

# **Macroinvertebrate Bioindicator Families Guide**

In freshwater systems, some groups of macroinvertebrates are considered biological indicators (bioindicators) for water quality. Traditional bioindicators include Ephemeroptera (mayflies), Plecoptera (stoneflies), Trichoptera (caddisflies) and Odonata (dragonflies & damselflies). These EPTO orders are typically either sensitive or tolerant to many pollutants in the aquatic environment, depending on the type of ecosystem (i.e. standing versus running water) they reside in and where in the country they are found. Tolerance values are calculated from macroinvertebrate's tolerance to organic pollution in the environment.

## **Ephemeroptera (Mayflies)**

Young mayfly nymphs are found in streams, rivers, lakes, and ponds for up to two years. As important links in the freshwater food web, young mayflies are often voracious herbivores, detritivores, or even carnivores, in addition to being preferred food sources for many freshwater carnivores.

## **Plecoptera (Stoneflies)**

Stonefly nymphs prefer cold, fast-flowing, and highly oxygenated lotic habitats in springs, streams, and rivers, where they often live under leaf packs and the stones that are their namesake. Most running-water species are herbivorous, often feeding on submerged leaves and benthic algae as shredders and scrapers, but other species are predator-engulfers of fellow macroinvertebrates.

## **Trichoptera (Caddisflies)**

Caddisfly larvae inhabit a broad scope of freshwater habitats, including streams, rivers, lakes, and ponds. Many species are known for their ability to construct cases from sticky homespun silk and sand grains, pebbles, or plant matter, but other species may be free-living or form silken nets to capture particles from the water column. Caddisfly species can be found across all feeding guilds for macroinvertebrates, including shredders, scrapers, and collector-filterers.

## **Odonata (Dragonflies and damselflies)**

Commonly found in standing waters (lentic systems) or slow-moving running waters (lotic systems), these fierce underwater predators remain one of the most fundamentally aquatic insect orders, with all known North American nymphs spending their young lives underwater. The Odonata can be divided into 2 suborders: the Anisoptera (the dragonflies) and the Zygoptera (the damselflies).

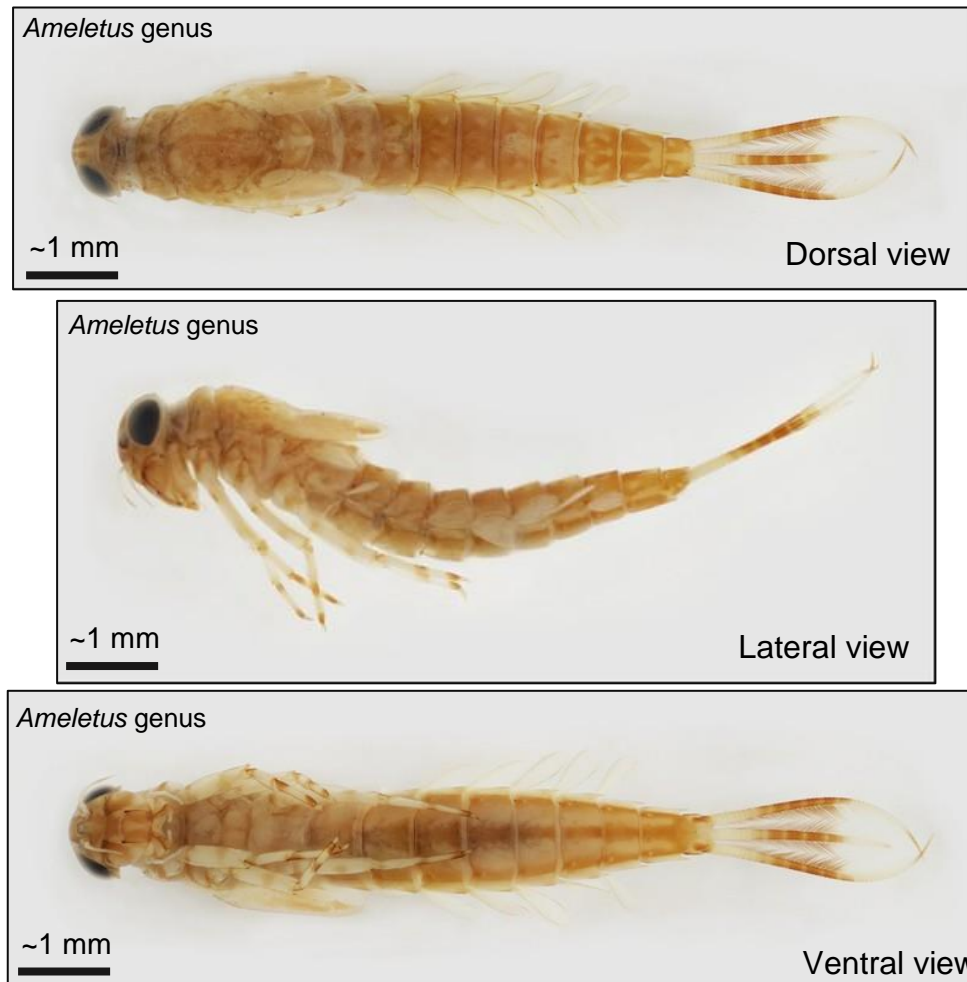
**DISCLAIMER:** This guide aims to provide basic information on the EPTO families found in aquatic systems across North America. This guide is not intended to provide quality assessments on freshwater systems and cannot be used in place of [CABIN measures of freshwater health](#). Tolerance values are approximate and each genus within a Family can vary between regions. **Information and images featured in this guide are sourced from the [Atlas of Common Freshwater Macroinvertebrates](#) unless stated otherwise. Please reference this website if you use any content from this guide.**

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## Ephemeroptera (Mayflies)

### Family: Ameletidae (Comb-mouthed minnow mayflies)



#### Information:

- Widespread in Canada – most west of the Rocky Mountains.
- 34 known species in North America

#### Feeding type:

- Collector-gatherers or scraper-grazers, feeding on detritus and diatoms.

#### Habitat type:

- Often found in cold, fast-flowing mountain streams, especially along edges, undercut banks, and in root masses.

#### Pollution tolerance (0 = least tolerant, 10 = most tolerant):

- Around 0

**Family: Baetidae (Small minnow mayflies)**



**Information:**

- Widespread in Canada
- 152 North American species

**Feeding type:**

- They feed by collecting and gathering food, or by scraping algae and periphyton from rocks and detritus.

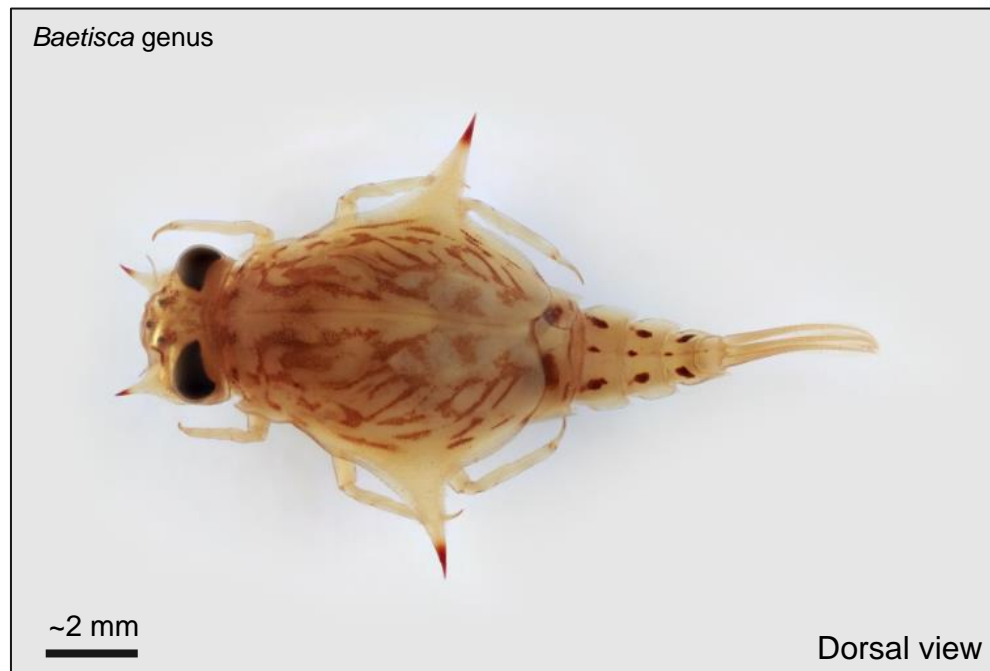
**Habitat type:**

- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) or lotic-depositional (running-water pools and margins with fine sediments) habitats.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 5

**Family: Baetiscidae (Armoured mayflies)**



**Information:**

- Mostly found in eastern Canada
- [15 species](#) of this family

**Feeding type:**

- They feed by collecting and gathering food, or by scraping algae and periphyton from rocks and detritus.

**Habitat type:**

- Pools or runs in sandy streams

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 4

**Family: Caenidae (Small square-gilled mayflies)**



**Information:**

- Mostly found in eastern Canada
- 30 North American species in 4 genera

**Feeding type:**

- They feed by filtering or collecting and gathering tiny bits of food or by scraping algae and biofilm from rocks and other substrates in their habitat.

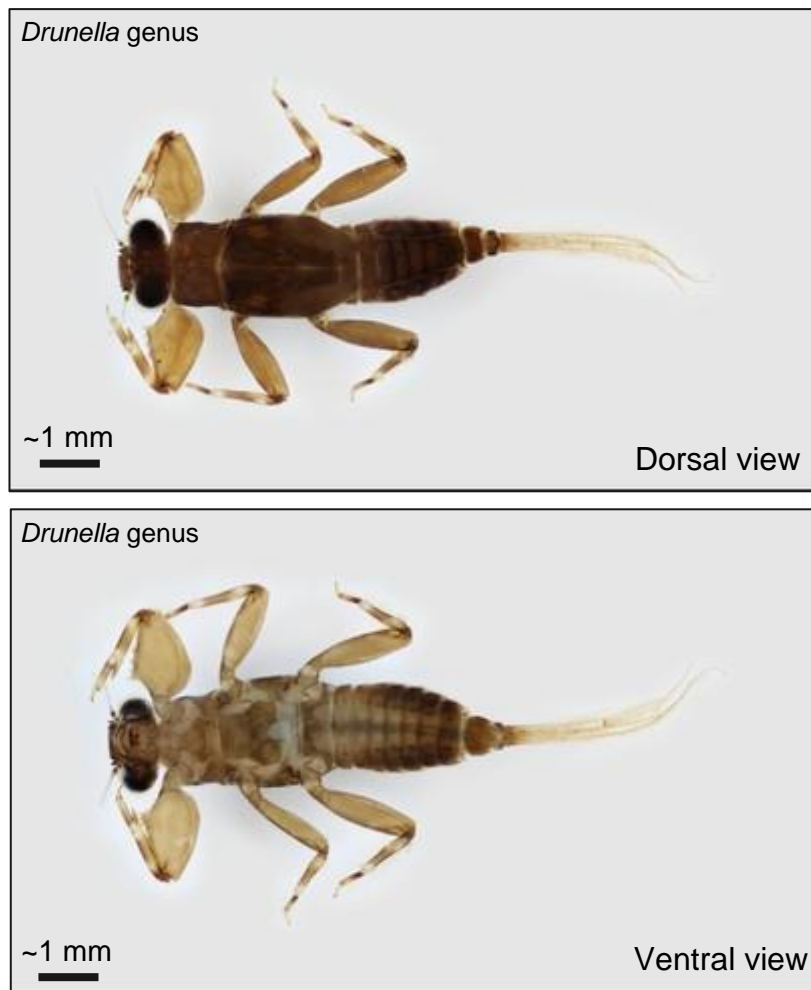
**Habitat type:**

- Prefer slow-moving or stagnant water where there is an abundance of silt and loose sediment and are often found sprawled on/in the silt or climbing among the plants.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 6

**Family: Ephemerellidae (Spiny crawler mayflies)**



**Information:**

- Western and eastern Canada mostly
- Roughly 80 North American species in 9 genera.

**Feeding type:**

- The family has a variety of feeding strategies, differing among species, including collector-gatherers, scrapers, some shredders of detritus or algae, and even one predator.

**Habitat type:**

- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) or lotic-depositional (running-water pools and margins with fine sediments) habitats, often among the rooted aquatic plants, moss, root masses, or woody debris.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 1

**Family: Ephemeridae (Common burrower mayflies)**



**Information:**

- Widespread in Canada
- Roughly 80 species in 7 genera.

**Feeding type:**

- The family has a variety of feeding strategies, differing among species, including collector-gatherers, collector-filterers and engulfer-predators.

**Habitat type:**

- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) or lotic-depositional (running-water pools and margins with fine sediments) habitats, often among the rooted aquatic plants, moss, root masses, or woody debris.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 3



**Family: Heptageniidae (Flat-headed mayflies)**



**Information:**

- Widespread in Canada - mostly found out east
- Over 100 North American species in 11 genera

**Feeding type:**

- They are sometimes collector-gatherers of fine organic particles; however, they typically feed by scraping algae and periphyton from rocks and other substrates at the bottom of the stream.

