



Jeffrey G. Davis
625 Crescent Road
Hamilton, Ohio 45013
(513) 868-3154
E-mail anura@fuse.net

October 3, 2013

Jason M. Earley
Senior Environmental Specialist
ASC Group, Inc.
800 Freeway Drive North, Suite 101
Columbus, Ohio 43229

Dear Mr. Earley,

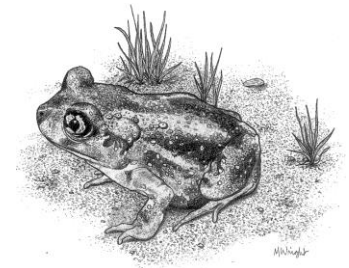
Please find the attached Eastern Spadefoot Habitat Survey Report and Invoice. I visited the three sites along the proposed route of the Portsmouth Bypass on September 21, 2013. Even though two (Sites 1 and 3) met four of the five parameters that would call for a Presence – Absence Survey, there was sufficient habitat alterations that I felt that migration corridors between potential breeding pools and upland burrowing habitat were eliminated. Therefore there is no risk of Eastern Spadefoots moving across construction areas in the three areas I determined needed site visits. At Site 1 (southern terminus of the Bypass) what I believe would be a migration corridor to and from breeding pools from upland (burrowing) habitat is blocked by a continuous row of concrete dividers between the east and west bound lanes of State Route 52. At Site 3, the northern terminus of the Bypass near Lucasville, there is a good deal of fill on the terrace above the Scioto River valley that is unsuitable for Eastern Spadefoots, and a deep, steep-walled drainage ditch that blocks the migration corridor between upland and breeding habitats. Site 2 had only three of five parameters and therefore did not have habitat of high enough quality to recommend a Presence – Absence Survey. **None of the sites will require a Presence – Absence Survey or further investigation regarding Eastern Spadefoots.**

I appreciate the opportunity to work with you. If I can be of further service or if you have questions regarding the current report, please do not hesitate to contact me.

Sincerely,

A handwritten signature in cursive script that reads "Jeffrey G. Davis". The signature is written in dark ink and is positioned above the printed name.

Jeffrey G. Davis



Final Report: Eastern Spadefoot (*Scaphiopus holbrookii*) Habitat Survey along the Portsmouth, Ohio Bypass. Scioto County, Ohio

Submitted to:

Jason M. Earley
Senior Environmental Specialist
ASC Group, Inc.
800 Freeway Drive North, Suite 101
Columbus, Ohio 43229

**Submitted by: Jeffrey G. Davis, Ohio Division of
Wildlife Approved *S. holbrookii* Surveyor**

October 3, 2013

1.0 INTRODUCTION

1.1 Purpose

This report presents the findings of Eastern Spadefoot (*Scaphiopus holbrookii*) habitat surveys performed at three sites along the proposed route of the Portsmouth Bypass (Ohio State Route 823). Hereafter, Eastern Spadefoots are simply referred to as Spadefoots.

1.2 Project Area Description

Three sites (Figures 1A-C) on the route along which the Portsmouth Bypass (Ohio State Route 823) is planned from Sciotoville to Lucasville, Ohio, required site visits to determine their suitability as Spadefoot habitat. The need for the site visits was based on the parameters described in section 2.1 (below). Site selection was based not just on potential habitat intersected by the route, but also on the possibility that Eastern Spadefoots migrating to or from potential breeding sites would cross the route. **Site 1** is in the Ohio River bottoms at the southern terminus of the Portsmouth Bypass. Its approximate center is at 38.74271°N, 82.86927°W. **Site 2** is situated on the north side of Sciotoville at approximately 38.76969°N, 82.87311°W. **Site 3** is at the western terminus north of Lucasville at 38.89213°N, 82.49895°W.

