

CRUSTACEANS

Crayfish (Superfamily Astacoidea)

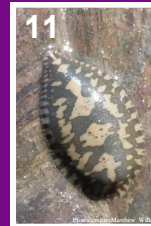


Crayfish (aka crawfish) are a well known, mostly-freshwater group of crustaceans, a large group including mostly marine crabs, shrimp and the closely-related lobsters. They grow up to 6", have two-part bodies and five pairs of limbs - four walking pairs and two large claws for predation and defense. They live atop beds of streams, lakes, wetlands, and ditches with flow and cover that they can

can burrow under. Crayfish are omnivorous, eating small aquatic insects and animals as well as some vegetation. Many species of crayfish are often eaten by people. There are ~600 species of crayfish worldwide. Eight are found in New York.

7. Scuds (Order Amphipoda)

Scuds are very small crustaceans, with most less than 0.1" long. These tiny animals either scavenge for dead organisms or likewise, are detritivores eating other types of decaying matter. They live in every type of aquatic environments. Over 1900 freshwater species exist. Ten genera live in New York.



MOLLUSCS

8. Freshwater Snails (Class Gastropoda)

Snails are soft-bodied invertebrates, usually with a hard-shell that inhabit many aquatic and terrestrial environments. They range from 1/2-2" in diameter to 2+ and either scavenge or filter-feed. There are an ~3800-4000 freshwater snail species. New York lays claim to about 65 types of them.

9. Mussels & Clams (Class Bivalvia)

Freshwater mussels and clams are soft-bodied, headless filter-feeders living inside a hinged, two-parted hard shell. They, range in size ~1/4-8"+ inches long. There are over 5000 species of freshwater mollusks in the world and about 30 different types are known from New York state.

ANNELIDS

10. Worms (Subclass Oligochaeta)

Aquatic worms burrow into the substrate of a body of water by lengthening and shortening its body, to push through finer matter, while scavenging for food. There are over 3100 global species of oligochaetes and New York alone shows a suprisingly high diversity with ~125 kinds found in its borders.

11. Leeches (Subclass Hirundinea)

The majority of freshwater leeches are mostly parasitic but sometimes predatory worms. They have segmented bodies and parasitic ones feed mostly on aquatic animals like fish and turtles. Predatory ones eat small invertebrates. There are ~700 leech species, including 65 in the United States.

AQUATIC INVERTEBRATES OF THE WEST POINT MILITARY RESERVATION



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1. Water Pennies (Family Psephenidae)

Water Pennies are a type of small, aquatic beetle, ~ 1/4 long. Their namesake is their small, oval red-brown larval form, resembling a penny. Its fully, aquatic larvae lives in high-quality eating algae and biofilm. As terrestrial adults they do not feed. Of 270 global species, New York hosts two types.

2. Riffles Beetles (Family Elmidae)

Riffle beetles are small, aquatic beetles up to ~ 1/4" in length both larvae and adults are found in - as its name suggests - riffles, fast-moving stretches of streams. Like water pennies, they feed on algae and biofilm. There are over 1500 species in the world but only around 25 across New York state.

3. Diving Beetles (Family Dytiscidae)

These are small, aquatic beetles, ranging between 1/2 inch to an inch long, found in most freshwater habitats around the world. Larvae (aka water tigers) and adults are fully aquatic and carnivorous, using sharp mandibles to catch small aquatic prey. New York hosts about ten of 4000+ living species.

4. Whirligig Beetles (Family Gyrinidae)

Whirligig beetles are small, aquatic beetles, about 1/4 long that are found on the surface of the water. Their name comes from their rapid whirl-like movements. These predators use split eyes to scan above and below water. Over 7000 species are found worldwide, and two groups inhabit New York.



5. Scavenger Beetles (Family Hydrophilidae)

Water scavenger beetles vary in size, from ~1/4 inch to 1.5 inches. The larvae of these aquatic beetles are primarily predators, however adults possess long jawlike appendages and scavenge (hence the name) organic matter. Over 2800 species exist. Those in New York compose nine groups.

6. Water Striders (Family Gerridae)

Striders are small (~1/2") aquatic true bugs (Order Hemiptera) with long legs with water-repellent hairs that let them skate on water surface and a sharp "beaks" to pierce prey like small insects. It is a rare insect able to live in salt water. Of about 17,000 species, only one genera lives in New York.

AQUATIC MACROINVERTEBRATES

The West Point Military Reservation features over a dozen lakes and about 50 miles of streams, all in the Hudson River Watershed. These waterbodies supply water for drinking, cooking, cleaning, and bathing and also enable recreational fishing and boating. Beyond these benefits to us, our waters are also habitat for many species of fish and other animals. While bass and trout, frogs and turtles, and even eagles and beaver are more familiar to us, it is actually the smaller, lesser-known animal groups are far more numerous and in some ways, far more important to the environment.

