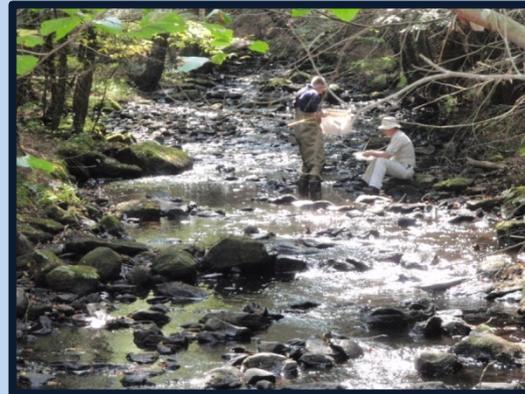
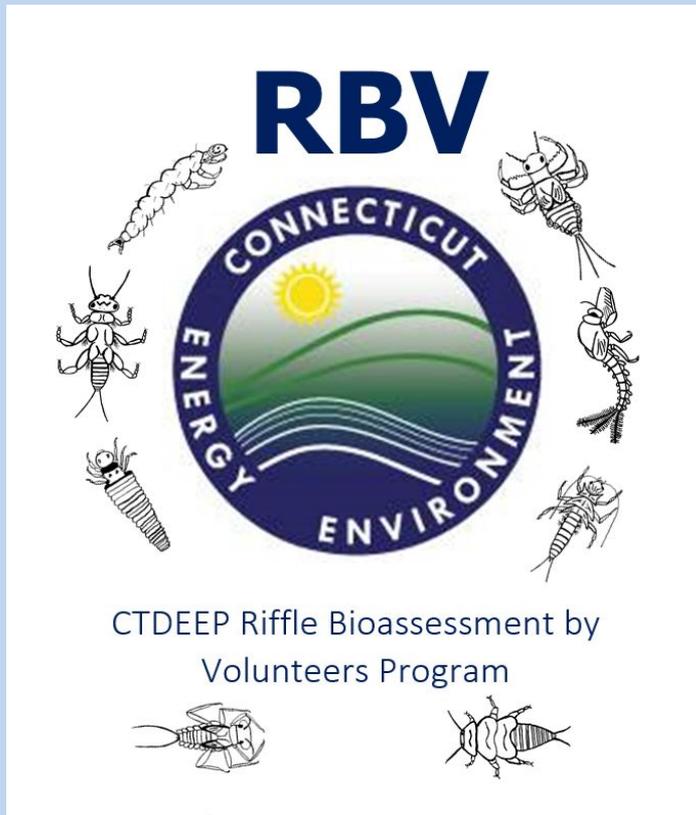


Riffle Bioassessment by Volunteers (RBV) *Volunteer Training*



*A CT DEEP Tier 2
Volunteer Water Quality Monitoring Network
www.ct.gov/deep/rbv*

Last revised 10/09/2015



Connecticut Department of Energy and Environmental Protection

Riffle Bioassessment by Volunteers (RBV)

Volunteer Training Presentation:

