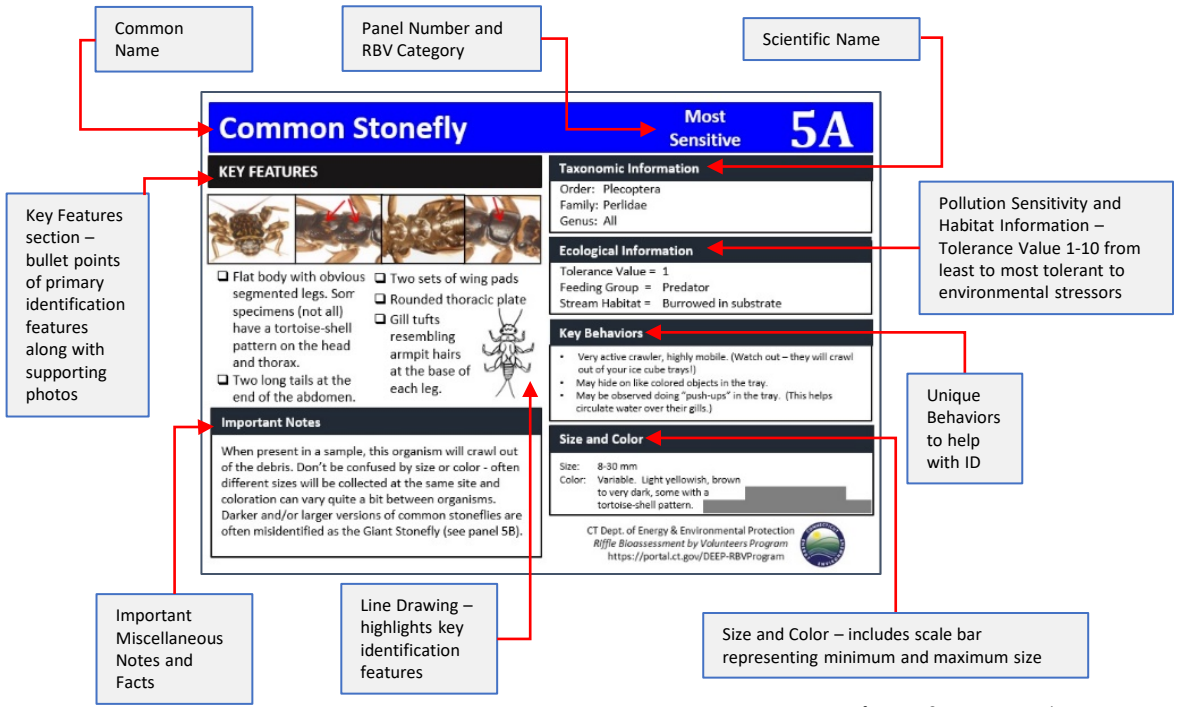

RBV
CONNECTICUT
ENERGY
ENVIRONMENT
CTDEEP Riffle Bioassessment by Volunteers Program
https://portal.ct.gov/DEEP-RBVProgram

How to Use the RBV Flash Cards



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Photographs utilized in this project were taken by the following individuals: Jake Renkert, Joshua Fusaro, Becky Martorelli, Kelsey Quarticco, and Robert Jacobs. Additional photographs are courtesy of Macroinvertebrates.org and iNaturalist.org, unless otherwise noted.

1

DORSAL

VENTRAL

RBV

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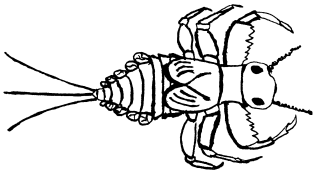
Body-Builder Mayfly

Most Sensitive **1**

KEY FEATURES



- ❑ The first section of the front legs look like muscular biceps being flexed.
- ❑ Front legs have a serrated edge.
- ❑ Flat body with obvious legs.
- ❑ Single set of wing pads.
- ❑ Three hair-like tails at the end of the abdomen.
- ❑ Small, round gills on the side of the abdomen

Important Notes

This organism can be confused with other members of the Ephemerellidae family. The distinguishing characteristic of *Drunella* is the enlarged front legs, each with a serrated margin along the front edge. These mayfly can be very abundant under appropriate conditions, However they typically emerge in the spring and are therefore uncommon in RBV samples.

Taxonomic Information

Order: Ephemeroptera
Family: Ephemerellidae
Genus: *Drunella*

Ecological Information

Tolerance Value =	0
Feeding Group =	Scraper
Stream Habitat =	On rocks or coarse organic substrates

Key Behaviors

- This mayfly nymph will crawl among leaves, stones, and other debris in the tray.
- Occasionally *Drunella* may swim by slowly undulating back and forth.

Size and Color

Size: 6-15 mm
Color: Tan to dark brown, legs may have orange or yellow bands

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2

DORSAL

LATERAL

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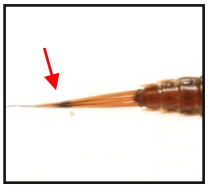
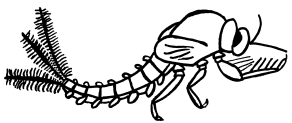
Brush-Legged Mayfly

Most Sensitive **2**

KEY FEATURES



- ❑ Front legs have a double row of long hairs on the inside edge.
- ❑ Single set of wing pads.
- ❑ Small, round gills on the side of the abdomen.
- ❑ Three feather-like tails at the end of the abdomen.
- ❑ Streamlined body, taller than wide.
- ❑ Often with a "humped back" or "S-shaped" appearance when swimming.



Identification Notes

There is only one genera (*Isonychia*) of Isonychidae in Connecticut. *Isonychia*, often called "Minnow Mayflies" by experienced volunteers, are very strong swimmers. The three tails are made up of a series of fine hairs that act like an oar on a boat, propelling the mayfly through the water. No other mayfly has a double row of fine hairs on the front legs.

Taxonomic Information

Order: Ephemeroptera
Family: Isonychidae (Oligoneuriidae)
Genus: *Isonychia*

Ecological Information

Tolerance Value = 2
Feeding Group = Collector-Filterer
Stream Habitat = Moderate to fast flows, rock surfaces

Key Behaviors

- This mayfly nymph is an extremely strong swimmer. It swims by undulating back and forth very rapidly.
- This mayfly will often stand on rocks, leaves and sticks.

Size and Color

Size: 8-17 mm
Color: Light brown to dark brown body,
Sometimes with yellow or white markings

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3

DORSAL

VENTRAL

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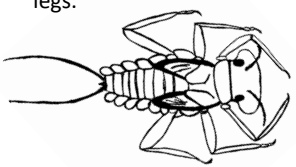
Two-Tailed Flathead Mayfly

Most Sensitive **3**

KEY FEATURES

- ❑ Small round gills on the sides of the abdomen.
- ❑ Two Long thin tails at the end of the abdomen (easily broken)
- ❑ Wide flat head, obvious eyes.
- ❑ Single set of wing pads.
- ❑ Extremely flat, almost translucent body, long thin legs.



Important Notes

The best way to find *Epeorus* is to carefully 'wash off' cobbles in the net before kicking. When present, these mayflies will scurry along the surface of the rock. Because of the body color and shape, they can be very difficult to spot. *Epeorus* can be extremely abundant when conditions are appropriate.

Taxonomic Information

Order: Ephemeroptera
Family: Heptageniidae
Genus: *Epeorus*

Ecological Information

Tolerance Value = 0
Feeding Group = Scraper
Stream Habitat = Cobble and organic substrates

Key Behaviors

- This mayfly nymph crawls very fast on the surface of stones.
- Will move quickly in the tray and try to hide under any leaves or sticks present.
- *Epeorus* may try to swim by wiggling side to side.

