Species Action Plan:

Eastern Spadefoot (*Scaphiopus holbrookii*)

Purpose: This plan provides an initial five year blueprint for the actions needed to attain near-term and, ultimately, long-term goals for the conservation and recovery of the eastern spadefoot. The action plan is a living document and will be updated as needed to reflect progress toward those goals and to incorporate new information as it becomes available.

Goals: The immediate goal is to maintain the extant populations of eastern spadefoot in the Commonwealth and to protect its remaining habitat. The secondary goal is to enhance extant populations by improving and increasing local habitat. Ultimately it is hoped the species will recover to the point where it can be removed from the Pennsylvania list of endangered species (58 Pa. Code §75.1).

Natural History

Taxonomy: Class Amphibia, Order Anura (frogs and toads), Family Pelobatidae (spadefoots), Eastern Spadefoot (*Scaphiopus holbrookii*, Harlan 1835)

Figure 1. Eastern spadefoot (*Scaphiopus holbrookii).* Photo by Tom Diez.

Description: The eastern spadefoot is a small to medium-sized, stout-bodied toad, with a snout-vent length (SVL) range of 1.7-2.2 in. (44-57 mm) (Figure 1). The eastern spadefoot has a single, sickle-shaped tubercle ("spade") on the underside of each hind foot, has two small, inconspicuous, round parotoid glands, and large protuberant eyes with vertically elliptical pupils. It has two distinctive yellowish lines that begin at the eye and continue across the dorsum in the shape of an hourglass or lyre and terminate at the sacrum. The dorsal color is variable, but typically resembles earth tones – shades of brown, olive, gray to black. The sides of the body and legs are mottled with pigment. The skin is relatively smooth with small, scattered warts that are colored brown or red. The ventral side is smooth with a pale, white or gray coloration.

Habitat: Eastern spadefoots are fossorial by nature. They typically inhabit loose, friable soils, where they can use their hind feet for burrowing. In the northeast, eastern spadefoot tend to be associated with sandy

soils along the floodplains of streams and rivers and in depressions in agricultural fields (Hulse *et al.* 2001). These depressions, sometimes quite shallow, may be temporary or permanent and often form ephemeral pools following rains. Although they have been documented as burrowing in silt loam or clay soils (Driver 1936, Pearson 1955), Jansen *et al.* (2001) found that eastern spadefoot preferred sandy soil for burrowing significantly more than other soil, gravel, and sod. Jansen *et al.* (2001) also discovered that spadefoot toads could not burrow into sod.

Life History: The eastern spadefoot spends much of its time underground, with surface activity dependent on periods of heavy rainfall, particularly in the spring and mid-summer, when it exits its burrow to forage or breed (Pearson 1955). The species has been documented burrowing to depths ranging from 5 cm to 2.5 m, where it spends a significant portion of its life (Jansen *et al.*, 2001, Pearson 1955). Pearson (1955) documented eastern spadefoot spending 109 consecutive days in their burrows. Hulse *et al.* (2001) suggests the possibility of spadefoots remaining inactive in their burrows for more than 200 days out of a year. In Pennsylvania, eastern spadefoot have been found to be active on the surface from March through October (B. Ruhe, personal communication 2010, Klemens 1993, Hulse *et al.*, 2001).

The eastern spadefoot has no defined breeding season and is considered an opportunistic, sporadic breeder. Adult emergence to the surface and breeding is triggered by a combination of factors including intense rainfall, a significant drop in barometric pressure, and drying and refilling of the breeding ponds. Reproduction occurs within one or two nights during and after heavy rain events, and is concentrated in vernal pools, rain-filled depressions in farm fields, and along streams (Hulse *et al.*, 2001). Eastern spadefoot eggs have been reported hatching in 24 hours to 7 days, and metamorphosis can occur in 14 to 63 days, being mostly dependent on ambient water temperature. Transformed toadlets emerge from the temporary pools when they are approximately ½ inch long (12.5 mm). Unlike the adults, the juvenile spadefoots are diurnal and will feed on small invertebrates and insects at the perimeter of the pool for two weeks before they disperse.

