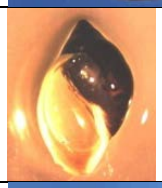
Freshwater Macroinvertebrates of NY

Click on the group name in the table below to read about aquatic and semi-aquatic invertebrates that can be found in NY. Information about aquatic insects not found in stream riffles in New York State may not be discussed.

Organisms from these groups can be collected with a kick net from riffle areas in freshwater streams that have substrates consisting of rocks, gravel and sand.

Aquatic and semi-aquatic invertebrates found in New York waters

Name of Group	Representative Picture of Group
Flatworms (Platyhelminthes)	
Mussel, Clams (Mollusca: Pelecypoda)	
Snails (Mollusca:Gastropoda)	
Worms (Oligochaeta)	
Leeches (Hirudinea)	
Scuds (Amphipoda)	
Crayfish (Decapoda)	
Sowbugs (Isopoda)	
Mayflies (Ephemeroptera)	

Name of Group	Representative Picture of Group
Dragonflies and Damselflies (Odonata)	
Stoneflies (Plecoptera)	
True Bugs (Hemiptera)	
Dobsonflies and Alderflies (Megaloptera)	
Water Beetles (Coleoptera)	
Caddisflies (Trichoptera)	
True Flies (Diptera)	

Additional Resources

- Glossary of Terms for Aquatic Macroinvertebrates
- Biomonitoring
- About the Macroinvertebrate Photos
- Freshwater Macroinvertebrate Atlas
- Links to identification keys : http://bugguide.net/ and http://sunsite.ualberta.ca/Projects/Aquatic_Invertebrates/index.php?arth=1&Page=22

References:

Peckarsky, B.L., P.R. Fraissinet, M.A. Penton, and D.J. Conklin, Jr. 1990. *Freshwater Macroinvertebrates of Northeastern North America*. Cornell University Press: Ithaca, New York.

Voshell, J.R. 2002. *A Guide to Common Freshwater Invertebrates of North America*. McDonald & Woodward Publishing Company: Blacksburg, Virginia.

Merritt, R.W., K.W. Cummins, and M.B. Berg, eds. 2008. *An Introduction to the Aquatic Insects of North America.* 4th Edition. Kendall/Hunt Publishing Co: Dubuque, Iowa.

Flatworms (Platyhelminthes)

General Information about Flatworms or Planaria (Platyhelminthes)

Life history	Different kinds of flatworms may reproduce sexually, or by dividing, depending on the environmental conditions. Some kinds will live from weeks to a few months; others that reproduce by dividing can live indefinitely.
Diversity	There is one class (Tricladida) of freshwater flatworms in North America.
Distinguishing characteristics	Soft un-segmented body; head is somewhat triangular with two eye spots; no segmented legs. They can be gray, brown, or black with stripes, spots, or mottled.
Habitat & Feeding	Flatworms may be found in springs, streams, ditches, marshes, ponds, lakes, and puddles. Flatworms are predators and collector-gatherers; they have no teeth, so they get on top of their prey and use their feeding tube to suck out the prey's fluids, or to eat chunks, or eat the prey whole.
Water quality indicator status	Flatworms are tolerant of low dissolved oxygen; high numbers of them may indicate that the water is impacted by organic or nutrient pollution.
Fun facts	• Flatworms can regenerate; if cut into several pieces, each piece will grow into an individual flatworm. • Some kinds of flatworms divide every 5-10 days.

