Wildlife Express

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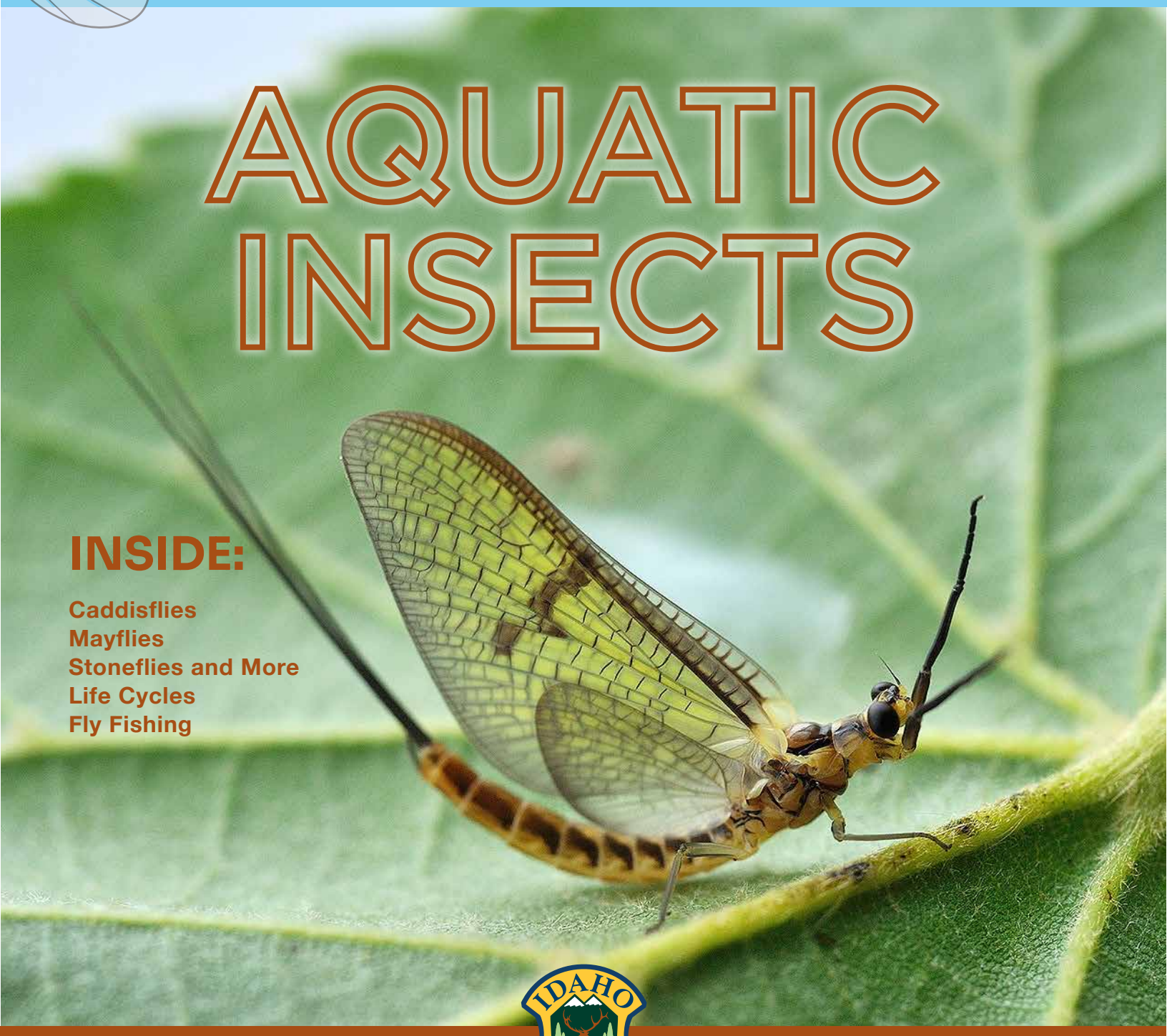
AQUATIC INSECTS



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AQUATIC INSECTS

Go ahead, call them bugs, or water bugs, to be more accurate. While these little alien-looking creatures may seem strange (and sometimes a little scary), they're a vital and critical part of Idaho's rivers, streams, ponds, lakes and reservoirs, especially for fish and other aquatic animals.