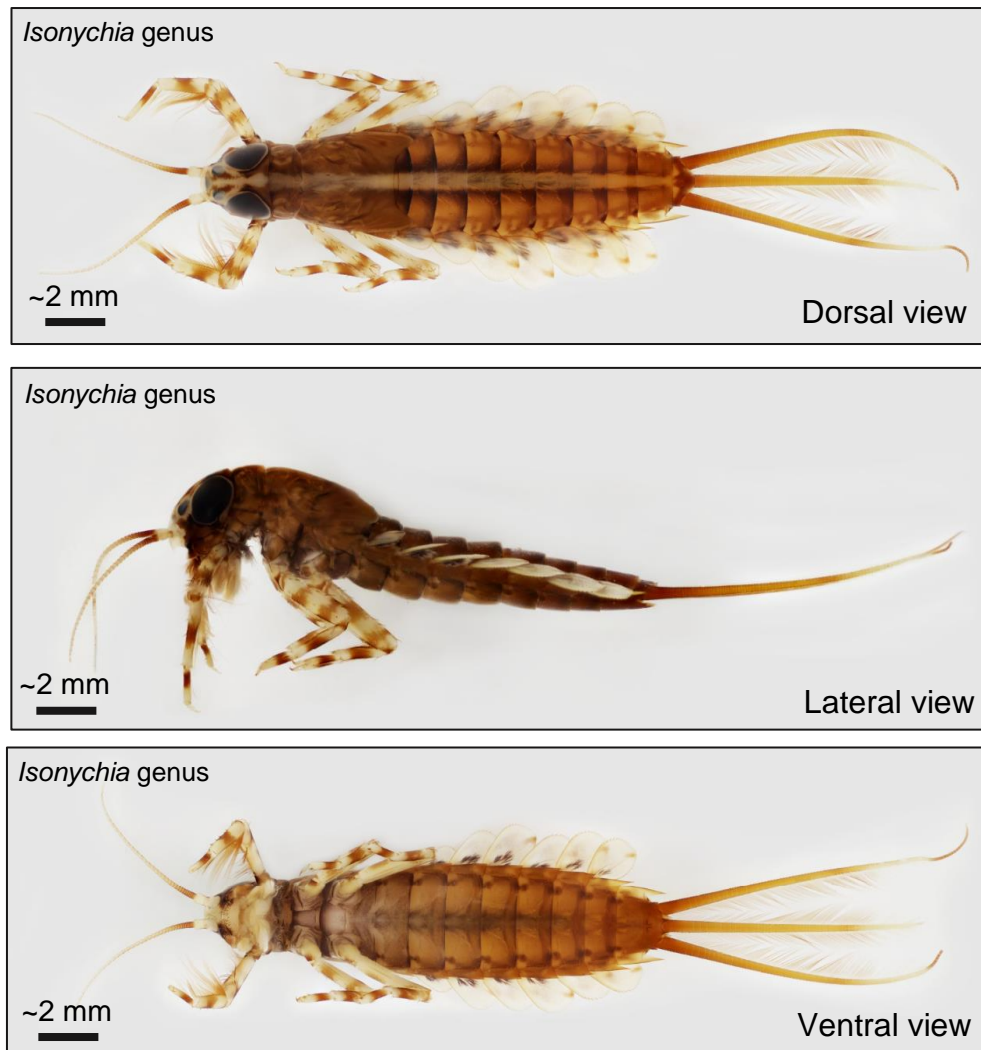
**Habitat type:**

- They are found in lotic (running-water) or lentic (still-water) erosional (riffles with coarse sediments) habitats, often among rocks.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 3

## Family: Isonychiidae (Brush-legged mayflies)



### Information:

- Widespread in Canada - mostly found out east
- 13 North American species

### Feeding type:

- They usually collect and gather small bits of organic particles for food, or some taxa also filter feed.

### Habitat type:

- Larval members of this family tend to be found in small streams and rivers in areas of slow flow; however, they can be found in lentic-littoral habitats as well.

### Pollution tolerance (0 = least tolerant, 10 = most tolerant):

- 2

**Family: Leptohyphidae (Little stout crawler mayflies)**



**Information:**

- Widespread in Canada - mostly found out east
- 13 North American species

**Feeding type:**

- They usually collect and gather small bits of organic particles for food, or some taxa also filter feed.

**Habitat type:**

- Larval members of this family tend to be found in small streams and rivers in areas of slow flow; however, they can be found in lentic-littoral habitats as well.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 3

**Family: Leptophlebiidae (Prong-gilled mayflies)**



**Information:**

- Widespread in Canada
- 70 North American species in this family.

**Feeding type:**

- Most feed by collecting and gathering food, however, some scrape periphyton from rocks or gather particles of detritus, others filter particles from the water.

**Habitat type:**

- Larvae tend to be found in gravel-bottomed streams, with woody debris, or among roots along banks; however, some can be found in lentic (still-water) habitats.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 4

**Family: Metretopodidae (Cleft-footed minnow mayflies)**



**Information:**

- Widespread – mostly east of the Rocky Mountains.
- 15 species in this family.

**Feeding type:**

- The family has a variety of feeding strategies, differing among species, including collector-gatherers and engulfer-predators.

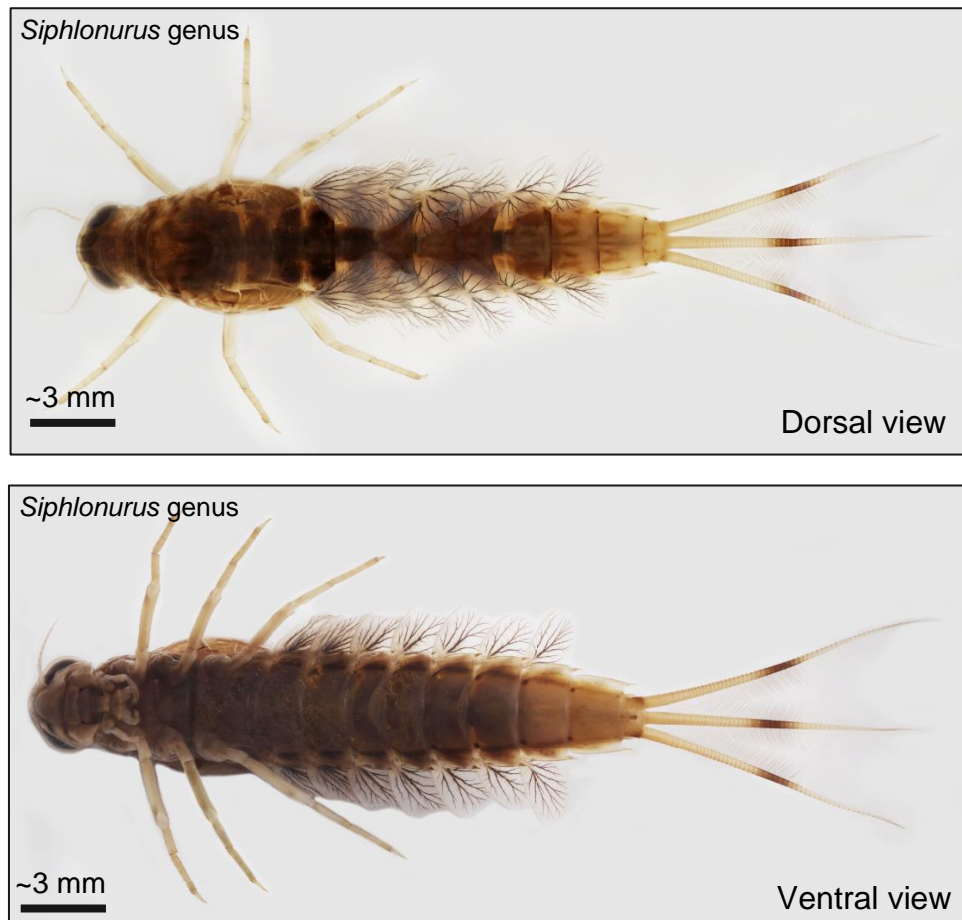
**Habitat type:**

- Larvae usually found in lotic-depositional (running-water pools and margins with fine sediments), lotic-erosional (running-water riffles with coarse sediments) and lentic-littoral habitats.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 2

**Family: Siphonuridae (Primitive minnow mayflies)**



**Information:**

- Widespread in Canada – mostly in east
- 26 North American species from 4 genera.

**Feeding type:**

- Most feed by collecting and gathering food.

**Habitat type:**

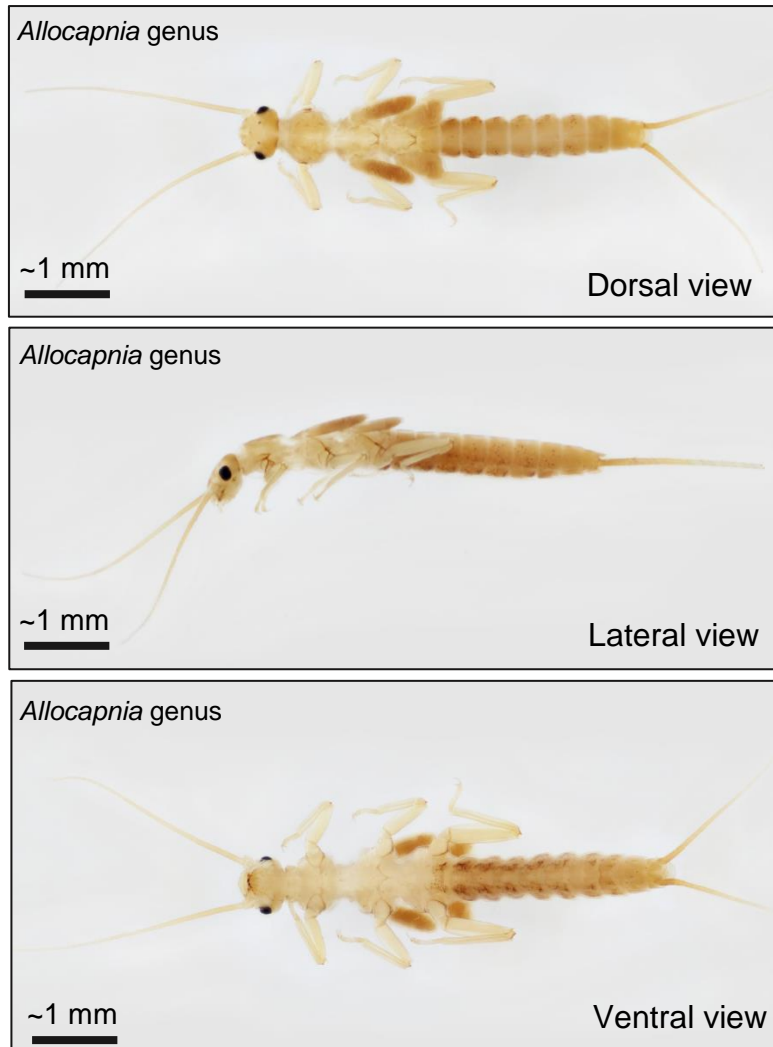
- Larvae usually found in lotic-depositional (running-water pools and margins with fine sediments) and lotic-littoral habitats.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 4

## Plecoptera (Stoneflies)

### Family: Capniidae (Small winter stoneflies)



#### Information:

- Widespread (east of the Rocky Mountains)
- [614 species](#) are known from North America

#### Feeding type:

- Most feed by shredding vegetation/feeding on detritus.

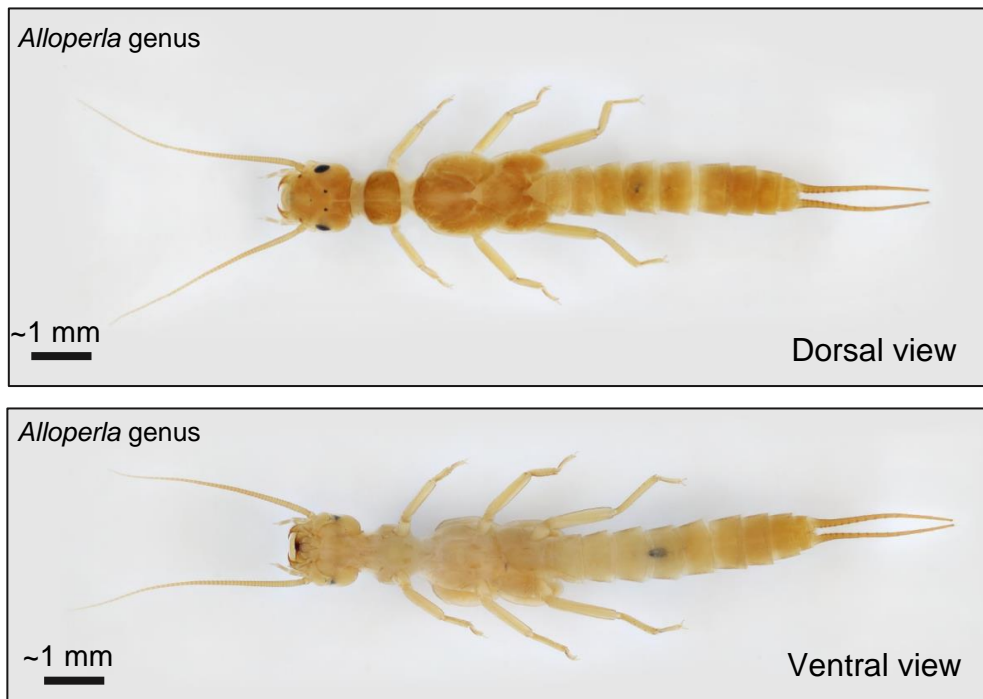
#### Habitat type:

- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) or lotic-depositional (running-water pools and margins with fine sediments) habitats.

#### Pollution tolerance (0 = least tolerant, 10 = most tolerant):

- 2

**Family: Chloroperlidae (Green stoneflies)**



**Information:**

- Widespread (east of the Rocky Mountains)
- [12 genera and 89 species](#) in North America

**Feeding type:**

- Most feed either by collecting-gathering, engulfing-predating or scraping-grazing.

**Habitat type:**

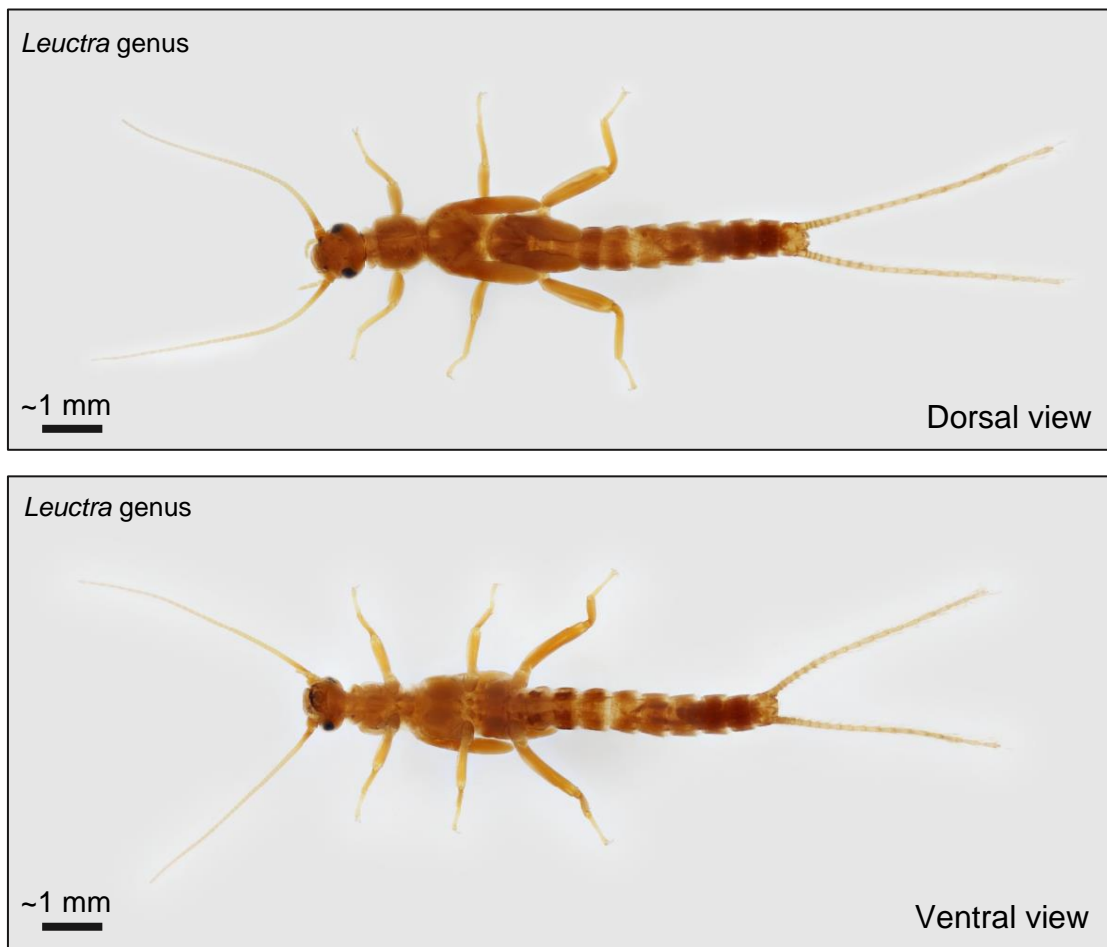
- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) habitats.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- Around 0



**Family: Leuctridae (Rolled-winged stoneflies)**



**Information:**

- Widespread (east of the Rocky Mountains)
- 6 genera with over 40 species in North America.

