Journal of Ecological Research, **4**, 69-73 (2002)

CHANGE IN COLOR-PHASE COMPOSITION OF EASTERN SCREECH-OWL (*OTUS ASIO*) TERRITORIES

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ABSTRACT

There are two color phases of Eastern Screech-owls, *Otus asio*, rufous and gray. Studies have shown that the rufous phase has a higher metabolic rate than the gray phase. I assessed habitat and color phase continuity by examining residence patterns in sixteen previously studied territories. I tested the hypothesis that there was no change in red and gray color phase composition of screech-owl territories between fall of 2000 and 2001. I used a Johnny Stewart Caller to attract screech-owls to determine color phase. I found no significant difference in color composition of territories between winter of 2000 and 2001(χ^2 =, df = 1, p = 0.420). I also hypothesized that residency of a specific territory does not fluctuate between color phases. I found that 62.5%(5) of the rufous phase territories changed, while 37.5%(3) of the gray phased changed. If one color phase has different territory selection, this could be important for future conservation efforts.

Keywords: color composition, color phase, Eastern Screech-owl, metabolic rate, turnover

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INTRODUCTION

Eastern Screech-owls, *Otus asio,* are common nocturnal predators that are widely distributed through much of Eastern United States (Belthoff and Ritchison 1989). They occur east of the Rocky Mountains, where they are a permanent resident of both rural and urban habitats from south of the Canadian Boreal forest to near the Tropic of Cancer in Mexico (Gehlbach 1995). There are two prominent color phases of the eastern screech-owl, rufous and gray. Hrubant (1955) hypothesized that the two color phases were due to the presence of two or three alleles, where rufous was dominant to gray, with a possible brown intermediate. Studies have shown that rufous phase screech-owls consume more oxygen than the gray phase, especially at low temperatures (-5 to –10° C)(Mosher and Henry 1976). A study by Dexter (1996) also noted that rufous feathers were less efficient at absorbing solar radiation, and speculated that rufous owls had higher metabolic rates to sustain the same body temperature as gray owls. Because rufous phase owls have a higher metabolism, this may effect habitat selection based on prey availability in each territory (Olsen and Mooney 2000). If the prey base does not change, color phase inhabiting that territory

should not change. Also, because screech-owls do not migrate, they generally occupy the same areas throughout the year (VanCamp and Henny 1975), and should be found in similar habitats throughout successive years. I therefore hypothesized there will be no change in color phase composition of screech-owl territories between fall of 2000 and 2001. I also hypothesized that residency of a specific territory does not change (turnover). To test this, I revisited Olsen and Mooney's (2000) previously established territories to measure color composition change.

FIELD SITE

I revisited eight rufous and eight gray eastern screech-owl territories found by Olsen and Mooney (2000) in the ridge and valley region of Huntingdon County, Pennsylvania. Site descriptions range from primarily evergreen to primarily deciduous forests (Table 1, Figure 1).

Table 1. Descriptions of 16 screech-owl territories in Huntingdon County, PA, 2000 and 2001.

Territory	Phase 00	Phase 01	Description
Diamond Valley Pond	Red	A	Primarily evergreen, with scattered deciduous, bordered by small stream and pond, lowland
Diamond Valley North	Gray	Gray	Exclusively mixed deciduous , no significant top soil, instead mostly boulders, elevated hillock
Patrick's Lodge	Red	A	Mixed deciduous and evergreens, alongside very small pond formed by dammed stream
Fouse's Crossing	Gray	Red	Primarily deciduous with mixed evergreens, slightly higher peninsula amidst lowland wetlands.
Zinn Springs	Red	A	Mixed deciduous and evergreens, stream lowlands
Supps Gameland S	Gray	A	Exclusive deciduous, immature forest, bordered by power line cut
Muddy Run Headwater	Red	Red	Mixed deciduous and evergreens, stream lowlands
Supps Gameland N	Gray	Gray	Primarily deciduous with scattered evergreens, alongside small clearing
Trail N	Red	U	Primarily deciduous with scattered evergreens, melt-water stream-bed, nearly adjacent to Raystown Branch of the Juniata River
Raystown Dam	Gray	Gray	Primarily deciduous with scattered evergreens, extremely steep slope on both sides of stream.
Trail S	Red	Red	Primarily deciduous with scattered evergreens, adjacent to Raystown Branch of the Juniata River
Logging road	Gray	Gray	Primarily deciduous with scattered evergreens, steep slope on both sides of stream.
James Creek	Red	Gray	An evergreen stand clearly divided from a deciduous stand by a ~20m wide swath of swampy lowlands
Raystown Field Station	Gray	Red	Mixed deciduous and evergreens exposed ridgetop
Diamond Valley South	Red	A	Primarily evergreen with scattered deciduous, small melt-water stream
Fouse's Hill	Gray	Gray	Primarily evergreens with mixed deciduous, steep incline

METHODS AND MATERIALS

I attracted the owls occupying the territories found by Olsen and Mooney (2000) using a Johnny Stewart Caller, which broadcasted the whinny and tremelo calls. I repeated callbacks up to 10 times at 1-minute intervals until owl color phase was positively identified with a spotlight. Each territory was visited until an owl was identified. If no owl was heard or seen on three separate visits then the territory was considered to be abandoned.