Aquatic insects have some things in common with all insects. They have six legs and they have no bones but are covered by an exoskeleton, a shell made of chitin. They also have three main parts to their body: head, thorax and abdomen.

To be called an aquatic insect, an insect must spend part of its life in water. They may live beneath the water surface or skim along the top. Some examples of aquatic insects are mosquitoes, dragonflies and caddisflies.

Adaptations

Aquatic insects come in many shapes and sizes, and they all have some interesting adaptations to live part of their lives underwater.

Insects are animals, so they need oxygen to survive. Many aquatic insects have gills, just like fish. The gills may be attached to the outside of the insect's body or found inside the body.

Some aquatic insects, like mosquito larvae and rat-tailed maggots, have tubes sticking out of their abdomens (siphons). They stick the tube above the water and breathe the same air you breathe. They may even stick the tube into plants underwater and get oxygen straight from the plants that make it.

Other aquatic insects, like diving beetles, grab bubbles of air and pull them underwater. The

Mayfly Photo: CC-BY Paul Castrovillo

beetles carry the air bubble in their back legs as they swim and breathe out of the bubble like a scuba diver. Once they have used all the air in the bubble, they go up and grab another bubble.

To get around underwater, many insects have legs and feet that are shaped like paddles. The two back pairs of legs on the giant water bug are wide, flat and hairy. The legs are like a perfect set of oars to push the bug through the water.

Some aquatic insects, like dragonfly larvae, are jet-propelled. They force water out of their abdomens to propel themselves through the water. Insects that do not swim usually have hooks on their bodies that help them cling to rocks and plants. The hooks help keep them from being swept away by water currents. Some can even produce a silk thread to anchor themselves to the rocks, like a climber dangling from a rope.

Have you ever seen an insect skating on top of the water? These insects have hairs and wax on their feet and legs that keep them from sinking so they can glide on the surface.

Ecological Niche

Every animal has a unique ecological role (niche). Depending on the species, aquatic insects perform many ecological jobs that benefit their habitat. They can be water filters, leaf shredders, algae scrapers, predators, or decomposers and aerators.

Aquatic insects also provide food for other critters both above and below the water's surface, such as fish, birds, bats, spiders and even other insects. They help connect the links in aquatic food chains and webs. If there were no aquatic insects, what would the trout and other fish you like to catch find to eat in the river? And their influence goes well beyond fish. If we don't have trout that live on insects, we might not have osprey or eagles that live on fish.

Top Photo: CC-BY Neva Olson; Stonefly Exoskeleton Photo: CC-BY Idaho Fish and Game; Bottom Photo: CC-BY Kristina Klaas at Unsplash.com

CADDISFLIES

Caddisflies are from the order Trichoptera and are very interesting insects. Look for their tiny cases next time you are wading in a stream or pond.

Many species build tiny portable houses to protect themselves during their immature stage of life. Other caddis larvae build nets to catch drifting food.

Worldwide there are at least 14,000 species. Nearly 1,900 species are found in North America. Idaho is home to about 160 species. Many species of caddisflies look similar, so telling them apart can be difficult. Studying the houses they create can help you identify species by the different materials and shapes of their houses.

Caddisflies undergo complete metamorphosis, much like a butterfly. They lay their eggs in water, and after the eggs hatch, a caterpillar-like larva crawls out. After eating and growing, some caddisfly species build a case for added protection. These species will finally seal themselves in their case for pupation, which is the process of transforming from an aquatic insect to a flying one.

Other species will not build a case until they are ready for their transition to adulthood. Adults emerge from the house they built, then swim to the surface before flying away as adults.