**Feeding type:**

- They are shredding detritivores, eating decaying leaves in the water; however, most of the nutrients they receive from this meal come from the periphyton growing on the leaves and not the leaves themselves.

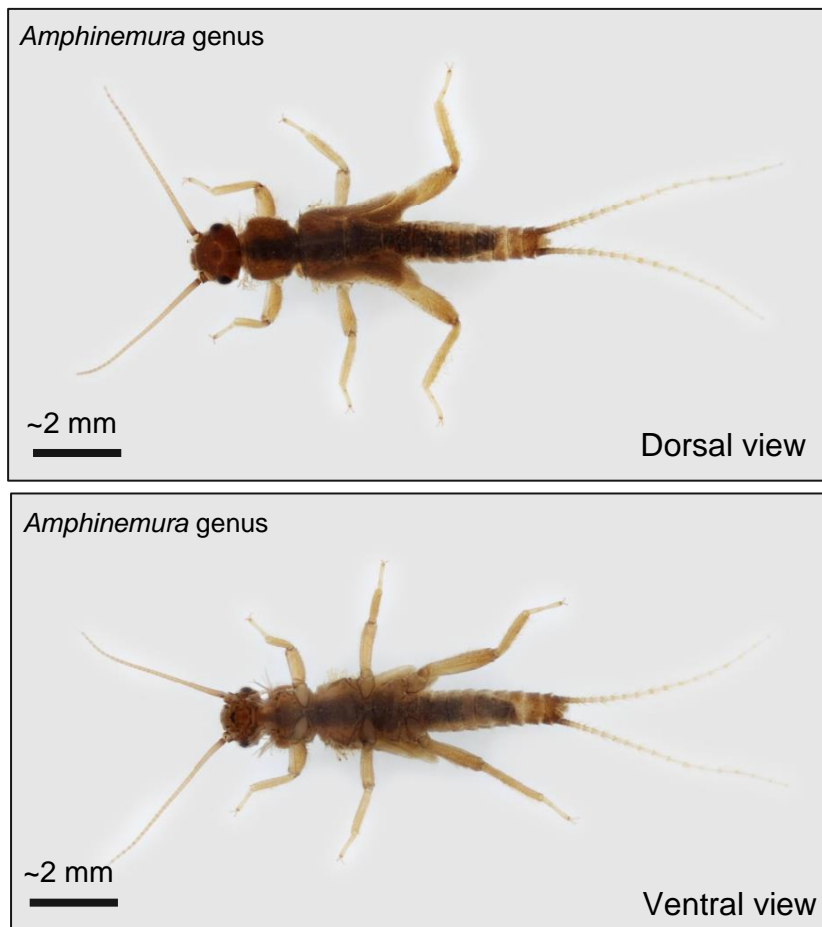
**Habitat type:**

- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) or lotic-depositional (running-water pools and margins with fine sediments) habitats.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- Around 0

**Family: Nemouridae (Spring stoneflies)**



**Information:**

- Widespread (east of the Rocky Mountains)
- 12 North American genera with roughly 60 species.

**Feeding type:**

- Most of them are shredding detritivores, though some are collector-gatherers.

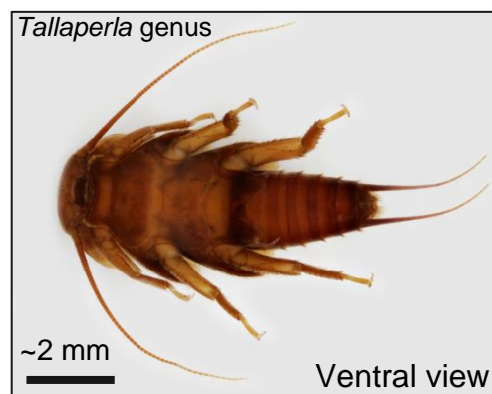
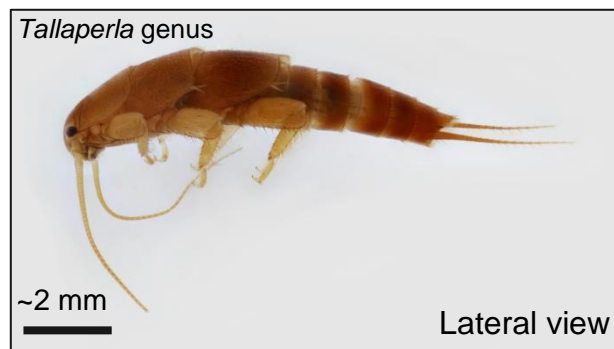
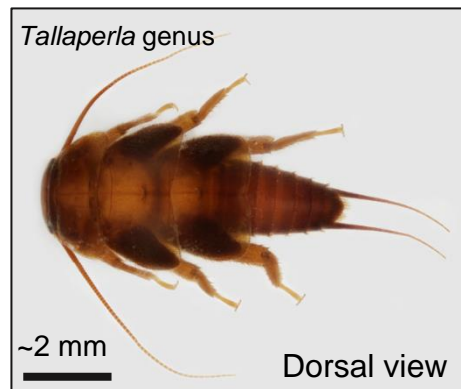
**Habitat type:**

- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) or lotic-depositional (running-water pools and margins with fine sediments) habitats. They are often found in leaf packs, wood, or other coarse sediments.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 2

**Family: Peltoperlidae (Roach-like stoneflies)**



**Information:**

- Mostly found on extreme east and west coasts.
- 5 Canadian species.

**Feeding type:**

- Most of them are shredding detritivores, and feed on leaf litter and debris piles in the water.

**Habitat type:**

- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) or lotic-depositional (running-water pools and margins with fine sediments) habitats.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- Around 0

**Family: Perlidae (Common stoneflies)**



**Information:**

- Widespread – mostly in eastern North America
- 84 North America species and almost 1,000 worldwide

**Feeding type:**

- Young larvae tend to collect and gather small amounts of food until they are large enough to engulf their prey, including caddisflies, midges, and other small invertebrates.

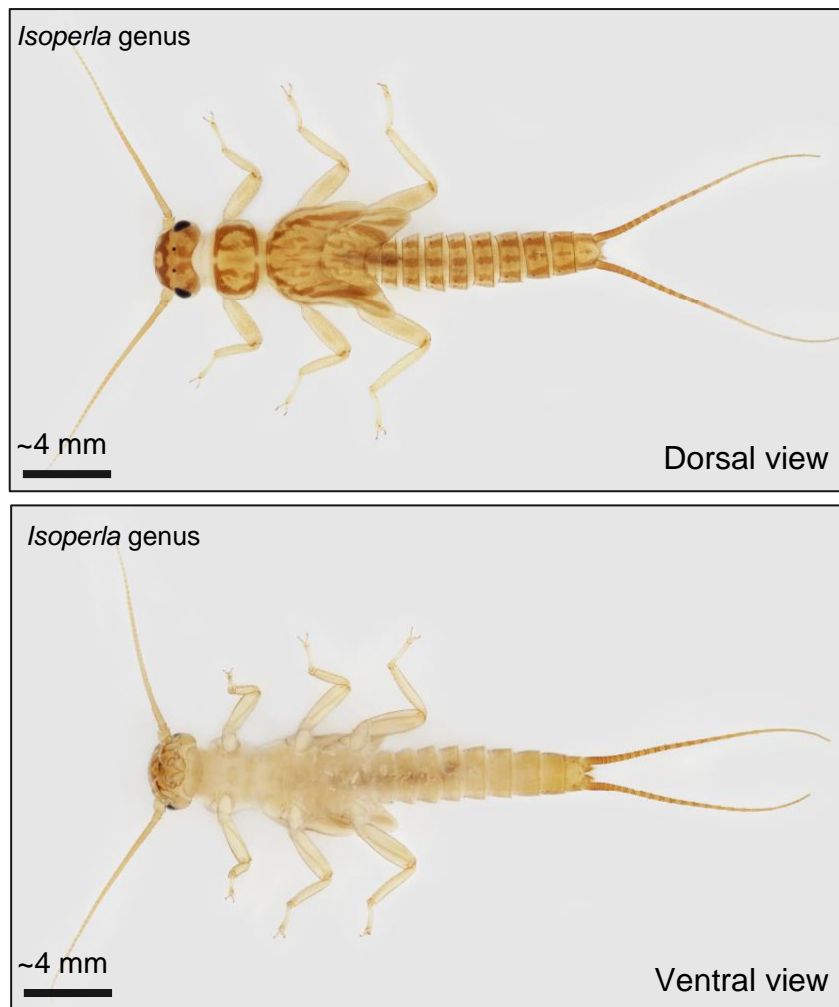
**Habitat type:**

- Larvae are often found clinging to substrate in riffles and other lotic-erosional (running-water riffles with coarse sediments) habitats.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 2

## Family: Perlodidae (Springflies)



### Information:

- Widespread – mostly in eastern North America
- 130 North American species and about 300 worldwide

### Feeding type:

- Most larvae are predators, but some species in this group are also shredders or collector-gatherers.

### Habitat type:

- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) or lotic-depositional (running-water pools and margins with fine sediments) habitats.

### Pollution tolerance (0 = least tolerant, 10 = most tolerant):

- 2

**Family: Pteronarcyidae (Giant stoneflies)**



**Information:**

- Widespread
- 9 species in Canada

**Feeding type:**

- These large stoneflies are mostly shredders, eating mostly algae and decomposing leaf litter.

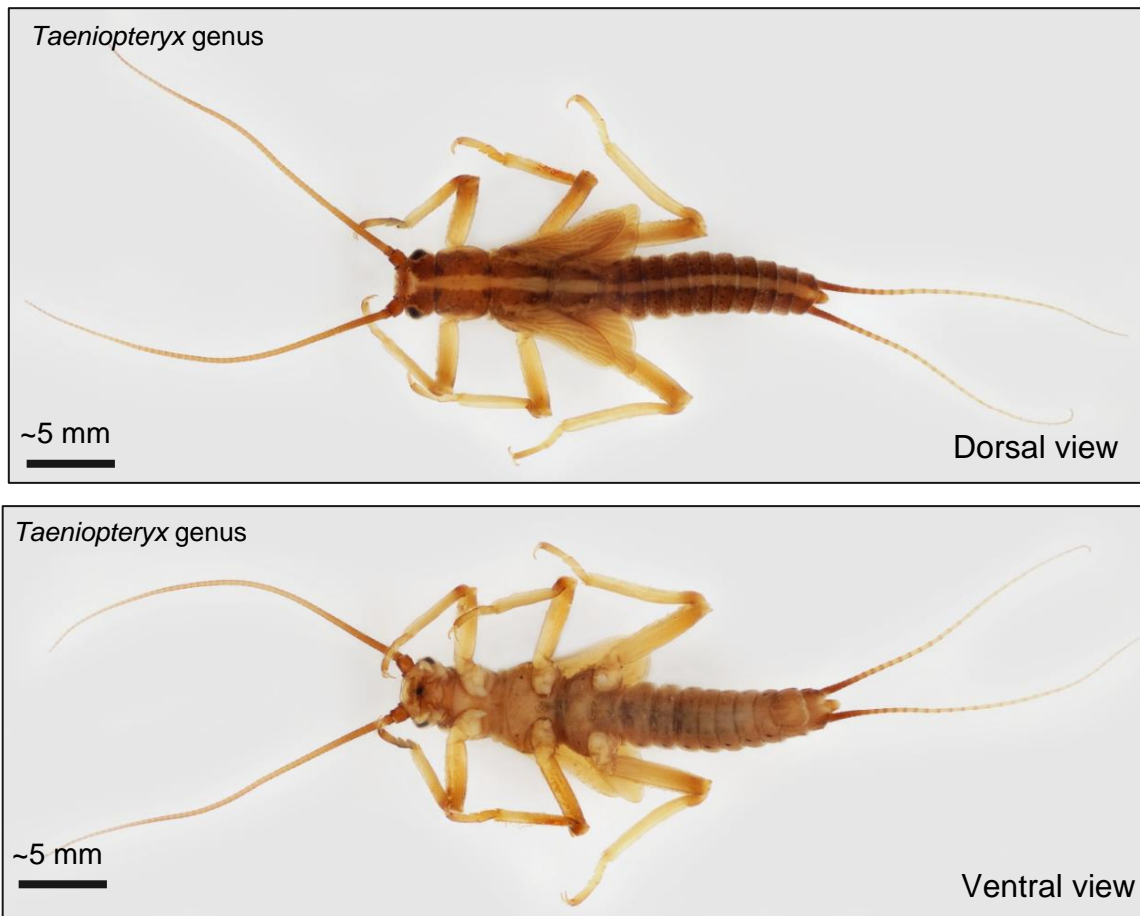
**Habitat type:**

- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) or lotic-depositional (running-water pools and margins with fine sediments) habitats.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- Around 0

**Family: Taeniopterygidae (Winter stoneflies)**



**Information:**

- Widespread – mostly in eastern North America
- 14 species in Canada

**Feeding type:**

- Most larvae are predators, but some species in this group are also shredders or collector-gatherers.

