

## **GBTU Trout Tails Educational Trail**

### ***Standards and Project Overview***

# of signs 12-15

3' w x 2' h

Full color, high resolution, UV resistant/made for outdoors

Pedestal base

Handicap accessible

### Color Standards

Color	Code	cmyk
White	fbfcfd	1 0 0 0
Blue	003066	100 88 32 23
Dk Green	339933	80 16 100 3
Yellow	e4d404	14 9 100 0
Brown	916602	
Dark Brown	674e31	
Water Blue	81a4f8      d6edfc	
Red	d71920	

### Font Standard

Gills Sans MT Family

### Reference Materials:

My Healthily Steam, Trout Stream Therapy, National Website, Stream Girls

<https://www.tu.org/conservation/our-approach/>

Images

<https://troutunlimited.photoshelter.com/galleries>

<https://digitalmedia.fws.gov/>

### Overriding Themes :

Protect Reconnect Restore Sustain

Connecting Communities and Watersheds consists of four interrelated parts: Protect, Reconnect, Restore, and Sustain.

Protect: Intact watersheds are working as nature intended. Often, the best way to help a place is to leave it alone. We advocate for responsible land and water use with lasting protection of trout habitat.

Reconnect: Free flowing, unobstructed river systems and their healthy watersheds benefit trout and people. Allowing fish to migrate for comfort and safety throughout a watershed greatly increases survival. Clean water and healthy ecosystems benefit everyone connected to our rivers.

Restore: The only way to give fish a chance is to reclaim land that is degraded through poor development practices and habitat compromising natural events. Our chapter is committed to raise funds, roll up our sleeves, and get wet restoring habitat.

Sustain: Our work to protect, reconnect and restore will last into the future if we inspire others to continue our work. We're motivated to educate the public and children about the benefits of clean water, healthy communities, and their own well-being through outdoor activities.

## **Sign Listing**

*(choose line to jump to content)*

## Table of Contents

<b>#0 Trail Head</b>	<b>3</b>
<b>#1 Welcome</b>	<b>4</b>
<b>#2 Connecting Communities and Watersheds: Protect Reconnect Restore Sustain</b>	<b>5</b>
<b>#3 Geology/History Haller Creek</b>	<b>7</b>
<b>#4 Watersheds and Riparian Areas</b>	<b>9</b>
<b>#5 Trout Water</b>	<b>11</b>
<b>#6 Bugging Out</b>	<b>14</b>
<b>#7 Trout Insights</b>	<b>17</b>
<b>#8 Habitat</b>	<b>21</b>
<b>#9 Life Cycle</b>	<b>23</b>
<b>#10 Water Watch</b>	<b>25</b>
<b>#11 Protect &amp; Reconnect</b>	<b>27</b>
<b>#12 Restore</b>	<b>29</b>
<b>#13 Sustain</b>	<b>31</b>
<b>#00 Lunker Structure</b>	<b>32</b>

## #0 Trail Head

Purpose: show where trail is at parking lot

Content:

Green Bay Trout Unlimited (GBTU) welcomes you to an enjoyable stroll along Haller Creek as you learn with us on our educational trail about the work we do in our community

Learn About

Protecting

Reconnecting

Restoring

Sustaining

Our Coldwater Fisheries  
and Watersheds

**TRAIL HEAD**

**Trout Tails Educational Trail**

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**Learn About**

- Protecting
- Reconnecting
- Restoring
- Sustaining

**Our Coldwater Fisheries and Watersheds**

**Trail Map**

Haller Creek

1/4 Mile Trail Loop

Pond

Bridge

Trail Head \*

Parking Lot

Reforestation Rd

**Trout Tails Educational Trail**

## #1 Welcome

### Purpose:

Introduce our chapter and our mission. How we go about fulfilling that mission. Mention the existence of other area chapters and how we are under a national umbrella including how we are all interconnected as individual chapters.

### Content:

Green Bay Trout Unlimited (GBTU) welcomes you to an enjoyable stroll along Haller's Creek as you learn with us on our educational trail about the work we do in our community

### We

- were founded in 1969 as Chapter #083
- are part of the Wisconsin State Council
- are a Chapter of a national organization

### We work

- on physical stream reclamation and restoration projects
- for public water access
- at educating others about our area's natural resources

We connect with others to improve our community & cold water resources

Children Veterans WI DNR U.S.F.S. Brown Co. Parks

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**Trout Tails Educational Trail** 1

## #2 Connecting Communities and Watersheds: Protect Reconnect Restore Sustain

Purpose: overview of TU's four guiding principles

Content:

Clean water and healthy ecosystems benefit everyone connected to our rivers

Protect

high quality habitat for native and cold water fish

- Intact watersheds are working as nature intended
- Often, the best way to help is to leave a place alone
- We advocate for responsible land and water use with lasting protection of trout habitat

Reconnect

fragmented fish populations and habitats

- Improve in-stream flows and remove fish passage barriers
- Free flowing, unobstructed river systems with their healthy watersheds benefit trout and people
- Allowing fish to migrate for comfort, safety and reproduction throughout a watershed greatly increases survival

Restore

watersheds in collaboration with others

- Give fish a chance by reclaiming land degraded through poor development practices and habitat compromising natural events
- Our chapter is committed to raise funds, roll up our sleeves, and get wet restoring habitat

Sustain

Our work to Protect, Reconnect and Restore will last into the future when we inspire others to continue our work. We are motivated to educate the public and children about the benefits of clean water, healthy communities, and their own well-being through outdoor activities.



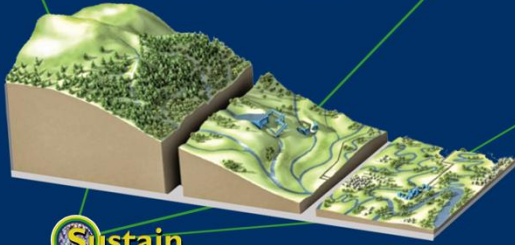
# CONNECTING COMMUNITIES AND WATERSHEDS

Clean water and healthy ecosystems benefit everyone connected to our rivers

## Protect

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## Trout Tails Educational Trail

2

### #3 Geology/History Haller Creek

Purpose: understand how the last glacier period influenced current geology, understand how trout came to live here, understand groundwater, trail history

Geology & History

#### **Glaciers Shape this Land**

Imagine

- Behind you, at the NEW Zoo, is a slowly melting wall of ice
- In front of you, glacial rivers and lakes carry away ice-cold meltwater

Where you stand now was first shaped by a series of movements of the Laurentide ice sheet, with the final retreat 13,000 years ago.

Then later shaped by wind, this area of sand dunes is considerably younger than the end of the last ice age in our region with the creek following an old channel that drained meltwater away from the ice.

Brook trout, which are actually a Char, descended from an ancient order of fishes that had its beginnings more than 100 million years ago.

Native to Wisconsin and North America, they followed the waves of glacial advance and retreat. Their cold-water history is of land masses in a constant state of flux with large hemispheric ice sheets scouring and reshaping the land and water.

#### **Go with the Water Flow**

In our Haller Creek, as with most rivers and streams, surface water and the groundwater system are connected.

As the Water Table varies, our creek will vary in its flow and level.

Haller Creek is a gaining stream. For a creek to gain water, the elevation of the Water Table is higher than the creek water.

Groundwater contribution keeps our creek flowing between precipitation events like rain or snowmelt. Our creek will dry up if we take too much of the groundwater away and lower the water table.

When we pollute the land, we pollute the connected water systems.

#### **Blazing a NEW Zoo Trail**

The planning for the NEW Zoo Educational Trout Trail started in 1992, with installation starting in 1993 and completion of the trail and covered bridge in 1994.

GBTU obtained WI DNR water zoning permits to modify the stream channel as well as approval from the property owner, the Brown County Parks Department.

The WI DNR Wild Rose trout habitat crew provided logs, stone and brush bundles to modify the stream. The Reforestation Camp constructed the crushed stone walking trail.

Special thanks to Prof. Nelson Ham of St. Norbert College  
& some material adapted from the book Brook Trout by Nick Karas

**GEOLOGY & HISTORY**

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**Trout Tails Educational Trail**

**3**



## #4 Watersheds and Riparian Areas

Wisconsin has an abundance of water. Our wild trout thrive and reproduce in our best streams, rivers and spring ponds.

Connected Watersheds with high water quality are essential for trout to survive.

### **Watersheds are areas where surface water comes together**

Watersheds are typically a lake, stream or river.

Trout move within a connected watershed to find the best conditions for them to live.

Watersheds come in all shapes and sizes and are bounded by mountains, hills and sloping land that funnels water downstream into a common valley.

Usually, a stream flows into a larger water body where it joins other streams to form a river.

*WI water map image*

As small stream, Haller Creek has its own watershed

Becoming a part of a larger watershed, the creek joins with the Suamico River

The river empties into the larger Green Bay watershed connecting to the very large watershed of Lake Michigan

*Haller Creek Watershed Image*

Watersheds receive, store, and release water like rain or melting snow.

How a watershed responds to added water depends on many factors, such as: soils, types and density of vegetation and land use.

