Status of Mountain Lion Management in North Dakota 2007

North Dakota Game and Fish Department

October 2007

EXECUTIVE SUMMARY

This report summarizes information collected on mountain lions (*Puma concolor*) in North Dakota by the North Dakota Game and Fish Department (Department) for the period beginning 1 January 2006 and ending 31 July 2007. Lion sightings were recorded by Department personnel, and included reports by the general public, deer hunters, fur hunters and trappers, and Department, U.S.D.A Wildlife Services, Theodore Roosevelt National Park (TRNP) and Three Affiliated Tribe (TAT) employees. The Department proposed a second lion season in the Governor's 2006-2007 Small Game and Furbearer Hunting Proclamation, which was approved. Similar to the first season, an agreement was made with TAT to include lions taken from Fort Berthold Reservation (Reservation) in the five lion quota. A mandatory check-in of intact carcasses was required, and information from lions killed on the Reservation outside of the hunting season also was shared with the Department. Following the season, a snow track survey for lions in the North Dakota Badlands (Badlands) was conducted in cooperation with U.S.D.A. Wildlife Services and TRNP. Efforts to educate North Dakota residents about lions continued and Department biologists gave 52 presentations on lions to a variety of audiences. The Department also met with TRNP and South Dakota State University researchers to discuss potential cooperative research opportunities. Although no formal research project was initiated, on 26 November 2006, an incidentally trapped subadult male lion that was reported to the Department was released after fitting it with a radio-collar. This was the first lion radio-collared in the state by the Department. The animal has remained in the Badlands, traveling over an area of about 140 square miles.

In 2006, 218 reports of mountain lions were recorded by the Department and from 1 January through 31 July 2007, the Department received 103 reports. Of the 52 reports classified as "Verified", 41 (82%) were either non-threatening observations of the animal (n = 8) or its sign (n = 35). Other verified sightings included seven lions (n = 4 males, n = 3 females) that died from causes other than legal hunting mortality. Of these, two subadult lions were legally shot for protection of property purposes involving outdoor domestic pets, two kittens were illegally shot, three lions (2 kittens, one adult) were captured incidentally in cable devices and/or traps set for bobcats, and one subadult lion was found dead in Lake Sakakawea. Similar to the past few years, the distribution of verified lion sightings occurred predominantly in western North Dakota, in the Badlands and vicinity, and to a lesser extent in other regions of the state. However, the lion population appears to be expanding into portions of the northern Missouri River (MR) Breaks based on a greater number of verified sightings in the region.

Unlike the first experimental mountain lion season in 2005-2006, when all five lions were taken from the Badlands and vicinity, only one lion during the 2006-2007 season (illegally harvested female kitten) was taken from the region. The remaining four animals (2 males, 2 females) were harvested in prairie-dominated landscapes in Kidder, Bottineau, and Morton counties, and along the Missouri River in McLean County, respectively. The fact that two of the four animals taken outside of the Badlands were 3-4-year-old females was interesting because females typically are philopatric. Similar to the first season, harvested lions were in good physical condition and good to fair nutritional condition. The preliminary genetic relatedness results provided evidence that indicates multiple breeding aged female mountain lions have occurred in the Badlands for

at least the past decade, and verified sightings in 2007 indicate continued expansion of the species in North Dakota. Based on the age and sex composition of the animals taken in the Badlands, the lion population appears not to have been negatively impacted by the first two experimental seasons with the additional human-caused mortality. However, until more information is known about population size and distribution, the number, age, and sex of lions killed in the Badlands, including those outside of season dates, and especially adult females, should be closely monitored.

INTRODUCTION

In 2005, the North Dakota Game and Fish Department (Department) assessed the current status of mountain lions in North Dakota as directed by Section 2 of House Bill 1102, enacted by the 2005 legislature (North Dakota Game and Fish Department 2006). The Department reviewed reported sightings of lions from the recent past (2001-2005), surveyed hunters for sighting information, mapped suitable lion habitat throughout the state, and initiated an experimental season with a quota of five animals. Although most of North Dakota was unsuitable for lions, the habitat suitability map identified the North Dakota Badlands (Badlands) and associated Missouri River (MR) Breaks (about 2% of the state's land area) 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 lions either had recolonized or were in the process of recolonizing a portion of their former range in the Badlands. Based on an initial analysis of habitat quality, suitable habitat in the Badlands and MR Breaks could support an average of 45 to 74 resident adult animals under a management scenario with no harvest mortality; this was not an estimate of the current population size, but rather an estimate of habitat potential for the area. Plans for 2006 and 2007 included continuing to record and verify reported sightings of lions, surveying hunters for sighting information, testing the habitat suitability map, conducting field surveys to monitor the population, coordinating with the Three Affiliated Tribes (TAT) and other agencies on lion management issues, continuing with education efforts and conducting a second experimental harvest. This report summarizes information collected on mountain lions in North Dakota by the Department from 1 January 2006 through 31 July 2007.

METHODS

Reported sightings

Reported mountain lion sightings by the public were recorded on Large Carnivore Report Forms (Appendix I) by Department personnel and subsequently entered into a web-based database. In addition to containing locations (i.e., Township, Range, Section or Latitude/Longitude coordinate) and specific information on the nature of the sighting, attempts were made to verify reports by obtaining physical evidence (i.e., video of animal, photographs of lions or their tracks, scat, hair, scrapes, kill sites, etc.). After investigating reports (via phone conversation or on-site visit), sightings were classified according to their validity, as "Unfounded", "Improbable unverified", "Probable Unverified" or "Verified". Sightings were classified as "Verified" when there was physical evidence of the reported event or the reporting party was "vouched for" as a credible witness by Department personnel. Sightings were classified as "Probable unverified" when there was no physical evidence for the sighting but the description of the animal or the circumstance of the sighting was credible. Sightings were classified as "Improbable unverified", when there was no physical evidence for the sighting and the description of the animal or the circumstance of the sighting was suspect; in these instances, although there was a probability that the sighting was that of a mountain lion, the probability was considered low. Sightings were classified as "Unfounded" when, upon investigation, they were determined to be something other than a mountain lion. Sightings of lions or their sign documented during Department or other agency work (i.e., by Department Biologists monitoring radio-collared bighorn sheep, U.S.D.A. Wildlife Service Specialists investigating predator complaints or while conducting other work, or

field personnel conducting the lion snow track survey, etc.) also were recorded and added to the database.

Deer hunter observation questionnaire and furbearer harvest survey

Questions were added to the Department's 2006 Deer Hunter Observation Questionnaire and 2006-07 Furbearer Harvest Survey (Appendix II) to gain more information on the distribution of mountain lion sightings in North Dakota and provide baseline data for documenting state-wide population trends. Data collected on the Deer Hunter Observation Questionnaire 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 calculate a population index for each hunting unit using the number of lions seen per 1000 hours of observation. In 2006, a total of 5,228 surveys were sent to deer hunters immediately prior to opening weekend of deer gun season (11 and 12 November). A question on lions also was added to the 2006 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 sportsman's license for the 2006-07 season. On the annual survey, the 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.

Mountain lion season

The Department proposed a second mountain lion season for North Dakota in the Governor's 2006-2007 Small Game and Furbearer Hunting Proclamation, which was approved (Appendix III). The quota for the state-wide season was five animals and all

animals taken for any reason (e.g., lions taken by U.S.D.A. Wildlife Services, the Department, private landowners in defense of livestock, road-killed animals, incidental animals taken by traps or cable devices, and animals taken for human safety issues) counted toward the quota. Any lion other than kittens (lions with visible spots) or females accompanied by kittens could be taken during the season. Dates, locations (Township, Range and Section), and method of take were recorded for all animals harvested. 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 assess overall nutritional condition. Various body measurements were taken (Logan and Sweanor 2001), and distances between upper and lower canines were measured to build a database on bite distances for aiding in the identification of wild and domestic animal kills made by cougars in North Dakota. For females, teat 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 (Riney 1955) to the nearest gram and using the following equation: (PR fat weight + RK fat weight) / K weight * 100% =

Percent Kidney Fat. Stomach and intestinal tracts were collected to document food habits and examine internal parasites. For females, reproductive tracts were examined for evidence of breeding activity. Samples of muscle tissue were collected and sent to the U.S. Forest Service Rocky Mountain Research Station, Missoula, Montana for genetic-relatedness analyses of individuals, and to build a database as part of a cooperative research effort between the Department and researchers and biologists in adjacent states. Also, in cooperation with U.S.D.A. Wildlife Services, blood samples of lions were collected to test for disease (e.g., tularemia and sylvatic plague).

Snow track survey

After the 2006-2007 mountain lion season ended, a snow track survey for lions in the Badlands was conducted by the Department in cooperation with U.S.D.A. Wildlife Services and TRNP. The purpose of the survey was to document continued persistence of the species in the region, aid in documenting range expansion in the Badlands and potentially record locations of family groups. Seven routes, each about 60 miles (min, max = 58, 65) and primary roads traveling through the north and south units of TRNP were surveyed (Figure 1). Routes were distributed throughout the Badlands and each route traveled through a portion of what was considered high-quality lion habitat based on conversations with Department Biologists and Conservation Officers. During morning hours after a 2-4 inch snow fall, at dawn, or shortly after, survey routes were driven by one or two person teams at 15-20 m.p.h., and any lion tracks encountered on the route were recorded (See Appendix IV for survey instruction sheet and data forms). Attempts were made to repeat each route two times during distinct snow events.

PRELIMINARY RESULTS

Mountain lion sightings

A total of 218 reported mountain lion sightings was documented by the Department during 2006. Similar to previous years (2005 and 2004) sightings were reported all months of the year (Table 1). The greatest numbers of reported sightings occurred in October (n = 34) and November (n = 40). By sighting classification, 26 reports (12%) were verified as being a lion (Table 2, Figure 2, Appendix V). Of these, the majority (n = 15 or 54%) of sightings were documented by observations of tracks of the animal (Table 3). Approximately half (48%) of the reports were classified as either 'Improbable unverified' (n = 58) or 'Unfounded' (n = 53). The majority of reports classified as 'Unfounded' (54%) were due to either tracks or sightings of domestic dogs or other canines being mistaken for lions (Table 4). Eighty-six reports (39%) could not be ruled out as being legitimate sightings, but lacked the evidence for verification. These 'Probable unverified' sightings occurred in counties throughout North Dakota (Figure 3). However, Dunn, McKenzie, Ward and McHenry counties received a greater number of these reports compared to other counties.

From 1 January - 31 July 2007, of 103 reports of mountain lion sightings recorded by the Department, 26 were classified as "Verified" (Appendix VI, Table 5, Figure 4). These reports included observations of the animals tracks (n=16), visual observations (n=2), domestic animal (cow) killed by a lion (n=1), kills of radio-collared bighorn sheep (n=5), incidentally captured animals by bobcat trappers (n=3), and animals shot for protection of property purposes (n=1), found dead (n=1), or killed illegally (n=1).

Deer hunter observation questionnaire

A total of 1,575 usable Deer Hunter Observation Questionnaires were returned to the Department a return rate of 30.1%. Of these, 14 respondents (2.4%) from ten hunting units (2J1, 2J2, 2K1, 2K2, 3A1, 3A4, 3B1, 3E2, 4A and 4C; Figure 5) reported they saw a mountain lion while hunting during opening weekend of the deer gun season (Table 6). Units 4A had 2 reported sightings and the highest population index value (Value = 3.91), followed by Unit 3A1, with 2 sightings and a population index value of 3.31.