**Habitat type:**

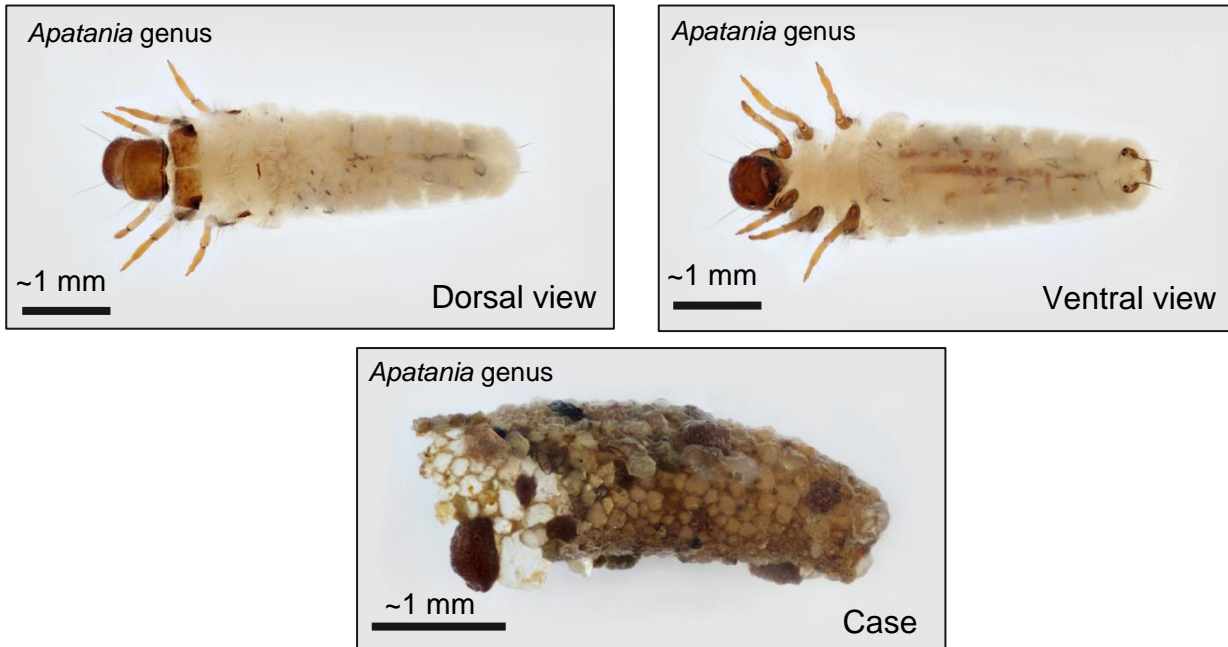
- Larvae usually found in lotic-erosional habitats (running-water riffles with coarse sediments), within debris accumulations, leaf packs, and in quieter water at the edges of streams, and also are frequently found in large rivers.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 2

## Trichoptera (Caddisflies)

### Family: Apataniidae (Early smoky wing sedges)



#### Information:

- Widespread – mostly in eastern North America
- 16 species in Canada

#### Feeding type:

- Larvae are grazer-shredders or collector-gatherers.

#### Habitat type:

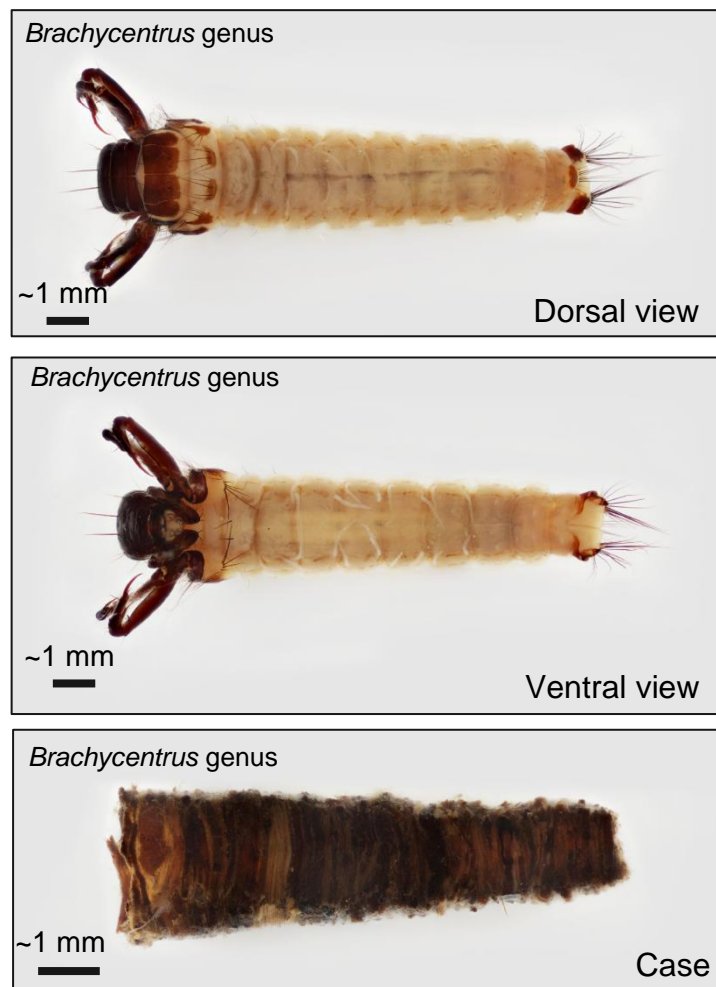
- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) and lentic-littoral habitats. The larva lives in a papoose-shaped case of fine sand grains on tops of rocks.

#### Pollution tolerance (0 = least tolerant, 10 = most tolerant):

- 3



**Family: Brachycentridae (Humpless casemaker caddisflies)**



**Information:**

- Widespread – mostly in eastern North America
- 16 species in Canada

**Feeding type:**

- Larvae are grazer-shredders, collector-gatherers or collector-filterers.

**Habitat type:**

- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) habitats. This caddisfly lives where the currents are consistently swift and are often found anchored to rocks at the heads of riffles.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 1

**Family: Calamoceratidae (Comb-lipped casemaker caddisflies)**



**Information:**

- Not very common
- 2 species in Canada

**Feeding type:**

- Larvae are shredder-detritivores or scraper-grazers.

**Habitat type:**

- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) or lotic-depositional (running-water pools and margins with fine sediments) habitats. The larva lives in a case that is composed of two flat pieces of dead leaves or in a piece of wood or a stick in which it has gouged its living space.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 3

**Family: Dipseudopsidae (Pilot-tube caddisflies)**



**Information:**

- Widespread – found mostly in east
- 3 species in Canada

**Feeding type:**

- Larvae are collector-filterers and use a silken net used to filter tiny bits of organic matter from the water.

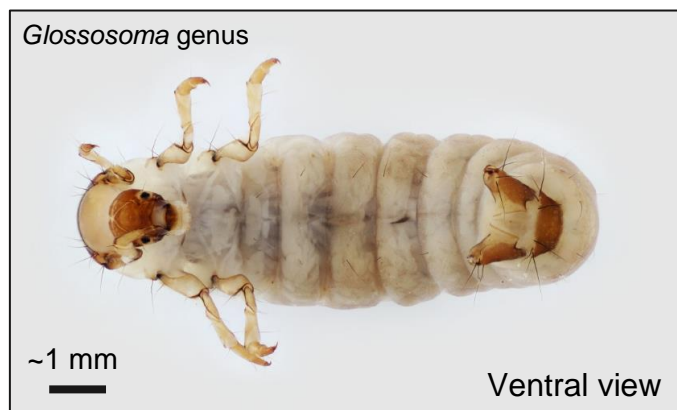
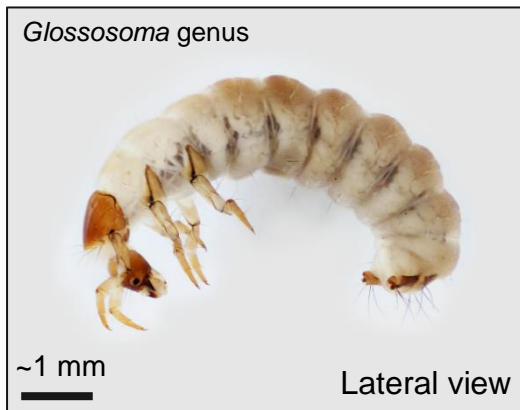
**Habitat type:**

- Larvae usually found in lotic-depositional (running-water pools and margins with fine sediments) habitats. Larvae burrow in sand or soft sediment and stabilize the walls of their burrow by shoring them with silk extruded from a long, movable spinneret.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 5

**Family: Glossosomatidae (Saddle casemaker caddisflies)**



**Information:**

- Widespread – found mostly in east
- 26 species in Canada

**Feeding type:**

- Larvae are scraper-grazers and eats algae and biofilm by scraping from rocks.

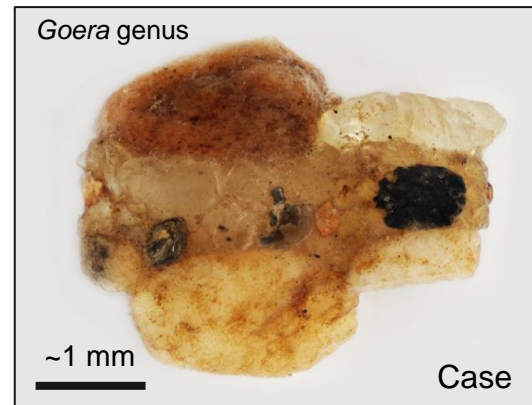
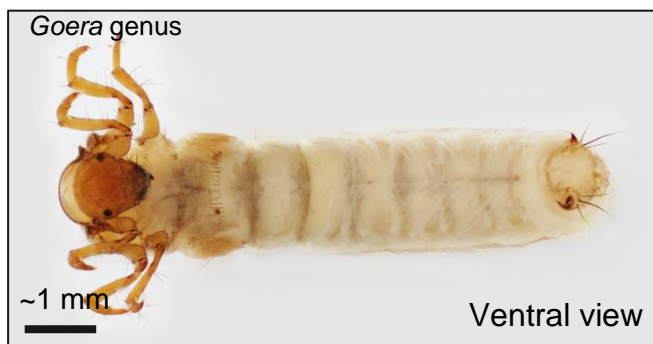
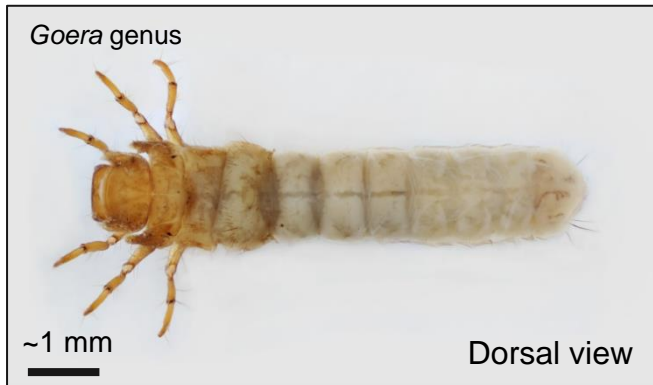
**Habitat type:**

- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) habitats. Larvae gather small rocks from the bottom of the stream and glue them together with silk from their mouths to form their cases.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 1

**Family: Goeridae (Weighted casemaker caddisflies)**



**Information:**

- Widespread
- 5 species in Canada

**Feeding type:**

- Larvae are scraper-grazers and eats algae and biofilm by scraping from rocks.

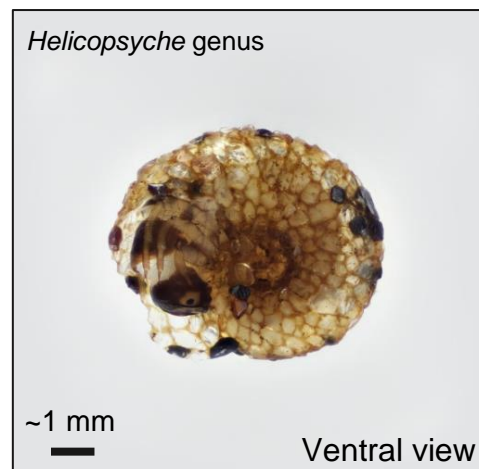
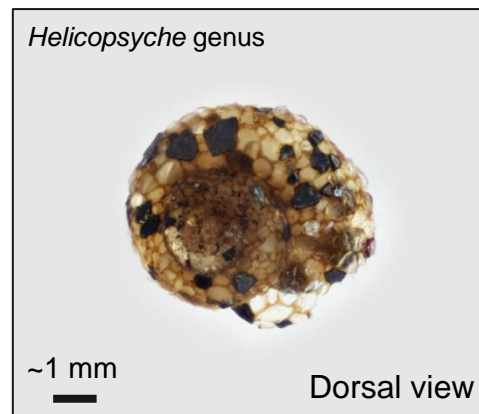
**Habitat type:**

- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) habitats. The larva lives in a case that is made of small stones, usually with pairs of larger stones on the sides.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 3

**Family: Helicopsychidae (Snail-case caddisflies)**



**Information:**

- Widespread
- 1 species in Canada

**Feeding type:**

- Larvae are scraper-grazers and eats algae and biofilm by scraping from rocks.