Size and Color

Size: 2-10 mm
Color: Tan to dark brown, sometimes with lighter gills and markings on the legs and head.

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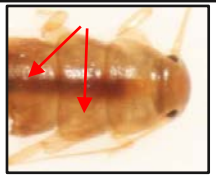
4

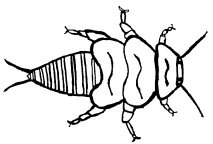
Roach-Like Stonefly

Most Sensitive **4**

KEY FEATURES





- ❑ Tear-drop shaped body with a uniformly shiny brown exoskeleton.
- ❑ Two short tails at the end of the abdomen.
- ❑ Two sets of wing pads.
- ❑ No gills on the sides of the abdomen.
- ❑ Commonly found on leaves

Size and Color

Peltoperlids are very intolerant of environmental stresses. Its characteristic inverted tear drop shape, short tails, and head which is broadly joined to the thorax, differentiate the Roach-Like Stonefly from other stoneflies.

Taxonomic Information

Order: Plecoptera
Family: Peltoperlidae
Genus: All

Ecological Information

Tolerance Value = 0
Feeding Group = Shredder
Stream Habitat = In and on coarse organic substrates

Key Behaviors

- This stonefly nymph is commonly found crawling in and amongst leaf packs in riffle areas. To locate, peel apart leaves in any packs present!
- Typically not observed swimming in the tray.

Important Notes

Size: 6-11 mm
Color: Light to dark brown, uniform

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5A

DORSAL

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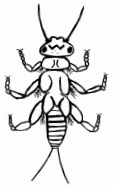
Common Stonefly

Most Sensitive **5A**

KEY FEATURES

- ❑ Flat body with obvious, segmented legs. Some specimens (not all) have a tortoise-shell pattern on the head and thorax.
- ❑ Two long tails at the end of the abdomen.
- ❑ Two sets of wing pads
- ❑ Rounded thoracic plate
- ❑ Gill tufts resembling armpit hairs at the base of each leg.



Important Notes

When present in a sample, this organism will crawl out of the debris. Don't be confused by size or color - often different sizes will be collected at the same site and coloration can vary quite a bit between organisms. Darker and/or larger versions of common stoneflies are often misidentified as the Giant Stonefly (see panel 5B).

Taxonomic Information

Order: Plecoptera
Family: Perlidae
Genus: All

Ecological Information

Tolerance Value = 1
Feeding Group = Predator
Stream Habitat = Burrowed in substrate

Key Behaviors

- Very active crawler, highly mobile. (Watch out – they will crawl out of your ice cube trays!)
- May hide on like colored objects in the tray.
- May be observed doing "push-ups" in the tray. (This helps circulate water over their gills.)

Size and Color

Size: 8-30 mm
Color: Variable. Light yellowish, brown to very dark, some with a tortoise-shell pattern.

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5B

DORSAL

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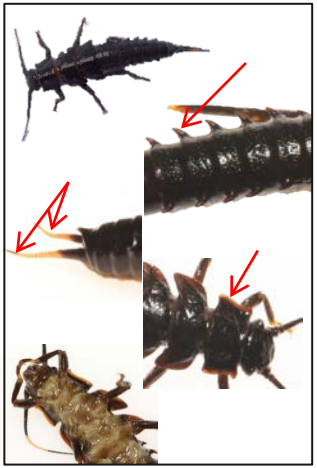
Giant Stonefly

Most Sensitive **5B**

KEY FEATURES



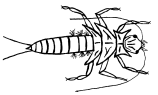
- ❑ Robust body, typically dark but occasionally with white or yellow markings.
- ❑ Pointed edges along the sides of the abdomen.
- ❑ Two, short tails at the end of the abdomen.
- ❑ First thoracic plate is rectangular with flared edges
- ❑ Two sets of wing pads, very angular in shape.
- ❑ Gill tufts on the thorax and the sides of the first three sections of the abdomen.

Important Notes

Pteronarcys is often confused with the Common Stonefly (Panel 5A) as both can grow to be quite big. The Giant Stonefly is distinguished easily by its relatively sluggish activity level and more armored appearance. Don't be fooled by size – all giant stoneflies must start out small! Typically, only a few Pteronarcyidae are collected at any site when conditions are appropriate.

Taxonomic Information

Order: Plecoptera
Family: Pteronarcyidae
Genus: *Pteronarcys*



Ecological Information

Tolerance Value =	0
Feeding Group =	Shredder
Stream Habitat =	Fast flowing, high-gradient riffles

Key Behaviors

- This stonefly nymph is not very active. If it moves at all, it will crawl very slowly around the tray.
- May curl into a C-shape and pretend to be dead when disturbed.

Size and Color

Size: 35-50 mm
Color: Brown to black, sometimes with white or yellow tail tips

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5C

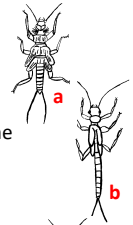
Miscellaneous Small Stoneflies

Most Sensitive **5C**

SMALL STONEFLY FAMILES

1a. Small Winter Stoneflies
(*Capniidae*)
- Legs short
- Often dark
- Abdomen slightly wider at middle

2a. Green Stoneflies
(*Chloroperlidae*)
- No distinctive color patterns
- Tails shorter than the abdomen is long



3b. Rolled-winged Stoneflies
(*Leuctridae*)
- Long, slender body
- Short legs
- Abdomen same width along length

4a. Nemourid Stoneflies
(*Nemouridae*)
- Long legs (tips extend to the tip of the abdomen or beyond)

5c. Perlodid Stoneflies
(*Perlodidae*)
- Very similar to the Common Stonefly but without gill tufts near the base of the legs

6d. Winter Stoneflies
(*Taeniopterygidae)*
- Wing pads form a distinct triangle
- Typically only present in late November RBV samples

Taxonomic Information

Order: Plecoptera
Family: See families at left
Genus: All within families at left

Ecological Information

- ❑ Tolerance Value = See chart
- ❑ Feeding Group = See chart
- ❑ Stream Habitat = Fast moving water, under rocks/debris

	Tolerance Value	Feeding Group
Capniidae	1	Shredder
Chloroperlidae	1	Predator
Leuctridae	0	Shredder
Nemouridae	2	Shredder
Perlodidae	2	Predator
Taeniopterygidae	2	Shredder

Size and Color

Size: 4-10 mm average
(*Taeniopterygidae* can reach up to 15 mm)
Color: Variable. Many light brown or cream colored

Important Notes

All stoneflies are intolerant of organic pollutants and therefore indicate high water quality.

General Identification

The following characteristics are universally true of the stonefly families at left:
- Two tails
- Two tarsal claws ('toes') at the end of each leg
- Dorsally flattened
- Small in size

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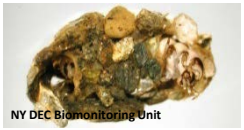
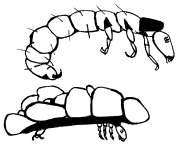
6A

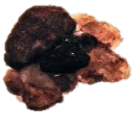
Saddlecase Maker Caddisfly

Most Sensitive **6A**

KEY FEATURES







- ❑ Small oval stone case made of sand grains and/or tiny pebbles, resembles a saddle or a turtle shell. (Case is NOT tube-shaped.)
- ❑ Underside of case has two round openings.
- ❑ Larva body is maggot-like and slightly C-shaped.
- ❑ Larva has a light (white to light brown) body with a dark head and legs.
- ❑ End of the abdomen has an attached 'butt plate'

Important Notes

Glossosoma is often confused with other small stone case building caddisflies. Unlike other caddisfly cases, the *Glossosoma* case is not tube shaped but rather resembles a turtle shell with only a thin 'strap' of pebbles holding the case around the organism. Keep an eye out for both the case and the organism in your tray as the two are easily separated.