Mussels & Clams (Mollusca: Pelecypoda)

General Information about Mussels & Clams (Mollusca)

Life history	Most freshwater mussels and clams hold their eggs inside their shells until they hatch as larvae. Some kinds of larvae require attachment to a fish host for part of their life stage. Another kind of mussel releases its eggs into the water for fertilization.
Diversity	There are about 5 families of freshwater mussels and clams in North America. Two of the families, Corbiculidae and Dreissenidae (zebra and quagga mussels), were introduced and are invasive.
Distinguishing characteristics	Two shells connected by strong hinge. Shells are a variety of shapes, sizes, and colors; shells may have bumps or ridges. There is no distinct head.
Habitat & Feeding	Mussels and clams may be found in lakes, ponds, medium to large rivers, springs, seeps, or small streams. Freshwater mussels and clams are filter feeders (they filter phytoplankton, zooplankton, detritus, and bacteria from the water).
Water quality indicator status	Almost all kinds of mussels and clams are sensitive to pollution and environmental stress.
Fun facts	• Mussels that have parasitic larvae use several techniques to attract a fish host: release large masses of larvae that look like food; look like worms, insect larvae or a small fish. The host fish is not harmed by the larvae. • Many different kinds of mussels and clams may live more than 20 years!

East elliptio mussel

Rainbow mussel

Fat mucket mussel

Pocketbook mussel

Snails (Mollusca: Gastropoda)

General Information about Snails (Mollusca: Gastropoda)

Life History	Freshwater snails lay a mass of eggs in the spring. Immature snails look like adult snails except they have fewer coils on their shells. Most kinds of freshwater snails live for 2-5 years.
Diversity	There are about 15 families of freshwater snails in North America. The families are divided into two major groups: gilled and lunged snails.
Distinguishing characteristics	Snails have a single shell; most kinds have a spiral shaped shell.
Habitat & Feeding	Freshwater snails may be found in lakes, ponds, marshes, swamps, streams and rivers. Freshwater snails are generally scrapers; they use a tongue-like structure covered with tiny small, sharp teeth to scrape food particles from the substrate.
Water quality indicator status	Freshwater snails that have gills are intolerant of low dissolved oxygen levels. Lunged snails are somewhat tolerant of low dissolved oxygen levels. High numbers of lunged snails may indicate poor water quality.
Fun facts	• Freshwater snails are eaten by fish, waterfowl, amphibians and many aquatic invertebrates. • Some kinds of freshwater snails are hermaphroditic.

Worms (Oligochaeta)

General Information about Worms (Oligochaeta)

Life history	Aquatic worms have a life span between several weeks to years. Aquatic worms reproduce sexually or by dividing their bodies. Mating usually occurs in the late summer to early fall.
Diversity	There are about 10 different families of aquatic worms in North America.
Distinguishing characteristics	Body is soft, cylindrical, and long. The body is divided into many segments (usually 40-200). No suckers or eye spots are present.
Habitat & Feeding	Aquatic worms live in lakes, ponds, streams, and wetlands. Aquatic worms are detritivores (eat decomposing plant and animal material), algivores (eat algae), and predators.
Water quality indicator status	Some aquatic worms are very tolerant of pollution (long red ones) while others are very pollution sensitive. The presence of high numbers of pollution tolerant worms at a site may indicate polluted conditions.
Fun facts	• Some kinds of aquatic worms under certain conditions can reach densities of 8,000 worms per square meter. • Some kinds of aquatic worms feed with their heads buried in the ground and their tails sticking out.

Leeches (Hirudinea)

General Information about Leeches (Hirudinea)

Life history	Leeches mate in the spring. Some types of leeches put their eggs in a cocoon and deposit them; others carry their eggs on their body. Most leeches are dormant, buried in the sediment, during the winter.
Diversity	There are about 8 different families in North America.
Distinguishing characteristics	Flat bodied with suckers at both ends of the body; the body is divided into 34 segments.
Habitat & Feeding	Freshwater leeches live in lakes, ponds, springs, streams, or marshes. They can be sanguivorous (eat blood), predators, or parasites.
Water quality indicator status	Some kinds of freshwater leeches can tolerate pollution, however they are rarely found in fine sediments because they cannot attach their bodies to the surface. An abundance of leeches at a stream site may indicate some kind of pollution stress.
Fun facts	• Some leeches can live for up to 15 years. • Some of the blood sucking leeches will only feed every 2 years.

