

Status of Mountain Lions (*Puma concolor*) in North Dakota

A Report to the Legislative Council

Submitted by the North Dakota Game and Fish Department

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EXECUTIVE SUMMARY

Section 2 of House Bill 1102, enacted by the 2005 legislature, directed the North Dakota Game and Fish Department (Department), in cooperation with Tribal authorities, to assess the status of mountain lions (*Puma concolor*) in North Dakota and report its findings to the legislative council before July 1, 2006. In the past year, the Department: 1) reviewed reported sightings of lions from the recent past (2001-2005), 2) surveyed North Dakota hunters for additional sighting information, 3) mapped suitable lion habitat throughout the state, and 4) initiated an experimental mountain lion season with a quota of five animals. Although most of North Dakota is unsuitable for mountain lions, the habitat suitability map identified the North Dakota Badlands (Badlands) and associated Missouri River (MR) Breaklands as having a sufficient amount of suitable habitat to support a small resident population. Data from verified reports of sightings and the experimental season indicated mountain lions either have recolonized or are in the process of recolonizing a portion of their former range in the Badlands. Not only did the majority of verified sightings occur in the Badlands and vicinity, but also, all animals harvested during the state-wide season were taken from this area. The relatively small lion population in the Badlands likely will be vulnerable to human-caused mortality due to its geographic isolation from breeding lion populations in adjacent states, therefore, close monitoring of management prescriptions carried out on the population will be necessary if a reproductively viable population is to be maintained. Based on an initial analysis of habitat quality, approximately 2% of North Dakota (suitable habitat in the Badlands and MR Breaklands) could support an average of 45 to 74 resident adult animals under a management scenario with no harvest mortality. This is not an estimate of the current population size, but rather an estimate of habitat potential for the area.

Plans for 2006-07 are to: 1) continue to record and verify reported sightings of lions, 2) survey hunters for lion sighting information, 3) test the habitat suitability map, 4) conduct field surveys to monitor the population, 5) coordinate with Tribal authorities and adjacent state agencies on lion management issues, 6) continue with education efforts and 7) conduct a second experimental season.

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INTRODUCTION

Historical and legal status

Historically mountain lions (*Puma concolor*) occurred in North Dakota, although the species was considered scarce in the open prairie country (Bailey 1926). According to historic records, in the 1800s lions were found along the Little Missouri River in the North Dakota Badlands (Badlands), Killdeer Mountains, and the Missouri River (MR) Breaklands. At the time, the species was not protected from indiscriminant killing, and by the early 1900s, the population was believed to be extinct (Young and Goldman 1946). The last confirmed record in North Dakota was in 1902, when a 65 kg (143 lb) male mountain lion was shot by Mr. C. Parker, 40 km (25 mi) down the Missouri River from Williston, North Dakota, on the south side of the River (Bailey 1926).

When mountain lions returned to North Dakota is unknown. The earliest record documented by the North Dakota Game and Fish Department (Department) occurred in 1958, near Killdeer, North Dakota. From 1958 until 1991 there were 11 confirmed reports in the state. Then, in 1991, after a young female lion was shot in a barn near Golva, North Dakota, lions were legislatively classified as a furbearer with a closed season (Senate Bill 2043, Section 1). However, regulations still allowed landowners to kill a lion that was depredating poultry or domestic animals, and in 2005, a law change required that such lions be turned in to the Department (House Bill 1102, Section 1). In the 12 years following regulation of the species (1991-2003), the number of confirmed reports (26) more than doubled from the previous 33 years. When continued presence of mountain lions in North Dakota was apparent, a more formal reporting system was initiated and a mountain lion action plan was prepared by McKenna, Ermer

and others (2004) to address interactions between lions and humans or their property (McKenna, Ermer et al. 2004).

Objective

The objective of this report is to assess the current status of mountain lions in North Dakota. According to Section 2 of House Bill 1102, enacted by the 2005 legislature, the Department, in cooperation with Tribal authorities, was directed to assess the status of mountain lions in North Dakota and report its findings to the legislative council before July 1, 2006. To accomplish this assessment, this past year, the Department: 1) reviewed reported sightings of lions from the recent past 2) surveyed North Dakota hunters for additional sighting information, 3) evaluated suitable lion habitat in North Dakota, 4) carried out an experimental mountain lion season, 5) coordinated with Tribal Authorities, and 6) coordinated with adjacent states on status and management of mountain lions. Questions the Department was seeking to answer included:

- 1) Are lions found throughout the state or are they concentrated in a few regions?
- 2) Are there individual adult breeding females in the state?
- 3) Is there an established breeding population?
- 4) What habitats are important to lions in North Dakota? and
- 5) Can North Dakota support a lion population or does it serve mainly as dispersal habitat for young lions?

BACKGROUND INFORMATION

Reported sightings by the public

Sightings of mountain lions reported by the public can be helpful to wildlife managers by identifying habitats or regions that may be important to the species as well as documenting their

presence in these areas. Sightings are not reliable for documenting annual population trends due to the high rate of misidentification of the species and a number of factors that influence reports [i.e., media coverage of incidents involving lions and people or domestic animals, increases in human population and road densities, greater public awareness of the species presence, trends in recreational use, changes in prey abundance, etc.; VanDyke and Brocke 1987; Cougar Management Guidelines Working Group (CMGWG) 2005]. However, reports of sightings, when carefully screened for reliability and used in conjunction with other information, can aid in assessing population status.

The Department has collected information on reported sightings of mountain lions in North Dakota since 1958. Initially, reports were infrequent, and although some historic records contain sufficient information to assess their validity and map respective locations, others provide little detail. In 2004, the Department adopted a more formal and consistent method of reporting and verifying sightings (McKenna, Ermer et al. 2004). In addition to recording specific locational information (i.e., Township, Range, Section or U.T.M. coordinate) and specific information on the nature of the sighting on a Large Carnivore Report Form (Appendix I), attempts are made to verify reports by obtaining physical evidence (i.e., video of animal, photos of lions or their tracks, scat, hair, documented kill site of wild or domestic prey). After an investigation (via phone conversation or on-site visit), sightings are classified according to their validity, as unfounded, improbable/unverified, probable/unverified or verified. Through this process, appropriate responses by the Department are determined based on the type of sighting documented (i.e., general sighting; recurring sighting; encounter; incident or attack), as defined in the guidelines for mountain lion/human/property interactions (Appendix II). These guidelines were established in order to minimize damage to private property, reduce the potential for public

safety concerns, and to provide guidance to the Department on how to handle situations where mountain lions interact with people or property (McKenna, Ermer et al. 2004).

Reported sightings by hunters

Although reported sightings are not useful for indexing lion populations, sighting data collected annually from resident hunters may be useful for documenting population trends (DeSimone and Semmens 2004). Deer hunters occur statewide, and hunting is a common activity associated with lion sightings (VanDyke and Brocke 1987). Data collected on numbers of hours hunters spent hunting (observing wildlife) over a specified period of time (e.g., during opening weekend of the deer gun season) and numbers of lions seen, would provide the necessary information to calculate population indices for North Dakota. Sightings by hunters are not verified, however, and indices obtained from hunter sighting data must be viewed cautiously, and periodically verified with empirical surveys (e.g., snow-track surveys, camera-station surveys).

Mapping suitable habitat for mountain lions

Because mountain lions are wide-ranging, solitary animals that are difficult to monitor, identifying suitable habitat is fundamental for defining breeding populations (CMGWG 2005). Large geographic areas are required to accommodate populations of mountain lions and management at the landscape level is necessary to manage populations long-term (Sinclair et al. 2001). Landscape level characteristics that can be measured across the range of the mountain lion include vegetative cover, topography, streams, and areas of human activity. These characteristics can be examined according to their suitability to mountain lions and mapped using geographic information system (GIS) technology. GIS enables rapid analysis and mapping

of landscape-level characteristics over large geographic areas to create species-specific habitat suitability maps.

Throughout their geographic range, mountain lions have adapted to a variety of habitats and environmental conditions where prey are abundant (primarily mule deer, *Odocoileus hemionus*, white-tailed deer, *Odocoileus virginianus* and elk, *Cervus elaphus*; Anderson 1983). However, an essential component of lion habitat is vegetative or topographic cover for concealment (Sunquist and Sunquist 2002). Dense thickets, overhanging boughs of trees, and other landscape elements (e.g., roots and logs of downed trees, shallow caves, rock outcrops, boulder piles, and undercut cliffs) provide lions cover for hunting and stalking prey, security while feeding and resting, and den sites for females with kittens (Hornocker 1970; Seidensticker et al. 1973; Logan and Irwin 1985; Laing and Lindzey 1991; Jalkotzy et al. 1999; Koehler and Hornocker 1991; Logan and Sweanor 2000; Sunquist and Sunquist 2002). Seidensticker et al. (1973) noted that mountain lions were “constantly moving through the country in a way that optimized encounters with prey and provided them with the best possible positions in terms of cover from which to launch attacks.” Once kills were made, lions dragged their prey into brush or dense thickets before feeding and generally remained near their kills until consumed. Dickson and Beier (2002) reported riparian habitats provided important stalking and feeding cover for mountain lions.

Not only must landscapes contain suitable habitat characteristics for mountain lions, but also, they must be distributed over a considerable area due to the large home ranges of these animals. For example, home ranges of four female and three male resident lions in the Black Hills of South Dakota ranged from 74 – 395 km² (29 – 152 mi²) and 251 – 1,329 km² (97 – 513 mi²), respectively (Fecske 2003). According to Beier (1993), a minimum of 1,000 – 2,200 km²

(386 – 893 mi²) of suitable habitat was needed to support a small lion population (15 – 20 adult animals) with a 99% probability of persistence for 100 years. Habitat suitability maps can identify areas that have a sufficient amount of suitable habitat to support a resident population, as well as smaller areas that may serve as travel habitat and temporary sites for dispersing animals. Logan and Sweanor (2001) noted the importance of identifying, mapping and conserving current mountain lion habitat, including travel habitat, to maintain self sustaining, interconnected populations. Like other large carnivores, mountain lions are considered an umbrella species (Logan and Sweanor, 2001), in that maintaining or enhancing habitat to sustain their numbers conserves viable populations of other species (Minta et al., 1999).

METHODS

Reported sightings by the public

Any Department employee who receives information regarding a human/mountain lion interaction is responsible for filling out a large carnivore report form (Appendix I). Such forms are forwarded to the Furbearer Biologist who enters the information in a web-based database. Data on historic records also have been entered in this database. To aid in understanding the distribution of mountain lions in North Dakota in the recent past, verified reports collected from 2001 – 2005, were mapped (Arc GIS 9, ESRI, Inc. Redlands, CA). Additionally, to document factors influencing lion sightings in North Dakota, the number of sightings by month and year (2004-2005), county of occurrence, type of sighting and verification status were examined.

Deer hunter observation questionnaire and furbearer harvest survey

Questions were added to the state's 2005 deer hunter observation questionnaire and 2005-06 furbearer harvest survey (Appendix III) to gain more information on the distribution of lion

sightings in North Dakota and provide baseline data for documenting state-wide population trends. For example, Question #7 on the deer hunter observation questionnaire asked “While hunting, did you see a mountain lion?”. Five thousand of these surveys were sent to deer hunters immediately prior to opening weekend of deer gun season. The data collected included, for a sample of hunters in each of the 37 deer gun hunting units in North Dakota, total number of hours spent hunting (“observing”) wildlife opening weekend of deer gun season and number of lions seen. The data were used to obtain a population index for each hunting unit using the number of lions seen per 1000 hours of observation.

A question on mountain lions also was added to the 2005 furbearer harvest survey to measure hunter effort for the species by county. This questionnaire surveyed 5,000 hunters and trappers statewide who either bought a furbearer stamp or a combination license for the 2005-06 season. On the annual survey, the mountain lion was added to the list of species hunted. Respondents were asked to record the number of days they spent hunting lions, the county of most activity, and number harvested.

Habitat suitability map

The mountain lion habitat suitability map for North Dakota was created in a GIS (GIS; ArcGIS 9, ESRI, Inc., Redlands, California), based on published literature on habitat requirements of the species and available digital databases. The model integrated three landscape level characteristics: concealment/stalking cover (trees and shrubs), concealment/stalking topography (slopes) and travel (riparian) habitat considered important to lions. Digital, gridded (30-m² cells) databases of habitat characteristics were recoded with numerical values according to their suitability to lions, and then summed to create a final habitat suitability map for the species. Landscapes unsuitable to lions [high-density residential/urban

areas (Dickson and Beier 2002) and open water] were incorporated into the final model by creating a binary grid, where unsuitable areas were assigned a value of zero; the unsuitable layer was then multiplied by the final habitat model to ‘zero out’ these regions.

The concealment/stalking cover component of the habitat-relation model was created under the premise that prairie landscapes having a higher percentage of concealment/stalking cover per 2.6 km² (1.0 mi²) are more suitable to lions than those having lower percentages of cover per 2.6 km². Therefore, for each land cover class in a gridded National land cover (NLC) database (NLC dataset; North Dakota GIS Hub), numerical values of the 30-m cells that represented classes offering concealment/stalking cover to lions were reclassified to a value of “1”. All other NLC classes were assigned a value of “0”. A focal sum analysis then was conducted on the binary grid. Focal sum analyses search a specified distance surrounding each cell in a grid, add up all assigned values for cells within the search distance, and assign the total to the cell in the center of the searched neighborhood. Higher cell values indicate higher suitability to mountain lions. For this component of the habitat suitability map, the focal sum determined, for each 30-m cell, the number of cells per 2.6 km² that contained concealment/stalking cover for lions. The final layer contained four values representing ranks of the percentage of concealment/stalking cover per 2.6 km², from least (0% stalking/concealment cover per 2.6 km² or a Value equal to 1) to most (>50% stalking/ concealment cover per 2.6 km² or a Value equal to 4) suitable to mountain lions (Table 1; Figure 1a).

