STATUS OF MOUNTAIN LION MANAGEMENT IN NORTH DAKOTA, 2016

North Dakota Game and Fish Department

September 2016

Time Period Covered

1 July 2015 – 30 June 2016

SUMMARY

We used a combination of reports of occurrence, harvest locations, and hunter and trapper questionnaires to determine the distribution of mountain lions in North Dakota. We examined abundance of mountain lions in relation to previous years (i.e. trend information) via these same methods, as well as previous habitat analysis. Additionally, we necropsied mountain lion carcasses to collect demographic, dietary, and genetic information. Necropsies indicate a small, but healthy population of mountain lions occurring in western North Dakota.

INTRODUCTION

Historically, mountain lions (*Puma concolor*) once ranged over most of North Dakota, although they were considered scarce except in the Little Missouri Badlands region (Bailey 1926). Records indicate mountain lions disappeared from North Dakota in the early-1900s (Bailey et al. [1914] *in* Young and Goldman [1946]) with the last confirmed record of a mountain lion being harvested in 1902 along the Missouri River south of Williston (Bailey 1926). There has never been a bounty on mountain lions in North Dakota (McKenna et al. 2004). In 1961, Adams advised that mountain lions have the potential to show up in North Dakota, particularly the Little Missouri Badlands region. According to Seabloom et al. (1980), there were 10 reports of mountain lions in southwestern North Dakota between 1958 and 1980 and they felt the species should be considered extant in the state. In 1991, after a young female mountain lion was shot near Golva, mountain lions were classified as a "fur-bearer" in the state (North Dakota Century Code 20.1-01). Provisions were made to allow removal of individual mountain lions for protection of property and human safety concerns (North Dakota Century Code 20.1-07-04). Prior to this time, mountain lions were unprotected and could be killed legally (McKenna et al. 2004). By the early-2000s, the number of reports of mountain lion occurrences documented by the North Dakota Game and Fish Department (hereafter, NDGFD) had increased such that it became apparent there was a continued presence of mountain lions in western North Dakota (NDGFD 2006).

Currently, it is recognized that there is a relatively small population of mountain lions occurring in western North Dakota. Occasionally, individual mountain lions are documented in other parts of the state (McKenna et al. 2004, NDGFD 2006, NDGFD 2007). As expected, initial estimates of habitat suitability indicated that the Badlands, Missouri River Breaks, and Killdeer Mountains regions (comprising 6% of total state area) provide suitable habitat for mountain lions (NDGFD 2006).

The first regulated hunting season for mountain lions in North Dakota occurred in 2005-2006 with a harvest limit of 5. This first hunting season was considered experimental with the goal being to acquire biological and distributional information about the population of mountain lions occurring in the state (NDGFD 2006). The second regulated hunting season (2006-2007) was modified to prohibit the harvest of kittens (i.e. mountain lions with visible spots) or females accompanied by kittens. Additionally, hunters were not allowed to use dogs to pursue mountain lions until 4 months later in the season. Changes to the 2007-2008 regulations included dividing the state into 2 management zones (Figure 1; Zone 1 had a harvest limit of 5, Zone 2 had no harvest limit), no longer including incidental or depredation removals against the harvest limit, and Fort Berthold Reservation (hereafter, Reservation) having a separate harvest limit of 5 mountain lions. During the 2008-2009 hunting season, the harvest limit for mountain lions in Zone 1 was increased to 8 while the harvest limit within the Reservation remained 5. The harvest limit in Zone 1 was again increased to 10 in the 2010-2011, 14 in 2011-2012, and 21 in 2012-2013 harvest seasons. In 2015-2016, the harvest limit within the Reservation was increased to 10.

METHODS

Reports of mountain lion occurrence (e.g. sightings, tracks, etc.) were recorded by NDGFD personnel, and included reports from the general public, deer hunters, fur hunters and trappers, United States Department of Agriculture-Wildlife Services, Theodore Roosevelt National Park, and Reservation Fish and Wildlife employees (Figure 2). Reports were classified as

a. Verified – Evidence available, including a carcass or live-captured mountain lion, photograph or video, DNA analysis results, or tracks, scat, kill or attack confirmed as being that of a mountain lion by a qualified wildlife professional.
b. Probable Unverified – No evidence available, but report, animal description, and/or location are plausible.
c. Improbable Unverified – No evidence available and report, animal description, and/or location are not plausible.
d. Unfounded – Evidence available which disproves the claim that it is a mountain lion, including carcass or live-captured animal, photograph or video, DNA analysis results, or tracks, scat, kill or attack disproved as being that of a mountain lion by a qualified wildlife professional.

We required a mandatory check-in of intact carcasses for all harvested mountain lions. Additionally, if possible, we collected data from mountain lions killed on the Reservation. From the mountain lion carcasses, we estimated age (Anderson and Lindzey 2000) and collected morphological measurements, reproductive tracts, stomachs, and tissue samples. We examined reproductive tracts for placental scars. We extracted an upper premolar and sent them to Matson's Laboratory (Manhattan, Montana, USA) to confirm age via counts of cementum annuli.

In early-April 2016, we mailed a questionnaire to 5,000 individuals who bought either a furbearer or combination license for the 2015-2016 harvest season (Tucker 2016). We asked hunters and trappers to indicate the amount of time spent pursuing mountain lions and number of individual mountain lions they harvested. From this, we estimated mean number of days hunting, total number of mountain lions harvested, and counties of most hunting activity.