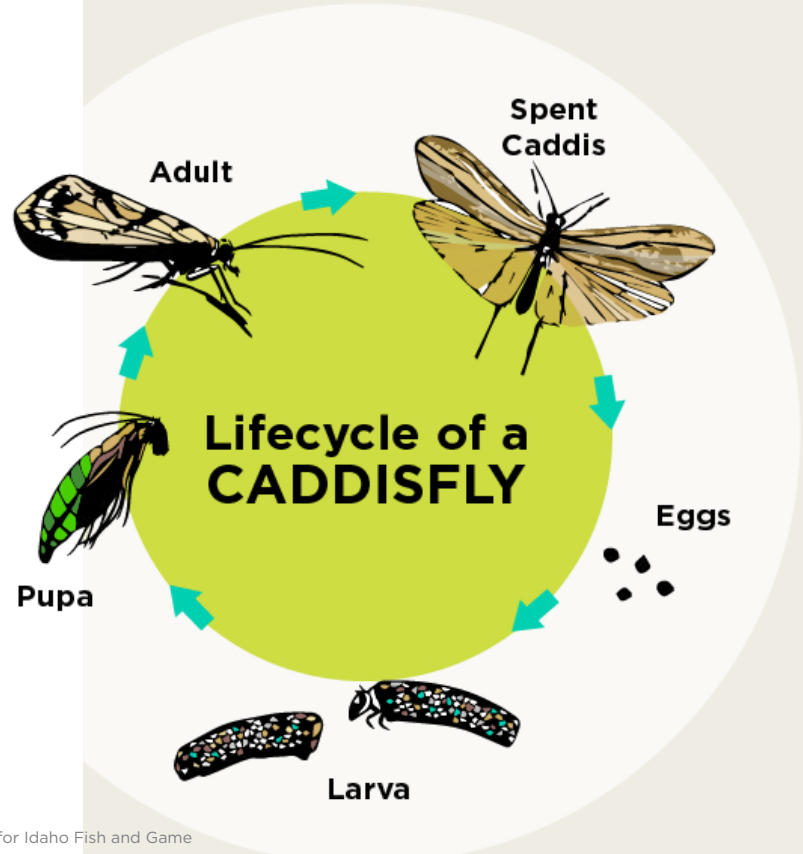
To build their cases for transforming into adulthood, they use silk-like spit using it like glue to fasten together tiny stones, or bits of plant matter, to make a tubular shaped home that provides safety from predators. Think of it like a hermit crab, but instead of finding a random shell to inhabit, caddisflies create their own protective home.

Some caddisflies also have tiny hooks that allow them to clasp on to rocks. As the larva grows, the “home” gets bigger at the front end as larva adds more material. The back of the tube is open, allowing waste to exit and water to flow through.

As adults, out in the open air, they breathe through spiracles, which are holes in the insects’ abdomens.

Caddisfly adults look very different from the larvae. They resemble moths that have lost the scales on their wings. Long, silky hairs cover caddisfly wings. Adults are brown to yellow-brown in color. They have big eyes and long antennae. When resting, caddisflies place their wings like a tent over their bodies.

Caddisflies are short-lived as adults. After they leave the water, most never eat again. They breed, lay their eggs and die. During the day, they hide in cool, moist places around riverbanks, lakes and ponds. At night, caddisflies often swarm around lights.



MAYFLIES

Mayflies are classified in the order Ephemeroptera, which comes from Greek words that mean “living a day.” This is a good name for mayflies because adults may only live for a few hours or days.

Mayfly adults are usually gray, green or brown, but sometimes can be yellow or even pink! They have a slender abdomen that slants upward with two or three long “tails” at the end. Their front wings are large and shaped like a triangle. The wings look a bit like the sail on a sailboat. Their back wings are very small and often difficult to see. Some mayflies do not have back wings at all.

