Aquatic Insect ID

The Joe Humphreys' Fly Fishing Stream School - Inspired by the Methods of Joe Humphreys

THE STREAM'S SECRET MENU - Aquatic Insect Field Guide

"I was six years old when I turned over my first rock. What I found changed everything."

- Joe Humphreys

For the grown-up (read this aloud to a Minnow, ages 6-10): Flip a rock in the fast water and look at the bottom of it. The bugs you find are what the trout eat. Count the tails: three tails is a mayfly, two tails and claws is a stonefly, a worm in a little stick house is a caddis, a tiny wiggler with no legs is a midge, and a little gray shrimp is a scud. Put the rock back the way you found it.

The Five Core Bugs (plain names first; the science names are in parentheses for older students)

1. MAYFLY NYMPH - the three-tailed swimmer (Order Ephemeroptera)

Feature	Detail
Look for	3 tails, oval gill plates, flattened body
Sizes	#12-20 | Found in: riffles and runs
Matching fly	Hare's Ear Nymph, Pheasant Tail
Fun fact	One of the most important trout foods in North America.

2. STONEFLY NYMPH - the two-tailed crawler with claws (Order Plecoptera)

Feature	Detail
Look for	2 tails, 2 hook-like claws on each foot, stocky body
Sizes	#4-16 | Found in: fast riffles
Matching fly	Pat's Rubber Legs
Fun fact	Require very clean, cold water. Their presence means the stream is healthy.

3. CADDIS LARVA - the worm in a stick house (Order Trichoptera)

Feature	Detail
Look for	Worm-like body, hooked rear claspers, carrying stick/sand case
Sizes	#12-18 | Found in: most stream types
Matching fly	Caddis pupa or Soft Hackle
Fun fact	Caddis build elaborate cases for protection. Each stream has its own building material.

4. MIDGE LARVA - the tiny wiggler (Order Diptera)

Feature	Detail
Look for	Very small, segmented, no legs, red/brown/green
Sizes	#18-26 | Found in: pools, slow sections
Matching fly	Griffith's Gnat
Fun fact	When nothing else works, a small midge often does.

5. SCUD - the little gray shrimp (Freshwater Scud, Amphipoda)

Feature	Detail
Look for	Curved shrimp-like body, swims sideways, olive/gray/orange
Sizes	#14-18 | Found in: spring creeks, tailwaters, weedy streams
Matching fly	Scud pattern
Fun fact	Spring-creek trout eat scuds all year, even in winter.

6. CRANE FLY LARVA - the big leathery grub (Tipulidae)

Feature	Detail
Look for	Large, leathery, gray-brown, no legs visible, segmented
Sizes	#6-10 | Found in: muddy banks, woody debris areas
Matching fly	San Juan Worm

7. SCULPIN - the little bottom fish (Cottidae) - A small bottom-dwelling fish, not an insect, but one of the most important night foods for large brown trout. Nocturnal. Joe calls them “the strawberry shortcake of the trout world.” If you are fishing for big browns after dark, think sculpin. Matching fly: a sculpin pattern, Muddler Minnow, or Woolly Bugger, swung slowly after dark. (A San Juan Worm is NOT a sculpin imitation; the San Juan Worm matches the crane fly larva.)

★ THE GREEN DRAKE - Joe’s Legendary Hatch

“The Green Drake hatch is the most spectacular thing I have ever seen on a trout stream. Two or three weeks a year, the whole stream comes alive.”

- Joe Humphreys, Live the Stream (2018)

What Is the Green Drake?

The Green Drake (Ephemera guttulata) is the largest and most dramatic mayfly hatch on Pennsylvania’s limestone spring creeks. Joe Humphreys has called it the pinnacle event of his 90+ years on the water.

Green Drake Fast Facts	
Scientific name	Ephemera guttulata
Size	Large - #8 to #10 hook
Timing	Late May into June (evening, around dusk)
Color	Olive-yellow body, mottled wings with dark veins
Tails	3 long tails (like all mayflies)
Habitat	Cold, clean limestone spring creeks
Matching fly	Green Drake Wulff, Coffin Fly (spent spinner)

The Lifecycle - Nymph to Dun to Spinner

NYMPH (underwater, 1-2 years): Burrows in sandy/silty stream bottom. Called a ‘burrowing nymph.’ Hard to imitate - trout key on it just before emergence.

DUN (surface, minutes): The dramatic hatch. Nymphs rise, split their shucks, and emerge as large olive-winged adults on the water surface. This is when trout feed in a frenzy.