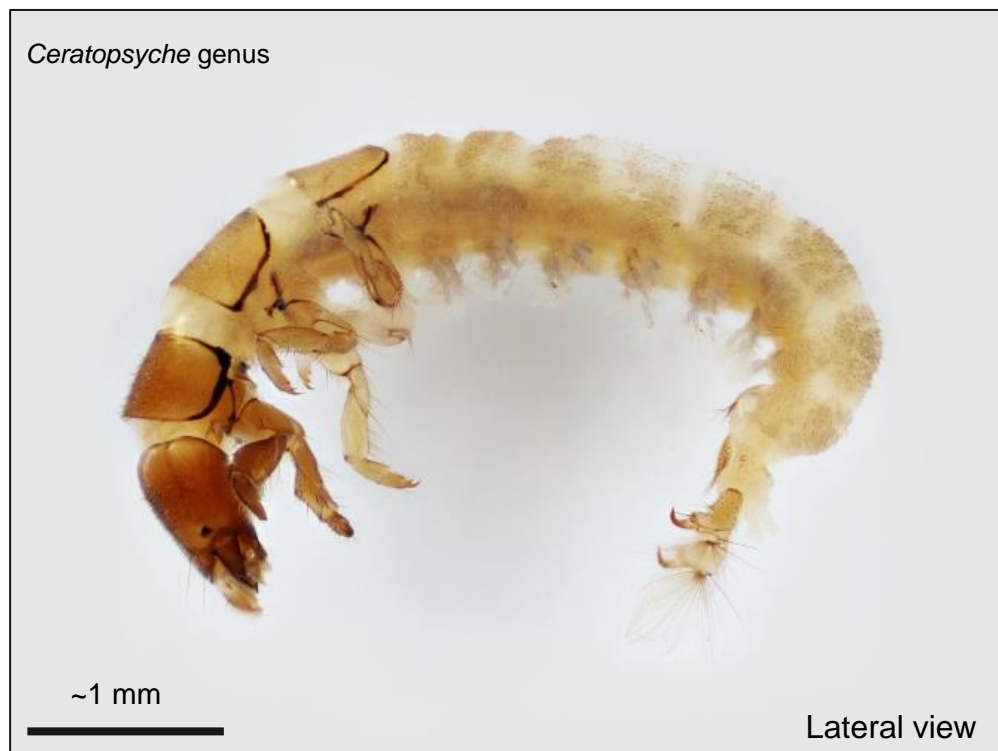
**Habitat type:**

- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) habitats. The larva lives in a case made of fine sand and coiled in the shape of a snail shell.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 3

**Family: Hydropsychidae (Net-spinning caddisflies)**



**Information:**

- Widespread
- 47 genera in the family globally, 56 Canadian species

**Feeding type:**

- Larvae are either collector-filterers, predator-engulfers or scrapers/grazers.

**Habitat type:**

- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) habitats. Larvae build stationary retreats of silk, detritus and rock fragments. A part of the entrance of a retreat has a silken filter net protruding into the current to strain food from the water.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 4



**Family: Hydroptilidae (Microcaddisflies)**



**Information:**

- Widespread
- 75 Canadian species

**Feeding type:**

- Larvae are either collector-gatherers, piercer-herbivores or scraper-grazers.

**Habitat type:**

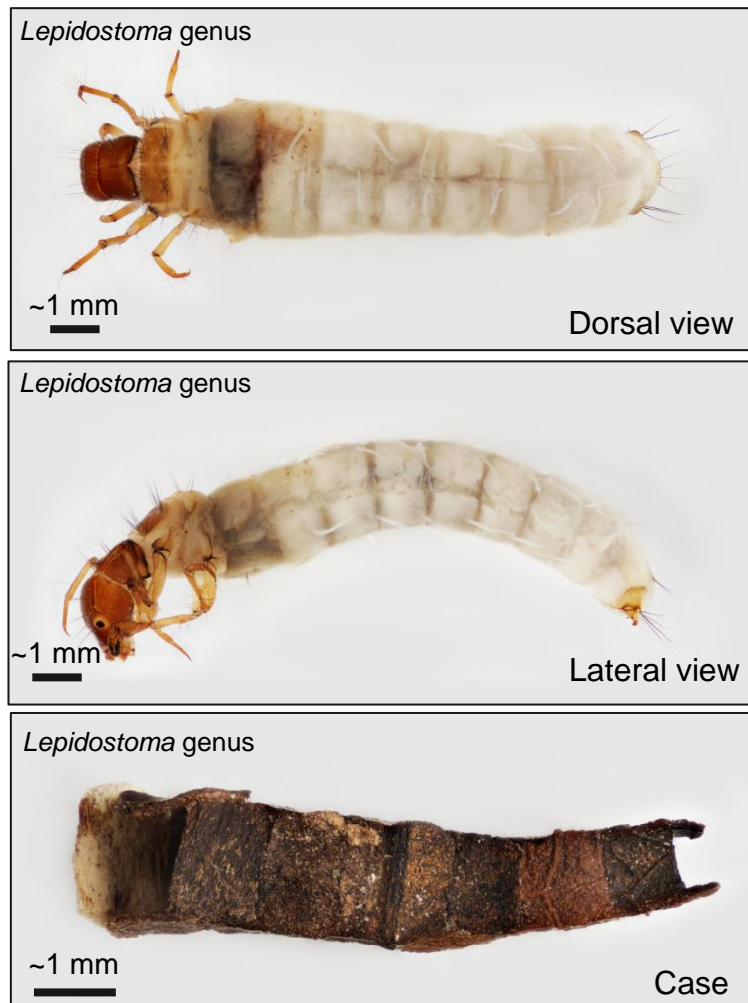
- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) or lotic-depositional (running-water pools and margins with fine sediments) habitats. Larvae live in a case, usually flat, made of silk or sand or filamentous algae.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 4



**Family: Lepidostomatidae (Bizarre caddisflies)**



**Information:**

- Widespread
- Over 60 North American species from two genera

**Feeding type:**

- They are shredding detritivores, feeding on decaying plant matter in the water; they also have been reported scavenging salmon carcasses.

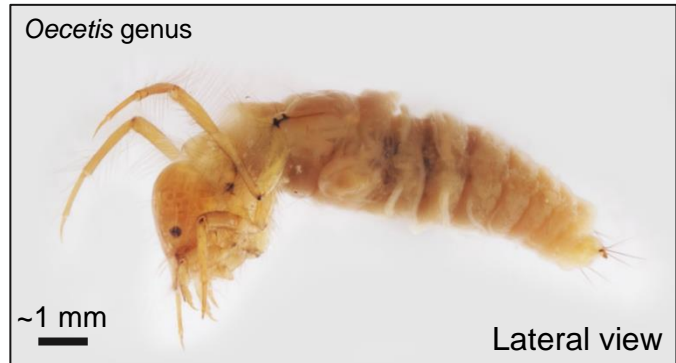
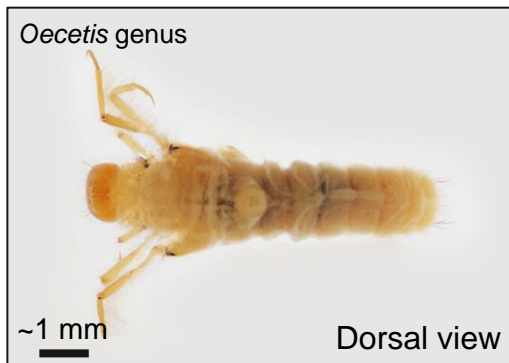
**Habitat type:**

- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) or lotic-depositional (running-water pools and margins with fine sediments) habitats. Commonly found in mountainous regions in small streams or along the edges of lakes and large rivers.
- The larvae construct cases of varying materials and shapes, however, a four-sided case constructed of square pieces of leaves is most commonly found.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 1

## Family: Leptoceridae (Long-horned caddisflies)



### Information:

- Widespread
- 68 species in Canada

### Feeding type:

- Larvae occupy many feeding guilds, including collector-filterers, collector-gatherers, engulfer-predators, scraper-grazers, shredder-herbivores.

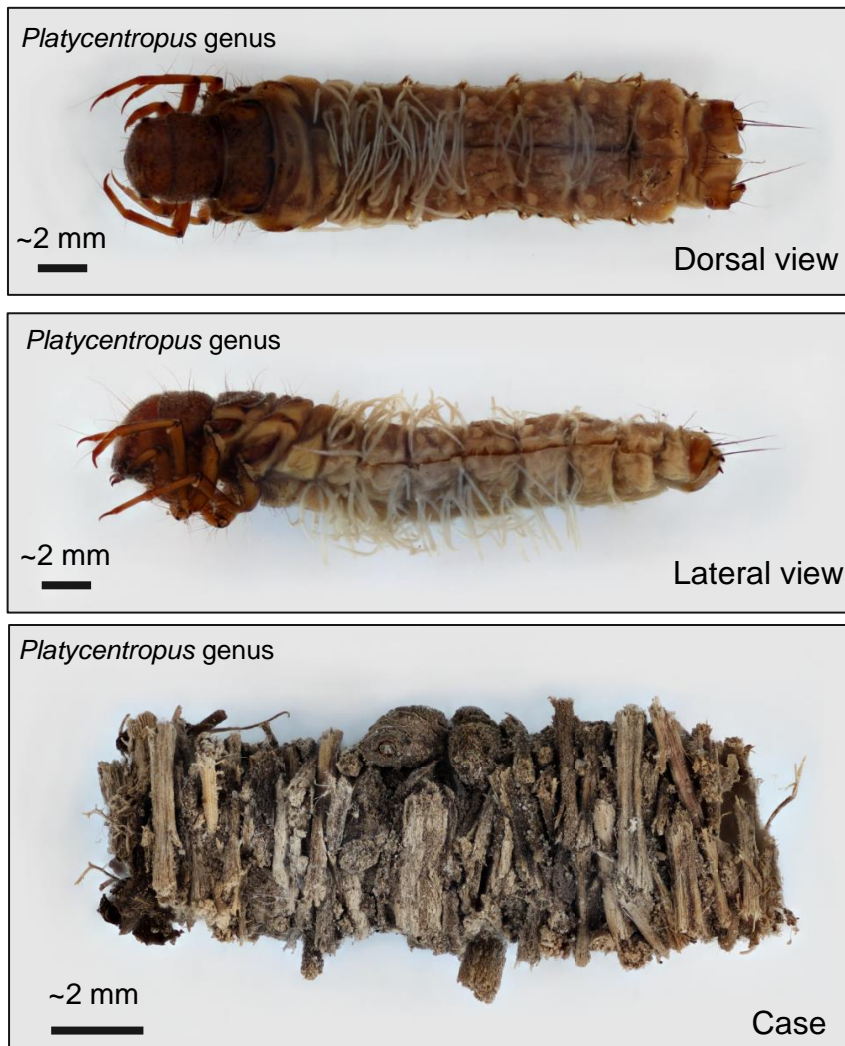
### Habitat type:

- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) or lotic-depositional (running-water pools and margins with fine sediments), and lentic-littoral habitats.
- Larvae create a wide variety of cases, consisting of plant or mineral materials or even pure silk.

### Pollution tolerance (0 = least tolerant, 10 = most tolerant):

- 4

**Family: Limnephilidae (Northern caddisflies)**



**Information:**

- Widespread
- 252 species in 41 genera in North America

**Feeding type:**

- Most are shredding or scraping herbivores or detritivores.

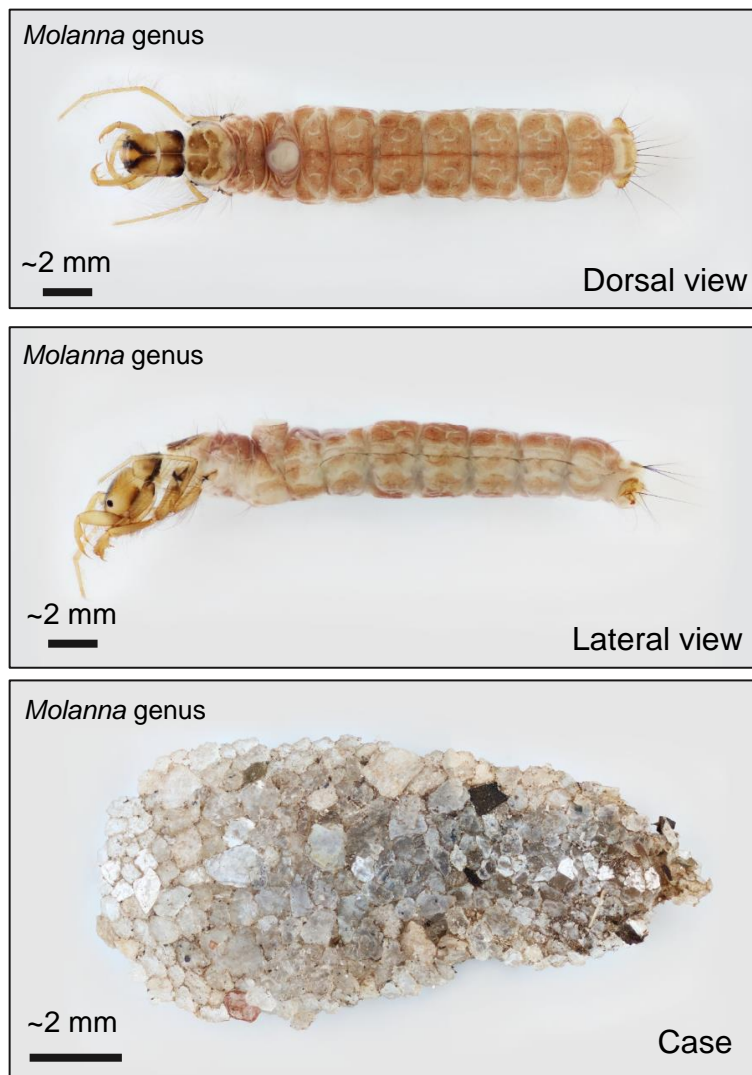
**Habitat type:**

- They can be found in a variety of lotic and lentic habitats and have varying habits which become more specific at the genus and species levels of taxonomic refinement.
- This group is well known for their diversity in cases materials and architecture, which at the genus or species level can often be used to aid in identification.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 3

**Family: Molannidae (Hooded casemaker caddisflies)**



**Information:**

- Widespread
- 6 species in Canada

**Feeding type:**

- Larvae occupy many feeding guilds, including collector-gatherers, engulfer-predators, scraper-grazers, engulfer-predators.

