

Evidence Confirms the Presence of Cougars (*Puma concolor*) in Ontario, Canada

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A study was initiated to collect and collate evidence to resolve the long-standing question of whether free-ranging Cougars (*Puma concolor*) exist on the Ontario landscape. A total of 497 pieces of evidence confirmed that Cougars were present in Ontario during the period 1991 to 2010. That evidence included 21 pieces of class 1 evidence (scat, hair, DNA, tracks, photographs of a Cougar), 13 class 2 sightings (by qualified observers such as biologists), and 463 class 3 sightings (credible sightings by unqualified observers). The evidence presented in this paper indicates the presence in Ontario of free-ranging Cougars of unknown origin.

Key Words: Cougar, *Puma concolor*, mountain lion, puma, endangered, Ontario.

The Cougar (*Puma concolor*, formerly *Felis concolor*) (Wozencraft 1993), also known as the puma or mountain lion, is native to North, Central, and South America (Wilson and Reeder 1993; Pierce and Bleich 2003; Bolgiano and Roberts 2005; Wilson and Reeder 2005). In North America, the distribution of Cougars has been reduced to a third of their historical range due primarily to mortality resulting from conflict with humans (Pierce and Bleich 2003). By the 1940s, native Cougars had apparently been extirpated from eastern North America, where the historical range was considered to be east of a line from the Red River in central Manitoba to the western boundary of Louisiana (roughly east of the 100th meridian) (Bolgiano et al. 2000). The U.S. Fish and Wildlife Service recently (March 2011) concluded that the Eastern Cougar (*Puma concolor couguar*) is extinct (McCollough 2011*). However, Cougars in Ontario, Canada, are currently classed as endangered provincially (Species at Risk 2010a*).

Evidence indicating the presence of Cougars in eastern North America has been accumulating during the last three decades. In the United States, the growing number of sightings prompted officials to place *Felis concolor couguar* on the 1973 endangered species list (Bolgiano and Roberts 2005). From 1976 to 2000, evidence (scat, tracks, videos, sightings, carcasses) corroborating the presence of Cougars was collected in 11 northeastern states and provinces from New Brunswick to Missouri (West Virginia, Missouri, Illinois, New Brunswick, Vermont, Maine, Ontario, Virginia, Maryland, North Carolina, and Massachusetts) (Gerson 1988; Stoeck 1995; Bolgiano et al. 2000). Evidence has subsequently been found in an additional 7 jurisdictions (Minnesota, Iowa, Arkansas, Ohio, Michigan, Manitoba, and Quebec) (Heist et al. 2001; Clark et al. 2002; Johnson 2002; Parks Canada 2004; Reichling 2004; Bolgiano and Roberts 2005; Parks

Canada 2006; Swanson and Rusz 2006). In Ontario, Gerson (1988) documented 189 probable Cougar sightings between 1935 and 1983. Since most of these sightings could not be verified, the question as to whether free-ranging Cougars occur on the landscape was still unanswered. The current study was initiated to gather additional evidence to resolve the issue and to confirm the existence of Cougars on the current Ontario landscape.

Study Area and Methods

In 2006, a Cougar research network led by the author was established in Ontario. The network consisted of 89 biologists and wildlife technicians, primarily from the Ontario Ministry of Natural Resources (OMNR). The purpose of the network was to compile reports of Cougar sightings received by OMNR offices, to gather physical evidence with which to corroborate credible observations, where possible, and to collaborate on the design and implementation of an Ontario Cougar research program. Collaborators in the project included the OMNR Wildlife Research and Development Section, OMNR district staff, the Ontario Puma Foundation, and the Natural Resources DNA Profiling and Forensic Centre at Trent University. To gain experience in tracking, capturing, and handling Cougars and in identifying Cougar sign, tracks, and scat through instruction by some of North America's renowned Cougar biologists, I attended Cougar workshops in New Mexico and Montana during 2008 and 2009.