Taxonomic Information

Order: Trichoptera
Family: Glossosomatidae
Genus: *Glossosoma*

Ecological Information

Tolerance Value = 0
Feeding Group = Scraper
Stream Habitat = Exposed upper surfaces of rocks

Key Behaviors

- This caddisfly larva is often attached to the surface of rocks in fast current.
- *Glossosoma* may not move at all while in the tray. If it does, it will crawl very slowly along the bottom of the tray.

Size and Color

Size: 3-10 mm
Color: White to light brown, with dark head, legs and butt plate

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6B

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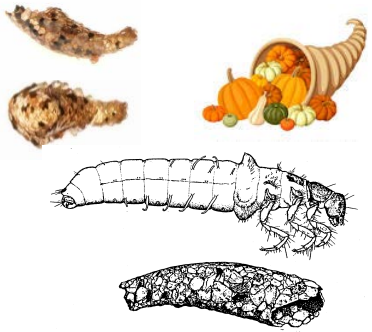
Cornucopia-Case Caddisfly

Most Sensitive **6B**

KEY FEATURES



- ❑ *Tiny* light-bodied organism
- ❑ Hunched appearance when in case.
- ❑ Triangular head with dark legs.
- ❑ Very small, delicate case made of sand grains
- ❑ Case is cone-shaped like a Thanksgiving cornucopia.

Don't be Fooled by This Imposter!

The Strong Case-Maker Caddisfly (Odontoceridae) also makes a case of small grains of sand. To tell the two apart, inspect the case closely. Odontoceridae cases are very difficult to break apart and are the same width at both ends. In comparison, the Apatania case is quite small (see above), more easily broken apart, and noticeably wider at the opening than at the other end.

Size and Color

Size: 2-6 mm
Color: Light colored body with dark head

Taxonomic Information

Order: Trichoptera
Family: Apataniidae
Genus: *Apatania*

Ecological Information

Tolerance Value =	3
Feeding Group =	Scraper
Stream Habitat =	Fast flowing, shallow riffles

Key Behaviors

- This caddisfly larva is tiny and therefore easily overlooked, however if you watch your tray closely you may see a tiny sand horn walking around the bottom!
- Resembles a tiny hermit crab in that it drags its case along as it walks.

Important Notes

This organism is commonly confused with other stone case building caddisflies including *Glossosoma.* The easiest distinguishing characteristic is that that *Apatania* is VERY tiny, typically smaller than the width of your pinky nail. This caddisfly can be abundant under appropriate conditions. Look very carefully in your trays for these tiny caddisfly larvae!

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7

DORSAL

LATERAL

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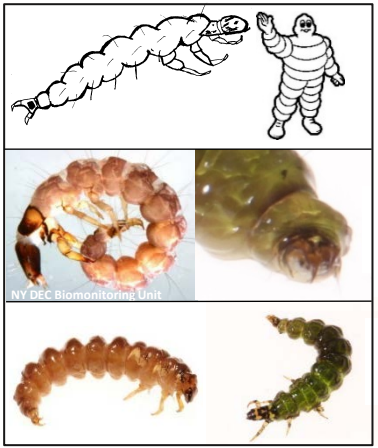
Free-Living Caddisfly

Most Sensitive **7**

KEY FEATURES



- ❑ Nicknamed "Michelin Man" caddisfly due to its smooth, lumpy abdomen
- ❑ Six short legs near the head
- ❑ Hard tan or yellow and brown patterned head with a single thoracic plate.
- ❑ Armored plate and two hooks at the end of the abdomen, somewhat loosely attached

Taxonomic Information

Order: Trichoptera
Family: Rhyacophilidae
Genus: *Rhyacophila*

Ecological Information

Tolerance Value = 0
Feeding Group = Predator
Stream Habitat = Fast flowing, high-gradient riffles

Key Behaviors

- Clings very well to the net.
- Moderately active organism; will crawl or wiggle in the tray.
- Will try to hide under objects.

Important Notes

Rhyacophila is called the 'free-living' caddisfly because larvae of this genus do not build a case until they are about to pupate (at which point they will build a loosely constructed stone shelter). This organism is often found among aquatic mosses. A key field characteristic is the bright green or lavender abdominal coloring.

Size and Color

Size: 10-30 mm
Color: Variable. White, green, purple

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8A

DORSAL

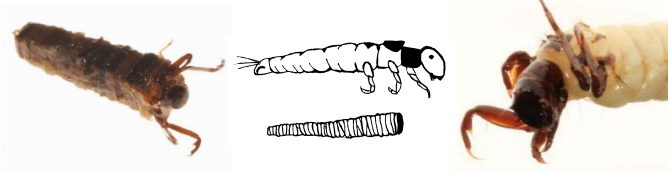
CASE

LATERAL

Humpless Case Maker Caddisfly

Most Sensitive **8A**

KEY FEATURES



Case Construction:

- ❑ Case constructed of thin strips of plant material assembled with a square opening.
- ❑ Wider at head opening than at tail end.

Macroinvertebrate Features:

- ❑ Light colored body with dark head and legs.
- ❑ Very long legs
- ❑ No abdominal humps.

Important Notes

This caddisfly can be very abundant under the appropriate conditions. Look carefully for *Brachycentrus* when the sample contains old leaves, sticks or bark. The cases may be attached to sticks, leaves or larger rocks.

Taxonomic Information

Order: Trichoptera
Family: Brachycentridae
Genus: *Brachycentrus*

Ecological Information

Tolerance Value = 1
Feeding Group = Shredder
Stream Habitat = Upper surfaces of rocks

Key Behaviors

- Typically *Brachycentrus* does not move in the tray. If it does move, it will carry its case with it as it slowly crawls along.

Size and Color

Size: 10-17 mm
Color: Light body with dark head and legs

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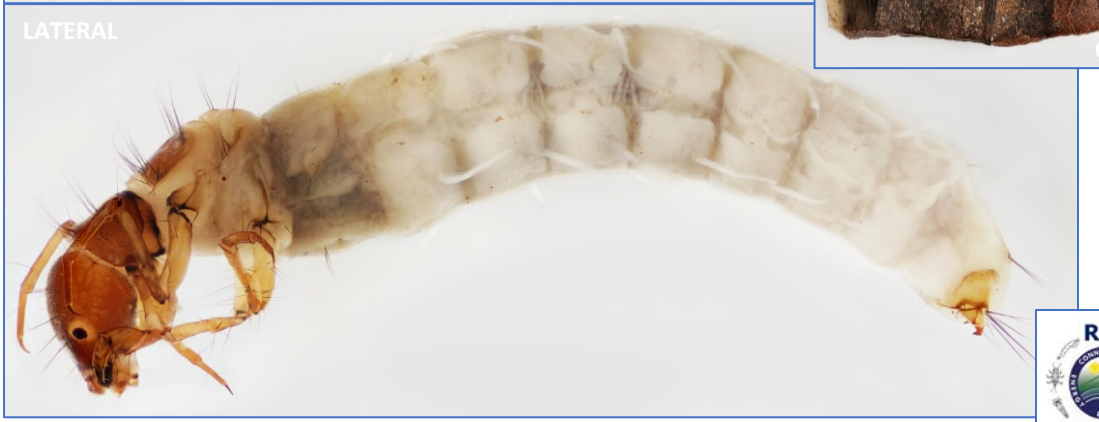
8B



RBV
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Plant Case Maker Caddisfly

Most Sensitive **8B**

KEY FEATURES

Case Construction:

- ❑ Builds a case out of small, rectangular or square pieces of bark or wood (no sand grains).
- ❑ Case is typically slightly wider at the head end.