I tested for difference in color composition change using a Chi-square test of independence (Ambrose and Ambrose 1995). I used an α level of 0.05 and considered differences to be significant if $p \leq 0.05$. In a like manner, I added turnover and abandoned territories together and compared percentage occupancy.

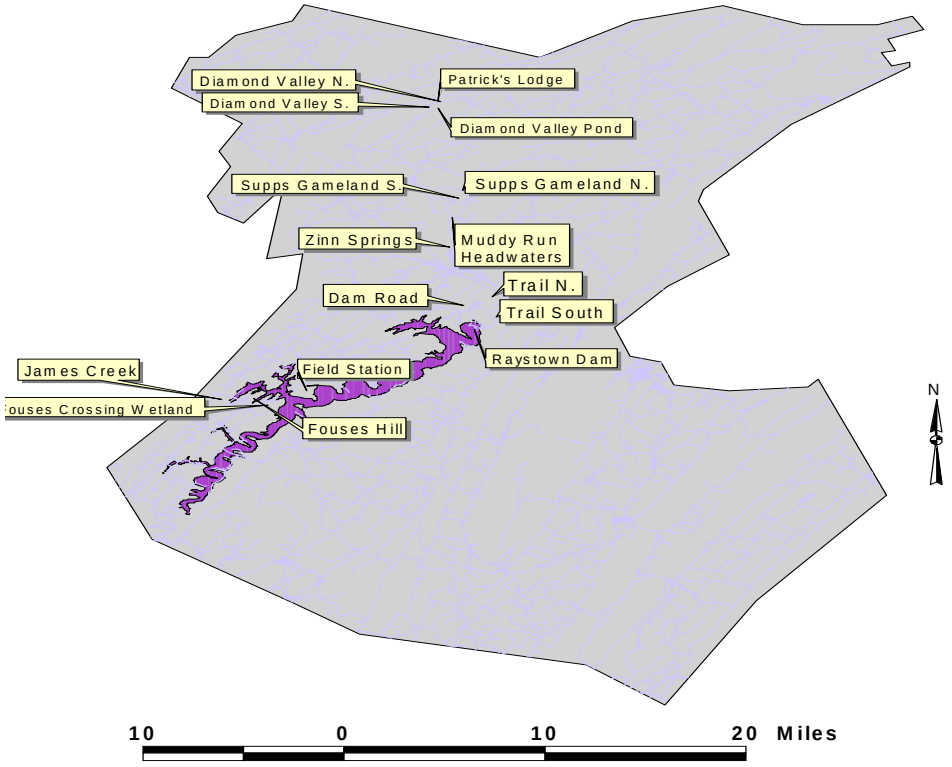

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Figure 1. Map of 16 screech-owl territories in Huntingdon County Pennsylvania 2001.

RESULTS

I did not find a significant difference in color composition between winter of 2000 (8 gray, 8 rufous) and 2001(6 gray, 3 rufous), (χ^2 =, df =1, p = 0.4). I recorded one color phase turnover for rufous and 2 turnovers for gray (Table 1), 2 unchanged rufous territories, and 5 unchanged gray territories. One of the rufous territories could not be determined. Abandonment of territories in the rufous owls was more frequent (4) than that of the gray (1). I also found no difference between percentages of combined turnover

and abandonment (Table 2). I observed a 62.5% change in the rufous phase, whereas gray phase exhibited a 37.5% change.

Table 2. Turnover in rufous and gray territories in Huntingdon County, Pennsylvania 2000-2001.

	Rufous	**Gray**
Changed	62.5%(5)	37.5%(3)
Unchanged	25.0%(2)	62.5%(5)

DISCUSSION

Reasons for a color phase change in a territory could be due to physical and biological limitations. Because the average lifespan of a screech-owl in the wild is 4 years (Gehlbach 1995), the resident owl could have died and another color phase may have entered its old territory. The reason for the gray phase screech-owls seeming to have lower amount of territory change (37.5% vs. 62.5%) could be a result of better nesting success than the rufous owls. It is known that females with successful broods will reuse an original nest site. Only 24% of females switch to alternative nest after previous success (Gelbach 1995). Switches are usually due to disturbance, death of mate, or divorce related to provisioning. Because availability of prey is another factor that potentially influences home range size in owls (Belthoff et al 1993), the population of mice may have declined accounting for the abandoned territories. The drought in 2001(personal observation) might have affected the productivity of the prey supply thus affecting the color composition in each territory. Olsen and Mooney (2000) determined that the prey base was larger in rufous phase territories than in gray. However, they assumed that both phases had the same territory size. Delineation of territory size of individual owls would help to determine whether or not rufous and gray owls have the same territory size. If this were the case, prey base area would also be similar and more efficient mouse trapping efforts could be managed. Fidelity of color phase composition in territories could be important in relating certain behavior differences between rufous and gray color phases.

ACKNOWLEDGEMENTS

I would like to thank Chuck Yohn, the Raystown Field Station for the use of its equipment, Russell Wilson, Paula Mooney, Beth Kobylarz, Julia Saylor, and Andy Watson for their help.

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