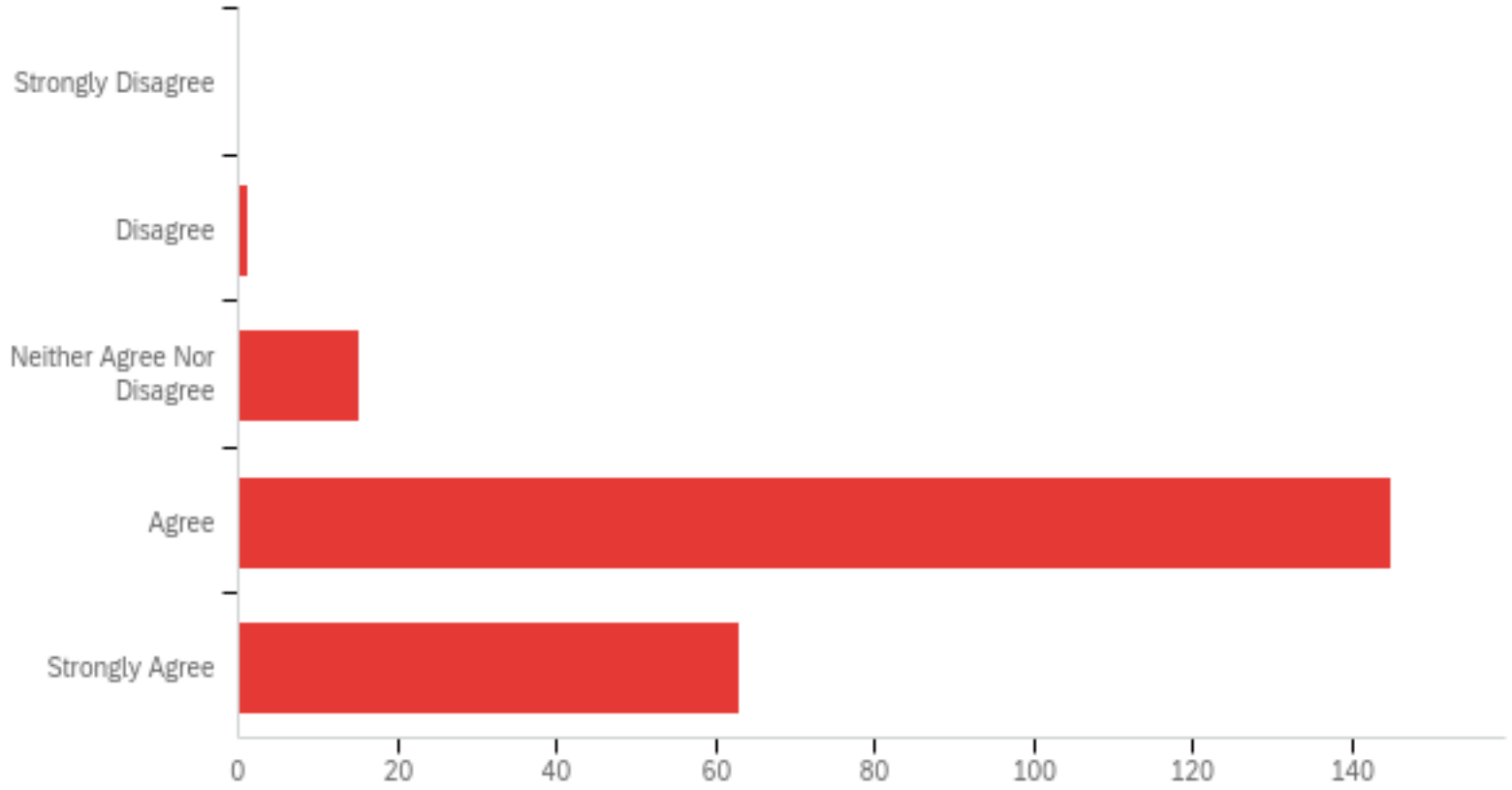
I fully understand the maintenance requirements for my backyard stream repair project



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Backyard Stream Repair

What is the condition of the small stream on your property? Does it have bank erosion issues? Do you notice increased sediment in the water? Is it prone to rising and falling quickly during rain events?

Save For Later Print

ARTICLES | UPDATED: APRIL 13, 2021

Managing Your Backyard Stream

Streams with eroding banks mean property loss for you and sediment pollution for our local waterways. They can also pose a risk to nearby buildings and infrastructure. Backyard streams may also be prone to flooding that can lead to additional property damage or make parts of your land or property unusable.

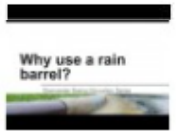
Knowing how to manage your backyard stream can be a win for the landowner as well as the natural environment. Planting native trees and shrubs to reduce erosion is one of the

RELATED PRODUCTS

Backyard Stream Repair Series
WEBINARS

Sinkholes and Underground Cavities Due to Human...
ARTICLES

Rain to Drain: Slow the Flow
GUIDES AND PU...



Why Use a Rain Barrel?
VIDEOS

Permitting

Q: Would you need a permit for using rock and soil fill as well as straw cover during live staking? Would you need a permit for using seed and matting during live staking?

