

# Nebraska Mountain Lion Management Plan



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# Nebraska Mountain Lion Management Plan

## **Executive Summary**

The Nebraska Game and Parks Commission (Commission) recognizes mountain lions as an important component of the state's biodiversity. Mountain lions have recolonized portions of the state over the past few decades, and the Commission is responsible for properly managing this native species. The Nebraska Mountain Lion Management Plan is intended to guide management decisions based on our agency mission, and the management goals and guiding principles stated in the plan. The Commission will monitor mountain lion populations and use regulated harvest as a primary strategy for meeting management goals and objectives when possible. This plan will be revised periodically as new information regarding mountain lion ecology and management becomes available.

## **Agency Mission**

The mission of the Nebraska Game and Parks Commission is stewardship of the state's fish, wildlife, park, and outdoor recreation resources in the best long-term interests of the people and those resources.

## **Management Goal**

The Commission's management goal is to maintain resilient, healthy, and socially acceptable mountain lion populations that are in balance with available habitat and other wildlife species over the long term.

## **Guiding Principles**

1. Mountain lions are an important component of Nebraska's native biodiversity that have intrinsic value, as well as recreational value to hunters and non-consumptive users.
2. Mountain lion management programs will be based on scientifically and biologically sound principles that: (a) meet statutory obligations, (b) minimize negative interactions

between humans and mountain lions, (c) pursue balance with other wildlife, (d) incorporate input from the public, and (e) ensure resilient and healthy mountain lion populations persist in suitable habitats in Nebraska over the long term.

3. Mountain lions may be killed by members of the public if: (a) they are in the process of stalking, attacking or showing unprovoked aggression towards a person, (b) they are in the process of stalking, killing, or consuming livestock, or (c) they are killed under the authority of a permit issued by the Commission. Otherwise they will be left undisturbed.
4. The Commission will provide accurate and timely information to the public concerning mountain lions in Nebraska.

## **Introduction**

The purpose of the Nebraska Mountain Lion Management Plan is to guide management of this native species in accordance with the mission of the Nebraska Game and Parks Commission.

This plan is meant to be dynamic and may be revised periodically as new information becomes available and mountain lion populations, distribution, and public acceptance change over time.

## **History**

Mountain lions (*Puma concolor*) are native to Nebraska but were extirpated by the early 1900s due to unregulated hunting, trapping, poisoning and decimation of prey species (Jones 1964). Historically, mountain lions were found throughout the state, wherever forests or steep terrain provided the opportunity to ambush prey and escape from competing predators such as wolves. Records from explorers and early settlers note mountain lion presence in Buffalo, Burt, Cass, Cherry, Dawes, Franklin, Holt, Sheridan, Sioux, Valley, and Washington counties (Swenk 1908; Jones 1964). Early records include an observation of a mountain lion by the scientific expedition to the Rocky Mountains led by Major Stephen H. Long during the winter of 1819–1820. The expedition observed the mountain lion while they overwintered at Engineer Cantonment, which was located near the Missouri River in present day Washington County (James 1823). Mountain lions likely remained in the state until the 1890s or early 1900s (Jones 1964). Some of the last verifiable records of mountain lions in Nebraska include a mountain lion

shot in a canyon near Valentine in 1880, a female mountain lion shot north of Hay Springs in the winter of 1884 (Swenk 1908), a mountain lion shot near O'Neill in 1886, and a mountain lion killed by W. M. Long south of Rushville in 1887 (Sioux County Herald 1886; Sioux County Herald 1887). Reliable reports of observations continued for a few more years, including an observation in southern Holt County in 1899 (Swenk 1908) and an observation by D.W. Lindeman and his brother on their ranch near Crawford in 1903 (Jones 1964).

Important prey species such as elk (*Cervus canadensis*), bighorn sheep (*Ovis canadensis*), and turkeys (*Meleagris gallopavo*) were also extirpated from Nebraska by the early 1900s; mule deer (*Odocoileus hemionus*), and white-tailed deer (*Odocoileus virginianus*) were nearly extirpated (Swenk 1908; Jones 1964; K. Hams, Nebraska Game and Parks Commission, personal communication). This drastic reduction of available prey, combined with active predator elimination efforts, created unsuitable conditions for recolonization by mountain lions during the early or mid-1900s. Despite many reported observations of mountain lions during the following decades, no verifiable evidence of their presence in Nebraska was documented for nearly 100 years.

## **Biology**

Mountain lions were historically found in Nebraska and throughout the lower 48 states. Their ability to adapt to various climates, prey species, and habitat types allowed them to become the most widespread terrestrial mammal species in the Western Hemisphere (Sunquist and Sunquist 2002). The historic distribution of mountain lions ranged from northern British Columbia, Canada, to the southern tip of South America (Young and Goldman 1946). Mountain lions were extirpated from the Midwestern and Eastern United States during settlement, with the exception of an isolated population found in Florida (Pierce and Bleich 2003).

Mountain lions are the largest wild felid found in Nebraska and the second largest in North America after the jaguar (*Panthera onca*). In North America, they feed primarily on deer but can consume a wide variety of prey items from moose (*Alces americana*; Ross and Jalkotzy 1996) to deer mice (*Peromyscus sp.*; Perry 1890; Hoffman and Genoways 2005). Mountain lions are most

active during twilight or night but can be active at any time of day. Adult males typically weigh 54–77 kg (120–170 lbs.) and are larger than females which typically weigh 34–45 kg (75–100 lbs.). Adults are uniformly tan with black markings on the muzzle, backs of the ears, and tip of the tail. The ventral portion of the animal is often lighter and may vary from buff to white. Kittens are born with dark black spots and black ringed tails that fade as they age.

Mountain lions typically reproduce after they have become sexually mature and have established a resident home range (Seidensticker et al. 1973). Males typically reach this milestone at approximately three years of age, and females typically reach this stage at approximately two years of age. Litter sizes vary from one to six, with litters of two or three being most common (Lindzey et. al. 1994). Kittens are born after a gestation period of approximately three months (Eaton and Velandier 1977) with adult females producing litters at intervals of two years (Lindzey et. al. 1994). Young mountain lions in the nearby Black Hills population of South Dakota became independent from their mothers at 10–16 months of age and dispersed one to three months after becoming independent (Thompson and Jenks 2010). Subadult male mountain lions typically disperse farther from their mothers' home range than females (Logan and Sweanor 2001). In the Black Hills, average dispersal distance for males was 274 km (170 miles) and 48 km (30 miles) for females (Thompson and Jenks 2010). Thompson and Jenks (2010) propose that young males disperse in search of mates and may travel great distances through areas with abundant prey and suitable habitat if available females are not encountered.

