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Incidental captures of Eastern Spotted Skunk in a High-elevation Red Spruce forest in Virginia

Corinne A. Diggins^{1,*}, David S. Jachowski², Jay Martin³, and W. Mark Ford⁴

Abstract - *Spilogale putorius* (Eastern Spotted Skunk) is considered rare in the southern Appalachian Mountains and throughout much of its range. We report incidental captures of 6 Eastern Spotted Skunks in a high-elevation *Picea rubens* (Red Spruce) forest in southwestern Virginia during late February and March 2014. At 1520 m, these observations are the highest-elevation records for Eastern Spotted Skunk in the Appalachian Mountains. They are also the first known records of this species using Red Spruce forests in the southern Appalachians.

Spilogale putorius L. (Eastern Spotted Skunk) is a nocturnal carnivore considered rare and possibly declining throughout its range (Chapman 2007, Gompper and Hackett 2005). The eastern portion of the species' distribution extends from southwestern Pennsylvania, southward along the central and southern Appalachian Mountains into the Gulf Coastal Plain and Florida (Chapman 2007, Kays and Wilson 2002). Habitat requirements for the species are highly variable across its range; suitable cover and den-site availability appear to be critical factors (Frank and Lips 1989, Lesmeister et al. 2008). Within the central and southern Appalachians, this species is believed to be associated with open deciduous forests containing emergent rock and extensive groundcover or ericaceous shrub cover (Reed and Kennedy 2000, Webster et al. 1985). Presently, this species is considered "vulnerable" in Tennessee, North Carolina, and Virginia due to the paucity of recent observations (Chapman 2007, Roble 2003). As such, virtually no research has been conducted on aspects of its distribution, ecology, demography, and life-history traits in the Appalachian Mountains or elsewhere in the eastern US. Current efforts to document Eastern Spotted Skunk distribution in Virginia are being conducted using automated cameras following numerous incidental records along the Virginia–West Virginia boundary by staff of the Appalachian Golden Eagle Monitoring Program (D. Jachowski; J. Rodrigue, US Forest Service, Northern Forest Research Station, Newtown Square, PA, and T. Katzner, US Geological Survey, Boise, ID, unpubl. data).

From February 19 through March 20 2014, C. Diggins was conducting live trapping for the federally endangered *Glaucomys sabrinus coloratus* Handley (Carolina Northern Flying Squirrel) at Whitetop Mountain (136°38'N, 81°35'W) on the Mt. Rogers National Recreation Area within the Jefferson National Forest in Grayson County, VA (Fig. 1). The study area was dominated by *Picea rubens* Sarg. (Red Spruce) and mixed spruce–northern hardwood forest communities at elevations of 1425–1550 m. The understory composition was varied and included areas dominated by grasses, deciduous woody seedlings and saplings, dense thickets of *Rhododendron maximum* L. (Rosebay Rhododendron), and Red Spruce advanced regeneration. Part of the study area was on a relatively flat bench, with numerous seeps draining through the lower portions of the study site. Within our study area, an outbreak of *Dendroctonus frontalis* Zimmerman (Southern Pine Beetle) occurred in part of the Red Spruce forests on Whitetop Mountain in 2003. In 2004, US Forest Service

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personnel applied hygiene treatments to reduce the spread of the beetle by felling infected trees. These treatments created large canopy gaps with abundant coarse woody debris and a dense growth of Red Spruce and hardwood saplings.



Figure 1. Capture sites of Eastern Spotted Skunks at Whitetop Mountain on Mt. Rogers National Recreation Area, Jefferson National Forest, Grayson County, VA during late February and March 2014. Capture sites are specified by number of individual Eastern Spotted Skunks captured.

The majority of our trapping occurred in Red Spruce-dominated stands, with lesser trapping efforts in adjacent northern hardwood forests. Trapping occurred over a 48-ha contiguous area, divided only by the single-track gravel road leading to the summit of Whitetop Mountain (Fig. 1). To facilitate squirrel captures, we placed the majority of traps (56 %) on the boles of trees 1.5 m above the ground (Loeb et al. 1999) and we placed the rest of our traps on the ground at the bases of trees and along logs. We used Tomahawk 201 live traps (14 x 14 x 41 cm; Tomahawk Live Trap Co., Tomahawk, WI). Our traps were baited with a mixture of bacon grease, molasses, peanut butter, and oatmeal smeared on a slice of apple. We placed polyfil batting in all traps to provide bedding and enclosed the trap in heavy-duty plastic secured with duct tape to reduce exposure and the chance of mortality. We opened traps at or just prior to dusk, and checked them at dawn the following morning.

