U.S. Fish & Wildlife Service

Stream Visual Assessment Manual

Cane River, credit USFWS/Gary Peeples

Conasauga River, credit USFWS

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Introduction

This guide should help a casual stream visitor both recognize and evaluate the factors that affect a stream to interpret the overall health of a stream, and the things that live in it!

What is a Stream?

A "stream" is created when water that flows from a higher surface begins to run downhill, joining with other overflowing water trickles to form bodies of water. The source of the water is typically rain, melted snow, or water flowing underground, near the surface. This collection of water moves with gravity as it flows downward, often joining other streams to form larger bodies of water, which often eventually flow into final aquatic destinations like lakes or oceans.

Deep River, credit USFWS

A stream interacts with the environment it winds through, bumping against rocks, tree roots, and natural and manmade structures. These interactions affect the stream's DNA, like its size, flow speed, dirt level, what lives in the stream, etc. These interactions ultimately determine a stream's health!

What Makes a Stream "Healthy"?

Many biological, physical, and chemical processes interact in one stream. Since everything in the stream ecosystem is interconnected, any change to a factor of a stream—like the amount of soil or rainfall in the stream—can impact other factors.

A healthy stream will look and function differently depending on where it is in the country and the landscape. For example, a mountain stream will be cooler and flow faster than a stream near the coast. However, there are several key things to look for when judging the health of any stream, regardless of where it is located:

- Trash, oil, or other visible **pollutants** – These are a dead giveaway that a stream might be in trouble. Bigger, visible pollutants signify that there are likely a good many smaller pollutants dissolved in the water (check out "How Pollutants Harm Water Quality/ The Science Behind Pollutants" for details).
- Living Organisms – The types of living creatures present can tell you how healthy the water is. When the presence of something indicates the health of its environment, it is called a biological indicator.
- Nearby Influences – Streams are negatively affected by **runoff** and pollution from the surrounding watershed. Sources of runoff can be busy city streets, waste from neighborhoods or local shopping centers, or pet waste/manure from animal farms.

Pollution Types and How Pollutants are Harmful

A **pollutant** is anything that enters a water source and makes it impure or less safe to drink or use. There are two broad categories of types of pollution: Point source pollution and nonpoint source pollution.

- *Point source pollution* comes from an identifiable source, such as a factory pipe dumping waste directly into a stream, or runoff from an animal farm nearby.
- *Nonpoint source pollution* means that the origin of the pollutant is unknown. Examples of this include food packages, cigarettes, pesticides, grease, and other waste that litters the ground and can harm water quality.

What is a "Reach"?

When using this guide, you will be judging overall stream health based on the section of the stream you will be evaluating, which is referred to as the stream **reach**. A reach is simply a segment of a waterway that does a good job representing what the rest of the waterway looks like. Choosing a good reach is important because the scores you give your stream will be based entirely off what you observe within it. Be sure to choose a reach of at least about 30 feet (around 10 meters) that includes the elements seen along the rest of the stream.

Using This Protocol

Context for Use of this Guide

The Stream Visual Assessment Protocol is intended to be a **simple, detailed guide that assesses the condition of a stream in an easy-to-use way. It is suitable as a basic first estimate** of stream condition. It can also be used to identify the need for more accurate assessment methods that focus on a particular aspect of the aquatic system.

The SVAP should be usable nationwide. Though regional differences matter when grading a stream, this assessment has been designed to measure factors that are the least sensitive to regional differences.

Assessment

The overall assessment score is determined by adding the values for each element, and dividing by the number of elements scored. For example, if your scores add up to 76 and you assessed 12 elements, then the overall assessment value would be 6.3 (76 divided by 12 equals 6.3). This value can then be used to make general statements about the environmental condition in and around the stream, and, if used more than once, can show how a stream changes over time.

Reach Identification

This section asks you to record basic info about the reach, including name, location, and surrounding land uses. Space is provided for drawing a picture of the reach, which may be useful for revisiting the site, or for pointing out problem areas. Taking pictures of the reach and what you find there is also encouraged to help you keep good records and share what you find with others.

The **active channel width** can be determined by finding the place along your reach where it appears the stream is at its widest when it is the most full. You can tell the maximum “flooding level” of a stream by looking at where the bank seems to hang over the stream, there is erosion, or there is very little green vegetation.

Note that at the time you use this guide to grade a stream, the stream may not be at its highest water level. For this protocol, a visual estimate of the average channel width is good enough. For the “assessment scores” section, assign a value for each of the seven elements based on your best judgment. If any element is not relevant to your site, then do not score that section at all. Any elements omitted will not be included in the “overall assessment” calculation.

Scoring Details

The following instructions will help you understand how to grade characteristics of the stream. All of the following characteristics include detailed items to look for that can tell you if the stream is in good, moderate, or poor condition. After reading each section, use the given scale to give that characteristic a score on your sheet that will be added up for a final score.