Part 4 – The RBV Organisms



A CT DEEP Tier 2

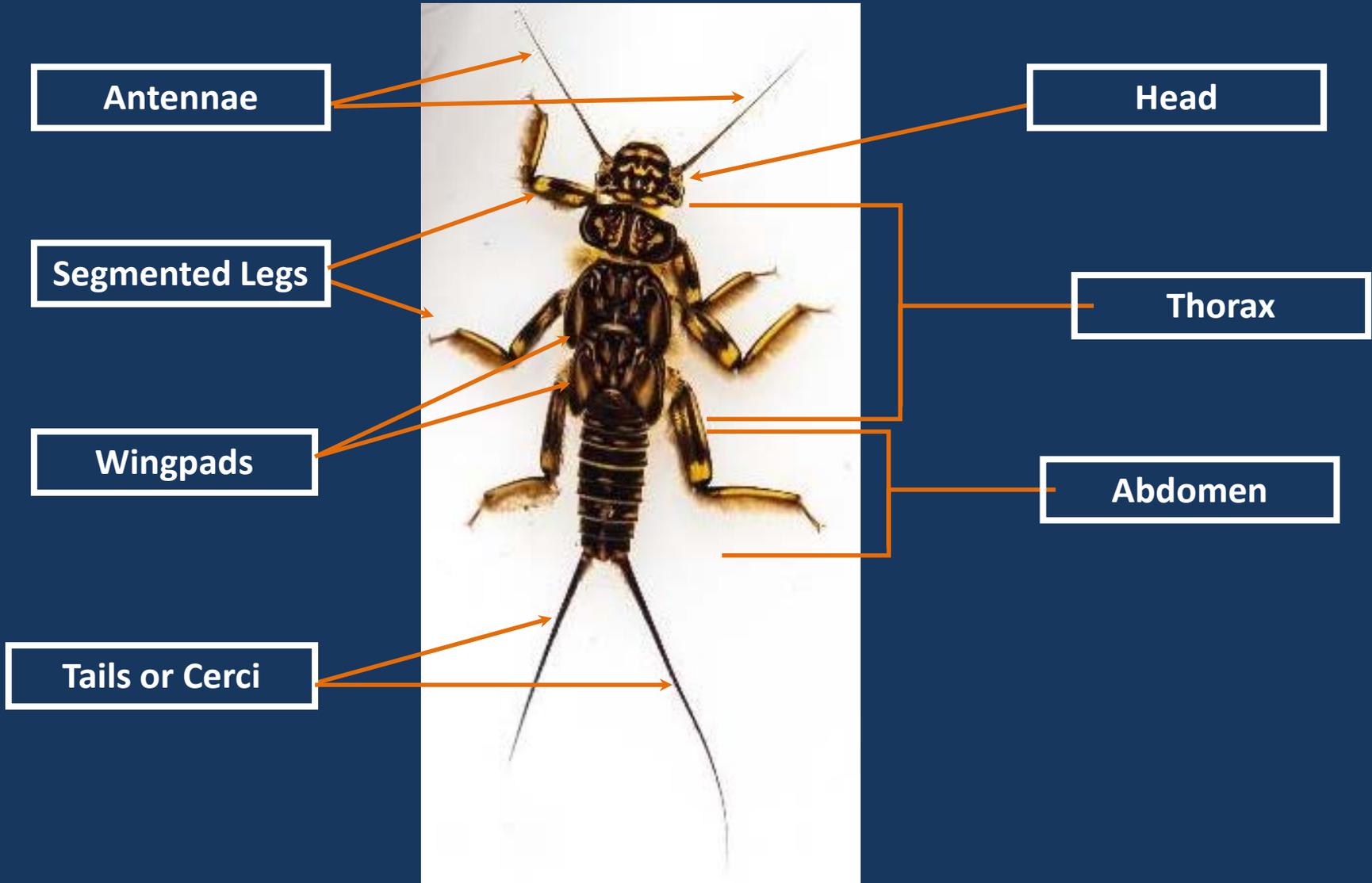
Volunteer Water Quality Monitoring Network

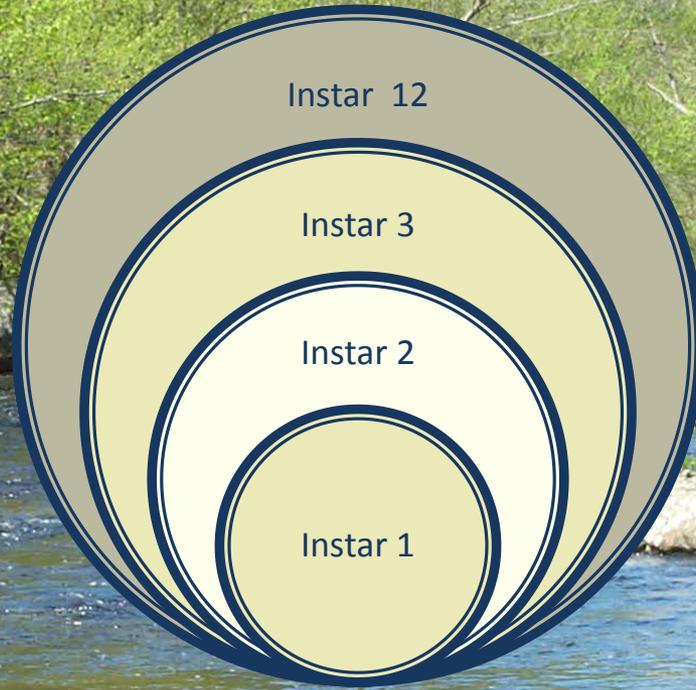
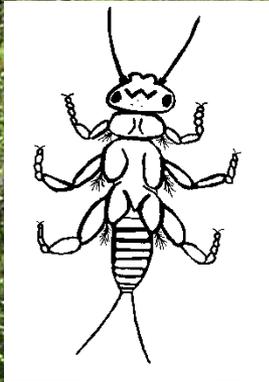
www.ct.gov/deep/rbv



