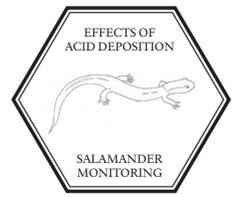


# SALAMANDER INFORMATION OF THE GREAT SMOKY MOUNTAINS NATIONAL PARK



Two major groups of amphibians occur in Great Smoky Mountains National Park: the salamanders (30 species) and the frogs and toads (13 species).

Great Smoky Mountains National Park is known as the “Salamander Capital of the World!” Salamanders are an especially abundant and diverse group in the Smokies. The majority of park vertebrates (the animals with back bones) are salamanders. We estimate that there are more salamanders than all of the park’s mammals combined.

Five families of salamanders are represented in the park: Cryptobranchidae, Proteidae, Salamandridae, Ambystomatidae, and Plethodontidae.

The southern Appalachian Mountains, including the Great Smokies, are a major center of evolutionary diversification for the family Plethodontidae, commonly known as the lungless salamanders. There are 24 species of lungless salamanders in the park. The family has undergone an extraordinary level of evolutionary diversification in the southern Appalachian Mountains. As their family name implies, these salamanders lack lungs. They “breathe” (exchange oxygen and carbon dioxide) through the walls of tiny blood vessels in their skin and linings of their mouths and throats. Lungless salamanders occur everywhere in the Great Smokies, in and along streams and under rocks, logs, and leaf litter in the forests.

Salamanders are commonly called “spring lizards” in the southern Appalachians. Lizards and salamanders are, however, very different sorts of animals: salamanders are amphibians while lizards are reptiles. The skins of salamander lack scales and are moist or slimy to the touch. Their eggs are surrounded by clear jelly. Lizards, on the other hand, have scales on their skin, and are dry to the touch. They lay eggs with leathery shells.

Amphibian life cycles are tremendously varied, and some are highly adapted for life on land. Amphibians as a group; however, are semi-aquatic or at least moisture-loving creatures.

Adult amphibians are carnivorous. Frogs and many lungless salamanders use their tongues to capture small prey, while other salamanders capture their prey by grasping them in their jaws. Amphibians generally feed on any prey small enough to be subdued and eaten. Insects and other small invertebrate animals comprise the bulk of salamander and adult frog diets.

Larval salamanders are also carnivorous, feeding mainly on small aquatic animals such as the immature stages of aquatic insects. Frog and toad larvae (tadpoles) are aquatic herbivores and scavengers, feeding on algae, aquatic plants, and bits of decaying organic matter.

Salamanders can drastically range in size. The Hellbender, the largest in the park, can grow up to almost 3 feet in length, has teeth, and roams stream bottoms at night. The smallest species in the Smokies is the Pigmy, at under 2 inches.

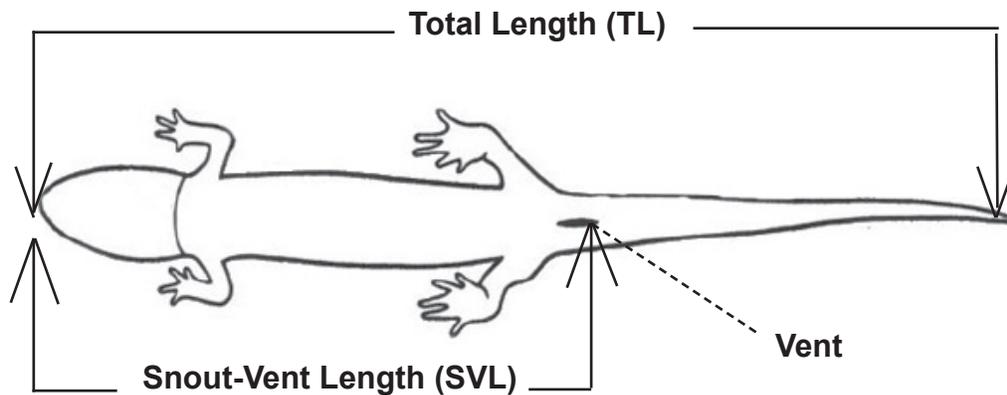
Most people go to the doctor for a yearly checkup to make sure they are healthy. Park biologists do a similar thing for the plants and animals in a park, only the periodic checkup is called monitoring. Salamander monitoring in the Smokies is done in several different ways. One way is using a nearby stream and forest. A length of stream is marked off into one meter sections, and students on field trips enter the stream to look for and hopefully catch salamanders. Another way is to use a forested area to the side of the stream that is also marked off into one meter sections, and students enter the forest to look for salamanders on the forest floor. A third method is to look under tree cross sections (“Tree cookies”). These tree cookies are designated by letter and number and are placed on the forest floor. All three groups need to note the flag number or tree cookie where they caught their salamander and bring it to the data collection station by the stream’s edge. There, each salamander is identified to species, weighed, and measured.