East Fork Headwaters, USFWS/Gary Peeples

Fish and Wildlife Service Visual Assessment Manual

Evaluator Name____

Date____

Stream Name____

Assessment Scores (1-10)

Channel Conditions	_______
Riparian Zone	_______
Bank Stability	_______
Water Appearance	_______
Nutrient Enrichment	_______
Macroinvertebrate habitat	_______
Hydrologic alterations	_______
Overall Score	_______

(Sum of above, divided by 7 (or number of factors scored)

<6.0 Poor 6.1 – 7.4 Fair 7.5 –8.9 Good >9.0 Excellent

Natural channel; no structures, man-made channels. No evidence of downcutting or excessive lateral cutting.	Evidence of past channel alteration, but with visible recovery of channel and banks. Any levees are set back to provide access to an adequate flood plain.	Altered channel; <50% of the reach shows signs of channelization. A braided channel. Levees restrict flood plain width.	Channel is actively downcutting or widening. >50% of the reach shows channelization. The stream is restricted from its flood plain by levees.
10	7	3	1

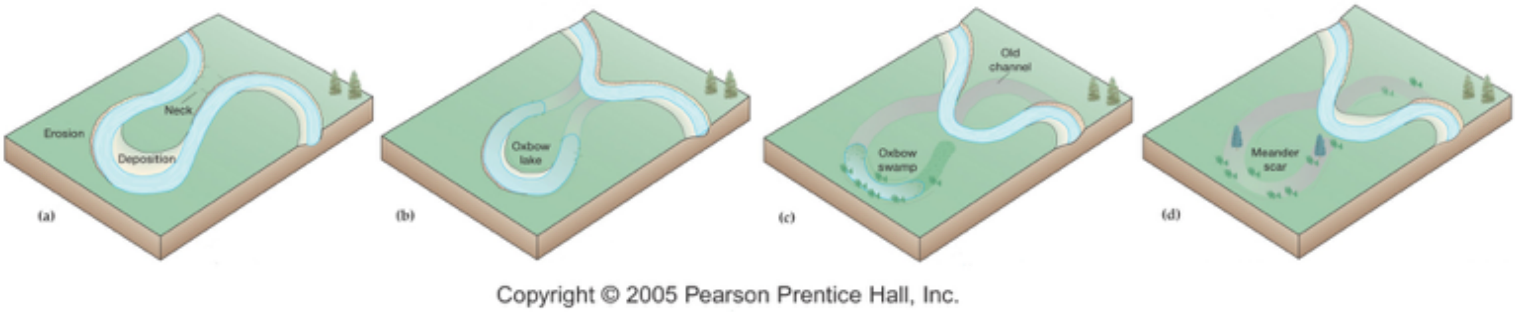


Figure 1. You can see the original stream (a) and how over time it has changed direction or meandered. http://web.gccaz.edu/~lnewman/gph111/topic_units/fluvial/fluvial2.html

Channel Conditions

Let's start by defining a channel as "the area where water flows continuously or periodically between a **stream bank** and over a **stream bed**." In simpler terms, it's the place where the stream flows. Channel conditions are the factors that may affect the direction of flow of these channels (see the glossary for the explanations of the words in bold).

Determining the condition of the channel always involves two factors: water flow, and the stability of the bank and stream bed. The flow of the water will determine the amount of **sediment** added or removed, from the channel and how fast changes in the channel will occur. Bank and Stream beds determine how deep the stream flows, and the direction it will flow through the watershed. The change of direction in the channels is called **meandering** (figure 1), when a channel veers from its natural path. When a stream erodes downward, below the natural stream bed, it is showing signs of **downcutting**. When the stream cuts across the bank into the land surrounding the stream, it is showing signs of lateral cutting.

Looking at our reach, if there are signs of unnaturally straight sections, high stream banks, or there are no signs of pools, riffles, or rapids, the stream might be channelized. Streams that already have been channelized may not have as much vegetation in or around it. In older channels with channelization, there will be lack of woody vegetation like trees and shrubs and more grasses. Signs of downcutting include riffles facing the opposite direction of the flow of water, causing backwards waves. You may see manmade structures like exposed pipes and bridge footings that were at one time underwater, now exposed due to a lowered streambed. Signs of built up sediment along loops and curves of the stream, called point bars, indicate a channel in the process of changing direction. Another indicator of channelization is woody vegetation below the bank. Looking at all these factors, you must determine the level of channelization and meandering and rate it based on the given scale.