If rainwater falls on soil that is:

Bare = runoff is rapid and carries soil into the stream

Heavily vegetated = runoff is slow and filters into the ground

### **Riparian Areas are the strips of land next to water**

These areas are valuable for fish and wildlife and buffer streams from soil and pollutants flowing off the surrounding land. Protection and Restoration of streamside land maintains healthy streams. A healthy stream sustains populations of native plants and animals with high water quality and natural flows with the support of a well-vegetated riparian zone.

*Riparian area image with stream, green strips, trees and animals*

# WATERSHEDS

Protect Reconnect Restore Sustain

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some material adapted from



## Trout Tails Educational Trail

4

## #5 Trout Water

Trout require cleaner water than mankind to survive. Clean water is a basic need for both of us to survive.

When our waters no longer give life to trout, the future of mankind is in peril.

Water is a vital resource to people.

Our food, health and our quality of life depend on water.

The health of our water = the health of our land.

Trout water is precious and of the highest quality.

Where trout live requires water to be:

Cold: 50 to 70 F

Clean: free of human caused pollution

Oxygenated: 4ppm (humans need 209,000ppm)

Spring Ponds are fed by a fairly constant flow of water moving underground that finds an opening to the surface. Their water is often mineral rich, clear, clean and cold.

Limestone Streams are fed by underground springs throughout the year. The forced up water provides stable, cooler flows and the limestone rock adds nutrients to the water.

Freestone Streams depend on the water supply from the adjacent water table, possibly spring seeps, and rain and snow runoff. In the summer and fall, they tend to be warmer and have reduced flows as water is less available. Our Haller Creek is a freestone stream.

Graphics:

Strahler map with all water and trout water

Photos of Spring Pond, Limestone Stream, Freestone Stream

Healthy trout streams are characterized by a meandering path, with logs and fallen trees, boulders, and undercut banks. The many different parts of the stream provide habitat for insects and fish to eat with a safe place to hide and reproduce.

There are repeating sections of riffles, runs, and pools.

#### Riffle

Swift, turbulent current

Choppy water surface

Shallow water depth

Gravel, cobble stones, rocks and boulders

High oxygen levels

#### Run

Moderate current

Broken to smoother water surface

Middle water depth

Many sizes of cobble stones, rocks and boulders

Good oxygen levels

#### Pool

Slow current

Smooth water surface

Deepest water depth

Gravel, cobble stones, boulders, rocks, sand, and silt

Lowest oxygen levels

#### Thalweg

the lowest points of land which the main and deepest flow of stream water follows

#### Graphics:

Meandering path of the S. Branch Oconto River

Typical Healthy Trout Stream



# TROUT WATER

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■ Trout ■ Other

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## Typical Healthy Trout Stream

Healthy trout streams are characterized by a meandering path. There are logs and fallen trees, boulders, and undercut banks. The many different parts of the stream provide habitat for insects and fish to eat with a safe place to hide and reproduce. There are repeating sections of riffles, runs, and pools.

### Riffle

- Swift, turbulent current
- Choppy water surface
- Shallow water depth
- Gravel, cobble stones, rocks and boulders
- High oxygen levels

### Run

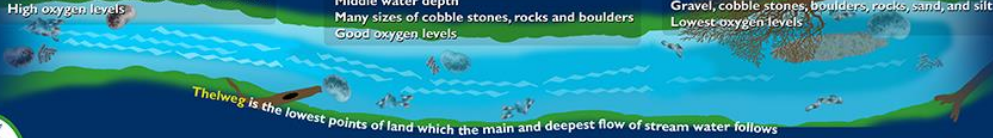
- Moderate current
- Broken to smoother water surface
- Middle water depth
- Many sizes of cobble stones, rocks and boulders
- Good oxygen levels

### Pool

- Slow current
- Smooth water surface
- Deepest water depth
- Gravel, cobble stones, boulders, rocks, sand, and silt
- Lowest oxygen levels



Meandering path  
S. Branch, Oconto River



The low is the lowest points of land which the main and deepest flow of stream water follows



## Trout Tails Educational Trail



## #6 Bugging Out

Clean water is essential to human life and life in and around water. When you know what to look for within and near our high-quality trout waters, you'll discover another world and cycle of life.

**Macroinvertebrates** are animals without backbones.

In streams, some macroinvertebrate aquatic insects shown in their water living form are:

Mayfly

Caddisfly

Stonefly

Alderfly

Scud

Macroinvertebrates Photos Credit:

David H. Funk

Stroud Water Research Center

Aquatic insect macroinvertebrates live most of their lives on the bottom substrate of streams among gravel and sand, and on rocks, logs, and aquatic plants. Their adult forms are short lived.

They are a major food source for trout and a main part of the food web in stream systems by feeding on algae, bacteria, leaves and a variety of decomposing organic matter.