Scuds or Side Swimmers (Amphipoda)

General Information about Scuds or Side Swimmers (Amphipoda)

Life history	Scuds live their entire life in the water and usually live for only one year. Females carry the eggs in a pouch on the bottom of their body until the hatched eggs are about a week old.
Diversity	There are about four families that include freshwater scuds or side swimmers in North America. Most kinds of scuds live in marine water.
Distinguishing characteristics	Two pair of long antennae; body is flattened from side to side; 7 pairs of legs.
Habitat & Feeding	Scuds or side swimmers may be found in lakes, ponds, streams, underground water and springs. Scuds are omnivores, feeding on both plant and animal material; usually decaying plant material and dead animal matter.
Water quality indicator status	Most kinds of scuds are tolerant of pollution and environmental stress; however some kinds are sensitive to heavy metals and pesticides.
Fun facts	• Scuds move in response to light; they generally avoid bright light and they are most active at night. • In waters without fish, the scud population can reach very high densities-up to 10,000 per square meter!

Family: Crangonyctidae

Family: Gammaridae

Crayfish (Decapoda)

General Information about Crayfish (Decapoda)

Life history	Crayfish live their entire life cycle in the water; they live for about 2 years.
Diversity	There are four families with freshwater crayfish in North America.
Distinguishing characteristics	Skin is thick and hard; long "nose"; large eyes; 5 pairs of walking legs; flipper at end of tail; large claws; looks like a little lobster.
Habitat & Feeding	Crayfish may be found in streams, large rivers, ponds, lakes, swamps, marshes, underground waters, and wet meadows. Crayfish are omnivorous, feeding on aquatic plants (mostly decaying) and animals.
Water quality indicator status	Crayfish are tolerant of most pollution and environmental stress (temperature, pH, alkalinity). Although, they bioaccumulate some metals (mercury); crayfish tissue samples can be used to detect contamination.
Fun facts	• Crayfish are a food resource for fish, snakes, raccoons, and people. • When disturbed in the water, crayfish use their "flipper" to quickly scoot backwards through the water.

Sow Bugs (Isopoda)

General Information about Sow Bugs (Isopoda)

Life history	Sow bugs live their entire life in the water and usually live only one year. Females carry the eggs in a pouch on the bottom of their body until the hatched eggs are 20-30 days old.
Diversity	There is one family of freshwater sow bugs in North America. There are many other kinds that live in marine or terrestrial environments.
Distinguishing characteristics	Flattened body; 7 pairs of legs; body is segmented with the last segment larger than the rest; last pair of legs looks like a pair of flat tails; 2 pair of antennae (one short , one long).
Habitat & Feeding	Sow bugs may be found in seeps, springs, and small spring-fed streams, streams, underground water, ponds, and shallow lakes. Sow bugs are omnivores, feeding on both plant and animal material; usually decaying plant material and dead animal matter.
Water quality indicator status	Sow bugs are tolerant of organic pollution and are good indicators of recovery in areas that have been affected by sewage pollution.
Fun facts	• Most of the freshwater aquatic sow bugs (about 130 different kinds) in North America belong to one family-Asellidae. • The pouch females use to hold their young is called a marsupium.

Mayfly (Ephemeroptera)

General Information about Mayflies (Ephemeroptera)