## **Recolonization**

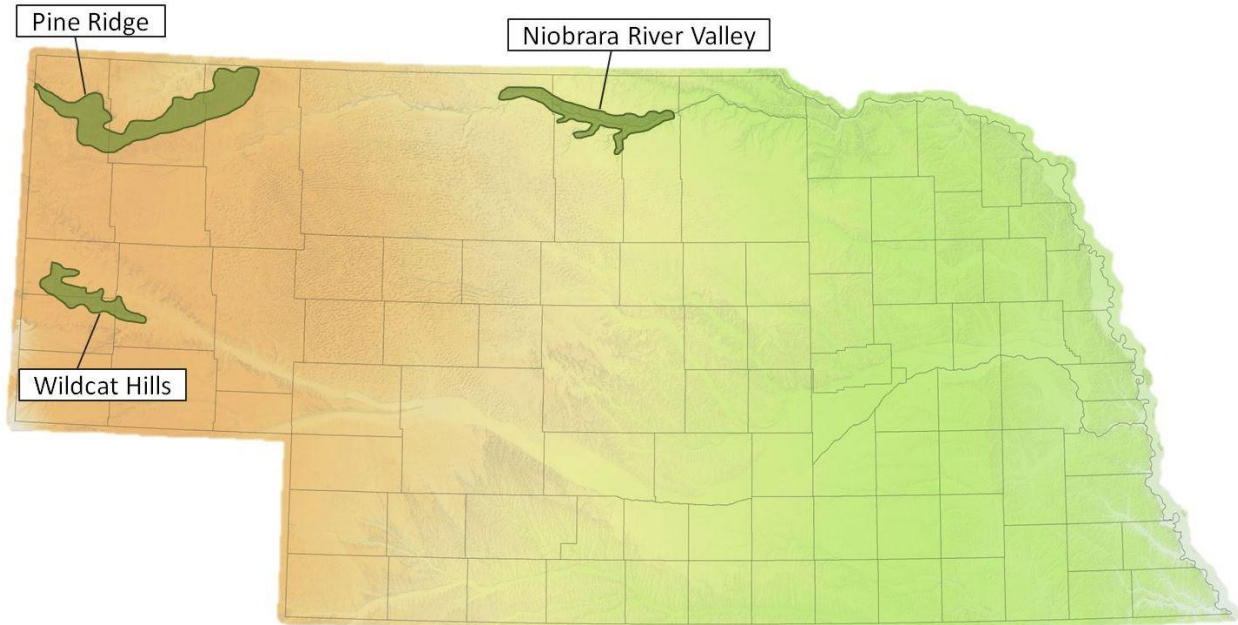
Prey populations recovered throughout the 20th century due to protection offered by game laws. Mountain lion populations recovered throughout the Mountain West over this time period due to the elimination of bounties and management of mountain lions and their prey as big game species (Genoways and Freeman 1996; Sweanor et al. 2000; Jenks 2011). These two factors allowed mountain lion populations to expand to the east and recolonize parts of South Dakota, North Dakota, and Nebraska (Fecske 2003; North Dakota Game and Fish Department 2006; Thompson and Jenks 2010; Wilson et al. 2010; LaRue et al. 2012).

The first confirmed presence of a mountain lion in modern times occurred in 1991 when tracks and a deer kill were documented in Dawes County and a female was killed in Sioux County (Genoways and Freeman 1996). Mountain lion presence was documented on 24 occasions between this occurrence and the beginning of 2006. During this timeframe, all mountain lions for which age and gender could be determined were young males that fit the profile of dispersing animals. No evidence of resident animals, or another female, was documented until 2006 when a female was photographed in the Pine Ridge area of northwestern Nebraska. A female mountain lion with a litter of kittens was documented the following year in 2007, which provided the first evidence of a resident reproducing population in Nebraska (Wilson et al. 2010). Based on this evidence, mountain lions appear to have recolonized the Pine Ridge during the mid-2000s. Populations have also been documented recently in the Wildcat Hills near Scottsbluff and in the Niobrara River Valley near Valentine (Figure 1; Nebraska Game and Parks Commission 2013). Presently, these are the only areas in the state with evidence of resident reproducing populations.

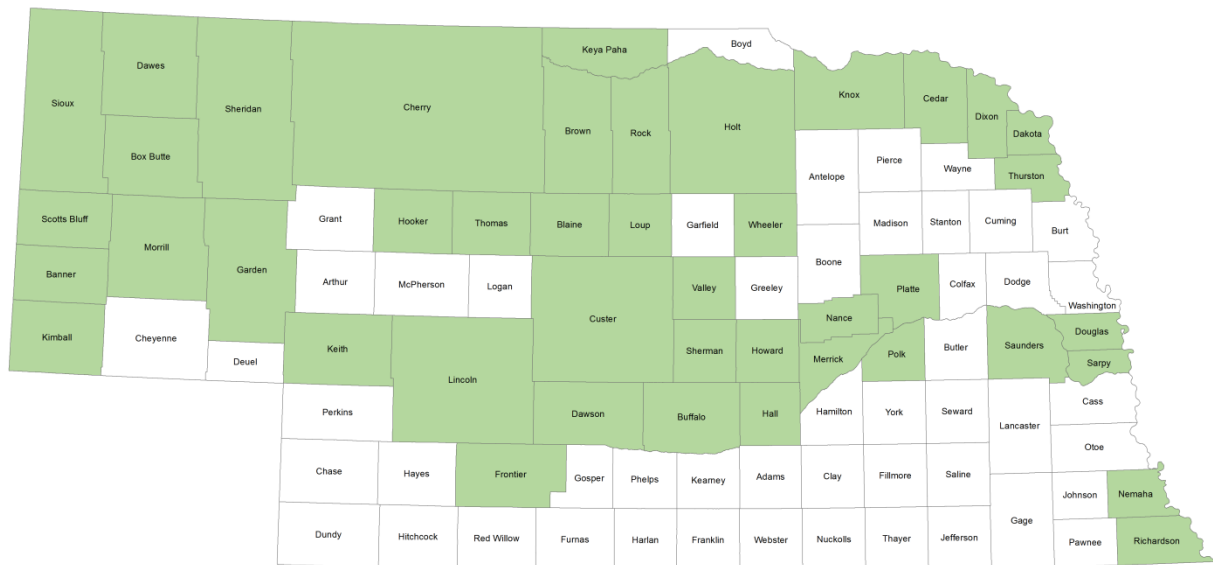
### **Distribution and Abundance**

Mountain lions returned to Nebraska through natural expansion from populations in neighboring states – primarily Colorado, South Dakota, and Wyoming (Nebraska Game and Parks Commission 2016). Mountain lion populations in Nebraska are part of a larger regional population where animals are continually mixing. Nebraska is on the eastern edge of a population of thousands of mountain lions that stretches from the Northern Great Plains to the Pacific Ocean. In Nebraska, populations with resident females, males, and evidence of reproduction have been documented in three areas: the Pine Ridge, Niobrara River Valley, and Wildcat Hills (Figure 1). Mountain lion presence has been documented through physical evidence (e.g., tracks, hair, scat, photographs, etc.) in 42 of 93 counties (Figure 2) from 1991 to October, 2017.





