

# **MOUNTAIN LION MANAGEMENT GUIDELINES**

**FOR**

**LION DAU-L17**

**GAME MANAGEMENT UNITS**

**123, 124, 125, 126, 127, 128, 129, 130, 132, 133, 134, 135,  
136, 137, 138, 139, 141, 142, 143, 144, 145, 146, & 147**

Prepared for:  
Colorado Division of Wildlife  
Southeast Region

By:  
Jeffrey A. Yost  
Terrestrial Wildlife Biologist  
Lamar, Colorado

July 2004

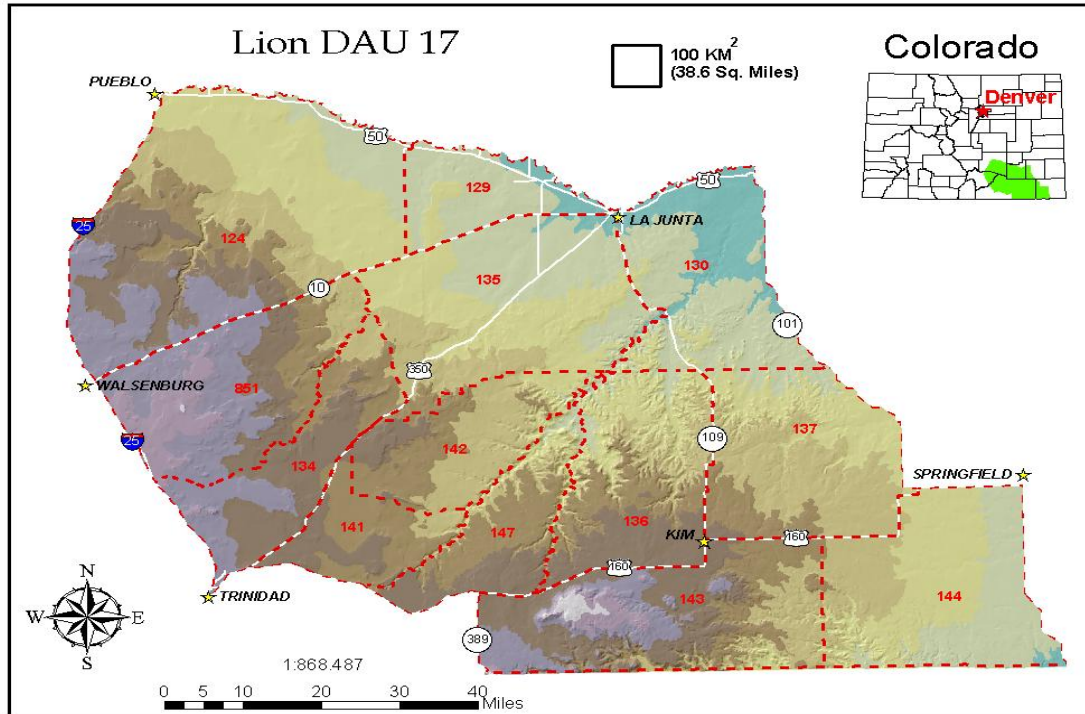


## DESCRIPTION OF DAU, HABITAT, AND PAST MANAGEMENT

### Location, Topography, Climate, Land Status

Mountain Lion (*Felis concolor*) Data Analysis Unit (DAU) L-17 is located in south east Colorado (Figure 1). Boundaries for L-17 include; the Arkansas River on the north; Hwy 101 and Hwy 287 on the east; the Oklahoma state line, New Mexico State line and Hwy 160 on the south; and on the west by Interstate 25. For harvest quota purposes game management units (GMU's) 123, 124, 125, 126, 127, 128, 129, 130, 132, 133, 134, 135, 136, 137, 138, 139, 141, 142, 143, 144, 145, 146, and 147 are combined. However, only GMU's 128, 129, 130, 133, 134, 135, 136, 137, 141, 142, 143, 144, & 147 are included in the spatial/habitat and population projection analysis contained in this DAU plan. The other GMUs are found on the fringes of acceptable lion habitat and are included in the quota to allow a licensed hunter to take a lion during an open season if one does show up in an outlying unit.