One group, "the aquatic macroinvertebrates", is a range of small animals without a spinal column that are large enough to see with the naked eye. It is mostly made up of aquatic insects like flies and beetles, etc. but also includes crustaceans, molluscs and even worms. These organisms are important *first*, for the ecological roles that they play as consumers of decaying matter and smaller animals, *second* in their role as prey to larger organisms like fish, birds, bats and other wildlife and *finally* in their role to us as water quality indicators, that is for what their presence has to tell us about the quality of the waters in which they are found.

This brochure aims to inform its readers about the aquatic macroinvertebrates present at West Point including descriptions, diet, habitat, and other life history information. It also discusses how macroinvertebrate population surveys are used to assess stream health. Hopefully, this brochure informs and interests its readers and maybe even helps some anglers learn about insects (e.g. mayflies, stoneflies, megaloptera, crayfish, etc.) their lures imitate. Despite this, our brochure is by no means a comprehensive guide. For more information, please see the NYSDEC website at www.dec.ny.gov.

BIOINDICATORS

The different types of animals in this brochure are each more or less tolerant to different conditions in their environments - temperature, dissolved oxygen content, pollution, etc. By studying aquatic macroinvertebrate communities in different water bodies as well as water quality metrics like oxygen content, temperature and conductivity and by observing changes in aquatic insect populations over time, we can assess and monitor the water quality over time. More tolerant species endure environmental degradation better than less tolerant species. General tolerance levels (from least to most tolerant) for the organism groups discussed here are:

- **LESS TOLERANT MACROINVERTEBRATES** incl. stoneflies, mayflies, riffle beetles, caddisflies, water pennies, and dobsonflies.
- **SEMI-TOLERANT MACROINVERTEBRATES** incl. crayfish, pillbugs, scuds, damselflies, dragonflies, alderflies, molluscs, diving beetles and crane flies.
- **MOST TOLERANT MACROINVERTEBRATES** incl. earthworms, leeches, snails and biting flies like midges and black flies.

INSECTS

Dragonflies & Damselflies (Order Odonata)



These big, long-bodied, winged insects (2-5" adult length) live in or near freshwater and seeps. Nymphs are fully aquatic. Adults fly over water. Dragonflies are thicker-bodied with wings that rest outward. Damselflies are thinner with wings folded up at rest. Both are lifelong predators. Nymphs ambush prey with extendable jaws. Adults chase down flies. They fly 15+ MPH and hover and can land and grab but not walk. There are 6000-7000 species worldwide, 100+ at West Point alone.

Mayflies (Order Ephemeroptera)



These small, winged insects (1/4 -1.5" adult length) have 2-3 tails and spend most of life as fully aquatic nymphs, living on or under rocks on lake and creek bottoms. Nymphs eat algal film off rocks or plant matter in the water while adults may not eat at all. Adults often live for hours to a few days, emerging in massive numbers - a pro-reproduction and anti-predation adaptation - before perishing in massive die-offs. New York hosts about 150 or so species of the world's 3,000 species of mayflies.

Stoneflies (Order Plecoptera)



These small to mid-size aquatic winged insects (1/4 -2.5" adult length) have long antennae and also spend most of life as larvae in primary streams. Nymphs eat plant matter and insects. Adults eat algae, lichens or pollen or not at all. To help themselves breathe, stoneflies pump their bodies up and down in a push-up motion. They may also communicate by drumming their bodies against the ground. There are 3500+ stonefly species worldwide, including 85 types of them in New York.

Caddisflies (Order Tricoptera)



These small winged aquatic insects (up to 3/4" adult length) are most well known for the larval shelters many species build. Using rocks, sand, plants, and silk they produce, many species build cases on rocks and other surfaces that they live in as larvae. Others swim around. Larvae may eat other aquatic insects, algae or plant matter. Adults live for days or weeks and eat mostly plant nectar. Around 180 species inhabit New York out of 14,000-15,000 species worldwide.

Dobsonflies & Alderflies (Order Megaloptera)



Dobsonflies are mid-to-large, winged aquatic insects (1-3" adult length). Alderflies are smaller winged insects (up to 1"). Their fully aquatic larvae - hellgrammites - are a common fishbait and live among rocks eating aquatic insects. Adults live for a few days to weeks and do not eat. Adult male dobsonflies have long curved mandibles but cannot bite. Alderflies and female dobsonflies have short mandibles and can. There are 300+ megalopteran species but only 6 or so kinds in New York.

Crane Flies (Family Tipulidae)



Crane Flies are large aquatic flies, up to 1/2 -2.5 inches in length and found in streams, lakes, moist soils, and puddles. As true flies (Order Diptera), like house flies and mosquitoes, crane flies have one pair of wings. Crane flies are neither mosquitoes, as are often called due to a slight resemblance, nor "mosquito-hawks." Adults only feed on nectar if at all. Larvae eat decaying plant matter and algae. There are about fifteen different types of crane flies found throughout New York State.