**Figure 1.** Three areas of suitable habitat in Nebraska with documented resident mountain lion populations.



**Figure 2.** Counties where mountain lion presence has been confirmed through physical evidence at least once during 1991–2017 are shown in green.

Confirmed mountain lion presence in Nebraska typically falls into one of two categories:

1. Confirmations in areas with evidence of reproduction and evidence of resident males and females (i.e., populations).
2. Confirmations in areas where mountain lions are not typically found, but where they may disperse through periodically.

The exception to these two categories may occur when a mountain lion stops dispersal movements and becomes the first resident in an area of suitable habitat. Advances in trail camera technology and the proliferation of their use by hunters and landowners across the state greatly increase the probability that resident mountain lions will be detected soon after they establish a home range. It also greatly increases the probability that dispersing mountain lions may be detected multiple times as they move through the countryside. Mountain lion presence is frequently and continually confirmed in areas with resident populations. This is because members of the population are constantly present and continually roaming suitable habitat searching for food and mates and defending home-range boundaries. By contrast, in most of the state (outside of the three documented populations) it is unlikely there are any mountain lions at any given time, though one may pass through periodically. Because dispersers can cover great distances (Thompson and Jenks 2010) a mountain lion could be present anywhere in Nebraska at a given point in time; however, there is only evidence of the continual presence of resident males and females in three areas.

The Commission has not created an estimate for the total number of mountain lions in Nebraska. Genetic surveys conducted during 2010–2015 indicate that the population in the Pine Ridge has been relatively stable, with estimates ranging from 22–33 total animals (Nebraska Game and Parks Commission 2016). In addition to the population in the Pine Ridge, there are also resident populations in the Niobrara Valley and Wildcat Hills; however, because of their recent establishment, there are presently no estimates for these populations. A few additional animals typically wander elsewhere in the state at any given point in time.

## **Legal Status**

Mountain lions, like many other present-day game species, could be killed whenever they were encountered during settlement. In 1885, statute allowed counties to pay a bounty of three dollars for each mountain lion killed. Bounties for wolves, wild cats, and coyotes were already in place by 1877. Bounties were discontinued in Nebraska and most western states with the majority of mountain states classifying them as game animals during the 1960s and 1970s. Mountain lions were not a protected species in Nebraska when the first modern confirmations were made in 1991. In 1995, the Nebraska Legislature added mountain lions to the statutory list of game animals, thereby affording protection for mountain lions under the Game Law. In 2012, statute provided authority for the Commission to issue permits and create regulations for mountain lion harvest seasons and explicitly stated how and when a person could kill a mountain lion in defense of people or livestock. These laws also provided the Commission the ability to issue landowners permits to kill mountain lions that have depredated livestock. In 2013, the Commission approved regulations for a mountain lion harvest season during 2014.

## **Mountain Lion Response Plan**

The Nebraska Game and Parks Commission intensified formal investigations of mountain lion presence after the original confirmation in 1991. In 2004, the Commission adopted a Mountain Lion Response Plan, which details the agency's response to various situations involving mountain lions and identifies criteria for confirming presence of mountain lions in Nebraska. The plan creates a Mountain Lion Working Group made up of qualified Commission staff. This working group is responsible for evaluating evidence of mountain lion presence, confirming presence when warranted, coordinating responses to situations involving mountain lions, responding to media, and dealing with other related issues. The plan details actions for responding to situations involving mountain lions including: 1) observations of a mountain lion or their sign, 2) livestock depredation, 3) threat or attack on humans, 4) occurrence of a mountain lion within a municipality, 5) killing or injuring of a mountain lion by a person, 6) other mortalities, 7) situations that may require tranquilization of a mountain lion, 8) accidental live capture, 9) illegal possession of a live mountain lion, and 10) disposition of a mountain lion

carcass or parts. An update to the Mountain Lion Response Plan is in process and scheduled for completion during 2018. The Mountain Lion Response Plan and other information on mountain lions in Nebraska is available on the Commission's mountain lion webpage at:

<http://outdoornebraska.gov/mountainlions/>

## **Response to Mountain Lion Predation on Bighorn Sheep**

Like mountain lions, bighorn sheep are native to Nebraska but were extirpated from the state by the late 1800s or early 1900s (Jones 1964). Conservation efforts and reintroductions beginning in 1981 have allowed this species to reclaim portions of its native range in the Pine Ridge and Wildcat Hills. Approximately 300 bighorn sheep are presently (October 2017) found in five herds; three in the Pine Ridge and two in the Wildcat Hills. Bighorn sheep are listed as a Tier I at-risk species by The Nebraska Natural Legacy Project – State Wildlife Action Plan (Schneider et al. 2011). They have become a popular species for wildlife viewing and are a symbol of ecosystem health and conservation efforts in western Nebraska.

Impacts of disease, primarily pneumonia, are the largest factor limiting bighorn sheep populations in Nebraska (T. Nordeen, Nebraska Game and Parks Commission, personal communication). Epizootic pneumonia is devastating to bighorn herds and can contribute to partial or complete die-offs (Onderka and Wishart 1984). Research in South Dakota found that pneumonia was the leading cause of mortality for bighorn lambs followed by predation, primarily from mountain lions (Smith et al. 2014).

Bighorn sheep distribution in the Wildcat Hills and Pine Ridge overlaps with mountain lion distribution. Throughout much of their range, and particularly in Nebraska, bighorn sheep exist in relatively small populations that may not be fully contiguous with other bighorn sheep habitat or populations. Predation by mountain lions can cause population declines in small populations of bighorn sheep (Wehausen 1996; Logan and Sweanor 2001). Not all mountain lions that overlap bighorn sheep distribution prey on them (Ernest et al. 2002) and most rarely kill them; however, some individuals learn to specialize on bighorns and can have significant impacts to small populations (Ross et al. 1997).