In 2016, we included in a survey to a random sample of deer hunters a question asking whether they saw any mountain lions while hunting deer (Stillings et al. 2016). We summarized visual observations of mountain lions by deer hunting unit.

We began a research project on mountain lions in North Dakota in cooperation with South Dakota State University (hereafter, SDSU) in August 2011 (Study No. E-XII). The principle investigator for the project from SDSU is Dr. Jonathan Jenks. The long term research objectives include 1) acquiring information on movements, home range, and spatial relationships of mountain lions, 2) obtaining estimates of survival, reproduction, and cause-specific mortality of mountain lions, 3) determining overall population health and fitness of the mountain lion population in North Dakota through examination of live and harvested animals, monitoring

disease, and assessing genetic vigor, 4) documenting habitat use and testing a habitat suitability map created for the species, 5) obtaining a density estimate for mountain lions in the Badlands, and 6) evaluating techniques for detecting trends in population size and assessing impacts of annual harvests. For more information, see Report No. C-480.

RESULTS

From 1 July 2015-30 June 2016, we recorded 40 reports of mountain lions (Table 1; Figures 3-4). Of those, 26 reports (65%) were classified as Verified (Table 2, Figures 4-5). The Verified reports consisted of 65% carcasses (i.e. mountain lions harvested during the regulated hunting season, dispatched for protection of property, or killed by automobiles), 19% photographs or videos, and 12% mountain lion signs (i.e. tracks, scat, kills, or scrapes; Table 2). Similar to the past several years, the distribution of Verified mountain lion reports occurred predominantly in western North Dakota, particularly the northern Badlands region (Figure 5).

The hunting season for mountain lions opened on 4 September 2015. Zone 1 had a harvest limit, whereas Zone 2 had no harvest limit and remained open for hunting until 31 March 2016. In Zone 1, the harvest limit was split between consecutive early- (4 September 2015-22 November 2015) and late-seasons (23 November 2015-31 March 2016). Zone 1 early-season harvest limit was 14 and the late-season harvest limit was 7, for an overall harvest limit of 21. Hunters could use dogs to pursue mountain lions only in the late-season. The early-season in Zone 1 closed on the last day of the season with 6 mountain lion being harvested (Table 3; Figure 7). The late-season in Zone 1 closed on 14 December 2015 after the harvest limit of 7 was reached. Additionally, 1 mountain lion was legally harvested in Zone 2. Therefore, the total legal harvest consisted of 7 females and 7 males. Methods of take included 6 shot with firearms, 7 pursued with dogs and shot with firearms, and 1 pursued with dogs and shot with a bow and arrow.

Additional mortalities included 2 male mountain lions being killed in automobile collisions (Table 3; Figure 7).

Majority of mountain lion carcasses we examined were in good nutritional condition; fat content observed during necropsy was at or above expected levels and parasite loads were low. Gross physical injuries included 5 mountain lions (1 female, 4 males) that were missing part of their tail, likely due to frostbite, and 2 females that were missing 1-2 toes on a single front paw, possibly due to encounters with foothold traps. We discovered diffused white lesions throughout the liver, lung, spleen, and/or kidneys of 3 mountain lions (1 female, 2 males) during necropsy, indicating parasite infections.

Results from the questionnaire mailed to furbearer and combination license holders indicated that 2.0% of license holders hunted mountain lions during the 2015-2016 season. Results from the questionnaire also indicated that individual hunters spent an average of 29.9 ± 84.3 ($\bar{x}$ ± SD) days pursuing mountain lions with an estimated statewide harvest of 2 mountain lions during the 2015-2016 hunting season. It is apparent that data obtained from the questionnaire

regarding mountain lion hunting activity has wide margins of error and is not a reliable estimate of true harvest at this time.

Responses from the deer hunter questionnaire resulted in <1% of people indicating they saw a mountain lion while deer hunting (Figure 6). Only four of the units where mountain lion observations were reported (4A, 4B, 4C, and 4D) contained habitat considered suitable for a breeding population of mountain lions (NDGFD 2006).

DISCUSSION

We monitored mountain lions in North Dakota via reports of occurrence, mandatory carcass check-ins, and harvest surveys. Additionally, we continued an active research project on mountain lions to determine baseline population information (Study No. E-XII). Our knowledge of mountain lion distribution, population demographics, and health has vastly improved over the past decade. However, we continue to improve our understanding of vital rates and habitat use for mountain lions in North Dakota. Therefore, until more information is known, mountain lions should continue to be monitored closely.

The number of reports of mountain lion occurrence we documented from 1 July 2015-30 June 2016 was 40% lower than the previous fiscal year (Table 2, Figure 4). We documented reports of mountain lion occurrence in 28% of the counties in North Dakota (Figure 3). However, we verified reports in only 17% of counties (Figure 5). Not surprisingly, we verified the largest number of reports in McKenzie (*n* = 9) and Dunn (*n* = 8) counties, which have the highest proportion of suitable habitat for mountain lions (NDGFD 2006). Although we cannot use Verified reports of mountain lion occurrence to document population trends, these reports provide us with valuable information regarding distribution, habitat use, and travel routes, especially those used for dispersal of mountain lions in North Dakota.