Distribution and Status

National Distribution: The species ranges from southern New England to the Florida Keys and west to eastern Louisiana, but Pennsylvania forms a break between the New England populations and Maryland (Figure 2; NatureServe 2010).

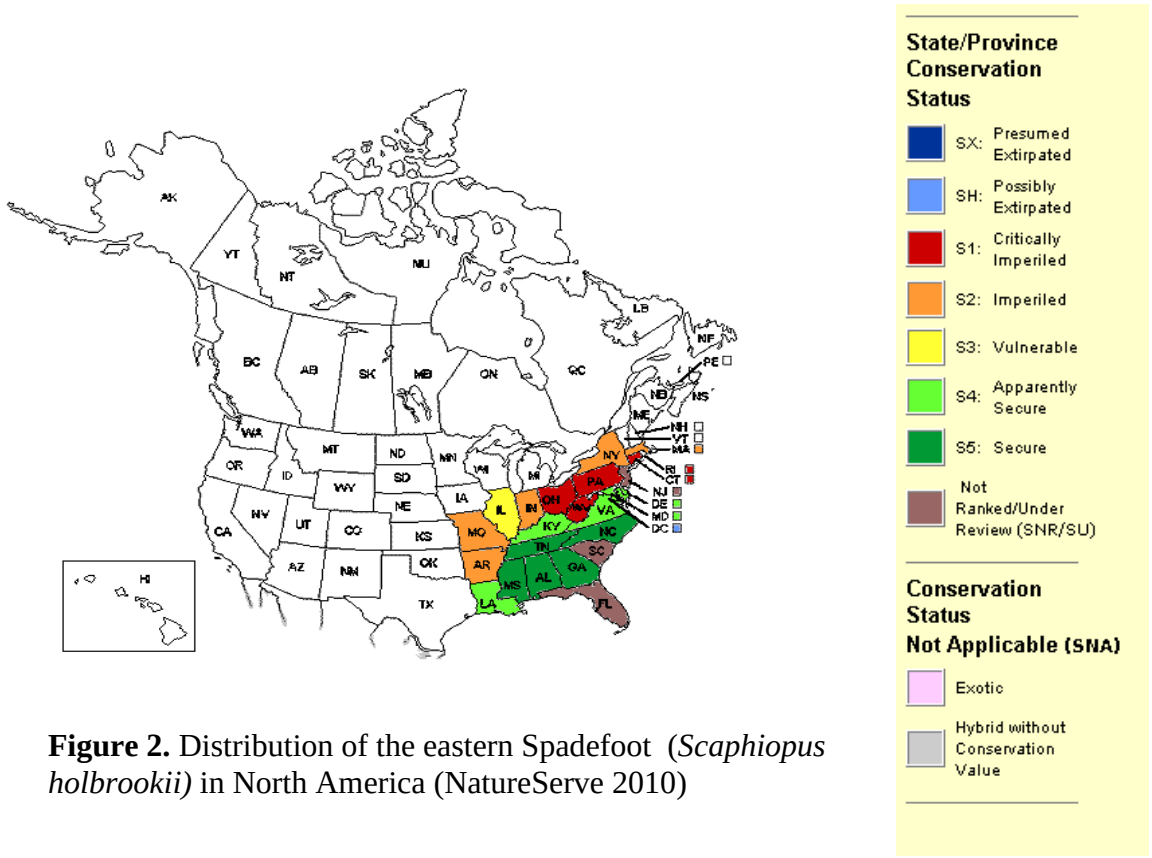

Figure 2. Distribution of the eastern Spadefoot (*Scaphiopus holbrookii)* in North America (NatureServe 2010)

Pennsylvania Distribution:
In Pennsylvania, populations are in the Susquehanna, Delaware, and Cumberland Valleys, including occurrences in the following counties: Adams, Berks, Bucks, Centre, Cumberland, Franklin, Lehigh, Northampton, Northumberland, Union, and York (Figure 3).