Collaborators from across Ontario were asked to forward credible (believable based on evidence) Cougar sighting data and other evidence (tracks, photographs, scat, tissue samples) to me for evaluation. Sightings that were determined not to be Cougars (either by me or by the primary investigator) were excluded from the analysis. Although data were primarily from the

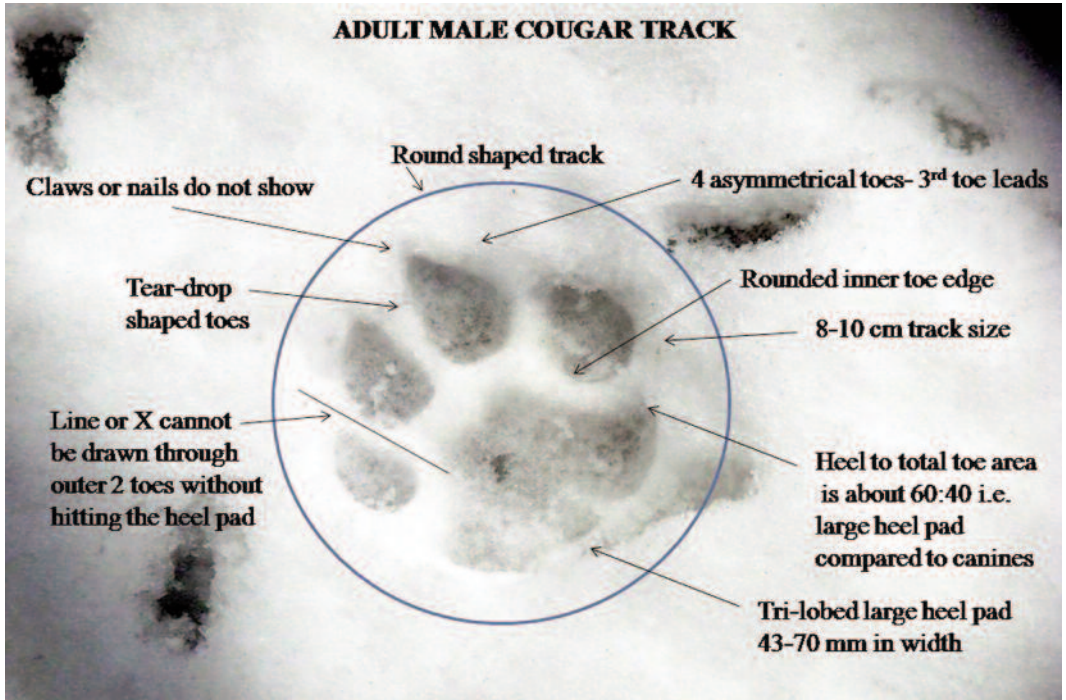


FIGURE 1. Photograph of a Cougar (*Puma concolor*) track showing key identifying features. Photo by Rick Rosatte.

present study (2006 to 2010), data collected by OMNR district staff during the period 1991 to 2005 were also examined. Physical evidence of Cougar presence was collected using standardized data collection protocols (Cardoza and Langlois 2002). Tracks were identified using the characteristics shown in Figure 1 and Shaw et al. (2007).

Credible sightings and physical evidence were classed in one of three categories according to Clark et al. (2002). Class 1 evidence included 1) Cougar DNA extracted from tissue, 2) hair determined to be Cougar through a comparison with reference samples known to be Cougar, 3) Cougar scat, 4) a photograph of a Cougar, or 5) tracks confirmed through expert analysis to be those of a Cougar. Photographs of tracks thought to be made by a Cougar were confirmed by at least two and up to four different tracking experts and Cougar biologists from across North America.

Class 2 evidence included sightings by a qualified observer such as a professional biologist or OMNR staff member (e.g., technician) with an extensive biological background that included mammalian identification.

