

Species Status Assessment

Class: Mammalia
Family: Felidae
Scientific Name: *Puma concolor cougar*
Common Name: Cougar

Species synopsis:

The eastern cougar (*Puma concolor cougar*) has long been considered a subspecies of the North American cougar. A recent genetic study found all North American subspecies to be a single subspecies (Culver et al. 2000) but taxonomy remains in question (USFWS 2011). The cougar is known by many common names, including puma, mountain lion, catamount, and panther.

Historic records indicate that the eastern cougar once occurred from eastern Canada southward into Tennessee and South Carolina, where its range merged with the Florida panther (*P. c. coryi*). The present distribution of the species in the United States is limited to the western states. Since the 1990s, five breeding colonies have been established east of the Rocky Mountains. Cougars from one of these, Black Hills, South Dakota, have been documented in Michigan and Minnesota as well as in Kansas, Oklahoma, Iowa, Illinois, Wisconsin and Missouri. In the west, cougars are still quite common in areas of the Rocky Mountain states and in British Columbia as well as in Alberta, the Great Basin, Cascades and Sierra Nevada and have colonized urban-suburban-wildland habitat matrixes into Seattle (Kertson et al. 2011), the Bay Area of California (Wilmers et al. 2013) and Los Angeles (Santa Monica National Recreation Area, National Park Service 2014). With the exception of Florida, the cougar has been considered extirpated from east of the Mississippi River since 1900 (McCollough 2011). The Adirondacks were the final stronghold for cougars in the Northeast, with the last record in 1903 (Whitaker and Hamilton 1998). An individual cougar that was previously verified in Wisconsin and Michigan was documented in the Lake George, New York vicinity in late 2010 and later killed by a car in Connecticut. Genetic testing indicated the animal was related to the of Black Hills, South Dakota population.

The eastern cougar was listed as an endangered species in 1973 and a recovery plan was approved by the U.S. Fish and Wildlife Service in 1982. In 2011, the eastern cougar was declared extinct (McCollough 2011, USFWS 2011).

I. Status

a. Current and Legal Protected Status

- i. **Federal** Endangered / Extinct **Candidate?** N/A
- ii. **New York** Endangered / Extirpated / SGCN

b. Natural Heritage Program Rank

- i. **Global** G5THQ
- ii. **New York** SX **Tracked by NYNHP?** Yes

Other Rank:

IUCN Red List— (CR) Critically Endangered

COSEWIC— Endangered

CITIES— Appendix I

Status Discussion:

Eastern North America populations, with the exception of those in Florida and perhaps in the Smoky Mountains, have been considered largely extirpated since the 1870s (McCollough 2011). Numbers are increasing in the western United States and Canada, however, and may be recolonizing parts of their former range, having been credibly documented in Illinois, Minnesota, Michigan, Louisiana, and Wisconsin (see summary in McGovern and Kretser 2014). Evidence of cougars has recently been documented in Quebec and New Brunswick (Lang et al. 2013) and in Ontario (Rosatte 2011).

II. Abundance and Distribution Trends

a. North America

i. Abundance

X declining ___ increasing ___ stable ___ unknown

ii. Distribution:

X declining ___ increasing ___ stable ___ unknown

Time frame considered: Extirpated east of the Mississippi since 1900

b. Regional

i. Abundance

___ declining ___ increasing ___ stable ___ unknown

ii. Distribution:

___ declining ___ increasing ___ stable ___ unknown

Regional Unit Considered: Northeast

Time Frame Considered: Extirpated 1870s

c. Adjacent States and Provinces

CONNECTICUT Not Present X No data ___

i. Abundance

___ declining ___ increasing ___ stable ___ unknown

ii. Distribution:

___ declining ___ increasing ___ stable ___ unknown

Time frame considered: Believed extirpated after 1832

Listing Status: Special Concern (SX) SGCN? No

MASSACHUSETTS **Not Present** X **No data** _____

i. Abundance

____ declining ____ increasing ____ stable ____ unknown

ii. Distribution:

____ declining ____ increasing ____ stable ____ unknown

Time frame considered: Believed extirpated by 1858

Listing Status: Not listed (SX) SGCN? No

NEW JERSEY **Not Present** X **No data** _____

i. Abundance

____ declining ____ increasing ____ stable ____ unknown

ii. Distribution:

____ declining ____ increasing ____ stable ____ unknown

Time frame considered: Believed extirpated after 1830-1840s

Listing Status: Endangered (SX) SGCN? No

ONTARIO **Not Present** _____ **No data** _____

i. Abundance

____ declining ____ increasing ____ stable X unknown

ii. Distribution:

____ declining ____ increasing ____ stable X unknown

Time frame considered: _____

Listing Status: Endangered

PENNSYLVANIA Not Present X No data _____

i. Abundance

____ declining ____increasing ____stable ____unknown

ii. Distribution:

____ declining ____increasing ____stable ____unknown

Time frame considered: Believed extirpated after 1905

Listing Status: Not listed (SX) SGCN? No

QUEBEC Not Present _____ No data _____

i. Abundance

____ declining ____increasing ____stable X unknown

ii. Distribution:

____ declining ____increasing _____stable X unknown

Time frame considered: _____

Listing Status: Not listed (no rank)

VERMONT Not Present X No data _____

i. Abundance

____ declining ____increasing ____stable ____unknown

ii. Distribution:

____ declining ____increasing ____stable ____unknown

Time frame considered: Considered extirpated by late 1930s

Listing Status: Not listed (SH) SGCN? No

d. NEW YORK Not Present X No data

i. Abundance

 declining increasing stable unknown

ii. Distribution:

 declining increasing stable unknown

Time frame considered: Believed extirpated after 1897

Monitoring in New York.

None.

Trends Discussion:

The cougar was targeted in the eastern United States beginning in the 1700s, when they were hunted by European settlers. States placed bounties on the cats with the goal of protecting livestock and the last confirmed cougar was trapped in the late 1930s, according to the USFWS (McCullough 2011).

III. New York Rarity, if known:

Historic	<u># of Animals</u>	<u># of Locations</u>	<u>% of State</u>
prior to 1970	<u> </u>	<u> </u>	<u> </u>
prior to 1980	<u> </u>	<u> </u>	<u> </u>
prior to 1990	<u> </u>	<u> </u>	<u> </u>

Details of historic occurrence:

There is insufficient data to evaluate historic occurrence. Early reports indicate cougars were more prevalent in the western Adirondacks than elsewhere in the state, and this information is supported by bounty records, but the reliability of the of bounty records for biological assessment has been questioned.

Current	<u># of Animals</u>	<u># of Locations</u>	<u>% of State</u>
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Details of current occurrence:

Sightings of animals are commonly reported by the public but to date, there is a lack of hard evidence that would suggest the existence of cougars living and reproducing in the wild in New York. A few individuals are kept in captivity under a special permit, and likely illegally as well. In at least two instances, captive cougars did make it to the wild in NY but neither cougar survived long. One confirmed sighting in New York was a 7.5-pound kitten shot in Saratoga County in December 1993 (Kahn, 1994). See also Brocke (1981).

In 2010 a reported cougar observation in Lake George was confirmed by tracks and DNA evidence. The same animal was struck by a vehicle and killed in Milford, Connecticut in June 2011, and further investigation revealed that it was a wild male from the Black Hills population in South Dakota (Kerwin 2013). Evidence of cougars with both North and South American (the latter suggesting former captives or their descendants) DNA has been documented recently in Ontario (Rosatte 2011, Mallory et al. 2012), Quebec, and New Brunswick (Lang et al. 2013) without evidence of breeding.

The U.S. Fish and Wildlife Service reviewed all available research and other information, and concluded in 2011 that the eastern cougar subspecies has been extinct since the 1930s, and recommended that it be removed from its list of endangered species (USFWS 2011). The agency used the 1946 taxonomy of S.P. Young and E.A. Goldman in defining the eastern cougar subspecies. While noting that some taxonomists in recent years have classified all North American cougars within a single subspecies, the agency's 2011 report said "a full taxonomic analysis is necessary to conclude that a revision to the Young and Goldman (1946) taxonomy is warranted."

