

**Project Title:** Habitat use and spatial ecology of Eastern spotted skunks in the Ozarks

**Project Summary:** Eastern spotted skunks are estimated to have undergone a >90% reduction throughout their range, including portions of the Ozarks. Previous research completed in shortleaf-pine forest systems of Arkansas has revealed close habitat associations between eastern spotted skunks and early successional forest habitat with dense understory. However, very little is known about spotted skunk spatial ecology in the broader Ozark region which is known to be within the range of the species. In the study we will capture and radio-track eastern spotted skunks within this region to evaluate how understory management practices performed as part of oak-woodland restoration could be influencing this species. Research is expected to take place over a single, year-long field season followed by several months of analysis to provide estimates of space use and resource selection for the species in the Ozark region. We will produce a final report, MS thesis, and multiple peer-reviewed publications that are oriented toward informing forest management practices for this species.

**Project Leader:**

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**Project Budget:**

SWG requested: \$ 79,079

Match provided: \$ 43,509

Total amount of project: \$ 122,588

**Need:**

The eastern spotted skunk (*Spilogale putorius*), once regarded as a fairly common furbearer throughout much of the Appalachians, Midwest and Ozark-Ouachita Highlands, is estimated to have undergone >90% decline across its range since the 1950's (Gompper and Hackett 2005). A variety of hypotheses have been developed to explain this observed decline. Correlative evidence suggest that declines could be linked to competition with meso-mammalian predators (i.e., striped skunks (*Mephitis mephitis*), raccoons (*Procyon lotor*), and coyotes (*Canis latrans*)) that have each increased in abundance since the 1980's when overall trapping pressure declined. Further, a series of rabies outbreaks in the mid-Atlantic and Midwest beginning in the 1970's also may have continued to suppress spotted skunk populations (Chapman 2007, Lesmeister et al. 2009, Lesmeister et al. 2010). However, currently, the most supported hypothesis is that spotted skunk decline probably has been a result of the loss of old field habitats due to expanding modern agricultural practices and maturation of early successional forests following land abandonment in the Midwest and Ozark-Ouachita Highlands (Gompper and Hackett 2005, Lesmeister et al. 2009).

Previous research in shortleaf-leaf pine (*Pinus echinata*) forest communities in Arkansas has closely linked spotted skunk resource selection with early succession forests that contain dense understory. Specifically, Lesmeister et al. (2009) found that eastern spotted skunks exhibited a strong preference for early-successional shrub-scrub, oldfield and young forest regeneration habitat, and avoidance of either open forest savanna or mature forest condition. This has led to potential conflicts between managing these forest types for restoration of red-cockaded woodpeckers (*Picoides borealis*; Lesmeister et al. 2012). However, short-leaf pine forested systems are not typical habitat within the range of the eastern spotted skunk in the Arkansas and Missouri Ozarks, and the habitat use relationships and spatial ecology of the species in these Oak-woodland systems remains unknown.

By accomplishing this project we will directly address the 2015 SWG funding priority for this species as well as directly addressing two of the three listed "Data Gaps and Research Needs" for the species according the Arkansas State Wildlife Action Plan (page 859): (1) Determine habitat use relationships, and (2) Determine home range.

**Purpose and Objectives:**

The purpose of this project is to investigate the habitat use and spatial ecology of eastern spotted skunks in oak-woodland forest of the Ozarks. In particular, our objective is to determine how spotted skunks respond to oak-woodland restoration and associated understory management programs. We will test the hypothesis that understory treatment programs that reduce understory cover result in decreased habitat suitability and are avoided by eastern spotted skunks relative to untreated forest patches.

**Location:**

Historically spotted skunks were present across a large portion of the Ozark region of northern Arkansas (Figure 1). A variety of locations within that present suitable research sites that

include but are not limited to: Bearcat Hollow, Sillamore Ozark National Forest, Gene Rush WMA, Madison County WMA, and private and public land holdings in Stone County, Arkansas. Pending project funding and approval, we will utilize historical sighting records and expert opinion to prioritize areas for trapping within these (and potentially other) study locations that contain a diversity of understory management regimes.

