



F.I.S.H.

First Investigation of Stream Health:



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.)? _____

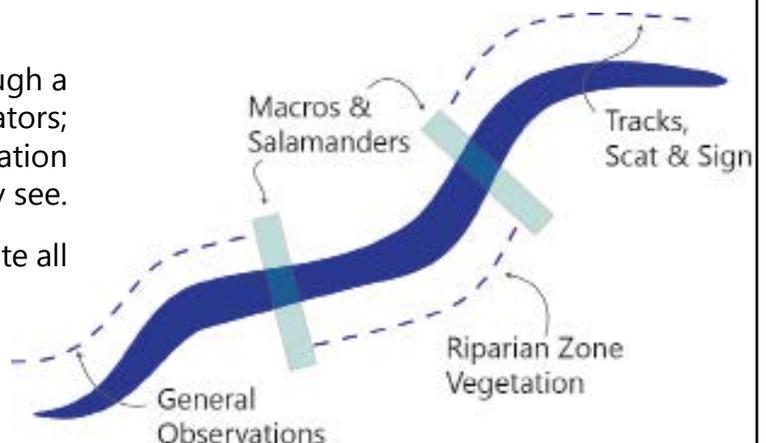
Suggested Sampling Procedure:

This protocol will take you step by step through a series of tasks to monitor: water quality indicators; macroinvertebrates; salamanders; vegetation cover and quality; and other wildlife you may see.

This diagram illustrates one way to incorporate all the elements of the protocol to provide a holistic picture of how your riparian buffer restoration is improving water quality and wildlife habitat.

Through time, your vegetation structure will change and grow. As it matures, the habitat will become more complex and you will likely see an increase in the number and variety of plant and animal species.

Enjoy the progress as you witness the changes!



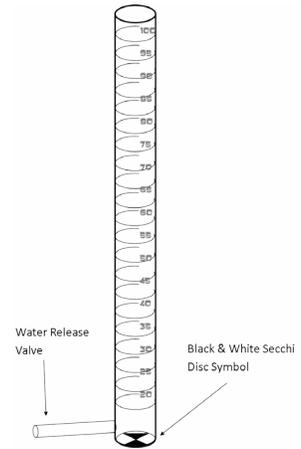
NOTE: Please be very careful to replace rocks, logs, and branches as you found them to maintain habitat integrity for riparian insects and salamanders!

Water Clarity

Transparency

Transparency measures the particles that are suspended in the water including soil and algae. It is a measure of water clarity and an indicator of water quality. Having clear water can be a sign of clean water and is much more aesthetically pleasing.

Using your transparency tube, measure the depth at which you can still see the symbol at the bottom, and record the measurement in centimeters: _____



Stream Bottom Habitats

Embeddedness

Macroinvertebrates, or aquatic bugs, require small spaces to have a healthy habitat. Rocks and gravel provide those small spaces, but fine sediment can fill up those holes making it hard for the insects to survive. If you waded into the stream and kick the bottom, how intense is the dirt cloud that appears in the water? To rate your section of stream on how embedded the gravel and rocks are in fine sediment, follow the categories below:

High Embeddedness: if the stream bottom is entirely mud. Embeddedness is also high if there are stones but they are packed down into mud and hard to remove from the stream bottom. A big dirt cloud arises when the stream bottom is kicked.

Medium Embeddedness: if the stream bottom is a mix of rocks and mud. Embeddedness is also medium if the stones are easily removed, but mud is still visible underneath. A medium-small dirt cloud arises when the stream bottom is kicked.

Low Embeddedness: if the stream bottom is entirely rocky and little to no sediment or mud is visible. A very small or no dirt cloud arises when the stream bottom is kicked.

High Embeddedness			Medium Embeddedness			Low Embeddedness		
1	2	3	4	5	6	7	8	9



If there are any rocks, they are all or mostly buried in the mud or sand.



There are some spaces between the stones and mud.



There is very little mud present and the rocks have spaces between them.

Please rate the level of embeddedness for your section of stream on a scale of 1 to 9: _____

Stream Life



Macroinvertebrates (only complete this task during spring walk)

Macroinvertebrates, or aquatic bugs, form the base of the food web for aquatic life and are also an indicator of water quality.