**Water quality assessment** by sampling is performed by recording aquatic insect types and quantity. You can find and identify insects by checking stream bottom rocks or using a net.

Aquatic insects are used for sampling as water quality indicators because they are:

- Visible to the human eye
- Identified and counted easily
- Sensitive to pollution and changes in their habitats
- Indicators of water quality over time with their relatively long-life cycle

You can tell a lot about water quality by learning to identify aquatic insects and their life stages.

**Metamorphosis** is the fascinating change insects undergo during their lives that reliably occurs at the same time of each year. For aquatic insects, changing from eggs in the stream bottom to flying adults producing eggs for the next generation and then dying.

**Mayflies** have been found in the fossil record from 300 million years ago. Today, there are about 150 different types in Wisconsin. A couple types are : Finding many in their Nymph form clinging and crawling on rocks in your stream shows good water quality as they are very sensitive to pollution.

“Trico” 5mm

“Hex” 27mm

Insect

Photo

Credit bwood 708

NHSE223-09

Mayflies undergo metamorphosis by passing through three major life stages:

Eggs Many months

Nymph Months to 2 years

Adult Dun 24 - 48 hours Sub Imago

Adult Spinner 2 -24 hours Imago

Instars Stages as nymphs grow and shed their exoskeletons

Nymphs rise in the water by swimming and trapping air

Sub Imago struggles to break through water surface tension and then floats on top to dry wings

Imago dips her eggs and they fall to the stream bottom

Molting Male Female

As an adult, mayflies molt between two change stages: Dun to Spinner.

A spinner female mayfly lays her 4,000 to 8,000 eggs before dying by dipping eggs into the water while flying, releasing a few eggs with each dip to start the life cycle over again.

Special Thanks and Learn More at:

**Caddisflies** have been found in the fossil record from 100 million years ago.

Today, there are about 250 different types in Wisconsin. Finding many of the Larva form in their stone houses or tending to their silk nets shows fair water quality as they are not as sensitive to pollution as Mayflies.

“White Miller” 15mm

Caddisflies undergo metamorphosis by passing through four major life stages:

Eggs Many weeks to 10 months

Larva 1 to 2 years Case Larva

Pupae 2 to 3 weeks

Adult 1 to 3 weeks

Instars Stages as larva grow and build larger houses

Pupae rises quickly in the water by forming an air bubble and swimming

Adult dives through the water to lay her eggs on the stream bottom  
 Male  
 Female

An adult female caddisfly lays her up to 800 eggs before dying by diving into the water while flying and then swimming to the stream bottom, releasing her eggs to start the life cycle over again.

Special Thanks  
 Tom Lager  
 Fox Valley TU

<https://www.eekwi.org/animals/insects/mayfly>  
<https://www.macroinvertebrates.org/> credit: Macroinvertebrates.org and NSF  
<https://stroudcenter.org/macros/>  
 Tom Lager, Fox Valley TU

**BUGGING OUT** — Protect — Reconnect — Restore — Sustain

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**Macroinvertebrates** are animals without backbones. In streams, some macroinvertebrate aquatic insects shown in their water living form are: Mayfly, Caddisfly, Stonefly, Alderfly, Scud.

Aquatic insect macroinvertebrates live most of their lives on the bottom substrate of streams among gravel and sand, and on rocks, logs, and aquatic plants. Their adult forms are short lived. They are a major food source for trout and a main part of the food web in stream systems by feeding on algae, bacteria, leaves and a variety of decomposing organic matter.

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Mayflies undergo metamorphosis by passing through three major life stages: Eggs, Nymph, Adult Dun, Adult Spinner.

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Special Thanks and Learn More at:  
 TROUT UNLIMITED Green Bay Chapter  
 STROUD RESEARCH CENTER  
 Special Thanks Tom Lager Fox Valley TU

**Trout Tails Educational Trail** 6



## #7 Trout Insights

theme: What is a Trout ?

Amazing oxygen using creatures, fascinating colors schemes dazzling to our eyes, torpedo shaped bodies and exceptional senses: trout are masters of their watery world.