On 21 February, the second morning of trap checks, we captured an Eastern Spotted Skunk in a ground trap in an area with a thick Rosebay Rhododendron shrub layer; we released it without handling. We captured another Eastern Spotted Skunk on 22 February in the Red Spruce-northern hardwood ecotone in an area with grassy ground cover, approximately 150 m from the site of the 21 February capture; we also released this animal without handling. Following the second capture, we weighed, sexed, and ear-tagged (Monel No. 1005-1; National Band and Tag Company, Newport, MA) additional captures. We did not immobilize Eastern Spotted Skunks during handling, but rather we gently transferred them from the trap into a pillowcase to facilitate an effective restraint sufficient for weighing, sex determination, and ear-tagging without risk of being sprayed.

Over the entirety of our trapping effort, we captured 2 unknown individuals and 6 tagged individuals (3 males, 3 females) 26 times, with recapture rates ranging from 0–5 (mean = 3 ± 0.68) times per individual. After the initial capture, each nightly trapping event produced at least 1 Eastern Spotted Skunk capture, with up to 3 captures on some nights over the 18 actual trapping nights (2426 total trap-nights; 93 trap-nights per Eastern Spotted Skunk capture). On 3 occasions, we caught Eastern Spotted Skunks in traps set in trees (2 of which were the same male at different trees on different nights), which is consistent with the documented climbing ability of Eastern Spotted Skunks (Howell 1906, Webster et al. 1985). The majority of captures (96%) were in Red Spruce-dominated forests or at the edge of this community type, with only 1 capture occurring in a northern hardwood stand (Fig. 1). However, our trapping effort in Red Spruce and northern hardwood stands was not equal, which may have influenced our observed capture rates between forest types. Although we had 76 ground traps placed on the landscape, only 15 ground traps produced captures of Eastern Spotted Skunks over the course of the study, with 2 traps producing captures of 2 individuals and 2 traps capturing 3 individuals (Fig. 1). We captured 2 Eastern Spotted Skunks (female #407 and male #406) in the same trap on consecutive nights 3 times during the study, and they were observed retreating into the same den site following release, possibly indicative of a mating pair, although mating is likely to occur primarily in March and April (Kinlaw 1995). Extrapolating from the minimum individuals known alive for our 48-ha study area, the potential density on or near the higher portions of Whitetop Mountain was 12.5 Eastern Spotted Skunk/km².

Our capture rates of Eastern Spotted Skunks were high compared to reports from the southern Appalachians (Reed and Kennedy 2000) and to the west in the Ouachita Mountains of Arkansas (Hackett et al. 2007, Lesmeister et al. 2010). Additionally, other mammal-trapping studies conducted in seemingly suitable habitat (i.e., near rocky outcrops) in the central and southern Appalachians have rarely recorded any captures of Eastern Spotted Skunks (Castleberry et al. 2002; Ford et al. 2006; C. Stihler, West Virginia Division of Natural

Resources, Elkins, WV, pers. comm.). Our results are particularly interesting because our study was designed to capture a different species by using smaller traps, a different bait type, and a species-specific trap placement (i.e., tree traps) than those used in other studies. We hypothesize that high Eastern Spotted Skunk capture rates in the Red Spruce forests were largely due to structural differences within that stand, which had dense vegetative cover and available emergent rocks. All captures were in close proximity (<400 m) to large emergent rock and scattered colluvium that were abundant throughout the site (Fig. 1). We also captured Eastern Spotted Skunks near concentrations of coarse woody debris on the edge of Southern Pine Beetle treatment areas. Further, after releasing captured Eastern Spotted Skunks from traps, we observed 4 individuals retreating into emergent rock. For example, 2 females (#407 and #409) captured ~25 m apart during the same night, immediately retreated to dens in the same nearby outcrop.

These are the first records in either the central or southern Appalachians linking the Eastern Spotted Skunk with high-elevation Red Spruce forests. The highest elevation at which a capture took place during our study was 1520 m, approximately 293 m higher than the previous highest-elevation record in Virginia. The previous record was approximately 250 km to the northwest of our study area on Salt Pond Mountain in Giles County, VA at 1227 m (D.S. Jachowski, unpubl. data). The previous highest-elevation records for this species in North Carolina and Tennessee were 1506 m in a northern hardwood forest in the Unicoi Mountain range ~150 km southwest of our study area (C. Kelly, North Carolina Wildlife Resources Commission, Raleigh, NC, pers. comm.) and 1103 m on Unaka Mountain in Unicoi County, TN in 2014 (C. Ogle, Tennessee Wildlife Resources Agency, Morristown, TN, pers. comm.), respectively. Although this species was not previously believed to be associated with montane habitats in Virginia (Handley 1992), the relatively high density and trap success we observed may indicate that high-elevation Red Spruce forests and adjacent northern hardwood forests, particularly where suitable den sites and cover exist, are potentially important habitats for Eastern Spotted Skunks in the central and southern Appalachians. Additional surveys in the limited extent of montane forest in Virginia (i.e., Clinch Mountain and Burke's Garden in Tazewell County, and the Laurel Fork and Sounding Knob areas in Highland County) and throughout similar, more widespread areas in western North Carolina and eastern Tennessee seem warranted.

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