Table 1. Landscape characteristics used to create a habitat suitability map for mountain lions by recoding values according to their suitability to the species. Highest quality habitat contained >50% cover per 2.6 km², occurred in habitat with slopes >50%, and was within 2.6 km² of a permanent water source.

Landscape characteristics	Category	Value
Concealment/stalking cover (trees and shrubs)	0 % cover per 2.6 km ² (1 mi ²)	1
	1-25% cover per 2.6 km ²	2
	26-50% cover per 2.6 km ²	3
	>50% cover per 2.6 km ²	4
Concealment\stalking topography (slopes)	0% slope	1
	1-20% slope	2
	21-50% slope	3
	>50% slope	4
Travel habitat (drainages)	No streams present within 2.6 km ² (1 mi ²) area	1
	Intermittent streams present within 2.6 km ² area	2
	Perennial streams or shoreline present within 2.6 km ² area	3
Unsuitable habitat	Residential/urban areas; open water	0

Slopes of land in North Dakota were derived in ArcGIS from a mathematical model run on a 30-m digital elevation model (National Elevation Dataset; North Dakota GIS Hub). Slopes (measured in percent) were recoded into four categories according to their suitability to mountain lions from least (0% slope or a Value equal to 1) to most (>50% slope or a Value equal to 4) suitable (Table 1; Figure 1b).

Land in North Dakota was mapped according to its likelihood of being used as travel habitat among suitable patches or for dispersing animals, or its proximity to a water source. A database of streams (National Hydrography Dataset; North Dakota GIS Hub) was converted to a 30-m cell grid, in which perennial streams were assigned a value of 3, intermittent streams, a value of 2 and other habitat a value of 1. A focal sum analysis then was conducted on the grid to determine, for each 30-m cell the value of all cells including and surrounding [per 2.6 km² (1.0 mi²)] that cell; cells with higher values had more travel habitat and or permanent water surrounding those cells than cells with lower values. The final travel habitat layer contained three values representing 2.6 km² areas that either contained habitat with no streams (Value = 1), intermittent streams (Value = 2), or perennial streams or shoreline (Value =3) for North Dakota (Table 1, Figure 1c). Unsuitable habitat was mapped by creating a binary grid where residential and urban areas and open water were assigned a value of zero.

The final habitat suitability map for mountain lions in North Dakota was made by adding the three ranked grids representing stalking/concealment cover, stalking/concealment topography and travel habitat and multiplying by the unsuitable habitat quality layer. Highest-quality habitat for the species contained >50% stalking/concealment cover per 2.6 km² (1.0 mi²) occurred at slopes >50% and was located in close proximity (within 2.6 km) to a permanent water source (Table 1).

Coordination with Tribal authorities and state agencies

Prior to setting the experimental mountain lion season, the Department coordinated with Tribal authorities regarding season parameters. An agreement was made with the Three Affiliated Tribes to include lions taken from Fort Berthold Reservation in the five lion quota. Also, because the lion population in North Dakota is heavily influenced by populations, habitats,

and lion management in surrounding states and provinces, it was essential to meet and coordinate with lion biologists from the region. In March 2006, the Department hosted a regional mountain lion management meeting in Dickinson, North Dakota (Appendix IV). Agenda items included setting seasons on lions, dealing with problem animals, analyzing reported sighting information, population status and current research (i.e., understanding dispersal patterns, genetic techniques to determine relatedness, field surveys for population monitoring, etc.).

Experimental mountain lion season

The Department proposed an experimental mountain lion season in the Governor's 2005-2006 Small Game and Furbearer Hunting Proclamation which was approved (Appendix V). The experimental season was initiated so the Department could gather locational and biological information on a small number of lions (n=5), without causing irreparable harm to the region's populations. The season was a cost-effective way to obtain information, while providing a modest amount of recreational hunting opportunity to North Dakota residents. A mandatory check-in of intact carcasses of all animals taken was required so the Department could collect biological and locational information on these animals (Appendix VI).

Dates, locations (Township, Range and Section), and method of take were recorded for all animals harvested during the season. Lions were weighed and sex identified. A cursory examination was performed on the carcasses prior to skinning the animals. Ages were determined based on tooth wear and fur color characteristics (Anderson and Lindzey 2000). Bodies were examined for wounds from intraspecific aggressive encounters (e.g., scratches or puncture wounds on face or limbs) or capturing prey (e.g., broken limbs, bruising, etc), presence of porcupine quills or ectoparasites, and to obtain body measurements to relate to nutritional condition. Distances between upper and lower canines were measured to build a database on bite

distances for identifying wild and domestic kills made by cougars in North Dakota. For females, nipple size and shape were examined for evidence of lactation (Anderson and Lindzey 2000).

Necropsies were performed on harvested mountain lions to assess nutritional condition, document food habits and collect other biological data. Organ (mesentery, heart and kidney) fat reserves were examined and subjectively categorized as low, moderate or high. Additionally, percent kidney fat was determined by weighing kidneys (K), and perirenal (PR) and riney kidney (RK) fat (to the nearest gram) and using the following equation:

$$(\text{PR fat weight} + \text{RK fat weight}) / \text{K weight} * 100\% = \text{Percent Kidney Fat}$$

Stomach and intestinal tracts were collected to document food habits and examine for internal parasites. For females, reproductive tracts were examined for evidence of breeding activity. Samples of muscle tissue were collected for genetic analyses. Also, in cooperation with USDA Wildlife Services, blood samples were collected to test for disease (tularemia and sylvatic plague).

RESULTS

Mountain lion sightings

From 2001-2005, there were 41 verified reports of mountain lions in North Dakota, of which 32 (78%) occurred within, or in the vicinity of the North Dakota Badlands, in Golden Valley, Billings, McKenzie and Dunn Counties (Figure 2). Nine verified reports occurred outside of the Badlands, in Divide, Mountrail, McHenry, Rollette, Dunn, Traill and Grand Forks Counties. In four cases of the 41 verified reports, the sex and age of the animals was known. Two subadult lions, one of each sex, were killed illegally, and one subadult female was killed by an archery hunter who felt threatened by the animal. The fourth animal was a subadult male lion

that had been radio-collared in the Black Hills of South Dakota for research (D. Thompson, Department of Wildlife and Fisheries Sciences, South Dakota State University, Unpublished Data). The animal was last located by the researchers September 2004 in northwestern South Dakota. Three months later, a North Dakota resident reported seeing a radio-collared lion in Turtle River State Park, eastcentral North Dakota, in Grand Forks County. The animal was confirmed to be the study animal from South Dakota and was subsequently monitored by the Department. However, the young male continued traveling northeast into Minnesota and eventually Manitoba, Canada.

A total of 187 mountain lion sightings were reported to the Department during 2004 (n=69) and 2005 (n=118) (Table 2). Sightings were reported all months of the year, although, overall, the greatest numbers of sightings occurred in September, October and November. By sighting classification, 12% (n=8) of the reported sightings in 2004, and 15% (n=18) in 2005, were verified as being from a mountain lion (Table 3). Close to half of the sightings, [49% (n=34) in 2004 and 47% (n=56) in 2005] were classified as either improbable/unverified or unfounded. Seventy-one sightings could not be ruled out as being legitimate sightings, but lacked the evidence for verification. In 2004 and 2005, these “probable/unverified” sightings made up 39% (n=27) and 37% (n=44), respectively, of the reported sightings and occurred in counties throughout North Dakota (Figures 3 and 4).

Of the verified reported sightings, over half (n=24 or 58%) were confirmed based on field sign, primarily from tracks left by the animal (Table 4). In two cases during June 2005, mountain lions were involved in negative encounters with domestic livestock or humans; three domestic sheep were killed by a mountain lion near Richardton, North Dakota, in Dunn County, and a lion behaved aggressively toward a couple south of the north unit of Theodore Roosevelt

National Park, McKenzie County. Of the 22 reports considered “Unfounded”, the greatest number of reports (n=8) was due to tracks of domestic dogs being mistaken for mountain lions (Table 5).

Deer hunter observation questionnaire

A total of 2,058 deer hunter observation questionnaires were filled out and returned to the Department for a return rate of 41.0%. Of these, nine (0.4%) respondents from eight hunting units (2G, 2E, 2I, 3A1, 3A3, 3C, 4C, 4D; Figure 5) reported they saw a mountain lion while hunting during opening weekend of the deer gun season (Table 6). Unit 3A1 had the greatest number of reported sightings (n=2) and the highest population index value (Value = 2.42).

Habitat suitability map

The habitat suitability map classified habitat in North Dakota as either suitable or unsuitable to mountain lions based on four ranked habitat classes: Rank 1 (unsuitable; low-quality habitat; summed value = 3, 4, or 5), Rank 2 (unsuitable; moderate-low quality; summed value = 6), Rank 3 (suitable; moderate-high quality; summed value = 7) and Rank 4 (suitable; high-quality habitat; summed value = 8, 9, 10 or 11; Figure 6). According to the map, 94% of the state’s land area [183,597 km² (70,888 mi²)] was considered not suitable to mountain lions (Rank 1 and Rank 2 habitat; residential/urban areas, and open water). The remaining 6%, classified as suitable (Rank 3 or Rank 4) habitat, was concentrated in a few regions of the state (North Dakota Badlands, Northern MR Breaklands, Turtle Mountains, Pembina Gorge, and west and south of the Knife River), or represented riparian habitat along streams. However, of this, only suitable habitat in the North Dakota Badlands and the Northern MR Breaklands region (about 2% of the state’s land area) met the size criteria of having sufficient suitable habitat to support a small population of animals [1,000-2,200 km² (386-893 mi²); Beier 1993; Figure 7]. Of

the two regions, the Badlands contained a greater amount, and more contiguous distribution of high-quality (Rank 4) habitat.

The greatest area of contiguous suitable mountain lion habitat [2,927 km² (1,130 mi²)] occurred in western North Dakota, in the Badlands ecoregion (contained in portions of Bowman, Slope, Golden Valley, Billings, McKenzie and Dunn Counties and including portions of Fort Berthold Reservation; Table 7, Figure 7). A relatively large area of suitable habitat [1,710 km² (660 mi²)] also occurred in western North Dakota in the northern MR Breaklands ecoregion (along the Missouri River, in portions of McKenzie, Williams, Mountrail, Dunn, McLean and Mercer Counties, and including portions of Fort Berthold Reservation). Other areas of the state that contained suitable mountain lion habitat included the Turtle Mountains of Bottineau and Rolette Counties, including portions of Turtle Mountain Reservation [573 km² (221 mi²)], the Pembina Gorge in Cavalier and Pembina Counties [270 km² (104 mi²)], and west and south of the Knife River in Mercer County [344 km² (133 mi²)]. These smaller areas of suitable habitat represented potential temporary sites for dispersing/transient mountain lions.

The map also identified potential travel habitat throughout North Dakota (Rank 3 habitat occurring outside of the Badlands and northern MR Breaklands) based on the proximity to perennial streams. Habitat near intermittent streams was less likely to be used by lions for travel (Rank 2 habitat), but more likely than habitat containing no streams (Rank 1 habitat).

Experimental mountain lion season

Five mountain lions (3 males, 2 females) were harvested during the 2005-06 state-wide experimental season which began September 2, 2005 and ended when the 5th animal was taken (15 January 2006; Table 8; Figure 2). The first two animals were shot mid-November (November 16 and 17, respectively) during deer gun season. The first lion (F1) was a 42 kg (92

lb), 2.5-3-year-old female, and the second (M2), a 45 kg (99 lb), 1.5-2-year-old male. Three lions were taken by houndsmen after being chased by dogs. The third lion (M3), a 4-5-year-old, 63 kg (140 lb) male, was killed on December 31. The fourth lion (M4), taken January 6, was a 2-year-old male and weighed 50 kg (111 lb). The fifth lion (F5), an 18 kg (39 lb), 4-6-month-old female, was taken January 15.

The five lions were harvested within a 1,632 km² (630 mi²) area in the Badlands and vicinity (Killdeer Mountains and near Fairfield, North Dakota; Figure 2), in McKenzie, Dunn and Billings Counties. Three animals (F1, M3 and F5) were considered residents and were harvested within a 116 km² (45 mi²) area along the Little Missouri River; an additional kitten was treed and photographed in the same area, but not harvested (A. Anderson, Williston, North Dakota, reported sighting).

Harvested mountain lions were in good physical condition (no scratches or puncture wounds on face or limbs, or broken limbs, bruising, etc., were apparent on any of the animals) and good to fair nutritional condition based on cursory examination of body and intestinal tract and examination of organ fat reserves (Table 9). Female (F1) had not yet had her first litter and was not pregnant at the time of her death. Documented prey species consumed by these animals included deer and porcupine. All animals tested negative for exposure to tularemia, but F5 tested sero-positive for exposure to sylvatic plague (R. Powers, USDA Wildlife Services, Bismarck, North Dakota, Personal Communication).

DNA samples (hair and tissue) were collected from all lions (5 hunter-harvested, 1 illegally trapped, and 1 shot by bowhunter) provided to the Department. Initially, it was believed that DNA analysis may provide insight as to the particular source population (Black Hills or Rocky Mountains, for example) from which the state's re-colonized lion's lineage derived.

However, DNA research regarding mountain lions throughout the United States has shown little to no genetic diversity among populations. Therefore, determining the origin of lions found in North Dakota will not be accomplished through DNA analysis. However, genetic history results will be valuable in determining with some degree of certainty the relatedness among the seven lions. In time, this background information may provide insight into generational structure and breeding, reproduction, and recruitment success, as well as determining the genetic health of the population and making inferences on relationships to other populations. Samples were sent to U.S. Forest Service Mountain Research Station, Missoula, Montana for analysis. Results from this genetic testing have not been completed to-date. Therefore, no findings can be reported at this time.