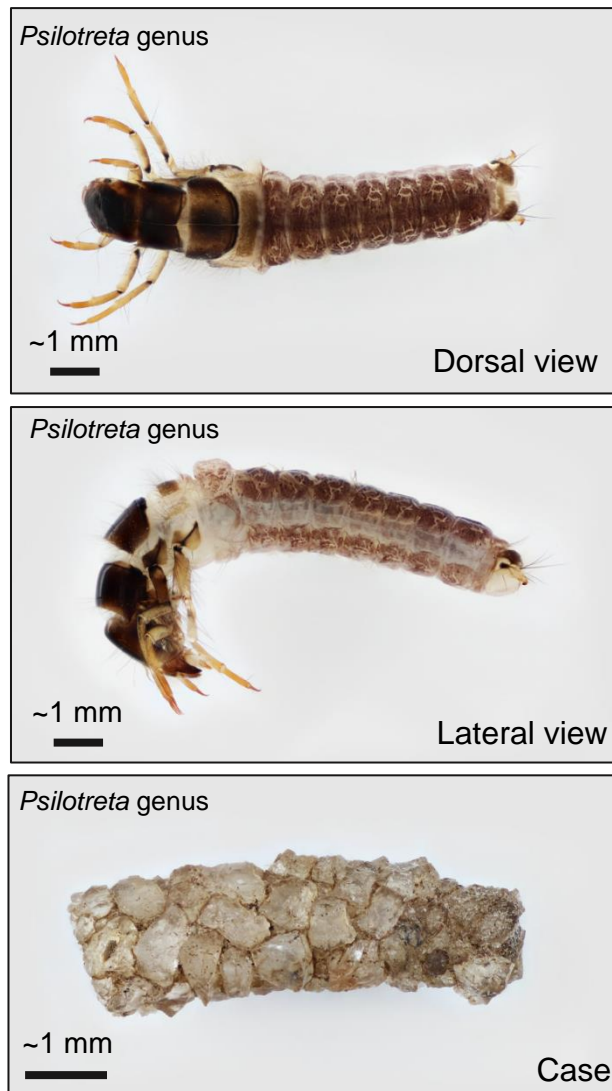
**Habitat type:**

- Larvae usually found in lotic-depositional (running-water pools and margins with fine sediments) habitats.
- Larvae live in a flat case made of fine sand that covers the head in dorsal view.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 6

**Family: Odontoceridae (Mortarjoint casemaker caddisflies)**



**Information:**

- Widespread
- 5 species in Canada

**Feeding type:**

- Larvae are mostly shredder-detritivores.

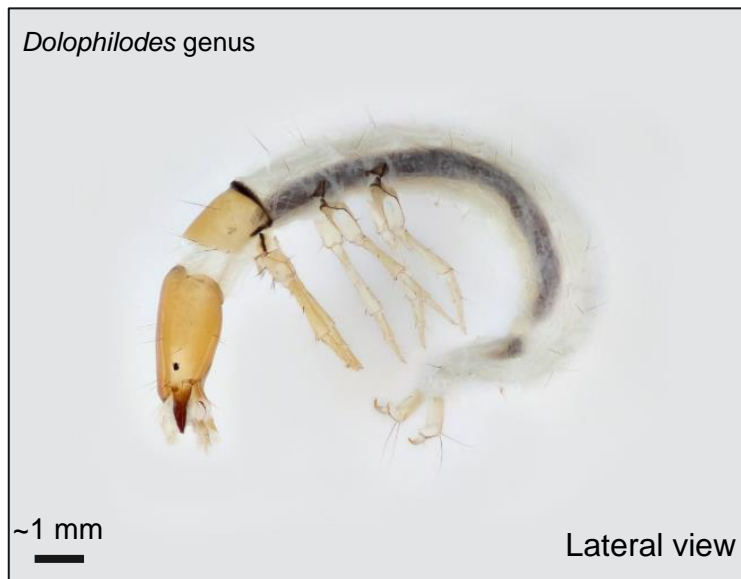
**Habitat type:**

- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) or lotic-depositional (running-water pools and margins with fine sediments) habitats.
- Larvae live in a stout cylindrical case, slightly curved and made of small stones.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- Around 0

**Family: Philopotamidae (Finger-net caddisflies)**



**Information:**

- Widespread
- 1,484 species globally and 76 species in North America

**Feeding type:**

- Larvae are collector-filterers and use their wind-sock to filter feed on very small bits of detritus, algae, and even small animals from the water.

**Habitat type:**

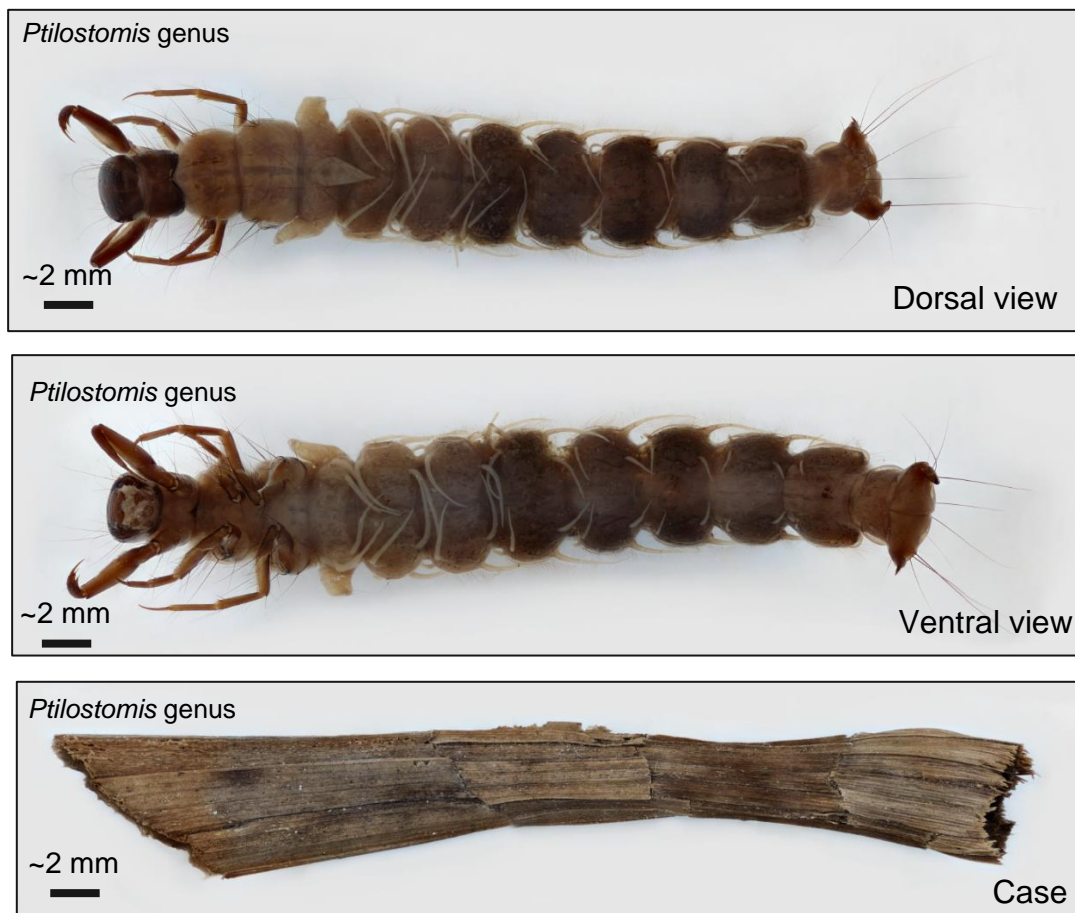
- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) habitats. Their preferred habitat is riffles, where their nets can be found on the undersides of rocks.
- The larvae spin wind-sock like nets with ultrafine mesh that are held open by the current

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 3



**Family: Phryganeidae (Giant casemaker caddisflies)**



**Information:**

- Widespread
- 26 Canadian species

**Feeding type:**

- Larvae can be shredder-herbivores or engulfer-predators.

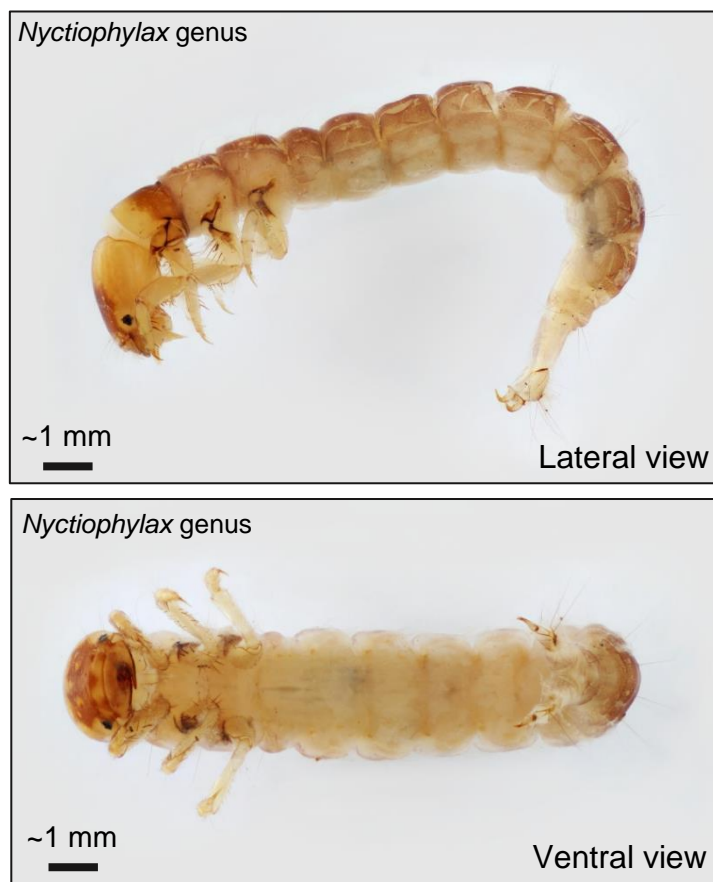
**Habitat type:**

- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) or lotic-depositional (running-water pools and margins with fine sediments) habitats.
- The larva lives in a case made of dead leaves with the pieces arranged as rings or in a spiral

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 4

**Family: Polycentropodidae (Trumpet-net caddisflies)**



**Information:**

- Widespread
- 37 Canadian species

**Feeding type:**

- Larvae can be collector-filterers or engulfer-predators.

**Habitat type:**

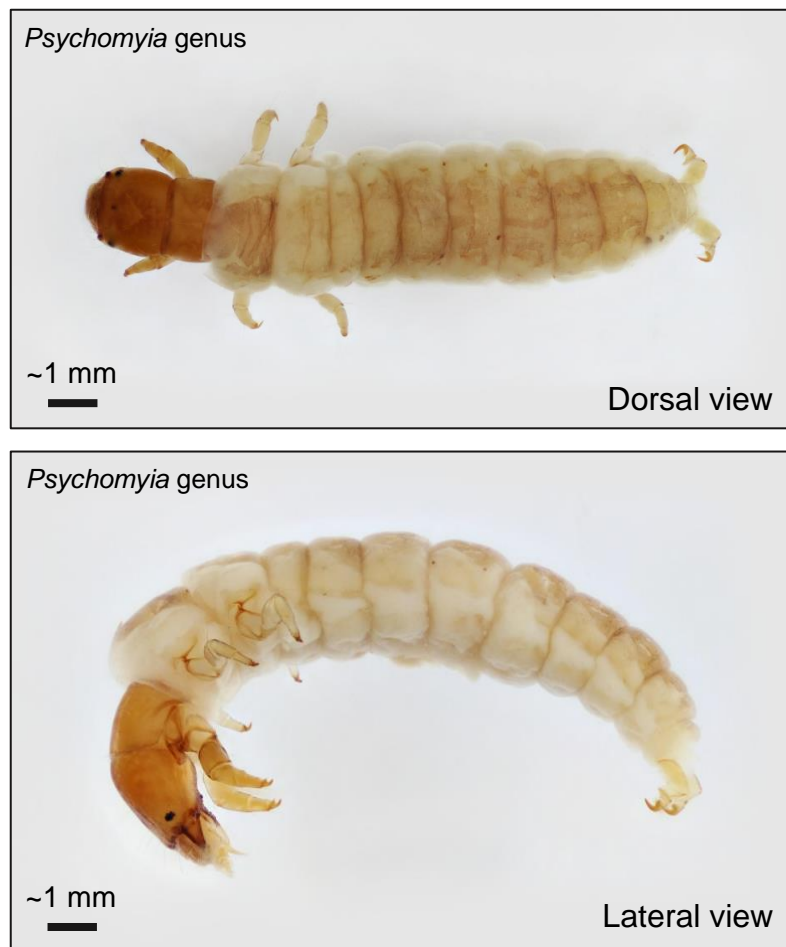
- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) or lotic-depositional (running-water pools and margins with fine sediments) and lentic-littoral habitats.
- The larvae live in a silken net that is funnel-shaped, tubular, flattened, or like a spider web

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 6



**Family: Psychomyiidae (Net-tube caddisflies)**



**Information:**

- Widespread
- 5 North American genera with 17 species

**Feeding type:**

- Larvae can be collector-gatherers or scraper-grazers.

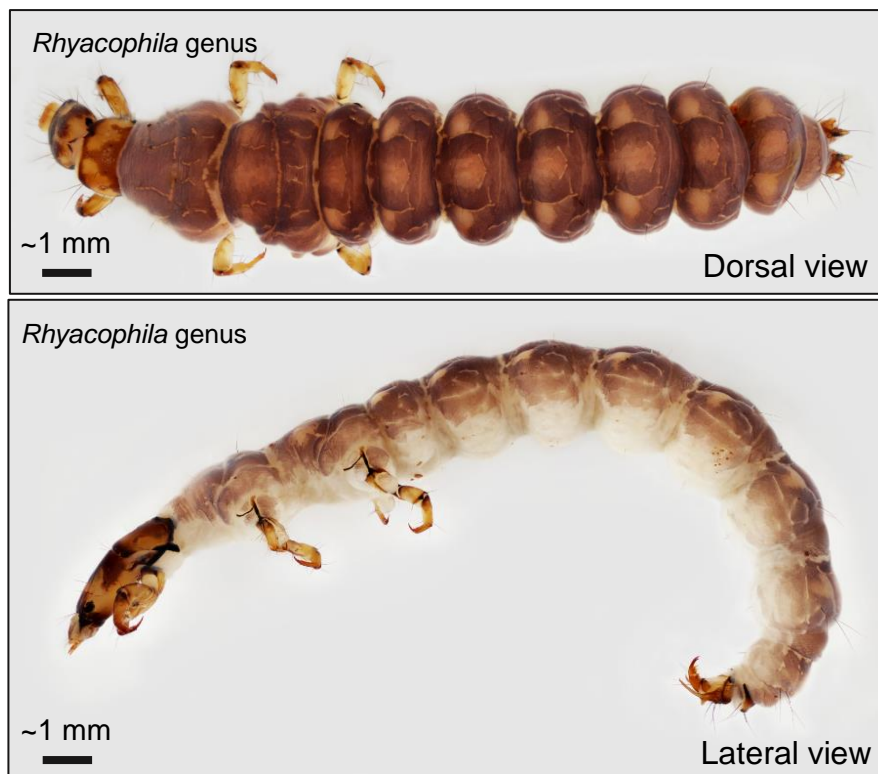
**Habitat type:**

- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) habitats.
- The larvae often build tubular retreats, the tops of the structures are camouflaged with silk and pieces of detritus and pieces of substrate.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 2

**Family: Rhyacophilidae (Free-living caddisflies)**



**Information:**

- Widespread
- 65 Canadian species

**Feeding type:**

- The larvae of Rhyacophilidae exhibit a variety of feeding strategies as young instars, feeding as collector-gatherers, scraper-grazers, or shredder-herbivores, but mature larvae are mainly free-ranging, engulfer-predators.

