REGION ONE 2015
MOUNTAIN LION REPORT
MONTANA FISH, WILDIFE & PARKS

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Introduction

Mountain lions (*Puma concolor*) are prevalent throughout northwest Montana, where a minimum of 80% of Montana Fish, Wildlife & Parks' (MTFWP) Region 1 is considered ideal mountain lion habitat (Figure 1). The persistence of this large carnivore on the landscape is paramount to healthy ecosystem function, as mountain lions help maintain a balance of prey species. In addition, viable mountain lion populations provide recreational opportunity for sport hunters and houndsmen. Conservation of mountain lion populations throughout Montana requires careful harvest management, as human-related adult female mortality is additive to overall population survival (Cooley et al. 2011, Robinson et al. 2014).

Effective management of mountain lion populations requires knowledge of population size anddistribution, as well as mortality, immigration, and emigration rates. These parameters can vary dramatically among populations and are often difficult to measure, making management challenging (McKinney 2011). To add to the complexity of lion management, both male and female juvenile mountain lions can disperse relatively long distances (Thompson and Jenks 2005, Stoner et al. 2008, Thompson and Jenks 2010), and it is not understood how dispersal or survival impact populations with varying harvest regimes (Robinson et al. 2015). In Montana, Newby (2011) found a mean dispersal distance for male and female mountain lions to be 43 and 24 km, respectively. This dispersal distance is typically not considered when assessing harvest impacts across management units and administrative regions (Robinson et al. 2015).

In Region 1, mountain lions are managed as a prized big game species through a combination limited entry and quota system that was initiated in 2005. The goal of this harvest strategy is to maintain a high quality hunting experience and a balanced mountain lion social structure that allows for the persistence of older, dominant males on the landscape (Beausoleil et al. 2013, Peebles et al. 2013, Keehner et al. 2015), while preventing the overharvest of adult females. Conservation of the historic social dynamics of the mountain lion population in Region 1 is believed to have helped reduce the prevalence of younger subordinate lions that are often involved in human-related conflicts (Hornocker and Negri 2010). Furthermore, this strategy helps maintain larger mature males on the landscape. Region 1 adheres to a zero tolerance policy concerning lions involved in conflicts in urban areas. Lethal removal of conflict animals in urban areas helps maintain a public tolerance for mountain lions in forested areas of the region.

Maintaining viable mountain lion populations using the Region 1 harvest model requires accurate population estimates (Robinson et al. 2015); however, enumerating mountain lion populations remains a challenge to wildlife managers. Robinson et al. (2015) developed a metapopulation model incorporating resource selection functions, mortality estimates, and dispersal modeling to help predict effects of hunting strategies on mountain lion populations in Montana. While the model shows great promise in assisting adaptive management of mountain lions in Montana, the authors stress that population size has a significant impact on model results. Therefore, they recommend that management programs should include population monitoring to bolster model predictions (Robinson et al. 2015).

Methods

Harvest Management and Monitoring.— During the 2014/2015 regulatory year, mountain lion hunting in Region 1 was open to both resident and nonresident hunters by general season or by drawing a special license, depending on hunting district. Harvest of mountain lions was by Special Lion License, obtained through a drawing, in hunting districts 100, 101, 102, 103, 104, 109, 110, 120, 121, 122, 123, 124, and 130. In Hunting Districts 132, 140, 141, 150, 151, and 170 hunters could harvest a lion using a General Lion License. Legal animals included adult male and female mountains lions. It was not legal to kill a female mountain lion with kittens or any mountain lion with body spots. Harvest limit was restricted to one mountain lion per hunter. Hunting seasons for mountain lions during regulatory year 2014-2015 for all hunting districts, except HDs 150 and 151, were as follows:

Sept 06-Oct 19: Archery only, without dogs
Oct 25-Nov 30: Fall season, without dogs
Dec 01-April 14: Winter season, with dogs

In Hunting District 150 and 151, dogs could be used from September 15 through April 14 due to the wilderness nature of the districts.

Successful hunters were required to report by phone within 12 hours of harvesting and present the carcass for inspection within ten days of harvesting to a FWP officer. At time of inspection, a tooth was removed for aging by cementum analysis. Cementum analysis was conducted by Matson's Laboratory LLC.

Each hunting district in Region 1 maintained separate harvest quotas and male subquotas. Once 20% of the available quota is reached during the Archery Only or Fall Season, or a combination of the two, the corresponding season will be closed until the winter season. This restriction ensures that 80% of the harvest is reserved for the winter season. Once the male subquota is reached in a hunting district, males may no longer be harvested. The season will be completely closed when the total quota for a hunting district is reached.

Hound Training and Use of Dogs to Chase.— Both resident and nonresident hunters possessing a General Lion License or a Special Mountain Lion license could use dogs to chase mountain lions in any valid hunting district from December 2 through April 14, except for HDs 150 and 151, which was open for chasing from September 15 through April 15.

Residents hunters could purchase a Hound Training License, which allowed them to chase mountain lions with dogs in any valid hunting district from December 2 through April 14.

Population Monitoring.— There has never been a direct estimate of mountain lion population size in Region 1. Mountain lion densities in Region 1 have been estimated using density estimates from a long-term study conducted in the Garnet Mountains (Robinson et al. 2014, Robinson et al. 2015).

Conflict Management.— Human-mountain lion conflicts in Region 1 are addressed by the FWP conflict specialist, local area wildlife biologists, FWP wardens, and USDA Wildlife Services. Wildlife Services is permitted by FWP to address livestock depredation and conflicts, whereas FWP personnel address urban or other non livestock-related conflicts. Lions involved in conflicts are not relocated. Instead, FWP typically addresses conflicts with education and/or lethal removal.

Results

Harvest Management and Monitoring.— During the 2014/2015 regulatory year, hunters harvested 100 mountain lions (57 males and 43 females) in Region 1 (Table 1, Figure 2, Appendix A). Harvest limits were not met for any hunting district; however, male subquota limits were reached in Districts 103, 109, 120, 121, 122, and 124. The majority of the harvest occurred during the winter season (92%), with only eight lions killed during the fall season and none during the archery-only season. For the hunting districts with a special license drawing permit, hunter success rate ranged from 25% in HD 110 to 79% in HD 122 ($n = 13$, $x = 51 \pm 17\%$). Ninety-two percent of successful hunters used dogs to track lions to the kill location.

Cementum-based ages were obtained for 66 (30 females and 36 males) out of the 100 mountain lions harvested in 2014/2015 (Figure 3, Table A-2). The majority of females and males harvested were two years old (11 and 17 individuals, respectively). Adult females (≥ 2 years old) and adult males (≥ 3 years old) comprised 30% and 21%, respectively, of the harvested lions that were aged (Figure 4).

Hound Training and Use of Dogs to Chase.— In 2014, 389 people purchased hound training licenses, and 5016 purchased a resident mountain lion license statewide; all of these people could legally chase mountain lions using dogs during the winter season. Out of the 393 people who purchased hound training license, 121 resided in Region 1; however, houndsmen from other regions train their dogs in Region 1, due to the accessibility of roads and density of mountain lions. The Swan Valley, in particular, is popular with local houndsmen, as well as houndsmen from other regions. Currently there is no system to track the number of houndsmen actively chasing lions in Region 1 or the distribution and intensity of chase activities across the landscape.

Population Monitoring.— No survey activities were conducted in 2014 to estimate mountain lion numbers in Region 1. The population estimate used for Region 1 is based on density estimates generated from the Garnet Mountain lion study in 2005 (Table 2; Robinson and DeSimone 2011). Currently, the population is assumed to be stable.