DISCUSSION

The majority of reported sightings of mountain lions in North Dakota occurred during months associated with hunting activity (September, October and November). During this time, a large number of people are traveling to, and hiking in, remote country throughout the state, increasing the probability of seeing a mountain lion. Similar to other states, a large percentage of reported sightings were either unverifiable due to lack of physical evidence or turned out to be other animals, primarily domestic dogs. Of the 41 sighting reports that were verified, 39 (95%) were non-threatening observations of either the animal or its sign (tracks or wildlife kills), supporting the fact that mountain lions are secretive, primarily nocturnal animals that typically avoid people. However, in one case, a negative mountain lion/human encounter was reported.

In June 2005, an aggressive interaction was documented between a mountain lion and two adult mountain bikers south of the north unit of Theodore Roosevelt National Park of the

Badlands. The couple knew how to act if confronted by a lion. They performed appropriate behaviors, remained unharmed, and the lion left the vicinity. In accordance with the Department's action plan, an attempt, although unsuccessful, was made to remove this potentially aggressive animal. As expected, due to media coverage of the encounter and heightened concern by the public, the number of sightings reported to the Department reached the highest documented to date in one month ($n=17$), in the four weeks following the incident, although only one of these reports was classified as a verified sighting. To continue to educate the public about this species, the Department created a powerpoint presentation on lions which will be presented to general audiences as part of the Department's outreach effort. Additionally, an educational brochure was produced (currently in review) that contains information about the species and what people should do if they see a mountain lion.

The habitat suitability map identified the Badlands and associated northern Missouri River (MR) Breaklands ecoregions as having a sufficient amount of suitable habitat to support a small resident population. The Badlands are a $6,322 \text{ km}^2$ ($2,441 \text{ mi}^2$) region in western North Dakota characterized by a highly variable landscape of clay slopes, steep canyons, buttes and bottomlands. Although not forested, the region is vegetated (primarily on north and east facing slopes) with thickets of small trees and shrubs, woody draws of cottonwood and green ash, and scattered stands of Rocky Mountain Juniper and ponderosa pine trees (Hagen et al. 2005). Bisecting the Badlands is the Little Missouri River which originates in eastern Wyoming, flows north through the Badlands and drains into Lake Sakakawea of the Missouri River. To the north of the Badlands is the Northern portion of the MR Breaklands, an area of about $4,318 \text{ km}^2$ ($1,667 \text{ mi}^2$), which also has a steep, dissected topography. Uplands in this region are vegetated with shortgrass prairie, but the area also contains woody draws and riparian cottonwood forests.

Not only do the Badlands contain a sufficient amount of suitable mountain lion habitat to support a small population (based on the habitat suitability map), but also, other data indicated the species either has re-established or is in the process of re-establishing in the Badlands, and the nearby Killdeer Mountains. The majority of verified reports of lions were concentrated in the Badlands. Also, resident, breeding animals (an adult male, adult female and two family groups) were documented during the experimental harvest. Furthermore, since the season ended, there have been five confirmed reports of lions in the region, four in the Badlands, and one, in the Killdeer Mountains (Figure 8). The Killdeer Mountains, are a small [60 km² (23 mi²)], elevated region rising 213-305 m (700-1,000 ft) above the surrounding prairie, located east of, and adjacent to, the Badlands, in northwestern Dunn County. The mountains are vegetated by deciduous woodlands of burr oak, quaking aspen, green ash, paper birch, western black birch and American elm (Hagen et al. 2005). Due to their small size, the Killdeer Mountains likely only can support few individuals. However, the area represents an extension of the Badlands with respect to delineating a breeding lion population. The North Dakota Badlands and Killdeer Mountains historically were part of the mountain lion's range in North Dakota (Bailey 1926).

According to the habitat suitability map, the Northern MR Breaklands also contained a sufficient amount of suitable habitat to sustain a small number of cougars. This region is interconnected with the Badlands and historically a part of the species range in North Dakota (Bailey 1926). However, the northern MR Breaklands is smaller region, containing a more fragmented distribution of suitable habitat. The implications are, that from a regional perspective, lions in the Badlands (including the Killdeer Mountains) and Northern MR Breaklands are part of the same population, however, habitat potential for mountain lions outside

of the Badlands is lower due to reduced habitat quality. Since 2001, only one verified sighting has occurred in the MR Breaklands region.

The habitat suitability map identified portions of western North Dakota as having sufficient suitable habitat to support a small population of mountain lions. This information can be used to estimate habitat potential for the species based on density estimates determined for other mountain lion populations (Table 10-7 in Logan and Sweanor 2001). Based on an initial analysis of habitat quality [4,637 km² (1,790 mi²) of suitable habitat in the Badlands and MR Breaklands], North Dakota could support an average of 45 to 74 resident, adult animals under a management scenario with no harvest mortality. [Habitat potential was derived from the average minimum and maximum density estimates (lions per 100 km²) reported for other lion populations (New Mexico, Idaho, Utah, Wyoming, and British Columbia and Alberta, Canada) extrapolated to suitable habitat in North Dakota (ave. min.= 45 ± 18 (SD), ave. max.= 74 ± 27 (SD))]. This is not an estimate of the current population size, but rather an estimate of habitat potential for the area based on the following assumptions:

- 1) Mountain lion prey are abundant throughout the Badlands and Northern MR Breaklands,
- 2) The habitat suitability map accurately identifies suitable mountain lion habitat in North Dakota, and
- 3) Density estimates reported for adult resident lions in other lion populations are similar to lion densities in suitable habitat of North Dakota.

More information is needed to estimate the current distribution and abundance of mountain lions and their prey (deer, elk, bighorn sheep), as well as impacts to prey populations in the Badlands and Northern MR Breaklands.

The Department currently is closely monitoring the recovering bighorn sheep population in the Badlands for mortality due to lions, because predation by lions on bighorn sheep can negatively impact small and isolated sheep populations (CMGWG 2005). According to the guidelines for mountain/lion/human/property interactions, mountain lions will be removed when they are determined to be a substantial, unpreventable threat to bighorn sheep, or other species of high public interest (McKenna, Ermer et al. 2004).

Mountain lion population densities are influenced by densities of their prey and habitat quality (Logan and Sweanor 2001). Although the Badlands contain suitable habitat and are supporting an unknown number of lions, most of the region does not contain the highest quality concealment/stalking cover and topography identified for the species (>50% concealment/stalking cover per 2.6 km² (1.0 mi²); area having slopes >50%) by the habitat suitability map. In fact, nowhere in North Dakota, are large expanses of dense forest cover and steep slopes available to mountain lions. The majority of concealment/stalking cover in the Badlands and MR Breaklands fell into the 26 to 50% per 2.6 km² (1.0 mi²) range and most of the slopes fell in the 20 to 50% range. This could influence habitat potential for mountain lions in North Dakota and respective density estimates. In Montana, rugged topography in forested habitats supported the highest densities of lions, although the animals also could be found in areas with rugged topography and little forest cover. However, lions were sparsely populated in areas where topographic heterogeneity was low and there was little forest cover (Riley and Malecki 2001). The habitat suitability map should be tested for its ability to predict mountain lion presence, based on confirmed sightings and locations of harvested animals. Additional research conducted in this region (i.e., harvest derived information, snow-track surveys, camera-station surveys, etc.)

would provide data to test the habitat suitability map and enable the Department to have a better understanding of mountain lion distribution and abundance in the Badlands.

Although resident adult animals have not been documented outside of the Badlands, individual animals have traveled through other portions of the North Dakota. A small number of confirmed reports of lions have occurred outside of the Badlands and MR Breaklands, and sightings classified as probable/unverified exist throughout all regions of North Dakota (Figures 3 and 4). It is likely, that the majority, if not all of the animals sighted outside of the North Dakota Badlands are dispersing individuals. The habitat suitability map identified riparian habitat and small islands of high-quality habitat that while too small to support breeding populations (e.g., Pembina escarpment), may be important for these transient individuals by serving as travel habitat and temporary sites (Figure 6).

According to the habitat suitability map, the Turtle Mountains of North Dakota did not contain a sufficient amount of suitable habitat to qualify as an area that could support a breeding population of mountain lions. However, the mountains extend into Canada, and habitat was not mapped for the Canadian Turtle Mountains. Including Canada, the total area of the Turtle Mountains is approximately 1,680 km² (649 mi²), of which about 1,058 km² (408 mi²; 63%) is in North Dakota. More information is needed to determine if the Turtle Mountains of North Dakota and Canada can support a small number of lions. Since 2001, there have been two verified reports of lions in the Turtle Mountains.

MANAGEMENT IMPLICATIONS

The Department initiated an experimental, state-wide season on mountain lions in 2005, and future seasons for recreational hunting are a management option, provided the population

can sustain annual harvest mortality. However, lions in the Badlands are geographically isolated from breeding populations of lions in Montana and South Dakota due to the vast expanses of agricultural and grassland landscapes surrounding the region. For example, the nearest known breeding lion populations to the west of the Badlands occur in the Little Rocky and Wolf Mountains, of northeastern and southeastern Montana, approximately 346 km (215 mi) and 138 km (86 mi), respectively, from the North Dakota Border (Rauscher 2005; Montana Department of Fish, Wildlife & Parks 2005; see Appendix IV for regional map showing nearest breeding mountain lion populations to the North Dakota Badlands). The nearest population to the south, occurs in the Black Hills of South Dakota, about 159 km (99 mi) from the North Dakota border. This isolation, coupled with management prescriptions (e.g., recreational harvest, nuisance animal removal) carried out by state agencies on lion populations in Montana and South Dakota, likely have influenced, and will continue to influence dynamics of the Badlands lion population. Reduction in immigration to the Badlands from an increase in annual harvests of lions in Montana, and as of 2005, harvests in the Black Hills, South Dakota, could make the population in North Dakota more vulnerable to harvest mortality, especially the females; immigration likely already is hampered due to the tendency for females to return to, or remain near the area where they were born. Immigrant lions are important for maintaining genetically healthy subpopulations regionally, and for increasing numbers of animals in establishing populations (Logan and Sweanor 2001). Therefore, close monitoring will be necessary to assess impacts to the population from future recreational harvest. The habitat suitability map identified areas that could potentially serve as travel habitat and temporary sites for immigrant animals in North Dakota. Travel habitat and temporary sites outside of North Dakota will need to be identified to

understand population dynamics of the Badlands population and for long-term management of the species.

MANAGEMENT APPROACH FOR MOUNTAIN LIONS 2006-2007

During 2006-07 the Department plans to undertake the following activities:

- 1) Continue to record and verify reported sightings of mountain lions
- 2) Continue the deer hunter observation questionnaire and furbearer harvest survey
- 3) Test the habitat suitability map
- 4) Conduct field surveys (snow track and camera station surveys) to monitor the population
- 5) Coordinate with Tribal authorities and other state agencies on lion management issues
- 6) Continue with education efforts (via general audience presentations and brochure on lions), and
- 7) Conduct a second experimental mountain lion season in 2006-07 with the following parameters:

DATES: September 1, 2006 through March 11, 2007

LOCATION: State-wide

HOURS: One half hour before sunrise to one half hour after sunset

WEAPONS: Any legal weapon currently allowed for other furbearers

DOGS: The use of dogs will be allowed. No hunting or pursuing with dogs until after January 1, 2007. People hunting with dogs may not pursue or take a female mountain lion accompanied by kittens.

LEGAL ANIMAL: Any mountain lion other than kittens (lions with visible spots) or females accompanied by kittens.

TRAPS AND SNARES: Are not allowed. Any incidental take of a mountain lion in a trap or snare must be reported within 12 hours and the entire intact animal must be submitted to the Game and Fish Department for analysis.

WHO IS ELIGIBLE TO PARTICPATE: By state law only North Dakota residents are allowed to take furbearers other than fox or coyotes.

LICENSE REQUIREMENTS: A valid furbearer or combination license

LIMITS: One mountain lion per hunter per season

REPORTING REQUIREMENTS: Any mountain lion that is taken must be reported to the Game and Fish Department within 12 hours and the entire intact animal must be submitted to the Game and Fish Department for analysis. Legally taken animals will be returned to the hunter following analysis.

QUOTA: The taking of 5 mountain lions will be allowed. Once this quota is reached, the season will close. This quota includes mountain lions taken by USDA Wildlife Services, the Game and Fish Department, taken by private landowners in defense of livestock, road killed animals, incidental animals taking by traps or snares, and animals taken for human safety issues. This quota does not include mountain lions taken on Indian land within the exterior boundaries of a Reservation. **EXCEPTION:** mountain lions taken on the Fort Berthold Reservation will be included in the quota. In the event that none of the five lions are taken on Fort Berthold Reservation, one additional mountain lion may be taken on the Reservation once the quota has been reached and the statewide season closed.

NOTIFICATION OF SEASON CLOSURE: Once the quota of 5 mountain lions has been reached the season will be closed immediately. The Game and Fish Department will

inform the public through press releases, public service announcements, and media contacts.

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Table 2. Number of reported sightings of mountain lions in North Dakota
(2004 –2005) by month.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
2005	9	6	5	3	5	8	17	14	12	10	14	15	118
2004	4	1	4	1	4	4	3	8	11	13	12	4	69
Total	13	7	9	4	9	12	20	22	23	23	26	19	187

Table 3. Number of reported sightings of mountain lions in North Dakota (2004-2005)
by sighting classification. Numbers in parentheses are percentages.

Sighting Classification	2005	2004
Unfounded	30 (25)	13 (19)
Improbable Unverified	26 (22)	21 (30)
Probable Unverified	44 (37)	27 (39)
Verified	18 (15)	8 (12)
Total	118	69

Table 4. Number of verified reported sightings of mountain lions in North Dakota
(2001-2005) by type of sighting (sign or event).

Type of sighting (sign or event)	Type of evidence	Number Reports	Total
Field sign	Tracks of animal	14	
	Wildlife kills:		
	Bighorn sheep	5	
	Mule deer	1	20
Visual observation	Credible Witness	6	
	Video/photo	5	
	Confirmed with Tracks	4	
	Radio-collared animal	1	16
Human-caused mortalities	Illegally killed	2	
	Legally killed	1	3
Domestic animal depredation	Domestic sheep kill	1	1
Close encounter	Aggressive behavior	1	1
Total			41

Table 5. Number of unfounded reported sightings (n=22) of mountain lions in North Dakota (2004-2005) by type of mistaken identity.

