

Observations of American Badgers, *Taxidea taxus* (Schreber, 1777) (Mammalia, Carnivora), in a restored tallgrass prairie in Illinois, USA, with a new county record of successful reproduction

John P. Vanek¹, Jess Fliginger¹, Richard B. King^{1,2}

1 Department of Biological Sciences, Northern Illinois University, DeKalb, Illinois, USA, 60115. **2** Institute for the Study of the Environment, Sustainability, and Energy, Northern Illinois University, DeKalb, Illinois, USA, 60115.

Corresponding author: John P. Vanek, john.p.vanek@gmail.com

Abstract

American Badgers, *Taxidea taxus* (Schreber, 1777) are poorly studied relative to other North American carnivores. We report on observations of American Badgers within a restored tallgrass prairie ecosystem owned and managed by The Nature Conservancy in Illinois. We documented badgers at six camera locations, including two prairie restorations restored from row crop agriculture in 2002 and 2015. In addition, we confirmed breeding activity in Ogle County, filling a gap in the known breeding distribution of American Badgers in Illinois. We provide context for these observations and suggestions for future research.

Keywords

Breeding, camera trap, distribution, The Nature Conservancy, Ogle County.

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Introduction

The American Badger, *Taxidea taxus* (Schreber, 1777), is a large terrestrial mustelid (up to 12 kg) inhabiting mostly open habitats in southwestern Canada, western/central United States, and northern/central Mexico (Reid 2006; Hunter 2011). American Badgers can have large home ranges (e.g. up to 200 km² in Illinois, USA) (Duquette et al. 2014) and excavate deep burrows for denning and in search of small burrowing mammals. American Badgers may dig new burrows each day during the summer, and burrows may be re-used (Sargeant and Warner 1972). For example, Sargeant and Warner (1972) documented, using radio-telemetry, a female

badger in Minnesota using 46 different burrows over a 5-month period. American Badgers are poorly studied relative to other North American furbearers, particularly east of the Mississippi, likely due to a cryptic life history strategy and low densities. As a result, little is known about their ecology (Long 1973; Duquette et al. 2014).

In Illinois, American Badgers were historically limited to the northern third of the state, but due to perceived scarcity, a moratorium on the killing of American Badgers (except for damage control) was initiated in 1939 (Mohr 1943). Since then, American Badgers have become more numerous and have spread south through the state, likely due to an increase in open areas as forested habitats declined due to agriculture and

strip-mining (Gremillion-Smith 1985). Subsequently, a trapping season was opened in the late 1990s, with a small number of badgers taken each year (Williams et al. 2018). Today, American Badgers have been confirmed in all but 3 of 102 Illinois counties, but breeding activity has only been confirmed in 42 counties (Warner and Ver Steeg 1995; Ver Steeg and Warner 2000). In this study, we report on observations of American Badgers using restored tall grass prairie habitat and identify reproductive activity in an additional Illinois county.

Methods

Study site. The Nachusa Grasslands (hereafter, Nachusa) is a ~1,500 ha preserve owned and managed by The Nature Conservancy (Fig. 1). Nachusa is located within the Grand Prairie physio-geographic region of Illinois in Lee and Ogle counties (41°53'N, 089°20'W) and

is notable for its tallgrass prairie remnants and restorations (Kleinman 2016). Other habitat types include oak *Quercus* sp. savanna and woodlands, wetlands, and row crop agriculture. Prescribed fire is a common management tool at Nachusa, and free-ranging American Bison, *Bison bison* (Linnaeus, 1758), were reintroduced to the site in 2014 (Kleinman 2016).

Tallgrass prairie is a mesic ecosystem dominated by large grasses that grow to 1–2 m tall, such as Big Bluestem *Andropogon gerardii* (Vitman), Indian Grass *Sorghastrum nutans* (L.) Nash, and Switchgrass *Panicum virgatum* (L.), coupled with shorter grasses and a high diversity of forbs. Woody species are typically excluded by fire or limited to wetlands (NatureServe 2018). Tallgrass prairie is a globally endangered ecosystem (Olson and Dinerstein 1998) and more than 99% of tallgrass prairie habitat has been lost in Illinois to agriculture, fire suppression, and development (Sampson and