When you flip over rocks in the stream, are there any bugs crawling over the bottom or sides of the rocks? (total count): _____

Try to identify the bugs you found and record their names below: (**Hint** - take a photo to help with identification later using the links provided under **Additional Resources** at the end of this document.)

Salamanders (Complete this task during spring/summer walks)

Salamanders can live either on land (terrestrial) or in water (aquatic). These animals primarily breathe through their skin and are sensitive to chemical pollutants, toxins, and sediments suspended in the water. They also require moist shady environments and places to hide such as logs or rocks to help them maintain their moist skin to breathe and regulate body temperature. Both aquatic and terrestrial salamanders eat insects (land and water living) and require riparian vegetation to survive. Because of these characteristics they are excellent indicators of environmental health. The variety and number of salamanders is likely to increase as your riparian buffer zone matures.

When you flip over rocks in the stream (in an area about 3 feet wide), are there any salamanders on or under the rocks? (total count): _____

When you flip over rocks, logs or branches on the banks, are there any salamanders on or under the objects? (total count): _____

Try to identify the salamanders you find in the stream or on the stream banks and record their names below: (**Hint** - take a photo to help with identification later using the links provided under **Additional Resources** at the end of this document.)

Did you see any fish while you were in the stream? (total count) _____

Did you see any frogs or toads in the stream or on the bank? (total count) _____

Did you see any turtles in the stream or on the bank? (total count) _____

Vegetation

Bank Cover

Fast moving water can erode the banks on either side of a stream. Erosion causes loose soil to break free, and be transported downstream by the water. Established vegetation on the banks can help prevent this from happening.

Please rate the percentage of the bank that is covered in vegetation by circling the number on the scale from 1 to 9 below that best describes the vegetative cover along your section of stream. Estimate an average value of the entire length for each side of the stream.

Poorly Vegetated

Partially Vegetated

Well Vegetated



There is no vegetation on the bank. Banks may be steep with evidence of severe erosion.



Some of the bank is vegetated but there are also many noticeable bare spots.



The entire bank is vegetated with little or no bare spots and little sign of erosion.

When looking downstream - the right bank vegetation estimate is:

Poorly Vegetated			Partially Vegetated			Well Vegetated		
1	2	3	4	5	6	7	8	9

When looking downstream - the left bank vegetation estimate is:

Poorly Vegetated			Partially Vegetated			Well Vegetated		
1	2	3	4	5	6	7	8	9

Riparian Zone

It is very important for a riparian buffer to exist along a stream. The wider the area and the more mature the vegetation, the more benefits the riparian buffer provides. Trees shade the stream which reduces water temperature making it more comfortable for fish to live. All of the vegetation works together to hold soil in place, absorb pollutants, and provide homes for birds, chipmunks, and other animals.

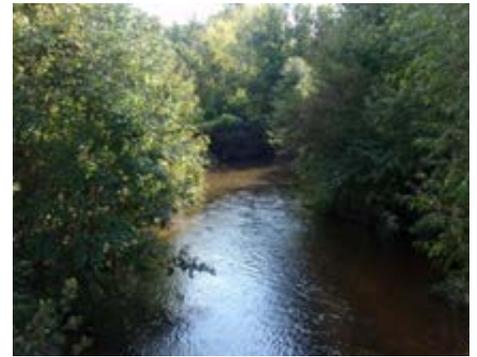
What is the average width of your riparian buffer? _____ ft

Measure from the top of the bank to where human activities are more prevalent. If you planted a riparian buffer, measure to the edge of the planting.

How much of the ground surface, within the measured riparian buffer, is covered by vegetation? Give an estimated percentage of vegetation visible (excluding rocky areas). _____%

Trees provide more benefits than shrubs, and shrubs provide more benefits than grass. Rank your measured riparian buffer on the type of vegetation that is growing.

Mostly Grass			Grass/Shrub/Tree Mix			Mature Trees		
1	2	3	4	5	6	7	8	9



The buffer has mostly grass-like vegetation. Planted trees and shrubs are seedlings and few are growing out of their tubes.

The buffer has a variety of grass, shrubs, and trees. Planted trees are growing out of their tubes or have had their tubes removed.

Tall trees grow along the stream, providing forest-like conditions and have an interlocking canopy for nearly full canopy cover that shades the stream.