Type of sighting (sign or event)	Mountain lion mistaken for:	Number Reports	
Field sign (tracks of animal)	Domestic dog	8	
Visual observation	Domestic dog	2	
	Coyote	2	
	Unknown animal	2	
	Domestic house cat	1	
Domestic animal attack (≥ 1 scratch marks on animal)			
	Horse	Barb wire	3
	Cow	Barb wire (n=1); unknown (n=1)	2
Video	Domestic house cat	2	
Total		22	

Table 6. Hunting Units in North Dakota in which hunters reported seeing a mountain lion while hunting deer opening weekend (November 4-5) of the 2005 deer gun season.

Hunting Unit	No. Respondents	No. lions seen	No. Hours hunted	Population Index No. reports / 1000 hours hunted
2E	49	1	578	1.73
2G	65	1	910	1.09
2I	58	1	763	1.31
3C	61	1	798	1.25
3A1	62	2	824	2.42
3A3	63	1	856	1.16
4C	51	1	750	1.33
4D	50	1	655	1.52
Total	459	9	6,134	1.46

Note: See Figure 5 for a map of hunting units in North Dakota.

Table 7. Regions in North Dakota that contained relatively large and contiguous areas (measured in km²) of moderate-high (Rank 3) and high- (Rank 4) quality habitat for mountain lions.

Region	Unsuitable Habitat	Rank 1 Habitat	Rank 2 Habitat	Rank 3 Habitat	Rank 4 Habitat	High-quality Habitat
North Dakota Badlands (6,322 km ²)	59	1,168	2,181	2,022	905	2,927
Northern MR Breaklands (4,318 km ²)	1,128	1,403	1,439	1,217	493	1,710
Turtle Mountains (1,058 km ²)	171	78	226	525	48	573
Pembina Gorge (708 km ²)	6	266	163	114	156	270
South of the Knife River (Mercer County)	19	1005	459	261	83	344

Table 8. Mountain lions harvested in North Dakota during the 2005-06 experimental mountain lion season.

Lion ID	Date Harvested	Sex	Age (Years)	Weight (lbs)	County Harvested
F1	11/16/05	Female	2.5-3.0	92	McKenzie
M2	11/17/05	Male	1.5-2.0	99	Dunn
M3	12/31/05	Male	4.0-5.0	140	McKenzie
M4	1/6/06	Male	2.0-2.5	111	Billings
F5	1/15/06	Female	4-6 months	39	McKenzie

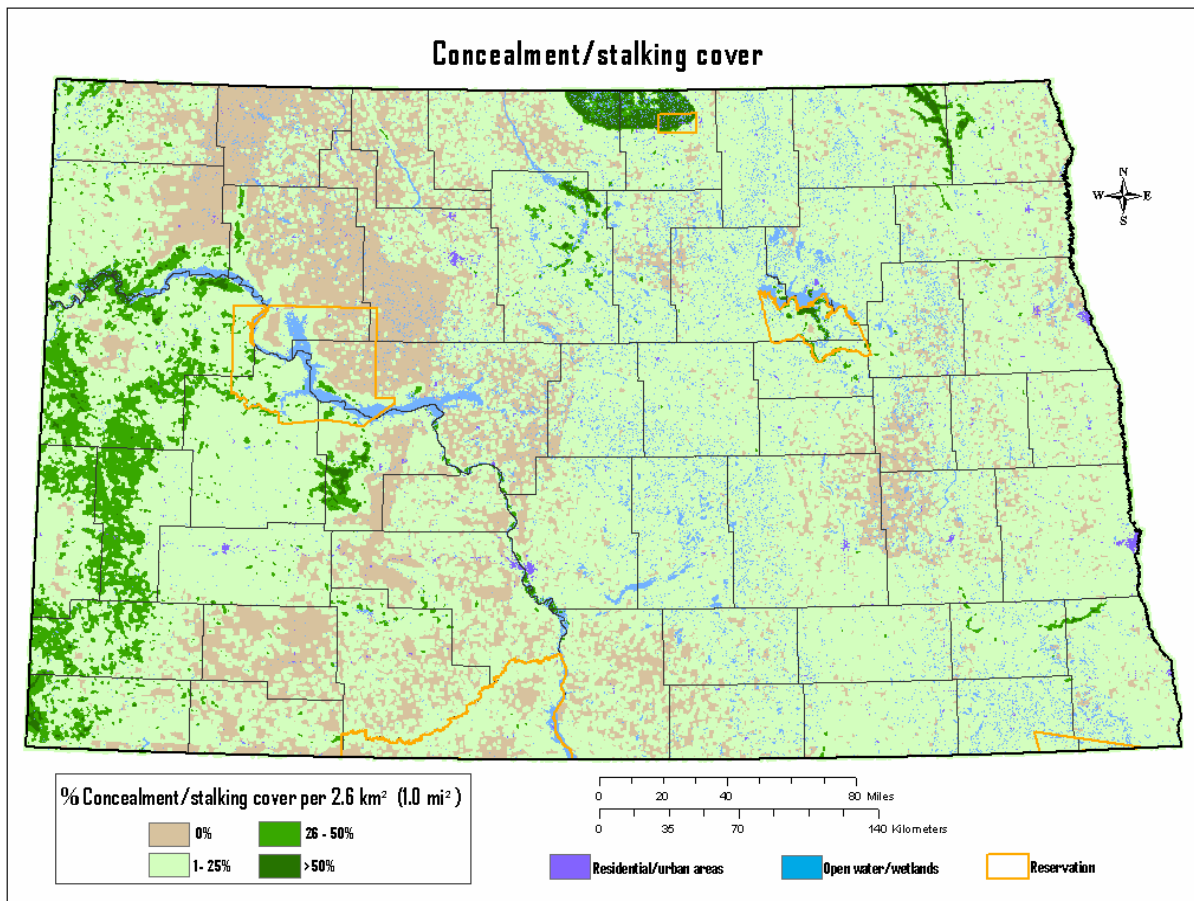
Table 9. Nutritional condition of five mountain lions harvested in North Dakota during the 2005-06 experimental mountain lion season.

Lion ID	Age (Years)	Weight (lbs)	Rank mesentery Fat	Rank Pericardial Fat	Rank Kidney Fat	% Kidney Fat	Prey consumed
F1	2.5-3.0	92	HIGH	MOD	HIGH	164.6	
M2	1.5-2.0	99	MOD	HIGH	MOD	108.6	Porcupine/Deer
M3	4.0-5.0	140	MOD	LOW	MOD	59.0	
M4	2.0-2.5	111	HIGH	MOD	HIGH	98.7	
F5	4-6 mo.	39	MOD	LOW	MOD	56.7	Porcupine

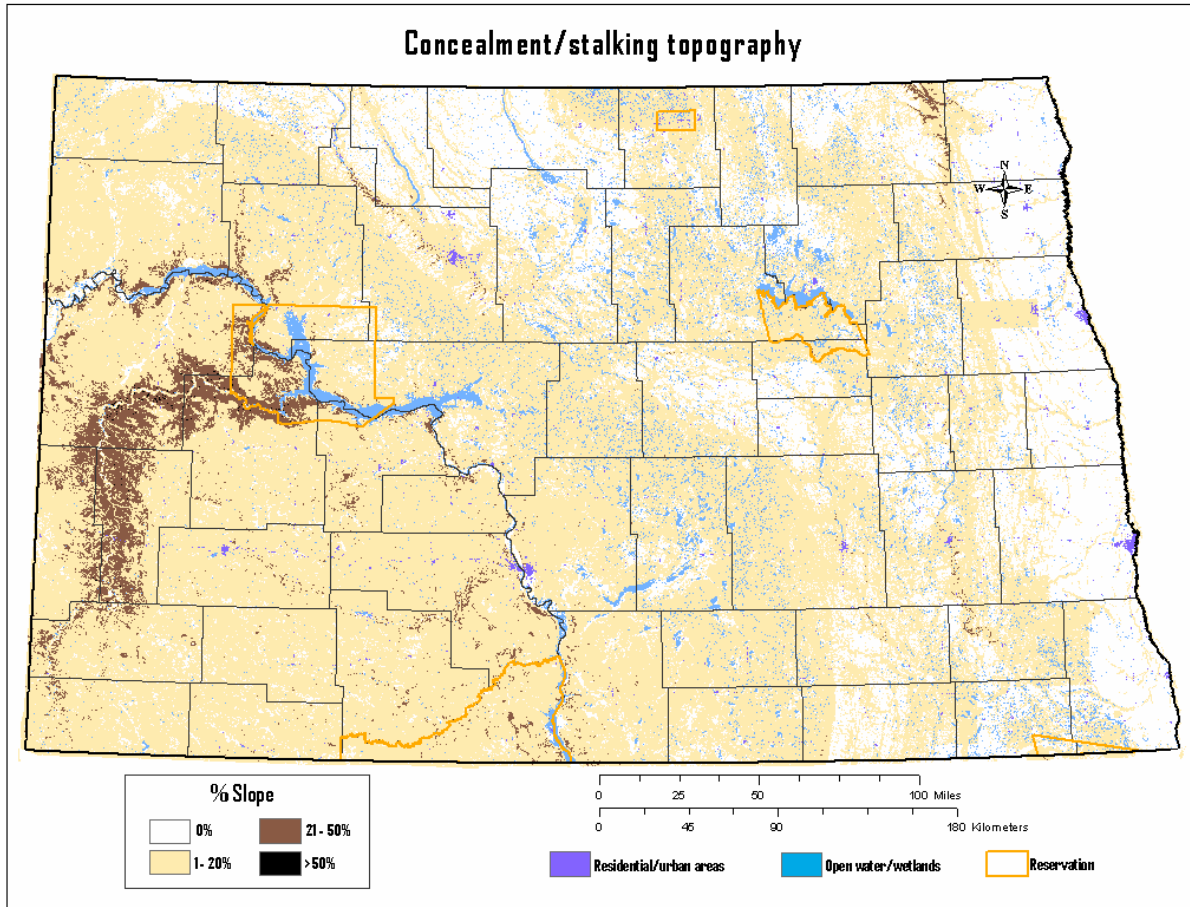
Note: Mesentery, Pericardial and Kidney fat were subjectively ranked as low, moderate (MOD) or high. Percent kidney fat was calculated based on the equation: perirenal fat weight + riney kidney fat weight / total kidney weight * 100. Prey consumed was based on cursory examination of intact carcasses (presence of porcupine quills on body or limbs) and gastro-intestinal tract.

Figure 1a-1c. Three components [concealment/stalking cover (trees and shrubs), concealment/stalking topography (slopes) and travel habitat (habitat near streams)] used to construct the habitat suitability map for mountain lions in North Dakota.

1a.



1b.



1c.

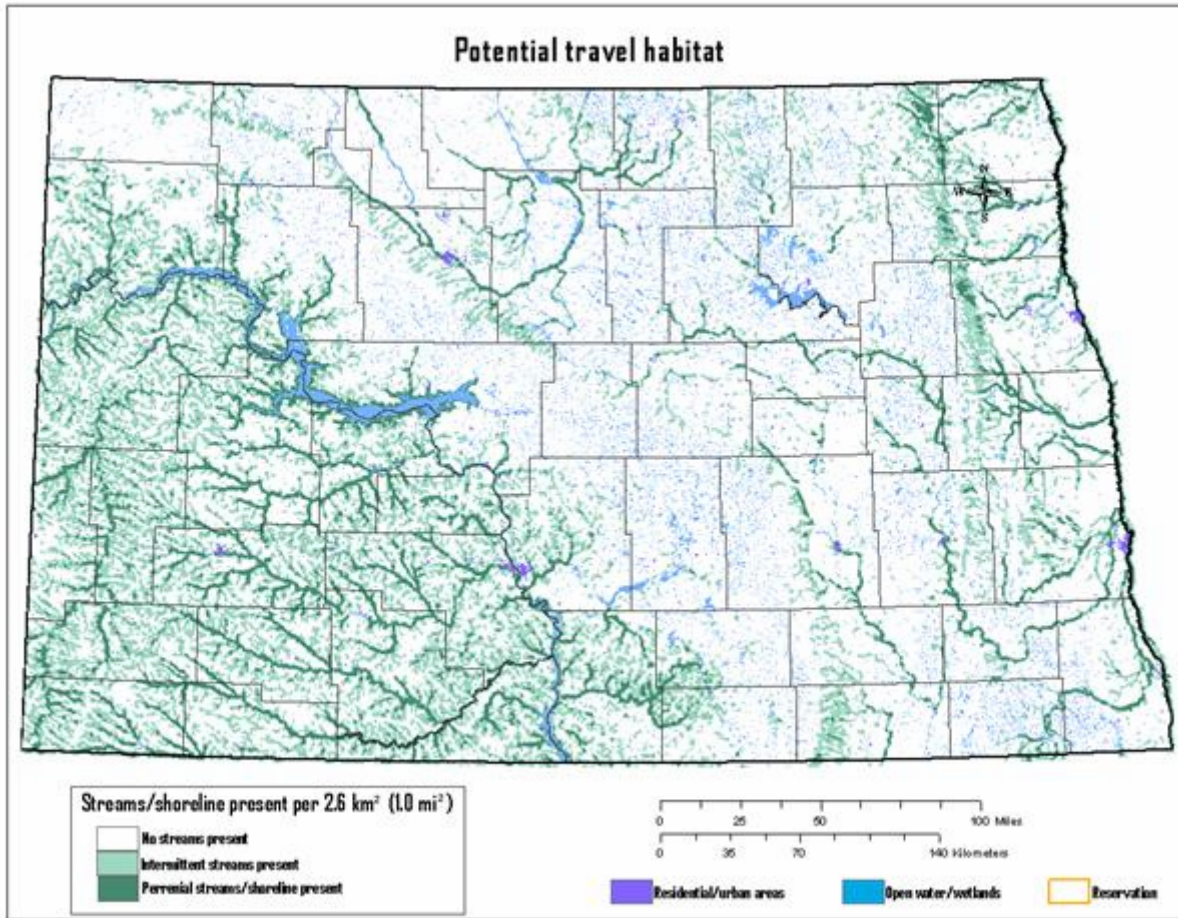


Figure 2. Verified reports of mountain lion locations in North Dakota, 2001-2005.