Due to the ability of an individual mountain lion to cause population declines, it may be necessary for the Commission to remove a mountain lion in order to prevent the extirpation of a bighorn sheep herd. This option will only be considered if a mountain lion has proven to target bighorn sheep, and predation by the individual significantly jeopardizes the existence of a bighorn herd. Mountain lions that prey on bighorn sheep known to be injured, diseased or otherwise debilitated, may or may not be targeted for removal as some predation may be partly compensatory in herds with pneumonia (Smith et al. 2014). Any effort to remove a mountain lion for predation on bighorn sheep must be authorized by the Director of the Commission.

## **Monitoring and Research**

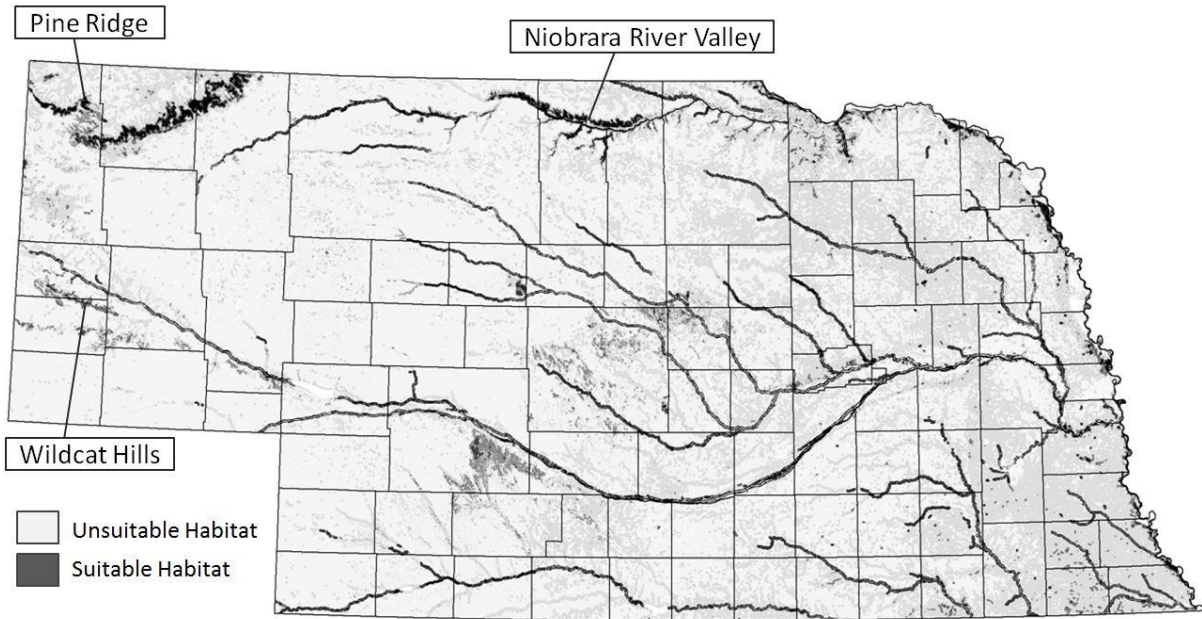
The Commission presently uses five primary techniques to learn more about mountain lions in Nebraska:

1. investigation of observations
2. genetic surveys utilizing a scat detector dog
3. estimating suitable habitat using geographic information systems (GIS)
4. trail camera surveys
5. capture and placement of global positioning system (GPS) collars

Investigating observations of mountain lions has been one of the primary methods for gathering information in Nebraska since 1991. Commission staff expends significant effort meeting with observers, collecting and obtaining evidence, and reporting results. These investigations enabled the Commission to document significant milestones, such as the first modern evidence of mountain lion presence in 1991, and the first modern instance of mountain lion reproduction in 2007 (Wilson et al. 2010). The Mountain Lion Response Plan approved in 2004 provides direction regarding how Commission staff investigate and document observations of mountain lions. This method of gathering information remains critically important today, as the effort put forth by the public in purchasing, placing, and monitoring trail cameras is beyond the scope of Commission research projects.

Genetic surveys utilizing scat detector dogs, and subsequent genetic analyses of the samples collected, have been conducted periodically in the Pine Ridge (2010, 2012, 2014 and 2015), Niobrara River Valley (2012 and 2014), and Wildcat Hills (2015) since 2010. Noninvasive genetic surveys, such as scat surveys, have proven to be an efficient and cost-effective method for surveying elusive carnivores including mountain lions (Long et al. 2007; Davidson et al. 2014; DeMatteo et al. 2014). The Pine Ridge is the only area with sufficient data from these surveys to create estimates of the population size. The CAPWIRE package in Program R (Miller et al. 2005; Pennell et al. 2013) was used to estimate the size of the Pine Ridge mountain lion population. This model was specifically developed for estimating small populations of elusive species utilizing information gathered through collection of genetic samples (e.g., scat, hair, urine, and blood). Results from genetic surveys conducted during 2010–2015 indicate that the population in the Pine Ridge has been relatively stable, with estimates ranging from 22–33 total animals (adults and kittens).

The Commission created a map of suitable habitat in 2010 (Figure 3) based on a GIS model developed by the North Dakota Game and Fish Department (North Dakota Game and Fish Department 2006). The model identifies areas of suitable mountain lion habitat using three primary landscape criteria: concealment and stalking cover (woody cover/forest/shrubs), topographic concealment and stalking cover (steep terrain/slopes), and proximity to water. Areas that are steep, forested, and have available water are considered most suitable. The model identified ~96% of Nebraska as unsuitable habitat for mountain lions and ~4% as suitable. The model identified the Pine Ridge as the largest non-riparian block of suitable habitat in the state. Riparian forests in many river valleys were identified as suitable habitat by the model, but it is unknown if these thin linear strips can be used as a home range for resident animals, or if they only serve as dispersal corridors.



**Figure 3.** 2010 estimate of suitable (dark gray) and unsuitable (light gray) habitat for mountain lions in Nebraska.

In 2015, the Commission initiated a large-scale, multiyear research project using GPS collars and trail cameras to learn more about mountain lions throughout the state. The objectives for this research are:

1. To determine population size, prey composition and impacts to big game species, impacts of 2012 wildfires to mountain lion habitat, habitat use, home range, age structure, and gender profiles for mountain lions in the Pine Ridge population and in recolonizing populations as possible.
2. To assess expansion or contraction of mountain lion distribution in Nebraska, determine changes in distribution in the Niobrara River Valley using trail camera surveys, and to characterize habits of dispersing mountain lions.