1.3 Eastern Spadefoot Life History

The Eastern Spadefoot (Figure 2) is a toad-like member of the family Scaphiopodidae. The following description of the species and its natural history is after Davis (2013). Adults attain a length of 570 mm. The back is usually brown and the belly is white or pale gray. A pair of curved tan or yellow lines extends from behind each eye and down the back forming an hourglass pattern. The Spadefoot's sides are sparsely covered with small warts that are usually orange in color. A pair of indistinct paratoid glands is located behind each eye. The eyes bulge significantly and unlike those of any other anuran that occurs in Ohio, their pupils are vertically elliptical (Figure 3). A sickle-shaped, sharp, black tubercle, called the spade, is located on each heel. It enables the Spadefoot to burrow vertically and backwards into the soil. This spade on the foot is the namesake of the species (Figure 4).

Several environmental components determine whether or not Spadefoots might inhabit an area. The soil must be sandy or of loose loam that is sufficiently friable to enable them to burrow. Although Spadefoots are known to inhabit open woods, in Ohio they are most frequently associated with fields where the canopy is open or along the edges of woodlands. There must also be areas where hydric soils capable of holding pools of water for several weeks after heavy rainfall can serve as the Spadefoots' breeding sites.

Mating occurs between late March and August in Ohio. The earliest recorded date for reproduction in Ohio is March 28, 2009 in Scioto County (Davis and Krusling, 2009). Adults move to temporary pools to breed after torrential thunderstorms that are associated with significant drops in atmospheric pressure. Breeding sites in Ohio can

be as small as roadside puddles or large flooded agricultural fields (Figures 5 and 6). The male's advertisement call can be described as a harsh "whar" that has been likened to the call of nestling crows. Amplexus is inguinal and the eggs are laid in double bands, one to two inches wide about 12 inches long and draped over submerged vegetation. The tadpoles are voracious feeders. They eat algae, plankton, and as their temporary pools begin to dry, they may become cannibalistic. While most Ohio species of frogs and toads require eight weeks to two years to metamorphose, Spadefoots may do so in as few as two or three weeks. Reproduction can be repeated several times in a season but during dry years it may not take place at all.

Spadefoots spend most of their time burrowed into friable soils such as sand or loams (Figure 7). They do not venture far from their burrows except to reproduce. On rainy nights they may leave their burrow to forage on a variety of small invertebrates, especially insects, and typically return to the same burrow. If the weather is dry, Spadefoots ambush passing insects from the mouth of their burrow. In Ohio, Spadefoots are restricted to the Hocking, Muskingum, Tuscarawas and Ohio River valleys, and the Sandy Creek drainage in Tuscarawas County. There is one historical record (1957) from Pike County in the Scioto River drainage. The distribution of the Spadefoot in Ohio is illustrated in Figure 8.

2.0 METHODS

2.1 Desktop Survey

A literature review and a search for museum specimens was conducted to determine the history of Eastern Spadefoot distribution in the vicinity of the project area. Because river floodplains serve as migration corridors for this species, historical records in the Ohio River, Scioto River, and pre-glacial Teays River valleys in Scioto County and adjacent counties were given careful consideration.

Soil and topographic maps and aerial photographs were examined to determine if a site visit was necessary based on available potential habitat (terraces adjacent to floodplains) and soil type (sandy or loamy soils consistent with known Spadefoot sites in Ohio).

2.2 Habitat Quality Ranking

The results of the desktop survey and site visit were combined to assess the suitability of the subject site as Spadefoot habitat. If potential Spadefoot habitat (habitat ranked **moderate** or **high quality**) was present, a Presence-Absence Survey at any of the three sites in the project area would be recommended to confirm the presence or absence of the species.

Eastern Spadefoot habitat quality is ranked by the number of habitat indicators present and the history of known populations in the vicinity of the subject area. Also considered in the evaluation are any anecdotal records (word of mouth but no conclusive evidence is available), and information from herpetologists familiar with the region and the species. Finally, consideration is given based on what is known about the herpetological

community in the county. If herpetologists have made significant efforts to document the amphibians and reptiles in the county one can assume an increased probability that most species that occur in the region will have been found.

It is important to recognize that due to the Spadefoot's unpredictable breeding season, fossorial habits, and short larval period it can be easily overlooked. These unique features of its life history are also taken into consideration when Spadefoot habitat assessments are being conducted.