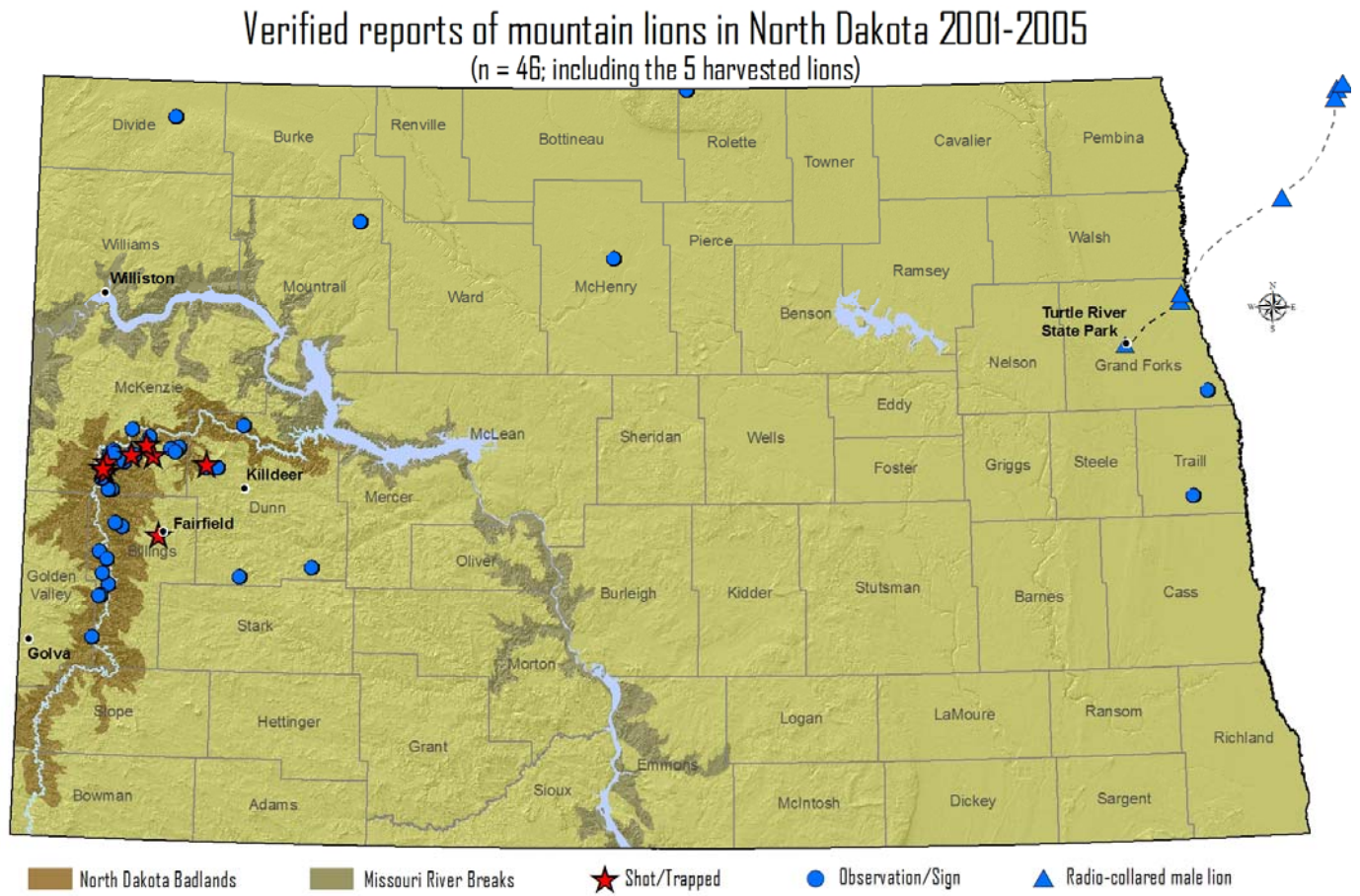


Figure 3. Counties in North Dakota with reported mountain lions sightings in 2004.

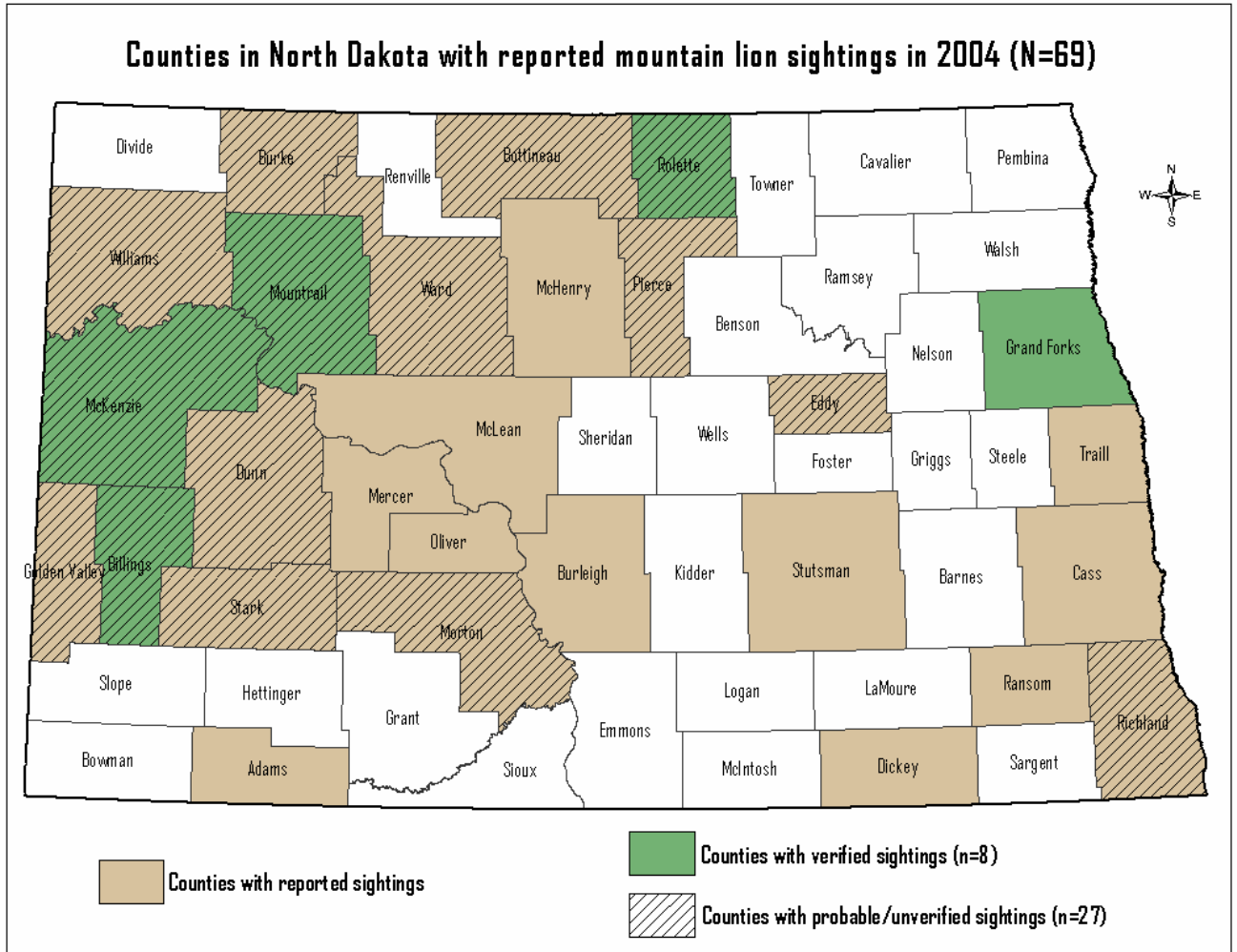


Figure 4. Counties in North Dakota with reported mountain lions sightings in 2005.

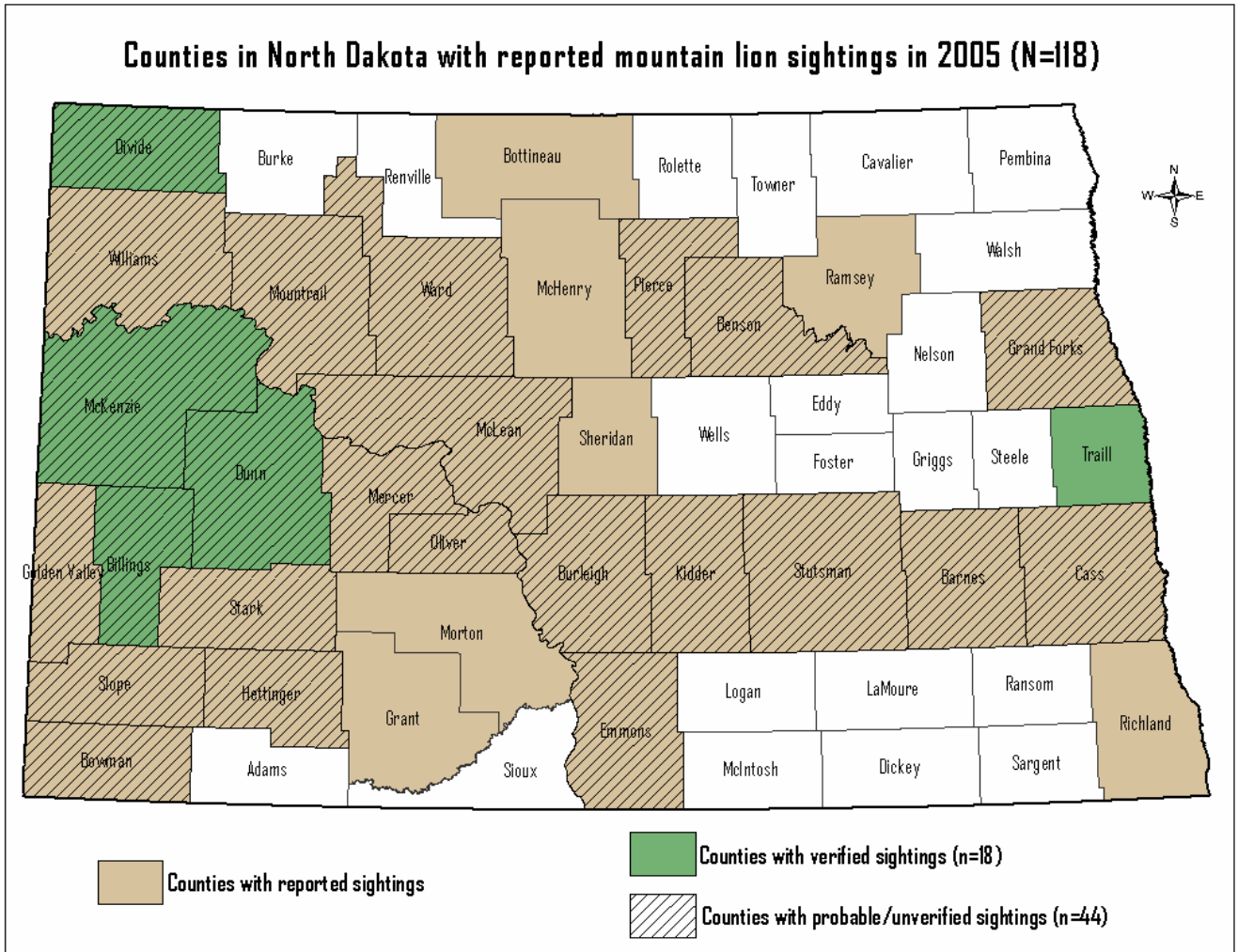


Figure 5. Hunting Units in North Dakota in which hunters reported seeing a mountain lion while hunting deer opening weekend (November 4-5) of 2005 the deer gun season.

