Project Title: Status and distribution survey of the long-tailed weasel, *Mustela frenata*, in Arkansas

Project Summary: The long-tailed weasel, *Mustela frenata*, was once distributed across all of the United States except for the desert southwest (Fagerstone 1987), and its distribution was considered statewide in Arkansas. The only monitoring activity for the species in Arkansas has been through trapping records. Given there is a data gap in each of the habitats across the state (Anderson 2006), we propose to conduct a status and distribution survey for the species across the state. This study will provide a measure of which habitats long-tailed weasels currently inhabit in Arkansas, the detectability in each of the habitats sampled, a habitat model of potential locations for future efforts, and insight into the effort required to effectively detect the species. In addition to presentations and reports, a peer-reviewed publication will result.

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Project Budget: Values given are estimated.

Item	Match	SWG	Total
Salary and Fringe	47148	7800	54948
Travel		26000	26000
Equipment/Supplies		12000	12000
Publication		1000	1000
Indirect 42% vs 17.5%	11466		11466
Sub-total	58614	46800	105414
Indirect		8190	8190
Total	58614	54990	113604
Percent:	51.6	48.4	

Need: Long-tailed weasels have been studied little because of the difficulty of capture, low densities, and their otherwise cryptic nature. Long-tailed weasels, however, have been trapped as a common furbearer across its range even though pelts are worth little (Sheffield and Thomas 1997). Fur harvests of long-tailed weasels, a measure of relative abundance for this and other furbearers, have been in decline across the species range since the 1930's (Fagerstone 1987). Causes for the decline likely have been two-fold. First, there has been a decline in the number of trappers over time and, second, habitat loss has likely affected the distribution of the species (Fagerstone 1987, Gehring and Swihart 2004).

Long-tailed weasels are considered common in most southern and mid-western states, but several states consider it a species of concern (Lester 2005, ALDCNR 2013, MDC 2013). The species is considered widely distributed throughout Arkansas but rare in its occurrence (Sealander and Heidt 1990). Only 6 long-tailed weasel pelts were reported sold in the last 25 years in Arkansas, and there has been no season for long-tailed weasels for more than 10 years (Sasse 2009, 2012).

Long-tailed weasels have been described as a generalist in their habitat selection (Sealander and Heidt 1990) preferring late seral stages or ecotones in close proximity to water (Gamble 1981). More specific to Arkansas, the species prefers open fields and forests adjacent to waterways. Long-tailed weasels are thought to be most common where pocket gophers populations exist within the state(Sasse 2012), but they too are limited in their distribution within Arkansas (Sealander and Heidt 1990).

Much of the research conducted on long-tailed weasels has been in the northern extent of the species range (Gehring and Swihart 2004, Quinlan et al. 2004, Proulx 2005), and most work is descriptive relative to habitat relationships (Polderboer et al. 1941, Musgrove 1951, Keith and Cary 1991). Trends in long-tailed weasel populations in Canada have recently been described as cyclic, peaking every 10 years (Keith and Cary 1991), and potentially making detection of the species more difficult during lulls in the cycle. While cycles are expected in some predator-prey systems in more northern latitudes, those same cycles are unknown to exist for long-tailed weasels in the southern portion of its range. There is a need to estimate the distribution and status of long-tailed weasels in Arkansas given the absence of individuals in trapping harvests and changes in land use practices. This work will address the *Mustela frenata* Comprehensive Wildlife Conservation Strategy priority that calls for the conduct of a distribution study for the species.

Purpose and Objectives: In general, this work will establish base-line information for the occurrence and probability of detecting long-tailed weasels in various ecoregions of Arkansas. The objectives of this study are to: 1) determine a relative measure of occupancy in each of the ecoregions sampled; 2) provide a measure of detectability in each of the ecoregions sampled; 3) provide a habitat model of potential locations for future efforts; and, 4) estimate the amount of effort required, in monetary terms, to effectively detect the species.