Conflict Management.— In 2014, human-mountain lion conflicts were addressed by FWP area biologists, wildlife specialists, game wardens, and USDA Wildlife Services personnel. In Region 1, the majority of lion conflicts were received and addressed by FWP wildlife conflict specialists. FWP conflict specialists received 111 calls regarding mountain lion conflicts (Wenum and Jones 2015). Out of those 111 calls, only 8 site visits were warranted, and 6 mountain lions were lethally removed, all in the Whitefish area. An additional 6 mountain lions were killed by FWP wardens, for a total of 12 lethal removals during the regulatory year.

Conflicts occurred year-round, with a spike in May and June and then again in September and October (Figure 4).

Discussion

Harvest Management and Monitoring.— In northwest Montana, mountain lion harvest has fluctuated in response to harvest restrictions, as well as population status. Prior to 1986, harvest was unlimited; however, in response to increasing concerns of overharvest, a quota system was adopted in Region 1 in 1986. Harvest was then managed with a total quota and female subquota system through 1994, followed by a total quota system through 1999. Harvest steadily increased from the late 1980s (66 individuals in 1989) to the late 1990s (243 individuals in 1998). During this time period, quotas were increased; however, hunter success rate increased, as well (55% in 1986 to 98% in 1998). In fact, quotas were exceeded in 1995 and 1997. This boom in mountain lion harvest began to dramatically decline in 1999, as did success rate. In 2000, managers attempted to reduce harvest by restricting nonresident harvest through a special lion license obtained through a drawing; however, this system was abandoned in 2005, when the overall strategy for mountain lion management changed.

Monitoring the age structure of mountain lion harvest can help identify potential impacts of the harvest on the population. For example, under a general season with unlimited quota, the percent of older individuals in the harvest can indicate the status of the population. In the late 1980s, harvest was low and only 38 ± 3% of the harvest comprised older individuals (≥ 3 years). As the harvest steadily increased from 1990 to 1996, 66 ± 11% of the harvest was older individuals, suggesting an increase in overall population and hunting pressure. The age structure of the harvested population began to change in 1997, and the harvest followed suit by 1999. This decline in harvest was coupled with fewer adult and older lions in the harvest, an indication of a higher percentage of juveniles and subadults in the population. This skewed age structure was a further indication that the mountain lion population was also in decline at this time. From 1997 to 2004, only 39 ± 6% of the individuals harvested was 3 years or older, corresponding to an overall decline in harvest numbers. While total quotas were reduced during this time as well, success rates were also declining, which is yet another indication of population decline. The decline in older individuals, harvest level, and success rates, and suspected population numbers warranted a change in management strategies for mountain lions in Region 1.

In response, a combination of limited entry permits and a harvest quota system was initiated in 2005. Based on the Garnet Mountain density estimates, Robinson et al. (2015) estimated the initial starting population in Region 1 at 1101 individuals in 2005. Under the combined permit and quota system, the mean estimated population growth rate between 2005-2010 ranged from 1.01 ± 0.04 to 1.02 ± 0.04 (Robinson et al. 2015). This change in management also resulted in a higher percentage of older individuals (≥ 3 years) in the harvest (55 ± 6% from 2005-2013), with an average harvest of 108 ± 25 individuals per year. In 2013, the Commission passed a male subquota, limit-based system for Region 1, and in 2014, this harvest system was initiated. The resulting 2014 harvest of 100 individuals was within the average annual harvest for 2005-2013; however, the percent of older individuals in the harvest dropped to 35%. Regardless, this is only one year of data and does not equate to a decreasing trend in the age structure of the harvest.

In addition to age structure, monitoring the sex ratio of harvested animals is a critical component in managing mountain lion populations. Harvest-related mortality of adult female mountain lions is additive to overall survival rates of a population (Cooley et al. 2011, Robinson et al. 2014), and therefore minimizing the take of adult females is key to maintaining a stable population. From 2005 to 2013, most of Region 1 was managed with a female subquota, during which time 29 ± 7% of harvested individuals that were aged were adult females (≥ 2 years). With the current male subquota system, this percentage remained the same in 2014 (30%). The number of mountain lions that were harvested, and from which no tooth was extracted for aging, has increased in recent years. Prior to 2002, more than 92% of all harvested mountain lions were aged; however, after 2002, the percent of lions aged has consistently decreased. Since 2011, 29 ± 7% of the harvested lions were not aged, including 35% in 2014. Efforts are underway to increase the number of teeth collected and aged, as this lack of consistency in the age data impedes our ability to monitor harvest impacts and population status.

Hound Training and Use of Dogs to Chase.— The popularity of chasing mountain lions with dogs is evident by the number of hound training licenses sold annually. Since 2005, 410 ± 50 hound training licenses were sold in Montana each year. These licenses enable hounds men and women to maintain the level of training of their dogs and to train new dogs to hunt mountain lions. The utility of hounds in mountain lion hunting is apparent by the number of successful hunters that use hounds versus those that do not use hounds (92% in 2014). Therefore, hounds are an integral part of maintaining a mountain lion harvest in northwest Montana.

While using dogs to chase lions is assumed to have no impact on the lion population, no research has been completed on this subject. A study of captive mountain lions found elevated levels of fecal glucocorticoid metabolites in lions exposed to stressors and displaying a flight response (Bonier et al. 2004). Chronic stress has been shown to have serious negative impacts on reproductive, digestive, and immune systems (Sapolsky et al. 2000); however, it is not understood if stress related to being pursued may impact overall fitness of mountain lions in Montana. To better manage mountain lion populations, it would be beneficial to understand if repeated chase of individual lions occurs and to what extent, and if this level of pursuit results in a population-level impact.

Population Monitoring.— There has never been a direct effort to estimate the number of mountain lions in Region 1; however, based on density estimates from the Garnet Mountain lion study, the population was estimated to be 1101 in 2005 (Robinson et al. 2015). Harvest levels from 2005 through 2010 suggest that the population increased through 2010. Regardless, the regulatory changes implemented by the Commission in 2012/2013 were projected to result in a 5% decrease in the overall population in Region 1 (Robinson et al. 2015).

Currently, FWP is revising its mountain lion management plan. With this revision, a new statewide genetic population monitoring program is being suggested. This program will provide population data that will then be used to model harvest impacts. Establishing a genetic mark recapture study area in Region 1 will provide regular population estimates so that harvest impacts can be evaluated specifically in northwest Montana. We recommend establishing two monitoring study sites in Region 1, preferably hunting districts that would provide a range of mountain lion density, as well as hunter accessibility.

Conflict Management.— Human-mountain lion conflicts have decreased in recent years; however, as human populations increase in Region 1, particularly in and around the Flathead Valley, the potential for conflicts may increase, as well. Therefore, it is paramount that the department continues efforts to educate the public on how to mitigate human-lion conflicts. Furthermore, as we move into the new population and harvest monitoring program, it will be important to fully document all mountain lion mortality, which includes accurate numbers, sexes, and ages of individuals lethally removed by FWP and USDA. Information on location and types of conflicts will also help us understand how to better mitigate conflicts in the future through increased education.

Conclusions and Recommendations.— Mountain lion hunting and conservation is rooted in the tradition of Region 1 and northwest Montana. Maintaining mountain lions as a prized big game species is paramount to the persistence of this hound-based, hunting tradition and the mountain lion population, alike. The current harvest strategy employed in Region 1 is considered a model for western states by M. Hornocker, a pioneer in mountain lion research and management in North America (Hornocker and Negri 2010). Regardless, the current male subquota limited system is still relatively new and depends highly on the concept that mountain lion hunters select for males. Once the male subquota is reached, it is expected that the desire to harvest female cats will be low and harvest limits will not be reached or exceeded; however, if adult females are harvested at a rate that exceeds 10% of the estimated number of adult females in the population, lion numbers are expected to decline. In 2014/2015, this female limit was exceeded in Hunting Districts 122 and 132. While one year of such overharvest is not a serious concern, multiple years of female overharvest will cause a population decline. Therefore, we recommend monitoring the adult female component of the harvest closely for sustainable levels. If this trend continues, we recommend decreasing total harvest limits for those hunting districts or considering a sex-based permit system.