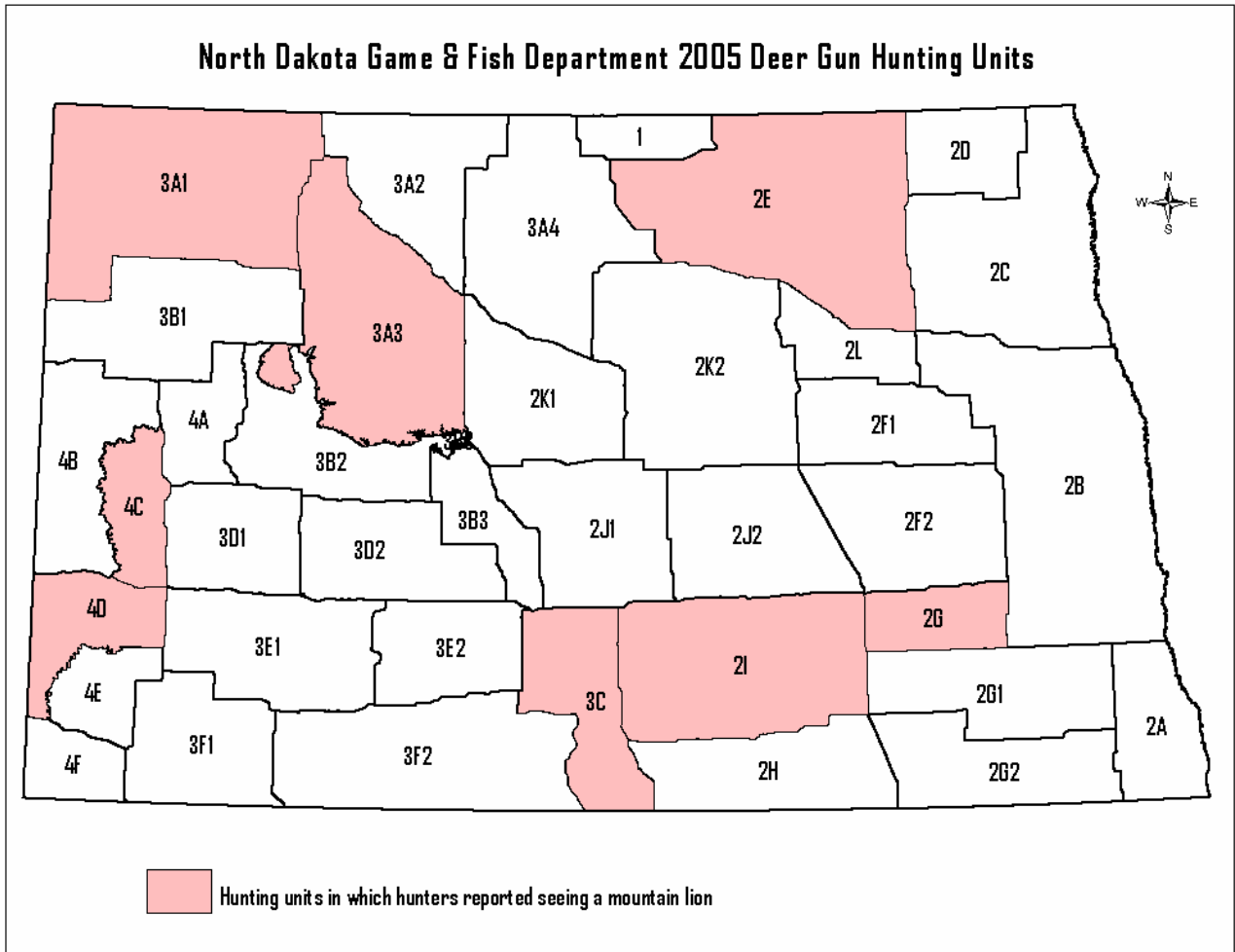


Figure 6. Habitat suitability map for mountain lions in North Dakota.

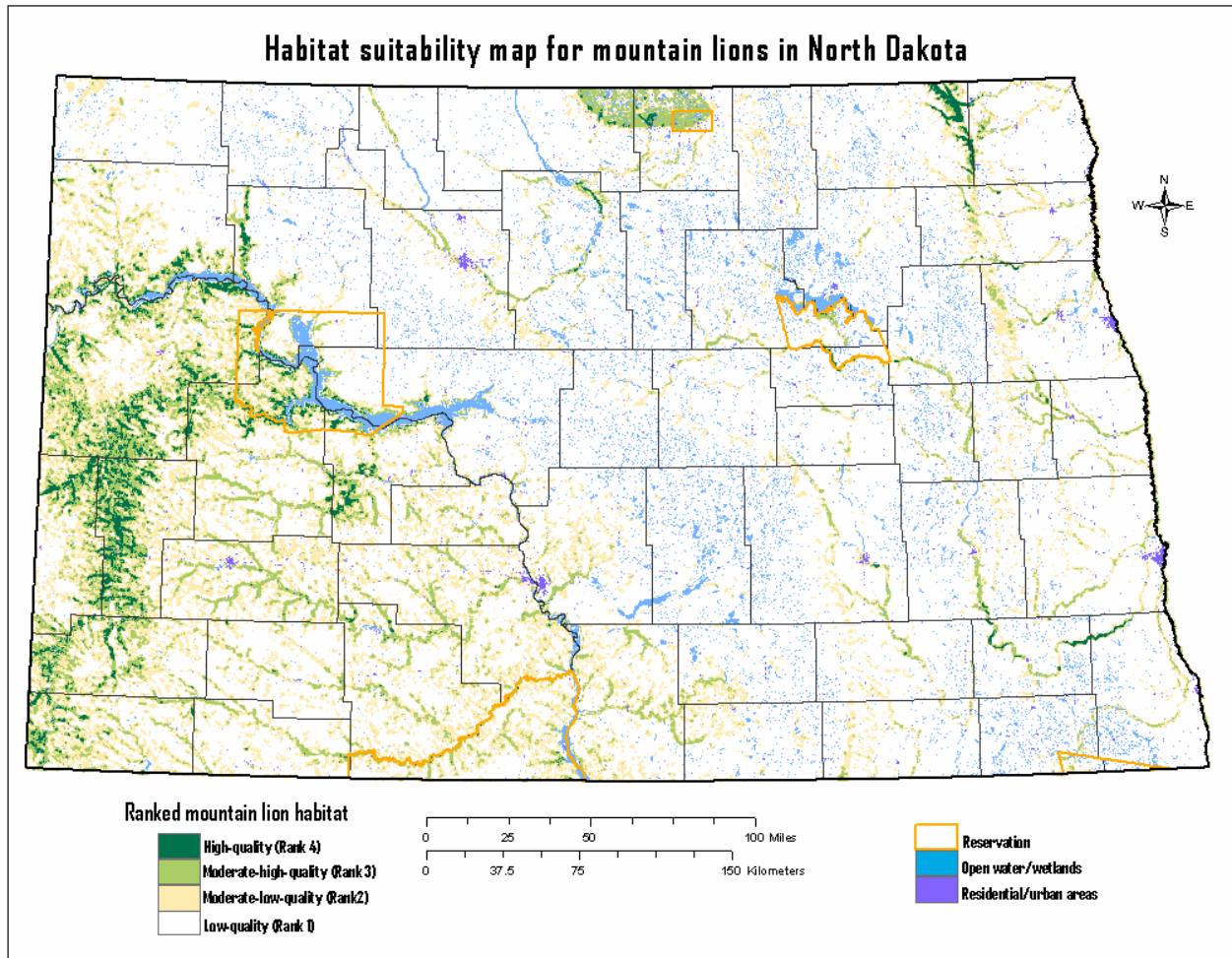


Figure 7. Ecoregions in North Dakota that can support a breeding population of mountain lions.

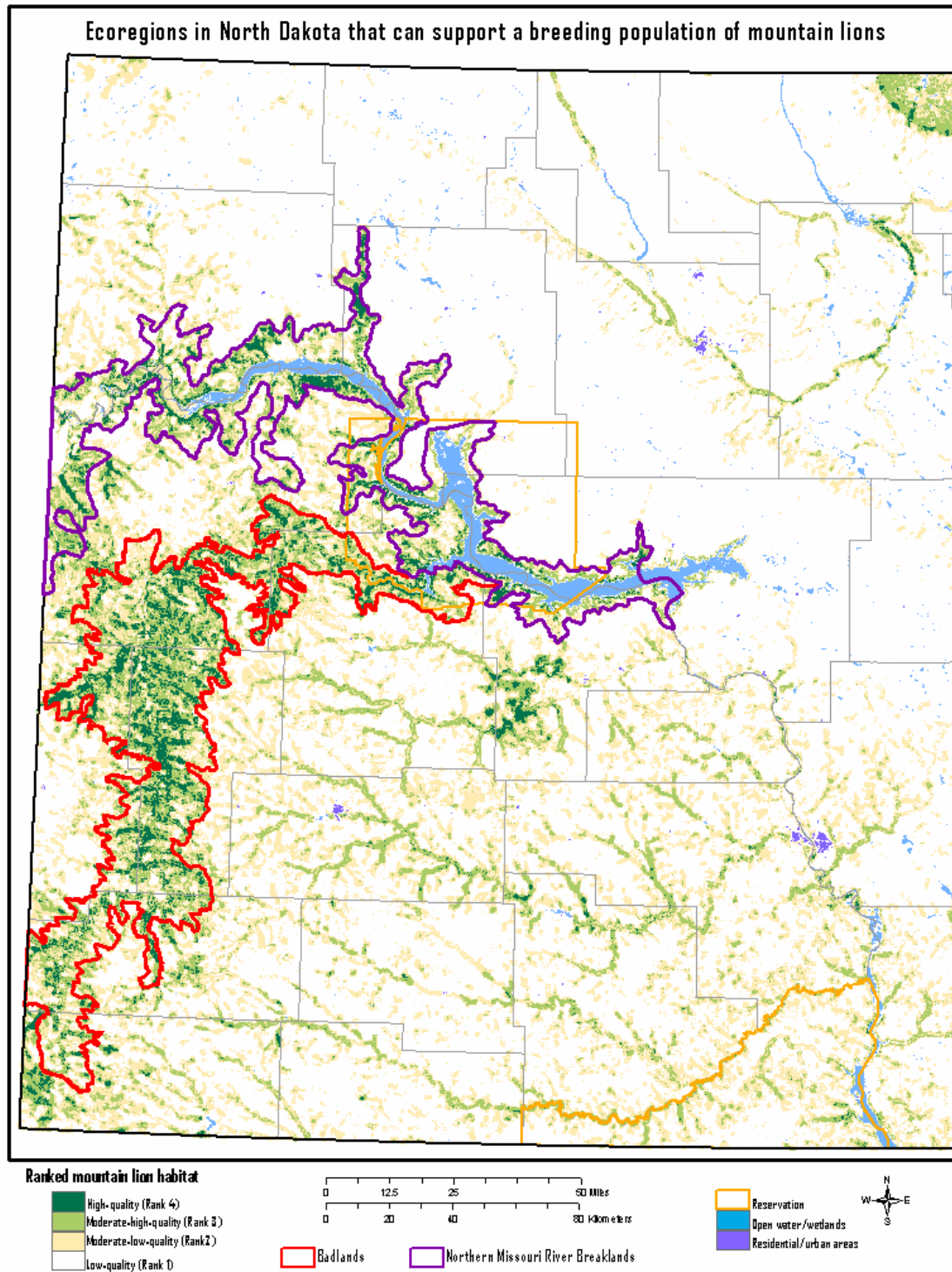
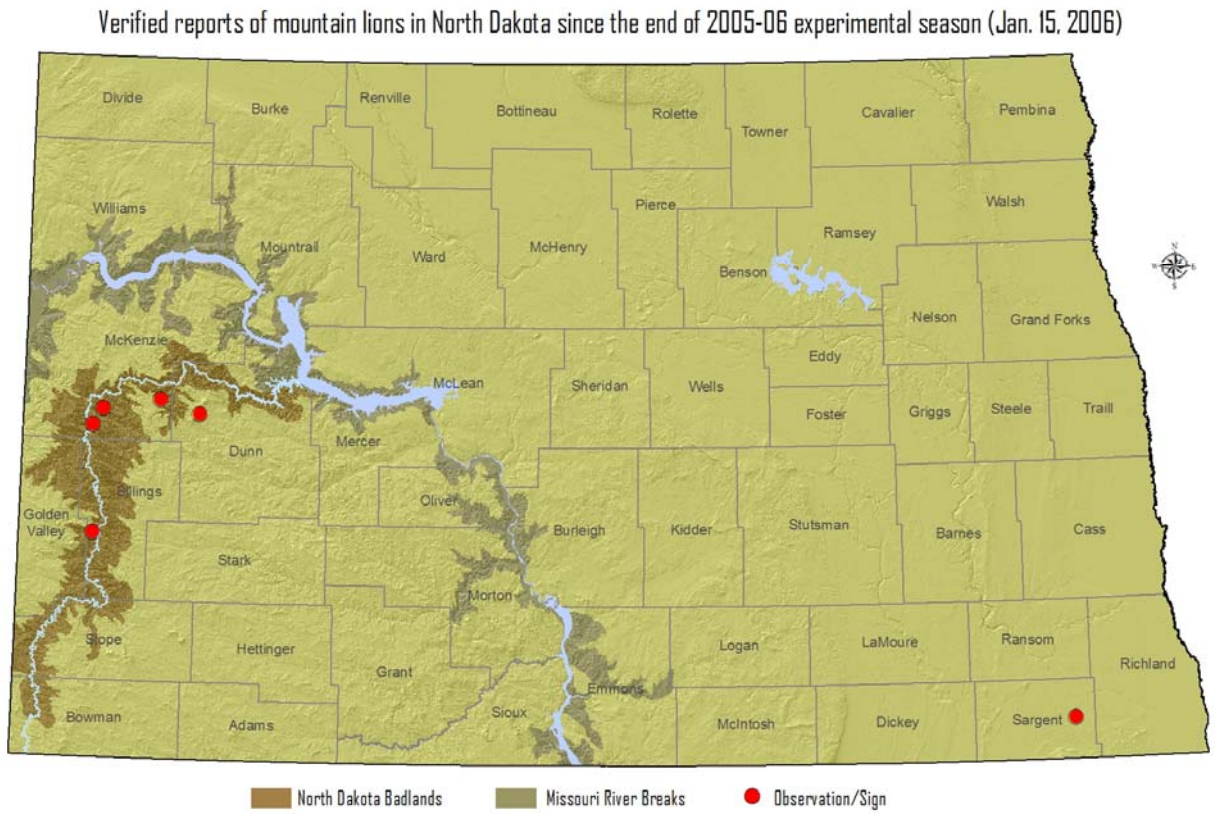


Figure 8. Verified reports of mountain lions in North Dakota since the end of the 2005-06 experimental season (Jan. 15, 2006).



APPENDIX I. Large carnivore report form.