Mountain lion season

Five mountain lions (2 males, 3 females) were harvested during the 2006-07 state-wide season (Table 7; Figures 6 and 7), which began 2 September 2006 and ended 9 November 2006 when the quota was filled. The five animals were harvested from McKenzie, Bottineau, McLean, Kidder and Morton counties. The first animal, a 26 lb female (F7), was considered illegally harvested because it was a 4-5-month-old kitten. This animal was taken 16 September during the youth deer hunting season. The second and third lions were taken opportunistically by hunters while pursuing upland game birds (pheasants). The second lion, a 3-4-year-old, 104 lb female (F8), was killed 18 October, and the third lion, a 1.5-2.5-year-old, 107 lb male (M9) was taken 28 October. The fourth lion, a 3-year-old, 100 lb female (F10), was killed 6 November; F10 was first accidentally hit by a vehicle on County Road 31 at approximately 2100 hrs, was wounded, and subsequently was shot. The fifth lion, a 3-4-year-old, 110 lb male (M11), was killed 9 November. M11 was observed entering a culvert under County Road 45.5 in New Salem at approximately 0700 hrs, and was shot in the culvert.

Similar to the first season, 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 the body and intestinal tract and examination of organ fat reserves. Females F8 and F10 had not lactated, nor did either animal have placental scars, indicating a past litter.

Other mountain lion fatalities and incidental lion captures in traps/cable devices

Between 1 January 2006 and 31 July 2007, seven mountain lions (n = 4 males, n = 3 females) died from causes other than due to hunting mortality (Figures 6 and 7; Appendices V and VI). Two lions [66 lb., 1.5-2.5-year-old female (F6); 112 lb, 2.0-2.5-year-old male (M18)] were shot legally for protection of property purposes. Three animals were cable restrained/trapped incidentally by bobcat trappers; of these, one lion [48 lb., 4-5 month-old male (M14)] was found dead in a cable device and the other two animals [42 lb, 4-5-month-old male (M13); 80 lb, 10+year-old female (F15)] were euthanized due to trap/cable device related injuries that were believed to inhibit their ability to survive in the wild. The remaining two animals were taken on the Reservation and reported to the Department by TAT; one lion [46 lb, 6-8-month-old female (F17)] was shot illegally, and another lion [unknown weight, 1.5-2.5-year-old male (M16)] was found dead in Lake Sakakawea.

A 108 lb, 1.5-2.5-year-old, male mountain lion (M12), was caught in a foothold trap that had been set for bobcats in the Badlands. The animal was reported to the Department the evening of 25 November 2006. The following morning a Department capture crew chemically immobilized the lion and released it on site. Prior to its release,

it was fitted with a radio-collar. The lion was located weekly by fixed wing air craft (Figure 8). Since its capture date through 31 July 2007, the animal has remained in the Badlands, traveling over an area of about 140 square miles (n=40 locations; annual home range estimate was generated using Minimum Convex Polygon method).

Genetic analyses

A non-technical report describing results of preliminary genetic analyses of mountain lions in North Dakota was provided to the Department by researchers at the U.S.F.S. Rocky Mountain Research Station, Missoula, Montana (Schwartz and Pilgrim 2007). Tissue samples from 17 lions (Figures 8 and 9; Appendix VII) were analyzed at 13 variable microsatellite loci for genetic variation and relatedness; an additional six microsatellite loci for these samples will be examined prior to completion of analyses. Overall, given the genetic variability detected with the markers analyzed, the probability that two random individuals matched by chance alone was 1 in 2,029,221. Based on initial results, statements of potential relatedness (e.g., lion 'A' and lion 'B' were not likely related, were highly related, or could be related but more information was needed) were made in response to specific questions by the Department regarding relationships between individual lions. Additionally, initial analyses provided the sex of an unknown lion tissue sample collected by TRNP Biologists from the South Unit of TRNP. Relatedness statements were provided to the Department (Appendix VII).

Snow track survey

The mountain lion snow track survey was conducted two times during the winter of 2006-07. During the first survey effort on 13 February 2007, all seven routes (433.1 miles), including the two routes in North and South Units of TRNP (13.9 and 26.4 miles

respectively) were surveyed for lion tracks for a total of 473.4 miles traveled. Three sets of lion tracks (one from early that morning and two older sets) were documented in the South Unit of TRNP (Figure 9). Whether or not the tracks were from the same animal is not known; the three sets of tracks were within about four miles of each other. No lion tracks were detected on any of the seven routes even though snow conditions were favorable for detecting tracks of animals (anywhere from 2.5-5 inches), and many tracks were documented (deer, turkeys, porcupines, bobcats, coyotes, cottontails, etc.) by field personnel.

During the second survey effort, all routes with the exception of Routes 1 and 3 were surveyed on 1 March 2007, including the two routes in TRNP for a total of 349.9 miles traveled. No mountain lion tracks were recorded during the survey effort, however, blowing snow likely reduced visibility of tracks on a few of the routes (Routes 1, 2 and 3). For example, observers on Route 2 believed one snow track to be a lion track, based on the size of the animal and trail pattern, but because the observers were not 100% certain due to blowing snow that filled the tracks, this track was not considered a verified lion track.

Educational efforts and coordination with other agencies and researchers

To continue to educate residents of North Dakota about mountain lions (i.e., their natural history and ecology, physical description of the animal and its tracks, how to live and recreate in lion country, what to do if you see a lion, etc.) and update other wildlife professionals on the status of the species, Department Outreach Biologists and the Furbearer Biologist gave general audience presentations and information updates on lions to a variety of groups (Table 8). Department Biologists also provided interviews to major

newspapers in the state about lions, and updated residents on the lion season through press releases, public service announcements, and other media outlets. An educational brochure about lions in North Dakota was made available to the public at District Department Offices, TRNP and U.S.D.A Wildlife Service Headquarters, U.S. Fish and Wildlife Service Refuges, and to TAT. Additionally Department Wardens and U.S.D.A Wildlife Service Specialists provided brochures to people who reported sightings or potential lion depredations to livestock, and biologists provided brochures at various events (i.e., North Dakota State Fair, Becoming and Outdoor Woman Camp, high schools etc.).

In addition to communicating with the public about mountain lions, the Department met with other agencies and researchers to share information and discuss cooperative survey and research efforts. For example, the Department met with TAT to plan a snow track route on the Reservation in the MR Breaks during the winter of 2007-2008 to add to the survey routes in the Badlands and in TRNP. The Department continued to collect samples as part of a cooperative effort with U.S.D.A. Wildlife Services to monitor carnivore diseases (sylvatic plague and tularemia). Additionally, meetings were held with TRNP and the Principal Investigator (PI) of the South Dakota mountain lion research project, to discuss cooperative research possibilities, including sharing data on lions collected by TRNP, listening during routine telemetry flights for radio-collar signals of missing South Dakota collared study animals, and sharing results of genetic analyses. The Department continues to evaluate the possibility for more research.

Discussion

Although the Department received a greater number of reports of mountain lion sightings in 2006 than previous years, the spatial and descriptive characterization of the sightings were similar to past years (North Dakota Game and Fish Department 2006). The distribution of verified lion sightings during this report period occurred predominantly in western North Dakota, in the Badlands and vicinity, and to a lesser extent in other regions of the state. Also, the majority of reported sightings in 2006 occurred during months associated with hunting activity (October and November), when a greater number of people were traveling to, and hiking in, remote country throughout the state, increasing the probability of seeing a mountain lion. Furthermore, 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 50 sighting reports that were verified, 41 (82%) were non-threatening observations of either the animal or its sign (tracks or kill sites), further supporting the fact that lions are secretive, primarily nocturnal animals that typically avoid people. Other circumstances of verified sightings included lions being killed legally for protection of property (n=2 domestic outdoor pet situations), killed illegally (n=2; both were kittens), captured incidentally in bobcat cable devices/traps (n=3), or found dead in a lake (n=1).

Based on verified mountain lion sightings, the species appears to be expanding its range in North Dakota into the northern MR Breaks region. The MR Breaks is interconnected with the Badlands and historically was part of the species range in North Dakota (Bailey 1926). According to a habitat suitability map (North Dakota Game and Fish Department 2006), the Northern MR Breaks also contained a sufficient amount of

suitable habitat to sustain a small number of lions, although habitat potential for lions was lower due to reduced habitat quality (North Dakota Game and Fish Department 2006). From 2001 through 2005, only one verified lion sighting in the MR Breaks region was recorded by the Department (North Dakota Game and Fish Department 2006), whereas, in 2006 through July of this year, the Department had already documented four verified lion sightings in this region. Additionally, a female lion kitten was shot illegally on the Reservation, about 5.5 miles southwest of Mandaree. Although, technically, this kitten was shot in the Badlands, its position documented at that time the northern and eastern-most location of a family group in the Badlands which was located only about 4.0 miles south and 7.0 miles west of MR Breaks. Furthermore, this past year, the TAT received a greater number of reports of mountain lion sightings on the Reservation in the MR Breaks, in Four Bears, Mandaree and New Town areas (F. Poitra, TAT Personal Communication).

Unlike the first experimental mountain lion season in 2005-2006, when all five lions were taken from the Badlands and vicinity (Killdeer Mountains and near Fairfield, North Dakota; Figures 6 and 7), only one lion during the 2006-2007 season (female kitten F7) was harvested from the region. The remaining four animals were harvested in prairie dominated landscapes (n=3; F8, F10 and M11) or along the Missouri River (n=1; M9). Especially interesting, was the fact that two of the four animals taken outside of the Badlands were 3-4 year-old females. To date, there are no reports of a breeding population of lions in large grasslands or agricultural landscapes (Cougar Management Guidelines Working Group 2005) and breeding females have not been documented in these landscapes in North Dakota. Female lions tend to be philopatric, but they are

capable of dispersing long distances. Although, F8 and F10 physiologically were able to have young, upon examination, neither had ever lactated, nor did either have placental scars in their reproductive tracts indicating past litters. Whether or not F8 and F10 had established or would have established home ranges on these prairie-dominated landscapes and reproduced is not known.

The genetic results provided evidence to support the idea that multiple breeding-aged female mountain lions likely occurred in the North Dakota Badlands for at least the past decade. First, FA and FB were two subadult female lions that were killed in the Badlands on 5 September and 27 December 2004, respectively. Due to their close ages and proximity at the time of their deaths (approximately 3.5 mi straight line distance), it was believed the animals could be siblings. However, because they were not related, the mothers of FA and FB could have occurred in the Badlands from around the time the two females were born in 2003 to at least their age of independence, and perhaps longer. Additionally, FA and FB were not related to F15, the 10+ year-old female alive in the Badlands, indicating three breeding age females in the region at that time. [Note: It is possible FA and FB immigrated independently to the Badlands in 2004]. Second, F15 was old enough to be the mother of all mountain lions analyzed. She likely was a resident or immigrant to the Badlands around 1997, or possibly earlier. The fact that only three (M14, M3 and F5) of 16 animals analyzed could have been the direct offspring of this female, is further evidence to indicate other breeding-age females may have occurred in the Badlands during the lifetime of F15. Although mountain lion reports in the Badlands were sporadic from the late 1950s to the early 2000s, during the late 1990s, the

Department documented two verified reports of lions in the region, and from 2001-2003 eight verified reports were documented (McKenna et al. 2004).

The genetic results provided evidence that two females occurred in the Badlands in January 2007, supplementing data from verified sighting reports that indicated species persistence in the Badlands subsequent to the 2006-2007 season. F15 likely was the mother of kitten M14, but not kitten M15. Both of these similar-aged kittens died from trap/cable device related injuries in January 2007 at locations approximately 10 miles apart (straight line distance). M14 was a healthy male kitten that would not have been able to survive without maternal care. Therefore, a breeding-age female likely was alive in the Northern Badlands until at least around the time of M14's death. Also the blood and urine sample collected from a snow during the snow-track survey on 13 February was determined to be from a female lion based on analysis of DNA. So, as of at least February 2007, a subadult or adult (based on the size of the tracks left in snow) female lion was alive in the Central Badlands in TRNP.