You are now an Ichthyologist - one who studies fishes -

### **Anatomy**

#### Gills

take in dissolved oxygen for breathing

#### Gill Cover

protects the delicate gills underneath

#### Nostril

very sensitive sense of smell to detect chemicals compounds

#### Eye

excellent sight for color and shades, low light, Ultra-Violet, near and far vision

#### Mouth

tongue is very sensitive to tastes and feel

#### Fins

Pectoral two of these for staying properly aligned and for moving backwards

Pelvic two of these for staying properly aligned and for moving backwards

Ventral two of these for staying upright

Caudal or tail for moving forward, very powerful

Adipose no purpose but unique to trout

Dorsal for staying vertical or upright

### **Other Senses**

#### Lateral line

a row of pores detecting movement by changes in water pressure

#### Internal Ear (located behind eye)

hearing in wide range and long distance as water carries sound very well

#### Touch

pressure and texture

#### Temperature

being cold blooded, trout are the same temperature as the water and seek comfortable zones

### **Scales**

small and smooth covering most of the body, reduces friction for increased speed and mobility, protects from injury and infection

### **Slime**

mucus secretion covering most of the body, reduces friction for increased speed and mobility, protects from infection and parasites

## Swim Bladder

internal, works like a balloon, controls buoyancy and used to change depth in the water

Rainbow Trout Photo Credit: Randal Rake

## Origin

Distribution

Length

Weight

Water Temp

Water Quality

Reproduction

## Brook

*Salvelinus fontinalis*

Char not trout !

Wisconsin and North America

Worldwide

10-20 inches

¾-4 pounds

53-57 °F

highest quality waters

Fall

### **Identification:**

back: wormlike markings on back and dorsal fin

body: olive/gray-green

body spots: distinctive blue halos surrounding pink spots

belly: silver to white

lower fins: pink, white leading edge and black lines

tail: squarish, some spots

Photo Credit:

## Brown

*Salmo trutta*

Germany: introduced here in 1883

Worldwide

16-30 inches

2-16 pounds

65-75 °F

can tolerate marginal water quality

Fall

### **Identification:**

back: black spotted with white halos across head and back

body: golden brown

body spots: red spots with light halos

belly: golden yellow  
lower fins: yellow, black leading edge  
tail: square, no spots  
Photo Credit: Randal Rake

## Rainbow

*Oncorhynchus mykiss*

Pacific Coast of North America: introduced here in 1880s

Worldwide

16 - 30 inches

2 - 16 pounds

53 - 57 °F

prefers higher quality water

Spring

### **Identification:**

back: black spotted across back

body: wide range of colors: pink, steel blue, green, tan

body spots: black with pink/red stripe

belly: silver white

lower fins: pink with white leading edge

tail: forked, spotted

Photo Credit: Randal Rake

# TROUT INSIGHT

Trout are the jewels of cold-blooded fish

Amazing oxygen using creatures, fascinating colors schemes dazzling to our eyes, torpedo shaped bodies and exceptional senses: trout are masters of their watery world  
 You are now an **Ichthyologist** - one who studies fishes -



**Slime**  
mucus secretion covering most of the body, reduces friction for increased speed and mobility, protects from infection and parasites

**Scales**  
small and smooth covering most of the body, reduces friction for increased speed and mobility, protects from injury and infection

**Other Senses**  
**Touch**  
pressure and texture  
**Temperature**  
being cold blooded, trout are the same temperature as the water and seek comfortable zones

**Caudal Fin**  
or tail : for moving forward, very powerful

**Adipose Fin**  
no purpose but unique to trout

**Dorsal Fin**  
for staying vertical or upright

**Gills**  
takes in dissolved oxygen for breathing

**Gill Cover**  
protects the delicate gills underneath

**Internal Ear**  
hearing in wide range and long distance as water carries sound very well

**Eye**  
excellent sight for:  
- color and shades  
- low light  
- ultra-violet  
- near and far vision

**Nostril**  
very sensitive sense of smell to detect chemicals compounds

**Mouth**  
tongue is very sensitive to tastes and feel



**Ventral Fin**  
two of these for staying upright

**Lateral Line**  
a row of pores detecting movement by changes in water pressure

**Pelvic Fin**  
two of these for staying properly aligned and for moving backwards

**Swim Bladder**  
internal, works like a balloon, controls buoyancy and used to change depth in the water

**Pectoral Fin**  
two of these for staying properly aligned and for moving backwards

**Brook Trout** *Salvelinus fontinalis*  
Char not trout!  
distinctive blue halos surrounding pink spots  
wormlike markings  
olive/gray-green  
squares, some spots  
silver to white  
pink, white leading edge and black lines  
Photo Credit: Randall Rabe

Wisconsin and North America  
Worldwide  
Length: 10 - 20 inches  
Weight: 1/2 - 4 pounds  
Water Temp: 53 - 57 °F  
Water Quality: highest quality waters  
Reproduction: Fall

**Brown Trout** *Salmo trutta*  
black spotted with white halos  
golden brown  
red spots with light halos  
golden yellow  
yellow tinted  
square, no spots  
Photo Credit: Randall Rabe