Connecticut Department of Energy and Environmental Protection

Insect Anatomy Overview



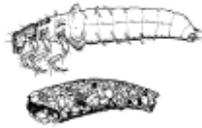


Don't be fooled by size!



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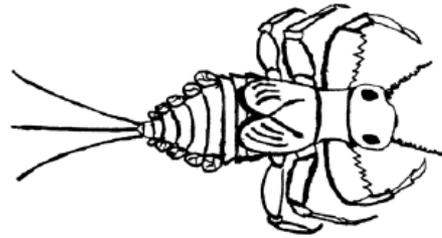
"Most Wanted" Macroinvertebrates

MOST WANTED (Most Sensitive to Pollution)	1	2	3	4	5A	5 B	5 C			
	"Body-Builder" Mayfly <i>Drunella sp.</i>	Brush-Legged Mayfly <i>Isonychia sp.</i>	2-Tail Flathead Mayfly <i>Epeorus sp.</i>	Roach-Like Stonefly Peltoperlidae	Common Stonefly Perlidae	Giant Stonefly <i>Pteronarcys sp.</i>	Misc. Small Stonefly Plecoptera			
										
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			
	MOST WANTED (Most Sensitive to Pollution)	6A	6 B	7	8A	8 B	# Most Wanted Types:	Water Quality:		
		Saddle-Case Caddis <i>Glossosoma sp.</i>	Cornucopia Case Caddis <i>Apatania sp.</i>	Free-Living Caddis <i>Rhyacophila sp.</i>	Humpless Caddis <i>Brachycentrus sp.</i>	Plant Case Caddis <i>Lepidostoma sp.</i>			5+	EXCEPTIONAL: Fully Supporting Aquatic Life Use Goals
									4	EXCELLENT: Likely Supporting Aquatic Life Use Goals
<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0-3			NOT DETERMINED: More Info Needed	

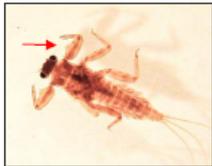


Body-Builder Mayfly

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

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.

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.

Size and Color

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



Photographs courtesy of (top to bottom): Kelsey Quartuccio/CT DEEP; Kelsey Quartuccio/CT DEEP; Jake Renkert/The Marvelwood School

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1

"Body-Builder" Mayfly
Drunella sp.



Brush-Legged Mayfly

Most Sensitive **2**



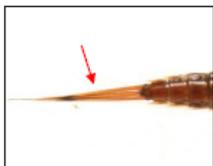
KEY FEATURES



- Streamlined body, taller than wide.
- Often with a "humped back" or "S-shaped" appearance when swimming.



- 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.

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.

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.

Size and Color

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



2

Brush-Legged Mayfly *Isonychia* sp.



Photographs courtesy of (top to bottom): Kelsey Quartuccio/CT DEEP; Jake Renkert/The Marvelwood School; NY DEC Biomonitoring Unit; Jake Renkert/The Marvelwood School

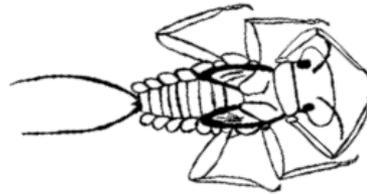
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Two-Tailed Flathead Mayfly

Most Sensitive

3



KEY FEATURES



- ❑ Extremely flat, almost translucent body, long thin legs.



- ❑ Small round gills on the sides of the abdomen.
- ❑ Two Long thin tails at the end of the abdomen (easily broken)



- ❑ Single set of wing pads.
- ❑ Wide flat head, obvious eyes.

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.