Macroinvertebrate Features:

- ❑ Light colored body with dark head and legs.
- ❑ Lateral humps present on the first section of the abdomen.

Important Notes

This caddisfly can be very abundant under the appropriate conditions, particularly in forested areas. Look carefully for *Lepidostoma* when the sample contains old leaves, sticks or bark. The cases may be attached to sticks, leaves or larger rocks.

Taxonomic Information

Order: Trichoptera
Family: Lepidostomatidae
Genus: *Lepidostoma*

Ecological Information

Tolerance Value = 1
Feeding Group = Shredder
Stream Habitat = Accumulated plant debris on bottom

Key Behaviors

- Typically does not move in the tray. If it does move, will carry its case with it as it slowly crawls.

Size and Color

Size: 7-15 mm
Color: Light body with dark head and legs

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LATERAL

Common Netspinner Caddisfly

Moderately Sensitive **9**

KEY FEATURES



The Marvelwood School &
Kent Conservation Commission RBV Program

- ❑ Series of three dark plates on the dorsal side of the thorax below the head.
- ❑ Fluffy gills on the underside (ventral sections) of the abdomen.
- ❑ Two paintbrush-like tails with hooks at the end of the abdomen.
- ❑ May have a 'dirty' or hairy appearance

Important Notes

Hydropsychidae is probably one of the most common organisms encountered during benthic sampling. These can be extremely abundant under appropriate conditions. Because some are greenish in color they may be confused as *Rhyacophila* (Panel 7). Hydropsychidae have a dark plate above each pair of legs & fluffy gills on the underside of the abdomen, *Rhyacophila* does not.

Taxonomic Information

Order: Trichoptera
Family: Hydropsychidae
Genus: All

Ecological Information

Tolerance Value = 4
Feeding Group = Collector-filterer
Stream Habitat = Rock surfaces, woody debris, plants

Key Behaviors

- Extremely active, wiggles violently back and forth
- Gregarious, will form clumps of 2-4 in the tray
- May cling strongly to the net!

Size and Color

Size: 13-18 mm
Color: Light brown to black, sometimes with green tint

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VENTRAL

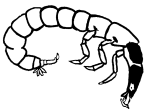
LATERAL

Fingernet Caddisfly

Moderately Sensitive **10**

KEY FEATURES

The Marvelwood School & Kent Conservation Commission RBV program



- ❑ Elongate, slender worm-like body.
- ❑ No gills on or along the abdomen.
- ❑ Two hooks at the end of the abdomen.
- ❑ Bright orange head with a transparent, t-shaped upper lip.
- ❑ Black border along the back edge of pronotum (the plate located behind the head capsule.)

Important Notes

Philopotamidae is a very common organism encountered during RBV sampling, and can be extremely abundant under appropriate conditions.

Taxonomic Information

Order: Trichoptera
Family: Philopotamidae
Genus: All

Ecological Information

Tolerance Value = 3
Feeding Group = Collector-filterer
Stream Habitat = Undersides of rocks in high gradient

Key Behaviors

- Extremely active, wiggles violently back and forth.
- Gregarious, will form clumps of 2-4 in the tray.
- Very active, will crawl around the bottom of the tray.

Size and Color

Size: 13-17 mm
Color: Yellow-orange, bright yellow, beige, white, or transparent

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11

DORSAL

VENTRAL

RBV

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Three-Tailed Flat Headed Mayfly

Moderately Sensitive **11**

KEY FEATURES

- ❑ Extremely flattened body.
- ❑ Small, oval or square-shaped gills along the sides of the abdomen.
- ❑ Three very long tails at the end of the abdomen. (Tails are fragile and can break off giving the appearance of only one or two.)
- ❑ Head is flat with large eyes on top.
- ❑ Resembles 'Jack Skellington' from Nightmare Before Christmas.
- ❑ Single set of wing pads.

Important Notes

Very common across Connecticut. Flat headed mayflies can be found by slowly lifting the cobbles out of the water. They may run to the other side of the rock. Be careful not to confuse this organism with the two-tailed version (*Epeorus*/Panel 3); the legs, gills, and tails of the flat headed mayfly tend to break off during the collection process.

Taxonomic Information

Order: Ephemeroptera
Family: Heptageniidae
Genus: *Stenonema* and *Maccaffertium*

Ecological Information

Tolerance Value = 4
Feeding Group = Scraper
Stream Habitat = On/underneath cobbles and organics

Key Behaviors

- Very mobile; can move and swim fast when in water.
- Doesn't move well in the net
- It will try to hide on any flat dark colored object like stones, leaves, and other invertebrates

Size and Color

Size: 5-20 mm
Color: Light golden brown to dark brown, often with spots or stripes on the legs and body

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DORSAL

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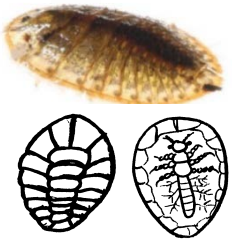
Water Penny Beetle

Moderately Sensitive **12**

KEY FEATURES



- ❑ Small, flat, disc-shaped organism.
- ❑ Uniform in color
- ❑ Head and legs only visible from ventral view (i.e. from underneath)

Don't be Fooled by This Imposter!

Often confused with the False Water Penny (*Eubriidae*). *Eubriidae* is more ovoid in shape and has a serrated or more jagged outer edge.

Important Notes

Water penny beetle larvae are common in RBV samples, but can be very hard to locate in the field due to their cryptic nature. Look very closely at any cobbles in your sample area; water penny beetle larva will adhere strongly to rock surfaces. They are very distinctive due to their penny like shape and coloration. These organisms can be locally abundant when conditions are appropriate.

Taxonomic Information

Order: Coleoptera
Family: Psephenidae
Genus: *Psephenus*

Ecological Information

Tolerance Value = 4
Feeding Group = Scraper
Stream Habitat = Attached to rocks in fast flows

Key Behaviors

- Cling very well to rocks and smooth surfaces such as the sorting tray
- May glide along the bottom of the tray
- May curl up when disturbed

Size and Color

Size: 3-10 mm
Color: Uniform in color. Ranges from golden to dark brown.

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13A

RBV

CTDEEP Riffle Bioassessment by Volunteers Program

Dobsonfly

Moderately Sensitive **13A**

KEY FEATURES

- ❑ Large pinching mouth parts.
- ❑ Will bite sampling spoons and your fingers so watch out!
- ❑ Elongate body with a pair of long soft spine-like appendages on each section of the abdomen.
- ❑ Can be extremely large (up to 4 inches)
- ❑ Two prolegs at the end of the abdomen, each with two hooks.
- ❑ Tufts of fluffy gills at the base of each abdominal projection.

Important Notes

Dobsonflies are very common in RBV samples. These macroinvertebrates are sometimes called “Hellgrammites” by fishermen and are a trout favorite!

Corydalus is often confused with *Nigronia* (Panel 13B). The Dobsonfly can be distinguished by its larger size, darker brown color, and the presence of fluffy gill tufts on the underside of the abdomen.

