Mountain Lions in Nebraska
When delivering presentations about mountain lions, the Nebraska Game and Parks Commission’s Sam Wilson begins by saying he has a four-pronged explanation about how the state’s most controversial cat arrived in the state in the 1990s. Then, laughs ensue when he shows a photo of a mountain lion with arrows pointing to each of its four feet.

Beyond the humor, Wilson discusses the science behind the Commission’s efforts to manage this species. It’s an area where he has much experience. Wilson has fulfilled the role of furbearer and carnivore specialist at Game and Parks for more than a decade. During that time, he has worked extensively with Nebraska’s mountain lion population, heading up innovative population studies, verifying sightings and educating the public about the species. He’s participated in conferences and workshops on mountain lion science and management across the western and midwestern United States, and he’s worked with biologists from neighboring states to better manage regional lion populations.

A lifelong hunter and outdoorsman, Wilson received his bachelor’s degree from the University of Nebraska-Lincoln, where he studied fisheries and wildlife. He received his Masters of Science through the University of Nebraska while working with scientists from the Nebraska Cooperative Fish and Wildlife Research Unit.

Wilson recently answered some commonly asked questions about this elusive and at times controversial carnivore.

**How did mountain lions return to Nebraska?**

Mountain lions returned through natural expansion from populations in Colorado, South Dakota and Wyoming. Mountain lions are native to Nebraska but were eliminated from the state by the end of the 1800s. Populations in neighboring mountain states increased as prey species recovered, bounties for killing mountain lions ended and states started managing mountain lions as game animals during the 1960s-1970s. Management as game animals with limited harvest allowed mountain lion populations to increase and expand out to nearby habitat in Nebraska, South Dakota and North Dakota. In Nebraska, the first modern mountain lion confirmations occurred in 1991, when tracks were found and a female was shot in the Pine Ridge. In 1995, the Nebraska Legislature classified mountain lions as a game animal, which means the species can only be hunted under rules prescribed by the Commission. Year-round protection under game law allowed the recolonization of suitable habitat in Nebraska over the past two decades.

**What is the Commission’s goal in managing mountain lions?**

The Commission’s goal is to maintain mountain lion populations in Nebraska over the long term as we do with all game animals. Mountain lions are a native species and part of the heritage of our state, so we want to ensure they are around for generations to come; however, our challenge is to manage the biological and social aspects of having mountain lions in Nebraska. We manage populations of game animals such as mountain lions through harvest seasons. Deer, elk and turkeys are just a few examples of game animals thriving with careful management that includes hunting. Game populations are evaluated annually to determine what, if any, harvest should be allowed. The basic premise is that when populations increase, harvest levels can increase, and when populations decrease, harvest can be reduced or stopped. This careful management is what has allowed many of these game species to be so successful over the long term.

**Where are mountain lions found?**

Nebraska is on the eastern edge of a population of thousands of mountain lions that stretches from the northern plains to the Pacific Ocean.

In Nebraska there are breeding populations in three areas: the Pine Ridge, Niobrara River Valley and Wildcat Hills, and we typically have a few mountain lions roaming other parts of the state as well. Young male mountain lions have been found dispersing throughout Nebraska and beyond. Females typically disperse much shorter distances and are the key to establishing new populations. This is why mountain lion populations first formed in the Pine Ridge,
One of the fundamental questions in managing a species is "How many are there?" Given that wild animals often try hard not to be seen or heard, wildlife scientists have spent decades developing survey methods that yield reliable results. The key to these state-of-the-art methods is to count the animals that are seen or heard and, using mathematical principles, also estimate those that were not detected. These sophisticated approaches are particularly needed to accurately count species such as mountain lions that are notoriously wide-ranging and elusive.

In order to answer this question and others, the Commission has begun a multi-year research project utilizing three state-of-the-art techniques: genetic surveys, collaring with global positioning system (GPS) collars, and trail camera surveys. These three techniques will work together to provide information regarding population size, impacts on big game prey species, and expansion or contraction of mountain lion populations in Nebraska.