New York's Contribution to Species North American Range:

% of NA Range in New York	Classification of New York Range
<input type="checkbox"/> 100 (endemic)	<input type="checkbox"/> Core
<input type="checkbox"/> 76-99	<input type="checkbox"/> Peripheral
<input type="checkbox"/> 51-75	<input type="checkbox"/> Disjunct
<input type="checkbox"/> 26-50	Distance to core population:
<input type="checkbox"/> 1-25	<u>1,000+ mi</u>

IV. Primary Habitat or Community Type:

1. Oak-pine Forest
2. Oak Forest
3. Mixed Northern Hardwoods
4. Spruce-fir Forest and Flats
5. Mountain Spruce-fir Forest

Habitat or Community Type Trend in New York:

Declining Stable Increasing Unknown

Time frame of decline/increase: _____

Habitat Specialist? Yes No

Indicator Species? Yes No

Habitat Discussion:

Throughout the 20th century the primary habitat requirement would have been described as a large wilderness area with adequate food supply (e.g. USFWS Division of Endangered Species 1991). In contrast, however, cougars have colonized urban-suburban wildland matrixes throughout the west. Beier and Loe (1992) and Beier and Barret (1993) suggested that 425 mi² to 850 mi² (1,100 to 2,200 km²) of high quality habitat is needed to support a long-term persistence of 15 to 20 cougars

in the absence of immigration. If a wildlife movement corridor is available to allow immigration of up to 3 males and 1 female per decade, an area as small as 231 mi² to 618 mi² (600 to 1,600 km²) may be adequate. The smallest documented home range is 39 km² (Laundré and Loxterman 2006). Space-use patterns differ little between wildland and residential environments (Kertson et al. 2011). Reproductive behaviors (communication/denning) require greater buffers from development than non-reproductive behaviors (movement/feeding) within the urban-suburban-wildland matrix (Wilmers et al. 2013). Male dispersal and settlement patterns are based on mating opportunities while female patterns are based on avoiding other cougars (Stoner et al. 2013).

Test-releases of Texas cougars to the southern Georgia-northern Florida area suggest that Florida panther reintroductions to southeastern habitat is biologically feasible (Belden and McCown 1996). Locations in the Midwest (LaRue and Nielsen 2011, Smith 2013), Southeast (Thatcher et al. 2006, Anco 2011) and the Northeast (Laundré 2013, Glick 2014) have been evaluated for suitable cougar habitat. Brocke (1981) concluded that survival of a reintroduced population in the Adirondacks would be “virtually impossible”. A more recent study conducted an analysis of Adirondack habitat, comparing the Black Hills of South Dakota with comparable road and development densities in the Adirondacks and concluded that the Adirondack Park could support 150 to 350 cougars within about 70% of the Park (Laundré 2013).

V. New York Species Demographics and Life History

- Breeder in New York**
 - Summer Resident**
 - Winter Resident**
 - Anadromous**
- Non-breeder in New York**
 - Summer Resident**
 - Winter Resident**
 - Catadromous**
- Migratory only**
- Unknown**

Species Demographics and Life History Discussion:

Cougars are polygamous and the large home range of a male typically encompasses several smaller female home ranges. Home ranges vary widely in size depending on local vegetation, prey density and distribution, and time of year. Male home ranges are typically 78 to 195 mi.² (202 to 505 km²) but can be up to 500 mi.² (1295km²) (Anderson 1983, Lindzey 1987, Hansen 1992, Logan and Sweanor 2000, 2001) and occasionally overlap with other males. Female home ranges of 8 to 400 mi.² (21 to 1036 km²) overlap widely (Anderson 1983, Lindzey 1987, Hansen 1992).

Although they are known to consume a wide variety of mammals, birds and even insects, large ungulates, particularly deer, are the cougar's principal prey in North America (Nowell and Jackson, 1996).