**Figure 1 – The Geographic Location and Boundaries of Lion DAU L-17**



The DAU covers approximately 18,357.6 square kilometers and ranges in elevation from

975 meters at the Kansas state line to 1830 meters on the higher mesas near Kim. The geography of Mountain Lion DAU L-17 DAU is varied and includes; cedar breaks, canyon lands, short grass prairie, agriculture and pasture lands. There are several major drainages across the DAU with the primary one being the Arkansas River. Others include the Purgatoire, Apishapa, and Cucharas; which all flow into the main-stem Arkansas. Carrizo Creek flows across the furthest southeast portion of the DAU eventually joining the Cimarron River in Oklahoma.

The climate of the area is characterized by long, hot dry summers and mild winters. Annual precipitation ranges from 25.4 – 43.8 centimeters with most occurring as spring rain and mid-summer monsoons. Severe thunderstorms and occasional severe blizzards are normal occurrences. Typically winter snows tend to melt rapidly making for poor or short term tracking conditions.

L-17 DAU is primarily private land with 78.6% in private ownership. The majority of public land within the DAU is found on the Comanche National Grasslands (8.1%) and is administered by the United States Forest Service. There are limited amounts of land controlled by the Bureau of Land Management (0.4%) and the State Land Board (7.8%) with grazing rights leased to private ranchers. The Department of Defense manages 5.2% of the lands in L-17.

## **History**

Land use, both public and private, is almost exclusively agricultural and has not changed significantly in recent times. Livestock grazing occurs on private land, the Comanche National Grasslands, BLM, and SLB properties. Farming methods consist of both dry-land and irrigated cropping; with alfalfa, wheat, corn and milo being the predominant crops produced. The total

acres of dry-land farming have decreased since the mid 1980's, with up to 30% of eligible land in some counties enrolled in the Conservation Reserve Program (CRP). CRP has provided a "refuge" for many species of wildlife. Deer have adapted quite well to the cover offered in CRP fields. This may be one factor in the spread of whitetail deer throughout the DAU. Development is not currently a significant threat to lion habitat although developers are moving into eastern portions of Las Animas County.

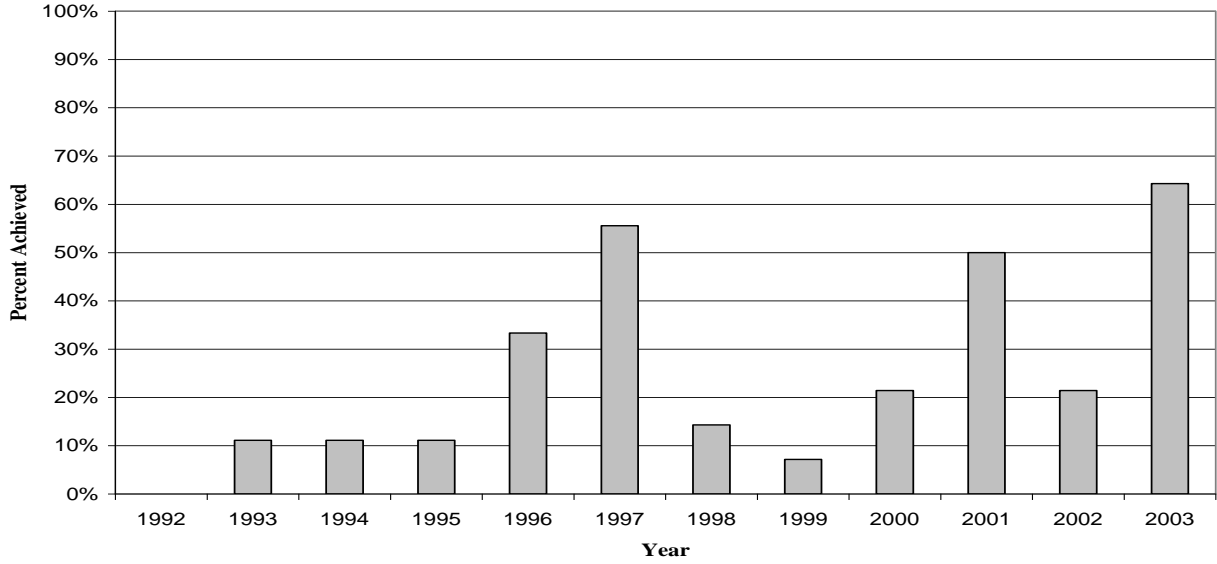
The lion population appears to have been increasing steadily in the DAU over the past several decades. According to local accounts very few lions were sighted in the area until recent years. Colorado Division of Wildlife lion harvest records show the same trend with very few lions killed by hunters until the early 1990's. Harvest has been on an increasing trend since that time. Some of this may be explained by increased hunting pressure and guides using hounds when conditions are favorable to track cats.

