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DECLINING FREQUENCY OF ROAD-KILLED RABBITS IN CENTRAL GEORGIA

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ABSTRACT

Cottontail rabbits (*Sylvilagus floridanus*, *Sylvilagus aquaticus*, and *Sylvilagus palustris*) are a common component of the mammal fauna of the southeastern United States, yet their numbers have been in decline for at least the past 40 years. Urban sprawl, land use changes, forest maturation, and increased predation have contributed to the decline in Georgia. In the current study we explore the proposition that long-term changes in roadkill frequency track changes in wildlife populations as a whole. Using comparisons of historical data collected by Georgia Department of Natural Resources personnel, and recent roadkill census data from Baldwin County, it appears that the overall decrease in the rabbit population is paralleled by a decrease in rabbit roadkill frequency in central Georgia. Using this approach, additional roadkill studies may provide reliable estimates of population trends for other commonly observed wildlife in Georgia.

Keywords: Cottontail rabbit, *Sylvilagus floridanus*, *Sylvilagus aquaticus*, *Sylvilagus palustris*, roadkill frequency

INTRODUCTION

Native rabbits are widely distributed across Georgia and are represented by the more abundant eastern cottontail (*Sylvilagus floridanus*) and the less abundant swamp rabbit (*Sylvilagus aquaticus*) and marsh rabbit (*Sylvilagus palustris*). Collectively they are often referred to as cottontails and are difficult to distinguish without handling. Cottontails are found in a variety of habitat types, most of which are characterized by early successional plant communities with a dense understory. They typically thrive in disturbed areas where development produces brushy edges along agricultural fields and woodlots (Chapman and Litvaitis 2003).

Based on harvest surveys collected by the Georgia Department of Natural Resources (GA DNR), it is apparent that rabbit populations have been declining in Georgia since the 1960s (GA DNR 2005). According to Chapman and Litvaitis (2003), predators may be the primary limiting factor in favorable habitats. In Georgia, these predators include domestic dogs and cats, and native canids, felids, weasels, hawks, and snakes. Change in land use is also recognized as a factor influencing rabbit abundance, and as the human population increases in Georgia, favorable habitats are reduced or lost. Additionally, automobile strikes may be a significant cause of cottontail mortality as cottontails are frequently observed dead on the roadways in central Georgia. The ecological effects of roads have been well documented (Forman and Alexander 1998;

Antworth et al. 2005) and, in Georgia, an estimated 5,400,000 mammals are killed by wildlife-vehicle collisions each year (Boitet and Mead 2014). Logic would predict that the frequency of road-killed rabbits should decrease as the population decreases. This link between wildlife populations and roadkill frequency has been documented in other mammals (Baker et al. 2004; Gehrt 2002). In this current study, we compare historical and recent cottontail roadkill census data to determine if relative roadkill abundances support the apparent population decline within central Georgia as indicated by hunter surveys.

MATERIALS AND METHODS

Johnson (1986) summarized roadkill abundance data recorded by GA DNR personnel throughout Georgia from July 1978 to June 1982. From this report, we looked at the cottontail roadkill summary for Game Management Region IV which includes Carroll, Heard, Troup, Coweta, Meriwether, Fayette, Spalding, Pike, Upson, Henry, Butts, Lamar, Monroe, Crawford, Peach, Newton, Jasper, Jones, Bibb, Twiggs, Houston, Putnam, Baldwin, Wilkinson, Hancock, Washington, and Johnson Counties. Data for individual counties was not available. The state-wide survey has not been repeated, so one of the counties within Region IV, where recent roadkill data has been collected (Baldwin), was used for comparison (Boitet and Mead 2014). For the Baldwin study, 22.17 km of roadways were systematically surveyed 171 times (3791.1 km total) over a 12 month period. In addition to roadkill data, Georgia GIS Clearinghouse data (United States Department of Commerce 2014) were analyzed to determine the human population growth between 1970 and 2010, and land cover changes from 1974 to 2008.