**Approach:**

Our approach is to evaluate eastern spotted skunk spatial ecology in Ozark oak-woodland managed forest areas that contain differing forest understory management regimes. To identify what specific habitat attributes are utilized within these habitats of differing understory management regimes, we will attempt to trap and radio-track 15-30 spotted skunks over the course of an entire year (see schedule below) to evaluate seasonal and sex-specific patterns in space use and resources selection. We will capture spotted skunks using protocols established by Lesmeister et al. (2009), where trapping will be done using baited tomahawk live traps and focused during winter

months between January-March 2016 when capture probability is highest. Upon capture, following collection of basic attributed data such as weight, sex, and physical measurements, spotted skunks will be marked with metal ear tags and fitted with a 12 gram VHF radio-tracking collar.

We will track and triangulate the location of marked skunks 28 hr intervals, thus allowing for collection of locations at differing times of day (capturing resting and foraging periods) and

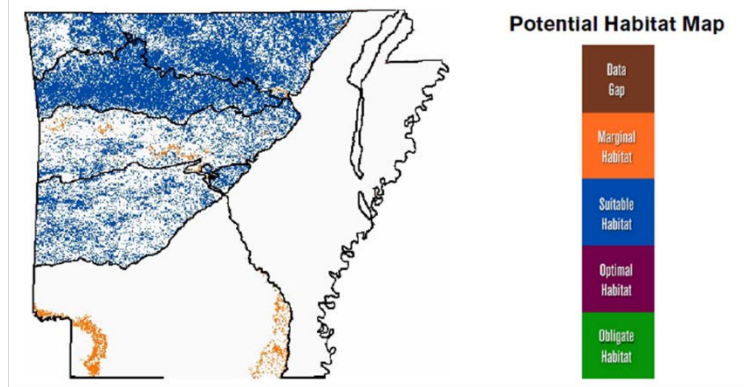


Figure 1. Map of potential spotted skunk habitat across Arkansas based on State Wildlife Action Plan.

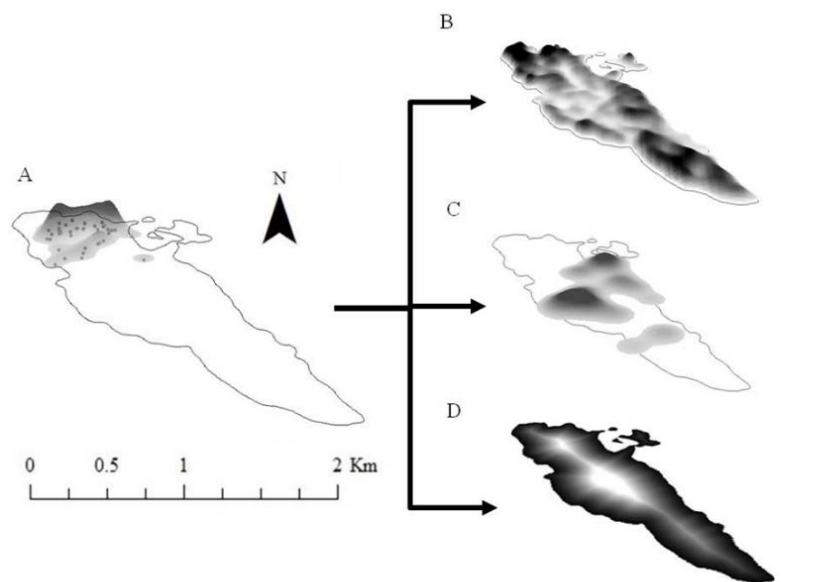


Figure 2. Example of 95% fixed kernel utilization distribution of a spotted skunk based on telemetry locations (A) within a forest management zone (solid outline). The individual pixel values within the UD grid will be simultaneously related to resource attributes B, C and D on a pixel-by-pixel basis using multiple regression.