The habitat is determined to be of **high quality** if all five indicators are present. Four of five indicators rank the habitat to be of **moderate quality**, three indicators rank the habitat as **low quality**, and zero to two indicators rank the site as **unsuitable** for Spadefoots. There may be circumstances where four of five indicators are present at a site but the Presence-Absence Survey is not recommended. This would be the case if the missing indicator is a potential breeding site or soil suitable for burrowing.

3.0 RESULTS

3.1 Museum Records and Literature Search

The museum search provided records of two extant populations in the Ohio River valley in Scioto County, Ohio. Records from recent years were found at the Cincinnati Museum Center's Geier Collections and Research Center. Specimen numbers CMC 11056 and 11057 were collected at Sand Hill, Porter Township in 2008 and CMC HP 5156-5159 were collected from Franklin Furnace in 2009. Sand Hill is just 5.3 km (3.2 miles) south of the subject site. The Franklin Furnace site is 13.1 km (8.2 miles) south of the subject site.

Reports of Spadefoots from Scioto County Ohio are also present in the literature. Davis and Krusling (2009) reported the presence of the population at Sand Hill and Davis (2013) reports the population at Franklin Furnace.

Herpetological specimens collected in Scioto County, Ohio are represented by 12 frog and toad species, 18 salamander, 4 lizard, 16 snake and seven turtle species (Davis and Menze, 2000; Pfingsten and Matson, 2003; Moody and Wynn, 2006; Davis and Krusling 2009; Pfingsten et al., 2013). These 57 species represent 93.4% of the 61 species that occur in extreme south central Ohio and suggest that a good deal of herpetological collecting by professional and qualified amateurs has taken place in Scioto County.

3.2 Subject Site Visit

A site visit was made to all three subject sites on 21 September 2013 to further determine their potential as Eastern Spadefoot habitat with specific attention being given to possible breeding sites and upland burrowing habitat.

3.3 Subject Site Habitat Quality

Site 1: A review of historical aerial photos at Site 1 indicated that water periodically pools in the field at the end of Banner Street (38.73926°N, 82.86940°W) after significant rain events (Figure 9). Such pools in pastures and agricultural fields are known breeding sites of Spadefoots elsewhere in Ohio. Because this species may move nearly 1,000 m to breeding sites, migrating adults could potentially cross the southern terminus of the proposed route of the Portsmouth Bypass when moving to and from the hills east of St. Rt. 52 to the Banner Street pool. Another potential site was found in the wooded area between St. Rt. 52 and the railway that parallels it to the southwest (Figure 10). However it was determined during the site visit, that concrete barriers between the east and west bound lanes of St. Rt. 52 would block any migrations between the hills and the floodplain. The soil was heavy clay and the canopy of the wooded area between the railway and St. Rt. 52 appears too dense to serve as Spadefoot habitat.

Site 2: Site 2 is located in an area named Happy Hours Addition on the northeast side of Sciotoville. The desktop survey revealed an elongated slough of water near the southern end of the area of interest at the base of a hillside at approximately 38.76657°N, 82.87398°W (Figure 11). This was examined as potential breeding site. The body of water is at the edge of a pasture near a sawmill. The landowner explained that the crescent-shaped slough was man made and was dug near the turn of the 20th century. It holds water permanently and therefore would not serve as suitable breeding habitat for Spadefoots. The hillside was extremely steep and much of it consisted of talus that had slid down the hillside. The soil above the talus slopes were too heavy to be suitable as Spadefoot burrowing habitat. As a result of a pedestrian and driving survey from the streets in Happy Hours Addition, no suitable habitat was identified (Figure 12). The area was strikingly similar to the neighborhood at Sand Hill where an extant population occurs.

Site 3: The exchange from St. Rt. 23 to the Portsmouth Bypass will be north of Lucasville at approximately 38.89159°N, 82.99985°W. The Scioto River valley is broad at this point and water pools in the agricultural fields on the west side of St. Rt. 23 at the site (Figures 13 and 14). Pools like those at Site 3 are often used as Spadefoot breeding sites elsewhere in Ohio. However there is a deep, steep-sided ditch between the field and St. Rt. 23. At the time of the site visit water was running through the ditch one day after a relatively light rainfall. The heavy storms required to initiate a Spadefoot breeding event would send water raging through the ditch blocking access to the fields from the terrace west of the highway.

