Habitat Characteristics and Distribution of the American Badger (*Taxidea taxus jacksoni*) in Southwestern Ontario

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Abstract

*Southwestern Ontario contains a complicated agricultural landuse pattern, benefiting open and edge wildlife including small furbearing mammals, ground-burrowing rodents, and birds of prey. The most endangered furbearer in the tobacco belt region is the American badger (*Taxidea taxus jacksoni*). With a population currently below 200, recovery plans are now being drafted to implement measures for restoration projects. Badger sightings and information solicited from the public by the Ontario Badger Recovery Team between 1999 and 2005 have helped create an inventory database. Electronic maps of landuse, physiography, roads, and vegetation were developed using Geographical Information Systems. The location of each badger sighting was then used to correlate habitat specificity and environmental characteristics. Of the 52 badger sighting reports, 46% of the sightings were reported in the vicinity of Simcoe, where a dense population exists. The majority of badgers were found on or near sand plains and open fields. 19% were 'Dead on Road', mostly found near Highway 3 near Simcoe, and near Highway 403 near the City of Brantford. Road underpasses constructed in the United Kingdom for the European badgers (*Meles meles*) have been successful in reconnecting of habitat severed by high-use roads, and should be considered in Ontario's badger habitat. Environmental factors such as pollution, predation, and hunting do not appear to have a significant affect on population decline.*

Introduction

The American badger (*Taxidea taxus*) is predominately found in tall-grass prairies, fields and meadows throughout North America. Their current distribution ranges from the mountains of British Columbia through to Southwestern Ontario, and south towards Mexico. They are fossorial carnivores often in pursuit of prey species including ground squirrels (*Spermophilus* spp.), woodchucks (*Marmota* spp.), voles (*Microtus* spp.), and rabbits (*Sylvilagus* spp.) (Ontario Badger Recovery Team, 2005). Females give birth to a litter of 2 to 5 in their second

year. Sex ratio is 1:1 (Environment Canada, 2006). Rate of survival decreases 50% each year where they may survive up to 13 years (Messick and Honecker, 1981). Populations are decreasing; however few studies have specifically addressed the cause of population decline. The least studied subspecies, *T.t. jacksoni*, (hereinafter "Jacksoni badgers") are found only in the Great Lakes region. Jacksoni badgers are currently listed "endangered" by both provincial and federal governments (COSEWIC 2006, OMNR 2005). In Ontario, a high density of Jacksoni badgers exists around the Town of Simcoe (Environment Canada, 2006).

Study Area

Only the largest known badger distribution range in Ontario was used in our study area. Other smaller badger habitats in Grey-Bruce, Quetico, and Rainy River were excluded. This research mostly encompassed the 'tobacco belt region'; from approximately London to Nanticoke, Turkey Point to Cambridge. This area was formerly a lake bed, so the area is fertile and sandy. The tobacco belt region contains a matrix of landuse patterns including a mixture of rural and urban centres. This landscape also contains one of the richest areas of tall-grass prairies, significant wetlands, and Carolinian forests in Ontario (Nelson *et al.* 2004).

Methods

From 1999, the Ontario Badger Recovery Team – a branch of the Ontario Ministry of Natural Resources – initiated an awareness campaign to solicit from local residents any information on badgers, including sightings, dens, road kill, and pelts for genetic testing (Ontario Badger Recovery Team, 2005). In late 2005, all 52 recorded sightings were provided for this research. One record was removed from most analysis (REC-18) because it was outside of the study area. A few other records were split into multiple sub-records since the record was for a badger and cubs. In total, the database contains 59 unique sightings. Using Geographical Information Systems (GIS), each confirmed sighting of a Jacksoni badger was assigned a UTM co-ordinate based on given information, then plotted onto all electronic maps. In cases where inadequate information was provided on the sighting location, a best guess co-ordinate was assigned. Since badgers are always seeking new territories (Long and Killingley 1983), point locations only provide an idea on where badgers can be found.