The deaths of three of four mountain lions incidentally captured in cable devices and/or traps set for bobcats revealed a factor affecting survival of individual lions in this population. The 2006-2007 bobcat season yielded a record high number (n=139) of animals taken for the state, probably due to relatively high pelt prices received for these animals. Four lions (M12, M13, M14, and F15) were incidentally captured during the 2006-2007 bobcat season; M12, the radio-collared study animal, was released unharmed, whereas M13, M14 and F15 were euthanized due cable device/trap-related injuries. As mentioned above, kitten M14 was considered to be highly related to F15 and likely was from her most recent litter. Based on examination of the reproductive tract of F15, she

had four kittens in her last litter. Therefore, any kittens alive at the time of her death (survival rate of lion kittens is 0.66; Logan and Sweanor 2001) would be too young to survive on their own.

Management Implications

Information collected by Department suggests that lions were present and breeding in the Badlands at least in the past decade, and possibly earlier based on occasional verified reports prior to 1997. However, it is difficult to assess impacts of annual harvests and additional human-caused mortality on the population without knowing the level of re-establishment prior to the first experimental season in 2005. An estimate of population potential for the Badlands, the Northern MR Breaks ranged from an average of 45 ± 18 to 74 ± 27 resident adult animals under a management scenario with no harvest mortality (North Dakota Game and Fish Department 2006). Thus, at a minimum, the region could support an average of 27, and at a maximum, 101 resident adult lions assuming no harvest or management. Where the current population lies with respect to these estimates is not known. Anderson and Lindzey (2005) suggested that the effect of harvests on populations would differ depending on the age and sex composition of lions removed; in established populations, males would easily be replaced by immigrant males and harvested subadult females would be replaced mostly by female young of the year. However, the breeding-aged females would be difficult to replace on an annual basis, and it is the breeding females that provide the resiliency in a lion population. They further noted that an annual harvest composed of 10-15% of adult females appeared sustainable for a population of mountain lions in Wyoming, but cautioned that more isolated populations may respond differently to similar harvest rates. Thirteen lions (n = 6 males,

n = 7 females) have been taken from the Badlands since 2004. Of the females, only one animal (F15) was considered to be a breeding age female; ages of the other six females ranged from 4.0-5.0 months to 2.5-3.0 years. Based on the age and sex composition of the animals taken in the Badlands, the lion population appears not to have been negatively impacted by the past two experimental seasons, with the additional human-caused mortality. However, until more information is known about population size and distribution, the number, age, and sex of lions killed in the Badlands, including those outside of season dates, and especially adult females, should be closely monitored.

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Table 1. Number of reported mountain lion sightings 2004 – 2006 (including all sighting classifications: "Unfounded", "Improbable unverified", "Probable unverified" and "Verified") in North Dakota by month.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
2006	6	8	7	12	18	23	22	19	18	34	40	11	218
2005	9	6	5	3	5	8	17	14	12	12	14	15	118
2004	4	1	4	1	4	4	3	8	11	11	12	4	69
Total	19	15	16	16	27	35	42	41	41	57	66	30	405

Table 2. Number of reported sightings of mountain lions by sighting classification 2004 – 2006 (percentages are in parentheses).

Sighting Classification	2006	2005	2004
Unfounded	53 (24)	30 (25)	13 (19)
Improbable Unverified	53 (24)	26 (22)	21 (30)
Probable Unverified	86 (39)	44 (37)	27 (39)
Verified	26 (12)	18 (15)	8 (12)
Total	218	118	69

Table 3. Number of verified reports of mountain lions in North Dakota (2006) by type of sighting. Note: Reported sightings of mountain lions include locations of radio-collared bighorn sheep that were being monitored by the Department and subsequently were preyed on by mountain lions.

Type of sighting (sign or event)	Type of evidence	Number Reports
Field sign	Tracks of animal	15
	Wildlife kills:	
	Bighorn sheep	3
	White-tailed deer	1
	Subtotal	19
Visual observation	Credible Witness	2
	Video/photo	1
	Confirmed with Tracks	1
	Confirmed with deer kill	1
	Subtotal	5
Human-caused mortalities	Illegally killed	1
	Legally killed	1
	Subtotal	2
Total		26

Table 4. Number of 'Unfounded' reported sightings (n=53) of mountain lions in North Dakota (2006) classified by type of mistaken identity.

Type of sighting (sign or event)	Mountain lion mistaken for:	Number Reports
Field sign (tracks of animal)	Domestic dog/canine	18
Visual observation	Domestic dog/canine	5
	Coyote	3
	Fox	2
	Unknown animal	5
	Domestic house cat	5
	Deer	1
Domestic animal: non-lethal attack		
Horse	Barb wire/fence	3
Horse	Unknown	2
Sheep	Domestic dog/ large canine	2
Cow	Unknown	1
Domestic animal: lethal attack		
Hog	Canine	1
Cow	Not attacked/ Fed on by coyotes	1
Chickens	Canine	1
Horse	Unknown	1
Video	Domestic house cat	1
Total		53

Table 5. Number of verified reports of mountain lions in North Dakota (1 January – 31 July 2007) by type of sighting. Note: Reported sightings of mountain lions include locations of radio-collared bighorn sheep that were being monitored by the Department and subsequently killed by mountain lions.

Type of sighting (sign or event)	Type of evidence	Number Reports
Field sign	Tracks of animal	12
	Wildlife kills:	
	Bighorn sheep	5
	Subtotal	17
Visual observation	Credible Witness	2
Human-caused mortalities	Illegally killed	1
	Legally killed	1
	Incidentally trapped/snared	3
	Subtotal	5
Lion carcass	Carcass found in thawing lake	1
Domestic animal kill (cow)	Photographs of tracks	1
Total		26

Table 6. Hunting Units in North Dakota in which hunters reported seeing a mountain lion while hunting deer opening weekend (November 10-11) of the 2006 deer gun season.

Hunting Unit	No. Respondents	No. lions seen	No. Hours hunted	Population Index No. reports / 1000 hours hunted
2J1	48	1	558	1.79
2J2	62	1	849	1.18
2K1	50	1	703	1.42
2K2	61	2	842	2.37
3A1	48	2	605	3.31
3A4	52	1	711	1.41
3B1	110	2	1364	1.47
3E2	49	1	620	1.61
4A	45	2	512	3.91
4C	46	1	679	1.47
Total	571	14	7443	

Table 7. Mountain lion mortalities in North Dakota (Post 2005-06 lion season – 31 July 2007).

Lion ID	Reason for take	Date Harvested	Sex	Age	Weight (lbs)	County Harvested
F6	Legal shooting: Protection of Property	7/12/06	F	1.5-2.0 years	66	McKenzie
F7	Illegal harvest (spotted kitten)	9/16/06	F	4-5 months	26	McKenzie
F8	Legal harvest	10/18/06	F	3-4 years	104	Bottineau
M9	Legal harvest	10/28/06	M	1.5-2.5 years	107	McLean
F10	Legal harvest	11/6/06	F	3 years	100	Kidder
M11	Legal harvest	11/9/06	M	3-4 years	110	Morton
M13	Incidental take	1/15/07	M	4-5 months	42	McKenzie
M14	Incidental take	1/30/07	M	4-5 months	48	McKenzie
F15	Incidental take	2/18/07	F	10+ years	80	McKenzie
M16	Found dead in Lake Sakakawea	5/12/07	M	1-2.5 year old	---	Montrail
F17	Illegal shooting (spotted kitten shot out of season)	5/27/07	F	6-8 months	46	Dunn/ McKenzie County border
M18	Legal shooting: Protection of property	5/30/07	M	2.0-2.5 years	112	Divide

Table 8. Groups and events in which Department Outreach and Furbearer Biologists presented on mountain lions (1 January 2006 – 31 July 2007).

Month/Year	Group/Event
March 2006	ND Game and Fish Department Wildlife Wednesdays, Grand Forks
	ND Game and Fish Department Wildlife Wednesdays, Bismarck
	Bottineau County Wildlife Club
	ND Fur Hunters and Trappers Association Winter Meet, Bismarck
	Regional Mountain Lion Meeting, Dickinson
April 2006	Western Warden Association, Bowman
	Annual Wildlife Division Meeting, Bismarck
September 2006	Bismarck Public Employees
November 2006	Finley Wildlife Club
December 2006	ND State Minerals (Oil and Gas) Division, Bismarck
	Wildlife Club, Napoleon
	Sertoma Club, Bismarck
	Century High School Biology Class, Bismarck
January 2007	Men's church group, Hazen
	ND Game and Fish Department Volunteer Recognition Banquet, Bismarck
	Bottineau Sportsmen Club
	River Keepers, Fargo
February 2007	Rolla Sportsmen Club
	ND Chapter of the Wildlife Society, Williston
	Far West Rotary Club, Bismarck
	Bismarck Sport Show Seminar and Booth
	KFYR Agri-International Seminar and Booth, Bismarck
March 2007	Lions Club, Mandan
	Environmental Festival, Bismarck
	Mandan Ag Day Booth
	Dickinson Sport Show Booth
	Soil Conservation District Ladies Ag Banquet, Center
	MN, ND and SD Tri-state Meeting, Wahpeton
	Rotary Club, Bismarck
	Dakota Zoological Society, Bismarck
	ND Game and Fish Department Wildlife Wednesdays, Bismarck
	Minot Sport Show
	ND Game and Fish Department Wildlife Wednesdays, Grand Forks

Month/Year	Group/Event
April 2007	Bismarck Optimist Club
	Sertoma Club, Minot
	Century High School Earth Day
	Lions Club, Bismarck
	Lions Club, Fargo
	Barnes County Wildlife Club
May 2007	Soil Conservation District 7th & 8th Grade Day, Dickinson
	Kiwanis Club, Minot
	Minot Rotary Club
	Minot Wildlife Club
	Zeeland Elementary School
	Envirothon Coaches, Crystal Springs
	Red River Area Sportsmen Club, Wahpeton
	Oak Grove High School
June 2007	Three Affiliated Tribes Tribal Council Meeting, Newtown
	4-H Camp, Washburn
	Saxvik Elementary Camp Adventure, Bismarck
	ND State Fair Mountain Lion Booth, Minot
	West Fargo Exchange Club

Figure 1. 2007 mountain lion snow track survey routes.