The portion of this Site 3 east of St. Rt. 23 was surveyed on foot. The native soils on the terrace east of St. Rt. 23 appeared sufficiently friable for Spadefoots to burrow into but it compacted into clumps. Spadefoots are only found in loose soils that do not form clumps that hold together when compressed. Therefore these soils are not suitable as upland (burrowing) habitat (Figure 15). Much of the terrace is paved over or covered with fill (Figure 16). If Spadefoots inhabited the area historically, the combination of disturbances to the terrace, construction of the highway and the ditch that blocks access to the flood plain has probably eliminated them.

Potential Spadefoot prey species were abundant at all three sites. Crickets, wood roaches, beetles, millipedes, and sowbugs were abundant under logs and plant debris. Grasshoppers were also plentiful. All of these are species that are included in the Spadefoot's diet.

Evaluation of habitat quality indicators for Sites 1, 2, and 3 are summarized in Tables 1, 2, and 3 respectively.

4.0 RECOMMENDATIONS

This Habitat Survey ranks **Site 1** as providing **moderate quality** Eastern Spadefoot habitat (4 of 5 indicators). However, the upland habitat northeast of St. Rt. 52 is isolated from the potential breeding sites southwest of the highway by a wall of concrete barriers between the east and west bound lands of St. Rt. 52. Consequently any historical populations of Spadefoots have probably been eliminated by habitat disturbance. **There are no indications that activities involved with construction of the Portsmouth Bypass will impact Eastern Spadefoots at Site 1.**

This Habitat Survey ranks **Site 2** as providing **low quality** Eastern Spadefoot habitat (3 of 5 indicators). **There are no indications that activities involved with construction of the Portsmouth Bypass will impact Eastern Spadefoots at Site 2.**

This Habitat Survey ranks **Site 3** as providing **moderate quality** Eastern Spadefoot habitat (4 of 5 indicators). However, disturbances to the soils and the migration corridor between the terrace east of St. Rt. 23 and the potential breeding pools west of it are significant and probably have eliminated Spadefoots if they occurred at the site historically. **There are no indications that activities involved with construction of the Portsmouth Bypass will impact Eastern Spadefoots at Site 3.**

A Presence – Absence Survey is not recommended at any of the three sites.

LITERATURE CITED

- Davis JG. 2013.** Eastern Spadefoot (*Scaphiopus holbrookii*) Pages 685-707. *In:* Pfingsten RA, Davis JG, Matson TO, Lipps G, Wynn D, and Armitage BJ (Editors). Amphibians of Ohio. Ohio Biological Survey Bulletin New Series, Volume 17 (1). Columbus.
- Davis JG, Krusling PJ. 2009.** Geographic Distribution *Scaphiopus holbrookii*. Herpetological Review 40(4): 447.
- Davis JG, Menze SA. 2000.** Ohio Frog and Toad Atlas. Ohio Biological Survey. Miscellaneous Contributions Number 6.
- Davis JG, Menze SA. 2002.** In Ohio's Backyard: Frogs and Toads. Ohio Biological Survey.
- Moody SM. 1986.** Geographic distribution: *Scaphiopus holbrookii* (Eastern Spadefoot). Herpetological Review 17(4): 91.
- Pfingsten RA, Davis JG, Matson TO, Lipps G Jr., Wynn D, and Armitage BJ. (Editors). 2013.** Amphibians of Ohio. Ohio Biological Survey Bulletin New Series. Volume 17 Number 1 xiv + 899 p.
- Pfingsten RA, Matson TO. 2003.** Ohio Salamander Atlas. Ohio Biological Survey. Miscellaneous Contributions Number 9.
- Wynn D, Moody SA. 2006.** The Ohio Turtle, Snake and Lizard Atlas. Ohio Biological Survey Miscellaneous Contributions Number 10.