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.

Size and Color

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



3

2-Tail Flathead Mayfly

Epeorus sp.



Photographs courtesy of (top to bottom): Kelsey Quartuccio / CT DEEP; DEEP files, author unknown; NY DEC Biomonitoring Unit; DEEP files, author unknown

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Roach-Like Stonefly

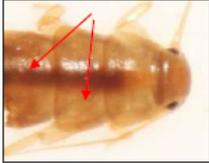
Most Sensitive **4**



KEY FEATURES



- Tear-drop shaped body with a uniformly shiny brown exoskeleton.
- Two short tails at the end of the abdomen.



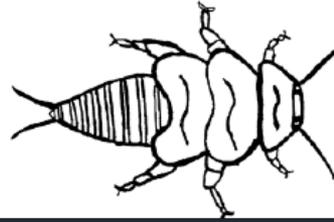
- Two sets of wing pads.



- No gills on the sides of the abdomen.



- Commonly found on leaves



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

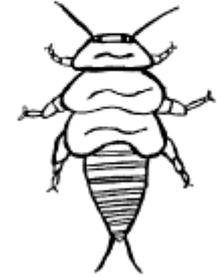
Peltoperlids are very intolerant of environmental stresses. Its characteristic inverted tear drop shape, short tails, and head which is broadly joined to the thorax, differentiate the Roach-Like Stonefly from other stoneflies.

Size and Color

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

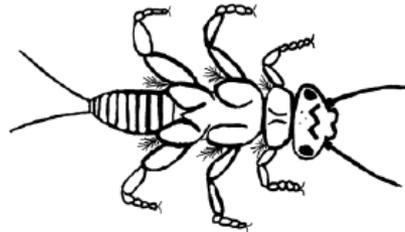


4 Roach-Like Stonefly Peltoperlidae



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.

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.)

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).

Size and Color

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

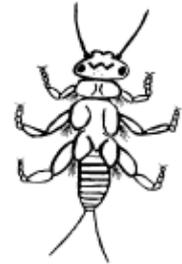


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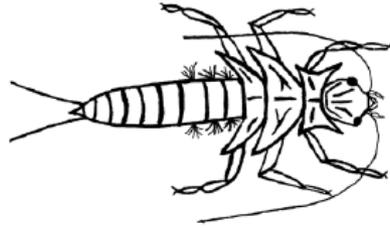
5A

Common Stonefly
Perlidae



Giant Stonefly

Most Sensitive **5B**



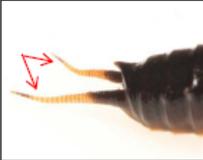
KEY FEATURES



- ❑ 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.

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.

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.

Size and Color

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

5 B

Giant Stonefly
Pteronarcys sp.



Miscellaneous Small Stoneflies

Most Sensitive **5C**

SMALL STONEFLY FAMILIES



- ❑ Small Winter Stoneflies¹ (*Capniidae*)
 - Often dark
 - Legs short
 - Abdomen slightly wider at middle



- ❑ Green Stoneflies¹ (*Chloroperlidae*)
 - No distinctive color patterns
 - Tails shorter than the abdomen is long



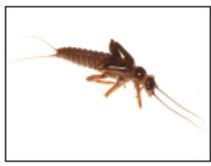
- ❑ Rolled-winged Stoneflies (*Leuctridae*)²
 - Long, slender body
 - Short legs
 - Abdomen same width along length



- ❑ Nemourid Stoneflies¹ (*Nemouridae*)
 - Long legs (tips extend to the tip of the abdomen or beyond)



- ❑ Perlodid Stoneflies³ (*Perlodidae*)
 - Very similar to the Common Stonefly but without gill tufts near the base of the legs

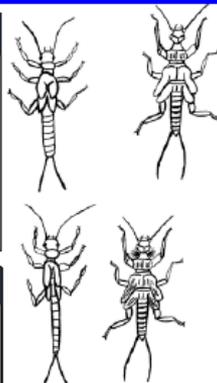


- ❑ Winter Stoneflies (*Taeniopterygidae*)⁴
 - Wing pads form a distinct triangle
 - Typically only present in late November RBV samples