A: While live staking and seeding onto already bare areas does not require a permit, adding rock and soil to a stream bank most likely would require a general permit. Contact your county conservation district prior to adding fill to a streambank. If all you are doing is planting or using biodegradable matting, and you are not manipulating the shape of your bank or the channel itself, you usually do not need a permit.

Q: Can I build up the bank on my side of the stream if the other side belongs to my neighbor? If I do build up the stream bank are their federal rules pertaining to streambank erosion mitigation, or is it all state regulated?

A: If it is on your property, yes, you can work on that side of the stream. But, if you are doing any kind of earth moving even on your own property, a permit will be required. Check with your county conservation district first to see what's needed. When you extend beyond a certain size project it becomes the jurisdiction of the Army Corps of Engineers. Your county conservation district or regional DEP office can help you figure out if your project requires that federal permitting as well.

Q: If you get a permit to grade the stream bank, generally how long is the permit good for in terms of doing ongoing maintenance as needed to maintain the stream bank in the same condition?

A: Certain parts of a permit, such as a Pennsylvania Natural Diversity Inventory (PNDI) may only be

Common Live Stake Species for Residential Stream Repair

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All of these live stake species are:

- Native to Pennsylvania
- Tolerant of full sun to partial shade, and medium to wet soils
- Deciduous (lose leaves in the fall)
- Fibrous rooted to help with erosion once established
- Hedge-like in appearance, with trimming and pruning
- Ideal species for smaller or residential plantings

Botanical Name	Common Name	Size (Height and Spread)	Description (Blooms, Fruit, Stems)	Notes	Photo
Cornus amomum and *Cornus sericea*	Silky dogwood and red-osier dogwood	Height: 6–12 feet; spread: 6–12 feet	Blooms: showy, yellowish-white cymes 2.5 inches across, May–June Fruit: showy, blue (silky) or white (red-osier) clusters in fall Stems: burgundy to bright red, provide winter interest	Attracts birds; tolerates deer; will tolerate close to full shade; may spread to form thickets; twigs and undersides of leaves have fine, "silky" hairs	 USDA NRCS Montana on flickr.com
Physocarpus opulifolius	Ninebark	Height: 5–8 feet; spread: 4–6 feet	Blooms: yellowish white, flowering May–June Fruit: drooping clusters of reddish fruit Stems: peel like cinnamon, provide winter interest	Attracts pollinators; grows well in rocky soil; may be cut down to the ground in winter to rejuvenate shrub	 karen_fine on flickr.com

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Only available to those who have completed the webinar series

Field Days

Join Penn State Extension for **Backyard Stream Repair Series Field Day**, a hands-on workshop where you will get the opportunity to help repair a stream while learning. We will demonstrate and then give you a chance to participate in planting a riparian buffer and live staking in a waterway in need of streambank stabilization. Planting riparian buffers and live staking are affordable, easy ways that landowners can repair their backyard stream.

When
Sat., Oct. 22, 2022
(9:00 AM - 12:00 PM ET)

Who is this for?

Those that have completed or are in the process of completing the Backyard Stream Repair Webinar Series

What will you learn?

- How to properly plant a tree
- Trees used for riparian buffers
- How live staking works
- Plants to use for live staking
- How to use the First Investigation of Stream Health (FISH) Protocol
- Hands-on experience

What should volunteers bring?

- Gloves
- Shovel
- Water bottle
- Hand pruners (if possible)
- Mallets/drilling hammers (if possible)
- Waterproof boots

Continuing Education Credits available for those who attend the LIVE presentations!

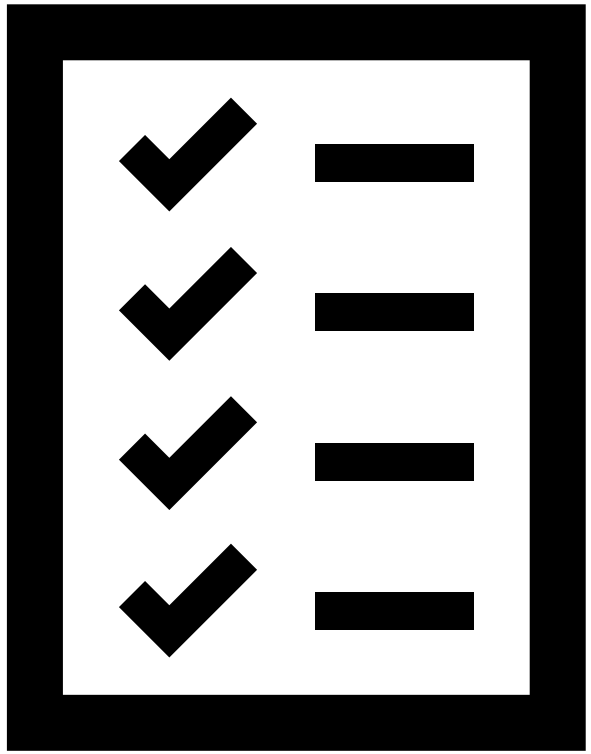
- Chesapeake Bay Landscape Professionals (CBLP) CEUs
- ISA Certified Arborist CEUs
- Pennsylvania Landscape and Nursery Association (PLNA) Pennsylvania Certified Horticulturist (PCH) and Sustainable Landscape Certification (SLC)
- Landscape Architecture CEUs and Engineering Professional Development Hours (PDHs)
- Certificates of attendance

About 800 registrants (Spring & Fall 2021 and Spring 2022 sessions)

Evaluating the Program

Qualtrics surveys were sent to each participant:

- After each webinar
- After completion of the webinar series
- Six to eight months after program completion



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Initial survey results after webinar series:

- Initial overall program evaluation responses (N=147) - 94% of participants were satisfied with the overall program.