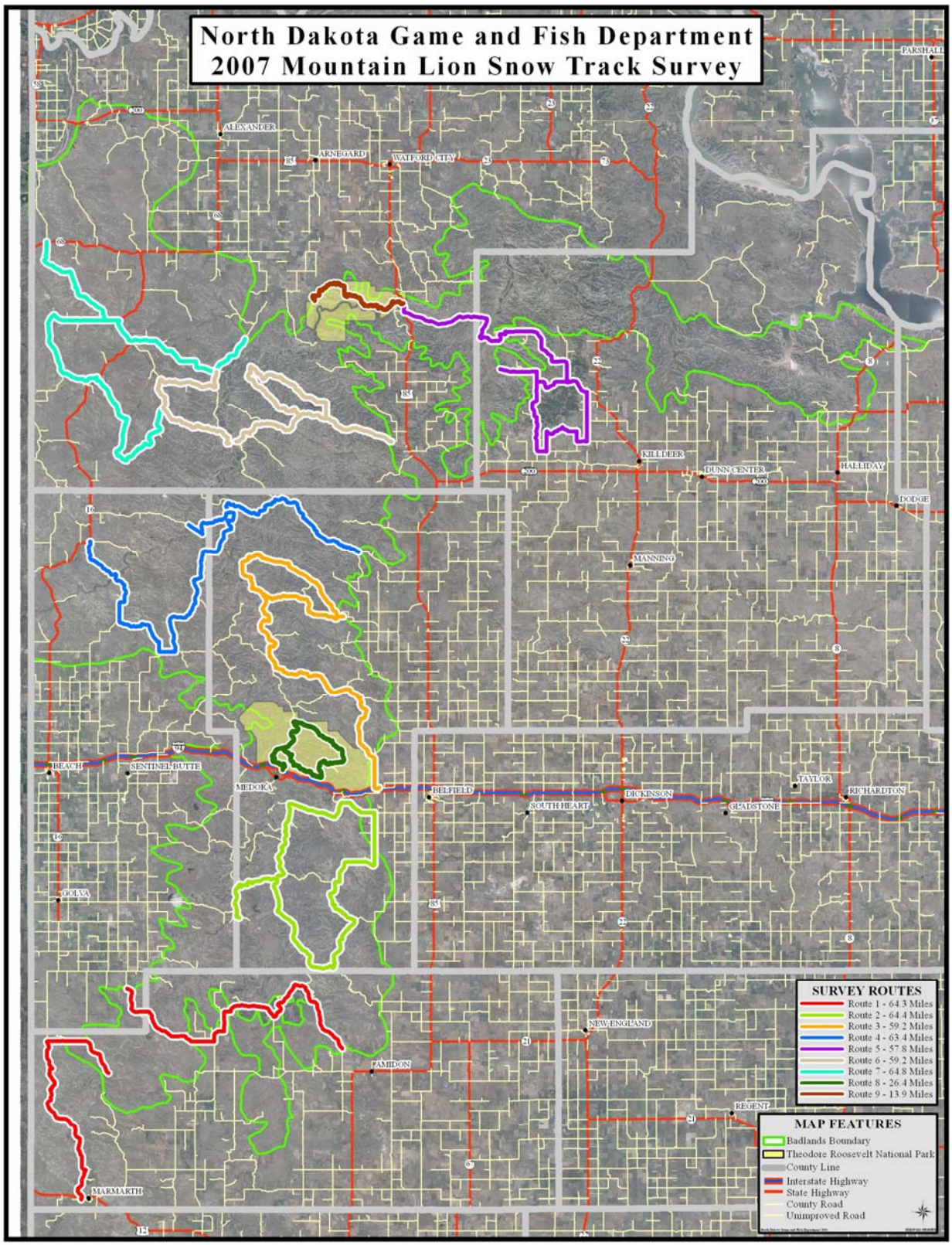


Figure 2. Verified mountain lion locations in North Dakota (2006), including seven animals harvested in 2006.

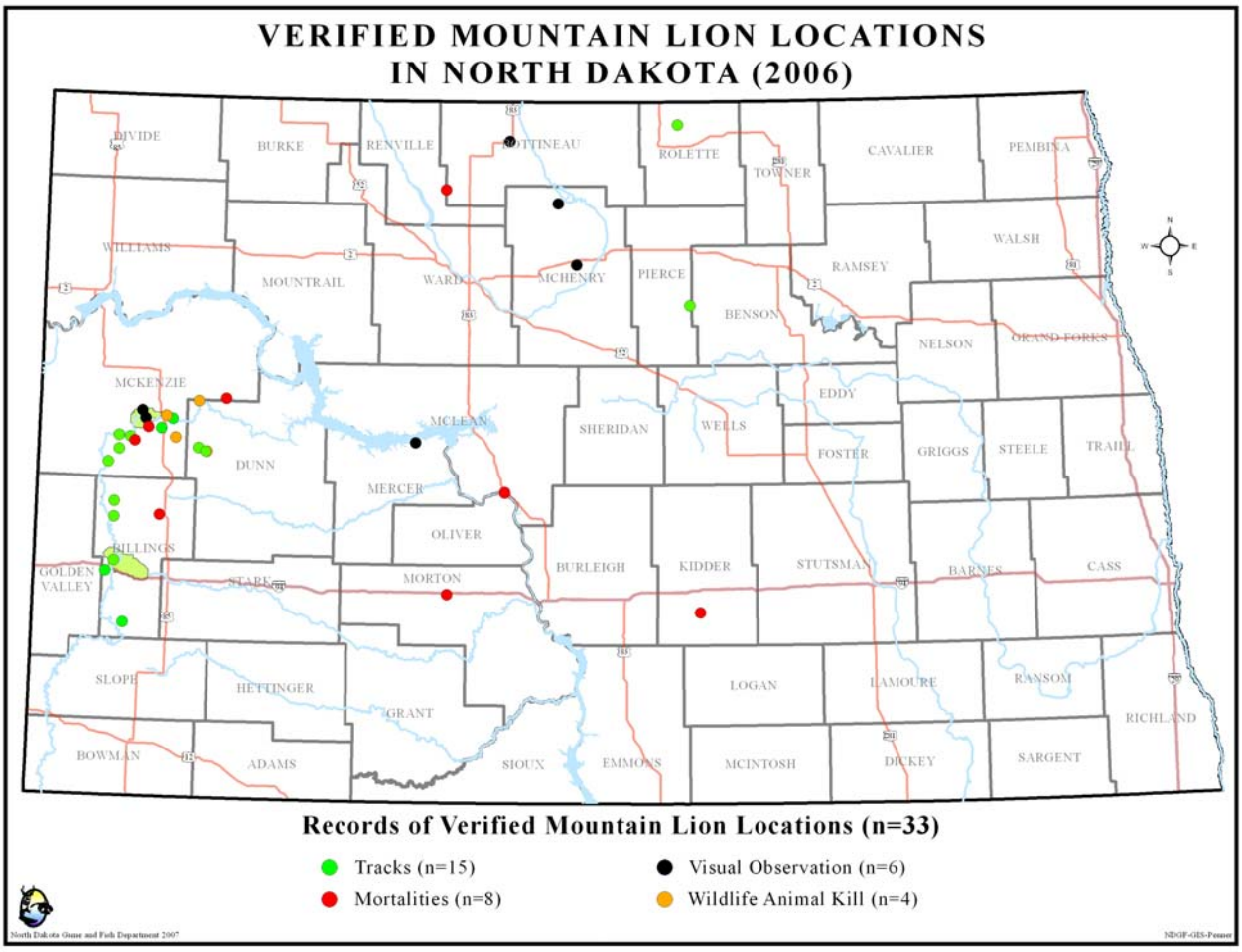


Figure 3. Counties with reported mountain lion sightings classified as “Probable unverified” in North Dakota (2006). Numbers in counties indicate number reports received by the Department.

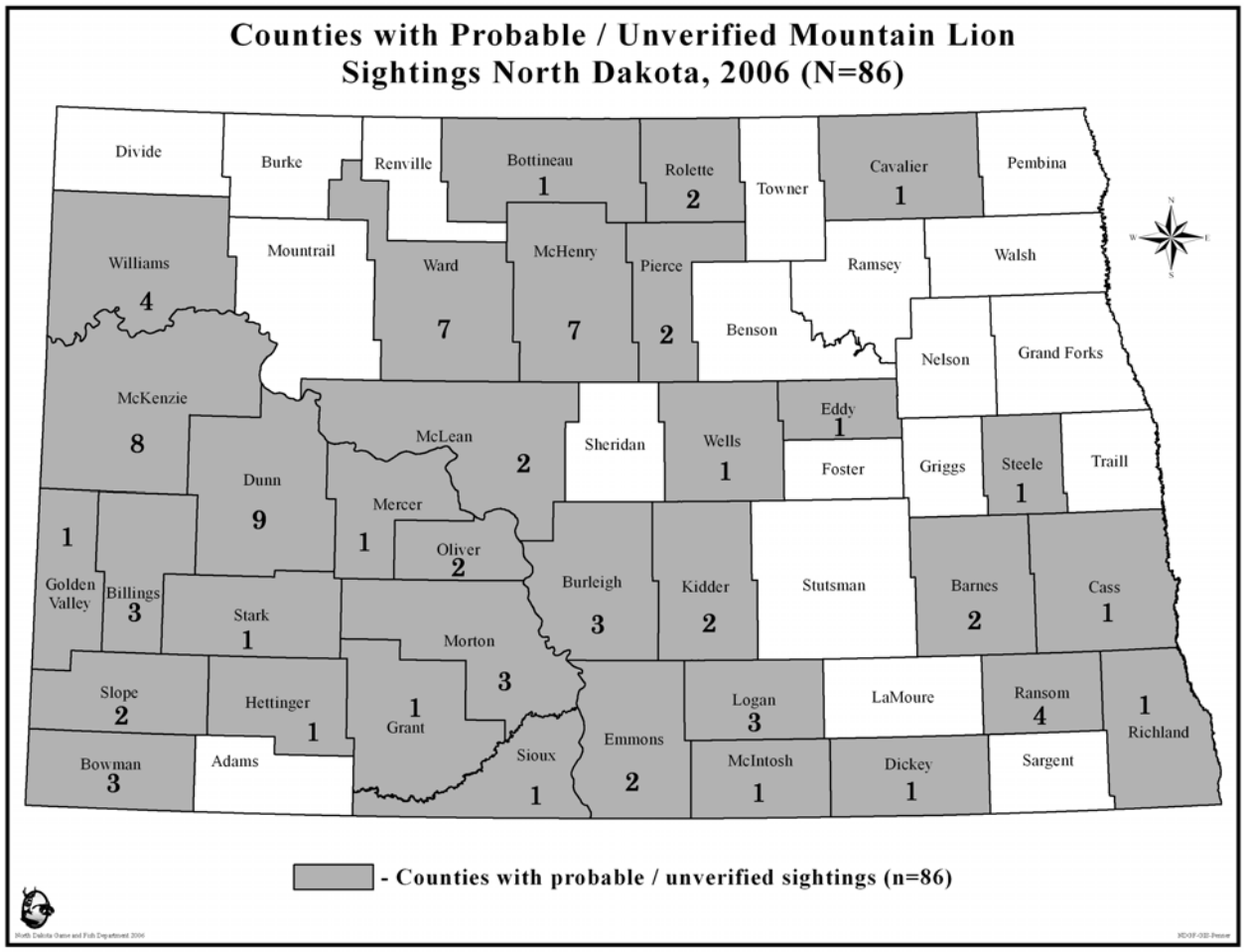


Figure 4. Verified mountain lion locations in North Dakota (1 January – 31 July 2007).