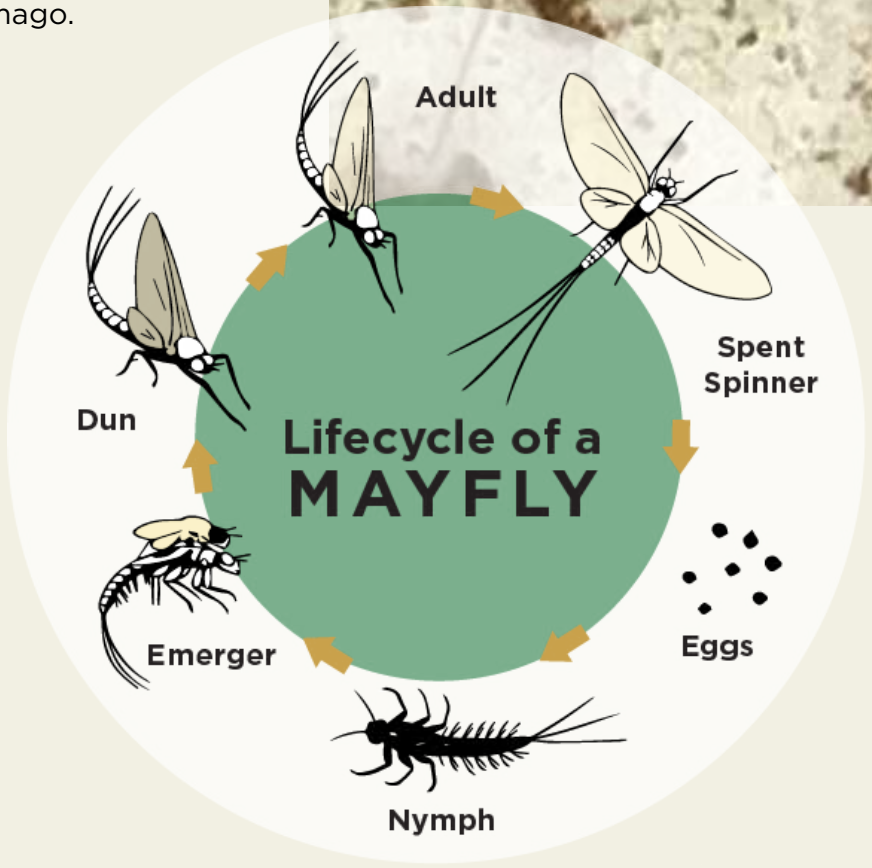
Adult mayflies have two things to do as adults: mate and lay eggs. Male mayflies gather in large swarms and fly in a kind of dance pattern while looking for females. You may have witnessed a mayfly “hatch” near a river or pond. If you are in a swarm, they may land on your clothing, and they can be slow to fly away when you brush them off. But don’t worry, they don’t bite or sting.

Females lay their eggs in different ways. It all depends on the type of mayfly. Some mayflies fly close to the water, dip their abdomen on the surface and lay eggs while flying. Other females lay their eggs in strands attached to plants and other things found in the water. Some just lay their eggs and let the eggs fall where they may. The females die as soon as their eggs are laid.

The males die after mating. Mayfly eggs may hatch very quickly. Some eggs will hatch as soon as they hit the water, while others may take a bit longer.

A “nymph” hatches from the egg with biting mouth parts. Most mayfly nymphs are scavengers. They scrape algae from rocks in the water and eat whatever plants or tiny water animals they can find. The color of a nymph is typically green or brown. What they’re eating can determine their color!

Nymphs may stay in the water for up to 4 years, depending on the species. When they leave the water, they molt. This stage of life is called a subimago. Subimagoes (dun) have cloudy or smoky wings. Think of them sort of like a temporary teenager. They will molt one more time and become clear-winged adults. Mayflies are the only insect to molt after having wings. When mating and egg laying is complete, adults will die and fall into the water. The spent adults twist in the current, giving them the name “spinners.”



STONEFLIES

Similar to mayflies, the stonefly lifecycle includes three stages: egg, nymph (or larva) and adult. Gills allow the aquatic nymphs to breathe underwater. If they're breathing polluted water, they won't last long. Stoneflies need cold, clean water, and their populations are often a sign of healthy streams.

Stonefly nymphs have special claws on their legs to help cling to rocks and other things in the water. This helps them stick to the stream bottom in strong currents, and avoid being eaten by hungry fish.

