Virginia Cooperative Extension

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Sustaining America's Aquatic Biodiversity

Salamander Biodiversity and Conservation

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Of the more than 400 species of salamanders found worldwide, 130 to 150 live in North America. Over 40 percent of these are considered to be at risk. The greatest diversity of salamanders in the world is found in the Southeastern United States. Salamanders are amphibians, like frogs, and most need water in which to reproduce. They live in a wide variety of habitats from swift-moving mountain streams to moist forests. In many habitats, they are the most abundant vertebrate.

Currently, 11 species are on the federal endangered or threatened species list in the United States, but many more species are at risk. The loss and modification of habitat is putting enormous pressure on salamander populations. Salamander habitat is being destroyed, modified, and fragmented, seriously diminishing the diversity and number of salamanders in the United States and around the world. Although these secretive creatures are unknown to many people, they are important parts of our natural world and in serious need of our protection.

What Is a Salamander?

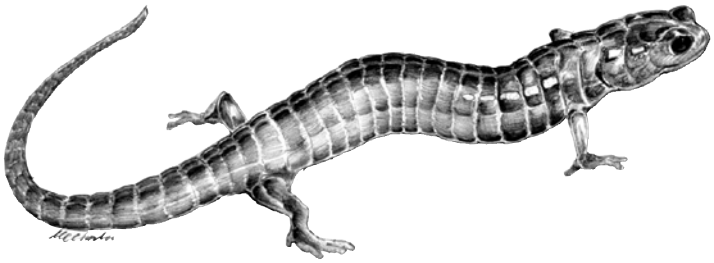
Salamanders are amphibians (class Amphibia), related to frogs and toads. They are in the order Caudata, meaning they have a tail. Because of their secretive nature and nocturnal lifestyle, salamanders are one of the least studied groups of animals. They love dark, wet places, often in deep woods, which is one reason why salamanders are the subjects of numerous myths and legends.

Structure and appearance

At first glance, most salamanders look like lizards and sometimes are called "spring lizards." However, salamanders are amphibians, not reptiles, and, unlike lizards, they have moist skin with no scales, no ears, and no claws.

Salamanders in the United States range in size from 2 inches to over 2 feet in length. Most species have two pairs of legs, but some look more like eels than lizards and have reduced or only a single pair of legs.

The tails of aquatic salamanders are often compressed to aid in swimming, whereas those of terrestrial species are more rounded. Some salamanders have the ability to regenerate their tails if they are lost. Salamanders continue to grow past sexual maturity



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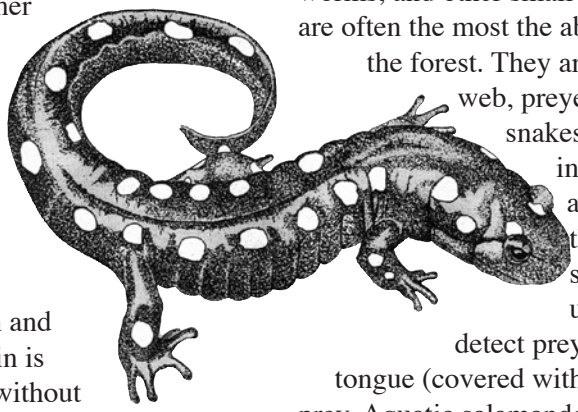
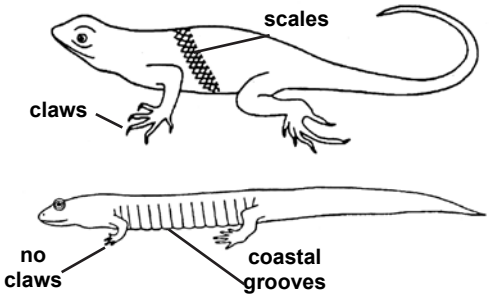
and must periodically shed their skin. After shedding, they often eat the skin. Mucous-secreting glands help prevent their skin from drying out when they are out of the water. Other glands release toxins that protect them from predators. Some have glands that produce pheromones, chemicals that are used in courtship and mating.



Some salamanders have lungs; others do not. In lungless species, respiration occurs through the skin and mouth. Respiration through the skin is important to both those with and without lungs during hibernation. All salamanders must remain in damp environments to keep their skin moist and prevent drying out.

Morphology: Lizard vs. Salamander



Most aquatic larval salamanders have gills that are absorbed when they metamorphose to adults. Some salamanders, such as the mudpuppies and waterdogs, keep external gills throughout their lives. The gills, as in fish, are red in color due to the high blood concentration necessary for oxygen absorption from the water. Gill size may be related to the water quality. In warm, slow-moving, low-oxygen waters, salamanders often have larger gills than those found in cool, flowing, high-oxygen waters.

Salamanders do not have ears, but may be able to detect vibrations through their legs and jaws. In the water, vibrations are detected by the lateral line system, rows of sensors found on the head. Most species have well-developed eyes. The exceptions are the few cave-dwelling species that live in complete darkness where eyes are unnecessary. Salamanders, unlike frogs, are voiceless except for a slight squeaking noise made by a few species when disturbed or excited.

What do they eat?

Salamanders are predators. Most feed on insects, worms, and other small invertebrates. Salamanders are often the most the abundant vertebrate animal in the forest. They are an important link in the food web, preyed upon by larger amphibians, snakes, turtles, birds, predaceous insects, and fish. Salamanders are active foragers, moving through their environment searching for prey. They can use visual and chemical cues to detect prey items. Salamanders use their tongue (covered with sticky secretions) to capture prey. Aquatic salamanders use suction to capture prey. Immature (larval) salamanders, like adults, are predators and feed upon aquatic insects and other invertebrates.

How do they reproduce?

Salamanders have a variety of reproductive strategies. Most species have a two-part life cycle that, like frogs, includes a larval stage and an adult stage. Some species lack a larval stage, and newly hatched individuals look like miniature versions of the adult. Most salamanders hatch from eggs and spend several weeks to years growing as aquatic larvae before they undergo metamorphosis to become adults. When the adults reach sexual maturity, they often return to breed at the same site where they were born.
Although frogs typically reproduce by external fertilization, few (10 percent) salamanders exhibit external fertilization. In most salamanders, fertilization is internal. Male salamanders court females with species-specific behaviors. The male then deposits a packet of sperm (a spermatophore) on the ground and the female transfers it into her body. The eggs are fertilized internally, but laid externally in a selected habitat.

Where do they live?

Most salamanders are found in or near wetlands. Because they lack the scales of reptiles, salamanders are susceptible to drying out, and must live in moist environments. Some species have the ability to burrow underground; others use burrows created by other animals like crayfish.