

SPRING SALAMANDER

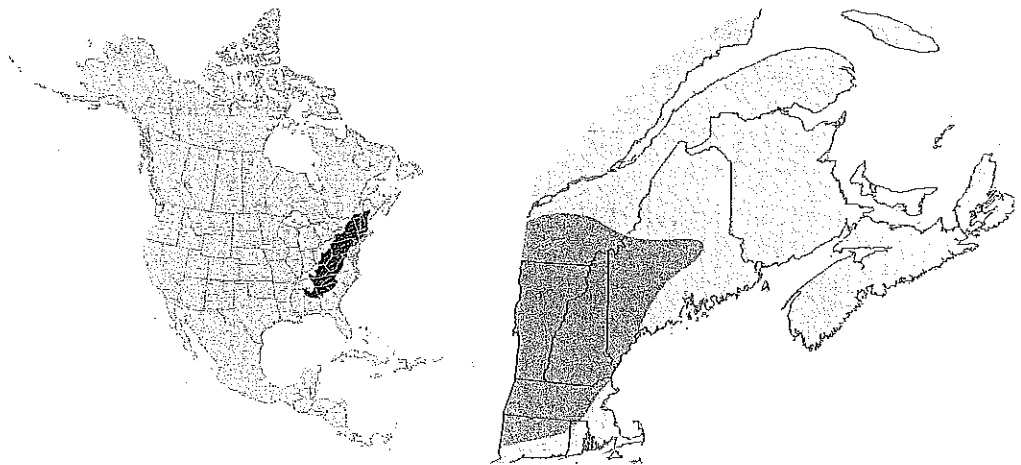
Gyrinophilus porphyriticus

Spring salamanders are the largest, most brightly colored, and least common of Maine's streamside salamanders. Their large, muscular, finned tail enables them to swim in swift mountain streams where they hunt among rocks and eddies. They are large and powerful enough to capture and eat the two-lined and dusky salamanders that also inhabit the stream's edge. Spring salamanders are limited to the coolest habitats: well-shaded or spring-fed mountain streams. Even in cool, clean, well-oxygenated streams, however, they are uncommon compared to dusky and two-lined salamanders.

DESCRIPTION: Adult length is 12–19 cm (4.7–7.5") and females are generally smaller than males. The background color of the skin is salmon pinkish orange, with darker net-like mottling on the sides, back, and tail. A light line bordered with gray begins at the eye and curves down over the nose and through the nostril. The tail has a prominent, knife-like keel on the top, an aid in swimming for this aquatic salamander. Costal grooves are conspicuous, with most individuals having 17. The venter is flesh colored. Larvae have a finely reticulated pattern like that of adults, and a proportionately larger head compared to the larvae of dusky and two-lined salamanders.

TAXONOMIC STATUS: Spring salamanders in this region belong to the subspecies *G. p. porphyriticus*, the northern spring salamander.

DISTRIBUTION AND STATUS: The spring salamander reaches its northeastern range limit in Maine. Prior to MARAP, it was known only from the western Maine mountains, with old records as far east as the Kennebec River. It is now known to range north and east as far as central



Penobscot County in the Penobscot River drainage. Although moderately common in some streams, it is generally far outnumbered by dusky and two-lined salamanders. In Maine, Massachusetts, and Connecticut it is listed as a Species of Special Concern.

HABITAT: Spring salamanders are found typically in cold, clean, undisturbed, high-relief mountain streams, but also in less steep, cool seeps and springs in forested areas. During the winter they remain in wet, unfrozen substrate or burrows near, in, or under brooks, where they may remain active all winter.

Their association with a cool, well-oxygenated habitat may be related to their anatomy. Like the other plethodontid salamanders, spring salamanders have no lungs; their oxygen needs are met by absorbing oxygen through their moist skin and the membranes in the throat. Because spring salamanders are large, they have a proportionately small surface area, relative to their mass, over which to absorb oxygen. Therefore, they are restricted to streams with an ample oxygen supply.

REPRODUCTION: Mating season is in the fall, with egg-laying in the spring and summer. During courtship, male and female engage in an amorous pushing match accompanied by much rolling around in the water. The male subsequently deposits a spermatophore which is picked up by the female. The sperm are stored in the female's cloaca until eggs are laid. Eggs are cemented one at a time under a stone, or sometimes a log, in running water. The female, while upside down in the water under a stone, presses her cloaca against the stone and extrudes the egg, which adheres where it is pressed. The resulting compact cluster may contain from 10 to 160 eggs, but 40 to 60 is most typical. Eggs hatch in late summer or early fall.

The aquatic larval period is variable but averages 4 years. Larvae are 2.6–2.8 cm (1–1.1") long when first hatched and 10.5–12.5 cm (4.1–4.9") long at metamorphosis, which occurs in late spring and summer.

DIET: Adult spring salamanders eat other small salamanders and frogs, millipedes, earthworms, spiders, snails, centipedes, and crustaceans. Larvae eat aquatic arthropods, worms, and molluscs. In northern New Hampshire, spring salamanders eat primarily terrestrial insects that incidentally occur at the edges of brooks (Burton 1976). In New York, dusky and two-lined salamanders constitute a minor part of their diet (Bishop 1941).

It has been speculated that the diet of spring salamanders, particularly the consumption of other salamanders, may be related to other aspects of their life history (Bruce 1972). In the Carolinas, almost half of the spring salamander's diet consists of other salamanders. Predation by larger salamanders may be a factor in the evolution of terrestriality in the smaller plethodontids (Hileman and Brodie 1994). In southern streams, spring salamanders are scarce, and Bruce (1972) suggested that this may be because of their high trophic level position. He suggested that in high-elevation, undisturbed streams, spring salamanders have the low reproductive rates of an animal that lives at a high trophic level in a stable environment. Bruce (1972) also found that in the southeastern edge of its range, at lower elevation streams where disturbances have probably subjected them to localized extinctions, spring salamanders seemed to have the higher reproductive rates of a population that exists at a lower trophic level in an environment characterized by disturbance. The tentative conclusions of this study might apply in Maine where spring salamanders are also at the edge of their range. Here they may feed at a lower trophic level and lay more eggs and mature more rapidly than in the central portion of their range. Such a hypothesis has yet to be tested.

INTERACTIONS WITH PEOPLE AND OTHER ANIMALS:

Spring salamanders are uncommon and seldom encountered by people. Their typical habitat is a steep mountain stream, but they also occur in stream systems where logging and development can degrade their habitat (Petranka et al. 1994). Acid precipitation may have a minimal effect on this species, since egg deposition and larval development occur after the major acid pulse from snowmelt and spring runoff. Maine stream predators that may occasionally take spring salamander adults or larvae include raccoons, mink, otter, and predaceous fish.

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