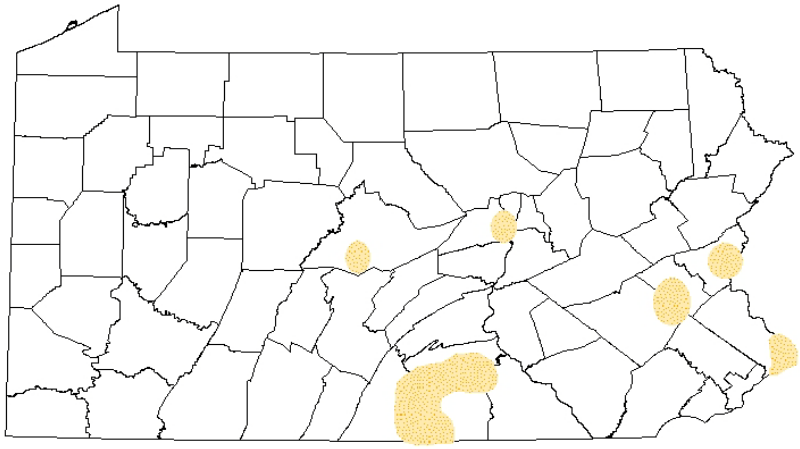

Figure 3. Distribution of the eastern Spadefoot (*Scaphiopus holbrookii)* in Pennsylvania, (PFBC 2010).

Pennsylvania Legal Status: The eastern spadefoot was listed as Endangered in Pennsylvania in September 2005.

Other States Legal Status: The eastern spadefoot is listed as endangered in Ohio, Connecticut, and Rhode Island (NatureServe 2010, Wildlife in Connecticut 1999, Rare native animals in Rhode Island 2006), considered a species of concern in New York, "declining" in New Jersey, rare in West Virginia, and threatened in Massachusetts.

Management Status

In 2005, the eastern spadefoot was listed as state endangered with only two extant populations documented in Pennsylvania. A State Wildlife Grant funded range determination study has identified six distributional areas in 11 counties as being occupied by this species. The study has also added to our knowledge of the habitat and natural history of the eastern spadefoot in Pennsylvania.

The Pennsylvania Fish & Boat Commission (PFBC), in cooperation with the Berks County Conservancy and its partners, have been monitoring the status of a preserve in Berks County that was recently established to protect two eastern spadefoot breeding pools.

Threats

1) Habitat destruction from residential and industrial development
2) Habitat alteration and changes in water chemistry
3) The species' breeding habitat is often temporary pools, which are not necessarily delineated as wetlands. Thus, wetland regulations can not be relied upon to provide sufficient protection for this species.
4) Even where wetlands are protected (breeding habitat), without upland buffers (foraging and burrowing habitat) this species could not persist.
5) The fossorial nature and its unpredictable breeding schedule make the eastern spadefoot difficult to detect and thus difficult to inventory and protect.
6) Poaching-eastern spadefoot are interesting and attractive creatures often sought by collectors.

Conservation and Recovery

Conservation Actions:

1) Protect existing populations through land preservation on both private and public properties (e.g., conservation easements, conservation agreements, fee title acquisition).
   a. Develop a prioritized site list by considering factors such as population size, habitat condition, and proximity of site to other occupied areas.
   b. Work with the landowners towards the protection of these identified sites.

2) Develop management plans addressing habitat maintenance and restoration for properties identified above.
   a. Offer management plans to private landowners who are not currently interested in land protection measures.
   b. Implement habitat management plans on properties where landowners accepted protection measures.

3) Continue to survey for undocumented populations of eastern spadefoot within their historically-occupied range.
   a. Analyze the results of the SWG study to determine the need for additional surveys.
   b. Develop GIS model for use in targeting surveys.
   c. Estimate population size through focused studies on documented newly documented populations.

4) Initiate monitoring of protected sites.
   a. Establish baseline dataset.
   b. Write and implement monitoring protocol.
   c. Apply results from the monitoring effort to improve management habitat plans.

5) Continue and expand ongoing protection measures for eastern spadefoot populations.
   a. Review and comment on permit applications that involve proposed temporary and/or permanent disturbances to known eastern spadefoot habitat.
      i. Mitigate for both direct and indirect impacts to eastern spadefoot habitat.
      ii. Spot check projects to confirm adherence to recommended mitigation actions.
   b. Develop best management practices and incorporate into the environmental review process.

6) Initiate and support research that would enhance the management of eastern spadefoot and implementation of this action plan.

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