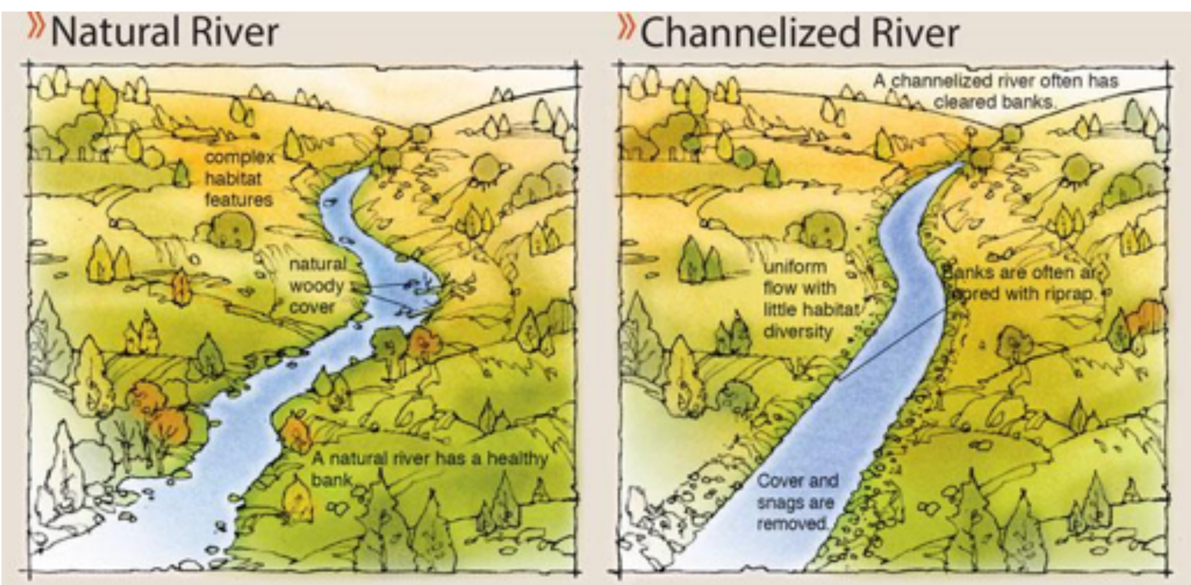


Figure 2. A visual representation of a natural streams jagged flow and it being straightened through channelization. https://www.geocaching.com/geocache/GC5TCT6_channelized-river-restoration

Riparian Zone

This is the easiest and most important characteristic to look at when it comes to stream assessments. The riparian zone can be defined as the amount of vegetation that surrounds the streams banks. This zone serves as a buffer between the stream and any surrounding sources of runoff. The buffer area is often made up of vegetation such as trees, bushes, and shrubs — plants that soak up potentially hazardous materials, recycling them into the environment before they are able to pollute the stream directly. Rain water is also soaked up in the riparian zone, feeding into the water table below the stream and contributing to the groundwater that establishes a baseflow.

The riparian zone also provides shaded areas along the banks of the streams that provide habitat for fish like bass and catfish. The riparian zone should be present on both sides of the stream in equal widths. These areas also provide a brake system of sorts—water rushing down hills (or other steep inclines) towards the stream is slowed down by the roots and leaves of plants, allowing for less erosion of sediment into the stream.

When looking at the riparian zone, check for complete and thorough plant communities. Are there multiple species present, including plants with various leaf sizes flowering types, and root structures? Look between the stream and the nearest road or human-disturbed area. Is there a big enough buffer where water can be slowed down before it reaches the stream? Make sure there are healthy riparian zones on BOTH sides of the stream as well. You do not want one side to be protected and the other slowly (or quickly) eroding away!

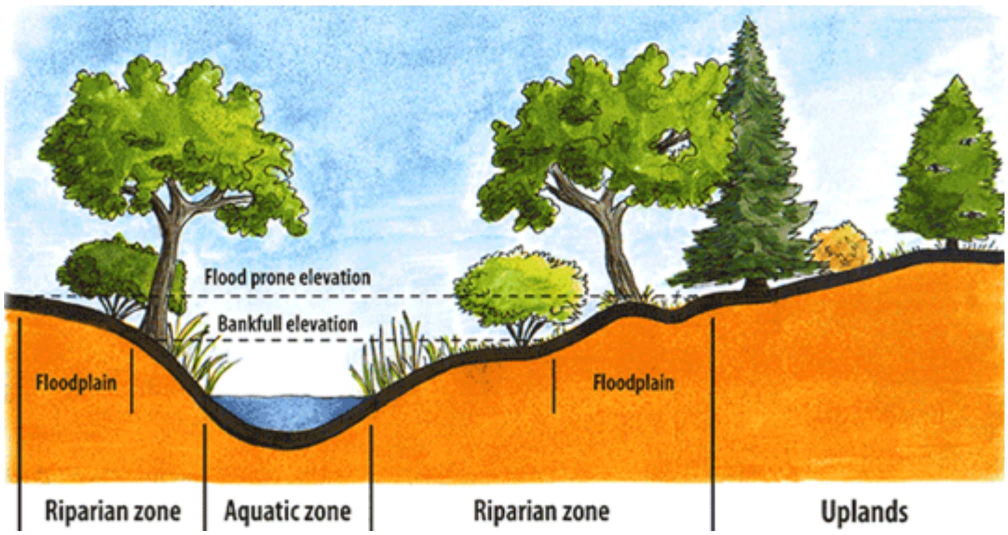


Figure 3. A visual representation of stream zones. See the riparian zone is the immediate buffer between uplands and the stream banks.
http://slco.org/watershed/streams-101/the-riparian-zone/

Lake Woodruff, credit USFWS/E Tramontana

Figure 4. An example of poor bank stability slowly eroding around the roots of the tree.