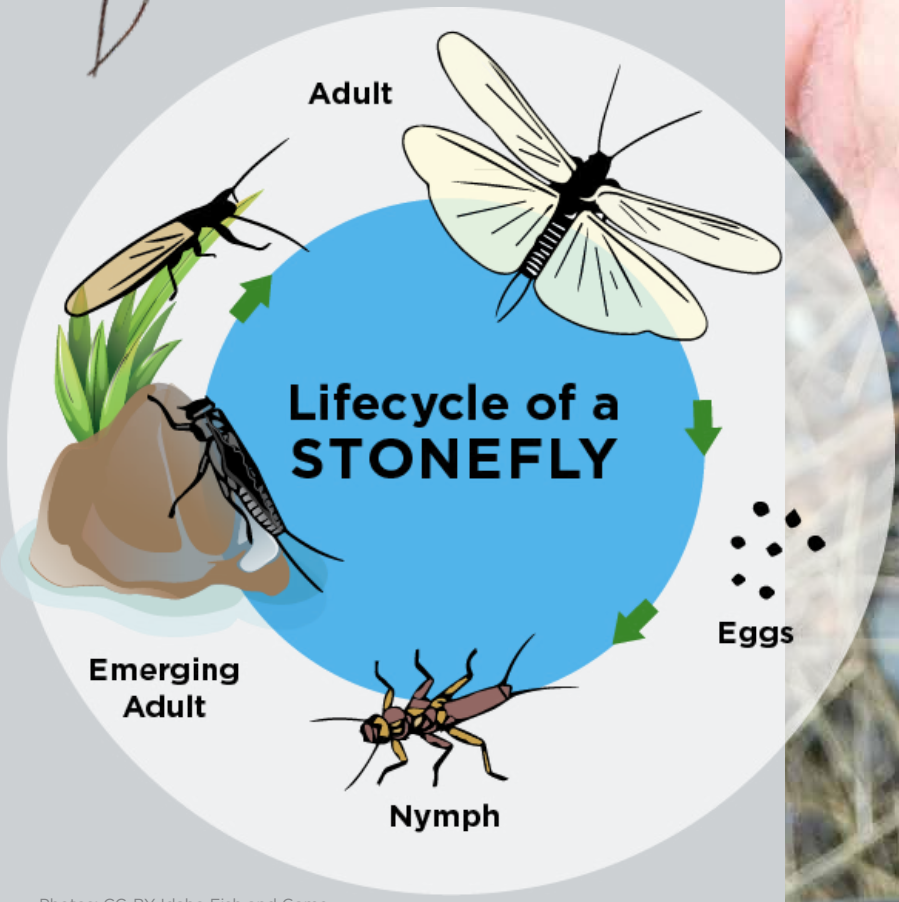
Fast moving water has more oxygen than slow moving water, and the stoneflies need oxygen in their nymph phase. Nymphs are active feeders, feeding on decaying vegetation in early stages. As nymphs get closer to becoming adults, they become carnivorous, eating others insect larva.

Adult stoneflies are easy to spot because their wings fold flat over their abdomen. They usually only live for a few weeks. As with other aquatic insects, the adult stage has one purpose: reproduction.

You can often spot the empty husk of a stonefly nymph clinging to rocks near shore. You will notice a split on the back where the adult emerged from the carapace.

Adults are not great fliers and stay close to the water, perching on rocks and vegetation near the banks until taking flight, dropping their eggs into the water. Laying eggs can be risky, and they are often eaten by birds, frogs, trout and salamanders.

There are about 3,500 species in the world, and scientists are still discovering new ones. Stoneflies belong to the order Plecoptera.



MIDGES

Midges belong to the order Diptera, or "true flies." This group of insects has some of the highest number of species of aquatic insects. They can be hugely abundant and as such, are an important year-round food source for trout and many other fish. They undergo complete metamorphosis, with four life stages: egg, larva, pupa and adult.

As larvae, they are worm-like and can be red (sometimes called blood worms), black, green or even transparent. They have a distinct dark head and live underwater. Red "bloodworms" are adapted to surviving in low oxygen waters, where they use hemoglobin to collect oxygen, giving them a red color.

As pupae, they grow wings, gills, and legs to get ready to move toward the surface where they hatch into flying adults.

The adults look much like mosquitoes, but do not bite. Most adult midges may only live for a few days to reproduce and lay eggs. You may have seen huge swarms of tiny insects near water. These were likely midges!

Midge Swarm Photo: CC-BY Andy Kraemer at Flickr.com; Midge Adult Photo: CC-By Don Loarie at Flickr.com

DRAGON AND DAMSELFLIES

Dragonflies and damselflies are in the insect order Odonata, which comes from the Greek word for “toothed.” Dragonflies have chewing mouthparts that have a serrated edge; they look a bit like teeth.