### **Quotas and Harvest**

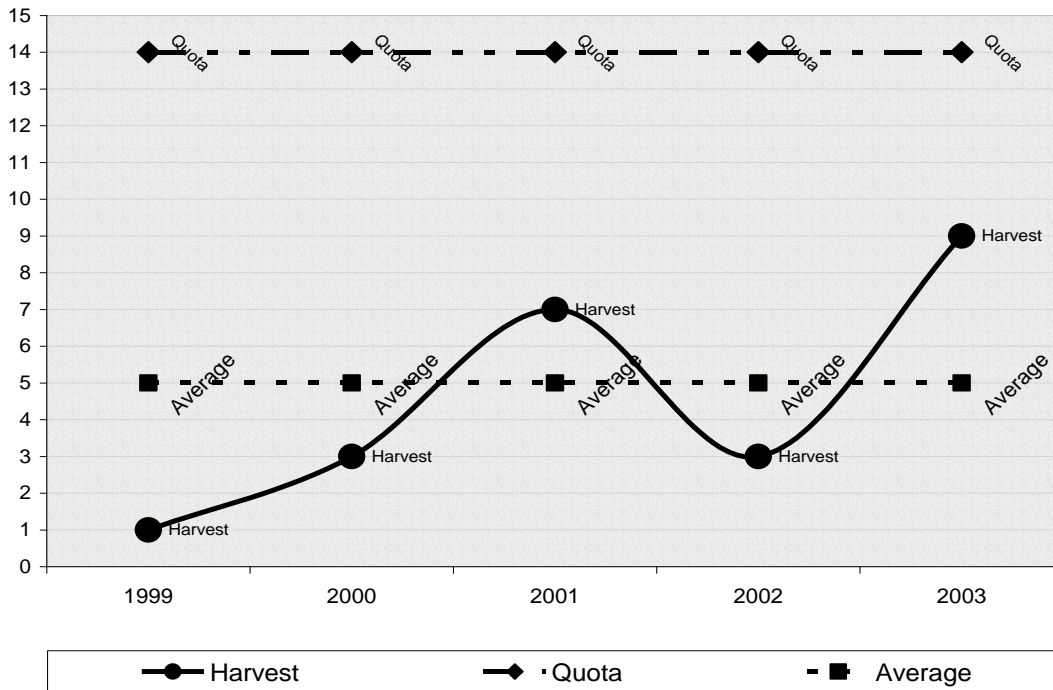
In 2002 mountain lion DAU's L-17 and L-18 were combined to simplify regulations and because the lions in this area likely interchange with one another a significant amount making them, for all intents, the same population. Thus the following harvest and quotas for this DAU are a combination of old L-17 and old L-18 combined into new L-17. The quota for L-17 has ranged from 7 in 1990 to 14 in 2004. The biggest factor for the increase is a doubling of the old L-18 quota from 5 lions to 10 lions in 1998. The quota increased then as a strategy to alleviate increasing lion complaints from landowners. The closest the quota has come to being met was 64%, or 9 cats of 14 in the quota, taken in 2003 when snow conditions were favorable for harvest (Figure 2). The five-

year average harvest is five lions (Figure 3).

