

Wyoming Mountain Lion Status Report

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Similar to management of mountain lions and other large carnivores across North America, the management of mountain lions in Wyoming has evolved considerably since European exploration and settlement. Initial steps towards “management” dealt with placing bounties on mountain lions and other predators in 1882, with unlimited bag limits and year-round seasons. In 1973, the mountain lion was classified as a trophy game animal in Wyoming, which allowed for state management as well as holding the Wyoming Game and Fish Department (WGFD) fiscally liable for confirmed livestock losses attributed to mountain lions. The following year, the first hunting season for mountain lions was instituted, with the entire state as one hunt area and an individual bag limit of one lion per year. Kittens and females with kittens present were protected, and hunters were required to present skulls and pelts to the nearest WGFD District Office or local game warden. Since the initial harvest season of mountain lions in Wyoming the management plan has evolved to include all pertinent information related to cougar population demographics as well as social attitudes and public input towards management of mountain lions within the state.

In 2007, a new mountain lion management plan (WGFD 2006) was implemented, which incorporated suggestions put forth in the cougar management guidelines (Cougar Management Guidelines Working Group [CMGWG] 2005). Most notably, the new plan called for managing mountain lions in an adaptive management scheme based on regional input and biological aspects associated with habitat of hunt areas and mountain lion management units (MLMUs). Hunt areas were classified as source, sink, or stable based on lion mortality sex/age criteria. Issues related to human/lion conflicts, livestock depredation, and habit quality related to prey availability were also included in developing management objectives for hunt areas. The adaptive management plan for mountain lions in Wyoming is aimed at sustaining mountain lion populations throughout suitable habitat at varying densities depending on management objectives, to provide for recreational/hunting opportunity, and to minimize mountain lion depredation and the potential for human injury throughout the state.

Distribution and Abundance

Mountain lions are distributed statewide at varying densities depending on habitat quality, prey abundance and availability, and intra/interspecific competition. In some areas of the state, mountain lions coexist with black bears (*Ursus americanus*), grizzly bears (*Ursus arctos*), and wolves (*Canis lupus*), which may affect movement patterns or spatial/temporal variations. Lion densities are generally higher in portions of the state where large tracts of contiguous lion habitat occur, with lower densities occurring in the grasslands of northeastern Wyoming and across the

Red Desert basin. Mixed conifer and mountain mahogany habitats are used for stalking cover (Logan and Irwin 1985). Based on habitat modeling, mountain lions used edge habitats related to prey density as well as making seasonal shifts to follow ungulate movements. During the winter, mountain lions were found at lower elevations and concentrated their use near the timber/prairie interface (Anderson 2003). We continue to assess habitat suitability of mountain lions and will update the Wyoming habitat model to include areas in northeastern and southwestern Wyoming. As human sprawl and energy development increase throughout the state, effects of habitat alteration on mountain lions is an issue that may need further assessment.

Harvest and Management

Mortality data on mountain lions are gathered annually among 31 hunt areas that are grouped in five MLMUs (Fig. 1.) The number of hunt areas increased from 29 to 31 in hunt year 2007. The additional hunt areas came as a result of splitting two existing hunt areas in order to better address regional concerns. The boundaries of MLMUs encompass large areas with contiguous habitat and topographic features and are believed to surround population centers. Each hunt area has a maximum mortality quota that varies from 2-25 animals, with 3 areas also having a maximum female harvest limit (Table 1). If the quota is filled (total or female), the hunt area automatically closes. During mandatory inspections of harvested animals, many variables are recorded, including: harvest date, location, sex, lactation status, estimated age, number of days spent hunting, use of dogs, other lions observed, as well as several other parameters. Skulls and pelts must be presented in unfrozen condition so teeth can be removed as well as providing evidence of sex and lactation status. The information gathered during inspection is used to assess sex/age structure of harvested animals. Beginning in 2007, all known human-caused mortality events counted towards the quota; prior to this, only legal and illegal mortalities counted towards the quota.