Individual electronic map layers in ArcMap format were cropped to the study area. Maps include physiography, soils, landuse, roads, parks and protected areas, infrastructure corridors and right-of-ways, and waterways. Redundant and duplicate attributes in each map legend were reclassified to allow visual simplification of maps. For example, "corn", "tobacco", and "vegetable" was simplified into "Row Crops". Information was not lost in the simplification process as it was retained in the database for further analysis.

Two maps in paper format were used for further analysis and comparison. A map that combined three previous studies – reported in Newhouse and Kinley (2002) – was scanned to create an electronic map compatible for GIS analysis. The 20-year map contained badger sightings that were used to compare recent finding with previous studies. Another map was taken from the Atlas of Mammals in Ontario (Dobbyn, 1994) to determine whether food resources are available and plentiful.

The maps produced by using spatial overlays qualitatively compared all sightings to determine any spatial correlation of habitat preference. They were also used to understand plausible factors involved in low population numbers throughout Southwestern Ontario. Furthermore, 10 confirmed 'dead on road' (DOR) reports were mapped separately to determine areas of high road moralities.

Results

A high density of Jacksoni badgers is found in the vicinity of the Town of Simcoe, becoming sparse towards the City of London. Two sightings were reported in Grand Bend and in Glen Morris – just outside of the study area. Population distribution from this study is consistent with previous reports.

Jacksoni badgers were sighted in areas where three biophysical criteria were met: sandy soils, landuse compatibility and abundance of prey species.

Of the badger sightings, 35% were found directly on a sand plain and an additional 14% were within 125 metres of a sand plain. Figure 1 indicates some badgers along clay plains; however, with closer analysis, badgers were actually seen near waterways where soils are friable. The maps used were too coarse in scale to map shoreline habitats.

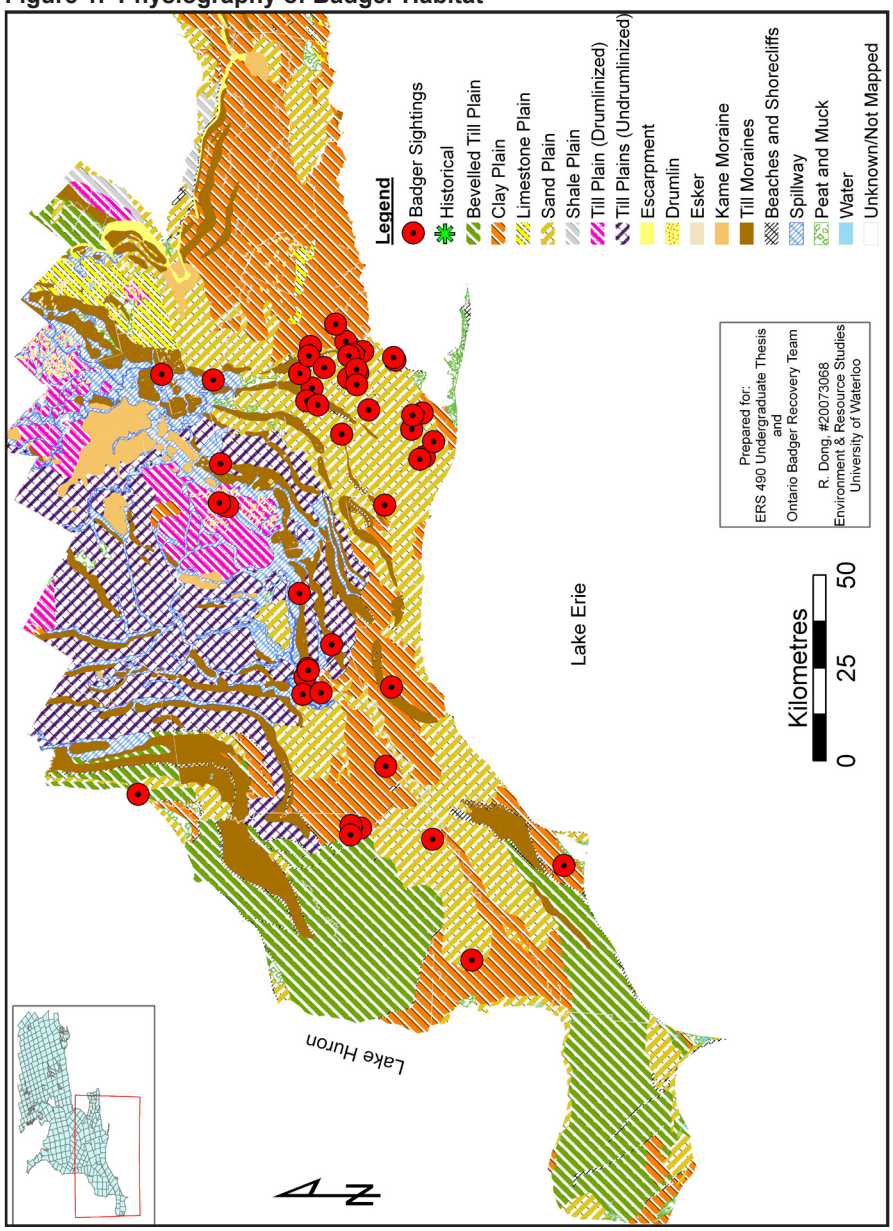
With respect to landuse, 31% of the badgers were closer to areas dominated by agricultural fields, rather than areas dominated by row crops (27%) (Figure 2). A high concentration of badgers is found in areas where fields are most dominant compared to areas dominated by row crops. A few badgers were reported in an urban environment, mostly in the outskirts of the Town of Simcoe.