Figures

Figure 1. Aerial view of three sites requiring site visits to evaluate their potential as Eastern Spadefoot habitat. In figures A and B the areas outlined in red were areas of interest and were examined from the road. A pedestrian survey was conducted in the areas outlined in blue. **(A)** Site 1 is in the Ohio River bottoms at the southern terminus of the Portsmouth Bypass. Its approximate center is at 38.74271°N, 82.86927°W. The area outlined in blue is most critical. **(B)** Site 2 is situated on the north side of Sciotoville at approximately 38.76969°N, 82.87311°W. The area outlined in blue is most critical. **(C)** Site 3 is at the western terminus near Lucasville at 38.89213°N, 82.49895°W. The entire area is critical.



Figure 2. Eastern Spadefoot, *Scaphiopus holbrookii*, from Meigs Co., Ohio.



Figure 3. Eastern Spadefoots are the only Ohio anurans to have vertically elliptical pupils. Photo by Jason Folt.



Figure 4. The hard black "spade" on the Eastern Spadefoot's heel is used to dig into soft soil. Photo by Jason Folt.



Figure 5. This Eastern Spadefoot breeding pool in Washington County, Ohio. is a puddle in a pasture.



Figure 6. This Eastern Spadefoot breeding pool in Morgan County, Ohio. is a flooded soy bean field.



Figure 7. In Ohio, Eastern Spadefoots inhabit areas where rivers have deposited sand to create sandy or loamy soils that is sufficiently friable for them to burrow into. This is sandy loam from an Eastern Spadefoot site in Meigs County, Ohio.



Figure 8. The distribution of the Eastern Spadefoot in Ohio is limited to the valleys of the Hocking, Ohio, Scioto, and Muskingum Rivers. There is a historic record from the Scioto River watershed in Pike County.

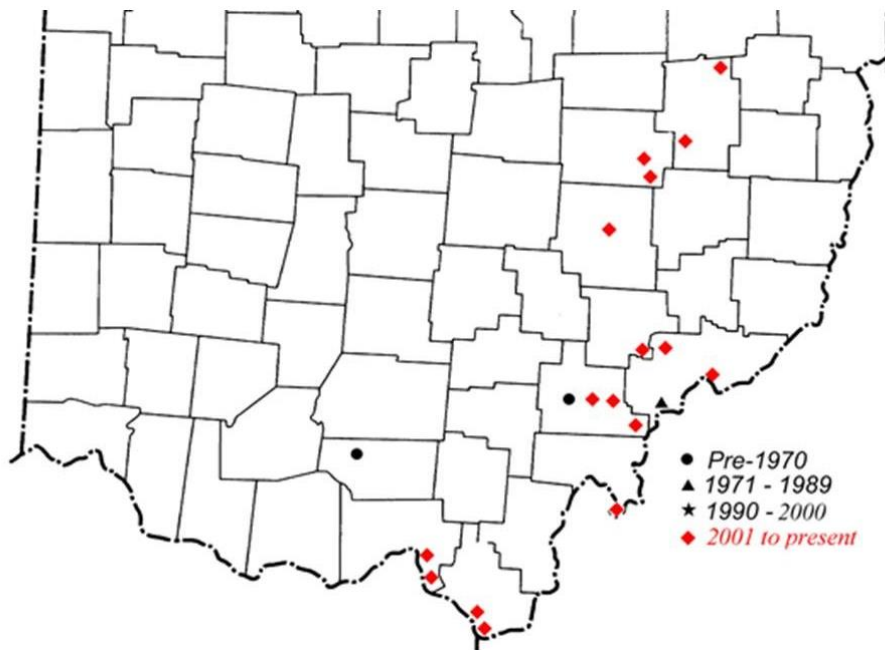


Figure 9. Evidence that the field at the end of Banner Street holds water during heavy rain events. Areas where no vegetation are growing were probably under water when seeds in the rest of the field germinated during spring. The center of the field is at approximately 38.73926°N, 82.86940°W (top). The same field from its north end on September 21, 2013 (bottom).