Legal shooting hours are from one-half hour before sunrise to one-half hour after sunset. The individual bag limit is one lion per hunter per calendar year, (except in one hunt area where an additional animal may be taken). Kittens and females with kittens at side are protected from harvest. Dogs may be used to take lions during open seasons only, with no pursuit season in Wyoming. Hunters are responsible for knowing about quota status of hunt areas by calling a toll-free telephone number prior to entering the field. Current prices for tags are \$25.00 for residents and \$301.00 for nonresidents. Additional licenses (for the one hunt area) are \$16.00 and \$76.00 for residents and nonresidents, respectively.

The WGFD does not estimate lion population numbers. Rather, population trends are assessed through sex and age composition of mortality data (Anderson and Lindzey 2005). Management objectives for MLMUs and hunt areas are determined by balancing public demands (i.e., human/lion interactions, livestock depredation, and adequate hunting/viewing opportunity) and biological requirements for sustainable lion populations throughout the landscape. The sex and age composition of harvested lions is compiled and analyzed statewide, for each MLMU and for each hunt area. Analyzing data by management units allows managers to evaluate harvest within specific hunt areas and the effect harvest has on the regional population. If observed trends are consistent with objectives set forth for each hunt area, changes in quotas are not recommended.

However, if trends deviate from hunt area objectives, quota increases or decreases may be recommended.

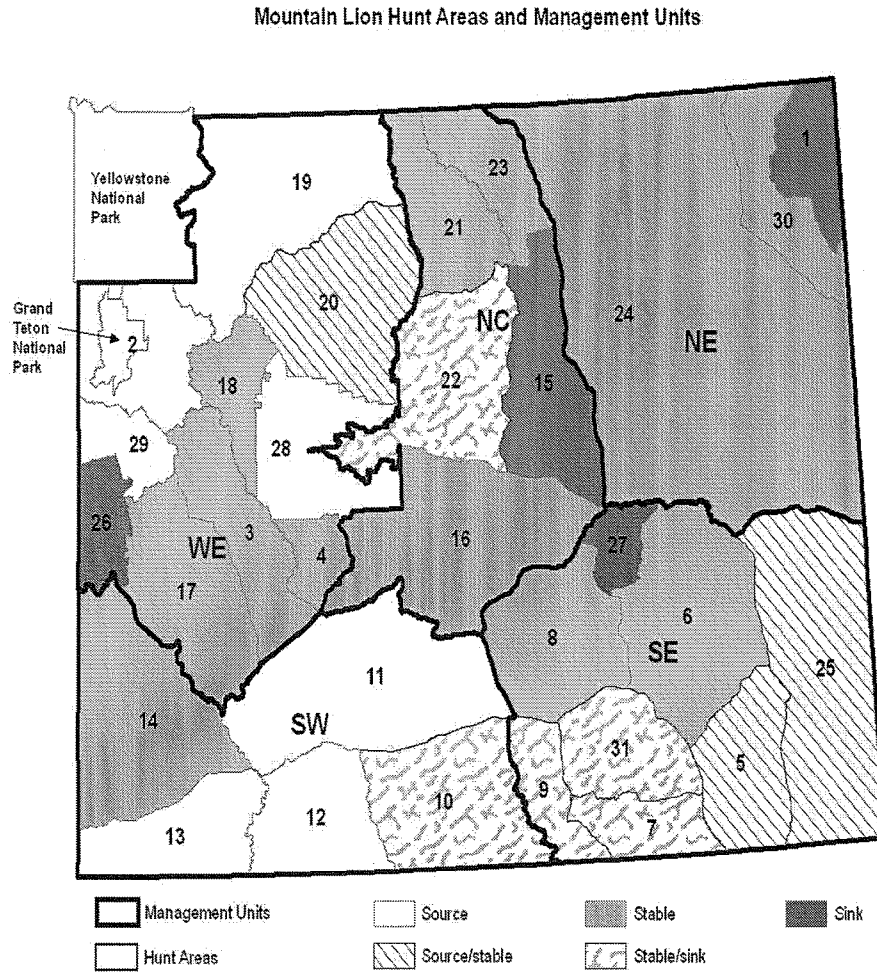


Figure 1. Mountain lion management units and hunt areas in Wyoming, 2007.