External and internal examination of mountain lion carcasses indicated mountain lions in North Dakota are generally healthy. The sex ratio of all mountain lion carcasses we have examined to date in North Dakota (*n* = 177) was 1.4 females per male and mean age was 2.5 ± 2.3 ($\bar{x}$ ± SD) years. In comparison, the sex ratio of mountain lion carcasses examined from 1 July 2014-30 June 2015 was 0.5 females per male and age was 2.5 ± 2.2 years. Mean weight for mountain lions ≥1 year of age was 88 (range 56, 126) and 121 (range 79, 170) pounds for females and males, respectively.

Report and population trends indicate that the number of mountain lions found in Zone 1 (breeding population) has been on the decline for the past 4 years. This concurs with results from our research over the past 5 years, which suggests that survival rates for radio-collared mountain lions in Zone 1 are below the amount needed to sustain current numbers (Wilckens 2014). Future data analysis and research should focus on refining these numbers so that we can annually confirm a responsible harvest limit.

LITERATURE CITED

Adams, A. W. 1961. Furbearers of North Dakota. North Dakota Game and Fish Department, Bismarck, North Dakota, USA.

Anderson, C. R. Jr., and F. G. Lindzey. 2000. A photographic guide to estimating mountain lion age classes. Wyoming Cooperative Fish and Wildlife Research Unit, Laramie, Wyoming, USA.

Bailey, V. 1926. A biological survey of North Dakota. North American Fauna, No. 49. United States Department of Agriculture, Bureau of Biological Survey, Washington, D.C.

McKenna, M., J. Ermer, S. Hagen, S. Dyke, R. Kreil, G. Link, and M. Johnson. 2004. Mountain lions in North Dakota: A report to the Director. North Dakota Game and Fish Department, Bismarck, North Dakota, USA.

North Dakota Game and Fish Department. 2006. Status of mountain lions (*Puma concolor*) in North Dakota: A report to the Legislative Council. North Dakota Game and Fish Department, Bismarck, North Dakota, USA.

North Dakota Game and Fish Department. 2007. Status of mountain lion management in North Dakota, 2007. North Dakota Game and Fish Department, Bismarck, North Dakota, USA.

Seabloom, R. W., M. G. McKenna, and R. D. Crawford. 1980. Recent records of mammals from southwestern North Dakota. Prairie Naturalist 12:199-123.

Stillings, B., W. Jensen, and J. Smith. 2016. Study No. C-I: Deer population studies. Project No. W-67-R-56, Report No. A-232, North Dakota Game and Fish Department, Bismarck, ND, USA.

Tucker, S. A. 2016. Study No. E-II: Furbearer harvest regulations study. Project No. W-67-R-56, Report No. C-477, North Dakota Game and Fish Department, Bismarck, North Dakota, USA.

Wilckens, D. 2014. Ecology of mountain lions (*Puma concolor*) in the North Dakota Badlands: population dynamics and prey use. Thesis, South Dakota State University, Brookings, South Dakota, USA.

Young, S. P., and E. A. Goldman. 1946. The puma: Mysterious American cat. Dover Publications, Inc., New York, New York, USA.

Table 1. Number of mountain lion reports recorded by classification in North Dakota, 1 July 2000 through 30 June 2016.

Fiscal year[a]	Verified[b]	Probable unverified[c]	Improbable unverified[d]	Unfounded[e]	Total
2000-2001	4	2	0	0	6
2001-2002	8	6	4	0	18
2002-2003	3	7	10	5	25
2003-2004	4	6	11	4	25
2004-2005	16	36	31	13	96
2005-2006	39	60	40	53	192
2006-2007	52	80	50	57	239
2007-2008	57	71	52	65	245
2008-2009	31	37	39	70	177
2009-2010	22	16	32	64	134
2010-2011	38	17	25	37	117
2011-2012	56	1	23	28	108
2012-2013	35	2	12	21	70
2013-2014	41	5	18	21	85
2014-2015	37	1	13	16	67
2015-2016	26	2	6	6	40

[a]July 1 through June 30.

[b]Evidence available, including a carcass or live-captured mountain lion, photograph or video, DNA analysis results, or tracks, scat, kill or attack confirmed as being that of a mountain lion by a qualified wildlife professional.

[c]No evidence available and the report, animal description, and/or location are plausible.

[d]No evidence available and the report, animal description, and/or location are not plausible.

[e]Evidence available which disproves the claim that it is a mountain lion, including carcass or live-captured animal, photograph or video, DNA analysis results, or tracks, scat, kill or attack disproved as being that of a mountain lion by a qualified wildlife professional.

Table 2. Reports of Verified mountain lion occurrence in North Dakota, 1 July 2000 through 30 June 2016.

Fiscal year [a]	Sign	Carcass	Visual observation	Incidental capture	Photograph/ Video	Total
2000-2001	3	1	0	0	0	4
2001-2002	4	0	3	0	1	8
2002-2003	2	0	0	0	1	3
2003-2004	3	0	0	0	1	4
2004-2005	6	2	4	0	4	16
2005-2006	22	5	11	0	1	39
2006-2007	32	12	6	1	1	52
2007-2008	30	12	8	0	7	57
2008-2009	10	11	4	0	6	31
2009-2010	5	12	3	0	2	22
2010-2011	14	22	0	0	2	38
2011-2012	14	33	3	0	6	56
2012-2013	14	20	0	0	1	35
2013-2014	10	22	0	0	8	41
2004-2015	12	22	1	0	2	37
2015-2016	3	17	0	0	5	26

[a]July 1 through June 30.

Table 3. Mountain lion mortalities in North Dakota, 1 July 2015 through 30 June 2016.