Germany: introduced here in 1883  
Worldwide  
Length: 16 - 30 inches  
Weight: 2 - 16 pounds  
Water Temp: 65 - 75 °F  
Water Quality: can tolerate marginal water quality  
Reproduction: Fall

**Rainbow Trout** *Oncorhynchus mykiss*  
black spots with pink/red stripe  
black spotted  
wide range of colors: pink, steel blue, green, tan  
forked, spotted  
silver/white  
pink with white leading edge  
Photo Credit: Randall Rabe

Pacific Coast of North America: introduced here in 1880s  
Worldwide  
Length: 16 - 30 inches  
Weight: 2 - 16 pounds  
Water Temp: 53 - 57 °F  
Water Quality: prefers higher quality water  
Reproduction: Spring



## Trout Tails Educational Trail

7



## #8 Habitat

Habitat is a place where an organism lives. A cold, healthy and connected watershed is the best habitat for trout.

Wild trout survive in healthy water habitat that provides:

**Clean** Trout need pollution free water without chemicals such as herbicides, pesticides, animal waste and fertilizers.

Small amounts of these chemicals can degrade water disrupting the behavior and reproduction of trout and the food they eat.

**Cold** Best water temperatures for trout are between : 50° to 70° F

**Oxygenated** Trout use oxygen to live like you do. Oxygen is added to the water flow by riffles, logs, and other obstructions.

Photo Credit: Haller Creek in Winter, Randal Rake

**Safety** Trout find safe places near many different types of structure. Logs, spaces in the rocks, boulders, undercut stream banks, trees and plants over the water provide cover for trout. Trout need safe places to hide from predators, rest, eat and reproduce.

Connected watersheds provide the option of moving to find food, cleaner water, comfortable temperatures and reproducing.

People who care about clean cold water connect their needs to the trout's habitat needs.

Photo Credit: South Branch Oconto River in Spring, Randal Rake

**Food** Trout grow best with reliable food sources.

The type, quantity and availability of food greatly effects the health of the fish.

Trout eat insects living and falling in the water, other fish, worms and mice.

Photos Credits:

Stonefly David H. Funk Stroud Water Research Center

Ants Beth Mittermaier WDNR

Minnow John Lyons WDNR

Worms Bob Queen WDNR

Mice & Voles WDNR

## Reproduction

Critical to the life cycle of trout, is habitat where they spawn or reproduce.

In the Fall, 2 to 5 year-old female brook trout move to build a Redd (nest) with her tail in the gravelly stream bottom, usually in an oxygen rich riffle. At the Redd, male brook trout fertilize the 20 to 400 eggs from the female near the stream bottom and the sunken eggs are then covered with gravel by the female.

Left undisturbed in the clear and cold running water, the eggs start their cycle of life.

Spawning Redd in Stream Gravel

Elwha Spawning Steelhead

Gila Trout Eggs on Stream Bottom

Trout Unlimited

# HABITAT

Protect
Reconnect
Restore
Sustain

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


Water Creek in Woodland Park




South Branch Otter River in Spring Mountain Park

Stonefly




Rough Sh. Fly  
Hatchling - Aquatic Insect

Ants




Red Ant  
Insect

Minnow




John Dore  
Minnow

Worms




Red Worm  
Worm

Mice & Voles




Moose  
Moose


Spawning Redd in Stream Gravel




Elwha Spawning Steelhead




Gila Trout Eggs on Stream Bottom





## Trout Tails Educational Trail



## #9 Life Cycle

Life cycle is the course of development of an organism.

From the time of inception, growth and then when a mature organism can viably produce another of its kind.

Complete life cycles of naturally reproducing trout populations occur in our highest quality cold water resources.

Adult Brook Trout on Spawning Redd in Stream Gravel  
DIGLLOYD.com

### **Adult**

- Survival from egg to reproducing adult is low, less than 10%
- Reproductive cycle is at 2 to 5 years of age
- At the proper time of the year, a female trout clears the gravelly stream bottom with her fins for the nest called a Redd
- Spawning is when the female trout releases her eggs and they fall into the Redd
- Eggs are fertilized by the male as they fall
- Before leaving the Redd the female slightly covers the eggs with some gravel

### **Egg**

- The female trout lays between 100 and 1,000 eggs
- Eggs are 3.5mm to 4.5mm in size

Gila Trout Eggs on Stream Bottom  
USFWS

### **Eyed Egg**

- Eyes develop at two weeks
- Proper water temperature & oxygen levels are necessary for survival
- Hatching occurs in 4 to 10 weeks

Eyed Eggs of Trout  
USFWS

### **Alevin or Sac Fry**

- Yolk sac develops on freshly hatched egg
- Yolk holds enough food for development
- Sac is absorbed by two weeks
- Breathing begins through developed gills
- Development of teeth & digestive system