Location: The study will be conducted across Arkansas (Figure 1) in each of the ecoregions on public lands, including wildlife management areas, national wildlife refuges, and national forest properties. Because long-tailed weasels seem to be in association with waterways adjacent to fields and forests, I will create a list of potential sites based on those habitat features modeled in a GIS. Locations to be sampled will come from the sampling frame developed in the GIS.
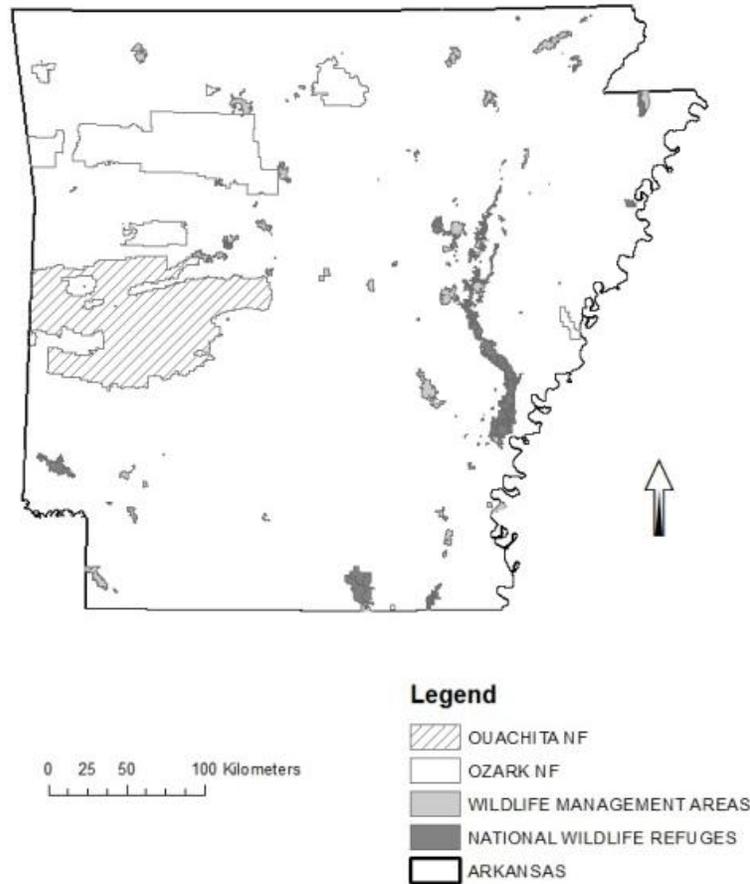
Figure 1. Public lands in Arkansas to be used as potential locations to sample for Long-tailed Weasels.

Approach: The sampling frame will be provided using a GIS to model potential areas of occurrence across the state. In each ecoregion a sample of sites will be randomly selected from the sampling frame to survey. Sampling will be based on occupancy modeling using a single species, single season approach (MacKenzie et al. 2006). Assuming a low probability of detection (i.e., p = 0.1), a low probability that a selected site is occupied by the species (ψ = 0.1), a liberal variance (var(ψ) = 0.2), and the optimum number of surveys to conduct (i.e., 14) given these assumptions (MacKenzie et al. 2006), a total number of surveys will be 56 per ecoregion and a total of 330 surveys across the state. Surveys will be conducted from 1 March to 31 May, as this is thought to span the best period to detect the species (Downey 2004).

