INTRODUCTION

**Paragraph 1: Urban wildlife – coyotes thrive in cities**

Urban landscapes are inhospitable for many animal species, but some survive and even thrive in the midst of human society (Schell et al. 2020). These synanthropes are highly adaptable and many have undergone population expansions even as the urbanization diminishes biodiversity and displaces other species across the globe (Foley et al. 2005; McKinney 2006). Among the displaced species are most large carnivores, which are often unable to coexist with high densities of humans (Woodroffe 2000). Coyotes (*Canis latrans*) are an exception to this pattern. Since the 1800s, coyotes have expanded out of the Great Plains across North America, including into densely populated cities (Bateman & Fleming 2012; Hody & Kays 2018). Urban coyotes are able to thrive alongside high densities of humans and have become known as urban exploiters (CITE).

The continued coexistence between urban coyotes and humans depends largely on minimizing real or perceived negative interactions. On the part of coyotes, their apparent boldness towards people and their pets is the main factor driving the outcome of these interactions (CITE). Coyotes that are habituated or otherwise exhibiting bold or aggressive behaviour are often the targets of lethal management programs (CITE) and often induce negative human perceptions (CITE). Fortunately, the vast majority of human-coyote interactions are non-encounters where coyotes behave appropriately to avoid human presence (Mowry et al. 2020; Drake et al. 2021). The human perception of negative interactions with coyotes is also super important, because it will drive policy and management decisions that affect urban coyote survival and tolerance. Coyote presence in the absence of negative interactions is often tolerated and even appreciated by the majority of city-dwellers (Soulsbury & White 2015; Sponarski et al. 2018), many of whom appreciate the benefits that coyotes provide to society by controlling rodent populations (Crooks & Soule 1999), scavenging (Fox 2006), and providing aesthetic enjoyment (Soulsbury & White 2015). However, when real or perceived negative interactions do occur, they attract significant media attention (Alexander & Quinn 2011) and rapidly erode public tolerance of urban coyotes (Sponarski et al. 2018; Draheim et al. 2019).

**Paragraph 3: Human-coyote conflict**

Human-coyote conflict occurs when coyotes pose real or perceived threats to the well-being of humans or their pets. Although human-coyote conflict includes the spread of zoonotic diseases (Catalano et al. 2012; Luong et al. 2020) and property damage (Glas et al. 2019), its most common manifestation is the risk that negative interactions with coyotes pose to the safety of humans and their pets (White & Gehrt 2009). As top urban carnivores, coyotes sometimes attack outdoor cats and dogs both as predatory acts and in defense of territories or young (Gehrt et al. 2013; Poessel et al. 2017). Direct coyote attacks on humans are extremely rare, but attacks pm children are typically predatory and often cause serious injury (Carbyn 1989; White & Gehrt 2009; Baker & Timm 2017). When assessing human-coyote conflict, it is important to distinguish between the actual risk of direct harm from a human-coyote interaction, which is driven largely by the behaviour of the coyote, and the perceived risk of harm that is the product of the human’s perception of coyotes.

**Paragraph 4. Discuss coyote boldness and Human perceptions**

Human-coyote conflict is often measured retroactively from attacks (White & Gehrt 2009; Baker & Timm 2017; Poessel et al. 2017a), but it can also be assessed from coyote behaviour or perceptions by people. Coyote behaviour towards people that directly threatens the safety of people or pets is characterized by increased boldness or aggression (Baker & Timm 2017). Recent findings have indicated that urban coyotes are bolder around people than rural animals, likely from repeated interactions with humans, reduced human persecution and anthropogenic food conditioning (Schell et al. 2018; Breck et al. 2019; Young et al. 2019). Conflict also relates to the risk people perceive of injury to themselves, children, or pets when they see or interact with a coyote. Although these perceptions may not align with the actual risk of an attack based on coyote behaviour, they can indicate public tolerance towards coyotes, and, subsequently, acceptance of various forms of wildlife management and policy (Sponarski et al. 2018; Draheim et al. 2019). Human perceptions of risk are affected by past interactions with coyotes, previous knowledge of pet or human attacks, and broader wildlife value orientations (Draheim et al. 2013; Sponarski et al. 2016; Drake et al. 2020). Understanding changes in coyote behaviour towards humans and the human perception of coyotes enables proactive conflict mitigation, instead of limiting management to responsive action after attacks or instances of extreme negative public perceptions of coyotes (Baker & Timm 2017; Draheim et al. 2019). The various factors surrounding each individual human-coyote interaction may provide insight as to where, when and why negative incidents are likely to occur.

**Paragraph 5. Discuss covariates**

(Hody & Kays 2018)

Alexander SM, Quinn MS. 2011. Coyote (Canis latrans) Interactions With Humans and Pets Reported in the Canadian Print Media (1995–2010). Pages 16:15, 345-359. Human Dimensions of Wildlife.