ID	Cause of death	Date	Sex	Estimated age class (yr)[a]	Weight (lbs)	County
M251	Roadkill	7/21/2015	M	0-1	66	Dunn
F252	Legal harvest	9/18/2015	F	3-4	75	Billings
M253	Roadkill	9/22/2015	M	1-2		Ramsey
M254	Legal harvest	10/24/2015	M	0-1	68	McKenzie
F255	Legal harvest	11/7/2015	F	1-2	77	McKenzie
F256	Legal harvest	11/13/2015	F	1-2	78	Billings
M257	Legal harvest	11/16/2015	M	2-3	118	Dunn
F258	Legal harvest	11/19/2015	F	2-3	92	Dunn
F259	Legal harvest	11/30/2015	F	2-3	83	McKenzie
M260	Legal harvest	12/11/2015	M	4-5	153	Dunn
M261	Legal harvest	12/12/2015	M	1-2	87	McKenzie
M262	Legal harvest	12/12/2015	M	1-2	107	McKenzie
M263	Legal harvest	12/12/2015	M	2-3	130	Dunn
F264	Legal harvest	12/12/2015	F	5-6	99	Dunn
M125	Legal harvest	12/13/2015	M	2-3	133	McKenzie
F265	Legal harvest	12/14/2015	F	3-4	99	McKenzie

[a]When possible, cementum analysis (Matson's Laboratory, Manhattan, Montana, USA) was used to determine age estimates. Otherwise, estimates of age followed that of Anderson and Lindzey (2000).

Figure 1. Harvest zones for mountain lions in North Dakota during the 2015-2016 season.

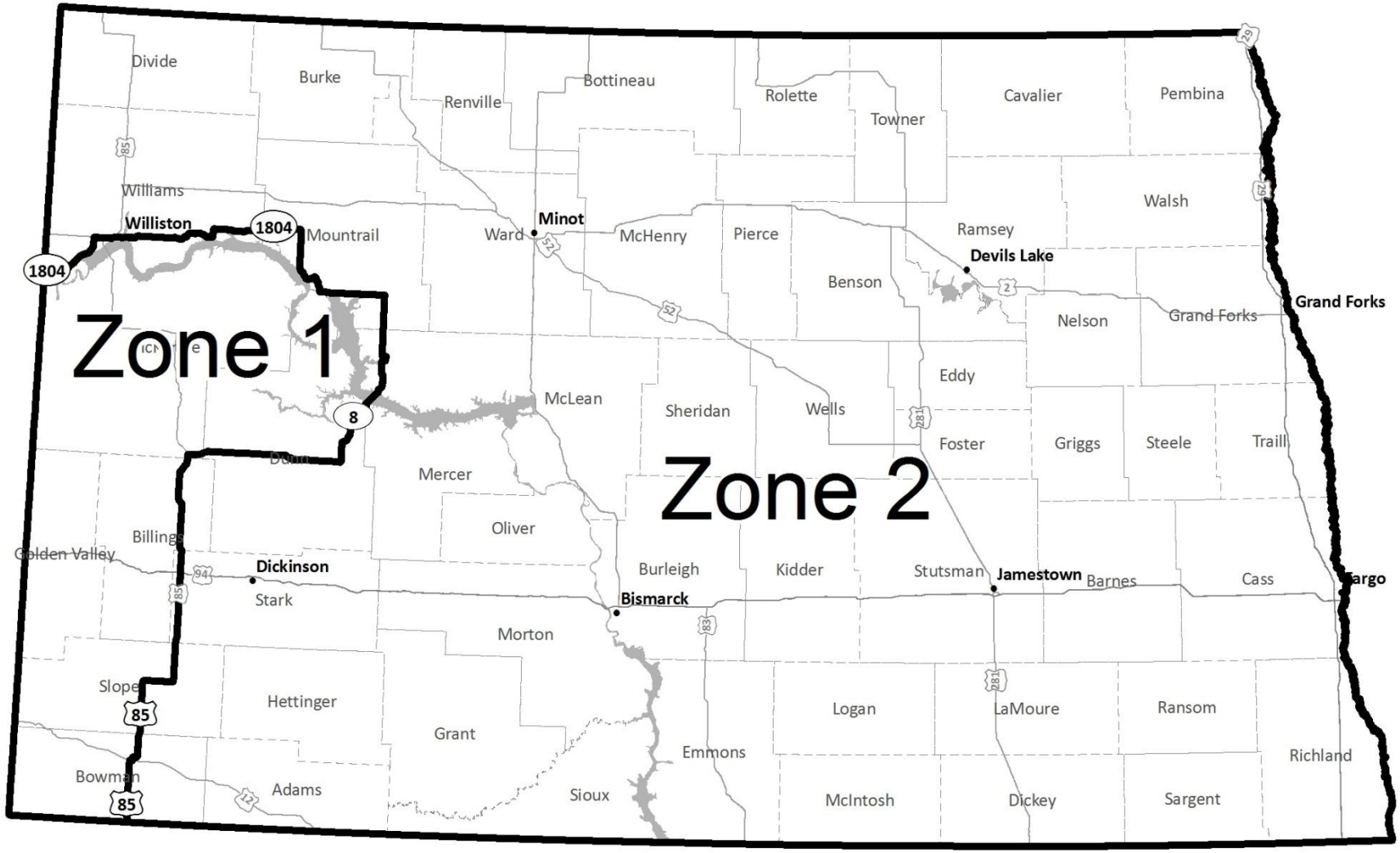
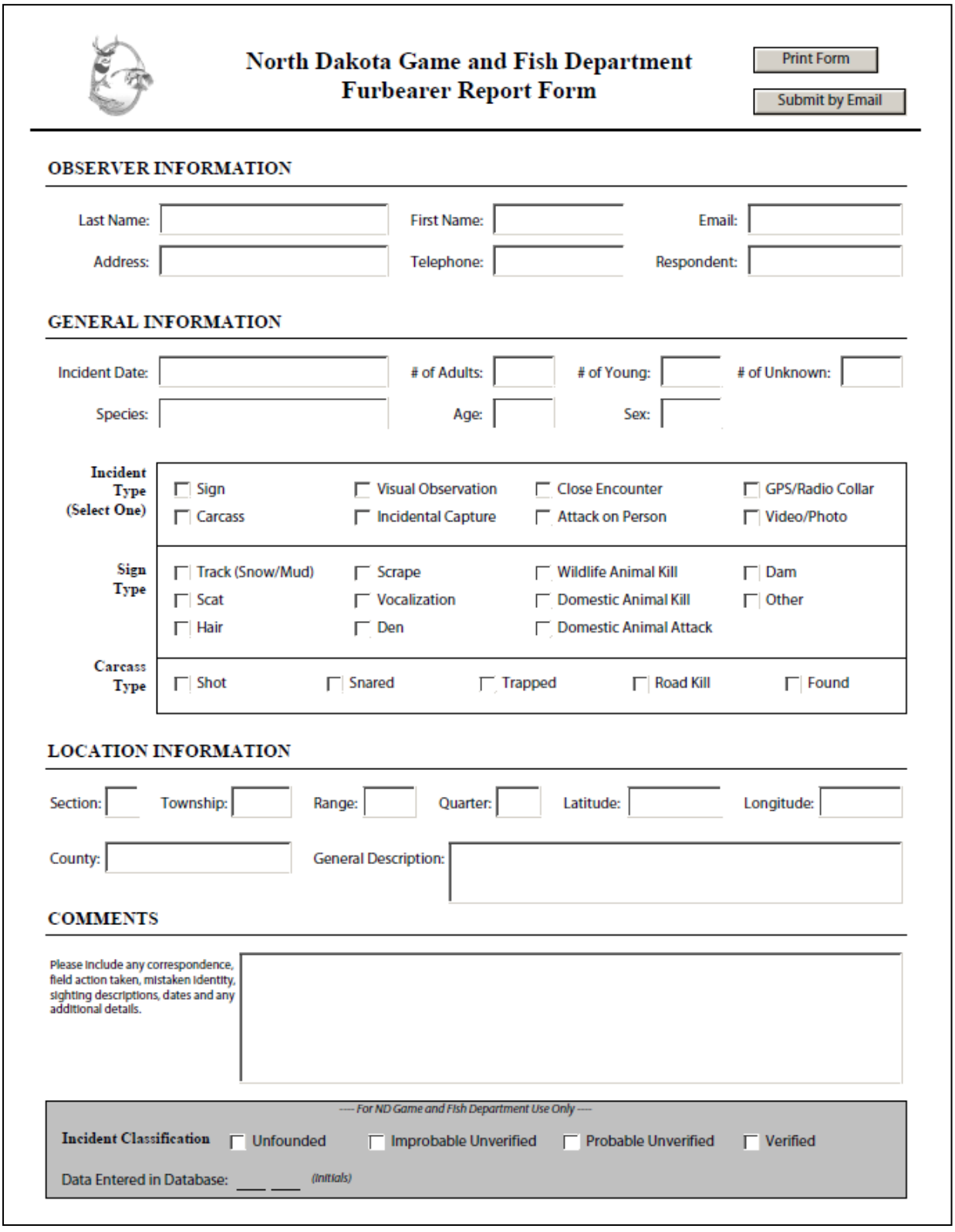