Bank Stability

The riparian zone leads directly into the bank stability. Large tree roots and structures allow for stable foundations along stream banks. This is important for the same reasons as riparian zones, reducing erosion and provided stable ground for vegetation to grow. Banks can cave in or crash down when they are undercut by flowing water.

If you've ever seen little caverns created under big tree roots creating caves along the bank, this CAN be a sign of poor bank stability. Remember, all banks erode over time so even a bank that may be 50% eroded can still be stable enough for that stream to continue. It all depends on the baseflow (flow at normal height) and the type of soil around the banks.

When grading the bank stability, look for good vegetation, trees and shrubs with good root systems that can hold soil together. Grasses and small plants may not have enough extensive roots to be able to hold up against erosion or flood levels.

Very clear, or clear but tea-colored; objects visible at depth 3 to 6 ft (less if slightly colored); no oil sheen on surface; no noticeable film on submerged objects or rocks.	**Occasionally cloudy, especially after storm event, but clears rapidly; objects visible at depth 1.5 to 3 ft; may have slightly green color; no oil sheen on water surface.**	**Considerable cloudiness most of the time; objects visible to depth 0.5 to 1.5 ft; slow sections may appear pea-green; bottom rocks or submerged objects covered with heavy green or olive-green film. or Moderate odor of ammonia or rotten eggs.**	**Very turbid or muddy appearance most of the time; objects visible to depth < 0.5 ft; slow moving water may be brightgreen; other obvious water pollutants; floating algal mats, surface scum, sheen or heavy coat of foam on surface. or Strong odor of chemicals, oil, sewage, other pollutants.**
10	**7**	**3**	**1**

Loakfoma Creek, credit USFWS

Water Appearance

This characteristic is very visual. Compare what your image of clear water is, probably our drinking water, to that of a typical stream. Would YOU swim in it? That is usually a good indicator of clarity. Water clarity can be determined by assessing the water's color and its turbidity (the measure of how murky the water is based on the amount of sediment is in the water). There is expected to be a significant amount of sediment present in streams that indicates a healthy flow. Signals of poor water appearance include cloudy, milky looking water, or signs of pollution like like foam or oils on the water. Water appearance can be relatively easy to assess, if it doesn't look healthy and habitable, it probably isn't!

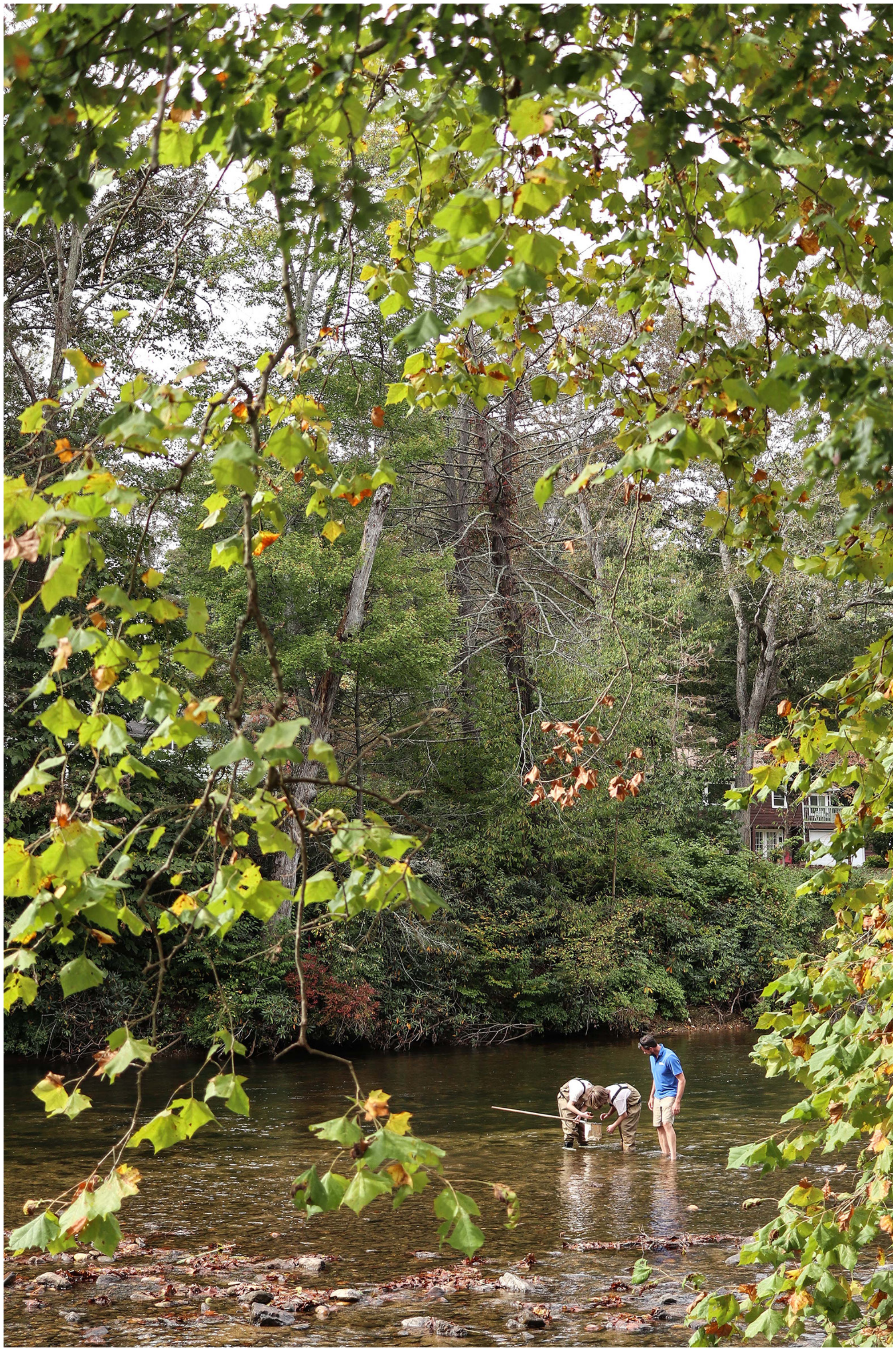
Within this category, look for pools of water. These are areas where there is little to no flow of water into or out of the area, thus creating little pools just like those in backyards. Pools can be shallow or deep and are important fish feeding and breeding grounds. A healthy stream should have a mix of shallow and deep pools, the depth depending on the surrounding overall depth of the stream. If little to no water is running between the pools and the stream, the pools may be prone to harboring algae or collecting or collecting other hazardous materials. Looking at your stream, one to two pools is normal to see for the reach assessed.