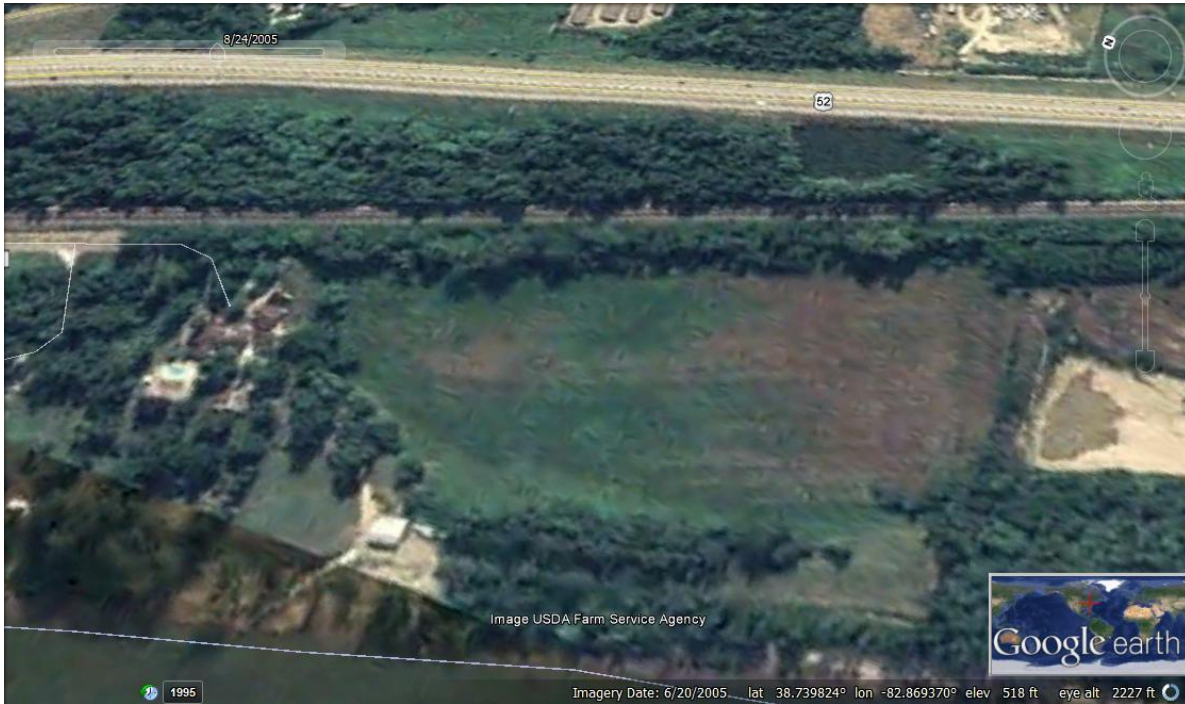


Figure 10. Potential breeding site located in the woodlot between St. Rt. 52 and the railway at 38.74051°N, 82.86857°W.



Figure 11. This elongated, crescent-shaped pool near Happy Hours Addition was investigated as a potential Eastern Spadefoot breeding site. It holds water permanently, in all but the driest of seasons and was consequently deemed unsuitable as a breeding site.



Figure 12. Happy Hours Addition is located in the floodplain of the Little Scioto River. There was evidence of low areas that might hold water during heavy rain events but no habitat that could be used for burrowing was identified.



Figure 13. Standing water was evident in the Scioto River floodplain on the west side of St. Rt. 23 at the time of the site visit. This photo was taken from Fairgrounds Rd. looking west across St. Rt. 23 (top). The same floodplain pool looking south from the Scioto River floodplain. Spadefoots breed in flooded pools in agricultural fields at several sites in Ohio.



Figure 14. Looking south at the same flooded depression in the Scioto River floodplain.



Figure 15. Soil on the terrace east of St. Rt. 23 at Site 3 was friable but contained enough clay to allow it to clump. This soil is unsuitable as Spadefoot burrowing habitat.



Figure 16. Much of the terrace is paved over, compacted or covered in rocky or gravelly fill. Consequently it is unsuitable as upland (burrowing) habitat for Spadefoots.