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



Taxonomic Information

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

Ecological Information

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

	Tolerance Value	Feeding Group
<i>Capniidae</i>	1	Shredder
<i>Chloroperlidae</i>	1	Predator
<i>Leuctridae</i>	0	Shredder
<i>Nemouridae</i>	2	Shredder
<i>Perlodidae</i>	2	Predator
<i>Taeniopterygidae</i>	2	Shredder

Important Notes

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

Size and Color

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



5 C Misc. Small Stonefly Plecoptera

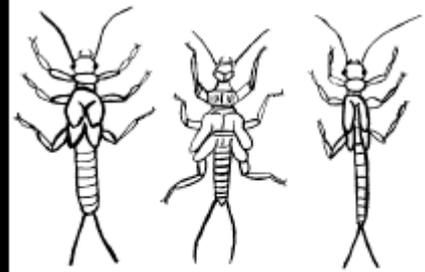


Photo courtesy of NY DEC



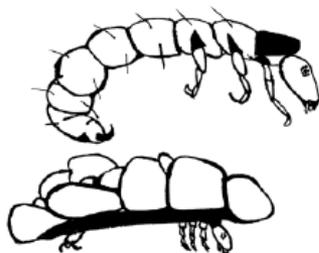
Photo courtesy of NY DEC

Photographs courtesy of: ¹Donald S. Chandler – www.discoverlife.org; ²Author unknown; ³Unknown – <http://aquaticinsectsofcentralvirginia.blogspot.com>; ⁴Jake Renkert – The Marvelwood School



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' (red arrow)

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.

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.

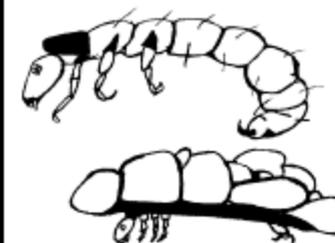
Size and Color

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



6A

Saddle-Case Caddis *Glossosoma* sp.



Photographs courtesy of (top to bottom): NY DEC Biomonitoring Unit; Kelsey Quartuccio/CT DEEP; Jake Renkert/The Marvelwood School

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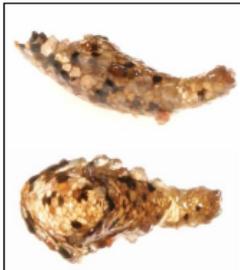


Cornucopia-Case Caddisfly

Most Sensitive **6B**



KEY FEATURES



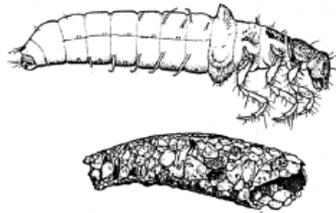
- ❑ Tiny light-bodied organism
- ❑ Hunched appearance when in case.
- ❑ Triangular head with dark legs.
- ❑ Very small, delicate case made of sand grains
- ❑ Case is cone-shaped like a Thanksgiving cornucopia.



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.



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!

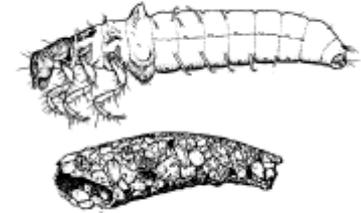
Size and Color

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



6 B

Cornucopia Case Caddis
Apatania sp.



Courtesy of NY DEC

Photographs courtesy of (top to bottom): NY DEC Biomonitoring Unit; Jake Renkert/The Marvelwood School; DEEP file photo, author unknown

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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



7
Free-Living Caddis
Rhyacophila sp.



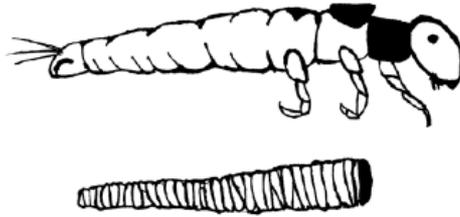
Photographs courtesy of (top to bottom): Jake Renkert/The Marvelwood School; Jake Renkert/The Marvelwood School; NY DEC Biomonitoring Unit; Jake Renkert/The Marvelwood School; Jake Renkert/The Marvelwood School

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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.



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.

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.