Life history	Mayflies, depending on the species, will spend 10 days to 2 years in the water as larvae. Typically larvae of the same kind in the same habitat emerge together on the same day. Their adult stage usually lasts from one to several days at most.
Diversity	There are about 23 different families of mayflies in North America.
Distinguishing characteristics	Most kinds of mayflies have 3 cerci (tails) and 1 tarsal claw (nail). A few mayflies have only two tails. Some kinds have flat bodies others have round bodies.
Habitat & Feeding	Mayflies can be found in fast flowing streams, rivers, ponds and lakes. They can be found in either soft or firm bottom substrates, rocks, aquatic plants, or coarse organic material. Most are scrapers or collector-gatherers; they eat either algae or fine organic material (decaying plant material).
Water quality indicator status	Most kinds of mayflies are sensitive to pollution. Usually the presence of mayflies is an indication of good water quality. Mayflies are an excellent indicator because they occupy a diversity of habitats and they are easy to find and usually abundant. Mayfly larvae are part of the widely used EPT Index (Ephemeroptera-Plectoptera-Trichoptera) to measure water quality condition. It is the number of different types of mayflies, stoneflies, and caddisflies.
Fun facts	• Adult mayflies have non-working mouthparts (they can't eat) and some live for only 90 minutes. • Because mayfly larvae emerge together and occasionally with great density in some locations, snowplows have been used to clear the roads of adult mayflies!

Family:Isonychiidae

Family: Leptohyphidae

Family:Polymitarcyidae

Family: Caenidae

Family: Baetidae

Family: Baetidae

Family: Heptageniidae

Genus: Eurylophella sp.

Family: Ephemeridae

Family: Leptophlebiidae

Family: Potamanthidae

Dragonflies and Damselflies (Odonata)

General information about Dragonflies and Damselflies (Odonata)

Life history	Dragonflies and damselflies can spend from a few weeks to 5 or 6 years as larvae in the water.
Diversity	There are about 14 different families in North America.
Distinguishing characteristics	This group has visible wing pads, their mouth is covered by an extensible "mask" (they use this to capture prey), they have 3 pairs of segmented legs, there are no gills along the side of the body, but some kinds have gills at the end of the body.
Habitat & Feeding	Dragonfly and damselfly larvae live in lakes, ponds, streams, and wetlands and they are predators.
Water quality indicator status	Some species are rare and live in unique habitats and have been listed on threatened and endangered lists. The presence of some types of dragonflies or damselflies may indicate that water quality is good and that the ecosystem has not been disturbed.
Fun facts	• Dragonfly and damselfly ancestors appeared 280-350 million years ago! • Some damselfly larvae are territorial; they defend their area by striking the intruder with either their gills or with the extensible face mask to scare the intruder away.

Family: Calopterygidae

Family: Gomphidae

Family: Cordulegastridae

Family: Coenagionidae

Stonefly (Plecoptera)

General Information about Stoneflies (Plecoptera)

Life history	Stoneflies usually spend 10 months to 2 years living and growing as larvae in the water. When ready the larvae emerge from the water and transform into terrestrial adults.
Diversity	There are 9 different families of stoneflies in North America.
Distinguishing characteristics	Most kinds of stoneflies have 2 long cerci (tails) and 2 tarsal claws (nails) at the end of each leg.
Habitat & Feeding	Stoneflies can be found in most running waters and are commonly found in boulder, cobble, water-soaked wood, and leaf packs. Most species are predators or shredders (eat decaying plant material).
Water quality indicator status	Stoneflies are usually associated with clean, cool flowing streams. Most stonefly taxa are sensitive to water pollution. Generally the presence of stoneflies is a reliable indicator of excellent water quality, but because of their specific habitat requirements, their absence does not necessarily mean the waterbody is polluted. Stonefly larvae are part of the widely used EPT Index (Ephemeroptera-Plectoptera-Trichoptera) to measure water quality condition. It is the number of different taxa of mayflies, stoneflies, and caddisflies.
Fun facts	• In low oxygen conditions, larvae will do "push-ups" to move water across their gills. • One species, when the aquatic larva is pursued by a predator, will reflex bleed. They squeeze out drops of their blood; scientists think that this produces a bad smell or taste or is done to confuse the attacker.

Family:Perlidae

Family:Chloroperlidae

Genus: Pteronarcys sp.

