

STREAM ECOLOGY

Functional feeding groups

Different taxa perform different functions in aquatic systems. They form an important component of the food web. For example, shredders break down leaves that fall into streams while scrapers use primary production.

Different streams will have different balances of these functional feeding groups, which can indicate the primary source of energy to the system.

Functional groups include:

- Scrapers—scrape off algae (many mayflies)
- Grazers—eating algae
- Shredders—shred organic matter like leaves (many caddisflies)
- Collectors/filterers—collect fine organic particles (many dipterans)
- Predators—eat other invertebrates (such as dragonflies)

LARGER INVERTEBRATES

There is a long history in stream ecology of studying benthic invertebrates.

Types of larger invertebrates in lakes and streams.

MALACOSTRACAN

Includes:

- Crayfish—omnivorous (generalist) feeding habits.
- Shrimp—common in tropical streams
- Amphipods and Isopods—omnivorous.

These crustaceans can be important to food webs of both streams and lakes. In the U.S., they are important native and invasive species (e.g., crayfish).

Life cycle: Separate sexes, no adult terrestrial phase, no diapausing stage. Can be long-lived.

INSECTS (ARTHROPODA)

This is a diverse group. >5000 spp in the North America. Not surprisingly that they have a lot of different adaptations, feeding habits, and use lots of different habitats. Most of these are benthic.

Important Orders:

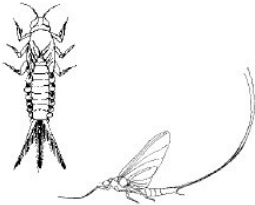
- Coleoptera—beetles. Often predatory. Adults have hard and shiny carapace.
- Diptera—flies and midges. Collector-gatherers, usually. (e.g., chironomid). Fairly tolerant to pollution and low O₂. Thin bodied, adults have delicate single pair of wings.
- Ephemeroptera—mayflies. Grazers often. Sensitive to pollution. Have two-three tails, adults have long tails, upright wings.
- Hemiptera—bugs (e.g., water strider, water boatman). Often predatory. Wings cross over forming a “V”.

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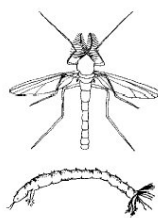
- Odonata—damselflies and dragonflies. Predatory. Often found in slower moving water and lakes. Shorter tails, as adults have 2 pairs of wings, adult wings either horizontal and perpendicular to body (dragonflies) or pointed back along abdomen (damselfly).
- Plecoptera—stoneflies. Often predatory. Found in fast, high O₂ water. Sensitive to pollution. Have two prominent antennae and two prominent tails and two pairs of wings. Adults have wings held tight along their abdomen.
- Trichoptera—caddisflies. Grazers and shredders. Sensitive to pollution. Grub-like as larvae, and sometimes live in houses they make. As adults, they look like moths with long antennae.

Some visual examples of key aquatic insect taxa:

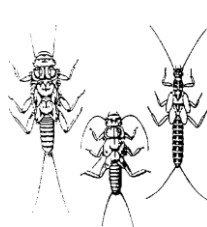
Mayfly



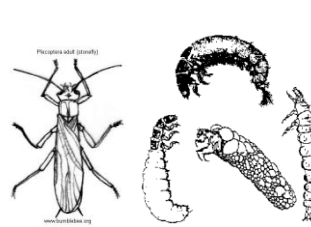
Dipteran



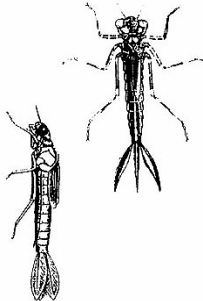
Stonefly



Caddisfly



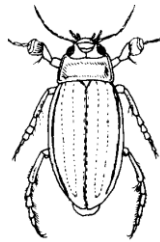
Damselfly



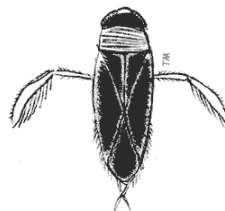
Dragonfly



Coleopteran



Hemipteran



Pictures from the web, mostly from: <http://life.bio.sunysb.edu>

Life cycle: Generally aquatic insects are sexual reproducers. Most of these groups have aquatic immature stages as larvae or nymphs, and adult stages that are terrestrial. The aquatic larval stages are usually longer-lasting than the adult terrestrial phase. For example, in mayflies the adults only live 24-48 hours and don't eat during this period. Many species lay diapausing. Because many of species have both terrestrial and aquatic life-stages, they connect aquatic and terrestrial habitats (see below).

MOLLUSKS

Bivalves (class)—clams and mussels

270 species

Gastropoda (class)—snails

500 species

STREAM ECOLOGY

Feeding: Bivalves and gastropods are generally scrapers/grazers as well as filterers.

These contain important native and invasive species.

- Mussels are some of the most endangered taxonomic groups in North America.
- The New Zealand Mudsail is invading North America. This is a tiny snail that can have large impacts.
 - It can reach extraordinarily high densities (100,000/m²)
 - Consume much of the available primary productivity.
 - Change nutrient cycling (excrete N)
 - Can survive being eaten by trout.