**Figure 2 - Percent Quota Achieved Through Hunter Harvest in L-17**



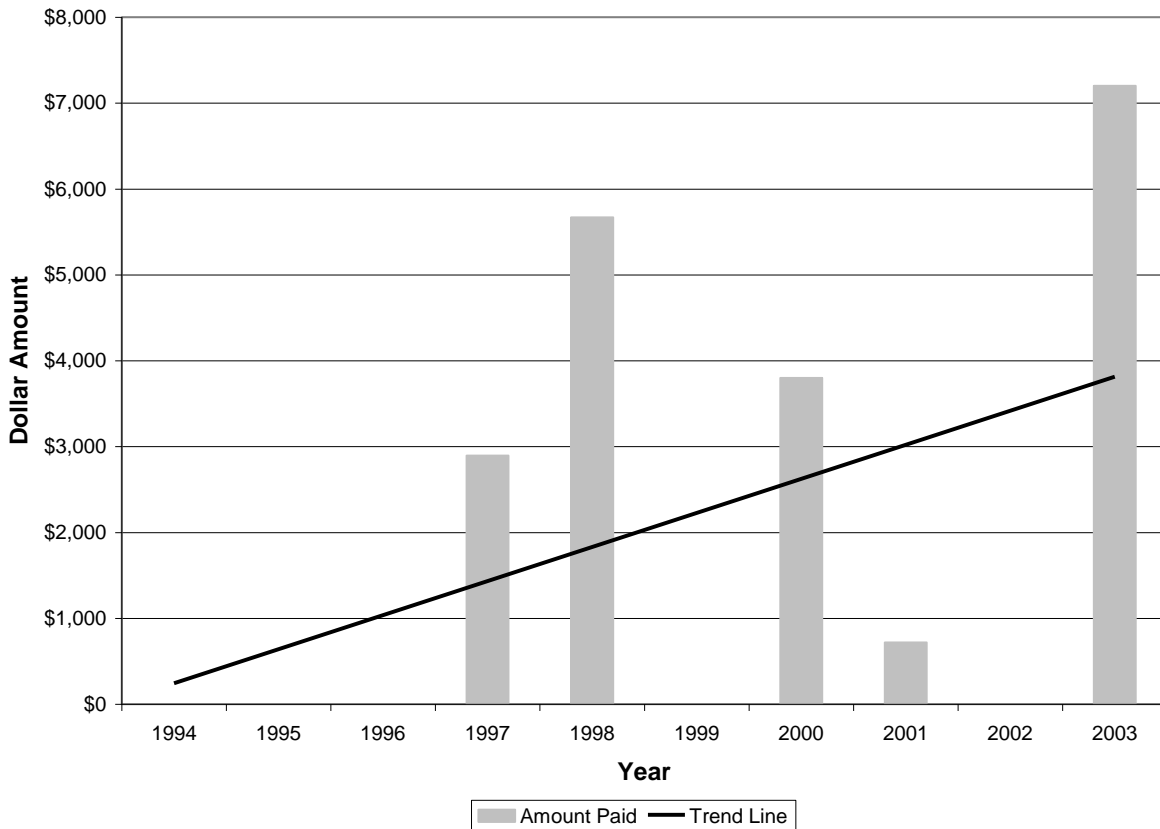
**Figure 3 - L-17 Quota, Annual Harvest, & Five-Year Average 1999-2003**



**KEY MANAGEMENT ISSUES**

The two most important issues in managing mountain lions in L-17 are suppressing the lion population to balance real and perceived damage concerns from the public and to maintain a viable, healthy lion population. The human population in L-17 is comprised mainly of farmers and ranchers whose livelihood depends on livestock production and, in some cases, income from big game hunting. In remote rural communities such as these the threat posed by mountain lions to livestock is very real and many believe too many lions may negatively affect the viability of their operations. Mountain lions do prey on deer, elk, and occasionally livestock. Damage claims attributed to lions are on the increase. From July 03–June 04 two damage claims totaled \$7,335.00 (Figure 4).