Cougars typically reach sexual maturity at 24 to 36 months (Eaton and Velandar 1977, Maehr *et al.* 1991) and the average age at first reproduction is 2.2 years (Belden and Schulz 2007). Cougars are induced ovulators (Bonney *et al.* 1981) and can breed year-round (Lechleitner 1969). Females breed at an interval of every 2 to 3 years and after their young have dispersed. Gestation is 82 to 96 days (Hansen 1992) and litter sizes range from 1 to 6, with a mean of 2.6 (Anderson 1983). Kittens are born year-round in caves, under uprooted trees, or in dense thickets (Young and Goldman 1946) but reproduction peaks appear from June to October (Laundré and Hernandez 2007). Young stay at the birth site until weaned and visit kill sites with their mother at about 6 weeks of age (Grinnell *et al.* 1937).

Kittens stay with their mother until about 18 months; they can become independent as early as 12 to 14 months of age (Robinette *et al.* 1961, Hornocker 1970, Beier 1995). Sub-adult females disperse short distances and often stay near or within the home range of their mother or another female. Transient males usually disperse and occupy a series of small home ranges until they find an area to occupy as a permanent territory (Beier 1995). Average dispersal distance is 31 to 100 mi. (49.9 to 160.9 km) for males (Ashman *et al.* 1983, Hornocker 1970) and 18 mi (29.0 km) for females (Ashman *et al.* 1983). Cougars have been previously reported to disperse up to 600 to 1,000 mi (965 to 1609 km) from their birthplace (Logan and Sweanor 2000, Thompson and Jenks 2005) but the apparent dispersal of a young male that was eventually killed in CT exceeds these distances (Kerwin 2012; also see below). Successful male recruitment seems dependent on either the death or relocation of a resident adult male or dispersal to unoccupied habitat (Maehr *et al.* 1991). The average life span for cougars is about eight years (Hansen 1992)

In 2010, a wild cougar was confirmed in New York. The profile of the cat's DNA was most closely related to a breeding population in the Black Hills of southwestern South Dakota. This cat was first sighted in eastern Minnesota on 11 December 2009 when DNA analysis confirmed it as a cougar. Additional DNA identifications of the same cat were made in St. Croix Wisconsin in late December 2009 and in Bayfield County, Wisconsin on 15 February 2010. On 20 May 2010 a trail camera photographed a young cougar in Oconto County, Wisconsin and later a trail camera in Michigan's Upper Peninsula photographed what is believed to be the same cat. The next known sighting of this cat was in Lake George, NY on 16 December 2010. According to the Connecticut Department of Environmental Protection, the cat was spotted several times in Greenwich, Connecticut in early June 2011 and photographed on 5 June before it was hit and killed by a motor vehicle on the Wilbur Cross Parkway in Milford, Connecticut on 11 June 2011. A necropsy, performed in Connecticut by a USFWS Wildlife Forensic Lab veterinary pathologist, found a healthy 3-year-old 140 lb. male mountain lion in good physical condition. The stomach was empty and there were porcupine quills under the skin. There were no signs of de-clawing or neutering and no sign of a PIT tag. Straight line distance from Champlin, Minnesota where the cat was first identified to Milford, Connecticut where it was killed is approximately 1,057 miles. The previous record for distance travelled by a dispersing mountain lion was from South Dakota to Oklahoma a distance of approximately 663 miles. This cat may have been born in the Black Hills of South Dakota (or possibly to parents that had previously dispersed to the east) and it appears that it travelled through Minnesota, Wisconsin, the Upper Peninsula of Michigan, and likely southern Ontario, then into New York, and Connecticut, a potential total distance of approximately 1,800 miles (Hynes 2011, Kerwin 2013).

Threats:

Overhunting, disappearance of suitable habitat, and market hunting of prey led to extirpation of the species in the Northeast. Overhunting and loss of habitat connectivity continue to pose a threat in regions where cougars still occur (Whitaker and Hamilton 1998). It seems likely that habitat

barriers would impede gene flow from existing cougar populations should eastern populations become established, suggesting susceptibility to low genetic variability and inbreeding.