Ecological Information

Order: Megaloptera
Family: Corydalidae
Genus: *Corydalus*

Taxonomic Information

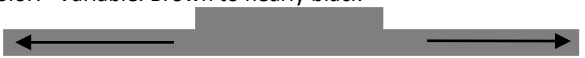
Tolerance Value = 6
Feeding Group = Predator
Stream Habitat = Under loosely embedded stones

Key Behaviors

- Very mobile, will be very active crawling or wiggling in the tray
- Will curl their abdomen around your finger if picked up
- May cling to the net
- **May pinch! Use caution when handling!**

Size and Color

Size: 25-90 mm
Color: Variable. Brown to nearly black



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13B

DORSAL

VENTRAL

RBV

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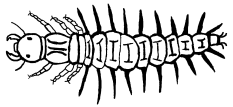
Fishfly

Moderately Sensitive **13B**

KEY FEATURES

- ❑ Large pinching mouth parts.
- ❑ No gills at the base of the abdominal projection.
- ❑ Elongate body with a pair of long soft spine-like appendages on each section of the abdomen.
- ❑ Two prolegs at the end of the abdomen, each with two hooks.



Important Notes

Very common in RBV samples. *Nigronia* is often confused with *Corydalus* (Panel 13A). The fishfly can be distinguished by its smaller size, more reddish color, and absence of fluffy gill tufts on the underside of the abdomen.

Taxonomic Information

Order: Megaloptera
Family: Corydalidae
Genus: *Nigronia*

Ecological Information

Tolerance Value = 4
Feeding Group = Predator
Stream Habitat = Under loosely embedded stones

Key Behaviors

- Very mobile, will be very active crawling or wiggling in the tray
- Will curl their abdomen around your finger if picked up
- May cling to the net
- **May pinch! Use caution when handling!**

Size and Color

Size: 25-50 mm
Color: Variable. Light brown to reddish orange.

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14A

1

2

Dragonfly

Moderately Sensitive **14A**

DRAGONFLY FAMILES

- ❑ **Darner Dragonfly** (*Aeshnidae*) [1]
  - Very common
  - Usually very dark and almost black
  - Elongate body with small thin legs

- ❑ **Biddie Dragonfly** (Cordulergastridae)
  - Somewhat common
  - Light brown; robust, hairy appearance
  - Deeply rounded labium extends out almost half the length of the body

- ❑ **Club Tail Dragonfly** (*Gomphidae*) [2]
  - Very common
  - Short antennae similar in shape to a Q-tip
  - Adapted for burrowing into the substrate to wait for prey

- ❑ **Common Skimmer Dragonfly** (*Libellulidae*)
  - Rare – prefers ponds and wetlands

General Identification

The following characteristics are universally true of the dragonfly families below:

- Robust body
- Three short spike-lie tails
- Two sets of wing pads
- Very large eyes
- Extendable lower jaw

Taxonomic Information

Order: Odonata (Suborder Anisoptera)
Family: All families at left
Genus: All genera within families at left

Ecological Information

Tolerance Value = See chart

Feeding Group = Predator

Stream Habitat = Typically among rocks and vegetation, or burrowed in soft substrate

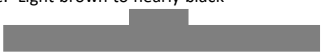
	Tolerance Value
Aeshnidae	3
Cordulergastridae	3
Gomphidae	1
Libellulidae	9

Important Notes

Dragonfly nymphs can be very common when conditions are appropriate. They are very mobile and move with jet propulsion or by walking. There are several types of dragonflies found in riffle areas, however the majority of species live in slow moving or standing water.

Size and Color

Size: 8-42mm
Color: Variable. Light brown to nearly black



14B

DORSAL

VENTRAL

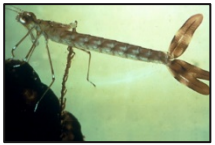
Damselfly

Moderately Sensitive **14B**

DAMSELFLY FAMILES

❑ **Broad Winged Damselfly** (*Calopterygidae*)
- First antennae segment is very long, almost half the length of the antenna
- Uncommon in RBV samples; prefers low gradient habitat

❑ **Narrow Winged Damselfly** (*Coengrionidae*)
- Two-toned gills at end of abdomen
- Occasionally in RBV samples; prefers rocks and vegetation in moderate to slow flowing waters



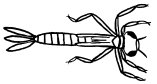
❑ **Spread Winged Damselfly** (*Lestidae*)
- Lower lip (labium) is long and slender
- Gills at end of abdomen are very dark and thick
- Rare in RBV samples; prefers thick vegetation in very slow flows

General Identification

The following characteristics are universally true of the damselfly families below:
- Slender, delicate body with long legs.
- Three long feather-like caudal gills at the end of the abdomen that resemble tails.
- Two sets of wing pads.
- Very large eyes and extendable lower jaw.

Taxonomic Information

Order: Odonata (Suborder Zygoptera)
Family: All families at left
Genus: All genera within families at left



Ecological Information

Tolerance Value = See chart

Feeding Group = Predator

Stream Habitat = Slow or standing water, on vegetation

	Tolerance Value
Calopterygidae	5
Coengrionidae	9
Lestidae	9

Important Notes

These larvae are very active and will move by wiggling side to side. Damselflies are rare in riffle areas; the majority of species live in slow moving or standing water. If you find a lot of damselflies in your sample check that you are in the right habitat for the RBV program.

Size and Color

Size: 13-50mm
Color: Variable. Yellow to dark brown. Sometimes with patterns.

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LATERAL

Scud

Least Sensitive **15**

KEY FEATURES

- ❑ Body strongly flattened from side to side.
- ❑ Two pairs of antennae are about the same length.
- ❑ Seven pairs of walking legs.
- ❑ The first two pairs of legs have hinged claws.

Important Notes

Common in CT streams, but less likely in RBV samples due to their preference for slower flows and lower gradients. They are typically found in areas of loose substrate and prefer cool, shallow streams and the backwaters of larger rivers. Most are omnivorous and feed in organic debris that accumulate in the stream margins. Scuds are an important food source for fish.

Taxonomic Information

Order: Amphipoda
Family: All
Genus: All

Ecological Information

Tolerance Value = 6
Feeding Group = Collector-gatherer
Stream Habitat = In and on organic substrate, slow flows

Key Behaviors

- Can swim very rapidly on their sides when disturbed; also called “side swimmers”
- Turn bleach white when preserved

Size and Color

Size: 5-20 mm
Color: White to gray

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16

DORSAL

VENTRAL

RBV

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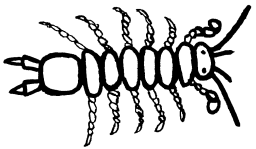
Aquatic Sow Bug

Least Sensitive **16**

KEY FEATURES



- ❑ Body is strongly flattened from top to bottom.
- ❑ Two pairs of antennae, of which one pair is significantly longer than the other pair.
- ❑ Seven pairs of legs.
- ❑ First pair of walking legs has enlarged ends with hinged claws.
- ❑ Six pairs of short appendages on the underside of the abdomen. The sixth pair extends behind like a pair of flat tails.

Important Notes

Aquatic sow bugs prefer darker, slower, shallow habitats; they are not typically found in high quality riffles and therefore are rare in RBV samples. Sow bugs are an important food source for fish in low gradient CT streams.

Taxonomic Information

Order: Isopoda
Family: Asellidae
Genus: All

Ecological Information

Tolerance Value = 8
Feeding Group = Collector-gatherer
Stream Habitat = In and on substrate, slow flows

Key Behaviors

- Crawl slowly amongst the debris.
- Sow bugs will avoid light by hiding under leaves or other debris.
- Turn gray when preserved

Size and Color

Size: 5-20 mm
Color: Medium to dark gray is most common but can also be blackish or brownish

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17

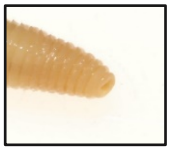
RBV

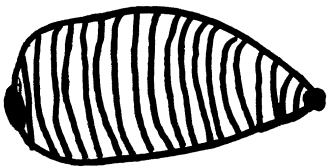
CTDEEP Riffle Bioassessment by Volunteers Program

Leech

Least Sensitive **17**

KEY FEATURES





- ❑ Somewhat soft but muscular, flattened body with many segments and no legs.
- ❑ Two distinct suction discs on the bottom of the body, one on each end.
- ❑ Several small eyespots on top of first segments.