One of the reasons it is important to monitor salamanders is because they are considered bioindicators due to their sensitivity to environmental change. Salamanders lay eggs in water. The eggs have no outer covering or protective shell like chicken eggs. This makes their eggs very vulnerable to chemical pollutants, ultraviolet radiation, and other things that disturb growth. Also, salamanders skin is permeable, meaning it allows water and gases to enter and leave; they're 'environmental sponges.' When the water is healthy, they're healthy, and the eggs are healthy. Things like acid rain affect the water in which salamanders live and lay their eggs. When there's a low population of salamanders in a water source, that may be an indication of low water quality.

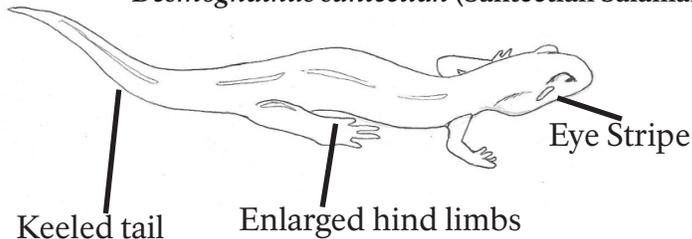
### Anatomical Information for Identification

Total Length (TL) is the length from the tip of the snout to the tip of the tail. Snout-Vent Length (SVL) is the length from the tip of the snout to the back of the vent (the opening of the cloaca, or the all-purpose opening from which both wastes and sex cells leave the body). To measure the salamander in the field a Snout-Vent Length (see below) will be used since the salamander may have lost part or all of its tail in the past.



Most salamanders have four digits (fingers) on their front limbs and five digits on their hind limbs. The size and shape of the tail in cross-section are important in identification. The tail may be rounded, oval shaped, or keeled (knife-like) (see picture below of rounded versus keeled tail). Dusky salamanders can be distinguished from other lungless (Plethodontid) salamanders by their general body form. They all have strongly enlarged hind legs. A light line extending from the rear corner of the eye to the angle of the jaw is visible in nearly all specimens. As their name implies, most dusky salamanders are rather dully colored, in shades ranging from light brown to nearly black (see picture below of enlarged hind limbs versus equal sized front and hind legs).

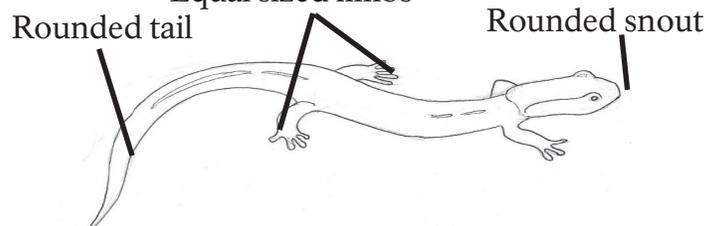
*Desmognathus santeetlah* (Santeetlah Salamander)



**Genus Desmognathus (dusky salamanders)**

- often difficult to identify to species
- have a pale diagonal line running from the eye to the angle of the jaw "eye stripe"
- hind legs often larger and thicker than fore limbs
- keeled tail

Equal sized limbs



*Plethodon jordani* (Jordan's Red-cheeked Salamander)

**Genus Plethodon (woodland salamanders)**

- all four limbs are about the same size
- rounded snout
- rounded tail