North Dakota Game and Fish Department			
Large Carnivore Report			
SPECIES (circle one) Mountain Lion Wolf Black Bear Other _____			
Date of Incident	Time of Incident	County	
Name of Reporting Party	Address	General Location Description	
Phone			
Township	Range	Section	½ Section
Latitude	Longitude		
<input type="checkbox"/> City limits <input type="checkbox"/> Rural agriculture	<input type="checkbox"/> Rural subdivision <input type="checkbox"/> Unpopulated	Distance From Dwelling	
TYPE OF EVENT			
<input type="checkbox"/> Visual Observation (incl sign) <input type="checkbox"/> Close Encounter <input type="checkbox"/> Attack			
<input type="checkbox"/> Incident/Threatening Encounter <input type="checkbox"/> Other <input type="checkbox"/> Roadkill <input type="checkbox"/> Person <input type="checkbox"/> Livestock			
REPORTED BEHAVIOR OF ANIMAL			
<input type="checkbox"/> Sedentary <input type="checkbox"/> Walking <input type="checkbox"/> Running <input type="checkbox"/> Chasing/Stalking prey <input type="checkbox"/> Evasive <input type="checkbox"/> Aggressive/Defensive			
SIGN		Number Seen	
<input type="checkbox"/> None <input type="checkbox"/> Track <input type="checkbox"/> Scat <input type="checkbox"/> Hair <input type="checkbox"/> Scrape <input type="checkbox"/> Sound <input type="checkbox"/> Other		Adults _____ Young _____	
<input type="checkbox"/> Wildlife kill: Type _____		<input type="checkbox"/> Domestic kill: Type _____	
ACTION			
INITIAL RESPONSE		Date _____	
<input type="checkbox"/> Phone call only <input type="checkbox"/> Drop in discussion <input type="checkbox"/> Onsite investigation			
EVENT VERIFICATION STATUS		Date _____	
<input type="checkbox"/> Unfounded <input type="checkbox"/> Improbable unverified <input type="checkbox"/> Probable unverified			
<input type="checkbox"/> Verified By Whom _____		Title _____	
MISTAKEN IDENTIFICATION		Brochure Provided	
<input type="checkbox"/> Yes <input type="checkbox"/> No Mistaken species _____		<input type="checkbox"/> Yes <input type="checkbox"/> No Date _____	
GAME & FISH/WILDLIFE SERVICES FIELD RESPONSE			
<input type="checkbox"/> No action <input type="checkbox"/> Harassed <input type="checkbox"/> Hunted <input type="checkbox"/> Trapped			
<input type="checkbox"/> Dog pursuit harassment <input type="checkbox"/> successful <input type="checkbox"/> unsuccessful <input type="checkbox"/> successful <input type="checkbox"/> unsuccessful			
FIELD RESPONSE RESULTS		Disposition of carcass	
<input type="checkbox"/> No contact <input type="checkbox"/> Harassed <input type="checkbox"/> Relocated <input type="checkbox"/> Euthanized			
By Whom _____			
Date _____			
Name of person filling out report form: _____		agency: _____	
COMMENTS			

Promptly return completed forms to: North Dakota Game and Fish Dept.
100 North Bismarck Expressway
Bismarck, ND 58501

Appendix II. Guidelines for mountain lion/human/property interactions

GUIDELINES FOR MOUNTAIN LION/HUMAN/PROPERTY INTERACTIONS

**North Dakota Game and Fish Department
March 2006**

The North Dakota Game and Fish Department recognizes that sightings of mountain lions, sign, and even encounters with livestock and humans will likely occur in the future as in the past. The public is rightfully curious and outright concerned about mountain lions and their behavior. In order for us to responsibly respond to interactions with this species, the following guidelines have been established in order to minimize damage to private property, reduce the potential for public safety concerns, and to provide guidance to the Department on how to handle situations where mountain lions interact with people or property.

It is not our intent to eradicate mountain lions as a matter of policy. Mountain lions will be removed only when they are determined to be a substantial, unpreventable threat to property, public safety, bighorn sheep, or other species of high public interest. We have considered trapping and relocating problem lions, however, due to their large home ranges and limited amount of available public habitat, this option will not be used.

We will develop management strategies that emphasize problem prevention. We will promote responsible land-use planning in areas where wildlife conflicts are likely and encourage individuals to assume a share of responsibility for wildlife conflicts, particularly where their actions contribute to conflict potential. For instance, efforts will be made to discourage feeding of wildlife (e.g., deer which are mountain lions main prey) to limit expansion of mountain lion populations in or near areas of substantial human populations.

Legal definition and regulations according to ND Century Code 2005:

20.1-01-02. Definitions. In this title, unless the context otherwise requires:

14. "Fur-bearers" includes mink, muskrats, weasels, wolverines, otters, martens, fishers, kit or swift foxes, beavers, raccoons, badgers, wolves, coyotes, bobcats, lynx, mountain lions, black bears, and red or gray foxes.

20.1-07-03. Fur-bearing animals which are protected not to be taken or disturbed during closed seasons. No person may hunt, shoot, trap, or take, in this state, any fur-bearer, except during the open or lawful season thereon as established under section 20.1-07-04 or 20.1-08-02.

20.1-07-04. Depredating fur-bearing animals - Destruction and disposition. A landowner or tenant or that person's agent may catch or kill any wild fur-bearing animal that is committing depredations upon that person's poultry, domestic animals, or crops, except a landowner or tenant or that person's agent shall notify and obtain the approval of the director before catching or killing a black bear. A landowner or tenant or that

person's agent may not commercialize in, sell, or ship an animal or the pelt or any part of an animal caught or killed under this section if caught or killed during the closed season. A person catching or killing a black bear or mountain lion under this section shall report the capture or killing to the department within twenty-four hours and the entire animal must be turned over to the department.

20.1-08-02. Governor may vary statutory open and closed season by order or proclamation.

INTERACTIONS AND RESPONSE GUIDELINES

A. Types of Human/Mountain Lion Interactions

1. Sighting - a visual observation of a lion or one or more reports of lion tracks or other sign.
2. Recurring Sighting – repeated sightings of a lion in a particular area.
3. Encounter- an unexpected direct neutral meeting between a human, livestock, or pet and a lion without incident (includes recurring sightings of a lion in close proximity to homes, stables, or livestock).
4. Incident – a conflict between a human, property, or bighorn sheep and a lion that may have serious results (e.g., a lion that must be forced to back down).
5. Attack – when a human, livestock, or bighorn sheep is bodily injured or killed by contact with a mountain lion.

B. Game and Fish Department Response

(if additional assistance or support is needed with identification and verification, please call Wildlife Services personnel for assistance)

1. To sightings:
Field response is recommended in all areas to verify the presence of a mountain lion. Have reporting party accompany you if possible. Personal contact with reporter is encouraged in all situations. (NOTE: If sighting report is from an urban/suburban or heavy populated area, **immediate response is required**. If person receiving report cannot respond immediately, they shall contact their supervisor or an appropriate superior to insure immediate response.)
 - A. Provide brochure to reporting party.
 - B. Complete large carnivore observation/report form and forward to appropriate personnel (Furbearer Biologist).
 - C. Collect any evidence such as photos, plaster casts, scat or hair samples.
2. To Recurring Sightings:
Prompt field response is required especially in populated areas to verify the presence of a mountain lion in a particular area. Have reporting party accompany you if possible. Personal contact with reporting party is encouraged in all situations. Further recurring sightings may not require personal verification.
 - A. Provide brochure to reporting party.
 - B. Complete large carnivore observation/report form and forward to appropriate personnel (Furbearer Biologist).

- C. Collect any evidence such as photos, plaster casts, scat or hair samples.
 - D. Analyze the situation and provide recommendations on reducing the odds of future conflicts.
3. To Encounter:
Field response is required. Have reporting party accompany you if possible. Personal contact with reporting party is encouraged in all situations.
- A. Provide brochure to reporting party.
 - B. Complete large carnivore observation/report form and forward to appropriate personnel (Furbearer Biologist).
 - C. Collect any evidence such as photos, plaster casts, scat or hair samples.
 - D. Analyze the situation and provide recommendations on reducing the odds of future conflicts.
4. To Incident:
Immediate field response is required in all cases. Where a lion is a repeat offender or is judged to be a substantial threat to property or public safety, it may be killed by the landowner or tenant or that person's agent (C.C. 20.1-07-04). Additionally a lion may be dispatched by Department personnel or by Wildlife Services personnel upon approval by the Department Director or designee if a lion is judged to be a substantial threat to property, public safety, bighorn sheep or other species of high public interest. Game and Fish personnel and Wildlife Services personnel must **IMMEDIATELY OBTAIN PERMISSION** from one of the following: Director, Deputy Director, Wildlife Division Chief, or Assistant Wildlife Division Chief of the Game and Fish Department for authority to dispatch a mountain lion under these circumstances.
- Local game wardens should be notified as soon as possible. Communications Supervisor must also be notified.
- A. Provide brochure to reporting party.
 - B. Complete large carnivore observation/report form and forward to appropriate personnel (Furbearer Biologist).
 - C. Collect any evidence such as photos, plaster casts, scat or hair samples.
 - D. Analyze the situation and provide recommendations on reducing the odds of future conflicts.
 - E. If granted permission, arrange to destroy the lion.
 - F. Coordinate with Communications Supervisor to develop news release if necessary.
5. To Attack:
Immediate field response is required in all cases. The Department Director or designee must be notified if Department or Wildlife Services personnel pursue a lion for the purpose of destroying it due to an attack situation. Game and Fish personnel and Wildlife Services personnel do not need prior authority to dispatch a mountain lion in an attack situation, however, **IMMEDIATELY NOTIFY:** Director, Deputy Director, Wildlife Division Chief, or Assistant Wildlife Division Chief of the Game and Fish Department. Local game wardens and the Communications Supervisor also should be notified. Game

and Fish personnel or Wildlife Services personnel may use the aid of traps, firearms, hunters, and/or a private houndsman to destroy the attacking lion.

- A. Complete large carnivore observation/report form and forward to appropriate personnel (Furbearer Biologist).
- B. Analyze the situation and provide recommendations on reducing the odds of future conflicts.
- C. Coordinate with Communications Supervisor to develop news release if necessary.
- D. Carcass must be returned to the Game and Fish Department for necropsy.

C. Data Collection

The ability to identify mountain lion presence, movement, trends and behavior patterns provides important guidance for management decisions. A web-based database is being used for this purpose. Any Department employee who receives information regarding a human/mountain lion interaction is responsible for filling out a large carnivore observation/report form. Such forms will be forwarded to the Furbearer Biologist who will enter the information in the database.

Mountain lions destroyed as a result of having been involved in an incident or attack will be necropsied, biological and physical data collected and recorded, and findings will be distributed for educational and informational purposes.

D. Contact Information

North Dakota Game and Fish Department:

Terry Steinwand, Director, 701-328-6313
 Roger Rostvet, Deputy Director, 701-328-6345
 Randy Kreil, Chief, Wildlife Division, 701-328-6330; 701-220-5802
 Greg Link, Assistant Chief, Wildlife Division, 701-328-6331; cell 701-220-0966
 Bob Timian, Law Enforcement Division Chief, 701-328-6324; cell 701-290-0351
 Craig Bihrlle, Communications Supervisor, 701-328-6317
 Dorothy Fecske, Furbearer Biologist, 701-328-6302

USDA/APHIS/Wildlife Services:

Phil Mastrangelo, State Director, 701-250-4405; cell 701-400-0587
 John Paulson, District Supervisor, 701-250-4405; cell 701-471-2178

Potential Houndsmen:

Joe Carpenter, USDA/APHIS/WS, New England, 701-579-4933
 or cell 701-290-7843
 Marty Beard, Mandan, 701-224-0118

E. Other information:

A box trap designed for mountain lion live captures is located at the Dickinson Game and Fish office. 701-227-7431.

APPENDIX III. 2005 Deer Hunter Observation questionnaire and 2005-06 Furbearer Harvest Survey.



SPECIAL 2005 DEER HUNTER OBSERVATION QUESTIONNAIRE

North Dakota Game and Fish Department
Wildlife Division SFN 6459

You may also receive another questionnaire after the hunting season is over. Please fill out and return both questionnaires as soon as possible.



1. Did you actively hunt for deer the FIRST Saturday and/or Sunday of the season?..... YES NO (If NO, Please GO to Ques 8)
2. Which hunting unit did you spend most of your time hunting? (see enclosed map).....
3. Which type of tag were you primarily hunting to fill?..... Mule Deer White-tailed Deer
4. How many hours did you hunt on SATURDAY, Nov 5th (count a partial hour as a whole hour)..... Hours Saturday (5 Nov.)
5. How many hours did you hunt on SUNDAY, Nov 6th (count a partial hour as a whole hour)..... Hours Sunday (6 Nov.)
6. If you hunted, please complete the tables below:

White-tailed Deer

	Number of Does Seen	Number of Fawns Seen	Number of Bucks Seen	Total Number of Deer Seen
SAT Nov 5th	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
SUN Nov 6th	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

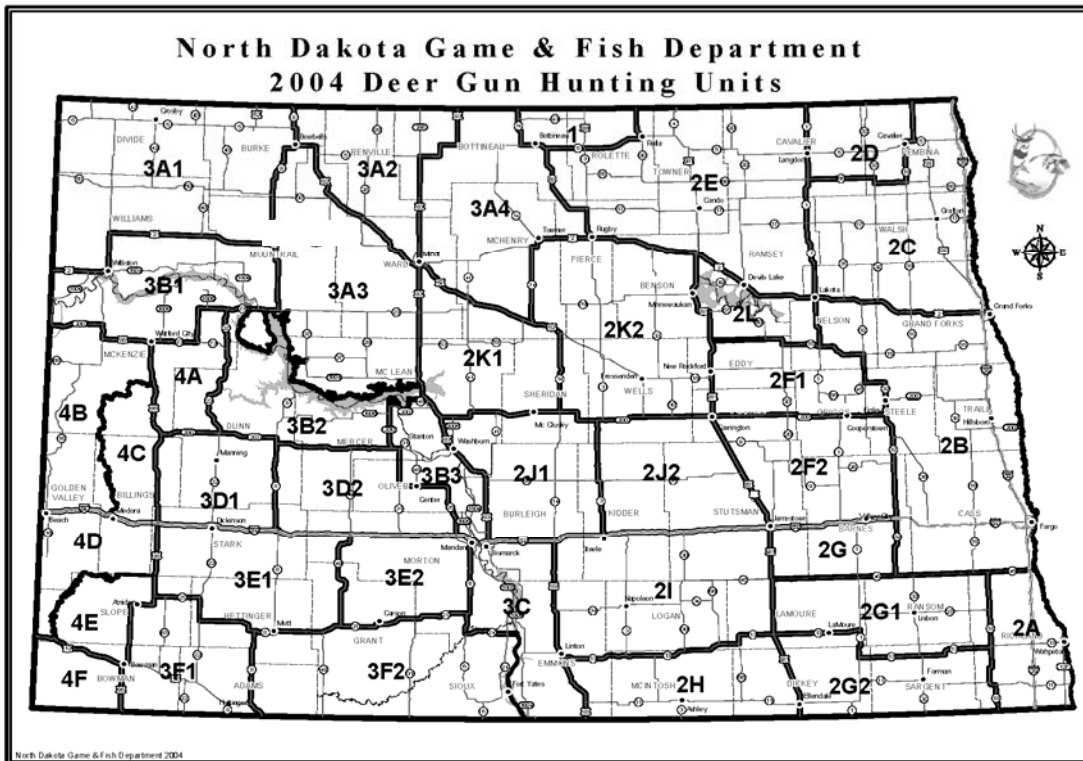
Mule Deer

	Number of Does Seen	Number of Fawns Seen	Number of Bucks Seen	Total Number of Deer Seen
SAT Nov 5th	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
SUN Nov 6th	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

7. While hunting, did you see a mountain lion? ... YES NO
8. What is your gender?..... Male Female
9. What is your age?..... Years Old (On Nov 5, 2005)

THANK YOU for taking the time to fill out this questionnaire! Your participation helps us manage North Dakota wildlife resources. Please return to the ND Game and Fish Department in the envelope provided. NDGF Survey Research, PO Box 2064, Bismarck, ND 58502-9932

Sort Code





2005-2006 FURBEARER HARVEST SURVEY
 North Dakota Game and Fish Department
 Wildlife Division
 SFN 6463 (3-2006)



PLEASE USE DARK INK

Shade Ovals Like This -- ● Not Like This -- ✕ ✓

Please answer each of the questions as completely and as accurately as you can. Give us your best estimate if you can't remember precisely. Information is compiled for summaries and averages and used for management purposes only. Please include information about your furbearer activities for the preceding twelve months.