Dobbyn (1994) reported all four main prey species were living in badger territories. The most abundant species are the woodchuck (*Marmota monax*), Eastern cottontail (S*ylvilagus floridanus*), Eastern chipmunk (T*amias striatus*), and Meadow vole (*Microtus pennsylvanicus*). From information provided by this mammal atlas, it appears food resources are not likely to be a limiting factor on badger abundance.

The road network throughout most of southern Ontario is created in a European grid style. Roadkills made up 17% of the badger sightings in this study. Two badgers were killed on or near Highway 403, whereas five were

killed near or on a secondary highway, of which four were along Highway 3 towards the east of the Town of Simcoe (Figure 3). Distance calculations of roads indicate that a badger travelling in one direction will cross one sideroad at least every 1.5 kilometre, a major arterial road every 5 kilometres, and a highway every 26 kilometres. Since badgers are constantly on the move in pursuit of

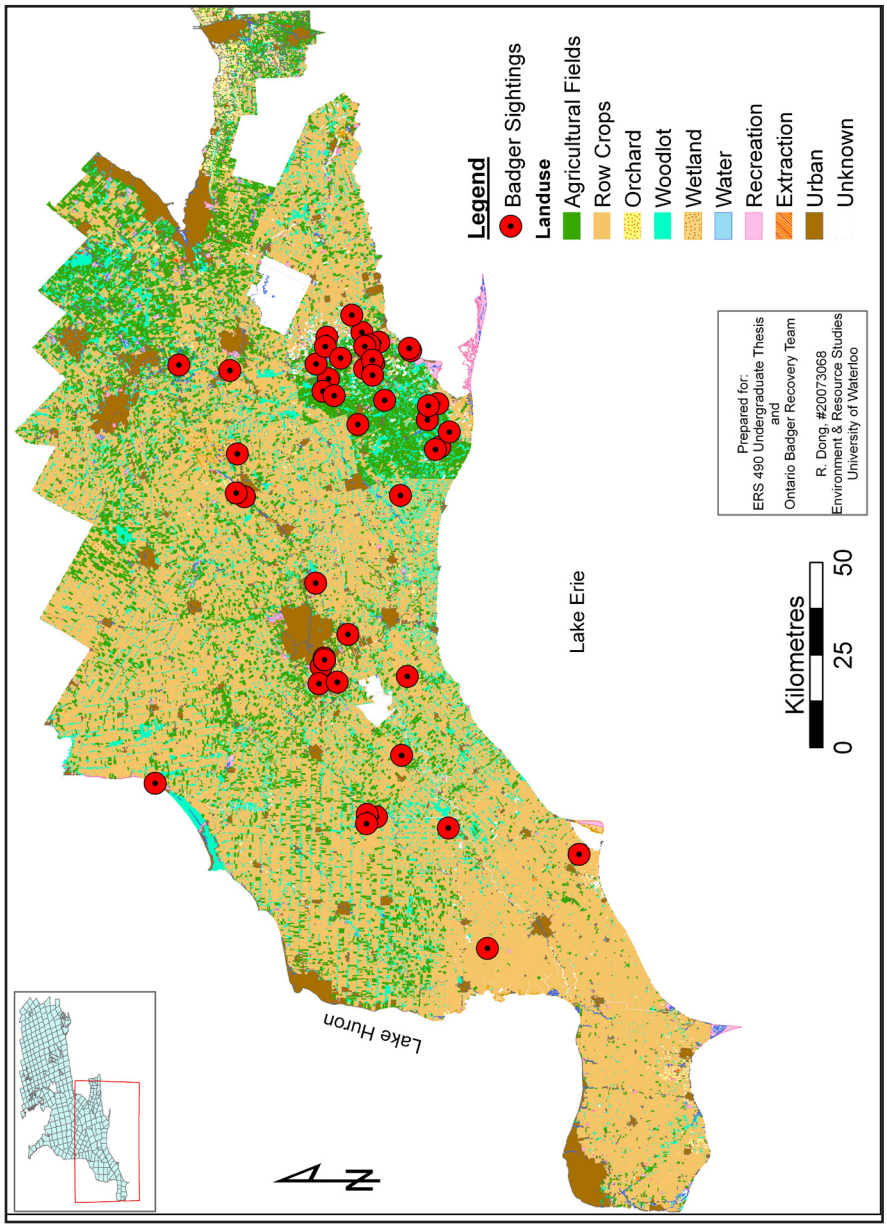
Figure 1. Physiography of Badger Habitat



prey, the likelihood of it being road killed increases every metre it travels.