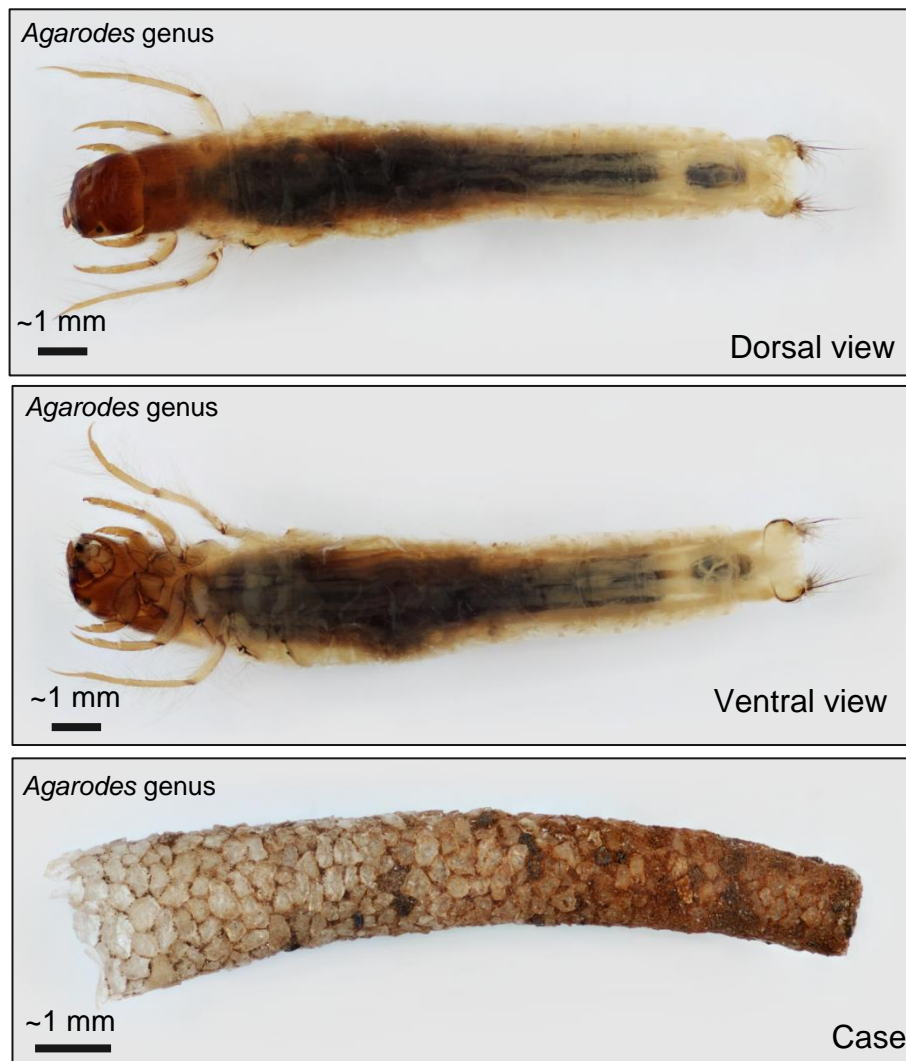
**Habitat type:**

- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) habitats.
- Larvae are free-living, meaning that they do not live in a case or retreat, but simply move throughout the environment

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 1

**Family: Sericostomatidae (Bush-tailed caddisflies)**



**Information:**

- Widespread
- 2 Canadian species

**Feeding type:**

- The larvae either exhibit collector-gatherers or shredder-detritivores feeding types.

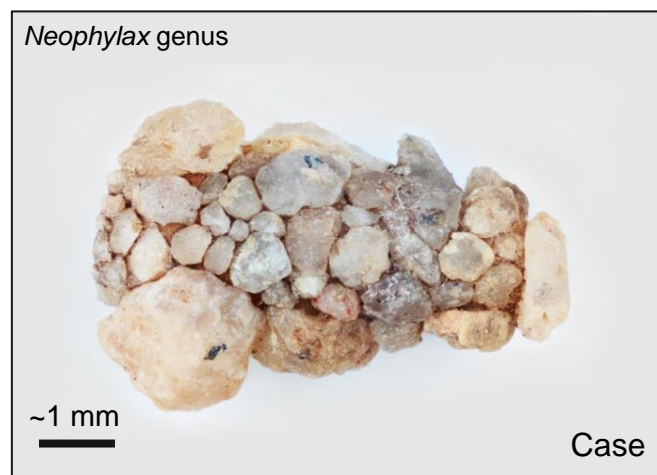
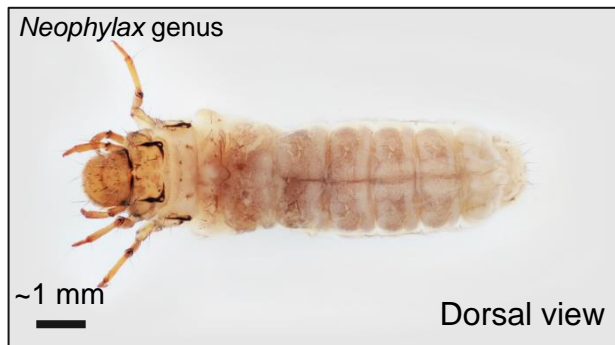
**Habitat type:**

- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) or lotic-depositional (running-water pools and margins with fine sediments) habitats.
- The larvae live in a cylindrical case, slightly curved and made of fine sand

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 3

**Family: Thremmatidae/Uenoidae (Stonecase caddisflies)**



**Information:**

- Widespread
- 16 Canadian species
- Previously Uenodidae, the family was split into two families Thremmatidae and Uenoidae, with uenoids all western.

**Feeding type:**

- The larvae typically feed by scraping periphyton from rocks.

**Habitat type:**

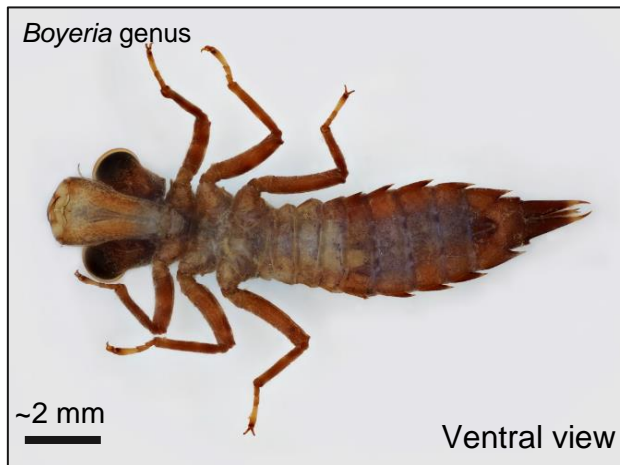
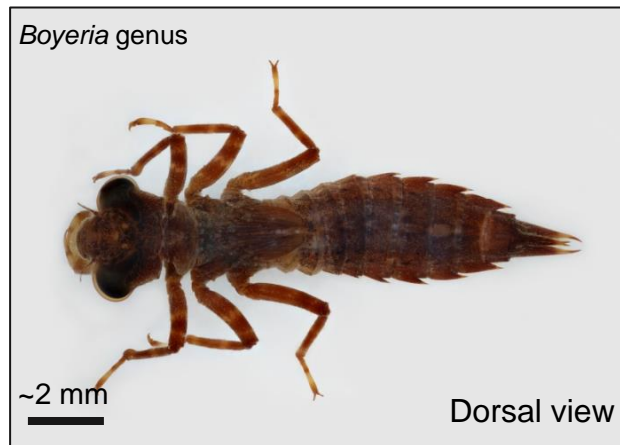
- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) habitats and tend to be found clinging to rocks and other substrates.
- The larvae create robust rock cases; eastern species add large lateral ballast stones, similar to cases of Goeridae.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 3

## Odonata (Dragonflies and Damselflies)

### Family: Aeshnidae (Darners)



#### Information:

- Widespread
- 20 North American species

#### Feeding type:

- Members of this family are predators, feeding on invertebrates and even small fish by stalking their prey.

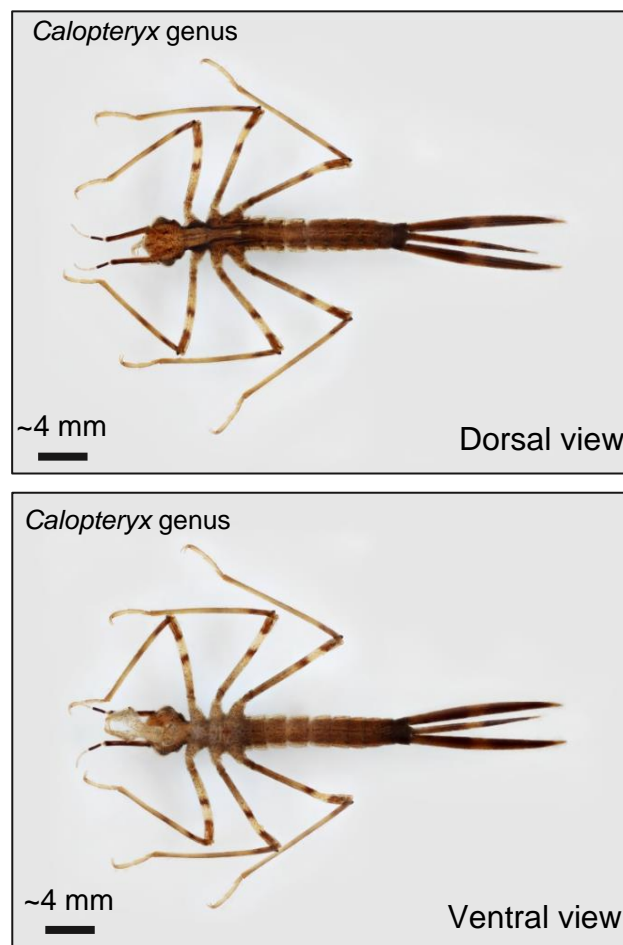
#### Habitat type:

- Larvae usually found in lotic-erosional (running-water riffles with coarse sediments) or lotic-depositional (running-water pools and margins with fine sediments) habitats.
- They can be found climbing on aquatic plants or root masses, in still or slowly flowing water.

#### Pollution tolerance (0 = least tolerant, 10 = most tolerant):

- 3

**Family: Calopterygidae (Broad-winged damselflies)**



**Information:**

- Widespread
- 9 North American species

**Feeding type:**

- They are engulfing predators that actively stalk their prey then snatch it up with their labial mask, an arm-like extremity that extends from below the face.

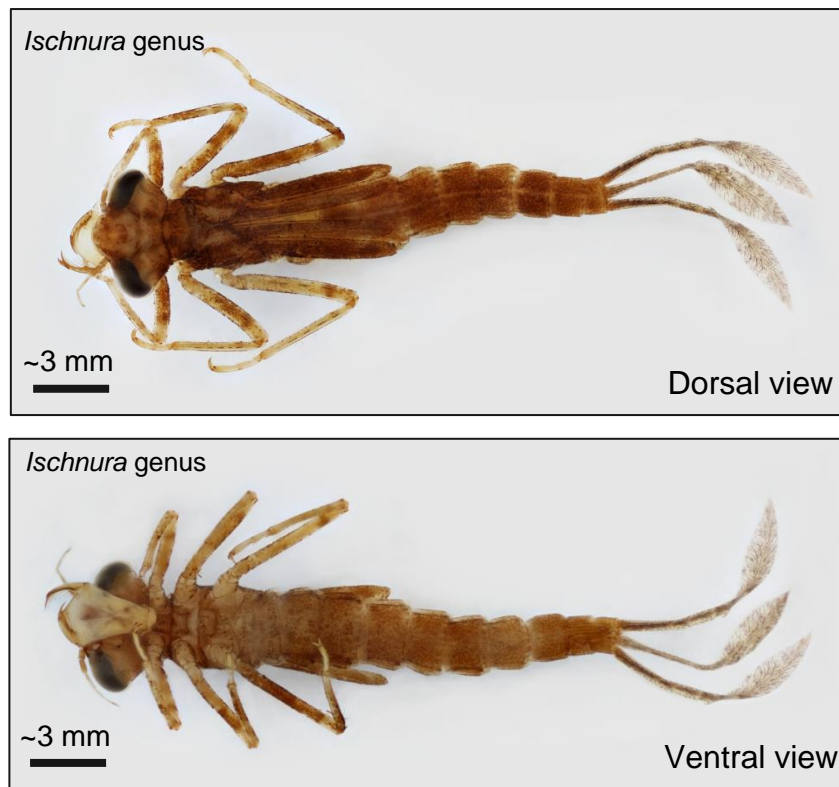
**Habitat type:**

- Larvae usually found in lotic-depositional (running-water pools and margins with fine sediments) habitats and tend to be found along the margins of streams, in areas of moderate or slower flow, where there is detritus.
- They can be found climbing on aquatic plants or root masses, in still or slowly flowing water.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 6

**Family: Coenagrionidae (Narrow-winged damselflies)**



**Information:**

- Widespread
- 90 North American species in 15 genera

**Feeding type:**

- They are engulfing predators that actively stalk their prey then snatch it up with their labial mask, an arm-like extremity that extends from below the face.