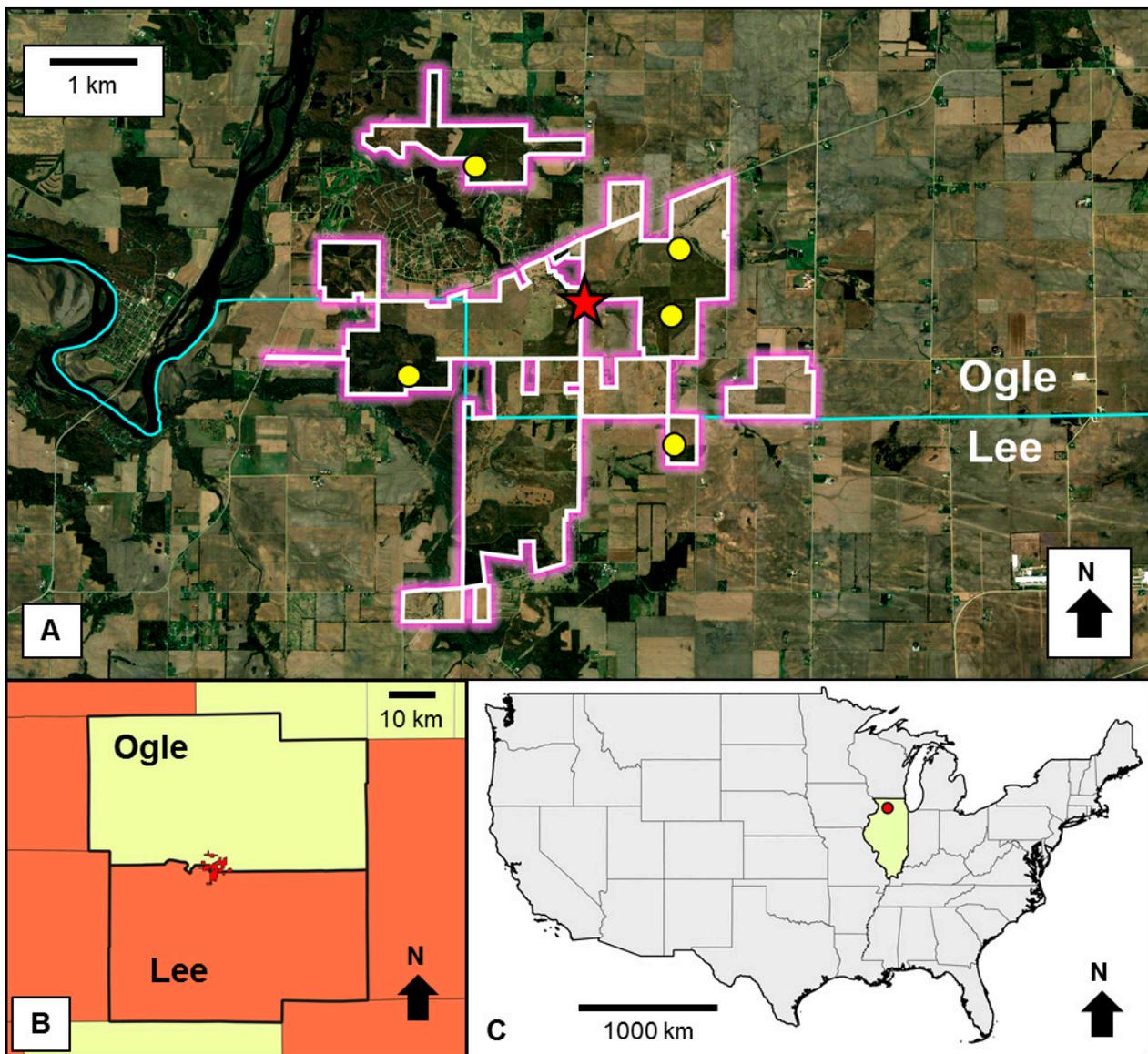


Figure 1. A. The Nachusa Grasslands (white/magenta outline), boundary between Ogle and Lee counties, Illinois (IL) (teal line), and camera locations where American Badger (*Taxidea taxus*) were observed (yellow circles and red star for the county record). B. Location of Nachusa Grasslands within Ogle and Lee Counties, IL (red polygon). Confirmed breeding distribution of American Badgers in orange based on Ver Steeg and Warner (2000). C. Location of Nachusa Grasslands (red circle) within Illinois (beige) and the United States.

Knopf 1994).

Field methods. We deployed 15 Browning® Strikeforce 850 HD sub-micro trail cameras (Model #BTC-5HD-850) at burrows from March 2018 through January 2019. We mounted cameras on posts, rocks, or structures ~1–1.5 m from each burrow and aimed cameras at the burrow entrance (Fig. 2). Cameras were set to record video, take photos, and take time-lapse photos) in an *ad hoc* manner at various times during the survey to experiment with optimal detection rates. We located burrows during visual searches of Nachusa (on and off trails) and deployed cameras as burrows were located. Cameras were not baited, and burrows were not limited to those thought to be created or occupied by American Badgers, except for a single camera placed at what we thought to be an active American Badger den with cubs.

Results

New records. UNITED STATES • 1 female and 3 juveniles; Ogle County; The Nachusa Grasslands; White



Figure 2. Typical setup of a camera trap mounted on a metal t-post deployed at a badger burrow.

House Management Unit; 41°54'09"N, 089°20'26"W; 18 May 2018.

Identification. The American Badger is a distinct member of the North American fauna and is unlikely to be confused for other species (Reid 2006). Diagnostic characteristics include a low profile, short tail (<30% of total body length), and black-and-white facial markings. The white stripe on the top of the head is often visible from behind (Hoffmeister 1989; Reid 2006). The American Badger can be differentiated from the smaller Striped Skunk, *Mephitis mephitis* (Schreber, 1776), by the dorsal color, which is uniformly gray or grizzled in the American Badger but typically black with a longitudinal white stripe in the Striped Skunk. In addition, the Striped Skunk has a much longer tail and a narrower face (Hoffmeister 1989).