Baker RO, Timm RM. 2017. Coyote attacks on humans, 1970-2015: implications for reducing the risks. Human-Wildlife Interactions **11**:120-132.

Bateman PW, Fleming PA. 2012. Big city life: carnivores in urban environments. Journal of Zoology **287**:1-23.

Breck SW, Poessel SA, Mahoney P, Young JK. 2019. The intrepid urban coyote: a comparison of bold and exploratory behavior in coyotes from urban and rural environments. Scientific Reports **9**:11.

Carbyn LN. 1989. COYOTE ATTACKS ON CHILDREN IN WESTERN NORTH-AMERICA. Wildlife Society Bulletin **17**:444-446.

Catalano S, Lejeune M, Liccioli S, Verocai GG, Gesy KM, Jenkins EJ, Kutz SJ, Fuentealba C, Duignan PJ, Massolo A. 2012. Echinococcus multilocularis in Urban Coyotes, Alberta, Canada. Emerging Infectious Diseases **18**:1625-1628.

Crooks KR, Soule ME. 1999. Mesopredator release and avifaunal extinctions in a fragmented system. Nature **400**:563-566.

Draheim M, Patterson K, Rockwood L, Guagnano G, Parsons E. 2013. Attitudes of College Undergraduates Towards Coyotes (Canis latrans) in an Urban Landscape: Management and Public Outreach Implications. Animals **3**:1-18.

Draheim MM, Parsons ECM, Crate SA, Rockwood LL. 2019. Public perspectives on the management of urban coyotes. Journal of Urban Ecology **5**.

Drake D, Dubay S, Allen ML. 2021. Evaluating human–coyote encounters in an urban landscape using citizen science. Journal of Urban Ecology **7**.

Drake MD, Peterson MN, Griffith EH, Olfenbuttel C, DePerno CS, Moorman CE. 2020. How Urban Identity, Affect, and Knowledge Predict Perceptions About Coyotes and Their Management. Anthrozoos **33**:5-19.

Foley JA, et al. 2005. Global consequences of land use. Science **309**:570-574.

Fox CH. 2006. Humans and coyotes: can we coexist? Pages 287-293. Proc. 22nd Vertebrate Pest Conference, University of California Davis.

Gehrt SD, Wilson EC, Brown JL, Anchor C. 2013. Population Ecology of Free-Roaming Cats and Interference Competition by Coyotes in Urban Parks. Plos One **8**:11.

Glas ZE, Getson JM, Prokopy LS. 2019. Wildlife value orientations and their relationships with mid-size predator management. Human Dimensions of Wildlife **24**:418-432.

Hody JW, Kays R. 2018. Mapping the expansion of coyotes (Canis latrans) across North and Central America. Zookeys:81-97.

Luong LT, Chambers JL, Moizis A, Stock TM, St. Clair CC. 2020. Helminth parasites and zoonotic risk associated with urban coyotes (Canis latrans) in Alberta, Canada. Journal of Helminthology **94**:5.

McKinney ML. 2006. Urbanization as a major cause of biotic homogenization. Biological Conservation **127**:247-260.

Mowry CB, Lee A, Taylor ZP, Hamid N, Whitney S, Heneghen M, Russell J, Wilson LA. 2020. Using community science data to investigate urban Coyotes (Canis latrans) in Atlanta, Georgia, USA. Human Dimensions of Wildlife:16.

Poessel SA, Mock EC, Breck SW. 2017. Coyote (Canis latrans) diet in an urban environment: variation relative to pet conflicts, housing density, and season. Canadian Journal of Zoology **95**:287-297.

Schell CJ, Stanton LA, Young JK, Angeloni LM, Lambert JE, Breck SW, Murray MH. 2020. The evolutionary consequences of human-wildlife conflict in cities. Evolutionary Applications:20.

Schell CJ, Young JK, Lonsdorf EV, Santymire RM, Mateo JM. 2018. Parental habituation to human disturbance over time reduces fear of humans in coyote offspring. Ecology and Evolution **8**:12965-12980.

Soulsbury CD, White PCL. 2015. Human-wildlife interactions in urban areas: a review of conflicts, benefits and opportunities. Wildlife Research **42**:541-553.

Sponarski CC, Miller C, Vaske JJ. 2018. Perceived risks and coyote management in an urban setting. Journal of Urban Ecology **4**.

Sponarski CC, Miller CA, Vaske JJ, Spacapan MR. 2016. Modeling Perceived Risk from Coyotes Among Chicago Residents. Human Dimensions of Wildlife **21**:491-505.

White LA, Gehrt SD. 2009. Coyote Attacks on Humans in the United States and Canada. Pages 419-432. Human Dimensions of Wildlife.

Woodroffe R. 2000. Predators and people: using human densities to interpret declines of large carnivores. Animal Conservation **3**:165-173.

Young JK, Hammill E, Breck SW. 2019. Interactions with humans shape coyote responses to hazing. Scientific Reports **9**:9.