Size and Color

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



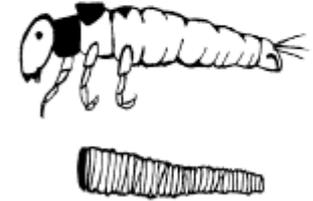
All photographs courtesy of Jake Renkert/The Marvelwood School

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8A

Humpless Caddis
Brachycentrus sp.



Courtesy NY DEC

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.



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.

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.

Size and Color

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



8 B
 Plant Case Caddis
Lepidostoma sp.



Photographs courtesy of (top to bottom): Jake Renkert/The Marvelwood School; NY DEC Biomonitoring Unit; Jake Renkert/The Marvelwood School



“Moderately Wanted” Macroinvertebrates

MODERATELY (Moderately Sensitive to Pollution)	9	10	11	12	13 A	13 B	14A	14B
	Common Netspinner Hydropsychidae	Fingernet Caddis Philopotamidae	3-Tail Flat Head Mayfly <i>Stenonema sp.*</i>	Water Penny <i>Psephenus sp.</i>	Dobsonfly <i>Corydalus sp.</i>	Fishfly <i>Nigronia sp.</i>	Dragonfly Anisoptera	Damselfly Zygoptera
								
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Common Netspinner Caddisfly

Moderately Sensitive

9



KEY FEATURES



- ❑ 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



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!

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.

Size and Color

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

Photographs courtesy of (top to bottom): NY DEC Biomonitoring unit; The Marvelwood School & Kent Conservation Commission RBV Program; Jake Renkert / The Marvelwood School; Becky Martorelli / Quinnipiac River Watershed Association; Jake Renkert / The Marvelwood School

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9

Common Netspinner Hydropsychidae

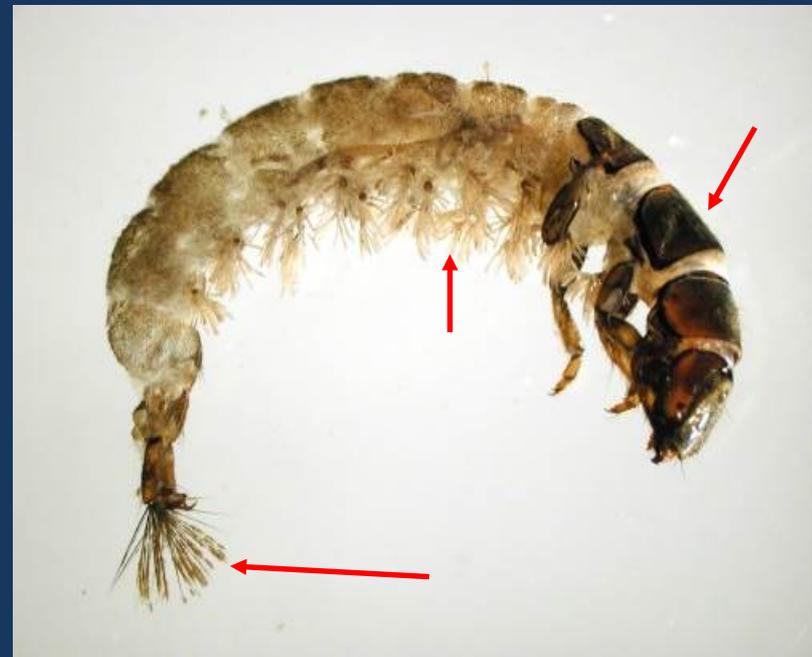
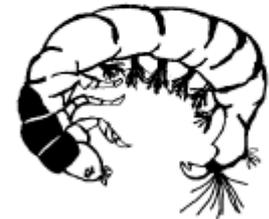
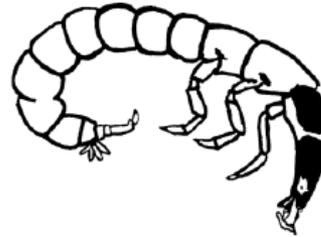
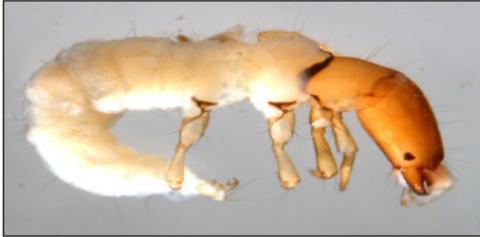


Photo courtesy NY DEC

Fingernet Caddisfly

Moderately Sensitive

10



KEY FEATURES



- ❑ 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.)