Figure 2. Report form used by North Dakota Game and Fish Department personnel to document the occurrence of mountain lions in the state.



North Dakota Game and Fish Department
Furbearer Report Form

Print Form | Submit by Email

OBSERVER INFORMATION

Last Name: | First Name: | Email:
Address: | Telephone: | Respondent:

GENERAL INFORMATION

Incident Date: | # of Adults: | # of Young: | # of Unknown:
Species: | Age: | Sex:

Incident Type (Select One)

☐ Sign ☐ Visual Observation ☐ Close Encounter ☐ GPS/Radio Collar
☐ Carcass ☐ Incidental Capture ☐ Attack on Person ☐ Video/Photo

Sign Type

☐ Track (Snow/Mud) ☐ Scrape ☐ Wildlife Animal Kill ☐ Dam
☐ Scat ☐ Vocalization ☐ Domestic Animal Kill ☐ Other
☐ Hair ☐ Den ☐ Domestic Animal Attack

Carcass Type

☐ Shot ☐ Snared ☐ Trapped ☐ Road Kill ☐ Found

LOCATION INFORMATION

Section: | Township: | Range: | Quarter: | Latitude: | Longitude:
County: | General Description:

COMMENTS

Please include any correspondence, field action taken, mistaken identity, sighting descriptions, dates and any additional details.

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Incident Classification ☐ Unfounded ☐ Improbable Unverified ☐ Probable Unverified ☐ Verified

Data Entered in Database: ___ ___ *(Initials)*

Figure 3. Number of reports of mountain lion occurrence in North Dakota, 1 July 2015 through 30 June 2016.