Literature Cited

Beausoleil, R. A., G. M. Koehler, B. T. Maletzke, B. N. Kertson, and R. B. Wielgus. 2013. Research to regulation: cougar social behavior as a guide for management. Wildlife Society Bulletin 37:680-688.

Bonier, F., H. Quigley, and S. N. Austad. 2004. A technique for non-invasively detecting stress response in cougars. Wildlife Society Bulletin 32:711-717.

Cooley, H. S., K. D. Bunnell, D. C. Stoner, and M. L. Wolfe. 2011. Population maangement: cougar hunting. Pages 111-133 *in* J. A. Jenks, H. S. Cooley, andM. R. Conover, editors. Managing Cougars in North America. Jack Berryman Institute, Utah State University, Logan, UT.

Hornocker, M., and S. Negri. Editors, 2010. Cougar: ecology and conservation. University of Chicago Pres, Chicago, Illinois, USA.

Keehner, J. R., R. B. Wielgus, B. T. Maletzke, and M. E. Swanson. 2015. Effects of male targeted harvest regime on sexual segregation in mountain lion. Biological Conservation 192:42-47.

McKinney, T. D. 2011. Cougar research and mangement needs. Pages 189-200 *in* J. A. Jenks, H. S. Cooley, andM. R. Conover, editors. Managing Cougars in North America. Jack H. Berryman Institute Press, Utah State University, Logan, Utah.

Newby, J. 2011. Puma Dispersal Ecology in the Central Rocky Mountains. University of Montana, Missoula, Montana.

Peebles, K. A., R. B. Wielgus, B. T. Maletzke, and M. E. Swanson. 2013. Effects of remedial sport hunting on cougar complaints and livestock depredations. Plos One 8:1-8.

Robinson, H.S. and R. M. DeSimone. 2011. The Garnet Range Mountain Lion Study: Characteristics of a hunted population in west-central Montana. Final Report, Montana Department of Fish, Wildlife & Parks, Wildlife Bureau, Helena, Mt. 102 pp.

Robinson, H. S., R. Desimone, C. Hartway, J. A. Gude, and M. J. Thompson. 2014. A test of the compensatory mortality hypothesis in mountain lions: a management experiment in west-central Montana. The Journal of Wildlife Management 78:791-807.

Robinson, H. S., T. Ruth, J. Gude, D. Choate, R. DesSimone, M. Hebblewhite, K. E. Kunkel, M. R. Matchett, M. S. Mitchell, K. Murphy, and J. Williams. 2015. Linking resource selection and mortality modeling for population estimation of mountain lions in Montana. Ecological Modelling 312:11-25.

Sapolsky, R. M., L. M. Romero, and A. U. Munck. 2000. How do glucocorticoids influence stress responses? Integrating permissive suppressive, stimulatory, and preparative actions. Endocrine Reviews 21: 55-89.

Stoner, D. C., W. R. Rieth, M. L. Wolfe, M. B. Mecham, and A. Neville. 2008. Long-distance dispersal of a female cougar in a basin and range landscape. Journal of Wildlife Mangement 72:933-939.

Thompson, D. J., and J. A. Jenks. 2005. Long-distance dispersal by a subadult male cougar from the Black Hills, South Dakota. Journal of Wildlife Mangement 69:818-820.

_____. 2010. Dispersal movements of subadult cougars from the Black Hills: hte notions of range expansion and recolonization. Ecosphere 1:1-11.

Table 1. Region 1 mountain lion quotas and harvest and other human-caused mortality for the 2014/2015 regulatory year.

HD	Season Type	Licenses/ Quotas	Male Subquota	Harvest			Other Human-Caused Mortality			Grand Total
				Males	Females	Total	Males	Females	Unk	
100	Special License	24	12	5	8	13	0	2	0	15
101	Special License	12	5	3	2	5	1	1	1	8
102	Special License	12	5	4	1	5	0	0	0	5
103	Special License	12	7	7	2	9	1	0	0	10
104	Special License	12	7	1	3	4	1	2	2	9
109	Special License	8	4	4	1	5	0	1	0	6
110	Special License	8	4	2	0	2	0	0	0	2
120	Special License	11	4	4	0	4	1	0	0	5
121	Special License	22	8	8	6	14	0	0	0	14
122	Special License	14	5	5	6	11	0	0	0	11
123	Special License	7	3	1	3	4	0	0	0	4
124	Special License	5	2	2	0	2	0	0	0	2
130	Special License	14	5	4	1	5	0	0	0	5
132	General Season	10	None	5	4	9	0	0	1	10
140	General Season	6	None	2	6	8	0	0	0	8
141	General Season	6	None	0	0	0	0	0	0	0
150 & 151	General Season	7	None	0	0	0	0	0	0	0
170	General Season	----- Unlimited -----		0	0	0	0	0	0	0
Unknown							1	0	1	2
Total		190		57	43	100	5	6	5	112

Table 2. Region 1 mountain lion density estimates by hunting district based on estimates from 2005 Garnet Mountain Lion study (Robinson and DeSimone 2011). Adult females includes individuals ≥ 2 years old.

		Density (lion/km^2)			Adult Female Density (lion/km^2)		
HD	Estimated Lion Habitat (km^2)	Low	Medium	High	Low	Medium	High
100	3,070	94	133	174	39	50	68
101	1,218	34	47	62	14	18	25
102	1,270	38	54	71	16	21	28
103	1,741	54	76	100	23	29	40
104	1,625	52	73	96	21	27	37
109	574	14	20	26	5	7	9
110	1,896	53	74	98	21	27	36
120	1,025	31	43	57	13	17	23
121	2,142	74	104	137	30	38	52
122	1,577	52	73	96	21	28	38
123	578	22	32	42	9	12	16
124	261	9	13	16	4	5	6
130	1,343	32	45	58	13	16	22
132	511	13	18	24	5	7	9
140	1,648	57	81	106	23	29	40
141	714	24	34	44	9	12	16
150,151	1,639	47	67	88	17	22	30
170	105	1	2	2	0	1	1