RESULTS

Between 1978 and 1982, cottontails were the second most frequently observed road-killed mammal in central Georgia averaging 2.2 per 1000 km driven (average of 2.3, 2.1, 1.8 and 2.6). The six most common taxa in the GA DNR report were Virginia opossums (*Didelphis virginiana*), cottontails, gray squirrels (*Sciurus carolinensis*), raccoons (*Procyon lotor*), white-tailed deer (*Odocoileus virginianus*), and striped skunks (*Mephitis mephitis*). Domestic animals were not tallied (Johnson 1986). In the 2011-2012 Baldwin County roadkill study, cottontails were the seventh most commonly observed mammal at 1.1 per 1000 km driven (Boitet and Mead 2014). The six most common species in the Baldwin study were white-tailed deer, Virginia opossums, gray squirrels, nine-banded armadillos (*Dasypus novemcinctus*), raccoons, and domestic cats (*Felis catus*). For the 27 counties in Game Management Region IV, GIS Clearinghouse data indicates an average 208% (106% for Bibb County to 1008% for Fayette County) human population increase between 1970 and 2010, with Baldwin County experiencing a 136% increase. Anthropogenic landscape change associated with population growth over this time period includes an increase in low intensity (+320%) and high intensity (+350%) urban development areas and a decrease in row crop/pasture (-19%), deciduous forest (-22%), and forested wetland (-10%) areas. Much of the low intensity development is ribbon development (urbanization along major rural roads) while the high intensity development is primarily large residential subdivisions.

DISCUSSION

Cottontail populations have been in decline across the eastern United States since the 1950s with some regions experiencing a 70% decline (Chapman and Litvaitis 2003). Georgia DNR harvest survey data indicate that cottontail harvest in the state has decreased from 1.27 million rabbits annually in 1960 to 338,597 in 1998/1999 to 325,757 rabbits in 2003, a decrease from 10.85 to 6.74 to 7.81 rabbits per hunter per year (Bearden et al. 2002; GA DNR 2005). The larger trend is an overall population decline and the small increase in the most recent survey data likely reflects environmental and demographic stochasticity. Although the number of hunters is steadily decreasing, the 74% reduction in total harvest and the 28% decrease in cottontails per hunter likely reflect a real decline in Georgia's rabbit population as reported by Chapman and Litvaitis (2003).

As previously mentioned, the historical DNR roadkill abundance data was summarized for each region, not the individual counties within the region. If the recent Baldwin roadkill data is representative for central Georgia (the area tends to exhibit similar cover types), then the comparison of the roadkill frequencies from 1978-1982 (2.2/1000 km) and 2012 (1.1/1000 km) indicates an approximately 50% decline in road-killed cottontails. If the observed roadkill is reflective of the cottontail population as a whole, then this decline represents a significant reduction in rabbit abundance in central Georgia. Roadkill abundance has been shown to reflect local population levels in wildlife taxa such as red foxes (*Vulpes vulpes*) (Baker et al. 2004) and raccoons (Gehrt 2002).

Likely factors influencing this population decline are habitat change and increased predation. Urban sprawl has resulted in a decrease in favorable agricultural and forested wetland areas with an increase in low and high intensity urban areas that are less suitable for cottontails. An additional factor is the presence of large areas of pine monoculture across central Georgia that likely replaced conventional agricultural areas that represent ideal cottontail habitat. Much of these pine-dominated landscapes may not contain the understory structure or plant diversity required to support large cottontail populations. Additionally, the maturation of forested areas (pine-dominated or otherwise) results in habitat transitions that are associated with significant declines in rabbit numbers (Chapman and Litvaitis 2003).

Coyotes (*Canis latrans*) are a primary cottontail predator in Georgia (GA DNR 2001) and since the 1960s their numbers have increased dramatically throughout the state (Schrecengost et al. 2009). Other predator populations that have increased significantly are feral and free-ranging domestic cats, which spread with urban sprawl. Domestic cats primarily hunt in gardens and within 10 m of the forest edge (Kays and DeWan 2004; Marks and Duncan 2009), the same edge that provides suitable habitat for cottontails. Feral or free-ranging cats were the sixth most commonly encountered mammals in the Baldwin roadkill study and, in many areas, have become so abundant that they are the dominant nighttime roadway scavenger within 2 km of human residences (Slater 2002). In New York (Kays and DeWan 2004) and Great Britain (Woods et al. 2003) rabbits were the third most common wildlife taxon preyed upon by domestic cats. Within the United States there are an estimated 10-20 million feral and free-ranging domestic cats that kill 6.9 to 22.3 billion mammals per year, 75% of which are mice, shrews, squirrels, and rabbits (Loss et al. 2013).

In summary, the frequency of observed road-killed cottontails in central Georgia has declined in conjunction with the declining cottontail harvest since the late 1970s indicating a substantial population decline. Loss of suitable habitat due to human

population growth, urbanization, and land use changes appears to primarily be responsible for this downward trend. However, the population decline also is likely due in part to the increased abundance of coyotes and feral/free ranging cats. Out of these possible causes of population decline, the numbers of feral/free ranging cats might be the most easily addressed through management and efforts to increase public awareness.

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