   Each site will be surveyed using two methods of detection, each placed at a station. The first method will be a soot-track plate system described by Downey (2004). Soot-track plates will be baited using chicken or some other meat with a predator scent sprayed at the site. The second method will be a trail camera system designed to record images every 10 seconds. Both methods will be used at each station and there will be 14 stations per site. Stations will be spaced approximately 1 km apart and at least 50 m from any road or trail. Each station will be checked every day for a week to take track samples, replenish bait, check the soot-track plates, and replace batteries. Tracks on soot-plates will be identified to species, as will images taken using the camera system. Though not planned, any capture and handling of weasels will be performed following guidelines of the American Society of Mammalogists (Sikes et al. 2011) and will be approved by the University of Arkansas at Monticello Institutional Animal Care and Use

Committee. Habitat variables including, but not limited to, cover type, distance from water, distance from roads, distance from fields, canopy cover, and number of debris piles in the vicinity will be used to assess the relationship between occurrence with habitat. Data will be analyzed using Presence 5.7 to determine the probability of detection and the probability of occurrence. A linear regression approach will be used to assess habitat relationships.

Expected Results and Benefits: I expect to estimate occupancy and detection rates for long-tailed weasels in selected ecoregions, provide a model predicting habitat that may be occupied by long-tailed weasels, and estimate the cost for future efforts to assess distribution and status of the species. The benefit of the work will be a baseline of information relative to population distribution within the state and will serve as a foundation on which to build future assessment efforts for the species. I will also provide presentations to scientific meetings, presentations to local trapping groups if interested, an annual and final report, and a peer-reviewed publication.

Budget

	YR 1		YR 2		Total		
	UAMF	SWG	UAMF	SWG	UAMF	SWG	Total
PI	7341	0	7341	0	14682	0	14682
Fringe	2312	0	2312	0	4624	0	4624
Program Technician	10800	0	10800	0	21600	0	21600
Fringe	3121	0	3121	0	6242	0	6242
Field Technician	0	3600	0	3600	0	7200	7200
Fringe	0	300	0	300	0	600	600
Travel	0	10000	0	10000	0	20000	20000
Supplies	0	10000	0	2000	0	12000	12000
Meeting	0	3000	0	3000	0	6000	6000
Publication	0	0	0	1000	0	1000	1000
Indirect Savings	6590		4875		11465	0	11465
Sub-total	30164	26900	28449	19900	58613	46800	105413
Indirect		4708		3483		8191	8191
Total	30164	31608	28449	23383	58613	54991	113604

The principal investigator reserves the right to move funds from one category to another if required to successfully complete the project.

Robert E. Kissell, Jr., Ph.D. is an Associate Professor in the School of Forest Resources at the University of Arkansas at Monticello. He has experience conducting research on large and medium-sized mammals, directing and conducting distributional surveys, estimating population size using various techniques, and modeling spatial distribution and resource selection. In Arkansas, he has directed graduate students in the study of the relative abundance of swamp rabbits, relative abundance of furbearers, and provided habitat modeling for selected species. In addition to final reports and numerous presentations, he has produced peer-reviewed publications in regional, national, and international journals for each study he has undertaken.

Selected Publications

Kissell, Jr., R. E. and S. K. Nimmo. 2011. A technique to estimate white-tailed deer density using vertical-looking infrared imagery. Wildlife Biology 17:85-92.

Vale, K. B. and **R. E. Kissell, Jr.** 2010. Home range, movements, and territoriality of male swamp rabbits in southeastern Arkansas. Mammalia 74:369-377.

Vale, K. B. and **R. E. Kissell, Jr.** 2010. Male swamp rabbit (*Sylvilagus aquaticus*) habitat selection at multiple scales. Southeastern Naturalist 9:547-562.

Fowler, A. T. and **R. E. Kissell, Jr.** 2007. Distribution and ecology of the swamp rabbit in the Mississippi Alluvial Plain of Arkansas. Southeastern Naturalist 6:247-258.

Gabor, T. M., **R. E. Kissell, Jr.**, D. A. Elrod, and R. E. Lizotte, Jr. 1994. Factors affecting scent-station visitation rates of raccoons and bobcats. Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies 48:182-190.

Kissell, Jr., R. E. and M. L. Kennedy. 1992. Ecologic relationships of co-occurring populations of opossums (*Didelphis virginiana*) and raccoons (*Procyon lotor*). Journal of Mammalogy 73:808-813.

Appendix
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