Important Notes

Leeches are rare in RBV samples due to their preference for slow flows. They feed on the blood of a host organism by using a drill-like rasping tongue to penetrate the skin. The leech injects hirudin, a chemical which prevents the blood from clotting. Some leeches are used in medical practice to remove the build-up of blood and body fluids in bruised or surgically reattached appendages or tissues.

Taxonomic Information

Phylum:	Annelida
Class:	Clitellata
Sub-Class:	Hirudinea

Ecological Information

Tolerance Value =	10
Feeding Group =	Predator
Stream Habitat =	Slow or standing water, among debris

Key Behaviors

- Leeches will stick to the bottom of the tray and move like inch worms
- Tend to curl up when preserved

Size and Color

Size: 4-450 mm

Color: Tan, brown, gray or black sometimes with colored patterns

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LATERAL

VENTRAL

RBV
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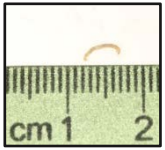
Non-Biting Midge

Least Sensitive **18**

KEY FEATURES



- ❑ Small, very thin, wormlike body
- ❑ Red or white in color
- ❑ May be found hiding in very finely constructed cases
- ❑ Distinct head capsule, though very tiny

Important Notes

Look carefully for midge larvae, they are common but extremely small! There are approximately 100 different genera of midges in Connecticut. These can be divided into two main groups: the white and red midges. The color in the red midges comes from a hemoglobin-like compound which allows the midge to survive in very low oxygen levels.

Taxonomic Information

Order: Diptera
Family: Chironimidae
Genus: All

Ecological Information

Tolerance Value = 6 (White) or 8 (Red)
Feeding Group = Collector-gatherer
Stream Habitat = On substrate in all flow types

Key Behaviors

- Midges swim by violent side to side wiggling
- Red midges turn white when preserved.

Size and Color

Size: 5-25 mm
Color: White (clear to cream) or red

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LATERAL

DORSAL

Black Fly

Least Sensitive **19**

KEY FEATURES

- ❑ Bowling pin shaped body with a capsule-like head that is distinct from the thorax.
- ❑ Enlarged rear one-third of the body. Resembles the shape of a vase.
- ❑ There is a proleg on the bottom of the first thorax segment.

Important Notes

Black fly larvae are common in RBV samples, but are relatively small so may be easily overlooked.

Black fly larvae have a ring of small hooks at the back end of the abdomen that enables them to adhere to a rock and not be swept away by the current. They use a brush-like structure to filter fine organic matter from the water column.

Taxonomic Information

Order: Diptera
Family: Simuliidae
Genus: All

Ecological Information

Tolerance Value = 6
Feeding Group = Collector-filterer
Stream Habitat = Attached to rocks in riffle areas

Key Behaviors

- Black flies will attach to the bottom of the tray
- Move like inch-worms

Size and Color

Size: 5-10 mm
Color: Whitish-gray

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Snail

Least Sensitive **20**

KEY FEATURES

❑ **Lunged Snails**
Subclass: Pulmonata
- Take in oxygen from the air into an internal lung-like structure
- Can tolerate low dissolved oxygen levels

❑ **Gilled Snails**
Subclass: Prosobranchia
- Breathe by absorbing dissolved oxygen from the water through gills
- Sensitive to pollution; indicative of high water quality


USGS / Wikipedia.org

❑ **Chinese Mystery Snail** (*Bellamya chinensis)*
- **Invasive! (pictured to left)**
- Relatively large, globose shells with concentrically marked opercula

Important Notes

Freshwater snails in CT are most commonly located below ponds and in wetlands areas and are therefore relatively uncommon in RBV samples. There are two major groups of snails in CT – 'right handed' and 'left handed'; they can be differentiated by facing the snail toward you and determining the direction to which the snail opens at the bottom.

Taxonomic Information

Phylum: Mollusca
Class: Gastropoda

Ecological Information

Tolerance Value = Variable
Feeding Group = Scraper
Stream Habitat = On rock surfaces and finer sediments

Key Behaviors

- May glide along the bottom of the tray or cling to tray walls

Size and Color

Size: 3-60 mm
Color: Variable. Light tan to dark brown.

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RBV

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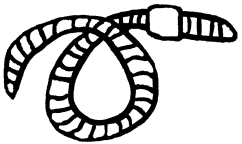
Aquatic Worm

Least Sensitive **21**

KEY FEATURES

- ❑ Soft, long, cylindrical bodies consisting of many ring-like segments
- ❑ No suckers or eyespots



Important Notes

Aquatic earthworms can be found in any flows, but prefer slower flows and are therefore not common in RBV samples. Aquatic earthworms, especially tubifex worms, can live in extremely polluted water with very low dissolved oxygen levels. Often, severely impacted streams will have large populations of these worms.

Taxonomic Information

Phylum: Annelida
Class: Oligochaeta

Ecological Information

Tolerance Value = 8
Feeding Group = Collector-gatherer
Stream Habitat = In and on fine substrate

Key Behaviors

- May wiggle or curl up in a 'knot' while in the tray

Size and Color

Size: 1-30 mm avg. (up to 150 mm)
Color: Variable, but typically white or reddish.

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22 A

Common Crayfish

Misc. Other 22 A

KEY FEATURES

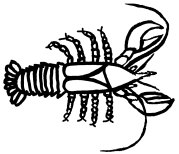
- ❑ **Rare, found only in western CT**
- ❑ Fairly uniform in color with no patterns
- ❑ Generally smooth body with smooth claws that curve slightly inward
- ❑ Smaller than average rostrum, square in shape

Important Notes

DO NOT INCLUDE THIS CRAYFISH IN YOUR VOUCHER COLLECTION. Photograph if found and return them alive to the stream from which you collected them. Send your photos to DEEP.RBVProgram@ct.gov – note the date and location that the photo was taken.

Taxonomic Information

Order: Decapoda
Family: Cambaridae
Genus: *Cambarus*
Species: *bartonii*



Ecological Information

Tolerance Value =	6
Feeding Group =	Gatherer, collector
Stream Habitat =	Prefer fast flowing, rocky streams and, sometimes, shallow lakes

Size and Color

Size: Up to 3 cm
Color: Plain brown, usually solid in color but sometimes with a reddish tint or mottling

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22 A

RBV

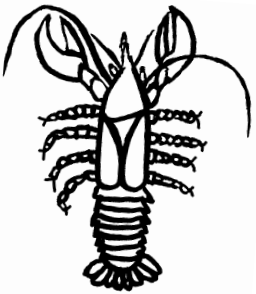
CTDEEP Riffle Bioassessment by Volunteers Program

Big Water Crayfish

Misc. Other **22 A**

KEY FEATURES

- ❑ Introduced species, now common statewide
- ❑ **Large, strong claws**
- ❑ Long, narrow rostrum with rounded corners
- ❑ Two rows of bumps on the inner margin of the palm and a depression on the outer margin



Taxonomic Information

Order: Decapoda
Family: Cambaridae
Genus: *Cambarus*
Species: *robustus*

Ecological Information

Tolerance Value = 6
Feeding Group = Gatherer, collector
Stream Habitat = Prefer fast flowing water and rocky substrate

Size and Color

Size: Up to 6 cm
Color: Greenish-brown

Important Notes

DO NOT INCLUDE THIS CRAYFISH IN YOUR VOUCHER COLLECTION. Photograph if found and return them alive to the stream from which you collected them. Send your photos to DEEP.RBVProgram@ct.gov – note the date and location that the photo was taken.