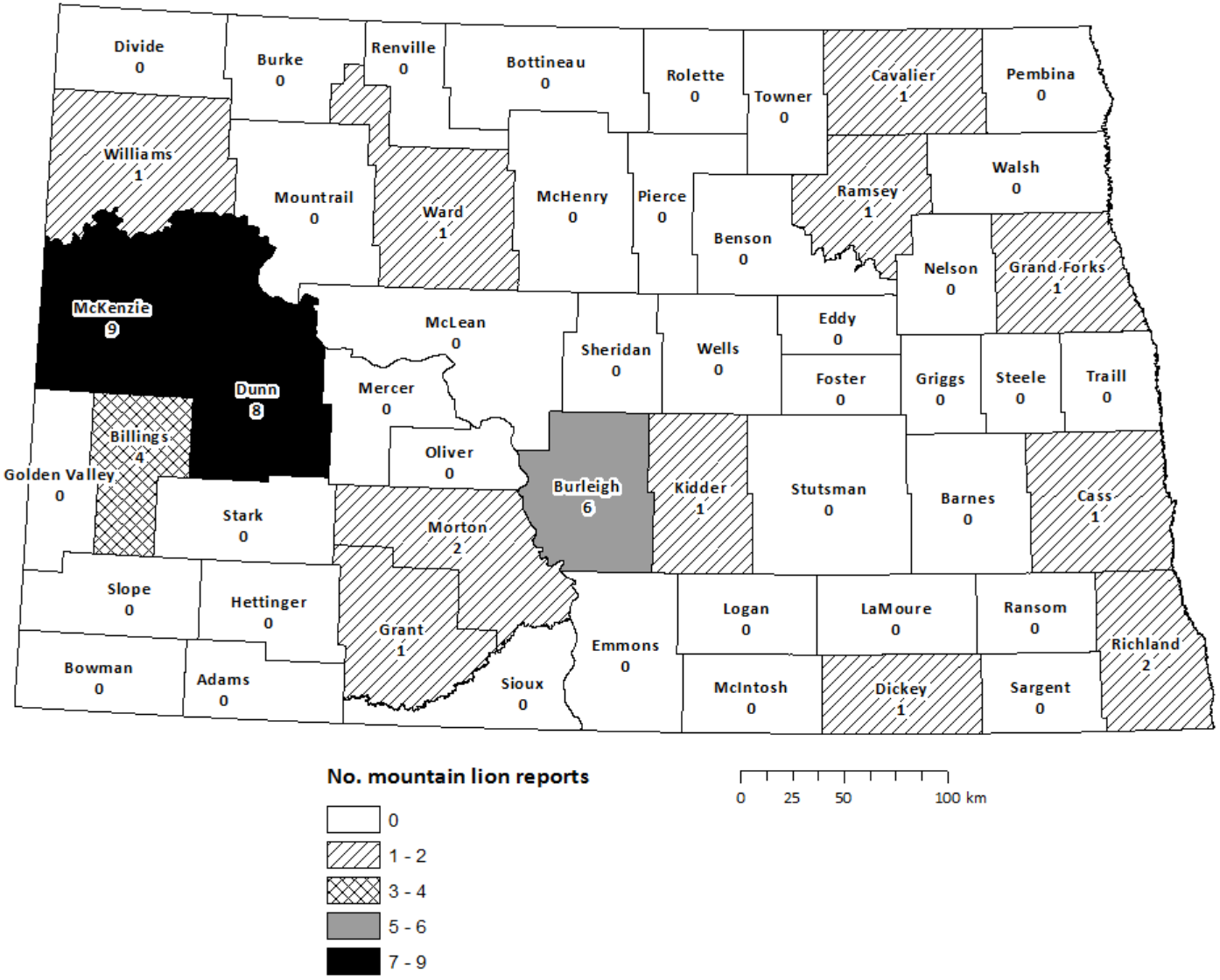

Figure 4. Number of reports of mountain lion occurrence in North Dakota, fiscal years (1 July-30 June) 2000-2001 through 2015-2016. Reports of occurrence were classified as Unfounded (evidence available to disprove the occurrence of a mountain lion), Unverified (no evidence available to prove or disprove the occurrence of a mountain lion), and Verified (evidence available to prove the occurrence of a mountain lion).