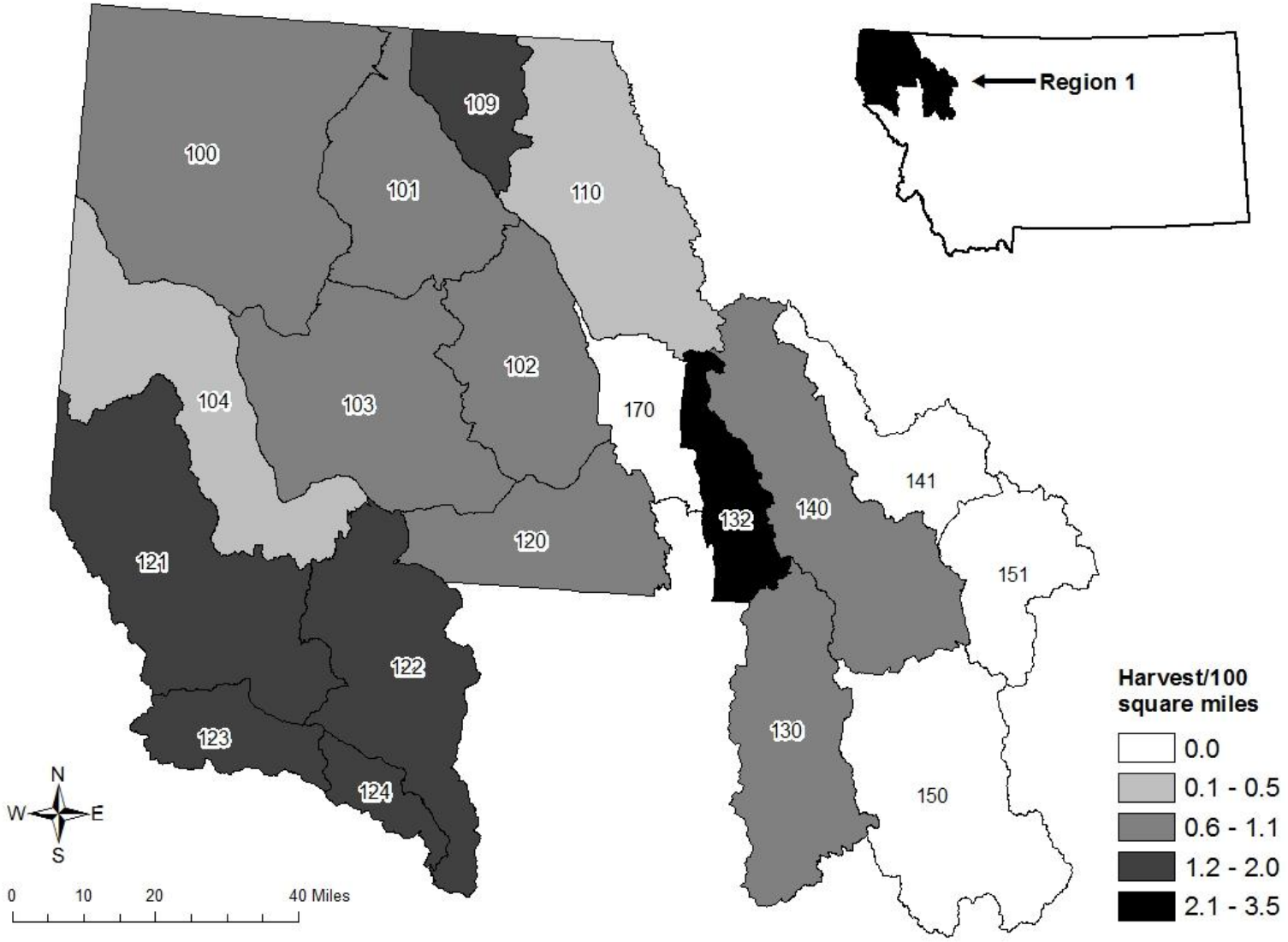

Figure 1. Harvest densities of mountain lions in Region 1, northwest Montana (2014/2015). Densities expressed in lions per 100 sq miles.

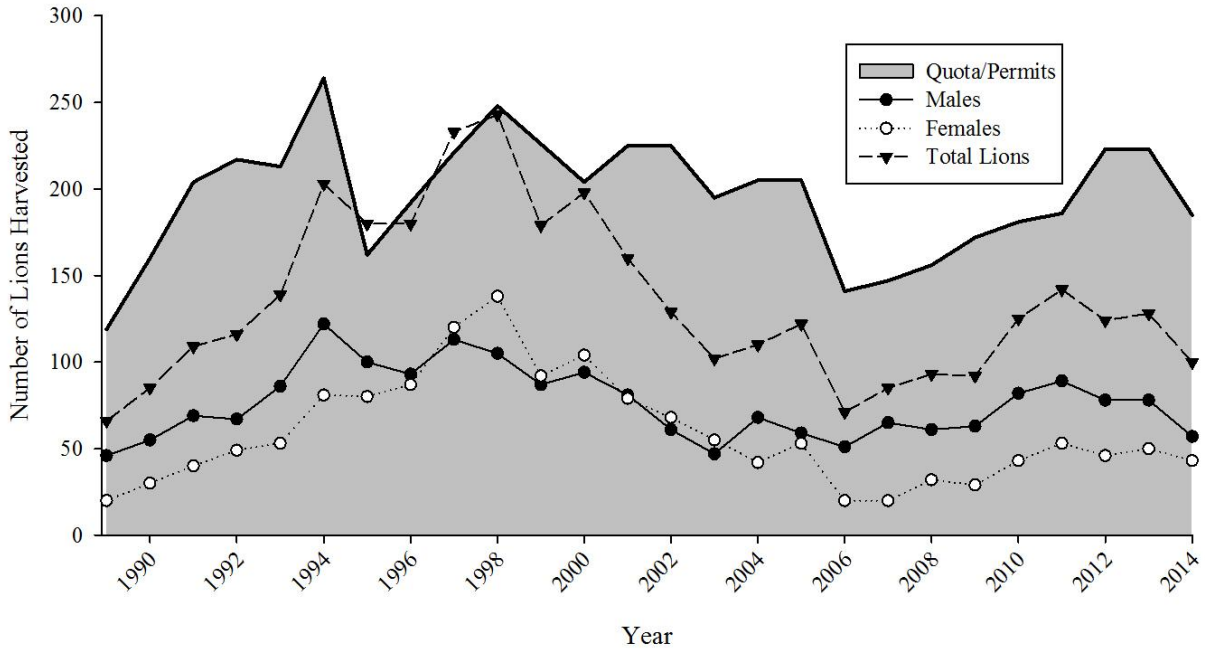

Figure 2. Mountain lion harvest in Region 1, northwest Montana, (1989-2014). Total number may include lions of unknown sex.