Photographs courtesy of (top to bottom): NY DEC Biomonitoring unit; The Marvelwood School/Kent Conservation Commission RBV program; The Marvelwood School/Kent Conservation Commission RBV program; The Marvelwood School/Kent Conservation Commission RBV program; Jake Renkert / The Marvelwood School

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.

Important Notes

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

Size and Color

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

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10

Fingernet Caddis Philopotamidae

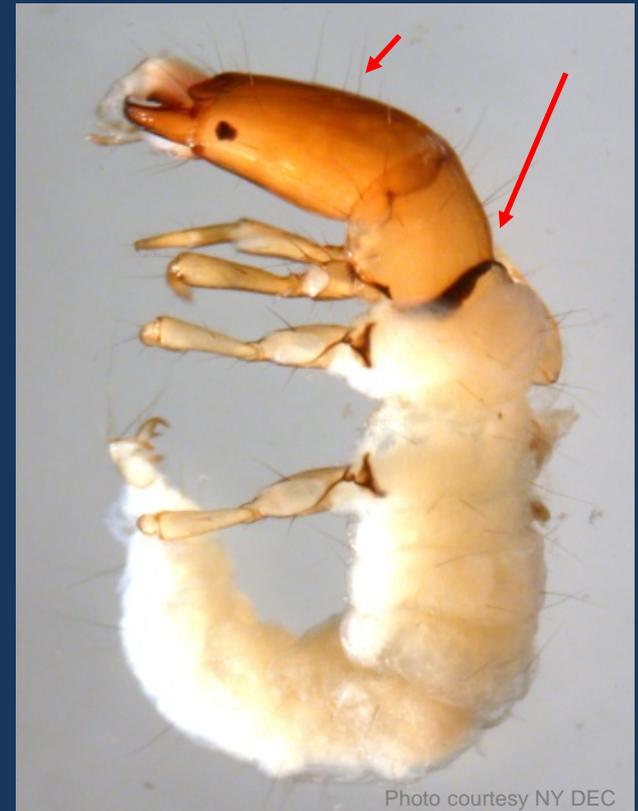
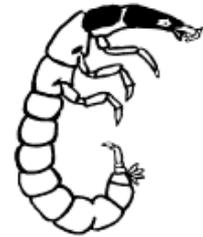
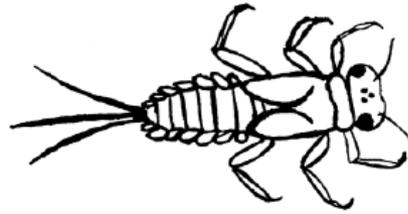


Photo courtesy NY DEC

Three-Tailed Flat Headed Mayfly

Moderately Sensitive

11



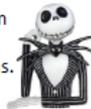
KEY FEATURES



- 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.

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

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.

Size and Color

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



Photographs courtesy of Jake Renkert / The Marvelwood School

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11

3-Tail Flat Head Mayfly

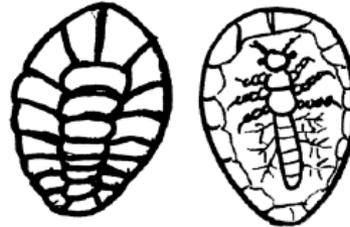
*Stenonema sp.**



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.

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 (see image at left)
- May glide along the bottom of the tray
- May curl up when disturbed

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.

Size and Color

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



Photographs courtesy of (top to bottom): Jake Renkert / The Marvelwood School (top three); Meghan Lally/CT DEEP; The Marvelwood School/Kent Conservation Commission RBV program; The

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12

Water Penny
Psephenus sp.



Dobsonfly

Moderately Sensitive

13A



KEY FEATURES



- ❑ 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)



- ❑ Large pinching mouth parts.
- ❑ Will bite sampling spoons and your fingers so watch out!



- ❑ Two prolegs at the end of the abdomen, each with two hooks.



- ❑ Tufts of fluffy gills at the base of each abdominal projection.