Genetic surveys utilizing a scat detector dog and subsequent DNA analysis have been the primary tool for estimating the size of mountain lion populations in Nebraska. Commission biologists have conducted such surveys in the Pine Ridge of northwestern Nebraska every year or two since 2010. More recently, the Commission also conducted genetic surveys in the Wildcat Hills and Niobrara River Valley; however, these newly formed populations did not provide enough data to run population models used for the larger and more established Pine Ridge population.

In a typical survey of the Pine Ridge, biologists search 200 to 300 miles of suitable habitat and collect a few hundred scat samples. Surveys conducted between 2010 and 2015 indicate that the population in the Pine Ridge has been relatively stable, with estimates ranging from 22 to 33 total animals. Births, deaths and movements of animals in and out of the region undoubtedly result in a different mix of individuals between the years.

In 2015, the Commission began fitting mountain lions with GPS collars. These collars are useful in determining mountain lions' impact on high-profile prey species such as bighorn sheep, elk and mule deer. The GPS collars also provide information on population size, home range, habitat use and movements. The collaring portion of the research is primarily conducted in the Pine Ridge but will include mountain lions anywhere they can be captured. These collars have already allowed Commission biologists to ear-tag litters of kittens born to collared females in both the Wildcat Hills and Pine Ridge.

Trail camera surveys are being used to document expansion or contraction of newly formed populations in the Wildcat Hills and Niobrara River Valley. These surveys are conducted by systematically placing motion sensitive cameras in a grid pattern across a patch of suitable habitat. Biologists document the locations and frequency of mountain lion photographs to gain insight into expansion or contraction of their populations. Trail camera surveys are also useful for documenting reproduction in newly recolonized areas via pictures of females with kittens. Commission biologists used trail cameras to obtain the first photograph of a female with kittens in the Wildcat Hills during 2014.

As with all wildlife, mountain lion populations are never static from one year to the next. The Commission will continue to use the best available science to manage this challenging species.
Public safety is the first concern whenever a mountain lion – or any large wild animal – wanders into a town or city. Since 2004, the Nebraska Game and Parks Commission policy has been to kill mountain lions that are found within municipalities. Several factors weighed into this decision. Unlike mountain states to the west, Nebraska has no large areas of public land where a mountain lion could be released and not be expected to quickly move off the area onto private property. Over the years, Game and Parks biologists have repeatedly tried to find a zoo or other licensed facility willing to take mountain lions, but these efforts have been unsuccessful. Without a suitable area to release them or facility to place a captured mountain lion, lethal removal is the appropriate response.

Urban Areas

## Q: Approximately how many mountain lions are there in Nebraska?

Genetic surveys conducted between 2010 and 2015 indicate that the population in the Pine Ridge has been relatively stable, with estimates ranging from 22 to 33 total animals. In addition to the population in the Pine Ridge, there are also resident populations in the Niobrara Valley and Wildcat Hills; however, due to their recent establishment in these areas, there are no estimates for these populations at this time. A few more animals typically wander elsewhere in the state as well.

It is important to consider that populations of animals are always changing. Populations grow with each new birth and they decline with every death. There are some animals that leave populations and some that come in from other areas. It wouldn’t be very accurate only to subtract animals that have died without also accounting for additions through births and immigration.

Dispersing mountain lions from established breeding range in mountain states have been documented throughout much of the Midwest since the early 1990s. The majority of these long-distance dispersers are young males looking for new territory, although females have also dispersed and formed populations in the northern plains states.
Mountain lions have established reproducing populations in three areas of Nebraska – the Pine Ridge, the Wildcat Hills and the Niobrara River Valley. Young lions likely moved into these areas from nearby established populations in the Black Hills and Wyoming.

The further away you get from the time of a survey, the more likely it is that the population has changed from births, deaths, immigration and/or emigration.