Standing dead trees, also called snags, provide nesting and roosting habitat for many types of wildlife including songbirds, bats, small mammals, woodpeckers, raccoons, flying squirrels, and many more. The size of the tree is important, because the bigger the tree the longer it will last, and the larger the type of wildlife that can use it. Estimate the width across the trunk of the tree in inches, at about 4 feet off the ground.

Tally the number of snags (standing dead trees) in each size class as you walk your section of creek:

Total count of snags less than 9 inches across _____

Total count of snags more than 9 inches across _____

Scat, Tracks & Sign

Wildlife not Seen

Oftentimes wildlife goes unnoticed, but they frequently leave behind evidence that they were there. We just have to look closely and learn to recognize the signs. You can use scat (the scientific term for poop), tracks (a.k.a. footprints), or sign (a catch-all for all other evidence, like broken branches, nibbled seedlings, slides in the mud, or runways in the grass).

Scat

Did you find any animal scat while walking your section of stream? _____

Can you identify what animal(s) produced the scat? _____

Need help with identification? Here are a few examples of the most common species:



White-tailed Deer



Eastern Cottontail



Red Fox

Tracks

Did you find any animal tracks while walking your section of stream? _____

Can you identify what animal(s) produced the tracks? _____

Need help with identification? Here are a few examples of the most common species:



Raccoon



White-tailed Deer



Squirrel

Sign (chew marks, browsed shrubs, slide runways, mounds, etc).

Did you find any "sign" that animals were present around your section of stream? _____

What were the signs & who made them? _____

Other Wildlife Observations

Birds

Identification of birds is a life-long quest in learning, but you don't have to be an expert to enjoy our feathered friends. Birds often use certain types of habitat, ground and shrubs, dense vegetation, open vegetation, fields, or high in the canopy of trees. By observing where in your riparian buffer you see these birds of different shapes and sizes, will help you understand how your riparian buffer is being used.

Are there more, less or about the same number of birds as your last visit? _____

Woodpeckers? (total count) _____

Songbirds? (total count) _____

Waterfowl? (total count) _____

Raptors (hawks or owls)? (total count) _____

General Wildlife Observations

Here is your chance to tell us about any other wildlife species you noticed while you were out experiencing your section of creek.

How many different species did you see today? (total count) _____

The following is a sample of questions to consider during your observations. Did you notice any other birds, fish, insects, mammals, or other wildlife that hasn't yet been recorded? Can you identify any of them? If not, did they have any distinguishing features that could help you identify them later with the help of a guide? (shape, size, color, bill length, wing shape, antlers, etc.)

Additional Resources *Check out these links for more information or help with identification.*

For Stream Bugs (Macroinvertebrates) visit:

<http://www.stroudcenter.org/education/MacroKeyPage1.shtm>

<http://www.dep.wv.gov/WWE/getinvolved/sos/Pages/Benthics.aspx>

For Reptiles, Amphibians or Fish visit:

<http://www.paherps.com> or

<http://fishandboat.com/pafish/fishhtms/chapindx.htm>

Wrap Up

Take a minute or two to observe the stream and the surrounding area. How has your restoration practice changed since it was installed or since you last did this monitoring? If you would like to write down any of your observations you can, otherwise enjoy this moment in nature.

The following is a sampling of questions you may consider during your observation. Does the area look the same as it has in the past or has it changed? Is there a dominant plant that is taking over? Could it be an invasive species? Are the plants flowering or have they gone to seed? Is the vegetation stressed because of lack of rainfall? Does the stream look clear or have any noticeable color? Do you notice any odors good or bad?

Please send us any photos you have of your stream monitoring site.

Additional Information

If you can't get enough monitoring, there are additional (optional) protocols that you can add to your monitoring visits. This additional information would help us understand a variety of different aspects that weren't covered in this rapid assessment. We want to respect your time commitment! But if you have more time to collect data, then we'll take it!

For an electronic copy of this protocol or other FISH protocol related information, please visit:

<http://extension.psu.edu/water/watershed-education/watershed-evaluation/FISH>

Survey results and photos can be submitted online at: www.FISHprotocol.org or by contacting the Lower Susquehanna Initiative Office at (717) 948-6609.

This publication is available in alternative media on request.

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