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22 B

RBV

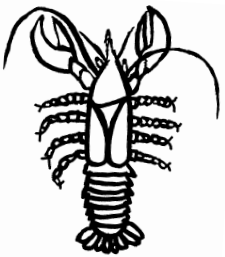
CTDEEP Riffle Bioassessment by Volunteers Program

Virile or Northern Crayfish

Misc. Other 22 B

KEY FEATURES

- ❑ Found occasionally, statewide distribution
- ❑ **Blue claws (chelae) with prominent white bumps and orange tips**
- ❑ Pair of spots on each abdominal segment
- ❑ Corners of the rostrum are sharp
- ❑ Narrow areola



Taxonomic Information

Order: Decapoda
Family: Cambaridae
Genus: *Faxonius*
Species: *virilis*

Ecological Information

Tolerance Value = 6
Feeding Group = Gatherer, collector

Size and Color

Size: Up to 5.5 cm
Color: Olive brown with claws that range from olive brown to bright blue

Important Notes

DO NOT INCLUDE THIS CRAYFISH IN YOUR VOUCHER COLLECTION. Photograph if found and return them alive to the stream from which you collected them. Send your photos to DEEP.RBVProgram@ct.gov – note the date and location that the photo was taken.

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22 C

R. Jacobs

RBV

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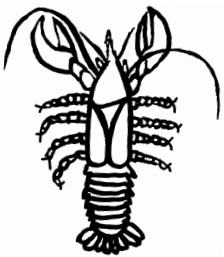
White River Crayfish

Misc. Other 22 C

KEY FEATURES

- ❑ Introduced species
- ❑ Common, especially in Eastern CT
- ❑ **Long, slender curved claws.** No spikes on the inside margin of claws. (Observe with caution!)



Taxonomic Information

Order: Decapoda
Family: Cambaridae
Genus: *Procambarus*
Species: *acutus*

Ecological Information

Tolerance Value = 6
Feeding Group = Gatherer, collector

Size and Color

Size: Up to 13 cm
Color: Brown with mottled spots to dark red with a black wedge on the top of the abdomen

Important Notes

DO NOT INCLUDE THIS CRAYFISH IN YOUR VOUCHER COLLECTION. Photograph if found and return them alive to the stream from which you collected them. Send your photos to DEEP.RBVProgram@ct.gov – note the date and location that the photo was taken.

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22 D1

AQUATIC INVASIVE SPECIES ALERT!

Red Swamp Crayfish – INVASIVE

Misc. Other

22 D

KEY FEATURES

- ❑ **Dark red color, look like small lobsters**
- ❑ **Bright red bumps on the front legs and claws**
- ❑ Uncommon, observed in Fairfield County drainages

Important Notes

If observed, photograph and then attempt to capture. Captured specimens must be either frozen or preserve in rubbing alcohol. If possible, take a GPS location at the spot where the organism(s) were found. Label the specimens with the date collected and location where they were found (e.g. ABC River, at Happy Road Crossing, Happy Town).

Send an email with the above information to DEEP.AquaticInvasiveReport@ct.gov and await instructions for submission to the DEEP.

Taxonomic Information

Order: Decapoda
Family: Cambaridae
Genus: *Procambarus*
Species: *clarkii*

Ecological Information

Native to freshwater bodies of northern Mexico and southern and southeastern United States. Considered a newly introduced species in Connecticut, with the potential to become an aquatic invasive species.

Size and Color

Size: 10-150mm
Color: Red

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AQUATIC INVASIVE SPECIES ALERT!

22 D2

RBV

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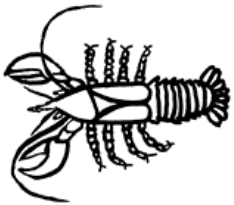
Rusty Crayfish - INVASIVE

Misc. Other 22 D

KEY FEATURES



- ❑ Found only in western CT, common where found
- ❑ **Rusty colored patch on each side of the body**
- ❑ Claws have orange tips and black bands.
- ❑ Rostrum has sharp corners

Important Notes

If observed, photograph and then attempt to capture. Captured specimens must be either frozen or preserve in rubbing alcohol. If possible, take a GPS location at the spot where the organism(s) were found. Label the specimens with the date collected and location where they were found (e.g. ABC River, at Happy Road Crossing, Happy Town).

Send an email with the above information to DEEP.AquaticInvasiveReport@ct.gov and await instructions for submission to the DEEP.

Taxonomic Information

Order: Decapoda
Family: Cambaridae
Genus: *Faxonius*
Species: rusticus

Ecological Information

Native to Ohio, Kentucky and Tennessee in the Ohio River basin. Considered an aquatic invasive species in Connecticut, these crayfish are very aggressive and will outcompete other native crayfish for food sources in the area.

Size and Color

Size: Up to 5.4 cm
Color: Olive green with rusty spot on side

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DORSAL
1


LATERAL
2


LATERAL
3

Cranefly

Misc. Other **23**

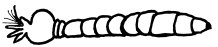
KEY FEATURES

The following characteristics are universally true of cranefly:

- ❑ Body is cylindrical and usually stout.
- ❑ Typically very soft bodied.
- ❑ Head is withdrawn and not visible.
- ❑ Two spiracles at the end of the abdomen surrounded by several pairs of short, fleshy lobes.
- ❑ One to seven pairs of lobes that often have a fringe of hair.

1

Hexatoma sp.



2

Tipula sp.

3

Antocha sp.

Taxonomic Information

Order: Diptera
Family: Tipulidae
Genera: *Hexatoma, Antocha, Tipula*

Ecological Information

Tolerance Value = 3
Feeding Group = Shredder
Stream Habitat = Burrowed in substrate and leaf packs

Key Behaviors

- Often found in leaf packs within sample

Size and Color

Size: 5-25 mm average (up to 100 mm)
Color: Tan to White

Important Notes

Craneflies are common in RBV samples. All crane flies have what appear to be tails, however they are respiratory organs. Most crane fly larvae are very large at around 2 inches long. Some species have a bulb-like structure near the tails, while others have dark areas on the top and bottom of the abdomen.

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DORSAL

VENTRAL

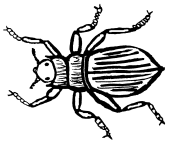
Riffle Beetle

Misc. Other 24

KEY FEATURES (Larva)

- ❑ Small, hard-bodied, cylindrical and slightly "C" shaped
- ❑ Two prominent claws on the ends of the legs.
- ❑ Long legs in relation to body size.

KEY FEATURES (Adult)



- ❑ Small, dark brown or black beetles.

Important Notes

Riffle Beetles are common in RBV samples. Elmidae is one of the very few benthic macroinvertebrates who remain aquatic in both its larval and adult stages.

Taxonomic Information

Order: Coleoptera
Family: Elmidae
Genus: All

Ecological Information

Tolerance Value = 4
Feeding Group = Scraper
Stream Habitat = On organic substrate in riffles

Key Behaviors

- Larval form is relatively inactive, but adult riffle beetles will crawl around the sorting tray.