According to one assessment population recovery would require the establishment of three self-sustaining populations (defined by a minimum of 50 breeding adults, and where losses of these adults are replaced through reproduction and/or immigration from nearby populations) (Downing 1981). Various locations in the Midwest (LaRue and Nielsen 2011, Smith 2013), Southeast (Thatcher et al. 2006, Anco 2011) and the Northeast (Laundré 2013, Glick 2014, but see also Brocke 1981) have been evaluated and found suitable for the establishment of self-sustaining populations. However, natural colonization of these areas is problematic. Given the limits of female dispersal natural recolonization to the Midwest and the East appears unlikely.

Are there regulatory mechanisms that protect the species or its habitat in New York?

No Unknown
 Yes

Although considered extirpated in New York, the cougar is protected by its status as state- and federally-listed Endangered. As an endangered species in New York, it is protected by Environmental Conservation Law (ECL) section 11-0535 and the New York Code of Rules and Regulations (6 NYCRR Part 182). A permit is required for any proposed project that may result in a take of a species listed as Threatened or Endangered, including, but not limited to, actions that may kill or harm individual animals or result in the adverse modification, degradation or destruction of habitat occupied by the listed species.

Describe knowledge of management/conservation actions that are needed for recovery/conservation, or to eliminate, minimize, or compensate for the identified threats:

Conservation actions following IUCN taxonomy are categorized in the table.

Conservation Actions	
Action Category	Action
Species Management	Species reintroduction

The Comprehensive Wildlife Conservation Strategy (NYSDEC 2005) includes recommendations for the following actions for large mammals that have been extirpated in New York.

Habitat research:

Conduct biological assessment for species shown to be socially acceptable.

Other actions:

— Conduct public attitude surveys when decision makers are of the opinion that there is a reasonable chance of public support for the restoration of an extirpated species.

Relocation/ reintroduction:

— Restore species believed likely to succeed and that are socially acceptable and monitor their progress.

Pending federal delisting could jeopardize any potential for recolonization if state protections are not established, maintained, and enforced east of the Prairie states.

A recovery team was appointed in 1976 to develop a federal recovery plan, which was approved by the USFWS in 1981 (Whitaker and Hamilton 1998). Based on cougar colonization and breeding patterns across western habitat matrixes including urban landscapes, on cougar test-releases in southeastern habitat, and on Adirondack, Georgia, Northeast, and Southeast habitat analyses, the required habitat for cougar reintroduction is likely available. Laundré's (2013) work concluding that the Adirondack Park could support a population of cougars also noted that the public's will to bring them back is a vital component. Following this, McGovern and Kretser (2014) explored attitudes of residents and visitors towards cougars in the Adirondack Park. A majority of respondents supported the idea of cougars returning naturally to the Adirondacks, with 35.7% of residents supporting intentional release of animals.

VI. References

- Anco, C. 2011. Habitat suitability and reintroduction potential for *Puma concolor* in the state of Georgia. Nicholas School of the Environment. Duke University.
- Anderson, A. E. 1983. A critical review of the literature on puma (*Felis concolor*). Colorado Division of Wildlife Special Report No. 54.
- Ashman, D. G. C. Christensen, M. C. Hess, G. K. Tsukamoto, and M. S. Wichersham. 1983. The mountain lion of Nevada. Nevada Department of Wildlife, Reno, Nevada, USA.
- Beier, P. 1995. Dispersal of juvenile cougars in fragmented habitat. *Journal of Wildlife Management* 59: 228-237.
- Beier, P. and S. Loe. 1992. A checklist for evaluating impacts to wildlife movement corridors. *Wildlife Society Bulletin* 20: 434-440.
- Beier, P., and R. H. Barrett. 1993. The cougar in the Santa Anna Mountain Range, California. Department of Forestry and Resource Management, University of California, Berkeley, California, USA.