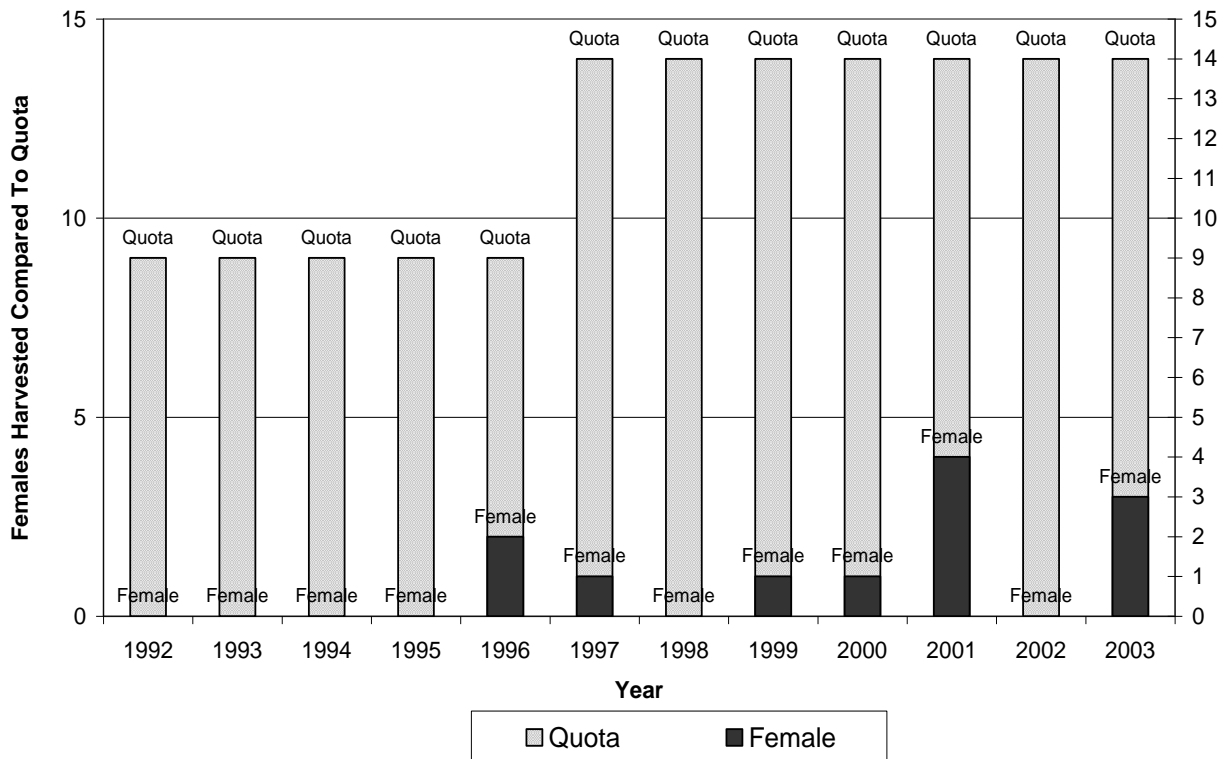
**Figure 4 - Amount Paid Annually in Lion Damage Claims In L-17**



Comments were received from the public through a series of public meetings held along the

southern front range of Colorado. All of the comments received concerning L-17 came from landowners and hunting guides who either live in or hunt in this DAU. All comments from the public indicated a strong desire to keep quotas at the current level with management objectives set locally. Many comments reflected concern that lions are not over hunted but still kept in check. This point was brought home by efforts of the Hounds-man’s Association to educate their members and hunters on sexing lions before they are harvested to reduce female take (Figure 5).

**Figure 5 - Total Female Harvest Compared To Quota**



**STRATEGIC GOALS**

The strategic management goal in L-17 is to maintain a biologically sound, self sustaining, lion population in balance with available resources while minimizing conflicts and game damage complaints. The DAU is being managed for a suppressed lion population in order to reduce those complaints. The CDOW will continue to monitor lion harvest through mandatory lion harvest checks, document non-hunting mortality, and use new information on lion management as it becomes available to improve on current lion management techniques. Adjustments to the lion management plan will be made as this new information becomes available.

## **MANAGEMENT OBJECTIVES**

Management objectives for L-17 have been determined by estimating the density of lion habitat in the area and then projecting a population based on the amount of area covered by specific habitat types and lion prey densities found within those habitats. Due to the remoteness of this DAU, the limited amount of public land, and low human population density found here, few lion sightings are reported. Generally reports of lions come in as mandatory checks, damage reports to livestock ,or tracks observed by ranchers. No scientific studies have been completed in L-17 to determine a population estimate