Size and Color

Size: 5-15 mm (Larva)
Color: Brown

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DORSAL

VENTRAL

RBV

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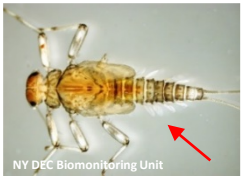
Small Minnow Mayfly

Misc. Other 25

KEY FEATURES



- ❑ Small in overall size
- ❑ Three pairs of legs; legs do not have a feathery fringe of hairs
- ❑ 2-3 hair-like tails, sometimes with a shorter middle tail
- ❑ Small, round gills along the sides of the abdomen – may be difficult to see without magnification
- ❑ Elongated wing pads

Important Notes

Baetidae are common in RBV samples, however due to their small size they are often easily missed when sampling. Baetidae is commonly confused with Isonychidae (Panel 2). Baetidae can be differentiated by its smaller size and lack of fine hairs along the inside edge of the front legs. (Some genera of Baetidae may also appear to only have two tails).

Taxonomic Information

Order: Ephemeroptera
Family: Baetidae
Genus: All

Ecological Information

Tolerance Value = 4
Feeding Group = Collector-gatherer
Stream Habitat = On and in rocky substrates

Key Behaviors

- Swim very well and will quickly swim in short bursts from one hiding spot to another in the tray

Size and Color

Size: 3-12 mm
Color: Light brown

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DORSAL

LATERAL

Aquatic Snipe Fly

Misc. Other 26

KEY FEATURES



- ❑ Series of small, paired prolegs along abdomen
- ❑ Rough appearance to the exoskeleton.
- ❑ Body is elongate with a pointed head end and tail-like structures at the end of the abdomen.
- ❑ Two stout, pointed tails with a fringe of hairs at the end of the abdomen

Important Notes

Atherix is relatively rare in RBV samples. They are piercer-predators that prey on midge and mayfly larvae.

Taxonomic Information

Order: Diptera
Family: Athericidae
Genus: *Atherix*

Ecological Information

Tolerance Value = 2
Feeding Group = Predator
Stream Habitat = Buried in the substrate in fast flows

Key Behaviors

- No unique behaviors; may be observed crawling in tray

Size and Color

Size: 10-20 mm
Color: Golden brown to dark brown

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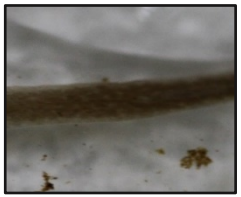
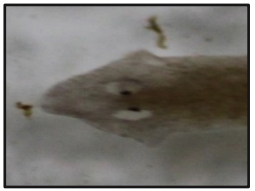
Flatworm

Misc. Other **27**

KEY FEATURES





- ❑ Slightly triangular head with two eyespots on top. (Resemble a cross-eyed, unsegmented leech)
- ❑ Soft, elongate, flattened body without segmentation or legs

Important Notes

Although flatworms occur in a wide variety of habitats, they are rarely collected in RBV samples. When a large number of planarians are present in a collection, the site is most likely affected by organic pollution.
Flatworms are heavily studied due to their regenerative capacity; when split lengthwise or crosswise they will regenerate into two genetically identical, individuals!

Taxonomic Information

Order: Tricladida
Family: Planariidae
Genus: *Planaria*

Ecological Information

Tolerance Value = 4
Feeding Group = Predator
Stream Habitat = On rocky substrate

Key Behaviors

- Planaria are able to 'glide' by beating microscopic cilia along a film of mucus.
- Tend to curl up when preserved

Size and Color

Size: 5-20 mm
Color: Gray, brown or black on top, sometimes with spots or pattern; light on bottom

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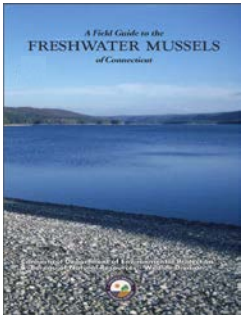
Native Freshwater Mussels

Misc. Other **28A**

FRESHWATER MUSSELS IN CONNECTICUT

Refer to the CT DEEP publication "A Field Guide to the Freshwater Mussels of Connecticut" for identification details.
To download a PDF version visit: https://portal.ct.gov/-/media/DEEP/wildlife/pdf_files/nongame/fwmuslpdf.pdf



Important Notes

All native mussel species are sensitive to pollution and environmental stress. In Connecticut, 6 of the 12 native freshwater mussel species are listed as special concern, threatened, or endangered.

To avoid accidentally injuring a listed species, please **DO NOT DISTURB OR HANDLE LIVE MUSSELS*** observed at your RBV monitoring location. **Photograph live mussels only; if empty shells are found, turn these in to your coordinator with your voucher.** **Exceptions include Zebra Mussels and Asian Clams which should be preserved and submitted to DEEP.*

Taxonomic Information

Order: Unionoida
Family: Margaritiferidae, Unionidae
Genus: See Field Guide

Ecological Information

Tolerance Value = 7
Feeding Group = Collector-filterer
Stream Habitat = Buried in substrate, slower flows

Key Behaviors

- Live on stream bottom, typically partially buried

Size and Color

Size: Variable (refer to guide)
Color: Variable (refer to guide)

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AQUATIC INVASIVE SPECIES ALERT!

Photo Credit: Khampha Bouaphanh

Zebra Mussel – Invasive Species

Misc. Other **28B**

KEY FEATURES

- ❑ Small (< 1inch)
- ❑ Triangular with flattened underside
- ❑ Distinct “zebra” stripes on shell
- ❑ Only freshwater mussel that adheres to underwater surfaces

Important Notes

If observed, collect several specimens and either freeze or preserve in rubbing alcohol. If possible, take a GPS location at the spot where the organism(s) were found. Label the specimens with the date collected and location where they were found (e.g. ABC River, at Happy Road Crossing, Happy Town).

Send an email with the above information to DEEP.AquaticInvasiveReport@ct.gov and await instructions for submission to the DEEP.

Taxonomic Information

Order: Veneroida
Family: Dreissenidae
Genus: *Dreissena*
Species: *Polymorpha*

Ecological Information

Native to the Black and Caspian Seas of Eastern Europe and the Middle East. Considered an aquatic invasive species in Connecticut.

Key Behaviors

Typically found attached to objects, surfaces (e.g. dock piling), or other mussels but can be found ‘loose’ on the sediment.

Size and Color

Size: Small (typically less than 1 inch)
Color: Light brown or gray with distinct ‘zebra’ stripes

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AQUATIC INVASIVE SPECIES ALERT!

Photograph by Marieli Cristina Scartezini.

Asian Clam – Invasive Species

Misc. Other **28B**

KEY FEATURES

- ❑ Small mussel
- ❑ "Inflated" appearance if observed from the side
- ❑ Many coarse rings on outer shell
- ❑ May have a white 'beak' from burrowing

Important Notes

If observed, collect several specimens and either freeze or preserve in rubbing alcohol. If possible, take photographs and a GPS location of the spot where the organism(s) were found. Note how many clams were present. Label the specimens with the date collected and location where they were found (e.g. ABC River, at Happy Road Crossing, Happy Town).

Send an email with the above information to DEEP.AquaticInvasiveReport@ct.gov and await instructions for submission to the DEEP.

Taxonomic Information

Order: Venerida
Family: Corbicula
Genus: *Fluminea*

Ecological Information

Native to temperate and tropical regions throughout much of Asia and Africa, as well as the eastern Mediterranean and parts of Australia. Considered an aquatic invasive species in Connecticut.

Key Behaviors

Found on stream or lake bottoms, particularly those with sand and gravel substrates.

Size and Color

Size: Small, typically 0.5-0.75 inches wide
Color: Yellow-green to light brown

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