- Belden, R.C. and J.W. McCown. 1996. Florida panther reintroduction feasibility study. Florida Game and Fresh Water Fish Commission. Bureau of Wildlife Research. Final Report. Study Number: 7507. Tallahassee, Florida.
- Belden, R. C., and C. Schulz. 2007. Florida panther (*Puma concolor coryi*) 5-year review: Summary and evaluation. U.S. Fish and Wildlife Service, South Florida Ecological Services Office, Vero Beach, Florida, USA.
- Bonney, R. C., H. D. M. Moore, and D. M. Jones. 1981. Plasma concentrations of oestradiol-17B and progesterone, and laparoscopic observations of the ovary in the puma (*Felis concolor*) during estrus, pseudo pregnancy and pregnancy. *Journal of Reproductive Fertility* 63: 523-531.
- Brocke, R.H. 1981. Reintroduction of the cougar in the Adirondacks: An analysis and recommendations. Final Report New York Federal Aid Endangered Species Project E-1-3.
- Downing, R. L. 1981. Eastern cougar recovery plan. U.S. Fish and Wildlife Service (USFWS) Denver Wildlife Research Center, Clemson, South Carolina, USA.
- Eaton, R. L. and K. A. Velandier. 1977. Reproduction in the puma: biology, behavior, and ontogeny. *World's Cats* 3: 45-70.
- Glick, H.B. 2014. Modeling cougar habitat in the Northeastern United States. *Ecological Modelling* 285: 78-89.
- Grinnell, J., J. S. Dixon, and J. M. Linsdale. 1937. *Furbearing mammals of California*. University of California Press, Berkeley, California, USA.
- Hansen, K. 1992. *Cougar: The American lion*. Northland Publishing, Flagstaff, Arizona, USA.
- Hornocker, M. G. 1970. An analysis of mountain lion predation upon mule deer and elk in the Idaho Primitive Area. *Wildlife Monograph No. 21*. The Wildlife Society, Washington, D.C., USA.
- Hynes, K. 2011. Unpublished species identification diagnosis: mountain lion (*Puma concolor*). New York State Department of Environmental Conservation Wildlife Pathology Unit, Albany, New York, USA.
- Kahn, J. 1994. Cougar kitten shot near Adirondack Park. *Northern Forest Forum* 2.
- Kertson, B., R. D. Spencer, J.M. Marzluff, J.Hepinstall-Cymerman, and C.E. Grue 2011. Cougar space use and movements in the wildland-urban landscape of western Washington. *Ecological Applications* 21:2866-2881.
- Kerwin, J. 2012. Far from home: wild western cougar travels through New York. *The New York State Conservationist*, October 2012. < <http://www.dec.ny.gov/pubs/85028.html>>. Accessed 2 April 2013.