We documented American Badgers at six camera locations (Table 1; Fig. 1) in April, May, October, and November. Three locations were within prairie, one was in savanna, one was in an oak woodland (Fig. 3A), and one was in an open pole barn used to actively store farm equipment and vehicles (Table 1). The distances between these observations ranged from 905–4,672 m (mean = 2,731 m ± 1,090 SD). Of the three prairie locations, one was a prairie remnant and two were prairie restorations. At the barn location, we documented three cubs and one adult (Figure 3B). We also documented an American Badger preying on a native Thirteen-lined Ground Squirrel, *Ictidomys tridecemlineatus* (Mitchill, 1821) (Fig. 3C).

Discussion

Our observation of successful reproduction in Ogle County fills a gap in the known breeding range of American Badgers in Illinois (Ver Steeg and Warner 2000). Ogle County is surrounded by seven counties: Stephenson, Winnebago, Boone, DeKalb, Lee, Whiteside, and Carroll. There has been confirmed breeding activity of American Badgers in all but Winnebago and Boone (Fig. 1). To the best of our knowledge, our camera trap work represents the first photographic evidence of American Badgers at Nachusa Grasslands. In addition, burrows suspected as belonging to badgers have been located, and at least one staff member has observed a badger. However, no definitive evidence, such as photographs, were obtained (Cody Considine, Restoration Ecologist, The Nachusa Grasslands, verbally, 2018). Our observations

Table 1. Camera locations at The Nachusa Grasslands (Illinois) where American Badgers (*Taxidea taxus*) were documented in 2018.

ID	Month of first observation	Latitude	Longitude	County	Habitat
SF 01	April	41°54'05"N	089°19'33"W	Ogle	Prairie, restored in 2002
TC 03	April	41°53'07"N	089°19'33"W	Lee	Prairie remnant
WH 01	May	41°54'08"N	089°20'25"W	Ogle	Human structure adjacent to prairie restoration
TE 01	October	41°53'39"N	089°22'03"W	Lee	Oak Woodland
OR 03	October	41°54'09"N	089°21'31"W	Ogle	Savanna
CC 03	November	41°54'34"N	089°19'30"W	Ogle	Prairie, restored in 2015



Figure 3. A. An American Badger (*Taxidea taxus*) at a limestone outcrop within an oak woodland in Lee County, Illinois, USA. **B.** A female American Badger (*Taxidea taxus*) and three cubs at a den within an open pole barn in Ogle County, Illinois, USA. **C.** An American Badger (*Taxidea taxus*) emerging from a burrow with a Thirteen-lined Ground Squirrel (*Ictidomys tridecemlineatus*) in Ogle County, Illinois.

also provide evidence that American Badgers will utilize tallgrass prairie restorations.

American Badgers select less disturbed habitats (such as grasslands and prairie) over intensely cultivated agriculture (Warner and Ver Steeg 1995; Duquette et al. 2014). In addition, American Badgers are often associated with and tend to select grasslands with high rodent abundance for dens (Hoodicoff 2003; Quinn 2008). In Illinois, small-mammal abundance is higher in undisturbed habitat types relative to areas of intense row-crop agriculture (Warner and Ver Steeg 1995). As Nachusa Grasslands provides one of the largest intact prairie ecosystems in Illinois and has a diverse small mammal

community (Burke 2016), the protected area might serve as important refuge for American Badgers. It is unknown how many female badgers could be supported by Nachusa Grasslands, as badgers inhabiting primarily agricultural landscapes in the midwestern United States and southern Ontario have large home ranges, often exceeding the total area of Nachusa (Warner and Ver Steeg 1995; Duquette et al. 2014; Sunga et al. 2017). However, Goodrich and Buskirk (1998) reported mean home range sizes of female badgers in Wyoming to be just 3.4 km² (95% adaptive kernel). Assuming Nachusa represents high quality habitat, the preserve may be able to support territories of 4 or 5 females, plus additional males (which have larger, but more highly overlapping territories). Further, this number could be higher if core home ranges (which are smaller than 95% kernels) are located within Nachusa, with less utilized portions of the home range relegated to the broader agricultural matrix.

We recommend further study of the American Badger at Nachusa Grasslands to determine the size and demographics of badgers inhabiting the greater Nachusa area. In addition, a better understanding of the spatial and foraging ecology of American Badgers at Nachusa Grasslands will benefit future conservation efforts. For example, do badgers prefer to forage in restored or remnant prairie? Given their large home range sizes in primarily agricultural landscapes, how many badgers can Nachusa alone support? Finally, future reintroduction attempts of Franklin's Ground Squirrel, *Poliocitellus franklinii* (Sabine, 1822), which is listed as Threatened and a Species of Greatest Conservation Need in Illinois (State of Illinois 2015) should take into consideration the presence of badgers, as Franklin's Ground Squirrels are likely to be preyed upon by badgers (Errington 1937; Snead and Hendrickson 1942; Haberman and Fleharty 1971).

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Authors' Contributions

JV wrote the manuscript. JF and RK edited the manuscript. JV and RK deployed and checked cameras. JF and RK made the initial observations of the badger den, prompting the additional camera deployment.

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