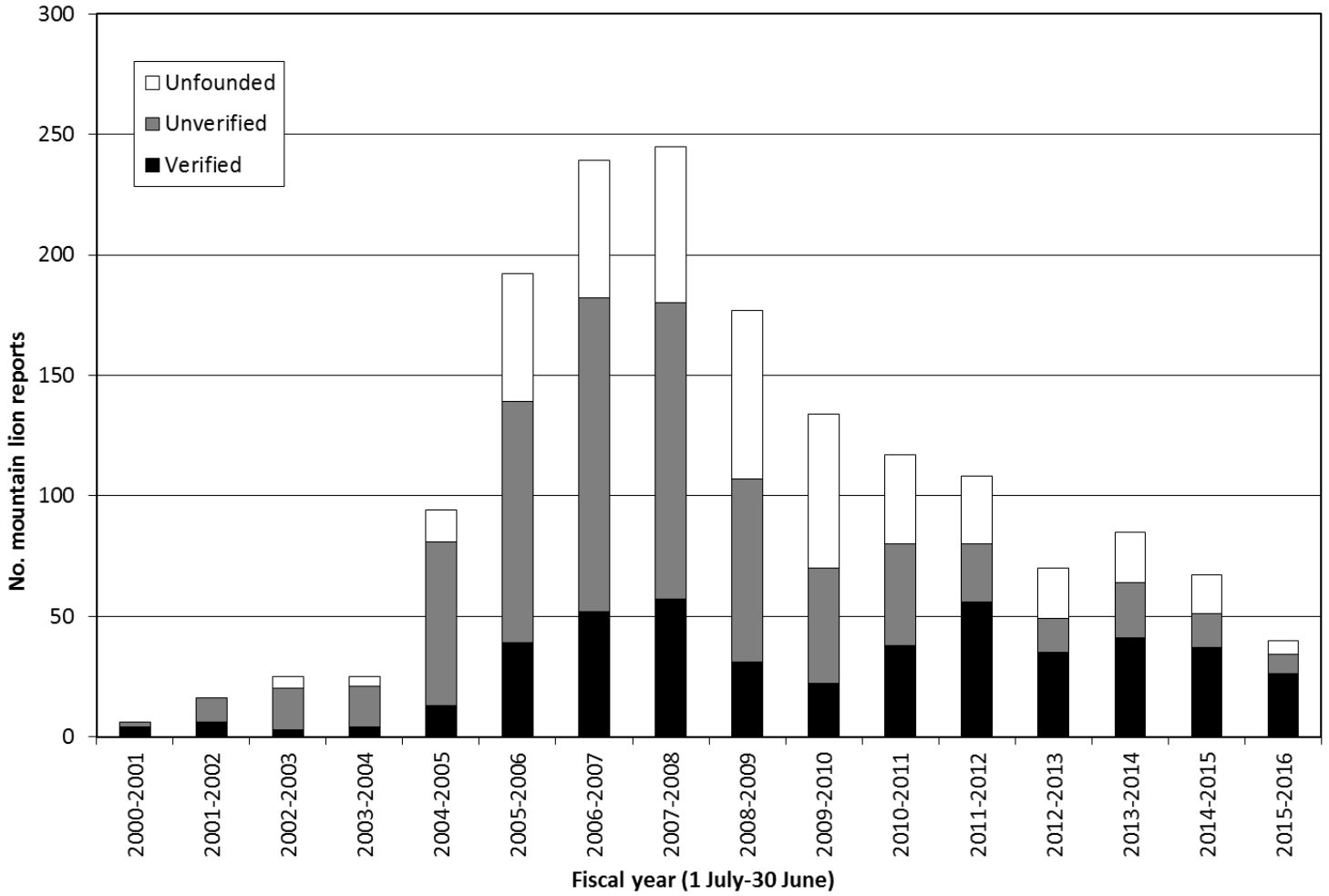

Figure 5. Locations of Verified reports of mountain lion occurrence in North Dakota, 1 July 2015 through 30 June 2016.