This research will inform management of mountain lions in Nebraska in the following ways:

1. GPS collars/DNA sampling during capture will allow new capture-mark-recapture based estimates of the mountain lion population in the Pine Ridge, in addition to the estimates produced primarily from genetic survey results.

2. Identification of prey items will allow managers to estimate impacts on big game species such as bighorn sheep, elk, and mule deer and adjust management of predator and/or prey accordingly.
3. A new statewide habitat suitability map based on GPS data from collared lions and updated GIS layers will be used to: 1) estimate potential population size for habitat patches, 2) predict possible areas of future expansion, and 3) predict/identify travel corridors.
4. The combined research will provide information on population size, impacts to big game prey species, health, and connectivity that are needed to make informed management decision regarding establishment of harvest units or recommendations for mountain lion harvest seasons.

The study area for this project includes the entire state of Nebraska. The focal areas for research include the Pine Ridge in northwest Nebraska, the Niobrara River Valley in north-central Nebraska, and the Wildcat Hills in the southwestern panhandle (Figure 1). These focal areas all have evidence of mountain lion populations, with an established population in the Pine Ridge and recently documented evidence of populations at the other locations. All three focal areas consist of rugged and steep habitat primarily covered by native grasses and ponderosa pine (*Pinus ponderosa*) forests. High densities of prey species including white-tailed deer, mule deer, elk, porcupines (*Erethizon dorsatum*) and turkeys, as well as steep slopes and thick vegetative cover needed for stalking prey make these three areas highly suitable for mountain lions.

Most objectives for this research will be met through analysis of GPS/VHF location data or inspection of captured mountain lions. Prey composition will be determined by investigating GPS location clusters that indicate a kill site and analysis of prey remains (Anderson and Lindzey 2003; Blake and Gese 2016). Trail camera surveys will be used in the Niobrara River Valley to document evidence of resident animals, changes in distribution, and evidence of reproduction. Cameras will be monitored throughout the study period and may continue into the future if they prove to be a cost-effective monitoring tool.



Approximately one-third of predicted suitable habitat for mountain lions in the Pine Ridge burned during historic wildfires in 2012. Large areas of suitable mountain lion habitat in the Niobrara River Valley also burned in 2012. The carrying capacity of these areas is likely affected, and the new habitat estimate will more accurately reflect the amount of suitable habitat available to mountain lions in these areas. This in turn may affect management decisions including proposed harvest levels if mountain lions are hunted in these areas. The new statewide habitat map will also be used by the Commission to aid in predicting which areas could experience mountain lion presence in the future and should therefore be prioritized for education and response efforts.

Dispersing mountain lions have recolonized the Pine Ridge, Niobrara River Valley, and the Wildcat Hills, but little is known regarding the extent of recolonization outside of the Pine Ridge. Results from this study will provide information for these, and possibly other, areas of suitable habitat. Dispersing animals collared as part of this research will provide information regarding this high-profile segment of the mountain lion population that has been exploring hundreds of miles east from established mountain lion range. These animals have been documented in central and eastern Nebraska, but very little is known regarding their diet, movement patterns, habitat needs, or possible travel corridors. Information gathered from this research will be used to inform the public about the habits of these high-profile dispersing animals.

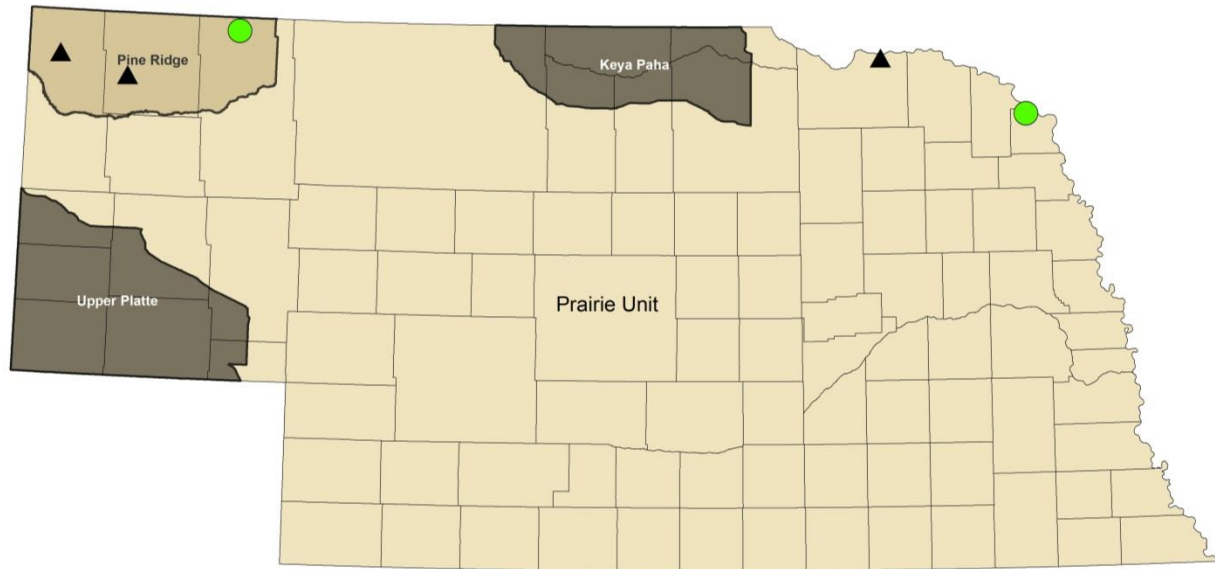
The Commission is committed to maintaining a geographically comprehensive approach for mountain lion management. Mountain lions move freely between Nebraska and neighboring western states, so Commission staff have worked closely with biologists from South Dakota and Wyoming to share information regarding mountain lion management and research. Since mountain lions interact and move between states, it is important that management decisions fit within what is happening in the larger region. Commission staff will also continue to

communicate with researchers throughout mountain lion range in order to pursue more cost-effective techniques for long-term population monitoring.

## **Regulated Harvest**

When the Nebraska Legislature classified the mountain lion as a game animal in 1995, it signaled to the Commission that hunting of the species could be allowed if the population was large enough to sustain a harvest. This is the same criteria used for any other species on the state's game animal list, from deer to bobcats to pheasants. State statute also identifies the Commission as the appropriate agency to set hunting seasons. Population information gathered through genetic surveys and habitat estimates in the Pine Ridge during 2010–2012, indicated the population reached a level of abundance where it would be resilient to a small harvest.