Taxonomic Information

Order: Megaloptera
Family: Corydalidae
Genus: *Corydalis*

Ecological 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!

Important Notes

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

Size and Color

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

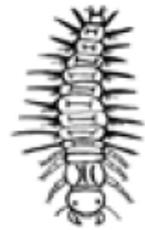
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Photographs courtesy of Jake Renkert / The Marvelwood School

13 A

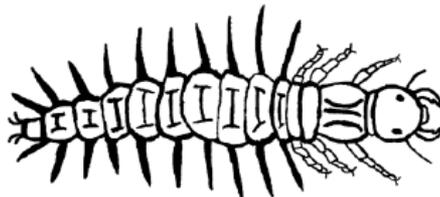
Dobsonfly *Corydalis sp.*



Fishfly

Moderately Sensitive

13B



KEY FEATURES



- ❑ Elongate body with a pair of long soft spine-like appendages on each section of the abdomen.



- ❑ Large pinching mouth parts.



- ❑ Two prolegs at the end of the abdomen, each with two hooks.



- ❑ No gills at the base of the abdominal projection.

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!**

Important Notes

Very common in RBV samples. *Nigronia* is often confused with *Corydalis* (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.

Size and Color

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

13 B

Fishfly

Nigronia sp.



Dragonfly

Moderately Sensitive

14A

General Identification

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

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



DRAGONFLY FAMILIES



- ❑ **Darter Dragonfly (*Aeshnidae*)**
 - 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*)**
 - 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

Taxonomic Information

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

Ecological Information

Tolerance Value = See below
 Feeding Group = See below
 Stream Habitat = Typically among rocks and vegetation, or burrowed in soft substrate

	Tolerance Value	Feeding Group
<i>Aeshnidae</i>	3	Predator
<i>Cordulergastridae</i>	3	Predator
<i>Gomphidae</i>	1	Predator
<i>Libellulidae</i>	9	Predator

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



14A
 Dragonfly
 Anisoptera



Damselfly

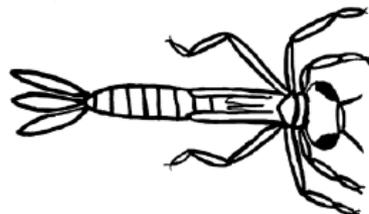
Moderately Sensitive

14B

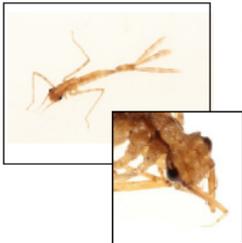
General Identification

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.



DAMSELFLY FAMILIES



- ❑ **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

Taxonomic Information

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

Ecological Information

Tolerance Value = See below
 Feeding Group = See below
 Stream Habitat = Slow or standing water, on vegetation

	Tolerance Value	Feeding Group
<i>Calopterygidae</i>	5	Predator
<i>Coengrionidae</i>	9	Predator
<i>Lestidae</i>	9	Predator

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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14B

Damselfly Zygoptera



Photo courtesy NY DEC

Photographs courtesy of Jake Renkert (top); NY DEC (middle); DEEP files, author unknown (bottom)

“Least Wanted” Macroinvertebrates



Photo courtesy NY DEC

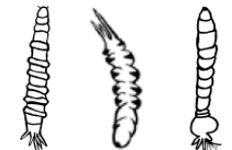
LEAST WANTED (Least Sensitive to Pollution)	15	16	17	18	19	20	21
	Scud Amphipoda	Aquatic Sow Bug Isopoda	Leech Hirudinea	Non-Biting Midge Chironimidae	Black Fly Simuliidae	Snail Gastropoda	Aquatic Worm Oligochaeta
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Photo courtesy NY DEC

"Others" Commonly Collected During RBV



OTHERS	22	23	24	25	26	27	28
	Crayfish Decapoda	Crane Fly Tipulidae	Riffle Beetle Elmidae	Small Minnow Mayfly Baetidae	Aquatic Snipe Fly <i>Atherix sp.</i>	Flatworm <i>Planaria sp.</i>	Mussel/Clam Unionoida
							
	<i>*Photograph and return all crayfish to the stream</i>						<i>*Photograph and return all mussels to the stream</i>
	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

