The Crayfishes

An Educational Series For Stream Teams To Learn and Collect

By Chris Riggert, Volunteer Water Quality Monitoring Coordinator

Crayfish, crustaceans in the order Decapoda, are known by many names like crawfish and crawdads. They have ten legs, with claws on the first three pairs, and their head and thorax are fused into a carapace. There are about 550 species of crayfish worldwide, native to every continent except Africa and Antarctica. North America is the hub of crayfish distribution with more than 400 species in the families Astacidae and Cambaridae. In Missouri there are six genera and at least 35 species of crayfish, all of which are in the family Cambaridae. This includes eight species that are endemic, or found only in Missouri.

Habitat

In Missouri, water equals crayfish. They are found in streams, rivers, ponds, lakes, wetlands, ditches, burrows, caves, and underground waterways. Habitat partitioning occurs between species and age groups. Some species prefer emergent vegetation and pools, while others specialize in riffles and runs. Coupled with their agonistic behavior, this explains why only a few species of crayfish are found in a given location. Crayfish are generally considered to be nocturnal. During the daylight hours they can be found under rocks and woody debris or in vegetation.

All crayfish burrow. Most species are tertiary burrowers, retreating to burrows when waterbodies go dry, for egg laying and brooding, and to get below the frost line in winter. Secondary burrowers remain in their burrows during dry months and venture into open water in the wet season. Primary burrowers spend their entire life in a burrow which often includes a large room. Crayfish burrows extend to the water table and can have multiple tunnels. They can be spotted by their tell-tale "chimneys."

There are three species of cave dwellers in Missouri. Stygophilic species can move in and out of caves. Stygobitic crayfish are restricted to caves and underground streams. These species have reduced or absent eyes, lack pigmentation, and grow slowly.

Life Cycle

Crayfish must shed their exoskeleton to grow. Molting, or ecdysis, is the most critical event in the life of a crayfish. It is also a dangerous period when they are vulnerable to predators, pollutants, and other threats. Although young crayfish molt up to twelve times during their first year, adults may only molt twice per year. Populations or species of crayfish often molt simultaneously and large die-offs of older individuals are common during the fall molt. Crayfish can regenerate body parts, like claws or legs, through molting.

Molting is also important for crayfish reproduction. Males exhibit cyclic dimorphism, meaning they have two forms. Reproductively active males are known as Form I and have corneous gonopods with a long, pointed yellowish tip. Form II males have hard gonopods with a short, blunt white or red tip.

Males molt to Form I in the fall and mating occurs. Females store sperm through the winter and lay eggs in March or April. Eggs are extruded through a duct at the base of the walking legs, coated with a sticky substance called cement or glair, and attached to her swimmerets. Sperm

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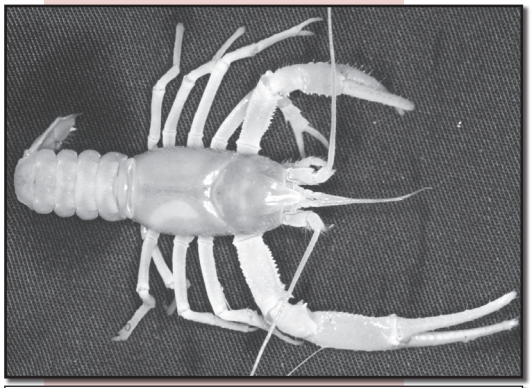

The Salem Cave Crayfish (Cambarus hubrichti) is endemic to Missouri and one of only three cave species found in the state. Note the lack of pigmentation and regenerated claw.

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is released and the eggs are fertilized externally.

Once the eggs are extruded, the female is said to be "in berry" or "berried." Females can carry 100-300 eggs depending on species and size. Berried females of many species become secretive, sheltering under boulders or burrowing in streambanks. Eggs typically hatch in May or June. Hatchlings undergo three metamorphic stages, looking more and more like adults. They remain attached to the mother by a thin thread through the first two molts. In the third stage they become independent, staying close to the mother for a short time before striking out on their own.

Depending on the species, crayfish in Missouri grow to a size of one to seven inches. The smallest species is the Neosho midget crayfish and the largest is the long-pincered crayfish. Growth slows during the winter when energy is being used for reproduction. It is believed that most crayfish live two to three years with a few exceptions. Cave species are long-lived and data suggest they can live 10 to 15 years. Another exception is the giant freshwater crayfish of Tasmania. It is the largest freshwater invertebrate in the world and can live up to 50 years.

Female Golden Crayfish (Orconectes luteus) "in berry."

Feeding and Ecology

Crayfish play an important role in aquatic food chains. They are polytrophic, eating almost anything including plants, algae, animals, insects, and decaying organic matter. Much of this material is assimilated into the crayfish's body, but a significant amount is ground into small particles and excreted. Many insects that cannot process larger particles eat this finer material. Nearly 250 types of animals eat crayfish, including fish, birds, reptiles, amphibians, mammals, and other invertebrates. About 70% of the diets of two of our most popular sport fish, smallmouth bass and rock bass, is comprised of crayfish.

In Missouri, humans primarily use crayfish for fishing bait but they are also collected for personal consumption. Annual commercial harvest of wild crayfish in the United States is 5,000 - 25,000 tons. Annual aquaculture harvest is 60,000 tons. Crayfish culture is second only to catfish in total production and is the largest aquaculture industry by acreage.

Conclusion

Crayfish gather energy from many sources and pass it up the food chain to their many predators. Some biologists consider crayfish "keystone" species, or animals of extraordinary importance because their presence helps drive an entire system. Crayfish are also water quality indicators falling into the somewhat tolerant category. In North America, about 50% of crayfish species need some protection status. Of these species, 18% are considered to be endangered and 14% are threatened. Reasons for decline include restricted range, habitat loss, overexploitation, pollution, and introduced species. In Missouri, there are currently 17 species considered to be Species of Conservation Concern.

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Mud "chimneys" are telltale indicators of burrowing crayfish.

Fast Facts

Introduced crayfish can cause significant ecological impacts in their new environments. Missouri has confirmed 25 crayfish introductions throughout the state. Please do not move any plant or animal from one location to another.

Don't forget to send your questions to streamteam@mdc.mo.gov or call 1-800-781-1989.

Sources:

DiStefano, R. J. 1993. Ecology of stream-dwelling crayfish populations: a literature review. Missouri Department of Conservation, Dingell-Johnson Project F-I-R-42, Study S-41, Job 1, Final Report.

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