The first regulated harvest season for mountain lions in Nebraska was held in 2014. Five mountain lions were harvested in total (Figure 4), three males and two females. Four units were created, two with a harvest allowed (the Pine Ridge and Prairie units) and two with no harvest allowed (the Keya Paha and Upper Platte units). The two units closed to harvest were areas with recent evidence of mountain lion recolonization but with no population estimates to inform harvest recommendations. 2,663 licenses/applications were sold in 2014. Detailed rules and regulations for the 2014 mountain lion harvest season are provided in appendix figure 5. No harvest season was held during 2015–2017, in part due to an unusual number of non-hunting mortalities that occurred during 2014.



**Figure 4.** Locations of male (black triangle) and female (green circle) mountain lions harvested during the 2014 season. Harvest was allowed in the Pine Ridge and Prairie units. Harvest was prohibited in the Upper Platte and Keya Paha units.

## Management Goal

The Commission’s management goal is to maintain resilient, healthy, and socially acceptable mountain lion populations that are in balance with available habitat and other wildlife species over the long term.

**Definition:** A resilient and healthy mountain lion population is one that: 1) maintains a reasonable proportion of older age animals, 2) maintains a sufficient number of breeding females to recover from mortality events, 3) has healthy individuals with minimal burden from disease or malnutrition, 4) is in balance with available prey, and 5) maintains genetic variability and connectivity to other populations.

## Objectives and Strategies

**Objective 1: Maintain resilient and healthy mountain lion populations in Nebraska.**

**Strategies:**

1. Monitor population size, demographics, and expansion or contraction of mountain lion populations in Nebraska through ongoing research.
2. Inspect mountain lions that are captured or killed to determine health status and test for disease when appropriate.
3. Determine genetic variability and health of mountain lions in Nebraska via analysis of samples by a qualified genetics lab.
4. Monitor known mortalities and identify cause of death when possible.
5. Monitor for evidence that mountain lion populations have exceeded carrying capacity, such as malnutrition or scars/mortalities caused by intraspecific strife.
6. Create a new statewide habitat suitability map to estimate potential population size of habitat patches based on reported densities in other states and results of ongoing research.

**Objective 2: Allow regulated harvest when harvest fits within management goals.**

**Strategies:**

1. Monitor population size, demographics, connectivity, and the number of known mortalities to determine if a population would be resilient to harvest.
2. Create management/harvest units when populations that would be resilient to harvest are identified.
3. Recommend a harvest season when a management unit has been created and a harvest fits within management goals.
4. Harvest seasons will be designed to minimize orphaning of kittens. No harvest of spotted mountain lions or two or more mountain lions traveling together will be allowed.
5. Harvest season dates will be selected to minimize probability of orphaning dependent kittens <6-months in age.

**Objective 3: Maintain socially acceptable mountain lion populations that are in balance with other wildlife species.**

**Strategies:**

1. Pursue the ability to issue landowner permits or landowner preference.
2. Assess impacts of mountain lions on prey species through ongoing research and, when necessary, adjust harvest of predator and/or prey to ensure the long-term persistence of both species.
3. Document concerns voiced by the public regarding management for annual review.
4. Regulated harvest may be used to reduce mountain lion abundance in populations with evidence that they: 1) caused significant depredation issues, 2) threatened human safety, or 3) seriously impacted declining wildlife populations.

**Objective 4: Minimize human safety issues and depredation of livestock by mountain lions.****Strategies:**

1. Provide information regarding what do if a person encounters a mountain lion via: 1) the Commission website, 2) brochures/handouts, 3) signage, 4) presentations to the public, and/or 5) media.
2. Provide information on best management practices for reducing depredation, and legal authority to defend livestock, when interacting with landowners for depredation claims.
3. Staff may assist in removal of a depredating mountain lion, or enlist help from Wildlife Services, when requested by a landowner with a confirmed depredation event.
4. In accordance with statute 37-472, the Commission may issue a permit allowing a landowner to kill a depredating mountain lion if the depredation is confirmed by the Commission.

**Measurement of Management Success**

Management of mountain lions in Nebraska will be considered successful during the term of this management plan if:

1. Management activities allow for resilient, healthy, and socially acceptable mountain lion populations that are in balance with available habitat and other wildlife species.

2. Management includes harvest seasons when appropriate considering goals and objectives.
3. Confirmed livestock depredation events are infrequent.
4. The Commission provides the public with scientifically based information regarding mountain lion populations in Nebraska, and information to help minimize human safety issues and depredation of livestock.

**\*The Mountain Lion Management Plan will be reviewed and updated periodically (e.g., ~every 5 years) in order to incorporate new information regarding ecology, management, or social issues.**

## LITERATURE CITED

1886. Nebraska. Sioux County Herald. 4 February 1886; page 2.
1887. Nebraska. Sioux County Herald. 30 June 1887; page 2.
- Anderson, C. R., and F. G. Lindzey. 2003. Estimating cougar predation rates from GPS location clusters. *Journal of Wildlife Management* 67:307-316.
- Blake, L. W., and E. M. Gese. 2016. Cougar predation rates and prey composition in the Pryor Mountains of Wyoming and Montana. *Northwest Science* 90:394-410.
- Davidson, G. A., D. A. Clark, B. K. Johnson, L. P. Waits, and J. R. Adams. 2014. Estimating cougar densities in northeast Oregon using conservation detection dogs. *Journal of Wildlife Management* 78:1104-1114.
- DeMatteo, K. E., M. A. Rinas, C. F. Argüelles, B. E. Holman, M. S. Di Bitetti, B. Davenport, P. G. Parker, and L. S. Eggert. 2014. Using detection dogs and genetic analyses of scat to expand knowledge and assist felid conservation in Misiones, Argentina. *Integrative Zoology* 9:623-639.
- Eaton, R. L., and K. A. Verlander. 1977. Reproduction in the puma: biology, behavior and ontogeny. *The World's Cats* 3:45-70.
- Ernest, H. B., E. S. Rubin, and W. M. Boyce. 2002. Fecal DNA analysis and risk assessment of mountain lion predation of bighorn sheep. *Journal of Wildlife Management* 66:75-85
- Fecske, D. M. 2003. Distribution and abundance of American martens and cougars in the Black Hills of South Dakota and Wyoming. Dissertation, South Dakota State University, Brookings, USA.
- Genoways, H. H., and P. W. Freeman. 1996. A Recent record of mountain lion in Nebraska. *Prairie Naturalist* 28: 143-145.
- Hoffman, J. D., and H. H. Genoways. 2005. Recent records of formerly extirpated carnivores in Nebraska. *Prairie Naturalists* 37:225-245.
- James, E. 1823. Account of an expedition from Pittsburgh to the Rocky Mountains, performed in the years 1819 and '20, by order of the Hon. J. C. Calhoun, Sec'y of War: Under the command of Major Stephen H. Long, from the notes of Major Long, Mr. T. Say, and other gentlemen of the exploring party. H. C. Carey and I. Lea, Philadelphia, 1: 1-503.
- Jenks, J. A., editor. 2011. Managing cougars in North America. Jack H. Berryman Institute, Utah State University, Logan, USA.