Table 1. Wyoming mountain lion management units, hunt areas, season dates and annual quotas for hunt year 2007.

Mountain Lion Management Unit	Hunt Area	Season Dates	Annual Mortality Quota	Annual Female Mortality Quota
Northeast	1	Sept. 1-Mar. 31	16	
	24	Sept. 1-Mar. 31	4	
	30	Sept. 1-Mar. 31	8	
Southeast	5	Sept. 1-Mar. 31	12	
	6	Sept. 1-Mar. 31	12	
	7	Sept. 1-Mar. 31	14	
	8	Sept. 1-Mar. 31	10	
	9	Sept. 1-Mar. 31	7	
	10	Sept. 1-Mar. 31	7	
	16	Sept. 1-Mar. 31	6	
	25	Sept. 1-Mar. 31	3	
Southwest	27	Sept. 1-Aug. 31	10	
	31	Sept. 1-Aug. 31	6	
	11	Sept. 1-Mar. 31	2	
	12	Sept. 1-Mar. 31	6	3
North-Central	13	Sept. 1-Mar. 31	3	
	15	Sept. 1-Aug. 31	25	
	21	Sept. 1-Mar. 31	20	
	22	Sept. 1-Aug. 31	15	
West	23	Sept. 1-Mar. 31	18	
	2	Sept. 1-Mar. 31	7	3
	3	Sept. 1-Mar. 31	12	
	4	Sept. 1-Mar. 31	8	
	14	Sept. 1-Mar. 31	15	
	17	Sept. 1-Mar. 31	9	
	18	Sept. 1-Mar. 31	12	
	19	Sept. 1-Mar. 31	20	
	20	Sept. 1-Mar. 31	4	
	26	Sept. 1-Mar. 31	15	
	28	Sept. 1-Mar. 31	3	
29	Sept. 1-Mar. 31	9	4	

Mountain lion management was augmented beginning in 2007 after a new plan was adopted by the WGFDC Commission, which fostered a regional management scheme based on source/sink/stable population dynamics (CMWG 2005). Managing for a combination of source, stable, and sink mountain lion subpopulations within MLMUs (i.e., at the hunt area level) will provide flexibility to address local management concerns (e.g., livestock depredation) while maintaining overall population viability on a landscape level and provide for long-term harvest and recreation opportunities.

Hunt area management objectives include:

1. Manage to be a Sink: reduce mountain lion densities
 - a) Maintain density of human-caused mortality >8 mountain lions/1,000 km² (386 mi²).
 - b) Achieve adult female harvest $>25\%$ of total harvest for 2 seasons.
 - c) Progression in mean age of harvested adult females should decline to <5 years old.

2. Manage to be a Source: maintain human-caused mortality levels that allow mountain lion population growth or maintain relatively high mountain lion densities that provide a source to other populations.
 - a) Maintain density of human-caused mortality <5 mountain lions/1,000 km² (386 mi²)
 - b) Maintain adult female harvest $<20\%$ of total harvest.
 - c) Maintain older-age adult females in the population (>5 years old). This will be difficult to identify without additional sampling due to low sample size from harvest, but would be expected for lightly hunted populations.

3. Stable management: maximize long-term hunting opportunity and population viability.
 - a) Maintain human-caused mortality density between 5-8 mountain lions/1,000 km² (386 mi²)
 - b) Adult female harvest should not exceed 25% of total harvest for more than 1 season.
 - c) Maintain intermediate-aged adult females (mean \cong 4-6 years old) in the harvest. Adequate age evaluation may require averaging age data over time to achieve meaningful sample sizes.

Statewide harvest increased from 1997 through 2001 and since then has tapered off (Fig. 2). Since 1997 Wyoming has averaged 190.9 cougars harvested annually. Hunt year 2007 had the highest harvest of the past ten years. However, in addition to higher quotas in some areas, all human-caused mortalities were included in the quota in 2007 rather than only legal/illegal kills. Preliminary results suggest total annual mortality does not appear to be significantly higher in 2007 compared to previous years. Since 1997, the average percent of females in the harvest has been 45%, ranging from 41% in 2005 to 51% in 2000 (Fig. 3). Since 1997, successful hunter effort has ranged from 3.3 to 4.1 days for an average of 3.6 days hunting per harvested animal

(Fig. 4). Approximately 90% of all successful hunters in Wyoming harvested lions with the aid of dogs from 1997-2007.