Clear water along entire reach; diverse aquatic plant community includes low quantities of many species of macrophytes; little algal growth present.	**Fairly clear or slightly greenish water along entire reach; moderate algal growth on stream substrates.**	**Greenish water along entire reach; overabundance of lush green macrophytes; abundant algal growth, especially during warmer months.**	**Pea green, gray, or brown water along entire reach; dense stands of macrophytes clog stream; severe algal blooms create thick algal mats in stream.**
10	**7**	**3**	**1**

Nutrient Enrichment

Nutrient enrichment can be measured by the species and number of aquatic vegetation in the water. Visible rooted aquatic plants (called macrophytes) provide food and hiding habitat for fish and macroinvertebrates. Seeing vegetation in a stream is normal and can indicate a healthy stream, but too much vegetation can cause problems for the organisms that live there. Aquatic plants use oxygen just like those on land and when they die they soak up the dissolved oxygen in the water, leaving the water unbreathable for fish. High nutrient levels can cause unsustained algal growth.

When assessing nutrient enrichment, you want to see clear water with a diverse aquatic plant community. Areas were there an overabundance of aquatic plants or algae film on top of the water indicates unhealthy levels of nutrients.



Pigeon River, credit USFWS/Gary Peeples

Macroinvertebrates Observed

Macroinvertebrates (animals without a backbone that can be seen by the human eye) observed in a stream can imply a lot about the ability of the stream to support aquatic invertebrate animals. For the purpose of this guide, macroinvertebrates are divided into four categories: ‘tolerant’, ‘semi-tolerant’, ‘sensitive’, and ‘very sensitive’ (to water pollution). The presence of ‘sensitive’ and ‘very sensitive’ species indicates healthy stream conditions; the abundance of ‘tolerant’ species indicates poor water quality. Please see the macroinvertebrate identification sheet on the next page. These small animals can be a great indicator into the health of the stream based on which ones are present. Streams can be deemed healthier upon visual assessment based on the sighting of more sensitive species. Use the guide provided to determine if the “bugs” you see in the water are sensitive or tolerant species.

How to Sample for Macroinvertebrates

You can collect macroinvertebrates by hand by picking up and looking under stones, however, the most effective way is to use a stream bottom sampling net. A common net is a “D-net”, which is used by setting the net a little bit downstream from where you are agitating the stream bottom with your foot. Here is a link to a demonstration on how to properly sample: https://www.youtube.com/watch?v=ftJuAi9Pj7U

Macroinvertebrate Habitat

Habitat for macroinvertebrates include woody debris, submerged logs, dense mats of fallen leaves, boulders, and coarse gravel. Shaded areas along the bank tend to be great spots for larvae and other insects to be flitting across the surface. Areas with a diverse amount of suitable habitat and high stability in these areas will promote a healthy macroinvertebrate population.

Look for areas where the vegetation creates a shadow over the water to provide cool areas. Places where trees have fallen or branches and roots dip into the water usually provide good insect habitat as well.