Family:Peltoperlidae

Family: Leuctridae

Family: Perlodidae

True Bugs (Hemiptera)

General Information about True Bugs (Hemiptera)

Life history	True bugs (aquatic) live their entire life in the water, but are capable of flying to different locations if water dries up. Aquatic true bugs breathe air like terrestrial bugs. The different kinds of true bugs have special modifications that enable them to store oxygen for underwater breathing.
Diversity	There are about 18 families of aquatic true bugs in North America.
Distinguishing characteristics	No gills; 3 pairs of segmented legs; mouth parts are beak-like; wings fold when not in use.
Habitat & Feeding	True bugs may be found in lakes, ponds, marshes, swamps, and pool and backwater areas within streams and rivers. Larvae and adults occupy by the same aquatic habitats. True bugs are generally predators.
Water quality indicator status	If aquatic true bugs are the majority of invertebrate population in a habitat it may be an indication that the water may be impacted by pollution because they do not rely on dissolved oxygen to breathe.
Fun facts	• Aquatic true bugs use their beak to stab prey and then release enzymes into the prey to poison and immobilize them. • The male of one kind of an aquatic true bug carries around the fertilized eggs on his back until they hatch.

Dobsonflies, Hellgrammites, Fishflies & Alderflies (Megaloptera)

General information about Dobsonflies, Hellgrammites, Fishflies & Adlerflies (Megaloptera)

Life history	Dobsonflies, hellgrammites, fishflies, and alderflies, depending on the species, will spend 1 to 3 years in the water as larvae. When the larval stage is complete, they pupate and usually emerge from the water in late spring to early summer to pupate into adults.
Diversity	There are two families in North America.
Distinguishing characteristics	Long bodies, head and thorax have thick skin, visible mouthparts in front of head, no wing pads, pairs of structures along the sides of the body, and the end of the body has either a pair of prolegs (unjointed legs) with two claws or one single long tapering structure.
Habitat & Feeding	Dobsonfly, hellgrammite, fishfly, and alderfly larvae can be found in lakes, streams, spring seeps, ponds, wetlands, bogs, marshes or swamps. They are predators, eating other aquatic insect larvae, worms, crustaceans, and mollusks.
Water quality indicator status	Most kinds of dobsonfly and fishfly larvae are found in moderately clean well oxygenated water and are sensitive to pollution. Alderfly larvae are more tolerant of pollution and may be found in areas impacted by pollution.
Fun facts	• When larvae emerge from the water to pupate into adults, they first excavate a cavity using their jaws and legs. • Some larvae can reach 2.5 inches in length!

Genus: Corydalus sp.

Genus: Sailis sp.

Beetles (Coleoptera)

General Information about Beetles (Coleoptera)

Life history	Some kinds of aquatic beetles live their entire life cycle in the water, other kinds spend their larval life stage in the water, and some other kinds spend their adult life stage in the water. Beetles undergo complete metamorphosis (egg, larva, pupa, adult).
Diversity	There are about 23 families of aquatic beetles in North America.
Distinguishing characteristics	Aquatic larvae: head is thick and hardened; no wing pads present, single tarsal claw (nail); some have long filaments at the end of the abdomen, some have visible structures along the sides of the abdomen, and most have hardened skin. Aquatic adults: hard body, wings covered by hard shell-like cover and are not veined, the sides of the cover create a center line along the back.
Habitat & Feeding	Different kinds of aquatic beetles can live in a variety of habitats: lakes, ponds, slow-moving water, fast-flowing streams, marshes, and marine or brackish water. Aquatic beetle larvae and adults may be: scrapers (eat algae off rocks), collector-gatherers (eat fine organic material), collector-filterers (eat fine organic material collected from the flowing water), or predators.
Water quality indicator status	Some kinds of aquatic beetles (larvae and adults) need specific environmental conditions. They also have a range of sensitivity to pollution and/or environmental stress caused by human activities.
Fun facts	• The Whirligig beetle's eyes are divided into two pairs: one above and one below; this allows the beetle to see predators above and below the water surface. • A highly specialized group of aquatic beetles is able to obtain oxygen from air spaces within submerged aquatic plants by piercing the plant with a spine on their tail.