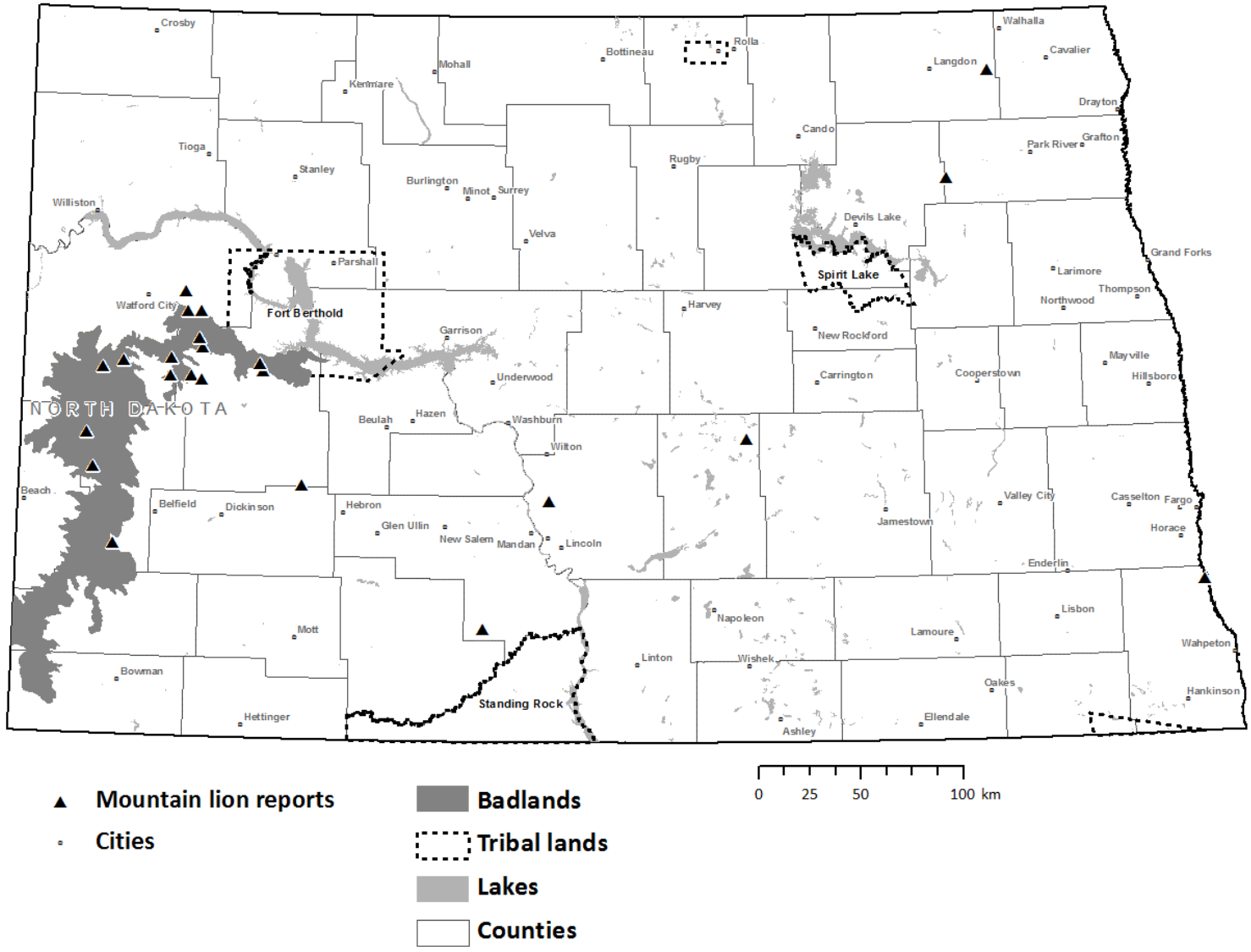

Figure 6. Deer management units where hunters reported observing a mountain lion while deer hunting in North Dakota, 2015.

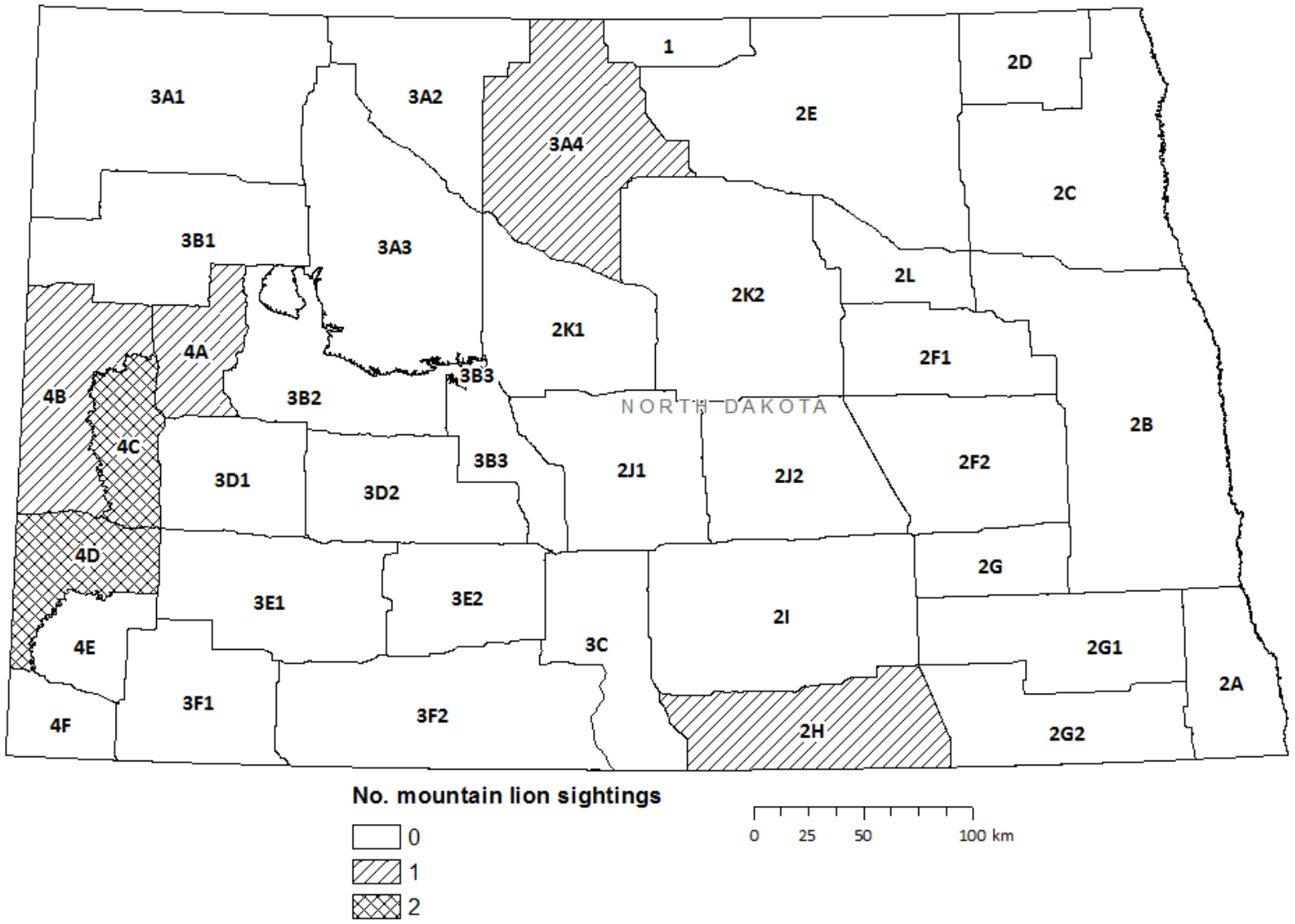

Figure 7. Number of documented mountain lion mortalities due to legal and illegal harvest, protection of property or self, incidental trapping or snaring, other or unknown human causes (automobile collisions, suspected poaching, etc.), and natural causes (predators, disease, etc.) in North Dakota, fiscal years (1 July-30 June) 2005-2006 through 2015-2016.