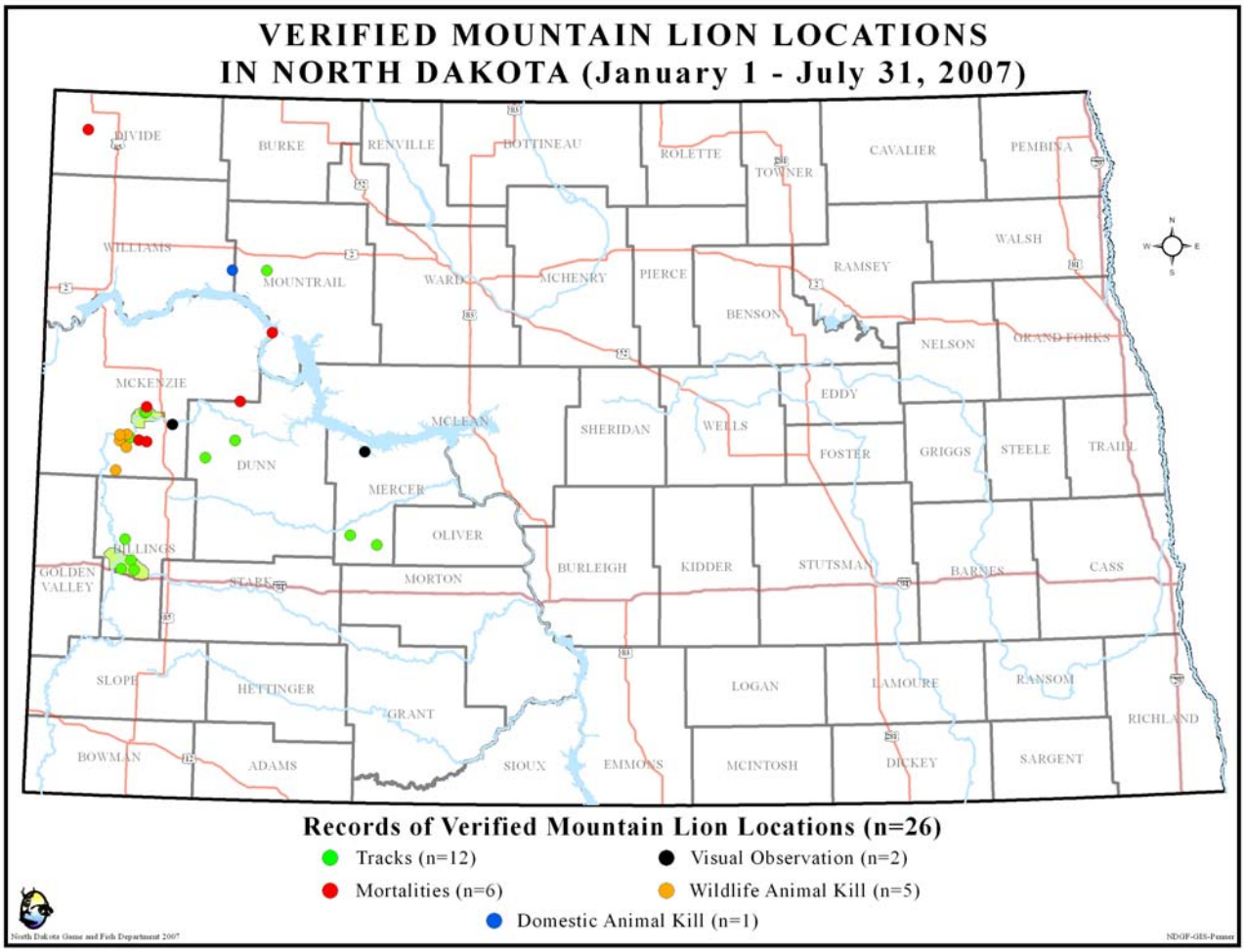


Figure 5. Deer Gun Hunting Units in which hunters reported seeing a mountain lion while hunting deer the opening weekend (November 10-11) of the 2006 deer gun season.

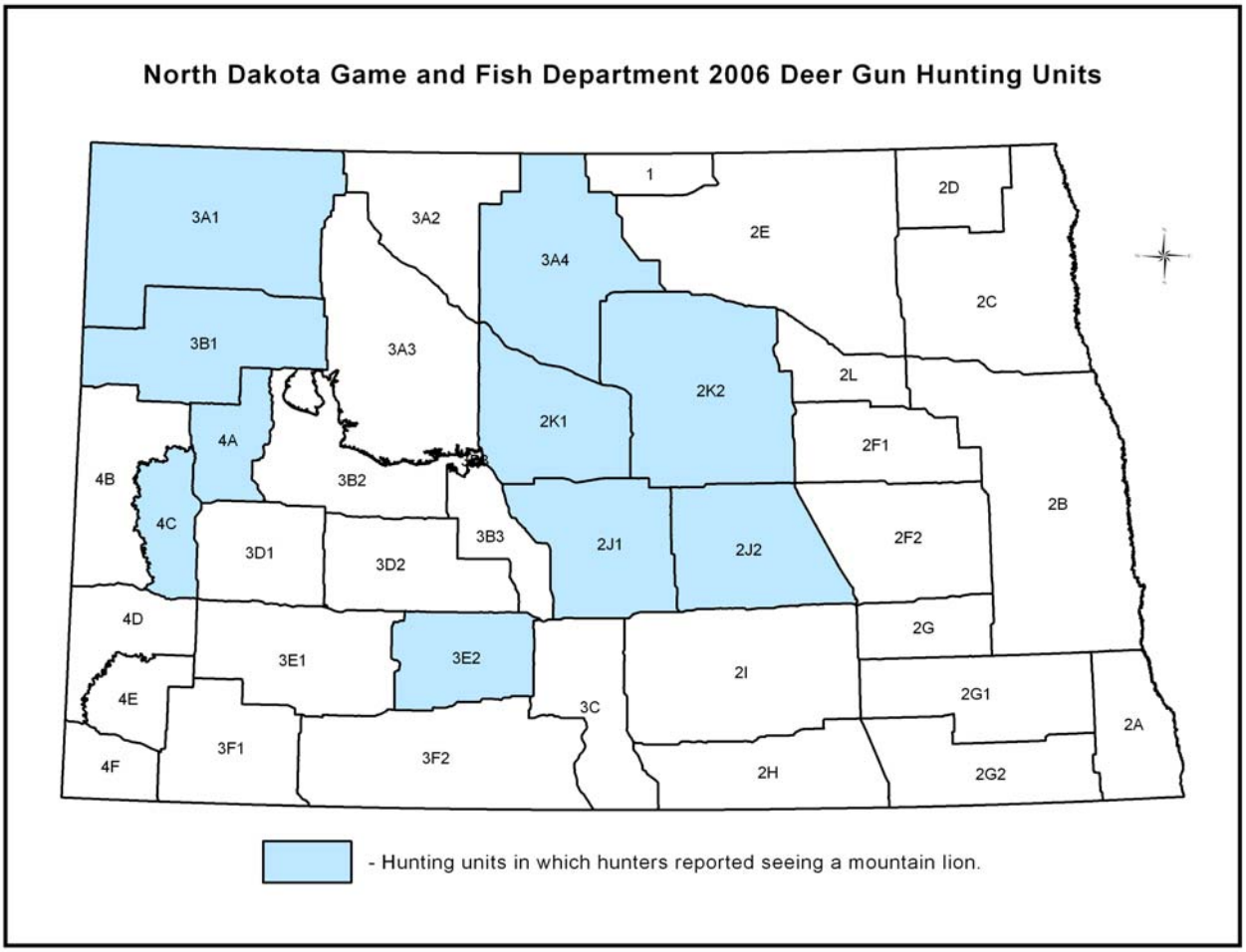


Figure 6. Mountain lion mortalities in North Dakota by season (2004 - 31 July 2007)

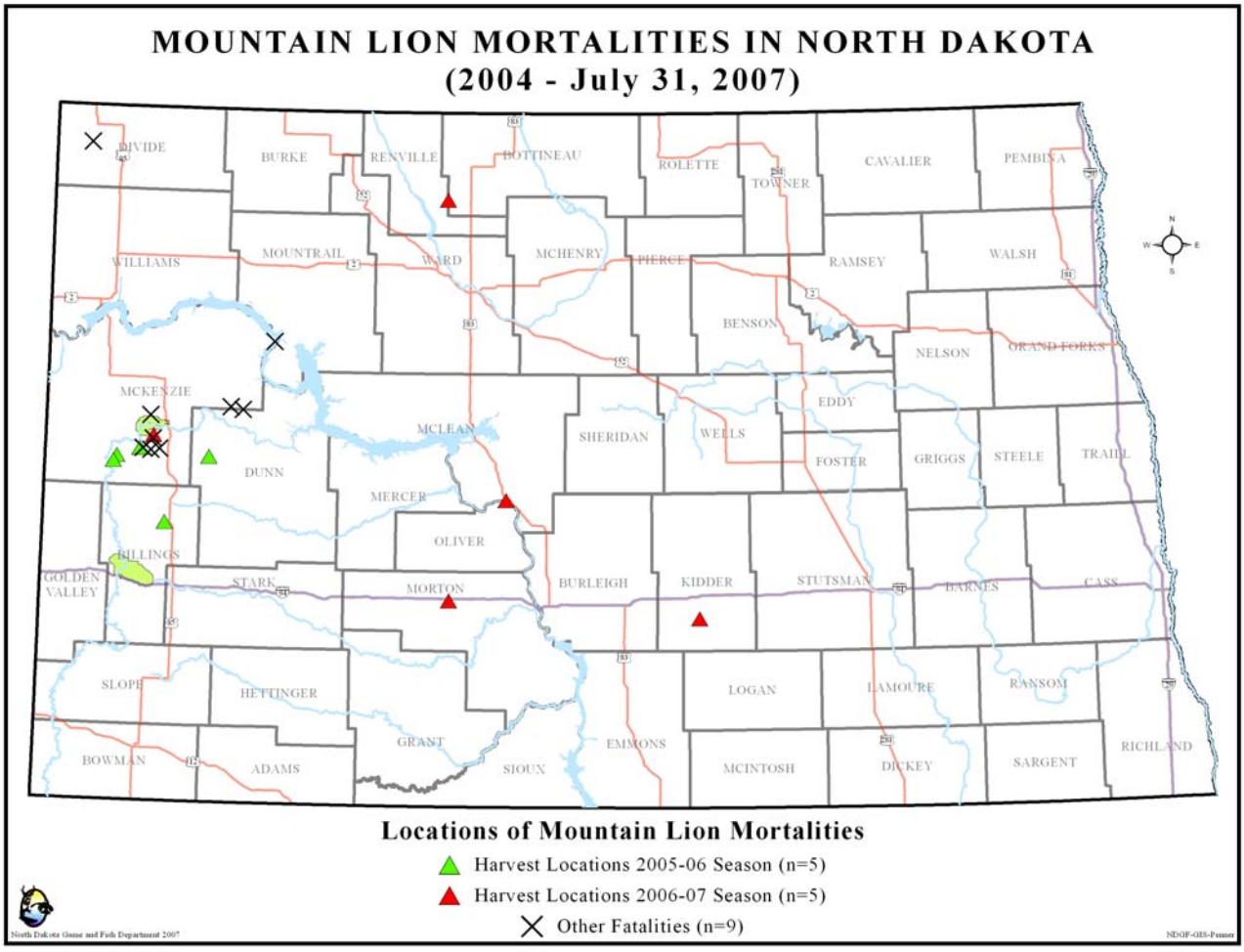


Figure 7. Mountain lion mortalities in North Dakota by sex (2004 – 31 July 2007).