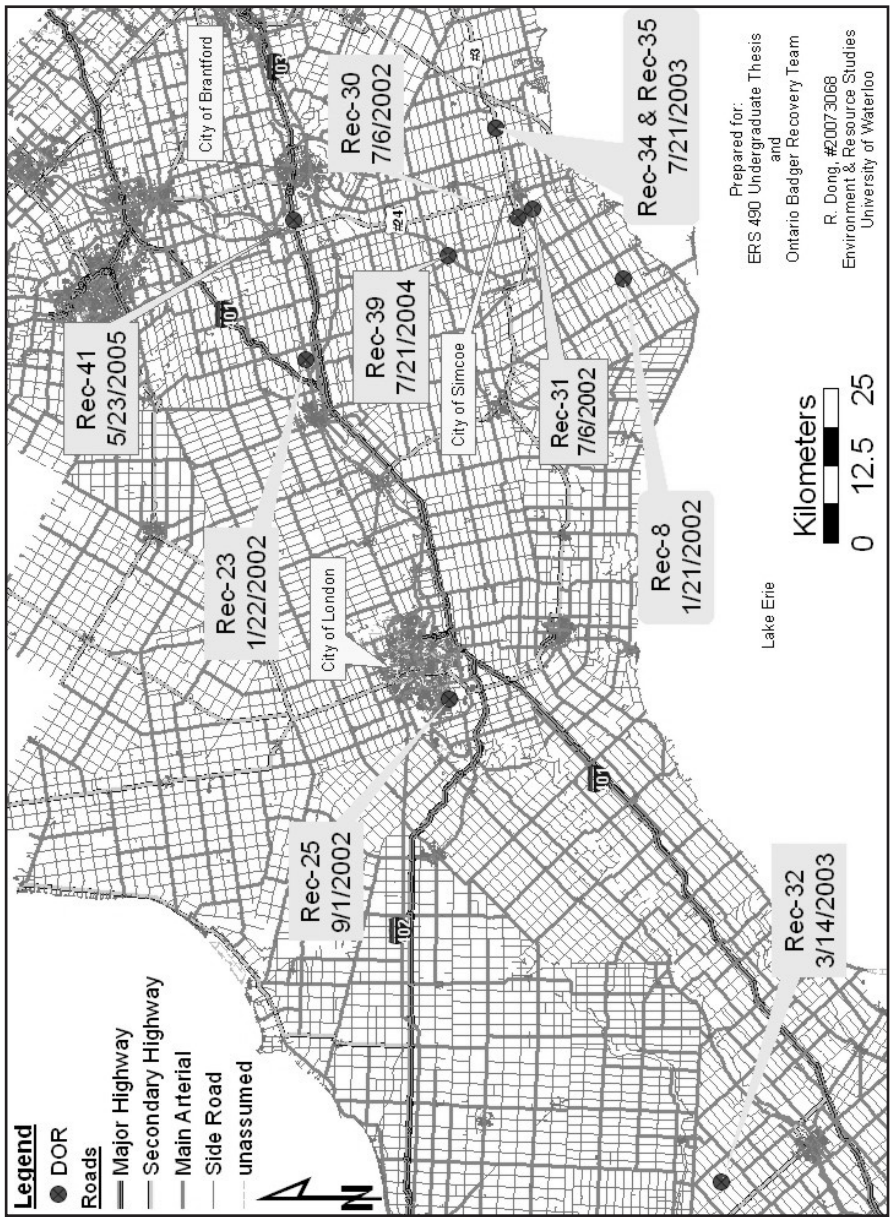
As opportunistic feeders, badgers continuously roam to find new food resources. Badgers do not appear to use wildlife "corridors" where tracts of prime habitat are used to move from one locale to another. This is suggested by creating a map of railway and hydro transmission corridors since many wildlife

Figure 2. Landuse in Badger Habitat



species use these relatively undisturbed right-of-ways to move throughout a landscape. Only through radio-tracking techniques will it be possible to accurately determine whether corridors are used by badgers. Employing wildlife underpasses could be successfully used – as demonstrated by recovery efforts in the United Kingdom (Neal, 1986).

Figure 3. "Dead on Road" Badger Reports



Discussion

Pollution from land use does not seem to be a factor leading to population decline. Hancox (1991) suggests high PCB levels have a detrimental effect on *Mustelids*, however PCB use has been banned in Canada since 1985 (Environment Canada, 2003). There seems to be no intense pollution source in the tobacco-belt region, aside from urban and agricultural inputs.

Mammals that predate badgers include foxes, coyotes, and eagles (Neal, 1986); however, most predation occurs when they are most vulnerable – when young and small. In the tobacco-belt region, it is uncertain whether predation poses a severe risk to badger population. Given that predators are not abundant and their prey species are variable, it is unlikely predators are suppressing the badger population.

Deliberate removal and hunting of badgers in Ontario is illegal. However, since 1990, an average of one badger per year has been accidentally trapped on a trapline intended for coyotes or foxes (Milne, 2005). Many residents in badger territories are not aware of the existence of badgers when interviewed. Currently in Canada, there is no market for badger pelts nor badger meat, thus it is assumed that direct human interactions are not a factor.

Food for badgers remains plentiful. However, when prey is not readily available, badgers are capable of diversifying their diet to consume seeds, vegetation, and soil insects (Neal, 1986).