- Jones, J. K., Jr. 1964. Distribution and taxonomy of mammals of Nebraska. University of Kansas Publications, Museum of Natural History 16:296–299.
- LaRue, M. A., C. K. Nielsen, M. Dowling, K. Miller, B. Wilson, H. Shaw, and C. R. Anderson. 2012. Cougars are recolonizing the Midwest: analysis of cougar confirmations during 1990-2008. *Journal of Wildlife Management* 76:1364-1369.
- Lindzey, F. G., W. D. Van Sickle, B. B. Ackerman, D. Barnhurst, T. P. Hemker, and S. P. Laing. 1994. Cougar population dynamics in southern Utah. *Journal of Wildlife Management* 58:619-624.
- Logan, K. A., and L. L. Swenar. 2001. Desert puma: evolutionary ecology and conservation of an enduring carnivore. Island Press, Washington, D.C., USA.
- Long, R. A., T. M. Donovan, P. MacKay, W. J. Zielinski, and J. S. Buzas. 2007. Comparing scat detection dogs, cameras, and hair snares for surveying carnivores. *Journal of Wildlife Management* 71:2018–2025.
- Miller, C. R., P. Joyce, and L. P. Waits. 2005. A new method for estimating the size of small populations from genetic mark-recapture data. *Molecular Ecology* 14:1991–2005.
- Nebraska Game and Parks Commission. 2013. Recommendations for mountain lion hunting. Nebraska Game and Parks Commission, Lincoln, USA.
- Nebraska Game and Parks Commission. 2016. Mountain lions in Nebraska. Nebraska Game and Parks Commission, Lincoln, USA.
- North Dakota Game and Fish Department. 2006. Status of mountain lions (*Puma concolor*) in North Dakota: a report to the Legislative Council. North Dakota Game and Fish Department, Bismarck, USA.
- Onderka, D. K., and W. D. Wishart. 1984. A major bighorn sheep die-off from pneumonia in southern Alberta. *Proceedings of the Biennial Symposium of the Northern Wild Sheep and Goat Council* 4:356-363.
- Pennell, M. W., C. R. Stansbury, L. P. Waits, and C. R. Miller. 2013. Capwire: a R package for estimating population census size from non-invasive genetic sampling. *Molecular Ecology Resources* 13:154–157.
- Perry, W. A. 1890. The cougar. Pages 405-427 in G. O. Shields, editor. *The big game of North America*. Rand, McNally and Company, Chicago, Illinois, USA.
- Pierce, B. M., and V. C. Bleich. 2003. Mountain lion. Pages 744-757 in G. A. Feldhammer, B. C. Thompson, and J. A. Chapman, editors. *Wild mammals of North America*. Second edition. Johns Hopkins University Press, Baltimore, Maryland, USA.



- Ross, P. I., and M. G. Jalkotzy. 1996. Cougar predation on moose in southwestern Alberta. *Alces* 32:1
- Ross, P. I., M. G. Jalkotzy, and M. Festa-Bianchet. 1997. Cougar predation on bighorn sheep in southwestern Alberta during winter. *Canadian Journal of Zoology* 74:771-775.
- Schneider, R., Stoner, K., Steinauer, G., Panella, M.J. and Humpert, M. eds., 2011. The Nebraska natural legacy project: state wildlife action plan.
- Seidensticker, J. C., M. G. Hornocker, W. V. Wiles, and J. P. Messick. 1973. Mountain lion social organization in the Idaho primitive area. *Wildlife Monographs* 35:1-60.
- Smith, J. B., J. A. Jenks, T. W. Grovenburg, and R. W. Klaver. 2014. Disease and predation: sorting out causes of a bighorn sheep (*Ovis canadensis*) decline. *PLoS ONE* 9(2):e88271.
- Sunquist, M. E., and F. Sunquist. 2002. *Wild cats of the world*. University of Chicago Press, Illinois, USA.
- Sweanor, L. L., K. A. Logan, and M. G. Hornocker. 2000. Cougar dispersal patterns, metapopulation dynamics and conservation. *Conservation Biology* 14:798-808.
- Swenk, M. H. 1908. A preliminary review of the mammals of Nebraska, with synopses. *Proceedings of the Nebraska Academy of Sciences* 8: 61-144
- Thompson, D. J., and J. A. Jenks. 2010. Dispersal movements of subadult cougars from the Black Hills: the notions of range expansion and recolonization. *Ecosphere* 1(4):1-11.
- Wilson, S., Hoffman, J.D., Genoways, H.H., 2010. Observations of reproduction in mountain lions from Nebraska. *Western North American Naturalist* 70:238-240.
- Wehausen, J. 1996. Effects of mountain lion predation on bighorn sheep in the Sierra Nevada and Granite Mountains of California. *Wildlife Society Bulletin* 24:471-479.
- Young, S. P., and E. A. Goldman. 1946. *The puma: mysterious American cat*. Dover Publications, New York, New York, USA.

## Appendix

Figure 5. 2014 Harvest Rules



# 2014 Mountain Lion Regulations

### Hunting Season Dates

Pine Ridge Unit Season 1 Jan. 1 - Feb. 14

The season shall immediately close if either the season harvest quota or female subquota is reached before Feb. 14.

Season 2 Feb. 15 - March 31

The season shall immediately close if either the season harvest quota or female subquota is reached before March 31.