- Lang, L., N. Tessier, M. Gauthier, R. Wissink, H. Jolicoeur, and F.-J. Lapointe. 2013. Genetic Confirmation of Cougars (*Puma concolor*) in Eastern Canada. *Northeastern Naturalist* 20(3): 383-396.
- LaRue, M.A. and C.K. Nielsen 2011. Modelling potential habitat for cougars in midwestern North America. *Ecological Modeling* 01/2011; 222(3):897-900.
- Laundré, J. W. 2013. The feasibility of the northeastern USA supporting the return of the cougar (*Puma concolor*). *Oryx/ Volume 47/ Issue 1/ January 2013*, pp 96-104.
- Laundré, J.W. and L. Hernandez. 2007. Do female pumas (*Puma concolor*) exhibit a birth pulse? *Journal of Mammalogy* 88:1300-1304.
- Laundré, J.W. and J. Loxterman. 2006. Impact of edge habitat on summer home range size in female pumas. *American Midland Naturalist*.157:221-229
- Lechleitner, R. R. 1969. Wild mammals of Colorado: Their appearance, habits, distribution, and abundance. Pruett Publishing Company, Boulder, Colorado, USA.
- Lindzey, F. 1987. Mountain lion. Pages 656-668 in M. Nowak, J. A. Baker, M. E. Obbard, and B. Malloch, editors. Wild furbearer management and conservation in North America. Ministry of Natural Resources, Ontario, Canada.
- Logan, K. A. and L. L. Sweanor. 2000. Puma. Pages 347-377 in S. Demarais and P. Krausman, editors. Ecology and management of large mammals of North America. Prentice-Hall, Englewood Cliffs, New Jersey, USA.
- Logan, K. A. and L. L. Sweanor. 2001. Desert puma: Evolutionary ecology and conservation of an enduring carnivore. Island Press, Washington, D. C., USA.
- Maehr, D. S., E. D. Land, and J. C. Roof. 1991. Social ecology of Florida panthers. *National Geographic Research and Exploration* 7: 414-431.
- Mallory, F. , R. A. Carter, J. L. Fortier, I. S. Kenn, L. Weis, and B. N. White. 2012. Cougars, *Puma concolor*, in Ontario: Additional Evidence. *Canadian Field Naturalist* 126(4): 320-323.
- McGovern, E.B. and Kretser, H.E., 2014. Puma concolor cougar in the Adirondack Park: resident and visitor perspectives. *Wildlife Conservation Society Adirondack Program Technical Paper*, 5.
- McCullough, M. 2011. Eastern puma (=cougar) (*Puma concolor couguar*) 5-year review summary and evaluation. U.S. Fish and Wildlife Service. Orono, Maine, USA.
- Nowell, K.; Jackson, P (1996). ["Wild Cats. Status Survey and Conservation Action Plan"](#) (PDF). IUCN/SSC Cat Specialist Group. IUCN, Gland, Switzerland. Retrieved July 27, 2007.
- Rosatte, R., 2011. Evidence to Support the Presence of Cougars (*Puma concolor*) in Ontario, Canada. *Canadian Field-Naturalist* 25: 116-125.

- Smith, J.B. 2013. Recolonization of the Midwestern United States by large carnivores: Habitat suitability and human dimensions. Department of Zoology in the Graduate School. Southern Illinois University Carbondale.
- Stoner, D., M.L. Wolfe, C. Mecham, M. B. Mecham, S. L. Durham and D. M. Choate. 2013. Dispersal behaviour of a polygynous carnivore: Do cougars, *Puma concolor*, follow source-sink predictions? *Wildlife Biology* 19(3):289-301.
- Thatcher, C. A., F.T. Van Manen, and J.D. Clark. 2006. Identifying suitable sites for Florida panther reintroduction. *Journal of Wildlife Management* 70:752-763.
- Thompson, D. J. and J. A. Jenks. 2005. Long distance dispersal by a subadult male cougar from the Black Hills, South Dakota. *Journal of Wildlife Management* 69: 818-820.
- U.S. Fish and Wildlife Service (USFWS) Division of Endangered Species. 1991. Eastern cougar species account. <<http://endangered.fws.gov/i/a/saa48.html>>. Accessed 27 March 2013.
- U.S. Fish and Wildlife Service (USFWS) Northeast Region. 2011. Press release: U.S. Fish and Wildlife Service concludes eastern cougar extinct. 2 March 2011. USFWS Northeast Region Page. <<http://www.fws.gov/northeast/ECougar/newsreleasefinal.html>>. Accessed 27 March 2013.
- Whitaker, J.O., Jr., W. J. Hamilton, Jr. 1998. *Mammals of the Eastern United States*. Cornell University Press. Ithaca, New York, USA.
- Wilmers, C., Y. Wang, B. Nickel, P. Houghtaling, Y. Shakeri, M. L. Allen, J. Kermish-Wells, V. Yovovich, and T. Williams. 2013. Scale-dependent behavioral responses to human development by a large predator, the puma. *PLOS One* 8(4): e60590.
- Wright, B. 1959. *The ghost of North America: the story of the Eastern panther*. Vantage Press, New York, New York, USA.
- Young, S.P., and E.A. Goldman. 1946. *The puma: Mysterious American cat*. American Wildlife Institute, Washington, D.C., USA.

Date last revised: _____ October 4, 2017 _____