Little Tennessee River, credit USFWS/Gary Peeples

Damselflies and Dragonflies

Order: Odonata
Size: ½" to 2"
Tolerance: Somewhat sensitive
Distinguishing Characteristics:

- Both have large eyes, six legs, and a large lower lip that covers much of the bottom of the head
- Damselflies are slender and have three oar shaped tails (gills)
- Dragonflies have a stocky body without tails

Dragonfly Adult

Dragonfly Larva

Damselfly

Crane Flies

Order: Diptera
Size: ⅓" to 2 ½"
Tolerance: Somewhat sensitive
Distinguishing Characteristics:

- Worm-like plump body
- Can be found in a variety of colors (clear, white, brown, and green)
- Segmented body with finger-like projections (gills) at the back end
- Head is usually pulled back into the front of the body

Midge Flies

Order: Diptera
Size: up to ¼"
Tolerance: Tolerant

- They can indicate poor stream health caused by pollution if found in large numbers

Distinguishing Characteristics:

- Often whitish to clear, but occasionally bright red
- Segmented body
- Has distinct head with two small prolegs in the front of the body
- Display a spastic squirming action in the water

Black Flies

Order: Diptera
Size: up to ¼"
Tolerance: Tolerant
Distinguishing Characteristics:

- The body is larger at the rear end similar to the shape of a bowling pin
- The distinct head contains fan-like mouth brushes
- Often curl into a "u" shape when held in your hand

CRUSTACEANS

Crayfish

Order: Decapoda
Size: up to 5"
Tolerance: Somewhat sensitive

- Can withstand large ranges of pH and temperatures and is sensitive to toxic substances

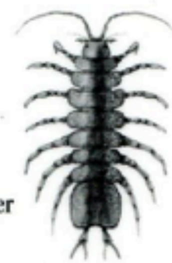
Distinguishing Characteristics:

- Resembles a lobster
- Has 10 legs and the two front legs have large claws or pinchers

Aquatic Sow Bugs

Order: Isopoda
Size: ¼"- ¾"
Tolerance: Somewhat sensitive
Distinguishing Characteristics:

- Flat, segmented body
- Has an "armored" appearance
- Seven pairs of legs
- Can be confused with scuds, however they are flattened top to bottom



Scuds

Order: Amphipoda
Size: ⅛" to ¼"
Tolerance: Somewhat sensitive
Distinguishing Characteristics:

- Resemble a small shrimp
- Translucent body with silvery-gray or tan coloration
- Seven pairs of legs
- Unlike sow bugs, scuds are flattened side to side

WORMS

Aquatic Worms

Class: Oligochaeta
Size: Usually 1" but up to 4"
Tolerance: Tolerant
Distinguishing Characteristics:

- Can be very tiny and slender or look similar to earthworms
- No legs, distinct head or any mouthparts
- Segmented body
- Aquatic worms can indicate organic pollution when they dominate the majority of the sample collection

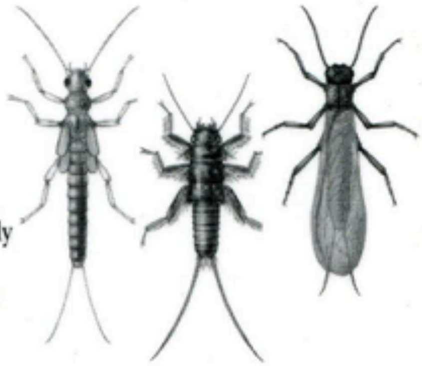
Leeches

Class: Hirudinea
Size: ¼" to 2"
Tolerance: Tolerant
Distinguishing Characteristics:

- Somewhat slimy, soft, segmented body
- Two suckers on the underside of the body, one in the front and one in the rear
- Can be confused with a flatworm, however flatworms have no suckers and leeches have fine lines (annuli) across the body

INSECTS

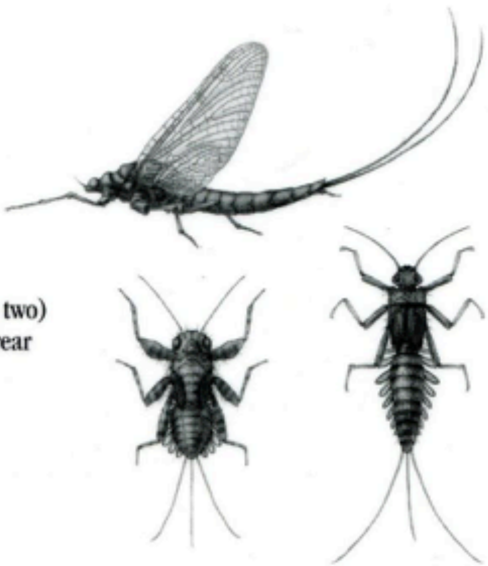
Stoneflies



Order: Plecoptera
Size: ½" to 1½"
Tolerance: Sensitive
Distinguishing Characteristics:

- Two hair-like tails
- No gills on rear half of body
- Structurally similar to mayfly nymphs, but have two tails instead of the usual three in mayflies
- 2 claws on each foot

Mayflies



Order: Ephemeroptera
Size: ¼" to 1"
Tolerance: Sensitive
Distinguishing Characteristics:

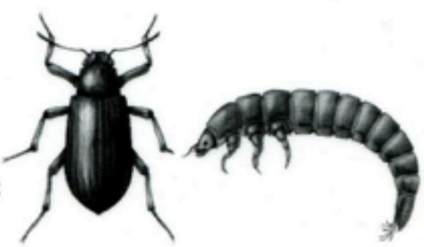
- Usually three long, hair-like tails (but sometimes only two)
- Gills present on the rear half of body
- 1 hook on each foot

Water Pennies

Order: Coleoptera
Size: up to ½"
Tolerance: Very sensitive
Distinguishing Characteristics:

- Looks like a flat, oval disc
- Plates extend from all sides
- Cannot survive on rocks covered with excessive algae or inorganic sediment

Riffle Beetles



Order: Coleoptera
Size: 1/16" to 1/8"
Tolerance: Sensitive
Distinguishing Characteristics:

- Very small
- Dark colored
- Adult riffle beetles will be found walking on the bottom of the stream

Aquatic Snipe Flies

Order: Diptera
Size: ¼" to 1"
Tolerance: Sensitive
Distinguishing Characteristics:

- Body is pale brown to green color
- Mostly cylindrical, with the front tapering to a cone-shaped point
- Larva have a number of mostly paired caterpillar-like prolegs
- Two stout, pointed tails with feathery hairs at back end

Caddisflies

Order: Trichoptera
Size: ½" to 1 ½"
Tolerance: Sensitive
Distinguishing Characteristics:

- Larva is caterpillar-like with three pairs of legs and tends to curl up slightly
- Two claws at posterior (rear) end
- May be found in a stick, rock, or leaf case with its head sticking out

Common Net Spinning Caddisflies

Order: Trichoptera
Family: Hydropsychidae
Size: up to 1"
Tolerance: Somewhat sensitive
Distinguishing Characteristics:

- Body is caterpillar-like with three pairs of legs and is strongly curved
- Dorsal plates (sclerites) on all three thoracic segments
- Branched gills on the ventral surface of the last two thoracic segments and most of the abdominal segments
- Usually have a bristle-like, setal tuft at the end of each anal proleg
- Color varies from bright green to dark brown

Dobsonflies/Hellgrammites and Fishflies

Order: Megaloptera
Size: ¾" to 4"
Tolerance: Somewhat sensitive
Distinguishing Characteristics:

- Stout body with large pinching jaws
- Eight pairs of pointed lateral appendages
- On the rear end of the body a pair of stubby, unjointed legs (prolegs), each with a pair of claws
- Dobsonflies/Hellgrammites have paired cotton-like gill tufts, fishflies lack these
- Fishflies have two short tube-like structures on the tail end

Dobsonfly Larva

Fishfly Adult

Fishfly Larva

Flooding every 1.5 to two years. No dams, no water withdrawals, no structures limiting the stream's access to the flood plain. Channel is not cut by braiding.	**Flooding occurs only once every three to five years; limited channel incision. or Stream withdrawals are occurring but do not affect available habitat for biota.**	**Flooding occurs only once every six to ten years; channel deeply incised. or Withdrawals significantly affect available low flow habitat for biota.**	**No flooding; channel deeply incised or structures prevent access to flood plain or Withdrawals have caused severe loss of low flow habitat. or Flooding occurs on a one-year rain event or less.**
10	**7**	**3**	**1**

Hydrologic Alterations

When a stream floods, how does that affect the way the stream flows? How does it affect the sediment in the stream, and the living creatures that live in the stream? Answering these questions addresses the stream's responses to hydrologic alteration.

A stream's flood plain area (the area around the stream that through time has been used to hold flood waters as the stream overflows) interacts with hydrologic alterations to create stream diversity. Human land use within and around the flood plain (including tree clearing, parking lot run-off, or agricultural use), affect the way a channel will interact with its corresponding flood plains.

Figure 5. This picture shows a stream that has experienced a division of the main stream, creating these smaller and weaker streams. This is an example of braiding.

Credit: United States Geological Survey; Image source: Earth Science World Image Bank http://www.earthscienceworld.org/images Copyright © Bruce Molnia, Terra Photographics

Water flows moves around both sediment of varying sizes and substances, and woody debris like fallen branches and logs, which provides diverse habitats for living creatures throughout the entire stream. High flowing water cleans gravel and larger sediment pieces for fish and aquatic animals, while low flowing water creates pools and ripples.

Baseflow is the stream water that comes from the ground, not runoff from rain or snow. Placement of human structures like irrigation systems and dams affects the baseflow to streams during drought, and the overall normal flow of that stream throughout the seasons When base flow runs low, overall stream flow is affected, and it can result in poor habitat for organisms.

If a channel has no distinction between the flood plain and the bottom of the channel, there will be a lack of overflow, and thus a lack of sediment movement, which cause the stream channel to widen. Well-established banks encourage sediment movement, which reduces the chance of channel widening, and channel braiding. Braiding (figure 3) is defined as channels splitting into three smaller and more shallow channels that lack good habitat for living creatures within the stream. T Splitting a stream into two channels can be positive, since the two new stream reaches tend to be more stable, providing stable habitat for species entering the new tributary.A large channel splitting into three generally stretches the original channel too thin, and it creates poor habitat.

When assessing the physical stream, look for flood lines (water marks along the bank), sediment deposits, and stream debris along the bank. Extra sediment deposits along the bank and shallow channels shows the possibility of braiding to occur, which is not good for habitat.

When grading a stream on hydrologic alteration, look for signs of high sediment movement by the water. Does it seem like a lot of dirt is being washed away from the banks? Look for signs of flooding, like water marks on trees, or vegetation pushed back from the banks.