Dragonflies undergo incomplete metamorphosis, meaning they do not have a pupae stage. They lay their eggs in water and hatch into naiad (nymph). The naiad gets bigger until one day it crawls out of the water. The back of the naiad splits open and out crawls the adult! Some species stay in the naiad stage for up to 5 years.

A unique part of a dragonfly is the mouth. They have a powerful set of mandibles (jaws) that are used to chop-up their prey, but the amazing part is the labium (like a lower jaw). When a dragonfly is immature and living in water, it likes to eat slimy things. Tadpoles, small fish and other insects are all on the menu. To help

the dragonfly grab its slimy prey, the dragonfly can shoot the labium out to almost its body length. The labium has hooks on it so the prey can be dragged back to the mouth.

As adults, dragonflies eat other flying insects. The adult dragonfly's legs point forward like a basket. The basket is used to scoop insects right out of the air. Once a dragonfly has food in its grasp, dinner is served!

Have you ever sat along a pond on a summer day and watched dragonflies zip and buzz around you? Some might swoop down a little too close for your comfort! What you are witnessing is a battle over territory or space. It's the males, not the females, madly buzzing around the pond. Some dragonflies are very territorial. They will try and chase off anything that gets too close. They will chase off dragonflies, birds, and even humans!

Idaho has 67 species of dragonflies and damselflies. The largest dragonfly in Idaho is the green darner. The adults can reach a size of just over 3 inches.

Get outside this summer and look for them near slow rivers or along the shoreline of shallow lakes and ponds. You can find a dragonfly just about anywhere there is water. Notice their different colors and different behaviors.

INDICATOR SPECIES

The types of aquatic insects found in our waters can tell us about water quality. We call these “indicator species” and that term can apply to any plant or animal that is the first to react if their habitats change. By keeping an eye on them, scientists get hints about the health of an ecosystem.

Aquatic insects are used to detect water pollution. Some insects are more sensitive than others and die quickly in polluted water. Scientists count the number and types of insects that they find in water. It is important to see if the numbers and species of insects they find changes over time.

Caddisflies, mayflies, and stoneflies are insects that are intolerant to water pollution. They are also sensitive to changes in the water that increase water temperature or lower dissolved oxygen. If water quality decreases in a stream, the number of caddisflies will also decrease. The fewer the number of caddisflies, the more polluted the water.

FLY FISHING

You may have heard the saying, “there is more to fishing than catching a fish.” This saying is so true especially with fly-fishing. When fly fishing, the angler must know what aquatic insects are present and which insect imitation (or “fly”) to use to fool a trout.

Anglers will search the air and water to see what aquatic insects inhabit the water before choosing what kind of fly to use so they can “match the hatch.”

Artificial flies typically include a series of patterns that imitate all stages of the life cycle of aquatic insects, as well as local variations in sizes and colors. Larvae, pupae and adult imitations are designed from thread, fur, feathers and other materials to look like the real thing and fool a trout into thinking they’re grabbing a bite of food instead of a hook.

Fly fishing is an interesting intersection between fishing and understanding the tiny inhabitants of a trout stream and how they key on certain insects, or stages of that insect’s life.

If you live in Idaho and are under 14 years of age, fishing is free. Anyone 14 and older can try fishing for an affordable price by buying a daily or annual license. Licenses are available at any Idaho Fish and Game office, and fishing and hunting license vendors throughout the state, or online at idfg.idaho.gov. You can also buy a license through the Go Outdoors Idaho app wherever there’s cell coverage and start fishing immediately.

BEYOND INSECTS

Aquatic organisms that play an important role in food chains, food webs and fly fishing are not all insects! There are plenty of other examples of life underwater, such as worms, snails, crustaceans (scuds and crayfish), leaches, plankton and small fishes like sculpins, dace and shiners that inhabit Idaho's rivers and other waters.

Signal Crayfish Photo: CC-BY Brian Lawless
Leach Photo: CC-BY Idaho Fish and Game
Sculpin Illustration: CC-BY Joseph Tomelleri

Photo: CC-BY Kameron Simpson at Unsplash.com

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