Class 3 evidence included sightings that were reported by an unqualified observer but that, based on evidence or descriptions of the animal, I deemed credible. Sightings that were identified by the observer as “black Cougars” or “black panthers” were not included, as there are no records of a black phase of Cougar occur-

ring in North America (Texas Parks and Wildlife 2011*). Credible black Cougar sightings were assumed to be exotic cats, such as a melanistic Jaguar (*Panthera onca*) or a melanistic Leopard (*Panthera pardus*) (Figure 2).

Whenever possible, I interviewed in person the individuals who reported Cougar sightings. They were asked to describe the animal according to colour, body size, and length of tail, and they were asked to provide the distance from the animal, the length of the observation, and the date and location of the sighting. They were also asked to select the animal that most closely resembled the animal they reported seeing from a series of photographs of mammals native to Ontario, e.g., Red Fox (*Vulpes vulpes*), Wolf (*Canis lupus*), Coyote (*Canis latrans*), Cougar, American Black Bear (*Ursus americanus*), Canada Lynx (*Lynx canadensis*), Bobcat (*Lynx rufus*), White-tailed Deer (*Odocoileus virginianus*), Fisher (*Martes pennanti*), and Common Raccoon (*Procyon lotor*), as well as exotic species, e.g., Jaguar and Leopard. If the description matched a Cougar and the observer selected the Cougar from the photographs, the sighting was deemed credible.

In an attempt to capture a photograph of a Cougar, trail cameras were installed by OMNR staff in the vicinity of credible Cougar sightings across Ontario during the period 2008 to 2010. Cameras were left in place for several months. The details of that study, including methods, are outlined in a manuscript that



FIGURE 4. Photograph of a Cougar track near Sioux Narrows, Ontario, March 2007. A trapper and a member of the public both observed the Cougar. Photo by Robert Horley.

in the Deciduous Forest and Great Lakes-St. Lawrence Forest regions, and the southeastern region is primarily in the Great Lakes-St. Lawrence Forest region (Species at Risk 2010b*).

Between 2006 and 2010, I gave presentations to naturalist groups, hunting and trapping organizations, and OMNR district staff in order to increase awareness and knowledge of Cougar presence in Ontario. I also assisted OMNR district and policy staff in designing Cougar response protocols and Cougar fact sheets, and I designed Cougar sighting data sheets, Cougar track identification sheets, and a Cougar sighting database for use during this study.

Results

The present study confirms the presence of Cougar in Ontario. A total of 497 pieces of evidence collected between 1991 and 2010 were evaluated. This included 21 pieces of class 1 evidence collected during the

period 1998 to 2010 (Table 1; Figure 3). Sixty-seven percent of that evidence was collected during the period 2006 to 2010 (the time of this study), with the remainder being collected during the period 1998 to 2005.

Class 1 evidence included 15 tracks in different areas of Ontario confirmed as Cougar (Figure 4); hair samples from the Sudbury area (northeastern region) that were morphologically identical to Cougar hair (J. Fortier, personal communication); DNA from one Cougar scat from the Wainfleet area (southwestern region) (A. Yagi, personal communication; Harris 2007); one scat from the Kenora area (northwestern region) confirmed as Cougar by thin layer chromatography (L. Anderson, personal communication); one photograph from the Orillia area (southeastern region) confirmed to be consistent with a Cougar (Figure 5); one infrared image from the Sunderland area (southeastern region) that was consistent with the morpho-



FIGURE 5. Photograph of a Cougar in the Orillia area near Coldwater, Ontario, in March 2007. S. Kenn of the Ontario Puma Foundation did an on-site investigation and determined that the photograph was authentic. Photo by Bill Robson.

logical features of a Cougar; and one photograph of a Cougar from the Gowganda area (northeastern region) that was confirmed to be consistent with a Cougar.

There were 13 class 2 sightings made by biologists across Ontario during the period 1994 to 2010 (Figure 3). Fifty-four percent of those occurred during the period 2006 to 2010 and the remainder occurred during the period 1994 to 2005.