Tables

Table 1. Summarization of habitat indicators at Site 1 of the Eastern Spadefoot Habitat Survey at the southern terminus of the Portsmouth Bypass. Four of five indicators were present at or in association with Site 1 ranking it as **moderate quality** habitat for Eastern Spadefoots. **However, the dividers between the east and west bound lanes of St. Rt. 52 nullify the moderate quality rating.** There is no suitable burrowing sites southwest of the highway.

Indicator	Present	Comments
Spadefoots are currently or were historically present in the watershed.	Yes	Spadefoots are known from Sand Hill, 5.3 km (3.2 miles) Franklin Furnace 13.1 km (8.2 miles) south of the subject site.
Potential breeding sites present	*Yes	Evidence of two depressions that hold water during heavy rain events are located at the subject site. *However, concrete barriers between east and west bound St. Rt. 52 would impede the ability for Spadefoots to migrate from the terraces northeast of the highway to the depressions southwest of it.
Open canopy or a lightly wooded canopy is present in areas where burrowing is possible.	Yes	Both were present but open canopy areas were very disturbed and the closed canopy areas were on steep hillsides lacking friable soils.
Friable soils are present.	No	Soils in the woodlot between St. Rt. 52 and the railway are too heavy for burrowing. Soils east of St. Rt. 52 are irrelevant because of the highway barriers.
Ground cover provides habitat for insects and other small animals for Spadefoot forage.	Yes	Prey species were plentiful at Site 1. A diversity of insects, millipedes, and sowbugs were found.

Table 2. Summarization of habitat indicators at Site 2 of the Eastern Spadefoot Habitat Survey near Happy Hours Addition northeast of Sciotoville, Ohio. Three of five indicators were present at or in association with Site 1 ranking it as **low quality** habitat for Eastern Spadefoots.

Indicator	Present	Comments
Spadefoots are currently or were historically present in the watershed.	Yes	Spadefoots are known from Sand Hill, 5.3 km (3.2 miles) Franklin Furnace 13.1 km (8.2 miles) south of the subject site.
Potential breeding sites present	No	The potential breeding pool identified during the desktop survey is permanent and consequently unsuitable as Spadefoot breeding habitat.
Open canopy or a lightly wooded canopy is present.	Yes	The edge of the wooded hillside provides a light canopy and the pastures and lawns provide open canopy.
Friable soils are present.	No	Soils at Site 2 were heavy clay or covered with talus and are unsuitable as Spadefoot burrowing habitat.
Ground cover provides habitat for insects and other small animals for Spadefoot forage.	Yes	Grasshoppers were abundant an, crickets, beetles, millipedes, sowbugs, and wood roaches were also found at Site 2.

Table 3. Summarization of habitat indicators for the Eastern Spadefoot at Site 3 of the Eastern Spadefoot Habitat Survey north of Lucasville, Ohio. Four of five indicators were present at or in association with Site 3 ranking it as **moderate quality** habitat for Eastern Spadefoots. However the degree to which access to the floodplain breeding pools from the terraces east of St. Rt. 23 are disturbed, it is unlikely that Spadefoots exit at the site.

Indicator	Present	Comments
Spadefoots are currently or were historically present in the watershed.	Yes	Spadefoots are known from the valley of a Scioto River tributary in Pike County, Ohio.
Potential breeding sites present	*Yes	Flooded depressions in the agricultural fields in the Scioto River valley on the west side of St. Rt. 23 were present at the time of the site visit. *A deep ditch between the fields and the terrace east of St. Rt. 23 would likely prohibit Spadefoots from reaching the flooded depressions in the field to the west.
Open canopy or a lightly wooded canopy is present.	Yes	Nearly all of the terrace west of St. Rt. 23 has an open canopy.
Friable soils are suitable for burrowing are present.	No	Soil on the terrace was friable but when compressed it formed clods suggesting the clay content is too high to make it suitable for Spadefoots. Much of it was paved over or covered with rocky or gravelly fill.
Ground cover provides habitat for insects and other small animals for Spadefoot forage.	Yes	Grasshoppers and crickets were abundant areas that were not mowed along the roadside and in empty lots.