SPINNER (mating swarm, days later): Adults return as ‘Coffin Flies’ - white-bodied spent spinners that fall on the water. Another major feeding event.

Why the Green Drake Matters

“We need to be stewards of the stream. You don’t have to pick the fish up out of the water and wave it around. Keep it in the water. We have to work on water quality.” - Joe Humphreys

It only hatches where water quality is excellent - cold, clean, well-oxygenated limestone springs.

Joe credits Spring Creek’s Green Drake hatch as proof that their conservation work of the 1970s-80s was successful.

It is a living report card: if the Green Drake hatches, the stream is healthy.

This is why Joe says every angler should be a conservationist - protect the stream and it rewards you with days like this.

** Classroom Connection**

Ask students: If the Green Drake only lives in clean water, and Joe says it disappeared from Spring Creek in the 1970s and came back in the 1990s - what does that tell us? What changed?

Brook Trout: Nature’s Water Quality Report Card

“If the brook trout are there, you know the water is right. They cannot survive in anything less than perfect. They are the most honest thing in the stream.”

- Joe Humphreys, Live the Stream (2018)

What Is a Bio-Indicator?

A bio-indicator is a living thing that tells you whether the water is healthy: if it is there, the water is good; if it is gone, something is wrong. Brook trout, Green Drake mayflies, and stoneflies are three of the most reliable bio-indicators in Pennsylvania streams.

Species	What Their Presence Means	Water Temp Required	Sensitivity
Brook Trout	Cold, clean, well-oxygenated water	Below 68°F (20°C)	Extremely high
Green Drake Mayfly	Limestone spring water, excellent quality	Cold year-round	Very high
Stonefly Nymph	Fast, highly oxygenated riffles	Cold, clean	High
Caddis Larva	Generally clean water	Wide range	Moderate

Species	What Their Presence Means	Water Temp Required	Sensitivity
Midge Larva	Can tolerate some pollution	Wide range	Low-Moderate

Brook Trout: Pennsylvania's Native Jewel

The brook trout (Salvelinus fontinalis) is Pennsylvania's only native trout - it was here long before brown trout or rainbow trout were introduced.

It is technically a char, not a true trout, but it lives in the same cold, fast water.

Brook trout require: water temperatures below 68°F, high dissolved oxygen, low sedimentation, and stable stream flows.

They are extremely sensitive to agricultural runoff, road salt, and acid rain - all of which raise water temperature or reduce oxygen.

When brook trout disappear from a stream, it is a warning sign that something is wrong with the watershed.

When they return - as Joe saw on Spring Creek after conservation work - it is a sign that the stream is healing.

Joe's Thompson Run Story

Joe grew up fishing Thompson Run as a boy, catching brook trout by hand in the tiny tributary streams. By the time he was a young man, those brook trout were gone - pushed out by warming water, sedimentation, and development. Joe never forgot them. His conservation work on Spring Creek was, in part, driven by the memory of those native brookies. Today, brook trout still hang on in the headwaters of many Pennsylvania streams, but they require every angler to be their advocate.

"I was on my bicycle with the fly rod across the handlebars, three peanut butter sandwiches in my pocket. Thompson Run was my classroom. What we caught and what we shot is what we ate. That is just the way it was." - Joe Humphreys

Joe didn't just walk to the stream - he crawled. On his belly through the morning dew-soaked grass, because walking upright sent every fish scattering before he could see them. He learned this as a boy on Thompson Run: slow down, get low, observe before you act. That habit of watching first - reading the water before making a single cast - is the foundation of everything he teaches. Observation Before Action is not a slogan. It started in the grass.

"I learned to crawl because when I walked, I sent ripples through the bank. The fish were gone before I could see them. Get low. Watch first." - Joe Humphreys

** Field Activity: The Bio-Indicator Survey**

Before fishing, turn over 3 rocks. Record what you find using this guide. Based on your finds, rate the stream's health:

• Found stoneflies + Green Drake nymphs = Excellent | Found caddis + mayflies = Good | Only midges = Fair/Poor

Share your findings with the group. What does the stream ‘say’ today? Put every rock back the way you found it.

The Hatch-Matching System

1. When you arrive at the stream: turn over 3 rocks and examine what’s on them.

2. Look for the most abundant insect type and size.

3. Match your fly size to what you find (tie it on with a Davy Knot).

4. If trout are rising, look at what’s floating on the surface - match that.

Joe’s Advice

“The stream is talking to you all the time. The question is whether you’re listening. Turn over rocks. Watch the water. Every insect you find is a clue.”

- Joe Humphreys