



The Eastern Spadefoot

by Rob Criswell

photos by Brandon M. Ruhe

Pennsylvania's amphibians fall into three distinct groups — salamanders, frogs and toads—except for one. One member of the Anuran group (the group that includes frogs and toads), the Eastern spadefoot, suffers from an identity crisis. Although the shape of the Eastern spadefoot's body, the warts on its back and its burrowing nature are toadlike, and the word "toad" is often included in its common name, it is actually a primitive frog.

This amphibian is rather small—up to 2½ inches—and stout, and it can be identified by two light, wavy stripes that start behind the eyes and run down its dark back, forming a lyre or hourglass pattern. But, its most distinctive and useful feature is a modification to its hind feet. The inner surfaces are equipped with a hard, sharp edge that is used as a digging tool, hence the name "spadefoot." This fossorial adaptation makes this frog a champion burrower, scraping away soil as it sits upright and simply dropping out of sight into the earth below.

The Eastern spadefoot is one of our most elusive animals. It will dig several inches below ground and may drill as deep as eight feet. This homebody has been documented spending 109 days in its subterranean environs without surfacing, and it may remain underground in Pennsylvania for as long as 200 days. It is nocturnal and emerges sporadically to forage for insects on warm, humid and rainy nights from March through October. When it does appear, it generally remains within 5 to 10 yards of its burrow.

In Pennsylvania, the Eastern spadefoot's habitat is variable but includes floodplains of streams and rivers and shallow depressions in agricultural areas and around seasonal ponds in woods and forests. Sandy and loamy soils are preferred for their ease in digging. The pools and depressions may have permanent water in them or may be wet for only very short periods and are usually fishless.

When it comes to breeding, this amphibian has adopted a wait-and-hurry-up philosophy, and it may wait for months. The Eastern spadefoot relies on very heavy rains, often two inches or more in 24 hours, and large swings in barometric pressure between April and September to trigger reproduction. When these soggy but ideal conditions present themselves, these frogs spring into action, congregating en masse in their shallow water nurseries and calling in a chorus of explosive low-pitched grunts that may be heard a mile away.

After a whirlwind mating frenzy that lasts only a night or two, females drape adhesive masses of 1,000 to 2,500 eggs over submerged twigs and grasses. Depending on water temperature, the eggs may hatch in 24 hours to 7 days. The tadpoles metamorphose into frogs in two to nine weeks. The newly transformed juveniles are only one-half inch long when they leave the water.

In spite of their reclusive habits and abbreviated breeding cycle, Pennsylvania's Eastern spadefoot is in trouble. In 2005, the Pennsylvania Fish & Boat



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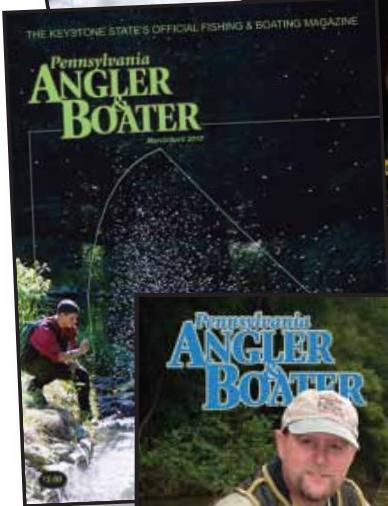
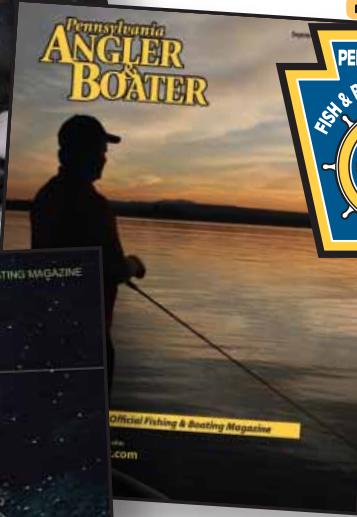
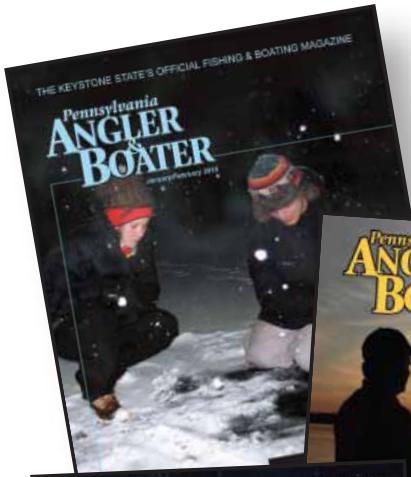
Commission (PFBC) listed the Eastern spadefoot as an endangered species, citing only two known populations in the state at that time and the threat of habitat alteration and destruction as justification. Since that time, intensive survey work conducted by East Stroudsburg University and PFBC, which was funded by a State Wildlife Grant, has identified several additional populations within its historic Pennsylvania range. The Keystone State now currently includes six distributional areas encompassing parts of 11 counties: Adams, Berks, Bucks, Centre, Cumberland, Franklin, Lehigh, Northampton, Northumberland, Union and York.

A number of threats to this species' well-being loom large. In addition to potential loss of habitat due to residential and industrial development, concerns include less obvious alterations that may compromise habitat quality. Although Eastern spadefoots have coexisted with agriculture for centuries, changes in farming practices and the use of pesticides in the future could degrade water quality in breeding pools. Often, the small seasonal ponds and depressions so important to these frogs do not receive the protection that larger bodies of wetlands are afforded and are more likely to be affected by human activity. Even if a pool itself is not damaged, activities such as logging or earth-moving adjacent to or near a location where Eastern spadefoots burrow and feed could render the site uninhabitable.

Other factors that may affect the long term survival of this species in Pennsylvania include barriers to travel and climate change. Since Eastern spadefoots are poor travelers, highways, railroads and even extensive swaths of developed lands within their range can limit their ability to move to and from suitable habitat. What effects warmer average temperatures may have on this and other amphibians in the future are unknown.

However, there is optimism that through education and cooperation this amphibian will survive in Pennsylvania. According to Chris Urban, Chief of PFBC's Natural Diversity Section, since 2005, PFBC has reviewed hundreds of development project proposals in the range of the Eastern spadefoot in Pennsylvania. Commission staff have worked with project proponents to successfully avoid impacts to the Eastern spadefoot. A common avoidance measure is to adequately buffer the ephemeral pools, where they are known to breed. Because the Eastern spadefoots burrow in nearby uplands, an associated upland buffer is included in the overall protective buffer for the long-term protection of the breeding pool and Eastern spadefoot population. In Berks County, a housing project proposal was dropped in favor of conservation. In a cooperative effort between PFBC, the Pennsylvania Department of Conservation and Natural Resources, the Pennsylvania Department of Environmental Protection, the William Penn Foundation and the developer, ownership of an Eastern spadefoot habitat was transferred to the Berks County Conservancy. Subsequently, a Wild Resource Conservation Program grant funded development of a management plan for the property.

Amphibians like the Eastern spadefoot provide beneficial services to mankind. They eat harmful and pesky insects and serve as environmental barometers, with their declines signaling problems that may affect us as well. Cooperating to keep their best interests in mind is in our best interest as well. ☐



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