Alevin Rainbow Trout  
USFWS

## Fry

- About an inch long
- Yolk sac absorbed
- Leaves the Redd to search for food

Fry Steelhead Trout at a Hatchery  
USFWS

## Fingerling or Parr

- Grow 1 to 3 inches long in a few months
- Eat insects and plankton
- Hide to avoid being eaten
- Parr marks are dark areas that develop on their sides

Fingerling Brook Trout at a Hatchery  
USFWS

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Gila Trout Eggs on Stream Bottom

Fry Steelhead Trout at a Hatchery

Alevin Rainbow Trout

Eyed Eggs of Trout

**Trout Tails Educational Trail**

9



## #10 Water Watch

Be on the watch to protect our precious trout waters and all of the water around you. A vital resource for us all is the cold, clean, oxygenated water of a trout stream.

### **Invasive Species**

An invasive species comes from outside a particular area and can cause environmental harm to another area.

Invasive species can spread by being transferred to uncontaminated waters.

image: water cleaning station

### **Agriculture**

CAFOs or Concentrated Animal Feeding Operations contain 1,000 or more animal units.

Surface waters and groundwaters are degraded by high concentrations of pollutants applied to the surrounding land from:

- untreated manure
- fertilizers
- pesticides

adapted from Wisconsin TU Position Paper

images: CAFO aerial and inside views Milwaukee Journal Sentinel

### **Mining**

The extraction of materials by mining impacts land and water with health risks to all living things.

When the mining ends, the negative impacts persist for long periods of time.

image: Sand Mine - Ted Auch

### **High Capacity Wells**

A high capacity well can withdraw more than 100,000 gallons per day.

Depleted groundwater causes:

- a lower water table
- drained lakes and streams
- negative impacts to home wells

A dead brook trout from the Little Plover River in the Central Sands Region of Wisconsin which experiences fish kills due to dry spells and depleted groundwater.

images: dead brook trout and dry plover river George Kraft

**Urban Sprawl**

The human built environment of shopping centers, housing and roads negatively affects the natural systems we rely on for life.

Growth of our built environment should be carefully planned to protect and preserve our natural areas to benefit and sustain us all.

image: barn and housing American Farmland Trust

**Climate Change**

The negative effects of human-caused global warming will increase as we add greenhouse gases to the atmosphere.

Some notable signs are supercharged weather extremes of :

- air and water temperatures
- wildfire numbers & intensity
- flood and drought events

image: wildfire & USFS logo

**WATER WATCH**

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**Trout Tails Educational Trail** 10

## #11 Protect & Reconnect

“Can’t get there from here” ... Trout deserve access to a connected watershed, and you deserve access to enjoy the outdoors. We remove barriers for trout and you.

### **Protect**

Public access to enjoy, conserve and restore our coldwater resources is worth the investment.

Conservation Easements provide outdoor activity opportunities and make our watersheds and communities more resilient. As population and development increase, so does the demand for spaces that provide outdoor recreation.

The Knowles Nelson Stewardship Fund Program was created in 1989 to preserve important natural communities, protect water quality and fisheries, and expand opportunities for outdoor recreation.

The Watershed Access Fund from Wisconsin Trout Unlimited provides grants for:

- Acquisition of lands with coldwater resources
- Conservation easements for access and restoration
- Partnering with land trusts and agencies for public access

Public Access Sign image

Credit: Jason G. Freund

### **Reconnect**

Free flowing, unobstructed river systems with their healthy watersheds benefit trout and people.

Allowing fish to migrate for comfort, safety and reproduction throughout a watershed greatly increases survival.

Fragmented fish populations and habitats are caused by improperly conceived culverts, which are tunnels for water to flow under roads. Action is taken to improve in-stream flows and remove fish passage barriers.

Rock Creek is a coldwater tributary to the Peshtigo River. Replacing the old, perched culvert reconnected an estimated 9 miles of trout stream.

Before

Perched culverts above stream level limit habitat access & water flow

After

Trout and water now have free movement to more of the stream

Chris Collier Great Lakes Stream Restoration Manager

Archibald Creek is high-quality, coldwater trout stream fed by Barney Springs. The new fish friendly structure reconnected about 3.3 miles of trout stream.

Before

A perched culvert limits access to habitat for spawning and refuge

After

Access restored for trout movement

Danielle Nelson Northern WI Program Coordinator

**PROTECT & RECONNECT**

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**Reconnect**

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Rock Creek is a coldwater tributary to the Peshtigo River. Replacing the old, perched culvert reconnected an estimated 9 miles of trout stream.