Adult Elmidae beetle

Larvae Elmidae beetle.

Family: Haliplidae

Family: Psephenidae

Caddisflies (Trichoptera)

General Information about Caddisflies (Trichoptera)

Life history	Caddisflies can spend from 2 months to 2 years as larvae in the water. They prepare a cocoon in the water during their pupal stage (before hatching into adults).
Diversity	There are about 26 different families of caddisflies in North America.
Distinguishing characteristics	Antennae are not visible; 3 pairs of segmented legs; no wing pads; head and first thoracic segment always has a hardened skin; pair of prolegs with one claw at end of soft abdomen; most larvae live in a portable case or retreat.
Habitat & Feeding	Caddisflies live in a wide range of habitats, including cool streams, warm streams, lakes, marshes, and permanent or temporary ponds. Caddisflies feeding is diverse; taxa within the group use almost every type of feeding strategy: shredders (eat decaying plant material), scrapers (eat algae off rocks), collector-gatherers (eat fine organic material), collector-filterers (eat fine organic material collected from the flowing water), or predators.
Water quality indicator status	Most types of caddisflies are pollution sensitive. Caddisflies are a good indicator of water quality because they live within a diversity of habitats. However, some types that are widespread, can tolerate pollution and environmental stress. Caddisfly larvae are part of the widely used EPT Index (Ephemeroptera-Plectoptera-Trichoptera) to measure water quality condition. It is the number of different types of mayflies, stoneflies, and caddisflies.
Fun facts	• Caddisfly larvae make a silk thread that they use to build portable cases, stationary retreats, or nets to filter food particles from the water. • Cases serve as shelters and, in low oxygen environments, allow larvae to move water across their gills by undulating their bodies inside their case.






Family: Hydropsychidae Family: Philopotamidae Genus: Brachycentrus sp.Genus: Glossosoma sp. Family: Helicopsychidae Family: Hydroptilidae





Family: Odonoceridae Family: Polycentropodidae Family: Lepidostomatidae Family: Uenoidae Family: Rhyacophilidae

True Flies, Mosquitoes, Gnats and Midges (Diptera)

General Information about True Flies, Mosquitoes, Gnats & Midges (Diptera)

Life history	True flies can spend from a few weeks to 2 years as larvae in the water.
Diversity	There are about 29 different families of true flies that have larvae that are aquatic in North America.
Distinguishing characteristics	Long, soft and fleshy bodies. Some kinds have hardened skin on their heads. There are no wing pads or segmented legs and larvae do not use a case. Some larvae move around using their prolegs (unjointed legs).
Habitat & Feeding	True fly larvae live in a wide range of habitats: pitcher plants, tree holes, wet soils mud puddles, seeps, springs, wetlands, streams, ponds, lakes, and rivers. Larval feeding is diverse; different kinds of larvae use almost every type of feeding strategy: shredders (eat decaying plant material), scrapers (eat algae off rocks), collector-gatherers (eat fine organic material), collector-filterers (eat fine organic material collected from the flowing water), or predators.
Water quality indicator status	This group can provide useful information to biomonitoring studies because several of the families have larvae that are very tolerant of pollution and environmental stress, while some families are also very sensitive to pollution.
Fun facts	• One kind of larvae live in rainwater or dew trapped in plants. Another kind of larvae can live in a natural crude oil seep. • The blood of some larvae in the non-biting midge family (Chironomidae) has hemoglobin to transport oxygen; this allows them to live in very low oxygen environments. Also, their bodies look red

Family: Athericicdae

Family: Simuliidae

Family: Tabanidae

Genus: Chironomus sp.

Genus: Hexatoma sp.

Family: Chironomidae