There were also 463 class 3 sightings that were recorded across Ontario during the period 1991 to 2010 (Table 1). Eighty-two percent of those occurred

during the period 2006 to 2010 with the remainder occurring during the period 1991 to 2005.

A total of 52 credible “black Cougar” sightings were reported in Ontario during the period 1991 to 2010: one in the northwestern region, 15 in the northeastern region, 9 in the southwestern region, and 27 in the southeastern region (Figure 2). These were not classed, as there are no records of black Cougars occurring in North America. They were assumed to be escaped exotic animals (Texas Parks and Wildlife 2011*).

TABLE 1. Pieces of evidence, by class and region, that confirm the presence of Cougars in Ontario, Canada, during the period 1991 to 2010.

Evidence	Region				All of Ontario
	Northwestern	Northeastern	Southwestern	Southeastern	
Class 1	7	3	3	8	21
Class 2	2	2	0	9	13
Class 3	5	116	64	278	463
Total	14	121	67	295	497

Class 1 = evidence such as DNA or hair from Cougars, Cougar scat, photographs of Cougars, or photographs of Cougar tracks; class 2 = credible sighting by a qualified observer such as a biologist; class 3 = credible sighting by an unqualified observer. Class 1 and class 2 evidence is from 1994 to 2010. Class 3 evidence is from 1991 to 2010; however, 81% of the sightings were made during the period 2006 to 2010.



FIGURE 6. Photograph of a Fisher, which is sometimes misidentified as a black Cougar. Photo by Rick Rosatte.

Trail cameras were set up across Ontario by OMNR staff to attempt to detect Cougar presence. More than 17 000 camera-nights were accumulated between 1 April 2008 and 31 December 2010. No definitive photographs of a Cougar were acquired during the study; however, one infrared image from a trail camera was assessed to be morphologically similar to a Cougar. Based on the number of photographs of animals taken by the trail cameras (154 736), the probability of taking a photograph of a Cougar on a trail camera in Ontario during the period 2006 to 2010 was close to zero.

Discussion

In a previous study, 318 Cougar sightings (189 of which were probable) reported in Ontario between 1935 and 1983 received subsequent evaluation by OMNR staff (Gerson 1988). Evidence from those sightings plus evidence from Minnesota and Manitoba suggested that Ontario might support a resident Cougar population (Gerson 1988). The number of credible Cougar sightings in Ontario increased from 28 during

the period 1950–1959 to 103 during the period 1980–1983 (Gerson 1988). In addition, the Ontario Puma Foundation received notice of more than 500 possible Cougar sightings provincially between 2002 and 2006 (S. Kenn, personal communication). This trend suggests an increasing presence of Cougars in Ontario and was one of the reasons the current study was initiated. In addition, the Gerson (1988) study relied on sightings, whereas the current study also sought to find physical evidence of Cougars in Ontario. The current study confirms the presence of Cougars in Ontario, primarily based on class 1 and class 2 evidence. However, it is acknowledged that although class 3 sightings were deemed credible (based on animal descriptions), there is always the possibility that some may have been misidentifications, especially if the animal in question was a Canada Lynx or a Bobcat.

As the diet of Cougars consists primarily of ungulates, in particular Mule Deer and White-tailed Deer (Hornocker and Negri 2009), there is certainly a sufficiently large prey base for Cougars in Ontario, which



FIGURE 7. Photograph of a treed Cougar west of Great Falls, Montana, taken in February 2009. Photo by Rick Rosatte.

has a White-tailed Deer population estimated to be between 400 000 and 500 000 (Bellhouse and Rosatte 2005).

As Cougars are habitat generalists, most areas of Ontario could support Cougars (Hauck 2000). The evidence from this study provides proof that Cougars exist on the landscape in Ontario; however, it does not indicate the origin of these animals. Possible sources of Cougars in Ontario include 1) escaped or released captive animals (or their offspring), 2) animals that have dispersed into Ontario from areas supporting free-ranging Cougar populations or their offspring, 3) remnants of a native free-ranging Cougar population in Ontario, and 4) a genetic mix of these sources of animals. In view of the high human population density and isolation of southern Ontario by the Great Lakes, it seems plausible that the source of Cougars in southern Ontario may be escaped captive animals. As northern Ontario is in closer proximity to source populations of Cougars than the southern part of the province, at least some of the source animals for northern Ontario could be immigrants from the west.