**Habitat type:**

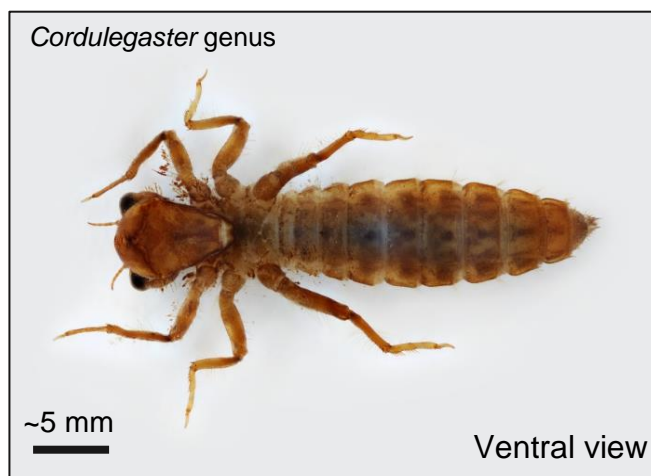
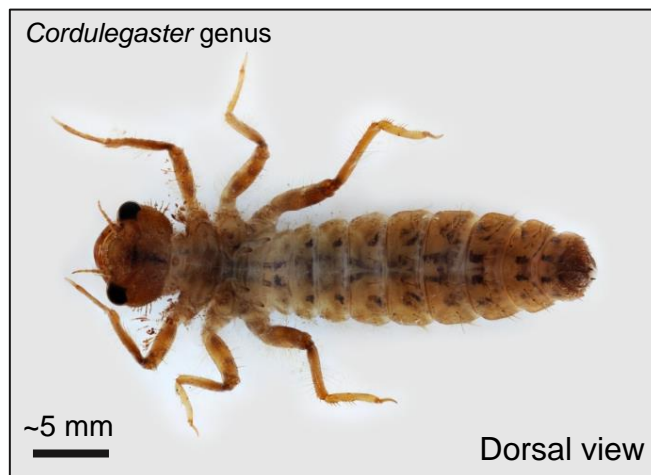
- Most genera are found in lentic habitats, except *Argia*, which is usually found in streams among rocks and plants.
- Nymphs are climbers and stalking predators among plants and roots.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 8



**Family: Cordulegastriidae (Spiketails)**



**Information:**

- Widespread
- 9 North American species in 1 genus

**Feeding type:**

- They are engulfing predators that actively stalk their prey then snatch it up with their labial mask, an arm-like extremity that extends from below the face.

**Habitat type:**

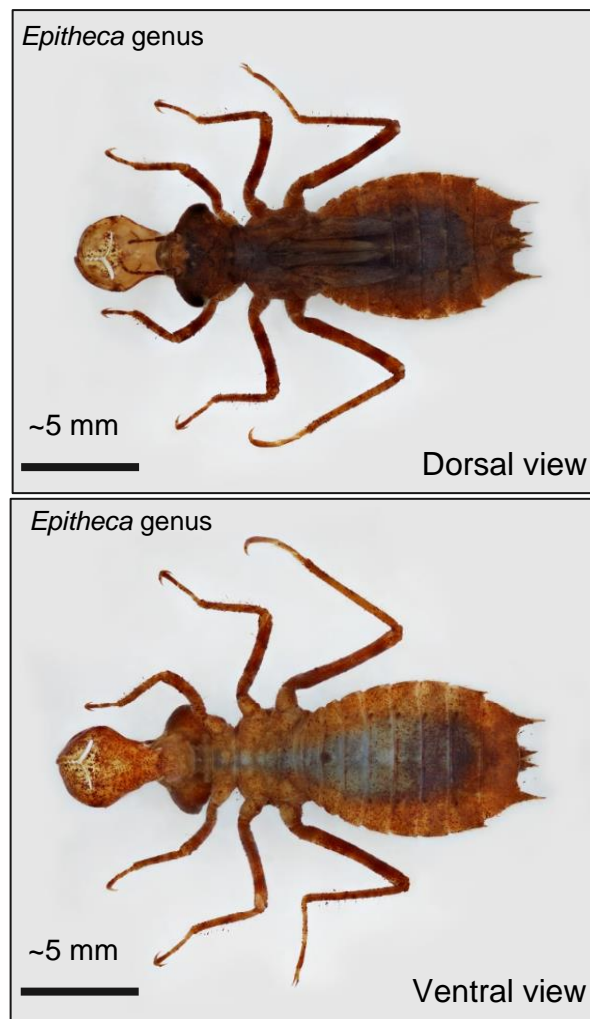
- Larvae usually found in lotic-depositional (running-water pools and margins with fine sediments) habitats.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 3



**Family: Corduliidae (Emerald dragonflies)**



**Information:**

- Widespread
- 7 North American genera and 50 species

**Feeding type:**

- They are engulfing predators that actively stalk their prey.

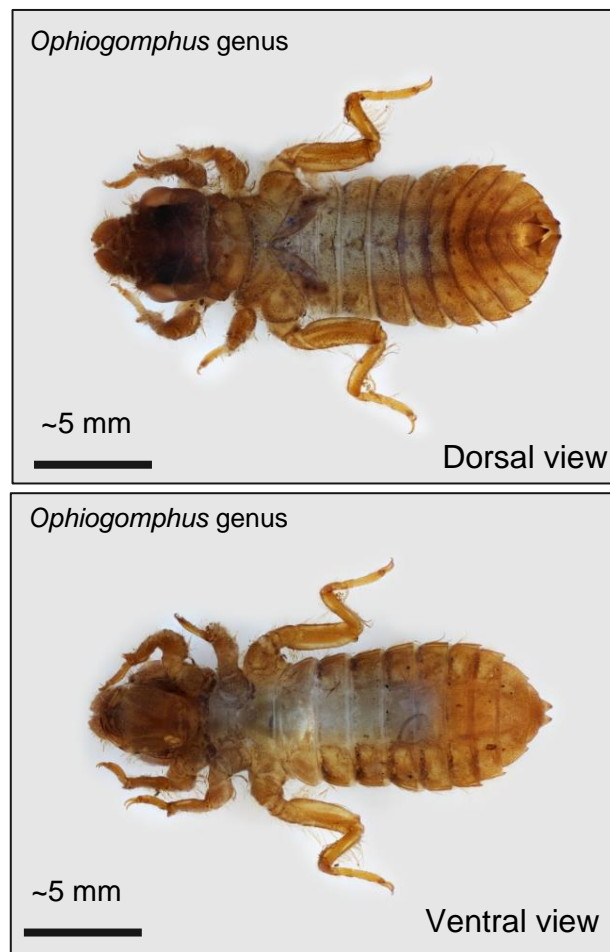
**Habitat type:**

- They can be found in varying habitats including streams, as well as lentic habitats such as lakes, ponds, and wetlands.
- They are sprawlers along the benthos and climbers on plants.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 2

**Family: Gomphidae (Club-tailed dragonflies)**



**Information:**

- Widespread
- 16 genera and more than 80 North American species

**Feeding type:**

- Like other dragonflies, the adults and nymphs are predators. Nymphs bury in the sediment, partially hiding themselves to wait for prey to pass by, and then snatch them up with their arm-like labral mask.

**Habitat type:**

- Found among debris or burrowing in both lentic and lotic habitats.

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 3

**Family: Lestidae (Spreadwinged damselflies)**



**Information:**

- Widespread
- 2 genera throughout North America

**Feeding type:**

- They are engulfing predators that actively stalk their prey then snatch it up with their labial mask, an arm-like extremity that extends from below the face.

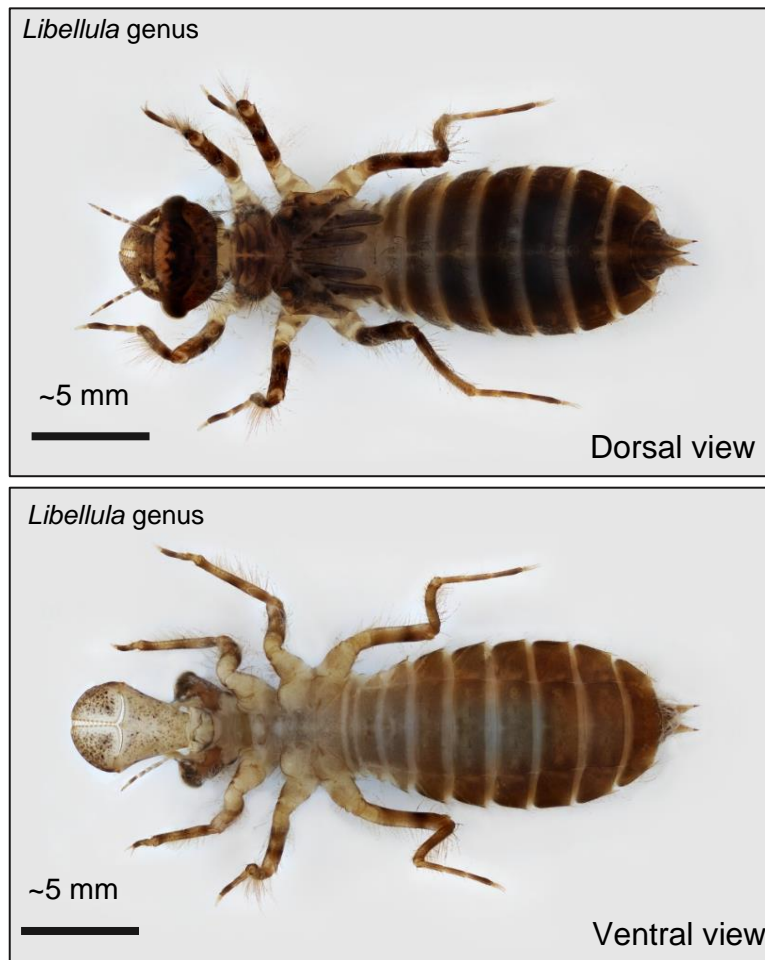
**Habitat type:**

- Found mostly in lentic systems (ponds and wetlands).

**Pollution tolerance (0 = least tolerant, 10 = most tolerant):**

- 6

## Family: Libellulidae (Skimmers)



### Information:

- Widespread
- 90 North American species, the most of any dragonfly family.

### Feeding type:

- They are engulfing predators that actively stalk their prey.

### Habitat type:

- Nymphs can be found in a variety of lentic habitats including wetlands, ponds, and ditches, as well as along the margins of slow-flowing lotic habitats.
- They can be found sprawling on the benthos or climbing plants and woody debris.

### Pollution tolerance (0 = least tolerant, 10 = most tolerant):

- 2

## Tolerance Summary Table

Macroinvertebrate Family	Approximate Tolerance
<b>Ephemeroptera (Mayflies)</b>	
Ameletidae (Comb-mouthed minnow mayflies)	0
Baetidae (Small minnow mayflies)	5
Baetiscidae (Armoured mayflies)	4
Caenidae (Small square-gilled mayflies)	6
Ephemerellidae (Spiny crawler mayflies)	1
Ephemeridae (Common burrower mayflies)	3
Heptageniidae (Flat-headed mayflies)	3
Isonychiidae (Brush-legged mayflies)	2
Leptohyphidae (Little stout crawler mayflies)	3
Leptophlebiidae (Prong-gilled mayflies)	4
Metretopodidae (Cleft-footed minnow mayflies)	2
Siphonuridae (Primitive minnow mayflies)	4
<b>Plecoptera (Stoneflies)</b>	
Capniidae (Small winter stoneflies)	2
Chloroperlidae (Green stoneflies)	0
Leuctridae (Rolled-winged stoneflies)	0
Nemouridae (Spring stoneflies)	2
Peltoperlidae (Roach-like stoneflies)	0
Perlidae (Common stoneflies)	2
Perlodidae (Springflies)	2
Pteronarcyidae (Giant stoneflies)	0
Taeniopterygidae (Winter stoneflies)	2
<b>Trichoptera (Caddisflies)</b>	
Apataniidae (Early smoky wing sedges)	3
Brachycentridae (Humpless casemaker caddisflies)	1
Calamoceratidae (Comb-lipped casemaker caddisflies)	3
Dipseudopsidae (Pilot-tube caddisflies)	5
Glossosomatidae (Saddle casemaker caddisflies)	1
Goeridae (Weighted casemaker caddisflies)	3
Helicopsychidae (Snail-case caddisflies)	3
Hydropsychidae (Net-spinning caddisflies)	4
Hydroptilidae (Microcaddisflies)	4
Lepidostomatidae (Bizarre caddisflies)	1
Leptoceridae (Long-horned caddisflies)	4
Limnephilidae (Northern caddisflies)	3
Molannidae (Hooded casemaker caddisflies)	6
Odontoceridae (Mortarjoint casemaker caddisflies)	0
Philopotamidae (Finger-net caddisflies)	3
Phryganeidae (Giant casemaker caddisflies)	4
Polycentropodidae (Trumpet-net caddisflies)	6
Psychomyiidae (Net-tube caddisflies)	2
Rhyacophilidae (Free-living caddisflies)	1
Sericostomatidae (Bush-tailed caddisflies)	3
Thremmatidae/Uenodidae (Stonecase caddisflies)	3
<b>Odonata (Dragonflies and Damselflies)</b>	
Aeshnidae (Darners)	3
Calopterygidae (Broad-winged damselflies)	6
Coenagrionidae (Narrow-winged damselflies)	8
Cordulegastridae (Spiketails)	3
Corduliidae (Emerald dragonflies)	2
Gomphidae (Club-tailed dragonflies)	3
Lestidae (Spreadwinged damselflies)	6
Libellulidae (Skimmers)	2

Tolerance Key (0 = least tolerant, 10 = most tolerant): 0-1; 2-3; 4-5; 6-7; 8-10

## Glossary

Term	Definition
Biofilm	Biofilm consists of a complex community of algae, bacteria, fungi, and protozoans living in a matrix of secretions that adhere to solid surfaces like rocks and aquatic vegetation.
Collector-filterer	Filter-feeders either swim through the water or sit sessile on the bottom filtering out particles that float by in the current. Often these are pieces of vegetation ripped up by shredders or tiny strips of biofilm dislodged by grazers, which are then sent downstream with the current. In addition, detritus from decaying plants and animals also provide a source of food.
Collector-gatherer	Collector-gatherers primarily wander the stream bottom scavenging for dead organisms, detritus, or other food particles that get lodged between rocks or in deep pools.
Detritivore	Detritivores obtain nutrients by consuming detritus (decomposing plant and animal parts as well as faeces).
Engulfer-predator	Engulfer-predators directly hunt out prey, often other macroinvertebrates.
Herbivore	Herbivores feed on plants, algae and photosynthesizing bacteria.
Lotic-depositional	Running-water pools and margins with fine sediments
Lotic-erosional	Running-water riffles with coarse sediments
Lentic-littoral	Area between lentic and littoral (near-shore area of lakes) zone.
Piercer-herbivores	Piercer-herbivores pierce and suck contents of algal cells.
Scraper-grazer	Grazers and scrapers are animals that specialize on feed on the biofilm layers. They use rasping mouthparts to scrape the biofilm and algae off of the rocks and vegetation.
Shredders	Shredders wander the stream bottom looking for vegetation that has fallen into the water. Using their tearing mouthparts, they rip and shred the leaves as they feed.