How does the Commission decide if there should be a hunting season?

When the Nebraska Legislature classified the mountain lion as a game animal in 1995, it signaled to the Commission that hunting of the species should be allowed if the population was large enough to sustain a harvest. This is the same criteria we use for any other species on the state’s game animal list, from deer to bobcats to pheasants. State statute also identifies Game and Parks as the appropriate agency to set hunting seasons.

We understood that any decision we made about mountain lion hunting would be controversial, and we sought to find a reasonable middle ground to protect the species’ long-term persistence in the state while allowing some appropriate level of hunting opportunity along the way.

To find this middle ground, we looked at a number of published studies about how populations have responded to different levels of harvest in western states where mountain lion hunting has been permitted for years. We also looked at data from South Dakota about harvest rates, birth rates and death rates, which was particularly helpful, as we know that populations in the Black Hills are well connected to those in Nebraska’s Pine Ridge by immigrating individuals. This, coupled with population estimates from our Pine Ridge genetic surveys (see sidebar, page 3) and other data we collected gave us enough information to make a solid, science-based recommendation.

That said, we also took public input into account, and in the end decided to maintain lion populations where they occurred in Nebraska, while slightly reducing their numbers.

The inaugural season, held in 2014, was set for just one year so that we could adjust future regulations as necessary. In response to an unusual number of non-hunting mortalities that occurred in 2014, the decision was made to not hold a season during 2015 or 2016. Decisions regarding whether to hold hunting seasons in the future will be made on an annual basis using a similar balance of population data and management objectives.

How does the Commission use money from the sale of mountain lion hunting permits?

All money received from the sale of mountain lion hunting permits has been invested right back into research and management of mountain lions. This funds a portion of our mountain lion research as well as other work we do while managing mountain lions.
Due to their secretive nature and low density, mountain lions rarely interact with people. Mountain lions typically hide or flee when a person is encountered. In the rare case that you encounter a mountain lion and it does not flee, the following tips may help you avert danger:

1. Do not approach a mountain lion.
2. Leave the animal an avenue of escape.
3. Stay calm, move slowly.
4. Back away to safety if you can. Do not turn your back or run.
5. Raise your arms and anything you are carrying to try to appear larger.
6. If children are present, lift them up to prevent them from running.
7. If you are being attacked, fight back. Mountain lions have been successfully fended off with bare hands. Use rocks, sticks or any weapons you can find. Try to remain on your feet and get back up if knocked down.

The Commission worked with the legislature to create common-sense laws that allow for protection of people and livestock. These laws allow people to defend themselves or others in the rare case that a mountain lion stalks, attacks or shows unprovoked aggression. Farmers and ranchers may also kill mountain lions that are in the process of stalking, killing or consuming livestock on their property. If mountain lions are killed under these circumstances they must immediately notify the Commission and turn over the carcass. If farmers or ranchers find a livestock carcass and suspect depredation by a mountain lion they should leave the carcass intact and immediately call the Commission.

Mountain lion populations have returned to Nebraska, and the Game and Parks Commission is committed to learning all we can about this high-profile species. This includes continuing investigations into observations of mountain lion presence by the public – which we have been documenting for more than 20 years. Trail camera photos submitted by the public have been particularly important in helping us document expanding populations in recent years, so we want to encourage people to contact the Commission if they get a photo of a mountain lion on their trailcams.

We recently initiated a large scale, multi-year research project aimed at determining population sizes, changes in distribution, movements, habitat use, and impacts on big game prey species. The majority of this information will be determined through capturing mountain lions and fitting them with global positioning system (GPS) collars. We will continue to estimate population sizes using genetic surveys, which we have been conducting since 2010. The third part of the newly planned research is to use systematically placed trail cameras to document expansion or contraction of populations in areas such as the Niobrara River Valley and Wildcat Hills. This research will take place over several years and will allow new insights into this otherwise secretive species.