Shelter also remains plentiful throughout Southwestern Ontario. Sandy soils can be found throughout the landscape, favouring digging and burrowing activities. Badgers in Idaho were as dense as 5 per square kilometre (Messick and Hornocker, 1981). Agricultural fields, meadows and prairies can be found throughout the tobacco-belt region and can readily support a larger number of badger dens. That said; habitat throughout the tobacco-belt region is highly fragmented by roads formed in a European grid pattern.

Badgers are important as a cultural identity to the United Kingdom, as beavers are to the Canadian identity (Westray, 2005). Unfortunately in Canada and most of the United States, badgers do not have the same appeal. Whereas badger paraphernalia litters many stores throughout Europe, there are only a few popular charismatic characters depicting the badger in North America. Paulette Bourgeois and Brenda Clark's children's cartoon and book series "Franklin the Turtle" includes a badger and the mascots of Brock University, University of Wisconsin, and Tall-grass Ontario are badgers. In both countries, field naturalists agree that seeing a badger provides excitement to the viewer.

Britain passed the Badger's Act in 1973 to prevent cruelty to, and to protect badgers from any harm (Neal, 1986). In Canada, badgers do not share the same level of protection as they are only protected under the Species at Risk Act (Environment Canada, 2006; COSEWIC, 2006). The endangered

T.t. jeffersonii badgers in British Columbia are currently being restored by the removal of concrete medians from roads to reduce road mortality (Parks Canada, 2005). In the UK, culverts constructed under roads as wildlife underpasses have been successful in preventing badger mortalities from busy traffic (Neal, 1986). Ontario's badgers might share the same benefits if these measures were implemented in strategic locations throughout Southwestern Ontario.

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References

Committee of the Status of Endangered Wildlife in Canada (COSEWIC). 2006. Environment Canada http://www.cosewic.gc.ca/eng/sct5/index_e.cfm

Dobbyn, J.S. 1994. *Atlas of the Mammals of Ontario*. Federation of Ontario Naturalists, Canada.

Environment Canada. 2006. Species at Risk - American Badger *jacksoni* subspecies. http://www.speciesatrisk.gc.ca/search/speciesDetails_e.cfm?SpeciesID=621

Environment Canada. 2003. *PCB - Polychlorinated biphenyls*. http://www.ec.gc.ca/pcb/eng/index_e.htm

Hancox, M. 1991. Badgers and otters – pesticides and pollution: a European perspective. *Mustelid and Viverrid Conservation* 5: 10-12.

Long, C. and C Killingley. 1983. *The Badgers of the World*. Charles C. Thomas Publisher. Springfield, Ill.

Messick, J and M. Hornocker. 1981. Ecology of the Badger in Southwestern Idaho.

Wildlife Monographs; No.76, *Wildlife Society*. Washington, D.C.

Milne, H. (2005). Personal Communication, Ontario Ministry of Natural Resources – Land Information [fur trade records]. November 8.

Neal, E. 1986. *The Natural History of Badgers*. Facts on File Inc. Great Britian.

Nelson, G., B. Veale and B. Dempster, eds. 2004. *Towards a Grand Sense of Place*. Heritage Resources Centre, University of Waterloo, Waterloo.

Newhouse, N. and T. Kinley. In Press. Update COSEWIC status report on the American badger in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa.

Ontario Badger Recovery Team. 2005. Ontario Badger Information and Monitoring fact sheet. Ontario Ministry of Natural Resources, Alymer.

Ontario Ministry of Natural Resources (OMNR). 2005. Natural Heritage Information Centre (Committee on the Status of Species at Risk in Ontario). http://nhic.mnr.gov.on.ca

Parks Canada. 2005. Species at Risk - American Badgers Give Birth in Kootenay National Park of Canada. http://www.pc.gc.ca/nature/eep-sar/itm2-/eepsar2d_e.asp

Westray, J. 2005. Resident of Sheffield, Stannington; United Kingdom. Pers. Comm.