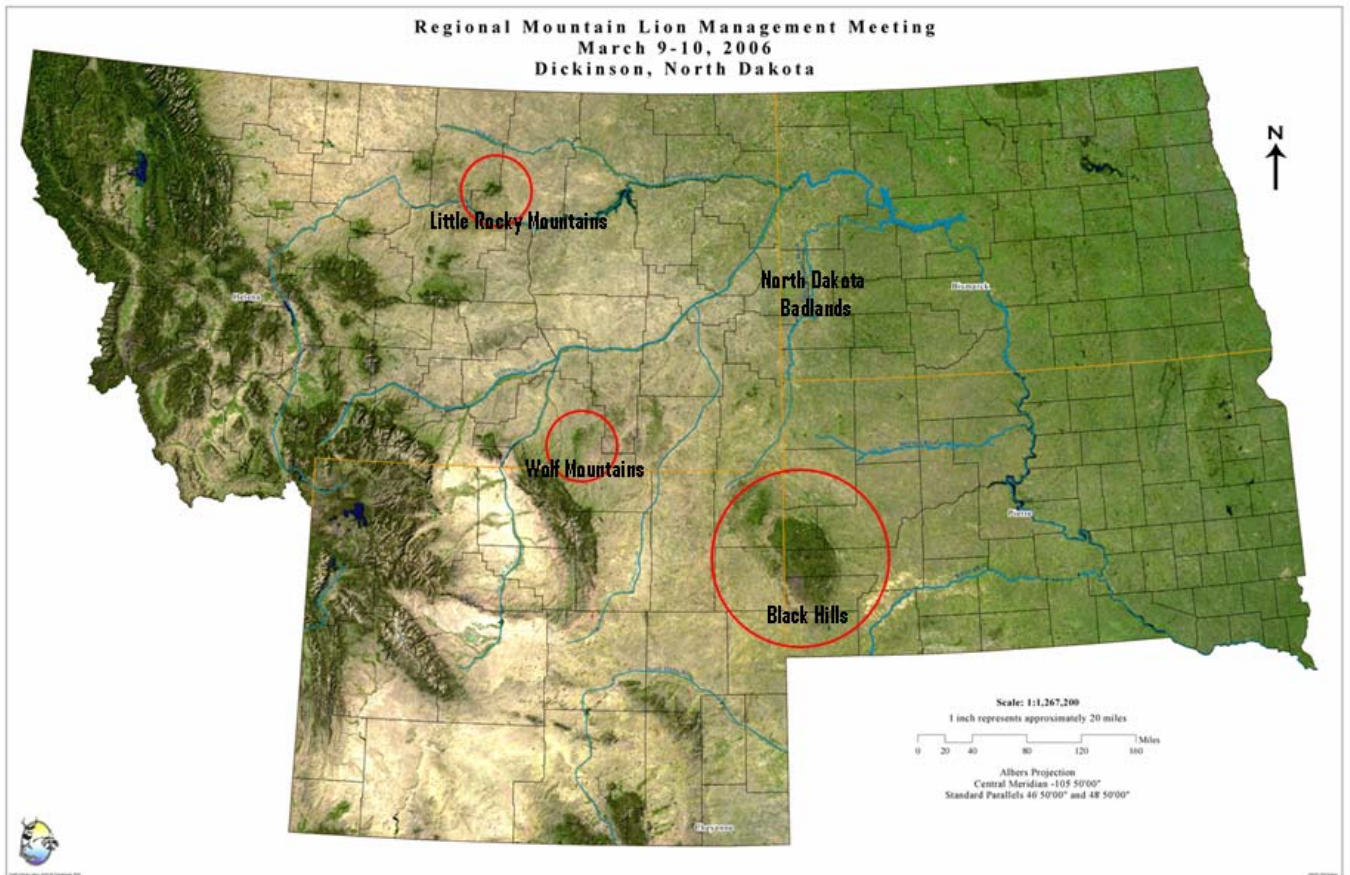
Did you purchase a North Dakota furbearer stamp or sportsman's license for the 2005-2006 season?

- Yes No-If no, please STOP here and return this questionnaire.

	HUNT	TRAP	SNARE	NUMBER OF DAYS			COUNTY OF MOST ACTIVITY *	NUMBER HARVESTED			NUMBER SOLD	NUMBER HARVESTED WITH MANGE
				HUNTED	TRAPPED	SNARED		HUNTED	TRAPPED	SNARED		
Fox	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Coyote	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Bobcat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Raccoon	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Badger	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Skunks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Beaver	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Weasel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Mink	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Muskrat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Mountain Lion	<input type="radio"/>			<input type="text"/>	<input type="text"/>		<input type="text"/>	<input type="text"/>	<input type="text"/>		<input type="text"/>	<input type="text"/>

* Refer to map on back for county code.

Appendix IV. Regional mountain lion management meeting, March 9-10, 2006, Dickinson, North Dakota.



○ Nearest breeding mountain lion populations to the North Dakota Badlands

REGIONAL MOUNTAIN LION MANAGEMENT MEETING

March 9 – 10, 2006
Dickinson, North Dakota



Meeting Place: **Holiday Inn Express Hotel and Suites**, Dickinson, North Dakota
For Reservations Call: 701-456-8000;
(A block of rooms has been reserved for the North Dakota Game and Fish Department for night of March 9, 2006. Reservations need to be made by March 5th to get the block room rate)

Agenda

Thursday March 9: 1:00 – 5:00 p.m.

1:00 – 1:10 p.m.

Arrival and Introductions

1:10 – 1:30 p.m.

Mountain lions in North Dakota

Dorothy Fecske, North Dakota Game and Fish Department

1:35 – 1:55 p.m.

South Dakota Lion Sighting Summaries

South Dakota Department of Game, Fish and Parks

2:00 – 2:20 p.m.

Dispersal Movements of Cougars from the Black Hills of South Dakota

Dan Thompson, Ph.D. candidate, South Dakota State University

2:25 – 2:45 p.m.

Black Hills Mountain lions: Are they at Carrying Capacity?

Dr. Jon Jenks, South Dakota State University

2:50 – 3:00

Break

3:00 – 3:20 p.m.

Cougar Genetics and Types of Information that can be Expected from Cougar DNA

Dr. Chuck Anderson, Wyoming Game and Fish Department

3:25 – 3:45 p.m.

Update on mountain lion research in Montana

Rich Desimone, Montana Fish Wildlife & Parks

3:50 – 4:10 p.m.

***SD Management Plan - still Evolving- part B - Policy/
Protocol on Dealing with 'Problem Lions'***

South Dakota Department of Game, Fish and Parks

4:15 – 4:35 p.m.

Incidental / Non-target Captures

South Dakota Department of Game, Fish and Parks

4:40 – 5:00 p.m.

Mountain Lions in Missouri

Dave Hamilton, Missouri Department of Conservation

Supper: A room has been reserved for us at 6:00 pm at
Ralphy's Restaurant (across the street)

Friday March 10: 8:00 – 12:00 p.m.

8:00 a.m. - 8:20 a.m.

***Wyoming Cougar Management - Data Collection and Synthesis Used
To Evaluate Cougar Management Objectives***

Dr. Chuck Anderson, Wyoming Game and Fish Department

8:25 a.m. – 8:45 a.m.

Recent harvest trends/statistics from the Wyoming Black Hills

Joe Sandrini, Wyoming Game and Fish Department

8:50 a.m. – 9:10 a.m.

SD 2005 Season Harvest

South Dakota Department of Game, Fish and Parks

9:15 a.m. – 9:35 a.m.

Strategies of the Opposition to Lion Hunting

South Dakota Department of Game, Fish and Parks

Break

9:40 – 10:00

10:00 a.m. – 12:00 a.m.

Group Discussion

Appendix V. Parameters of 2005-06 experimental mountain lion season.

DATES: September 2, 2005 through March 12, 2006

LOCATION: State-wide

HOURS: One half hour before sunrise to one half hour after sunset

WEAPONS: Any legal weapon currently allowed for other furbearers

DOGS: The use of dogs will be allowed

TRAPS AND SNARES: Are not allowed due to concerns over the taking of non-target species. Any incidental take of a mountain lion in a trap or snare must be reported within 12 hours and the entire intact animal must be submitted to the Game and Fish Department for analysis.

WHO IS ELIGIBLE TO PARTICPATE: By state law only North Dakota residents are allowed to take furbearers other than fox or coyotes.

LICENSE REQUIREMENTS: A valid furbearer or combination license

LIMITS: One mountain lion per hunter per season

REPORTING REQUIREMENTS: Any mountain lion that is taken must be reported to the Game and Fish Department within 12 hours and the entire intact animal must be submitted to the Game and Fish Department for analysis. Legally taken animals will be returned to the hunter following analysis.

QUOTA: The taking of 5 mountain lions will be allowed. Once this quota is reached, the season will close. This quota includes mountain lions taken by USDA Wildlife Services, the North Dakota Game and Fish Department, taken by private landowners in defense of livestock, road killed animals, incidental animals taking by traps or snares, and animals taken for human safety issues. This quota does not include mountain lions taken on Indian land within the exterior boundaries of a reservation. **EXCEPTION:** mountain lions taken on the Fort Berthold Reservation which will be included in the quota.

NOTIFICATION OF SEASON CLOSURE: Once the quota of 5 mountain lions has been reached the season will be closed immediately. The Game and Fish Department will inform the public through press releases, public service announcements, and media contacts.

APPENDIX VI. Data collection sheets for harvested mountain lions.

CURSORY EXAMINATION AND MORPHOLOGICAL MEASUREMENTS OF HARVESTED MOUNTAIN LIONS

Lion # _____
Date harvested _____ Time harvested _____
Harvest location: Township Range Section _____
General Description of area:

Hunter information:
Name: _____
Address: _____
Home phone: _____
Method of take: _____

Cursory Examination of Mountain Lion: [Presence of porcupine quills; old wounds from fighting (e.g., scratches on face, puncture wounds, etc.) or capturing prey (broken limbs, bruising, etc.); presence of ectoparasites]

Head/mouth/ears examined _____
Front limbs and feet _____
Rear limbs and feet _____
Body _____
Tail _____

PHOTOS TAKEN _____
ECTOPARASITES COLLECTED _____

Weight of animal: _____

Age of animal:
TEETH: Examine for canine ridge _____ measure canine ridge _____
Incisor wear _____

FUR Spotting present: underbelly _____ limbs _____ body _____
Barring present front limbs _____ intensity of color _____

Estimated age of animal _____

PHOTOS TAKEN _____

Reproduction:

Females: Examine nipple size and shape for evidence of lactation _____

Males: scrotal? _____

PHOTOS TAKEN _____

Morphological measurements of mountain lions.

Lion #	
Sex	
Date	
Age	
Weight	
Total length	
Body length	
Tail length	
Shoulder height	
Thoracic girth	
Head length	
Head width	
Right pinna	
Neck circumference	
Right hind foot heel width	
Right hind foot heel length	
Right forefoot heel width	
Righth forefoot heel length	

MOUNTAIN LION HARVEST NECROPSY DATA SHEET

Lion # _____
 Date harvested _____ Time harvested _____
 Harvest location: Township Range Section _____
 General Description of area:

Hunter information:
 Name: _____
 Address: _____
 Home phone: _____
 Method of take: _____

Necropsy Date _____
 Necropsy conducted by: _____

Sex _____
 Age _____
 Weight _____

Visual inspection of Mesentary fat:	LOW	MODERATE	HIGH
Inspect and collect reproductive tract	_____		
Visual inspection of Kidney fat	LOW	MODERATE	HIGH
Remove adrenal gland and kidney	_____		
Adrenal gland weight	_____g		
Perirenal (PR) fat weight	_____g		
Riney kidney (RK) fat weight	_____g		
Kidney (K) weight	_____g		

(PR fat weight + RK fat weight) / K weight * 100% = TOTAL KIDNEY FAT

_____ + _____ / _____ * 100% = _____

Collect stomach and intestinal tract _____

Visual inspection of pericardial fat	LOW	MODERATE	HIGH
Muscle sample taken for genetic analysis	_____		