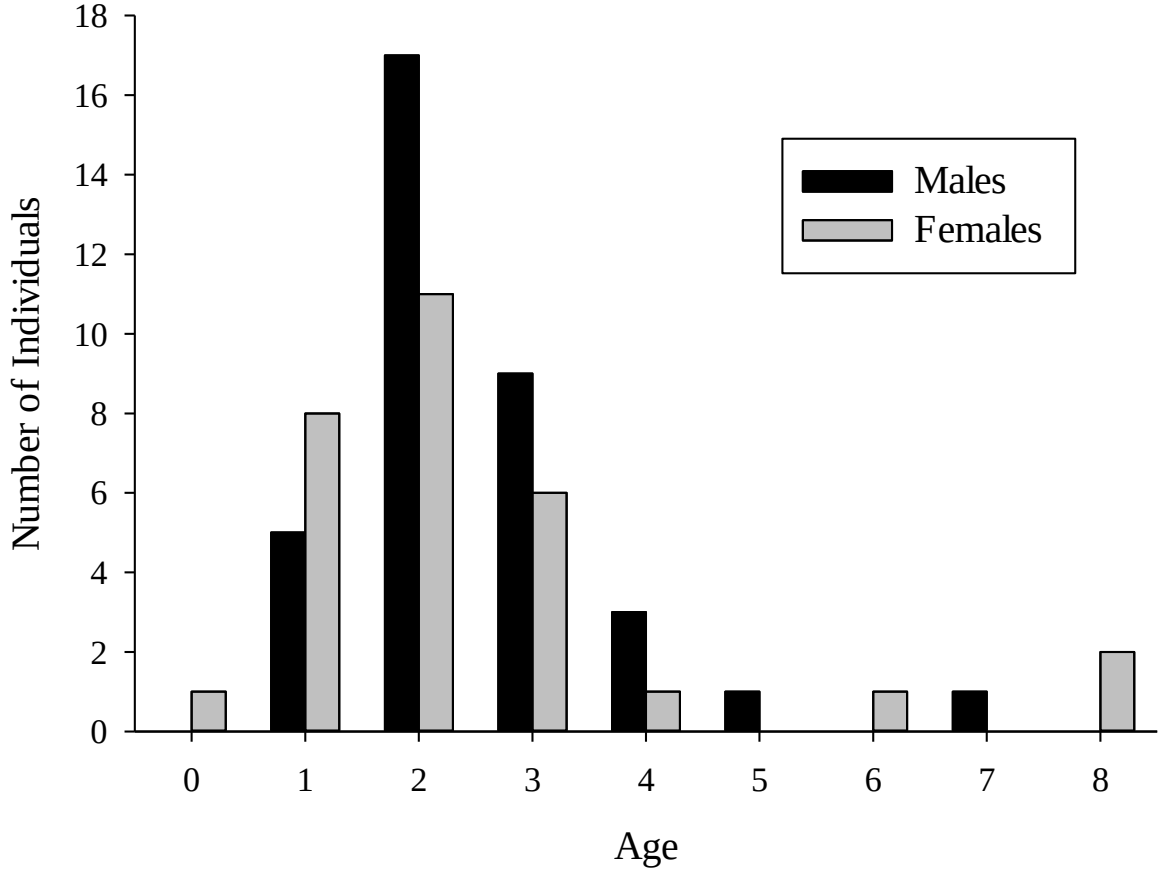

Figure 3. Age distribution of mountain lions harvested in Region 1, northwest Montana, in 2014/2015 regulatory year (females: n = 30 , males: n = 36). Mountain lions of unknown age not included (n = 34).

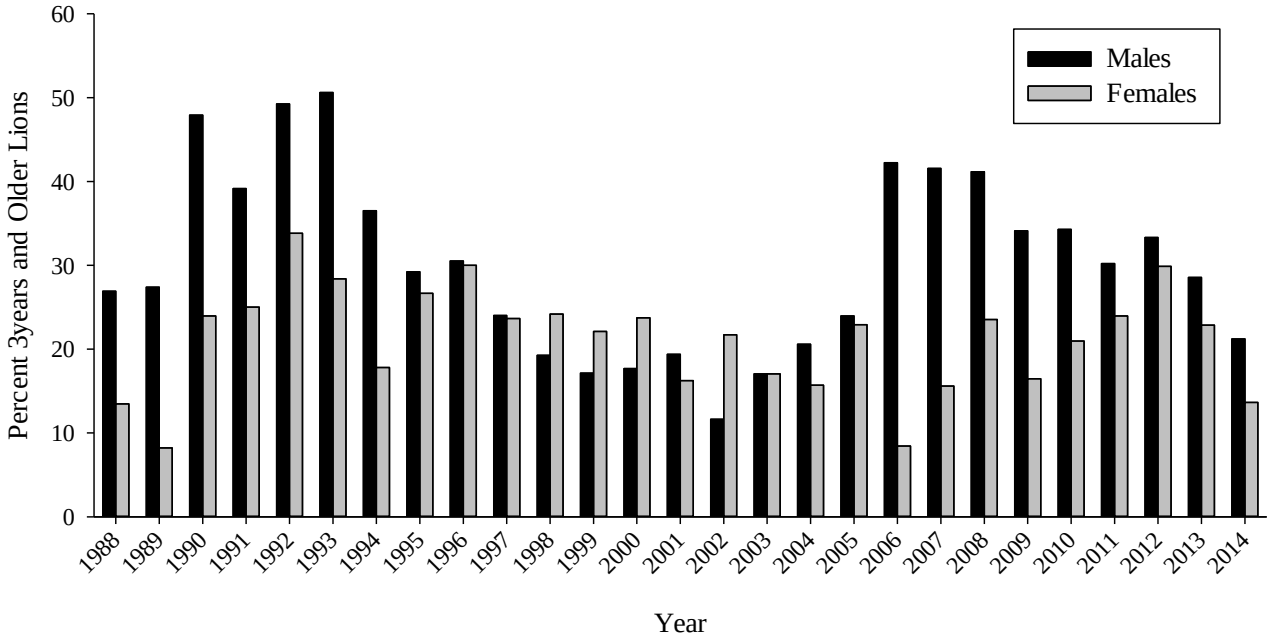

Figure 4. Percentage of adult mountain lions (≥ 3 years old) harvested in Region 1, northwest Montana (1988-2014).

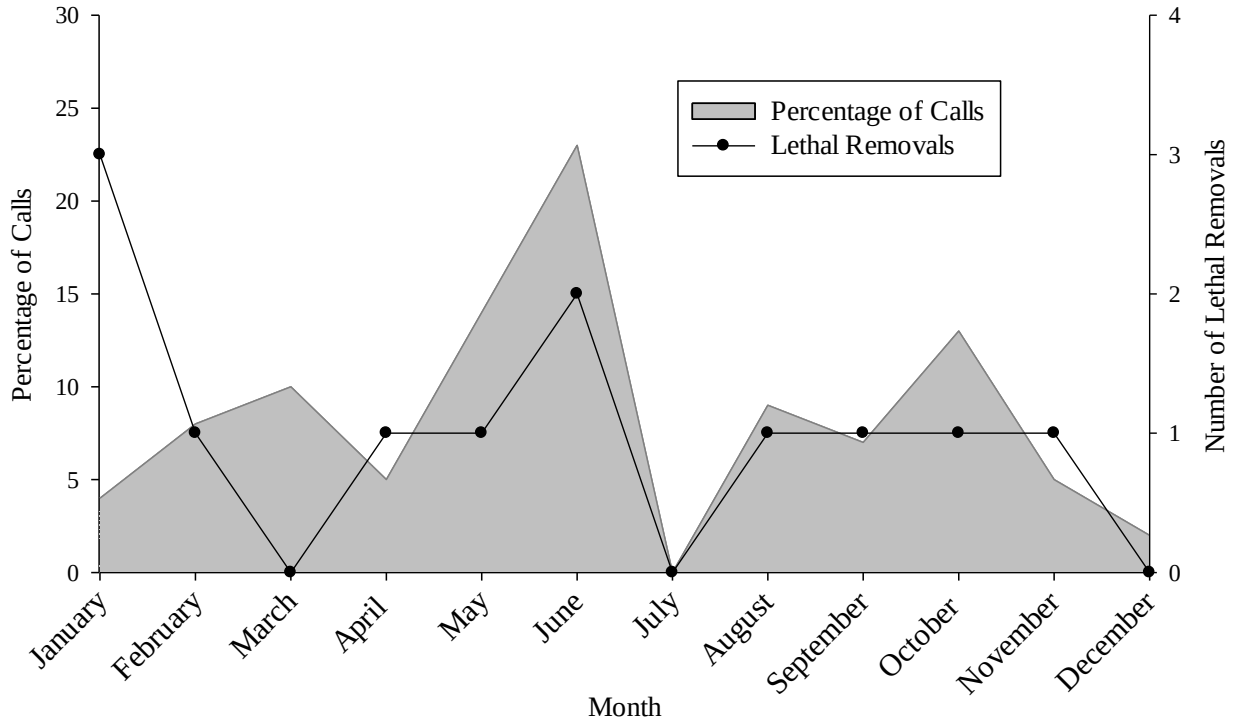

Figure 5. Distribution of human-mountain lion conflict calls (n = 111) and lethal removals (n = 12) during regulatory year 2014/2015 in Region 1, northwest Montana.

APPENDIX A

Table A-1. Mountain lion harvest in Region 1, northwest Montana, by hunting district (1989-2014).