- Over 50% of participants reported being extremely likely to:
  - Evaluate their stream
  - Plan a live staking or riparian buffer for implementation within the next few years
  - Educate family and friends about what they learned

Average confidence increased in:

- Creating a stream repair plan
- Knowing when to apply for a permit
- Managing their stream
- Evaluating stream health

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Survey results after 6-8 months:

Of those responding to impact evaluations: (N=88) **

- 75% educated their family, friends, about grading, live staking, and/or riparian buffers.
- 50% evaluated their stream using the First Investigation of Stream Health protocol or some other visual assessment technique.
- 48% prepared a planting plan for their backyard stream repair project.

Note: Percentages do not include respondents who reported they did the action before the webinar series or respondents who selected "N/A" on the survey for the action

**Results are for Spring 2021 and Fall 2021

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Survey results after 6-8 months:

Of those responding to impact evaluations: (N=88) **

- 46% assisted someone else (e.g., family, friends, neighbors, and/or clients) with restoring their stream.
- 42% completed a riparian buffer planting
- 40% completed a live stake planting along a stream.
- 5% graded the banks of their stream to a 3:1 ratio after applying for and receiving a permit.

Note: Percentages do not include respondents who reported they did the action before the webinar series or respondents who selected "N/A" on the survey for the action

**Results are for Spring 2021 and Fall 2021

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Survey results 6-8 months (cont.)

More than 69 different stream repair projects worked on since the series:

- 75% of projects took place at a private residence
- 25% of projects took place on municipal/public lands

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Program Impacts:

Live stake and/or riparian buffer planting projects conducted since webinar series:

- Total stream length of any woody or meadow riparian buffer plantings = **3,405 ft**
- Average width of newly planted buffers = **46 ft (2ft-500ft)**
- Total number of trees or shrubs planted in riparian buffers = **1,171 trees/shrubs**
- **2,438 total hours** invested by respondents into their stream repair projects
- **$38,248 invested** by respondents into their stream repair projects

Example 1

Flooding in 2021

Planted in Fall 2022

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Example 2

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Example 3

Before: Invasive Plants

After: Invasive plants removed, Buffer being planted

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Program Impacts: Maintenance

- Around half (55%) of respondents reported completing maintenance activities on their stream repair projects **monthly**
- An additional 37% reported doing maintenance at other time intervals including weekly, just once, and after significant weather events

Program Impacts – beyond local:

Riparian buffers are estimated to remove up to 100 pounds of nitrogen, 8 pounds of phosphorous, and 2,483 pounds of suspended sediment per acre per year. (chesapeakeforestbuffers.net)

Impacts reach far beyond what homeowners are doing in their backyard!

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Comments from participants:

- “We participated in the webinar series to become **better stewards of the stream** running through our property…(feel **empowered** to work on stream now).”

- “I am most grateful for this information and I hope I can **influence the community** to help the stream that runs through the community.”

- “Phenomenal job - I was so impressed by **the level of information** provided in both the course and the guide.”

Considerations
Before Setting Up a Program In Your State. . .

Think about:

- Demand
  - Is stream erosion a significant water quality issue?
- Permit Requirement(s)
  - Does your state allow the installation of vegetation and/or earth disturbance alongside streams?
- Climate
  - Does your state have the right climate to support live staking

Illinois Fox River in Wisconsin near Illinois State Line
Andy Yencha

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Pike River near Kenosha WI, Andy Yencha

Q. Are streambanks eroding in your state?

A. Probably yes.

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Is revegetating allowed?

Riparian rights and responsibilities vary across the nation:

- Navigability
- Habitat
- Erosion
- Flood Control

Tributary, Slotznick Run
Dauphin County
Pennsylvania
Andy Yencha

https://wetland-plants.sec.usace.army.mil/nwpl_static/v34/home/home.html

Create a native plant list for your region

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How does this benefit you?

Direct people to this program if:

- their property/needs are too small for your programs.
- they aren’t sure what they want for their stream and are looking for ideas.
- you lack the resources to give personal advice to everyone who contacts you.
- you have young staff or volunteers who need to better understand stream repair options.

Illinois Fox River in Wisconsin near Illinois State Line
Andy Yencha

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People are interested in DIY opportunities

They just need the resources to get started

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Interested in learning more?

https://extension.psu.edu/backyard-stream-repair-series

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Thank you!

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Questions?

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