**Before** Perched culverts above stream level limit habitat access & water flow.

**After** Trout and water now have free movement to more of the stream.

Archibald Creek is high-quality, coldwater trout stream fed by Barney Springs. The new fish friendly structure reconnected about 3.3 miles of trout stream.

**Before** A perched culvert limits access to habitat for trout spawning and refuge.

**After** Access restored for trout movement.

**Trout Tails Educational Trail**

**11**



## #12 Restore

Wilderness is a resource which can shrink but not grow...creation of new wilderness in the full sense of the word is impossible  
Aldo Leopold

### Restore

The best way to protect a watershed is by leaving the area untouched. But, when needing help, we give fish a chance by reclaiming habitat degraded through harmful human impact and compromising natural events.

Trout streams are continually degraded by human and natural events. We work to optimize trout habitats by improving stream and watershed conditions. in collaboration with others.

Riparian and in stream habitat restoration improves water quality and stream flows to benefit wild trout.

### Brush Bundling & Placement

Proper placement narrows and deepens the channel, provides undercut banks, restores the natural meander of the stream, and the thalweg (the central current) is enhanced. Stream sediment is continually captured by the bundles allowing banks to form and grasses to establish.

#### Before & Stake Lines

Stake lines are placed to guide bundle placement for stream contour

#### Placement

Conifers and/or tag alders are pulled together with rope and placed

#### Anchoring

Bundles are placed and anchored at the edge of the stream

#### Result

Natural meander and central current of the stream are restored  
Banks form and grasses establish

### Brushing

Tag alders are cut from along the stream edges and frequently re-used for bundling placement. Tag alder removal allows: sunlight to enter the stream, proper water flow, and meadow re-growth along the banks. In-stream debris interfering with proper stream flow is removed or placed in a different area. Removal assists in clearing trout gravel spawning areas, with increased stream depth and flow.

Before  
Vegetation interferes with stream flow

Cutting  
Tag alders are cut by loppers and chainsaws

Removal  
Cuttings are bundled or removed

Result  
Increased stream depth and water flow restored

The Friends Program from Wisconsin Trout Unlimited provides grants for habitat improvement projects.

We are committed to restoring habitat by raising funds, advocating and doing the physical work.

Completed projects are testimony to our ability to provide solutions that mesh seamlessly into natural environments.

**RESTORATION** — Protect — Reconnect — Restore — Sustain

“Wilderness is a resource which can shrink but not grow...creation of new wilderness in the full sense of the word is impossible.” Aldo Leopold

**Restore** The best way to protect a watershed is by leaving the area untouched. But, when needing help, we give fish a chance by reclaiming habitat degraded through harmful human impact and compromising natural events.

We work to increase trout resiliency through habitat restoration in collaboration with others.

Riparian and in stream habitat restoration improves water quality and stream flows to benefit wild trout.

**Brush Bundling & Placement** Proper placement narrows and deepens the channel, provides undercut banks, restores the natural meander of the stream, and the thalweg (the central current) is enhanced. Stream sediment is continually captured by the bundles allowing banks to form and grasses to establish.

<b>Before &amp; Stake Lines</b> Stake lines are placed to guide bundle placement for stream contour	<b>Placement</b> Conifers and/or tag alders are pulled together with rope and placed	<b>Anchoring</b> Bundles are placed and anchored at the edge of the stream	<b>Result</b> Natural meander and central current of the stream are restored	<b>Result</b> Banks form and grasses establish
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**Trout Tails Educational Trail** 12

TROUT UNLIMITED Green Bay Chapter



## #13 Sustain

“No one will protect what they don’t care about, and no one will care about what they have never experienced.” David Attenborough

Our work to Protect, Reconnect and Restore will last into the future when we inspire others to continue our work.

We are motivated to educate the public and children about the benefits of clean water, healthy communities, and their own well-being through outdoor activities.

### Angling

We hold introductory fly-tying and casting sessions at local businesses and schools

### Trout In the Classroom

Students learn to see connections between trout, water resources, the environment, and themselves by studying and raising trout from eggs in an aquarium at school.

Lombardi Middle School FFA students release their fish

TIC Logo

### Veteran Service Program

We are proud to give back to our area veterans, the best way we know how ... teaching about fishing.

### Kids Fishing Day

Getting kids outdoors, in partnership with:

PALs Program

Ilzaak Walton League

Connect with us at [TU.org](http://TU.org) & [greenbaytu.org](http://greenbaytu.org)

- To actively protect and restore your local coldwater resources
- To share your time and talents in accomplishing our mission

We hope to see you caring for the outdoors.

Thanks for visiting !

# SUSTAIN



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# Trout Tails Educational Trail

13

## #00 Lunker Structure

- Lunker Structure
- no number for sign