	100			101			102			103			104			109			110		
Year	M	F	Tot	M	F	Tot	M	F	Tot	M	F	Tot	M	F	Tot	M	F	Tot	M	F	Tot
1989	6	5	11	4	2	6	1	3	4	1	0	1							5	1	6
1990	9	3	12	6	1	7	1	3	4	3	3	6	1	1	2				5	1	6
1991	8	6	14	6	2	8	5	2	7	11	1	12	0	0	0				4	4	8
1992	12	5	17	7	6	13	6	1	7	3	5	8	2	0	2				7	5	12
1993	16	5	21	6	5	11	8	3	11	6	2	8	0	2	2				5	5	10
1994	12	13	25	12	9	21	4	2	6	8	8	16	10	1	11				7	3	10
1995	15	6	21	9	8	17	6	2	8	10	6	16	4	6	10				4	6	10
1996	11	13	24	11	6	17	6	3	9	13	11	24	7	3	10				7	4	11
1997	12	13	25	9	15	24	7	8	15	13	7	20	8	7	15				7	5	12
1998	16	15	32*	9	13	22	6	9	15	13	12	25	8	7	15				7	8	15
1999	9	10	19	10	4	14	3	10	13	10	3	13	7	2	9				3	3	6
2000	7	23	30	8	8	16	9	6	15	12	6	18	7	2	9				2	4	6
2001	10	6	16	10	9	19	7	7	14	5	9	14	5	4	9				3	4	7
2002	12	11	23	5	3	8	5	5	10	3	3	6	3	5	8	0	1	2	2	1	3
2003	10	11	21	2	3	5	6	1	7	3	2	5	2	3	5	1	1	2	2	2	4
2004	9	4	13	3	2	5	5	1	6	3	1	4	4	2	6	0	2	2	5	3	8
2005	10	13	23	5	1	6	3	2	5	4	1	5	1	2	4*	3	1	4	2	5	7
2006	9	2	11	0	2	2	1	2	3	4	0	4	3	1	4	1	0	1	2	1	3
2007	7	0	7	5	0	5	2	1	3	7	1	8	6	2	8	0	1	1	2	1	3
2008	12	7	19	2	1	3	5	0	5	4	2	6	3	3	6	1	2	3	2	2	4
2009	6	3	9	4	3	7	3	2	5	4	2	6	4	1	5	2	1	3	3	1	4
2010	8	6	14	7	3	10	4	4	8	6	3	9	3	2	5	6	3	9	3	2	5
2011	10	9	19	7	3	10	6	4	10	5	3	8	8	3	11	6	2	8	4	3	7
2012	11	7	18	5	4	9	8	4	12	5	1	6	2	2	4	2	1	3	1	3	4
2013	6	11	17	5	4	9	7	5	12	4	1	5	4	1	5	2	3	5	0	3	3
2014	5	8	13	3	2	5	4	1	5	7	2	9	1	3	4	4	1	5	2	0	2

* Includes one lion of unidentified sex

Table A-1. (cont.)

	120			121			122			123			124			130			132		
Year	M	F	Tot	M	F	Tot	M	F	Tot	M	F	Tot	M	F	Tot	M	F	Tot	M	F	Tot
1989	3	1	4	8	2	10	3	2	5	4	2	6				8	2	10			
1990	4	0	4	10	3	13	3	2	5	3	3	6				2	7	9	2	2	4
1991	1	1	2	6	6	12	8	2	10	9	3	12				5	6	11	5	5	10
1992	1	2	3	6	6	12	4	6	10	2	3	5	2	1	3	6	3	9	5	2	7
1993	2	0	2	13	10	23	4	1	5	6	3	9	1	1	2	8	8	16	6	2	8
1994	4	3	7	15	12	27	12	10	22	5	5	10	2	1	3	14	2	16	8	7	15
1995	5	6	11	15	11	26	9	5	14	4	3	7	3	1	4	7	8	15	5	6	11
1996	3	5	8	10	9	19	10	10	20	2	5	7	1	2	3	3	8	11	5	5	10
1997	3	4	7	15	15	30	12	15	27	6	4	10	3	1	4	8	13	21	6	7	13
1998	4	2	6	12	21	33	11	14	25	3	9	12	2	3	5	5	15	20	6	5	11
1999	5	6	11	13	18	31	13	10	23	5	5	10	2	3	5	1	8	9	4	9	13
2000	5	3	8	12	12	24	11	13	24	4	5	9	1	3	4	5	9	14	8	5	13
2001	3	8	11	11	12	23	8	7	15	4	3	7	2	1	3	5	8	13	4	0	4
2002	5	5	10	10	11	21	6	7	13	1	4	5	1	1	2	3	7	10	2	1	3
2003	2	5	7	10	8	18	2	5	7	2	2	4	1	1	2	2	5	7	0	2	2
2004	2	5	7	9	10	19	3	2	5	3	2	5	1	2	3	9	2	11	6	2	8
2005	3	3	6	8	9	17	3	4	7	4	2	6	2	1	3	4	4	8	5	0	5
2006	0	2	2	9	8	17	5	0	5	4	1	5	1	1	2	6	0	6	3	0	3
2007	4	0	4	9	7	16	2	0	2	5	0	5	2	0	2	5	2	7	4	4	8
2008	2	0	2	12	3	15	5	1	6	2	3	5	0	1	1	3	1	4	5	3	8
2009	5	0	5	9	5	14	6	4	10	0	0	0	2	0	2	5	3	8	6	2	8
2010	3	2	5	16	7	23	6	0	6	3	1	4	2	1	3	6	4	10	5	4	9
2011	3	2	5	12	7	19	7	4	11	1	1	2	2	1	3	8	1	9	5	4	9
2012	2	2	4	16	7	23	6	2	8	4	0	4	2	1	3	7	2	9	4	7	11
2013	2	1	3	15	8	23	8	5	13	4	0	4	3	0	3	10	1	11	5	3	8
2014	4	0	4	8	6	14	5	6	11	1	3	4	2	0	2	4	1	5	5	4	9

Table A-1. (cont.)

	140			141			150			151			170			Region 1		
Year	M	F	Tot	M	F	Tot	M	F	Tot	M	F	Tot	M	F	Tot	M	F	Tot
1989	1	0	1	1	0	1	0	0	0	0	0	0	1	0	1	46	20	66
1990	4	1	5	1	0	1	1	0	1	0	0	0	0	0	0	55	30	85
1991	1	1	2	0	1	1	0	0	0	0	0	0	0	0	0	69	40	109
1992	4	3	7	0	0	0	0	1	1	0	0	0	0	0	0	67	49	116
1993	4	5	9	0	0	0	1	1	2	0	0	0	0	0	0	86	53	139
1994	5	2	7	0	1	1	3	2	5	1	0	1	0	0	0	122	81	203
1995	3	4	7	1	1	2	0	1	1	0	0	0	0	0	0	100	80	180
1996	2	1	3	0	0	0	0	2	2	2	0	2	0	0	0	93	87	180
1997	3	5	8	1	1	2	0	0	0	0	0	0	0	0	0	113	120	233
1998	3	5	8	0	0	0	0	0	0	0	0	0	0	0	0	105	138	243*
1999	1	1	2	1	0	1	0	0	0	0	0	0	0	0	0	87	92	179
2000	3	5	8	0	0	0	0	0	0	0	0	0	0	0	0	94	104	198
2001	4	1	5	0	0	0	0	0	0	0	0	0	0	0	0	81	79	160
2002	2	2	4	1	0	1	0	1	1	0	0	0	0	0	0	61	68	129
2003	2	3	5	0	1	1	0	0	0	0	0	0	0	0	0	47	55	102
2004	6	2	8	0	0	0	0	0	0	0	0	0	0	0	0	68	42	110
2005	2	4	6	0	0	0	0	1	1	0	0	0	0	0	0	59	53	112*
2006	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	51	20	71
2007	5	1	6	0	0	0	0	0	0	0	0	0	0	0	0	65	20	85
2008	3	2	5	0	0	0	0	1	1	0	0	0	0	0	0	61	32	93
2009	3	2	5	0	0	0	0	0	0	1	0	1	0	0	0	63	29	92
2010	4	1	5	0	0	0	0	0	0	0	0	0	0	0	0	82	43	125
2011	3	3	6	0	0	0	0	1	1	0	0	0	2	2	4	89	53	142
2012	3	3	6	0	0	0	0	0	0	0	0	0	0	0	0	78	46	124
2013	2	4	6	1	0	1	0	0	0	0	0	0	0	0	0	78	50	128
2014	2	6	8	0	0	0	0	0	0	0	0	0	0	0	0	57	43	100

* Includes one lion of unidentified sex.