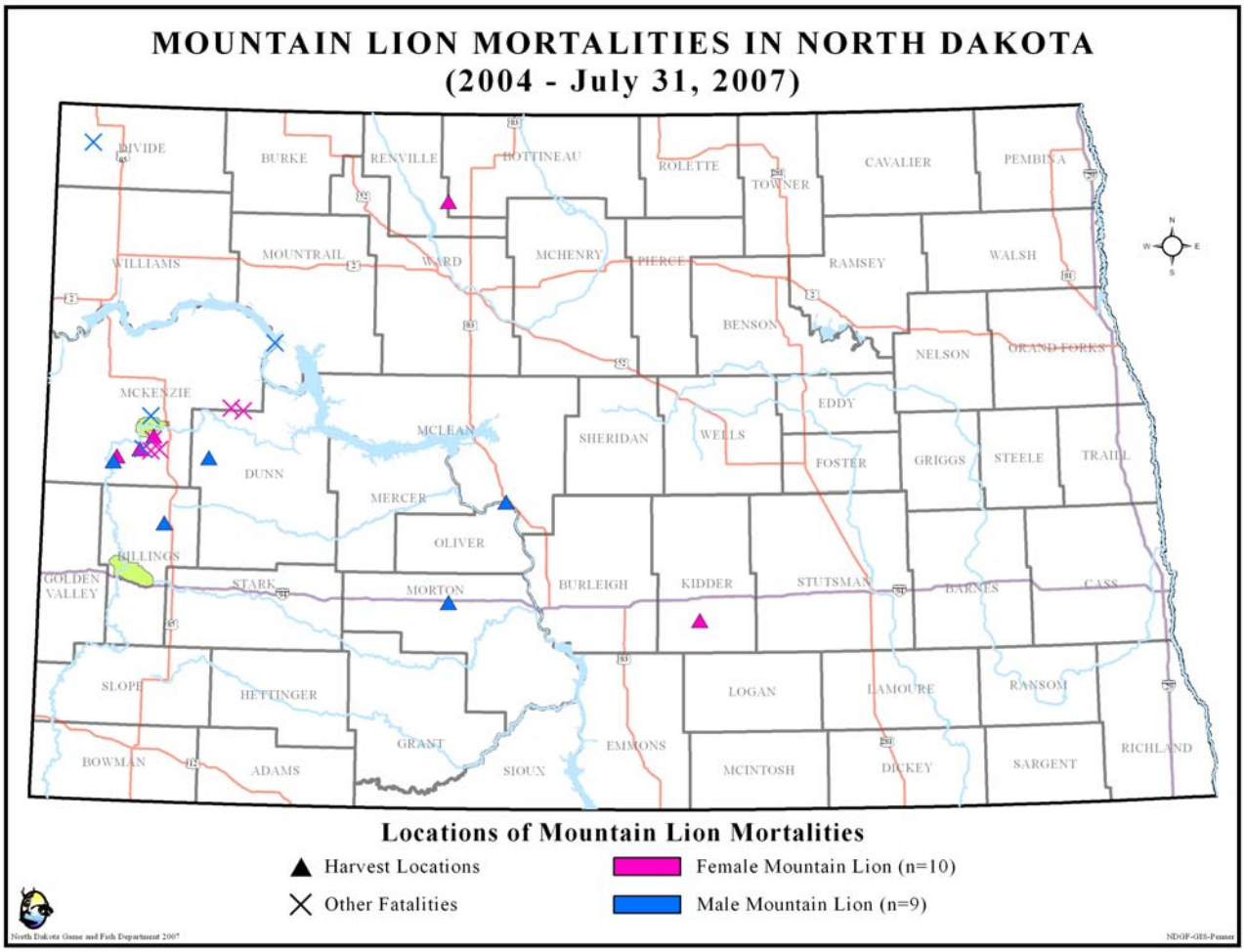


Figure 8. North Dakota mountain lion database of tissue sample locations for genetic relatedness analyses.

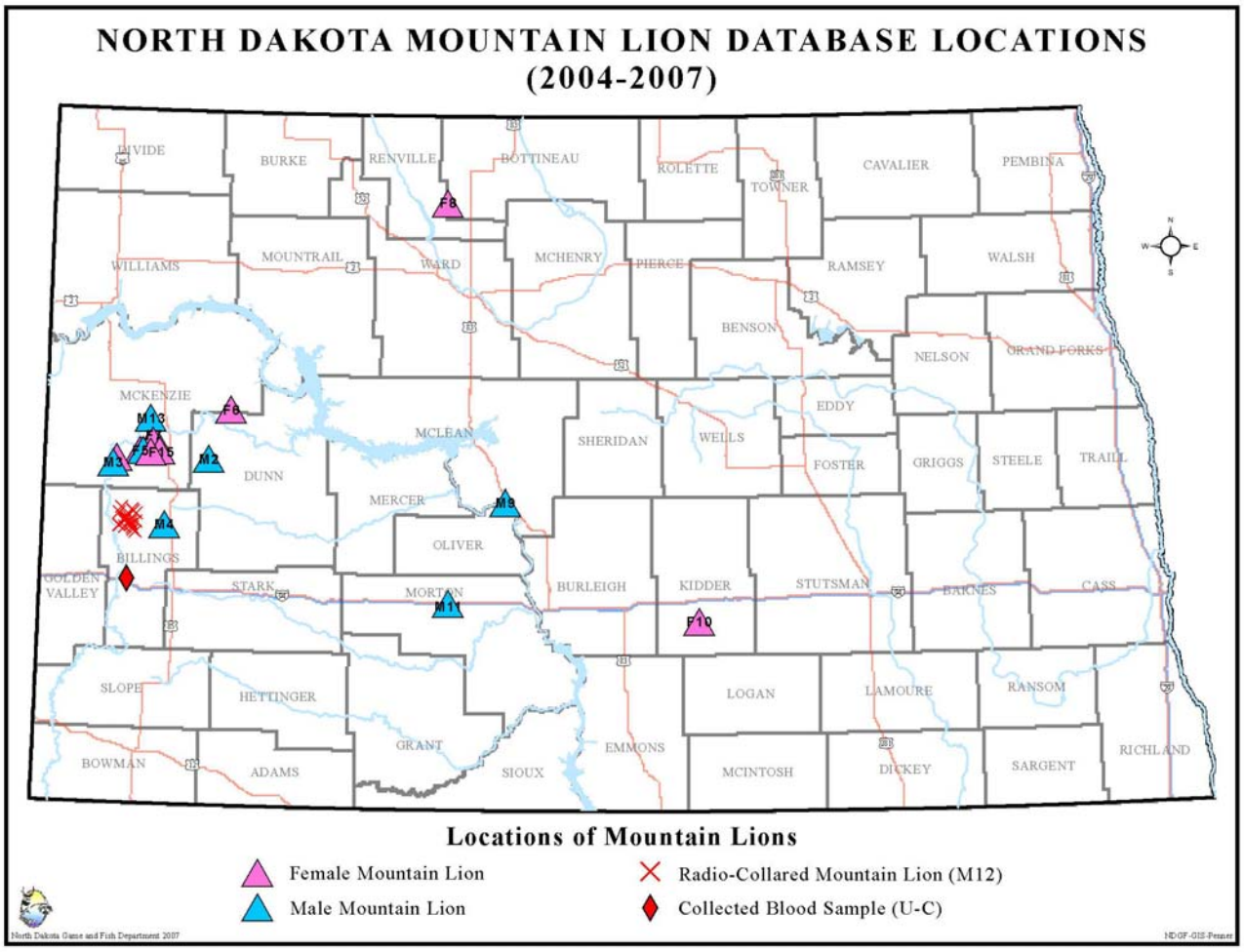


Figure 9. North Dakota mountain lion database of tissue sample locations for genetic relatedness analyses.

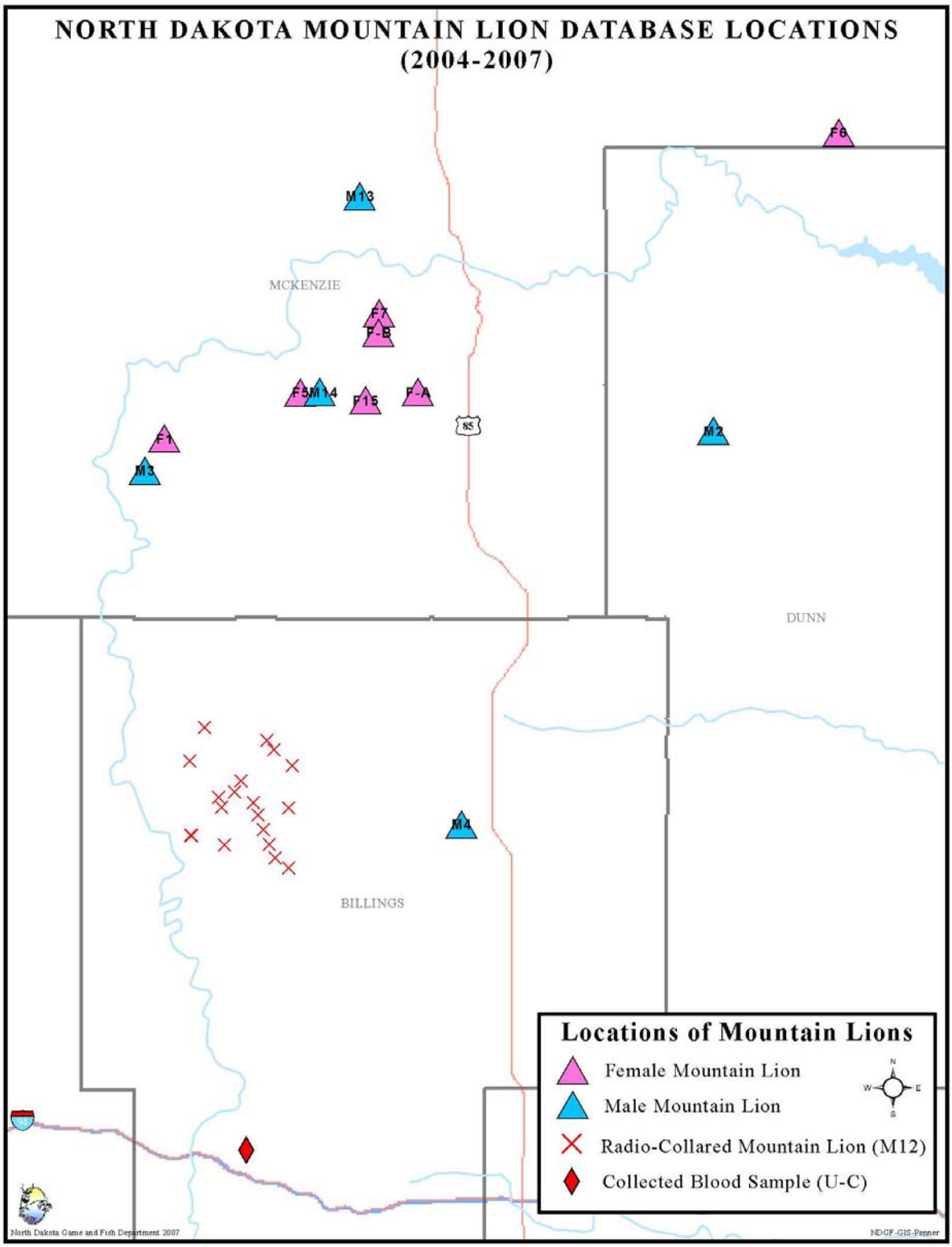
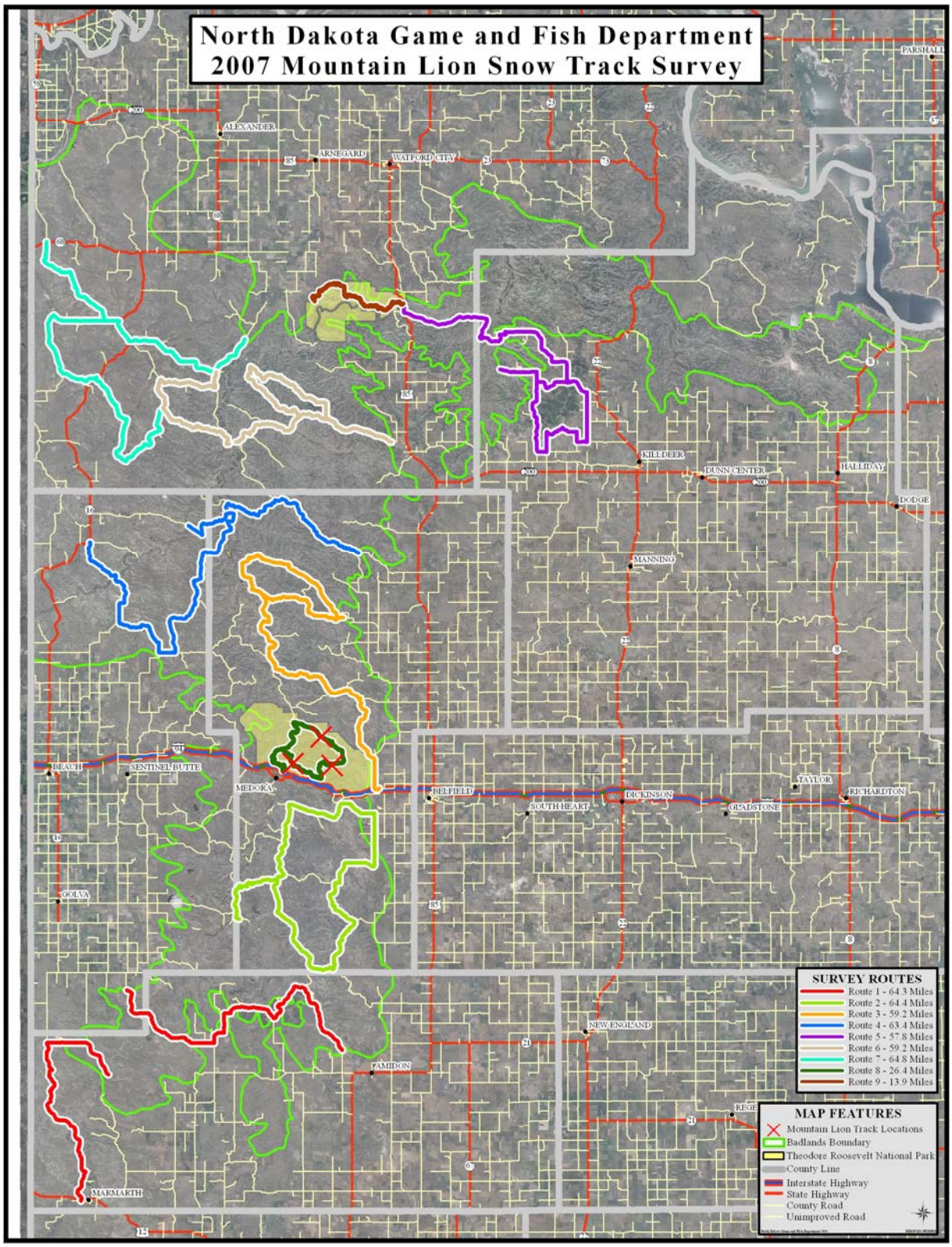