It is unknown how many Cougars there are in captivity in Ontario, but it is likely several hundred. It is reasonable to assume that at least some of those may

have escaped or been released into the wild (Bolgiano and Roberts 2005). It would also be plausible to assume that some Cougars immigrated into Ontario. The eastward expansion of Cougars is clearly evident, with the presence of Cougars having been documented by photographs in Minnesota (2009), Indiana (2009 to 2010), Wisconsin (2009 to 2010), and Michigan (2010) (The Cougar Network 2011*). Cougar sighting evidence (1879 to 1975) and two Cougar carcasses (one shot and one trapped in 2004), as well as three photographs of Cougars (2006 to 2008), have proven that Cougars are present in Manitoba (Nero and Wrigley 1977; Watkins 2005; The Manitoba Mountain Lion Wildcat Watch 2011*). If Cougars have expanded their range from western North America, it is possible that Cougars have immigrated into Ontario from the western U.S. states and western Canadian provinces (Cougars are capable of moving 50 km/night, with home ranges of 150 to 700 km²; Hornocker and Negri 2009). In fact, one radio-collared Cougar was documented moving 960 km from South Dakota to Saskatchewan before it was shot in 2008. Another Cougar from the same South Dakota study travelled 1060 km to Oklahoma (Hornocker and Negri 2009). Another radio-collared Cougar from South Dakota travelled >800 km

to northwestern Minnesota (Hornocker and Negri 2009; The Cougar Network 2011*). Potential travel corridors for Cougars immigrating into Ontario include the Sault Ste. Marie area (from Michigan), the Kenora area (from Manitoba), the Quebec border area, and the Thousand Islands Ontario/New York border area (dispersal via the Appalachians). Cougars have been sighted and physical evidence of Cougars has been found recently in all of those areas (Bolgiano and Roberts 2005).

In my opinion, the majority of Cougars currently in Ontario are most likely a genetic mixture of escaped/released captives (or their offspring), immigrants (or their offspring), and/or native animals. Cougars appear to have been present in Ontario between the 1930s and the 1980s (Gerson 1988). In view of this, at least some native Cougars in Ontario may have survived the decimation of eastern Cougar populations in the late 1800s. This would be feasible, given the size of Ontario (area of >1 million km²) and the remoteness of the province, especially in the north. However, the presence of Cougars in Ontario between the 1930s and the 1980s may also have been the result of immigration from the west or escaped/released captive animals (Bolgiano and Roberts 2005).

More class 3 Cougar sightings were reported by the public in some areas of Ontario (e.g., North Bay to Cochrane, Sudbury to Sault Ste. Marie, Belleville/Brockville to Ottawa, Bancroft to Madoc, Peterborough to Lindsay and Port Perry, and Aurora to Orillia) than in other areas. This is likely more a reflection of the reporting system than of Cougar density. Due to a variety of factors (e.g., work load, high staff turnover, low human population density, reluctance on the part of the public to report Cougar sightings in some areas, poor road access in northern Ontario), detailed records of Cougar sightings were not available for all areas of the province. Some areas had fewer reported credible Cougar sightings, but that does not mean that Cougars are not present on the landscape in those areas. Explanations could include sightings that were not reported at all, sightings that were reported but not tabulated, or sightings that were recorded but not made available for analysis.

Conversely, a significant number of sightings in an area do not necessarily mean that Cougar density is high in that area. Cougars are generally solitary (other than during breeding and adult females with young) and they range widely and travel extensively; therefore, multiple sightings in an area could be of the same Cougar. A rash of sightings in an area has also been attributed to an increased awareness of Cougars by the media.