Prairie Unit Jan. 1 - Dec. 31

Keya Paha Unit Closed in 2014

Upper Platte Unit Closed in 2014

### 2014 Harvest Quotas

Pine Ridge

Season 1 Two lions, with subquota of one female

Season 2 Two lions, with subquota of one female

Prairie Unlimited

Keya Paha 0

Upper Platte 0

### Legal Weapons

- .22-caliber or larger rifle that deliver at least 900 foot-pounds of energy at 100 yards
- .357 magnum rifle
- .45 Colt rifle
- .44-caliber or larger muzzleloading rifle
- .62-caliber or larger muzzleloading musket, firing a single slug
- Handguns or muzzleloading handguns that deliver at least 400 foot-pounds of energy at 50 yards
- Long bow, compound bow, recurve bow, or shoulder-fired non-electronic crossbow with a draw weight of at least 125 pounds

### Note

- Full-metal jacket or incendiary bullets are illegal.
- Arrows must have a sharpened hunting head with a blade of at least 7/16-inch cutting radius from the center of the arrow shaft.
- Arrows containing poison, stupefying chemical or having an explosive tip are illegal.

### Bag Limit

One mountain lion of either sex.

### Permits

No person may obtain more than one mountain lion permit in a calendar year.

### Shooting Hours

Thirty minutes before sunrise to 30 minutes following sunset.

### Minimum Age to Hunt Mountain Lions

12 years of age. Any person age 12-15 must be supervised by a person at least 19 years of age who has a valid hunting permit.

### Rules for Open Mountain Lion Seasons

#### Pine Ridge Unit

- Season 1 -- The season shall immediately close if either the season harvest quota of two mountain lions or subquota of one female mountain lion is reached before Feb. 14.
- Season 2 -- The season shall immediately close if either the season harvest quota of two mountain lions or subquota of one female mountain lion is reached before March 31.
- Hunting mountain lions with the aid of dogs in the Pine Ridge Unit is allowed only during Season 1.
- Any permittee who does not harvest a mountain lion during Season 1 may hunt during Season 2.
- If a Season 1 permittee does not harvest a mountain lion during Season 1 or Season 2, his or her permit will remain valid during the open seasons of the following year in which a season is authorized in the Pine Ridge Unit.

#### Prairie Unit

- There is no harvest quota.
- Hunting with the aid of dogs is allowed Jan. 1 through March 31 only.

### Permission

Permission is required to hunt on private land. It is unlawful to hunt with a rifle within 200 yards of an occupied dwelling or feedlot without specific permission for that purpose or within 100 yards using other methods.

### Hunter Orange

Not required.

### Cancelling the Permit

The successful permit holder must cancel the permit by punching or notching it, indicating date of kill and sex, immediately after killing a mountain lion. The canceled permit must remain on the person of the hunter while in possession of a mountain lion before successfully completing the check station process.

### Status of Mountain Lion Season

It is unlawful to hunt mountain lions in a unit with a limited harvest quota (Pine Ridge Unit) without first confirming that the season is open **EACH DAY** by checking the toll-free phone number provided on the hunting permit or by checking [www.nebraskamountainlions.org](http://www.nebraskamountainlions.org)

### Transportation

If the permit holder does not accompany the mountain lion during transportation, the cancelled permit must be attached to the carcass of the mountain lion.

### Possession

It is unlawful for any person other than a successful permit holder to possess a mountain lion. It is unlawful to give, put, leave or retain the whole carcass, meat or flesh of a mountain lion at any place or in the custody of another person, cold storage, or processing facility unless the animal is tagged with the following information: (1) Name; (2) phone number; (3) permit or seal number; (4) estimated pounds of meat; (5) species and quantity; and (6) signature of donor and name of recipient and date of transfer, if transferred by gift.

### Habitat Stamp

Any resident age 16 or older and all nonresidents who hunt mountain lions in Nebraska must have a valid Nebraska Habitat Stamp. Only one stamp is needed for all hunting of any species in a calendar year.

### Checking

- Any mountain lion harvested must be reported to Game and Parks within eight hours of recovery of the animal using a phone number or website specified by Game and Parks, or in person at a district office during normal business hours.
- The entire unfrozen carcass must be presented to a Game and Parks representative within 24 hours of the time of kill for inspection and attachment of an official harvest seal, unless Game and Parks has been notified and arrangements are made for a later check.
- Game and Parks shall collect two premolar teeth to allow determination of age and a tissue sample from each mountain lion harvested.
- The permittee shall furnish Game and Parks with the date and location of kill before attaching the harvest seal.
- The harvest seal must remain attached to the mountain lion until the pelt is tanned, mounted or otherwise preserved.

### Unlawful Acts

- chase, run or harass a mountain lion with a motor vehicle
- shoot at or take a mountain lion from a motor vehicle that is moving or underway
- take a mountain lion in any area other than the area for which the hunting permit is issued
- take a mountain lion within 200 yards of a site upon which feed, feed supplement or bait has been placed within the last 60 days, except where food, supplement or bait has been placed in the active operation of husbandry for domesticated livestock other than domesticated cervidae. Game and Parks may, by



### Mountain Lion Management Units

**Keya Paha** – Keya Paha County and those parts of Boyd, Brown, Cherry, Holt and Rock counties east of U.S. Hwy. 83, north of U.S. Hwy. 20, and west of U.S. Hwy. 281.

**Pine Ridge** – Those parts of Box Butte, Dawes, Sheridan and Sioux counties north of the Niobrara River and west of Neb. Hwy. 27.

**Prairie** – Those parts of Nebraska not included in the Keya Paha, Pine Ridge or Upper Platte units.

**Upper Platte** – Banner, Cheyenne and Kimball counties and those parts of Deuel, Garden, Morrill and Scotts Bluff counties south and west of a line commencing at the junction of U.S. Hwy. 26 with the Nebraska-Wyoming state line, then east on U.S. Hwy. 26 to State Link 62A, then east on State Link 62A to U.S. Hwy. 385, then south on U.S. Hwy. 385 to U.S. Hwy. 26, then east on U.S. Hwy. 26 to Neb. Hwy. 27, then south on Neb. Hwy. 27 to U.S. Hwy. 30, then west on U.S. Hwy. 30 to U.S. Hwy. 385, then south on U.S. Hwy. 385 to the Nebraska-Colorado state line.

**NOTE:** Unit boundaries are the same as deer management unit boundaries.

special permit, allow take otherwise prohibited by these regulations.

- harvest or attempt to harvest a mountain lion with a spotted coat (kitten) or any mountain lion accompanying another mountain lion
- hunt mountain lions with the aid of traps or bait
- fail to check or report any mountain lion taken
- falsely check or report the harvest of any mountain lion
- harvest a mountain lion within 24 hours of obtaining a mountain lion permit

### Nebraska Wildlife Crimestoppers

If you see a game violation, report it to Nebraska Wildlife Crimestoppers toll-free at 800-742-7627. Your free call will be kept confidential and you may be eligible for a cash reward.