The Commission is also working on a more geographically comprehensive approach for mountain lion management. As I mentioned, mountain lions move freely between Nebraska and neighboring western states, so we have worked closely with biologists from South Dakota and Wyoming to share information regarding mountain lion management and research. We will continue to work closely with biologists from those areas to make sure our management decisions fit within what is happening in the larger region.

**People and Livestock**

- **Mountain Lion**
- **Coyote**
- **Bobcat**
- **Domestic Dog**

**Track Comparisons**

Mountain lion front tracks are 3 to 4-1/4 inches long and 3-1/4 to 4-3/4 inches wide. Claws usually do not register because they are retracted. Claw marks are usually (but not always) visible in coyote and dog tracks. The heel pad in cat tracks has two lobes in the front and three lobes in the back, while dog and coyote tracks show only one lobe in the front and two lobes in the back. The tracks from a small mountain lion and a large bobcat can be difficult to distinguish. In cats the toes are almost evenly spaced from the heel pad, while in dogs and coyotes, the separation from the middle two is greater.
Few animals spark debate like Puma concolor. People can’t even agree on what to call it – monikers include cougar, mountain lion, puma and catamount. Most experts, including Nebraska Game and Parks furbearer and carnivore program manager Sam Wilson, agree on some basic attributes. Here’s what the evidence shows on some widely discussed and often misunderstood topics concerning cougar behavior.

Cougars spend most of the day conserving energy at rest but by nature are wanderers, moving nocturnally and traveling most frequently at dusk and dawn. While females with kittens usually stay within a few miles of their young, other adults – especially males – have been known to relocate at a distance of 20 miles in one night. Home ranges vary from as little as 21 square miles among females to 350 square miles or more with males. In July 2011, officials confirmed that a mountain lion killed by automobile in Connecticut had trekked more than 1,500 miles from the Black Hills of South Dakota.

While most cougar litters are born in late spring or summer, a female cougar can go into estrus at any time of year and therefore will mate and give birth during any month. Cougars are least likely to have dependent young during winter and early spring according to research from South Dakota. Litters, which usually consist of 2-3 kittens, are born after a three-month gestation period. The kittens disperse between 1½ to 2 years of age. The dispersing “transients,” as they’re known, are the most likely cougars to have encounters with humans. These young cats are notorious for stumbling into danger and are frequently killed by resident adult males of their own species in territorial quarrels.

Cougars populations are always in flux with births and deaths and lions moving into or out of a region. The population in the Pine Ridge and other parts of Nebraska is on the eastern edges of a greater mountain lion population (of tens of thousands of animals) stretching from the northern Plains states of Nebraska, South Dakota and North Dakota to the Pacific Ocean. At any given time, there are several hundred lions in Wyoming and South Dakota that are within a normal dispersal distance of Nebraska’s populations.

Cougars are considered to be hypercarnivores. While they will eat grass as a means to rid parasites and hair from their digestive tracts, they most frequently feed on animals, especially deer. They also eat elk, bighorn sheep and numerous smaller animals, a favorite being porcupine. The amount of prey they kill varies. Research with GPS tracking technology has shown that each female cougar without kittens require a deer or the equivalent every 16 days. A female cougar with three 15-month-old kittens may require a deer every three days. The standard estimate is about a deer (or deer-sized meal) a week per adult mountain lion. Cougars’ effect on an ungulate herd, such as deer, is largely determined by the overall health of the potential prey’s population and the availability of alternate prey.

Cougars are highly efficient predators and have become feared by many humans. Cougars present a very small threat to humans – smaller than most realize. There have been three human mortalities in North America as a result of interactions with mountain lions since 2000, fewer deaths than from any of the following causes: dog attacks, snakes bites, lightning strikes and bee stings. Research has shown that cougars predominantly seek prey chosen from learned behavior and avoid others.

Mountain lion photographed by Robin Poluch along the Dismal River in Nebraska in 2009.