Figure 10. North Dakota Game and Fish Department 2007 mountain lion snow track survey.



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		
☐ City limits ☐ Rural agriculture	☐ Rural subdivision ☐ Unpopulated	Distance From Dwelling	

TYPE OF EVENT
☐Visual Observation (incl sign) ☐Close Encounter ☐Attack
☐Incident/Threatening Encounter ☐Other ☐Roadkill ☐Person ☐Livestock

REPORTED BEHAVIOR OF ANIMAL
☐Sedentary ☐Walking ☐Running ☐Chasing/Stalking prey ☐Evasive ☐ Aggressive/Defensive

SIGN
☐None ☐Track ☐Scat ☐Hair ☐Scrape ☐Sound ☐Other
☐Wildlife kill: Type _____ ☐Domestic kill: Type _____

Number Seen
Adults _____ Young _____

ACTION

INITIAL RESPONSE
☐Phone call only ☐Drop in discussion ☐Onsite investigation Date _____

EVENT VERIFICATION STATUS
☐Unfounded ☐Improbable unverified ☐Probable unverified Date _____
☐Verified By Whom _____ Title _____

MISTAKEN IDENTIFICATION
☐Yes ☐No Mistaken species _____

Brochure Provided
☐Yes ☐No Date _____

GAME & FISH/WILDLIFE SERVICES FIELD RESPONSE
☐No action ☐Harassed ☐Hunted ☐Trapped
☐Dog pursuit harassment ☐successful ☐unsuccessful ☐successful ☐unsuccessful

FIELD RESPONSE RESULTS
☐No contact ☐Harassed ☐Relocated ☐Euthanized
By Whom _____ Date _____

Disposition of carcass

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. 2006 Deer Hunter Observation Questionnaire and 2006-2007 Furbearer Harvest Survey.

SPECIAL DEER HUNTER OBSERVATION QUESTIONNAIRE

North Dakota Game and Fish Department
Wildlife Division SFN 8459

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

Draft

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				
SUN Nov 6th				

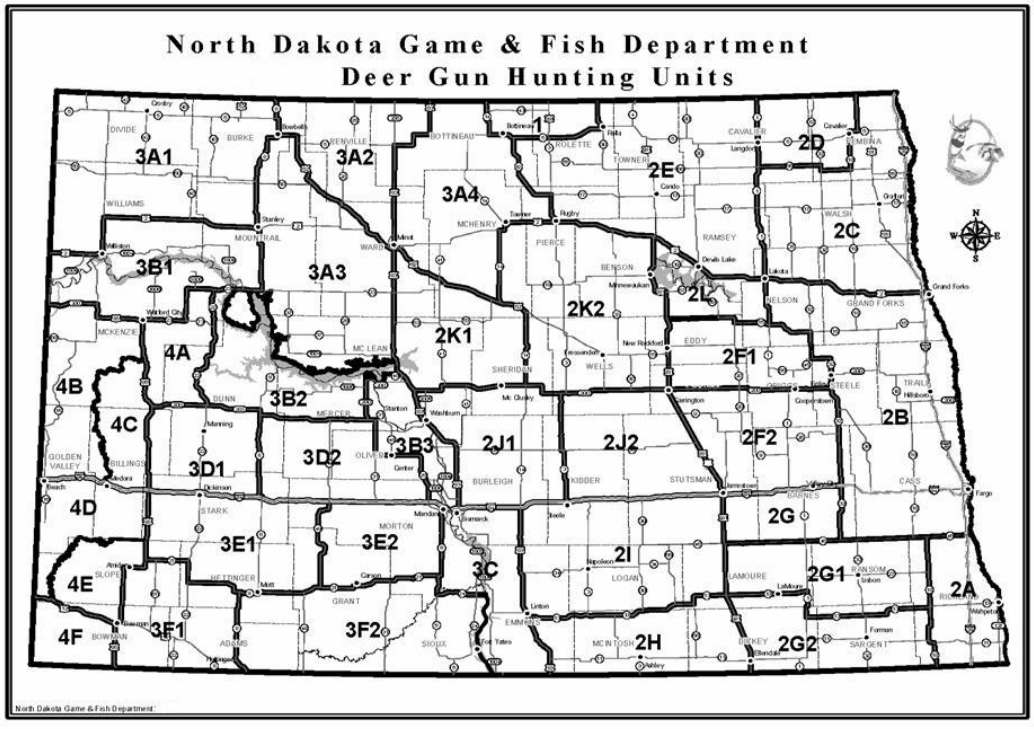
Mule Deer

	Number of Does Seen	Number of Fawns Seen	Number of Bucks Seen	Total Number of Deer Seen
SAT Nov 5th				
SUN Nov 6th				

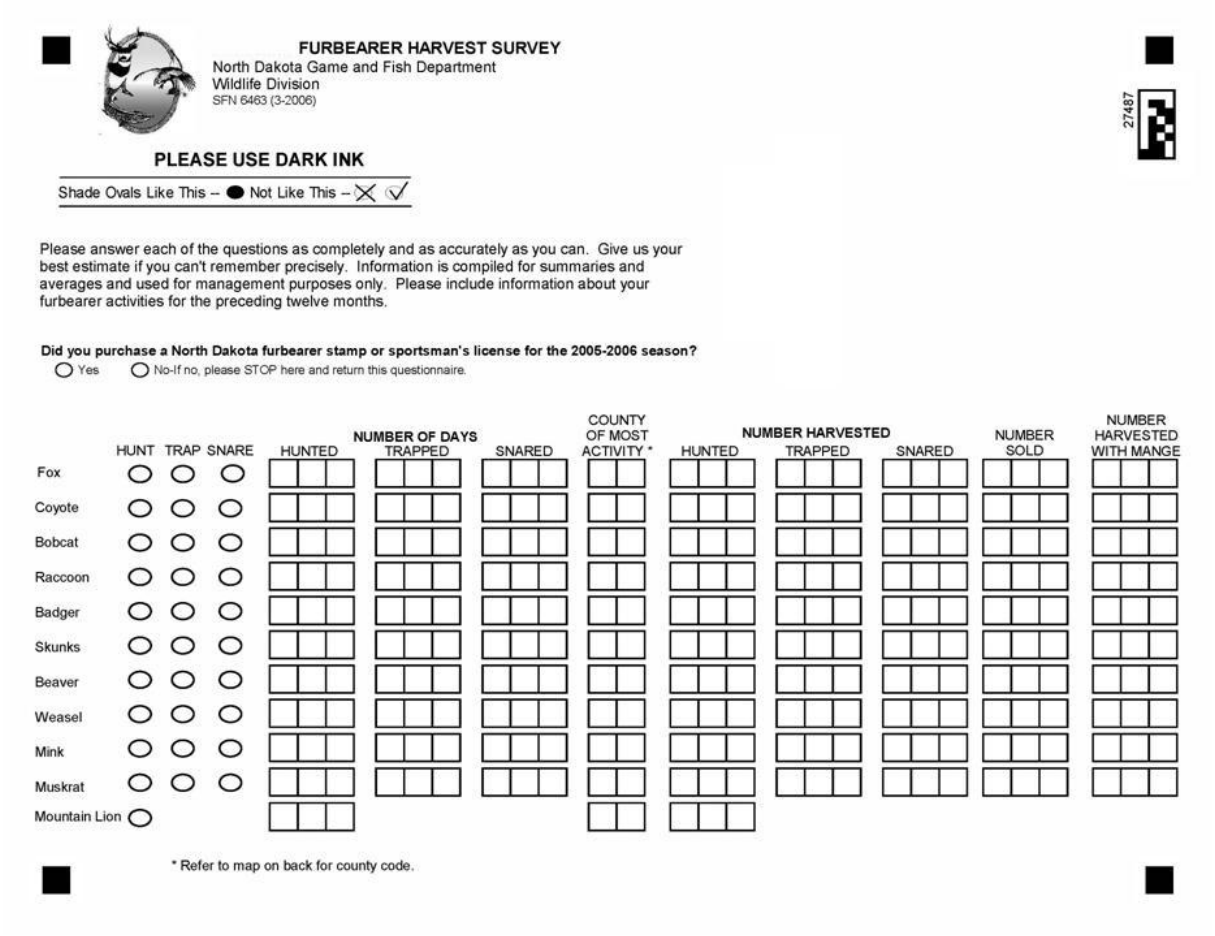
7. While hunting, did you see a mountain lion? ... ☐ YES ☐ NO
8. What is your gender? ☐ Male ☐ Female
9. What is your age? ☐☐ Years Old

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



Appendix II (Cont.)



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

27487

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 HUNTED	NUMBER OF DAYS TRAPPED	NUMBER OF DAYS SNARED	COUNTY OF MOST ACTIVITY *	NUMBER HARVESTED HUNTED	NUMBER HARVESTED TRAPPED	NUMBER HARVESTED SNARED	NUMBER SOLD	NUMBER HARVESTED WITH MANGE
Fox	○	○	○									
Coyote	○	○	○									
Bobcat	○	○	○									
Raccoon	○	○	○									
Badger	○	○	○									
Skunks	○	○	○									
Beaver	○	○	○									
Weasel	○	○	○									
Mink	○	○	○									
Muskrat	○	○	○									
Mountain Lion	○											

* Refer to map on back for county code.

Appendix III. 2006-2007 Small Game and Furbearer Hunting Proclamation Section 23.