Glossary

Little River mussel, credit USFWS/Gary Peeples

Active channel width
The width of the stream at the bankfull discharge. Permanent vegetation generally does not become established in the active channel

**Baseflow
The portion of streamflow that comes from from groundwater, not water runoff; average stream discharge during low flow conditions

Benthos
Bottom-dwelling or substrate-oriented organisms

Biological indicator
Something that provides clues about the health of an environment based on its presence or absence, or certain physical characteristics/manifestations. For example, frogs are good biological indicators of water quality because they are more sensitive to pollutants than many animals. If water quality is poor, frogs may have unusual characteristics such as missing toes or extra limbs, or be entirely absent from the area.

Braiding
A series of channels created when a main stream splits off into smaller parts separated by islands of sand or sediment. Smaller channels that are created are considered the braids.

Boulders
Large rocks measuring more than 10 inches across

Channel
A natural or artificial waterway of perceptible extent that periodically or continuously contains moving water. It has a definite bed and banks that serve to confine the water.

Channelization
Straightening of stream channel to make water move faster.

Cobbles
Medium-sized rocks which measure 2.5 to 10 inches across.

Degradation
Geologic process by which a stream bottom is lowered in elevation due to the net loss of substrate material as it is washed downstream. Often called downcutting.

Downcutting
See degradation.

Ecoregion
A geologic area defined by similarity of climate, landform, soil, potential natural vegetation, hydrology, or other ecologically relevant variables.

Ecosystem
A community of organisms that interact with each other within a physical environment

Flood plain
The flat area of land adjacent to a stream that is formed by current flood processes

Grass
An annual to perennial herb, generally with round erect stems and swollen nodes

Gravel
Small rocks measuring 0.25 to 2.5 inches across

Habitat
The area or environment in which an animal lives

Hydrology
The study of the properties, distribution, and effects of water or Earth's surface, soil, and atmosphere

Incised channel
A channel with a streambed lower in elevation than int historic elevation in relation to the floodplain

Intermittent stream
A stream I contact with the ground water table that flows only certain times of the year, such as when the groundwater table is high or when it receives water from the surface source

Lateral cutting
See degradation; along the width of the stream

Meander
A winding section of stream with many bends that is less than 1.2 times longer, following the chanel, than its straight-line distance. A single meander generally comprises two complete opposing bends, starting from the relatively straight section of channel just before the first bend to the relatively straight section just after the second bend

Macroinvertebrate
A spineless animal visible to the naked eye or larger than 0.5 millimeters. These are organisms that do not have a skeleton and are fairly small, but can still be seen with the naked eye. These can be aquatic worms, crayfish, aquatic insect larva, and more. Though small, these animals are important to a balanced ecosystem, and can even be biological indicators (**refer to the macroinvertebrate identification pamphlet to see which species are tolerant or not…)

Nonpoint source pollution
Pollution (such as runoff from farmland, etc.) that is not confined to a single point

Perennial stream
A stream that flows continuously throughout the year

Point bar
A gravel or sand deposit on the inside of a meander; an actively mobile river feature

Point source pollution
Pollution from an identifiable source

Pollutant
A substance or energy introduced into a specific environment that has undesired effects or adversely affects the usefulness of a resource.

Pool
Deeper area of a stream with slow-moving water

Reach
A section of stream (defined in a variety of ways, such as the section between tributaries or a section with consistent characteristics)

Riffle
A shallow section in a stream where water is breaking over rocks, wood, or other partly submerged debris and producing surface agitation

Riparian
The zone adjacent to a stream or any other waterbody

Run
A fast-moving section of stream with little surface agitation

Runoff
The draining of water downhill off of surfaces such as paved roads, buildings, cars, etc. As water moves this way across the landscape, it picks up the pollutants it encounters and takes them with it. When the runoff droplets eventually reach the water system of the watershed, they bring those pollutants with them, thereby polluting the water source.

Scouring
The erosive removal of material from the stream bottom and banks

Sediment
Naturally occurring material found at the bottom of streams that is broken down by erosion. It typically either settles on the stream bed, or is transported by stream flow to other parts of the stream.

Stream bed
The bottom of the stream or river channel, contained between the banks of the stream.

Substrate
The mineral or organic material that forms the bed of the stream; the surface on which aquatic organisms live

Turbidity
The depth to which an object can be clearly seen is a measure of turbidity. This can be measured by lowering a disk (called a secchi disk) into the water until it disappears. The depth you can lower the disk before it disappears can be used to determine the clarity of the water. The lower the depth, the more clear.

alt. Turbidity
Murkiness or cloudiness of water caused by particles, such as fine sediment (silt, clay) and algae

Watershed
A ridge of high land dividing two areas that are drained by different river systems. The land area draining to a waterbody or point in a river system; catchment area, drainage basin, drainage area

alt. Watershed
An area of land where water runs downhill to the same body of water or water system. Its function is to collect rainfall, store it as groundwater, and eventually allow that water to drain into streams, rivers, and oceans.

Tuskasegee River, credit USFWS/Gary Peeples