Table A-2. Age structure of harvested mountain lions in Region 1, northwest Montana (1988-2014). The numbers in parentheses are percentages.

		Age																						Total	Unaged	
Year	Sex	0.5		1		2		3		4		5		6		7		8		9		10		aged	adults	Total
1988	Male	1	(3)	7	(21)	12	(35)	6	(18)	4	(12)	2	(6)	0		1	(3)	1	(3)	0		0		34	0	34
	Female	1	(6)	3	(17)	7	(39)	1	(6)	1	(6)	2	(11)	0		2	(11)	1	(6)	0		0		18	0	18
	Total	2	(4)	10	(19)	19	(37)	7	(13)	5	(10)	4	(8)	0		3	(6)	2	(4)	0		0		52	0	52
1989	Male	6	(12)	9	(18)	14	(29)	10	(20)	2	(4)	2	(4)	2	(4)	1	(2)	1	(2)	0		2	(4)	49	1	50
	Female	5	(21)	10	(42)	3	(13)	1	(4)	2	(8)	1	(4)	1	(4)	0		0		0		1	(4)	24	0	24
	Total	11	(15)	19	(26)	17	(23)	11	(15)	4	(5)	3	(4)	3	(4)	1	(1)	1	(1)	0		3	(4)	73	1	74
1990	Male	1	(2)	9	(15)	6	(10)	10	(16)	10	(16)	13	(21)	4	(6)	3	(5)	5	(8)	0		1	(2)	62	2	64
	Female	0	0	4	(12)	7	(21)	7	(21)	4	(12)	3	(9)	3	(9)	2	(6)	2	(6)	0		2	(6)	34	2	36
	Total	1	(1)	13	(14)	13	(14)	17	(18)	14	(15)	16	(17)	7	(7)	5	(5)	7	(7)	0		3	(3)	96	5	101
1991	Male	4	(5)	9	(12)	17	(22)	0	0	16	(21)	9	(12)	4	(5)	10	(13)	5	(6)	2	(3)	1	(1)	77	4	81
	Female	1	(2)	2	(5)	10	(23)	9	(21)	7	(16)	2	(5)	5	(12)	0		2	(5)	1	(2)	4	(9)	43	0	43
	Total	5	(4)	11	(9)	27	(23)	9	(8)	23	(19)	11	(9)	9	(8)	10	(8)	7	(6)	3	(3)	5	(4)	120	7	127
1992	Male	5	(6)	1	(1)	5	(6)	5	(6)	10	(13)	7	(9)	8	(10)	8	(10)	10	(13)	9	(12)	10	(13)	78	1	79
	Female	5	(9)	3	(5)	4	(7)	7	(12)	5	(9)	4	(7)	3	(5)	7	(12)	6	(10)	6	(10)	8	(14)	58	2	60
	Total	10	(7)	4	(3)	9	(7)	12	(9)	15	(11)	11	(8)	11	(8)	15	(11)	16	(12)	15	(11)	18	(13)	136	6	142
1993	Male	2	(2)	4	(4)	8	(8)	14	(15)	15	(16)	18	(19)	8	(8)	11	(11)	6	(6)	5	(5)	5	(5)	96	2	98
	Female	2	(3)	7	(11)	11	(17)	13	(20)	4	(6)	9	(14)	3	(5)	7	(11)	3	(5)	3	(5)	4	(6)	66	2	68
	Total	4	(2)	11	(7)	19	(12)	27	(17)	19	(12)	27	(17)	11	(7)	18	(11)	9	(6)	8	(5)	9	(6)	162	4	166
1994	Male	5	(4)	23	(17)	24	(18)	14	(11)	18	(14)	18	(14)	3	(2)	13	(10)	7	(5)	4	(3)	3	(2)	132	5	137
	Female	2	(2)	23	(26)	23	(26)	5	(6)	5	(6)	12	(14)	5	(6)	5	(6)	1	(1)	0		6	(7)	87	2	89
	Total	7	(3)	46	(21)	47	(21)	19	(9)	23	(11)	30	(14)	8	(4)	18	(8)	8	(4)	4	(2)	9	(4)	219	7	226
1995	Male	4	(4)	14	(13)	32	(30)	13	(12)	11	(10)	11	(10)	7	(7)	5	(5)	4	(4)	4	(4)	2	(2)	107	4	111
	Female	1	(1)	11	(13)	24	(27)	6	(7)	9	(10)	12	(14)	7	(8)	7	(8)	0		2	(3)	9	(10)	88	3	91
	Total	5	(3)	25	(13)	56	(29)	19	(10)	20	(10)	23	(12)	14	(7)	12	(6)	4	(2)	6	(3)	11	(6)	195	7	202
1996	Male	4	(4)	12	(13)	22	(23)	32	(33)	16	(17)	1	(1)	5	(5)	1	(1)	1	(1)	0		2	(2)	96	10	106
	Female	0		14	(15)	23	(24)	18	(19)	17	(18)	9	(10)	3	(3)	2	(2)	2	(2)	0		6	(6)	94	5	99
	Total	4	(2)	26	(14)	45	(24)	50	(26)	33	(17)	10	(5)	8	(4)	3	(2)	3	(2)	0		8	(4)	190	16	206

Table A-2. (continued)