allowing for assumption of independence between fixes (Lesmeister et al. 2009). We will use all individuals for which we are able to collect >30 locations per season to construct 95% fixed kernel home range utilization distributions (Lesmeister et al. 2009). We will then relate probability of space use within home ranges to available habitat within study area using a resource utilization function (RUF) approach (Figure 2), that involves multiple regression and AIC<sub>c</sub> model ranking to determine the best approximate model for fine-scale resource selection within an animal's home range (Jachowski et al. 2010).

Timeline/Schedule:

August 2015 – December 2015: MS student will take classes and prepare for upcoming field season

January 2016 – December 2016: Year-long field work tracking radio-collared spotted skunks

January 2016 – August 2017: Completion of data analysis, report writing and thesis defense

**Expected Results and Benefits:**

Collectively, these investigations should improve our understanding of habitat attributes and potential forest management practices that could improve habitat conditions for spotted skunks. Results will be presented in an MS thesis, final report, and at least 2 peer-reviewed publications containing recommendations for land managers to enhance availability of spotted skunk habitat. Further, given the urgent need for forest managers in Arkansas and other parts of the US to understand spotted skunk habitat requirements, we will present our findings at national and regional meetings. Finally, because the value in informing the public about this species of conservation concern, we will be able to profile results of this research project on multiple media outlets, including our dedicated spotted skunk blog: <http://easternspottedskunk.blogspot.com/>

**Budget:** Total = \$122,588; Requested = \$79,079; Match = \$43,509 or (35% of total)

| Item                            | August 2015-July 2016 |                  | August 2016-July 2017 |                  |
|---------------------------------|-----------------------|------------------|-----------------------|------------------|
|                                 | Requested             | Match            | Requested             | Match            |
| Personnel                       |                       |                  |                       |                  |
| PI                              |                       | \$10,500         |                       | \$10,500         |
| MS Student                      | \$ 18,000             |                  | \$ 18,000             |                  |
| Field Technician                | \$ 4,400              |                  | \$7,900               |                  |
| Fringe                          | \$ 2,450              | \$ 2,961         | \$ 3,640              | \$ 2,961         |
| Travel                          | \$ 3,000              |                  | \$ 4,500              |                  |
| Materials and Supplies          | \$ 8,500              |                  | \$ 1,500              |                  |
| Graduate Assistant Differential |                       | \$ 8,091         |                       | \$ 8,496         |
| <b>Total</b>                    | <b>\$ 36,350</b>      | <b>\$ 21,552</b> | <b>\$ 35,540</b>      | <b>\$ 21,957</b> |
| Indirect Cost (10%)*            | \$ 3,635              |                  | \$ 3,554              |                  |
| <b>Grant Total</b>              | <b>\$ 39,985</b>      | <b>\$ 21,552</b> | <b>\$ 39,094</b>      | <b>\$21,957</b>  |

**Qualifications:**

Dr. David S. Jachowski is a renowned small carnivore expert with 3 ongoing research projects on Eastern Spotted Skunks. Each of these projects (located in Virginia, North Carolina, and South Carolina) is investigating patterns in eastern spotted skunk distribution and spatial ecology and involves collaboration with state furbearer biologists, private landowners (including the Nature Conservancy), and Federal land managers. In addition, Dr. Jachowski is an expert on animal space use and resource selection studies, having published over 30 peer-reviewed journal articles. Most notably, he has over 15 years of experience in working with small carnivores, most recently writing a book on the ecology and conservation of the endangered black-footed ferret. Finally, Dr. Jachowski has a history of working in the Ozarks. His wife is a leading expert on the Ozark hellbender, his best friend was the lead researcher in an earlier study of spotted skunks in Arkansas (Damon Lesmeister), and he maintains active collaborations with researchers at the University of Missouri regarding elk populations in the region.

## Literature Cited:

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