During this study, a total of 52 credible “black Cougar” sightings were reported in Ontario. In my opinion, they were in all likelihood escaped exotic animals, most likely melanistic Leopards or melanistic Jaguars (Figure 2), or another species such as a Fisher

(Figure 6) or a small American Black Bear. I could not find any records or published literature documenting the capture, killing, or photographing of black Cougars in North America (Texas Parks and Wildlife 2011*). However, a few black Cougars were found in South America during the 1700s (Buffon 1772–1809). Given this, it is highly unlikely there are any melanistic Cougars in Ontario.

It is difficult to discern whether increasing evidence from sightings is indicative of an expanding or increasing free-ranging population of Cougars in Ontario. For example, the media can have a great impact on the frequency of reports from the public of possible Cougar sightings (Cougar Management Guidelines Working Group 2005). On Saturday, 19 June 2010, one Ontario newspaper published an article on Cougar research in Ontario by the Ontario Ministry of Natural Resources. On Monday, 21 June 2010, 48 media outlets (television, radio, newspaper) covered the same story. This resulted in numerous (>20) members of the public phoning OMNR and the Ontario Puma Foundation on the day of the story to report that they had observed a Cougar that day. Many of those sightings were mis-identifications, with reporting being stimulated by the media coverage.

Because of their reclusive and secretive habits, Cougars are very difficult to find, even in areas that support considerable populations (Hornocker and Negri 2009). For example, in February 2009, I attended a Cougar workshop in Montana. As part of the course, the instructor led the group into the mountains and tracked Cougars using two trained tracking dogs. It took the group four days of snowshoeing to intersect the trails of just three Cougars—and only one of the Cougars was treed and photographed (Figure 7). Also in support of the view that Cougars are difficult to detect, trail cameras have been used with limited success to detect Cougar presence in areas supporting low to moderate densities of Cougars. In one study in Alberta and Saskatchewan, only two Cougars were photographed by trail cameras (Bacon 2010). In another study, in California, only three Cougars were captured on cameras (Casey 2008). In our trail camera study, there was only one photo that was judged to be a Cougar, based on morphological features on an infrared photo, despite thousands of trail camera-nights across the province. Given the low probability of capturing a photograph of a Cougar in areas supporting low to moderate densities of Cougars, trail cameras are probably not a good tool to use to detect Cougar presence in Ontario. It also suggests that Cougars exist at low densities in the province.

While this study provided evidence of Cougar existence in Ontario, it did not determine the subspecies of Cougar currently present in the province. In the early 1900s, 32 distinct subspecies of *Puma concolor* were identified in North and South America, based on geographic and morphometric criteria (Young and Gold-

man 1946; Culver et al. 2000; Culver 2004, 2005). Recent molecular evidence suggests 6 subspecies, with only one for North America (*Puma concolor cougar*) (Culver et al. 2000; Culver 2005). One reason to initiate genetic studies on Cougars in Ontario would be to determine their geographic origin (i.e., are they South American genotype Cougars from the pet trade?). However, the results would likely be inconclusive. If the Cougar sample was found to be a North American genotype (which was the case with the DNA from the Cougar in Wainfleet, Ontario; Brad White, personal communication), the animal could be an escaped or released captive, a descendant of such, an immigrant from another area, or an animal descended from native stock. Indeed, it could have ancestors from all three of the aforementioned sources. If DNA analysis showed that the Cougar was wholly or partially derived from a "Latin American subspecies," then one would suspect that it or its ancestors were former captives, i.e., escaped or released captive Cougars. If one agrees with Culver (2005) that there is only one subspecies of Cougar in North America, then it does not really matter whether a specific Cougar is a "captive" North American genotype or a "wild" free-ranging genotype, in terms of managing this species in Ontario. What is important is that there are "free-ranging" North American genotype Cougars in Ontario that have originated from an unknown combination of released, escaped, native, or dispersing animals.

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