Year	Sex	Age 0.5		1		2		3		4		5		6		7		8		9		10		Total aged	Unaged adults	Total
1997	Male	12	(8)	33	(23)	31	(22)	28	(20)	18	(13)	13	(9)	3	(2)	1	(1)	3	(2)	0		1	(1)	143	5	148
	Female	3	(2)	33	(24)	34	(25)	16	(12)	13	(10)	10	(7)	4	(3)	10	(7)	6	(4)	1	(1)	6	(4)	136	9	145
	Total	15	(5)	66	(24)	65	(23)	44	(16)	31	(11)	23	(8)	7	(3)	11	(4)	9	(3)	1		7	(3)	279	15	294
1998	Male	2	(2)	24	(22)	34	(32)	18	(17)	14	(13)	8	(7)	4	(4)	2	(2)	1	(1)	0		0		107	4	111
	Female	6	(4)	30	(22)	42	(31)	16	(12)	9	(7)	10	(7)	5	(4)	6	(4)	3	(2)	4	(3)	6	(4)	137	8	145
	Total	8	(3)	54	(22)	76	(31)	34	(14)	23	(9)	18	(7)	9	(4)	8	(3)	4	(2)	4	(2)	6	(2)	244	18	262
1999	Male	4	(4)	30	(34)	24	(27)	13	(15)	7	(8)	6	(7)	1	(1)	3	(3)	0		1	(1)	0		89	8	97
	Female	4	(4)	29	(32)	19	(21)	11	(12)	8	(9)	3	(3)	5	(5)	5	(5)	4	(4)	2	(2)	2	(2)	92	6	98
	Total	8	(4)	59	(33)	43	(24)	24	(13)	15	(8)	9	(5)	6	(3)	8	(4)	4	(2)	3	(2)	2	(1)	181	14	195
2000	Male	10	(11)	17	(18)	32	(34)	11	(12)	16	(17)	5	(5)	0		3	(3)	0		0		0		94	0	94
	Female	13	(13)	11	(11)	33	(32)	17	(16)	6	(6)	9	(9)	6	(6)	5	(5)	2	(2)	1	(1)	1	(1)	104	0	104
	Total	23	(12)	28	(14)	65	(33)	28	(14)	22	(11)	14	(7)	6	(3)	8	(4)	2	(1)	1	(1)	1	(1)	198	0	198
2001	Male	9	(11)	11	(!4)	30	(37)	18	(22)	7	(9)	3	(4)	2	(2)	0		0		1	(1)	0		81	0	81
	Female	8	(10)	18	(23)	27	(34)	6	(8)	5	(6)	6	(8)	1	(1)	4	(5)	0		0		4	(5)	79	0	79
	Total	17	(11)	29	(18)	57	(36)	24	(15)	12	(8)	9	(6)	3	(2)	4	(3)	0		1	(1)	4	(3)	160	0	160
2002	Male	2	(3)	24	(39)	20	(33)	8	(13)	2	(3)	4	(7)	1	(2)	0		0		0		0		61	0	61
	Female	3	(4)	22	(32)	15	(22)	5	(7)	7	(10)	4	(6)	5	(7)	3	(4)	2	(3)	0		2	(3)	68	0	68
	Total	5	(4)	46	(36)	35	(27)	13	(10)	9	(7)	8	(6)	6	(5)	3	(2)	2	(2)	0		2	(2)	129	0	129
2003	Male	1	(2)	11	(27)	14	(34)	8	(20)	7	(17)	0		0		0		0		0		0		41	6	47
	Female	0		11	(23)	21	(45)	5	(11)	2	(4)	2	(4)	0		0		1	(2)	2	(4)	3	(6)	47	9	56
	Total	1	(1)	22	(25)	35	(40)	13	(15)	9	(10)	2	(2)	0		0		1	(1)	2	(2)	3	(3)	88	15	103
2004	Male	1	(2)	19	(31)	20	(33)	11	(18)	2	(3)	2	(3)	2	(3)	4	(7)	0		0		0		61	8	69
	Female	2	(5)	9	(22)	14	(34)	4	(10)	4	(10)	4	(10)	1	(2)	0		2	(5)	0		1	(2)	41	1	42
	Total	3	(3)	28	(27)	34	(33)	15	(15)	6	(6)	6	(6)	3	(3)	4	(4)	2	(2)	0		1	(1)	102	9	111
2005	Male	3	(6)	9	(18)	14	(29)	12	(24)	9	(18)	0		1	(2)	1	(2)	0		0		0		49	10	59
	Female	1	(2)	9	(19)	15	(32)	9	(19)	6	(13)	4	(9)	1	(2)	1	(2)	0		0		1	(2)	47	6	53
	Total	4	(4)	18	(19)	29	(30)	21	(22)	15	(16)	4	(4)	2	(2)	2	(2)	0		0		1	(1)	96	17	113

Table A-2.
(continued)

Year	Sex	Age 0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5+	Total aged	Unaged adults	Total
2006	Male	1 (2)	4 (8)	16 (31)	15 (29)	8 (16)	2 (4)	2 (4)	1 (2)	1 (2)	1 (2)	0	51	1	52
	Female	0	4 (20)	10 (50)	4 (20)	0	0	1 (5)	0	0	0	1 (5)	20	1	21
	Total	1 (1)	8 (11)	26 (37)	19 (27)	8 (11)	2 (3)	3 (4)	1 (1)	1 (1)	1 (1)	1 (1)	71	2	73
2007	Male	0	12 (20)	17 (28)	16 (26)	10 (16)	1 (2)	4 (7)	1 (2)	0	0	0	61	4	65
	Female	0	3 (19)	1 (6)	4 (25)	2 (13)	5 (31)	1 (6)	0	0	0	0	16	4	20
	Total	0	15 (19)	18 (23)	20 (26)	12 (16)	6 (8)	5 (6)	1 (1)	0	0	0	77	8	85
2008	Male	0	5 (9)	15 (27)	7 (13)	10 (18)	4 (7)	7 (13)	4 (7)	2 (4)	1 (2)	0	55	6	61
	Female	0	4 (13)	6 (20)	6 (20)	7 (23)	0	2 (7)	3 (10)	1 (3)	0	1 (3)	30	2	32
	Total	0	9 (11)	21 (25)	13 (15)	17 (20)	4 (5)	9 (11)	7 (8)	3 (4)	1 (1)	1 (1)	85	8	93
2009	Male	1 (2)	10 (17)	18 (31)	12 (12)	9 (16)	5 (9)	1 (2)	1 (2)	0	1 (2)	0	58	5	63
	Female	0	5 (19)	8 (30)	5 (19)	3 (11)	1 (4)	1 (4)	2 (7)	0	1 (4)	1 (4)	27	2	29
	Total	1 (1)	15 (18)	26 (31)	17 (20)	12 (14)	6 (7)	2 (2)	3 (4)	0	2 (2)	1 (1)	85	7	92
2010	Male	0	11 (16)	23 (33)	11 (16)	5 (7)	12 (17)	5 (7)	1 (1)	1 (1)	1 (1)	0	70	12	82
	Female	0	4 (11)	9 (26)	9 (26)	3 (9)	0	4 (11)	2 (6)	2 (6)	1 (3)	1 (3)	35	8	43
	Total	0	15 (14)	32 (30)	20 (19)	8 (8)	12 (11)	9 (9)	3 (3)	3 (3)	2 (2)	1 (1)	105	20	125
2011	Male	0	7 (11)	27 (43)	10 (16)	14 (22)	2 (3)	2 (3)	0	1 (2)	0	0	63	26	89
	Female	0	3 (9)	7 (21)	6 (18)	7 (21)	3 (9)	3 (9)	1 (3)	1 (3)	1 (3)	1 (3)	33	20	53
	Total	0	10 (10)	34 (35)	16 (17)	21 (22)	5 (5)	5 (5)	1 (1)	2 (2)	1 (1)	1 (1)	96	46	142
2012	Male	0	4 (7)	22 (40)	15 (27)	8 (15)	2 (4)	3 (5)	1 (2)	0	0	0	55	23	78
	Female	0	0	6 (19)	9 (28)	7 (22)	3 (9)	2 (6)	2 (6)	1 (3)	2 (6)	0	32	14	46
	Total	0	4 (5)	28 (32)	24 (28)	15 (17)	5 (6)	5 (6)	3 (3)	1 (1)	2 (2)	0	87	37	124
2013	Male	0	8 (14)	21 (36)	9 (15)	9 (15)	7 (12)	2 (3)	1 (2)	0	1 (2)	1 (2)	59	19	78
	Female	0	11 (24)	11 (24)	5 (11)	5 (11)	3 (7)	3 (7)	4 (9)	2 (4)	1 (2)	1 (2)	46	4	50
	Total	0	19 (18)	32 (30)	14 (13)	14 (13)	10 (10)	5 (5)	5 (5)	2 (2)	2 (2)	2 (2)	105	23	128
2014	Male	0	5 (14)	17 (47)	9 (25)	3 (8)	1 (3)	0	1 (3)	0	0	0	36	21	57
	Female	1 (3)	8 (27)	11 (37)	6 (20)	1 (3)	0	0	0	2 (7)	0	0	30	13	43
	Total	1 (2)	13 (20)	28 (42)	15 (23)	4 (6)	1 (2)	0	1 (2)	2 (3)	0	0	66	34	100