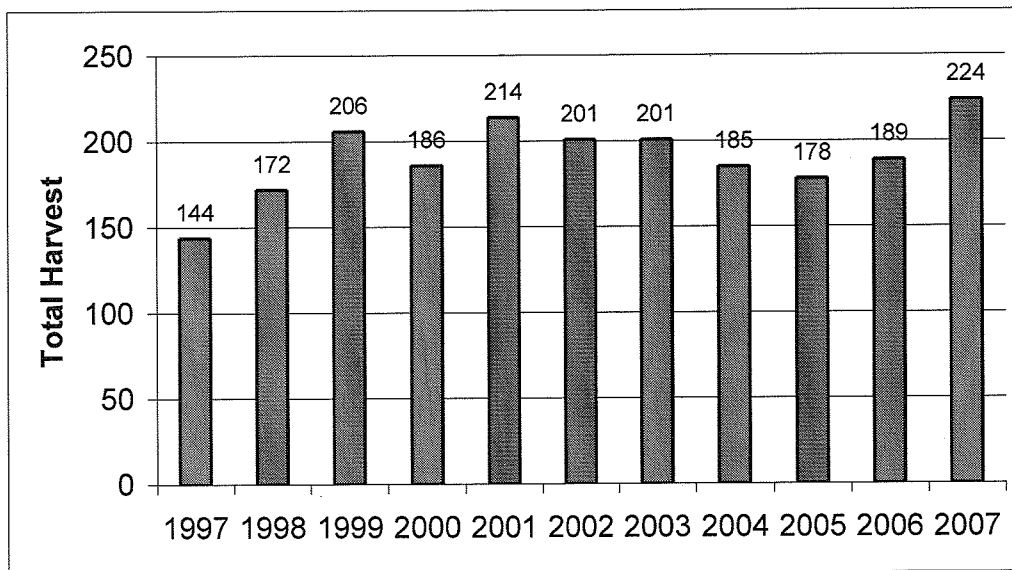


Figure 2. Total Wyoming mountain lion harvest, 1997-2007. (2007 hunt year initiates inclusion of all human-caused mortality.)

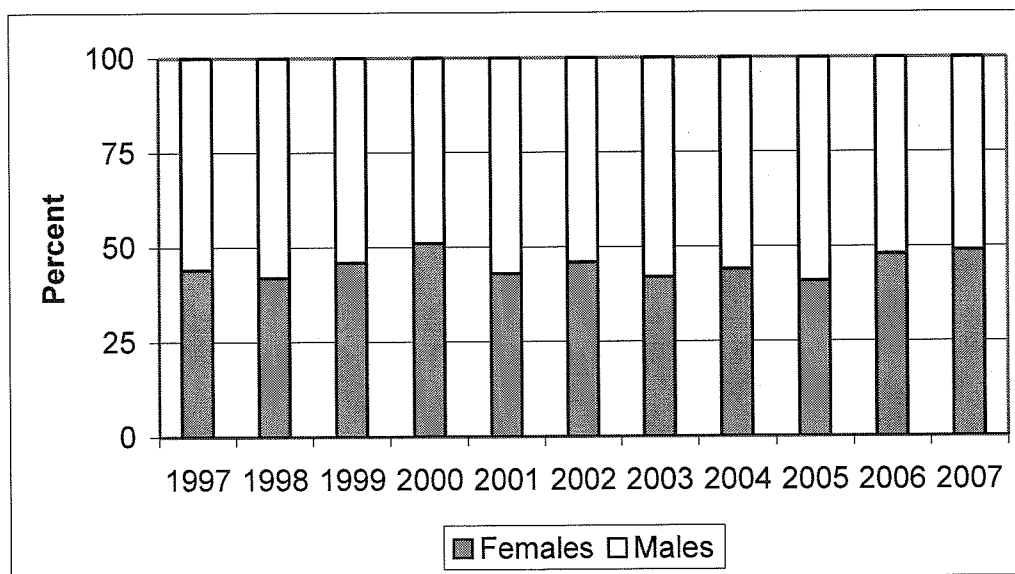


Figure 3. Percent male and female Wyoming mountain lion harvest, 1997-2007.