23. EXPERIMENTAL (QUOTA) MOUNTAIN LION SEASON:

North Dakota residents may harvest mountain lions statewide from September 1, 2006 through March 11, 2007. Shooting hours will be one half (½) hour before sunrise to one half (½) hour after sunset and any legal weapon currently allowed for furbearers is legal. No hunting or pursuing with dogs will be allowed until January 1, 2007. Snares and traps cannot be used to take mountain lions. A quota of 5 mountain lions will be allowed. Any mountain lion other than kittens (lions with visible spots) or females accompanied by kittens may be taken during the season. The limit for mountain lions is one animal per hunter per season. Once this quota is reached, the season will be closed immediately. The North Dakota Game and Fish Department will inform the public through press releases, public service announcements, and media contacts of this closure. This quota will include all lions taken by USDA Wildlife Services, North Dakota Game and Fish Department, private landowners in defense of livestock, road killed animals, incidental animals taken by traps or snares, and animals taken for human safety issues. This quota also includes mountain lions taken in accordance with tribal regulations on Indian land within the exterior boundaries of the Fort Berthold Reservation (NOTE: In the event that none of the five lions are taken on Fort Berthold Reservation, one additional lion may be taken on the reservation once the quota has been reached and the statewide season is closed.). This quota does not include mountain lions taken on other Indian land within the exterior boundaries of a reservation. Any mountain lion that is taken must be reported to the Department within 12 hours and the entire intact animal must be submitted for analysis. Legally taken animals will be returned to the hunter following analysis.

Appendix IV. Mountain Lion Snow Track Survey Instruction Sheet and Data Form.

Directions:

1. Arrive at the beginning of your route as early in the day as possible (preferably at or shortly after dawn).
2. Before beginning the survey (and then again, after completing your route), record the time, snow depth, and precipitation, and estimate % cloud cover and wind velocity. Record in the comments box any additional information on weather conditions that may affect your ability to see tracks during your route (i.e., thick fog reducing visibility or blowing snow covering tracks, etc). **NOTE**: [If weather conditions change significantly during your route, note the change along with the time and where you were on your route in the comments box. Also, on your Forest Service map, circle the part of the route that you covered before the weather changed significantly].
3. After recording initial information, begin traveling your route to search for mountain lion tracks. Travel between 15-20 mph. Focus on the driver side for tracks, or if two people are present, survey both sides of the road.
4. For each track encountered, record the time, a GPS coordinate (U.T.M. or Latitude Longitude), **AND** mark an approximate location of the track(s) on your Forest Service map. If you don't have a GPS unit, record Township, Range and Section. Note the approximate direction of travel and whether or not the tracks are from an individual or multiple animals (**NOTE**: multiple tracks most likely will be from family groups (female with young or subadults traveling together), but also could be from breeding adults. If there are tracks from a mother with young, try to determine the number of kittens traveling with the mother.
5. If you have a digital camera, photograph the tracks with a ruler in the picture. Take two or three pictures in case one picture shows distinguishing characteristics better than others. Do not record a track as a mountain lion unless you are **100%** certain. If the tracks aren't clear, or you are in doubt, record the location and take several photographs of the tracks, including the pattern of travel and from different angles.
6. When you finish your route call my home phone number and leave a message that you completed your route along with the time the route was completed.

Supply list:

1. 2007 Mountain Lion Snow Track Survey Data Forms
2. USDA Forest Service map with route highlighted
3. Map of Badlands showing all Track Survey routes
4. Two Pencils, one pen, a clip board, 6 inch and 12 inch rulers
5. Outdoor thermometer

Other items: GPS Unit and Digital camera

Appendix IV. (Cont.)

Route _____ Date_____

Name(s) _____

	Time	**Temp.** °F	**Snow depth** (in)	**Precipitation** Dry Fog: light, moderate or heavy Rain: light, moderate or heavy Sleet: light, moderate or heavy Snow: light, moderate or heavy	**% cloud cover** 1. 0-25% 2. 26-50% 3. 51-75% 4. 76-100%	**Wind velocity** 1. 0-10 mph 2. 11-20 mph 3. 20-30 mph 4. >30 mph	**Comments**
Start Route							
Finish Route							

Track #	**Time**	**GPS coordinate or Township Range Section**	**Direction Of Travel**	**Number of Individuals**	**Number Photos Taken**	**Comments**

Appendix IV. (Cont.)

Route _____ Date_____

Name(s) _____

Track #	Time	GPS coordinate or Township Range Section	Direction Of Travel	Number of Individuals	Number Photos Taken	Comments

Appendix V. Database of verified mountain lion locations (not including harvested mountain lions) in North Dakota 2006.

No.	Date	Type of sighting/evidence	Location (County)
1	1/21/06	Tracks (snow)	McKenzie
2	2/15/06	Wildlife kill (Bighorn sheep ewe) Scat	McKenzie
3	2/27/06	Tracks (snow)	McKenzie
4	2/27/06	Tracks (sand/mud)	Billings
5	4/12/06	Wildlife kill (Bighorn sheep ewe) Tracks	Dunn
6	5/12/06	Sighting: Credible witness	Mercer
7	5/26/06	Tracks (hardened clay)	McKenzie
8	6/22/06	Tracks	McKenzie
9	7/9/07	Legal shooting of a female lion (66 lbs., 1.5-2.0 yrs old)	McKenzie
10	8/2/06	Tracks (mud)	Billings
11	Aug/Sept 2006	Tracks (mud)	Rolette
12	9/1/06	Sighting	McKenzie
13	9/15/06	Tracks	Billings
14	9/26/06	Tracks (mud): Credible witness	McKenzie
15	10/6/06	Tracks	Dunn
16	10/20/06	Sighting (female & two kittens) Tracks (snow)	McKenzie
17	10/21/06	Sighting Tracks	McHenry
18	10/21/06	Sighting Wildlife kill (white-tailed deer); tracks	McHenry

No	Date	Type of sighting	Location (County)
19	10/24/06	Wildlife kill (Bighorn sheep ewe) Tracks and scat	McKenzie
20	10/27/06	Sighting: Credible witness	Bottineau
21	10/27/06	Tracks	Billings
22	10/28/06	Tracks	Pierce
23	11/7/06	Tracks (mud)	McKenzie
24	11/20/06	Tracks (sand)	Billings
25	12/9/06	Tracks (snow)	Dunn
26	12/10/06	Wildlife kill (white-tailed deer) Tracks (snow)	Dunn

Appendix VI. Database of verified mountain lion locations (not including harvested mountain lions) in North Dakota 2007 (1 January – 31 July 2007)

No.	Date	Type of sighting	Location (County)
1	1/15/07	Incidental trapping; euthanized (Shot); M13; 4-5 months; 42 lbs.	McKenzie
2	1/21/07	Tracks (snow) Porcupine carcass	McKenzie
3	1/30/07	Incidental capture; found dead in neck cable device. M14; 4-5 months; 48 lbs.	McKenzie
4	2/8/07	Tracks (snow)	Mercer
5	2/9/07	Tracks (snow)	Dunn
6	2/13/07	Tracks (snow): 1of 3 sets documented during the lion snow track survey	Billings
7	2/13/07	Tracks (snow): 2 of 3 sets documented during the lion snow track survey	Billings
8	2/13/07	Tracks (snow): 3 of 3 sets documented during the lion snow track survey	Billings
9	2/18/07	Incidental trapping; transported to Bismarck Zoo; Euthanized due to snare/ trap-related injuries; F15; 10+ years old; 80 lbs.	McKenzie
10	2/26/07	Sighting and tracks (snow)	Mercer
11	3/01/07	Tracks (snow): Credible witness	Billings
12	3/7/07	Tracks	Dunn
13	3/8/07	Tracks	Mercer
14	3/9/07	Wildlife kill (Bighorn sheep ewe) Tracks	McKenzie
15	3/12/07	Tracks (snow)	McKenzie
16	3/13/07	Domestic animal kill (cow)	Williams

No.	Date	Type of sighting	Location
17	3/16/07	Tracks (snow)	Mountrail
18	3/26/07	Wildlife kill (Bighorn sheep ewe)	McKenzie
19	4/13/07	Wildlife kill (Bighorn sheep)	Mckenzie
20	4/14/07	Tracks	Mckenzie
21	4/17/07	Sighting: Credible witness	McKenzie
22	5/12/07	Carcass found in Lake Sakakawea	Montrail
23	5/27/07	Illegal shooting: Kitten F17; Out of season	McKenzie
24	5/30/07	Legal shooting: M18; Protection of property	Divide
25	6/19/07	Wildlife kill (Bighorn sheep) Scat	McKenzie
26	6/27/07	Wildlife Kill (Bighorn sheep ram)	Mckenzie

Appendix VII. North Dakota mountain lion tissue database (2004 – 2/18/07).

Lion ID	Sex	Reason for Take	Season	Method of Take	Date	Age	Weight (lbs)	Location (County)
F-A	F	Human safety	N/A	Shot by bow and arrow by archery hunter	9/5/04	1-2 yrs	80	McKenzie
F-B	F	Illegal kill	N/A	Incidental capture in cable device; Shot	12/27/04	1.5-2.5 yrs		McKenzie
F1	F	Legal harvest:1of 5	2005-06	Shot	11/16/05	2.5-3.0 yrs	92	McKenzie
M2	M	Legal harvest:2of 5	2005-06	Shot	11/17/05	1.5-2.0 yrs	99	Dunn
M3	M	Legal harvest:3of 5	2005-06	Shot	12/31/05	4.0-5.0 yrs	140	McKenzie
M4	M	Legal harvest:4of 5	2005-06	Shot	1/6/06	2.0-2.5 yrs	111	Billings
F5	F	Legal harvest:5of 5	2005-06	Shot	1/16/05	4.0-6.0 mos	39	McKenzie
F6	F	Property Protection	N/A	Shot	7/12/06	1.5-2.0 yrs	66	McKenzie
F7	F	Illegal harvest:1of 5 (spotted kitten)	2006-07	Shot	9/16/06	4-5 mos	26	McKenzie
F8	F	Legal harvest:2of 5	2006-07	Shot	10/18/06	3-4 yrs	104	Bottineau
M9	M	Legal harvest:3of 5	2006-07	Shot	10/28/06	1.5-2.5 yrs	107	McLean
F10	F	Legal harvest:4of 5	2006-07	Vehicle collision; Shot	11/06/06	3 yrs	100	Kidder
M11	M	Legal harvest:5of 5 (Human safety)	2006-07	Shot	11/09/06	3-4 yrs	110	Morton

Lion ID	Sex	Reason for Take	Season	Method of Take	Date	Age	Weight (lbs)	Location (County)
M12	M	Incidental take; Hair collected for DNA analyses	N/A	N/A; Incidental trapping Radio-collared study animal	11/26/06	1.5-2.5 yrs	108	Billings
M13	M	Incidental take	N/A	Incidental trapping; Euthanized (Shot)	1/15/07	4-5 mos	42	McKenzie
M14	M	Incidental take	N/A	Found dead in neck cable device	1/30/07	4-5 mos	48	McKenzie
F15	F	Incidental take	N/A	Incidental trapping Transported to zoo; Euthanized: cable device/ trap-related injuries	2/18/07	10+ years	80	McKenzie
U-C	U	N/A	N/A	N/A; Blood in urine collected in fresh snow track in south unit TRNP	2/12/07	N/A	N/A	Billings

Relatedness statements:

1. FA and FB were not likely related; they appeared to be highly unrelated.
2. Of 16 lions, only M14, M3 and F5 could be related to F15; all other animals were not related to F15. F15 and M14 appeared to be highly related but more information is needed to confirm relatedness between F15 and M3 and F5.
4. Kitten M14 and kitten M15 were not likely related.
5. The unknown sample U-C (from blood and urine collected in a snow track) was from a female lion.
6. F10 and M11 could be related.
7. F10 appeared to be genetically different from the other lions; F8 also appeared to have unusual alleles.