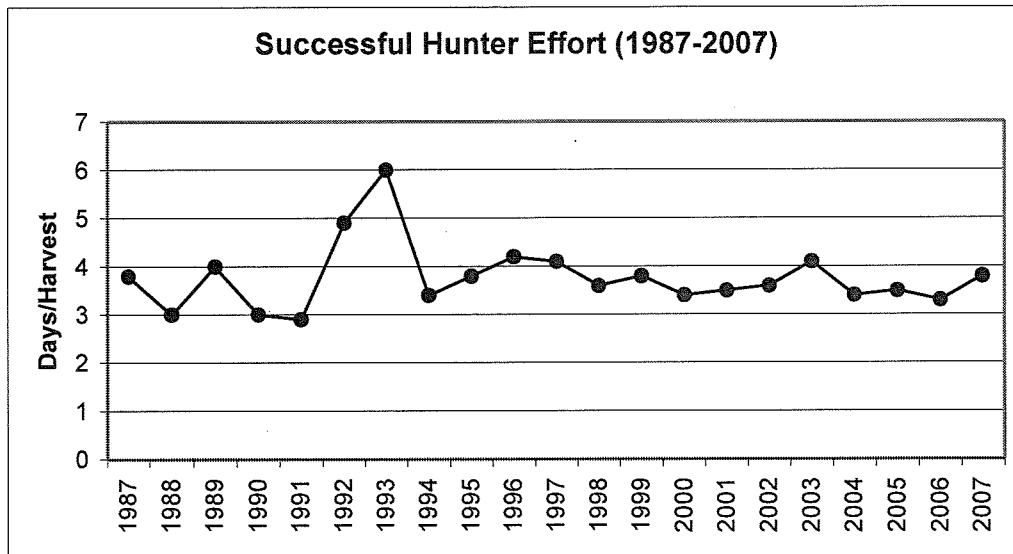


Figure 4. Successful hunter effort for Wyoming mountain lion hunters, 1987-2007.

Depredation and Human Lion Interactions/Conflicts

Currently, Wyoming uses a statewide protocol for managing trophy game depredations and interactions with humans. A depredating lion is defined as a lion that injures or kills livestock or domestic pets. In addition, 4 types of human/mountain lion interactions are defined by the WGFD: 1) Recurring sighting – repeated sightings of a particular lion; 2) Encounter – an unexpected meeting between a human and a lion without incident; 3) Incident – an account of abnormal lion behavior that could have more serious results in the future (e.g., a lion attacking a pet, or a lion exhibiting aggressive behavior toward humans); and (4) Attack – human injury or death resulting from a lion attack. Each incident is handled on a case-by-case basis and is dealt with accordingly based on the location of the incident, the threat to human safety, the severity of the incident, and the number of incidents the animal has been involved in. Every effort is made to prevent unnecessary escalation of incidents through an ascending order of options and responsibilities (WGFD 1999):

- 1) No Management Action Taken
 - Informational packets are provided to the reporting party that describe mountain lion natural history and behavior, damage prevention tips, and what to do in the event of an encounter.
- 2) Deterrent Methods
 - Removal or securing of attractant
 - Removal of depredated carcass
 - Removal or protection of livestock
- 3) Aversive Conditioning

- Use of rubber bullets
 - Use of pepper spray
 - Use of noise-making devices or flashing lights
 - Informational packets provided to the reporting party
- 4) Trapping and Relocation
- If the above efforts do not deter the lion from the area, if public safety is compromised, if it is a first offense, or if it has been a lengthy span of time between offenses
 - Informational packets provided to the reporting party
- 5) Lethal Removal of the Animal by the WGFD or land owner
- If the above methods do not deter the lion, if public safety is compromised, or if the offending lion has been involved in multiple incidents in a short span of time
 - Wyoming statute 23-3-115 allows property owners or their employees and lessees to kill mountain lions damaging private property, given that they immediately notify the nearest game warden of the incident
 - Lions that have been removed from the population will be used for educational purposes
 - Informational packets provided to the reporting party

Information and Education

Information and education regarding mountain lion ecology and management is a vital aspect of human/mountain lion interaction prevention, and a pivotal element of mountain lion management in Wyoming. The WGFD works closely with hunters, outfitters, recreationalists, livestock operators, and homeowners in an attempt to minimize conflicts with large carnivores including lions. Every spring, the WGFD hosts “Living in Bear and Lion Country” workshops throughout the state to inform the public about bear and lion ecology, front and back-country food storage techniques, and what to do in the event of an encounter with a bear or lion. In addition, numerous presentations are given throughout the year to civic, private, and school groups. Media outlets are also used to inform, and in rare incidents warn, the general public about bear and lion safety issues and any recent sightings.

Despite the educational efforts undertaken by the WGFD and preventive measures taken by the public, conflicts with mountain lions do occur. The number of mountain lion conflicts has ranged from 5-32 annually from 1997-2007. There have been a total of 183 mountain lion/human conflict reports in Wyoming since 1997 with no major injuries or deaths reported. Encounters represent the majority of reports ($n=130$), followed by pet depredations ($n=32$) and aggression towards humans ($n=13$)

Wyoming statute 23-1-901 provides monetary compensation for confirmed livestock damage caused by mountain lions. The number of damage claims for the last 10 years ranged from 10 claims in 2005 to a high of 28 claims in 1998 (Table 2) Payments made to claimants range from a low of \$10,131 (2003) to a high of \$44,071 (1998; Table 2). The strong majority of mountain lion-livestock depredation issues in Wyoming are attributed to sheep. From 1997 to 2006, 94%

of damage compensations related to sheep, 2% involved horses, and 2% involved cattle. An average of 5 mountain lions was removed annually for depredation or human safety reasons over the past decade.

Table 2. Wyoming ten-year mountain lion damage claim and translocation/removal history.

Year	# Claims	\$ Claimed	\$ Paid	# Translocations	# Removals
1997	20	28,935.16	28,761.50	1	10
1998	28	56,171.39	44,070.79	2	5
1999	21	32,307.63	22,627.43	2	6
2000	20	42,352.69	30,773.59	0	5
2001	15	38,322.79	25,592.46	1	6
2002	13	35,870.99	32,075.05	0	2
2003	21	13,688.89	10,130.86	1	1
2004	14	25,680.30	23,449.73	0	3
2005	10	41,834.23	39,328.83	0	4
2006	12	21,949.37	18,502.53	1	7
Mean	17.4	33,711.34	27,531.28	0.8	4.9

Issues of Concern and What the Future Holds

Livestock depredation attributed to lions, primarily on sheep, will always be an issue of contention that will be dealt with regarding lion management in Wyoming. Certain hunt areas are being managed as sink areas (reduced lion densities) and we will evaluate this management technique as it relates to the issue of livestock depredation.

While not considered an “issue” necessarily, human safety and human/mountain lion interactions are topics that are vigilantly addressed and monitored where people and mountain lions coexist. Educational efforts continue annually, and if warranted, will be increased to inform the public about mountain lion behavior and safety procedures that can be adopted in case of a mountain lion interaction. Efforts are made towards preventive methods (i.e., landscaping, husbandry techniques, outdoor awareness) that reduce the overall chance of mountain lion/human encounters. Education increases the ability of co-existence of the species.

The management plan currently being used by WGFD is new and therefore assessment of the adaptive techniques involved is critical in order to evaluate the overall effectiveness. We will assess differences related to conflict and depredation issues between the different harvest objectives (e.g., source vs. sink) and evaluate hunter success rates and effort. We plan to implement additional field research in areas of the state where data are needed, as well as modeling habitat in regions of the state where data need augmentation.

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