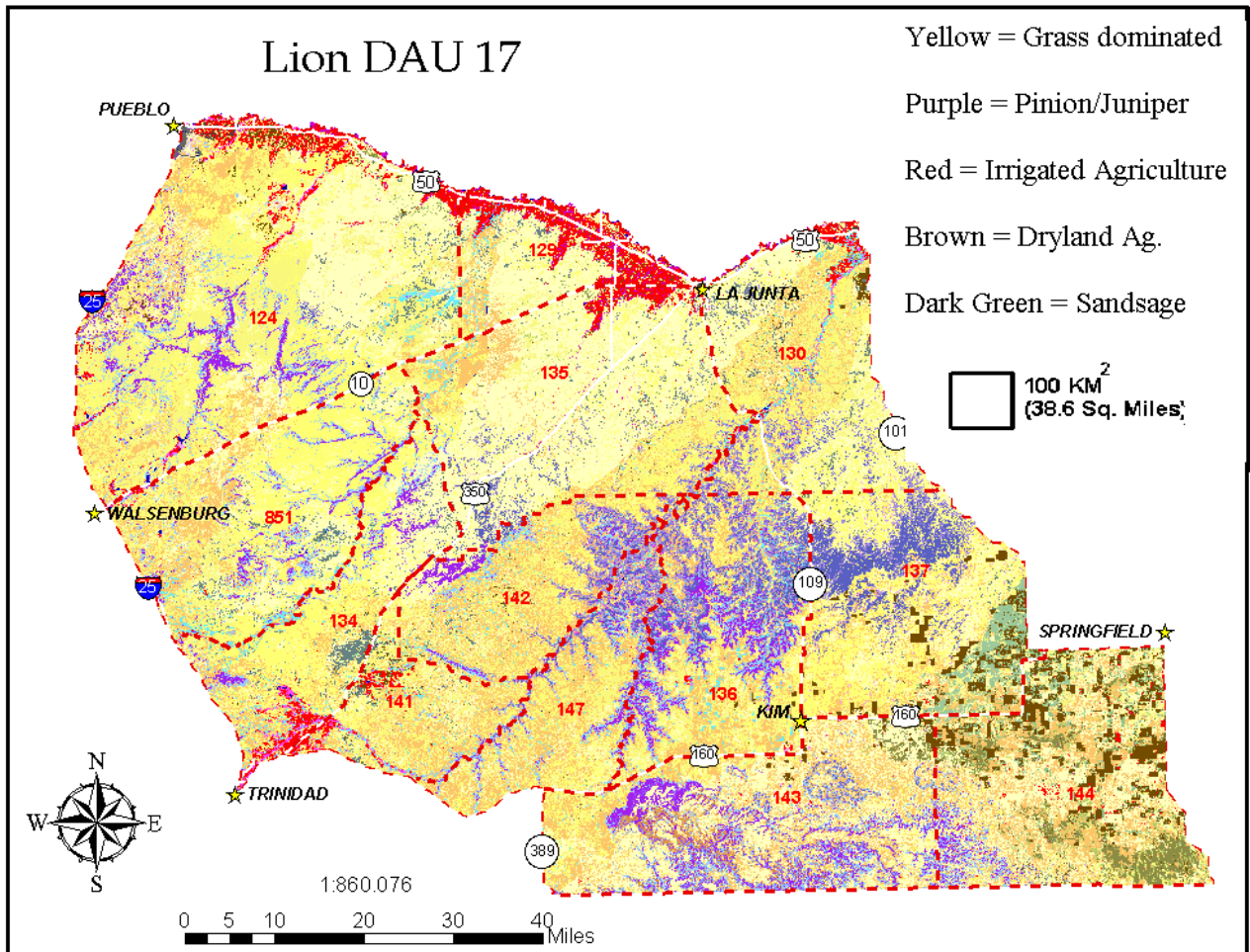
### **Population Projection**

Lacking lion population information specific to this area, population projections are based on previous work (Anderson 1983, Logan and Sweanor 2001) in similar habitat types. Due to the relatively low elevation of this DAU there is no substantial difference between winter and summer range of deer and elk, the primary prey species of lions. However, there is a significant difference in vegetation types and topography. Primary vegetation types are pinion/juniper interspersed with



mountain shrub, and shortgrass prairie. In order to estimate the number of square kilometers of various cover types geographic information system (GIS) data was used to produce vegetation maps of the DAU (Figure 6).

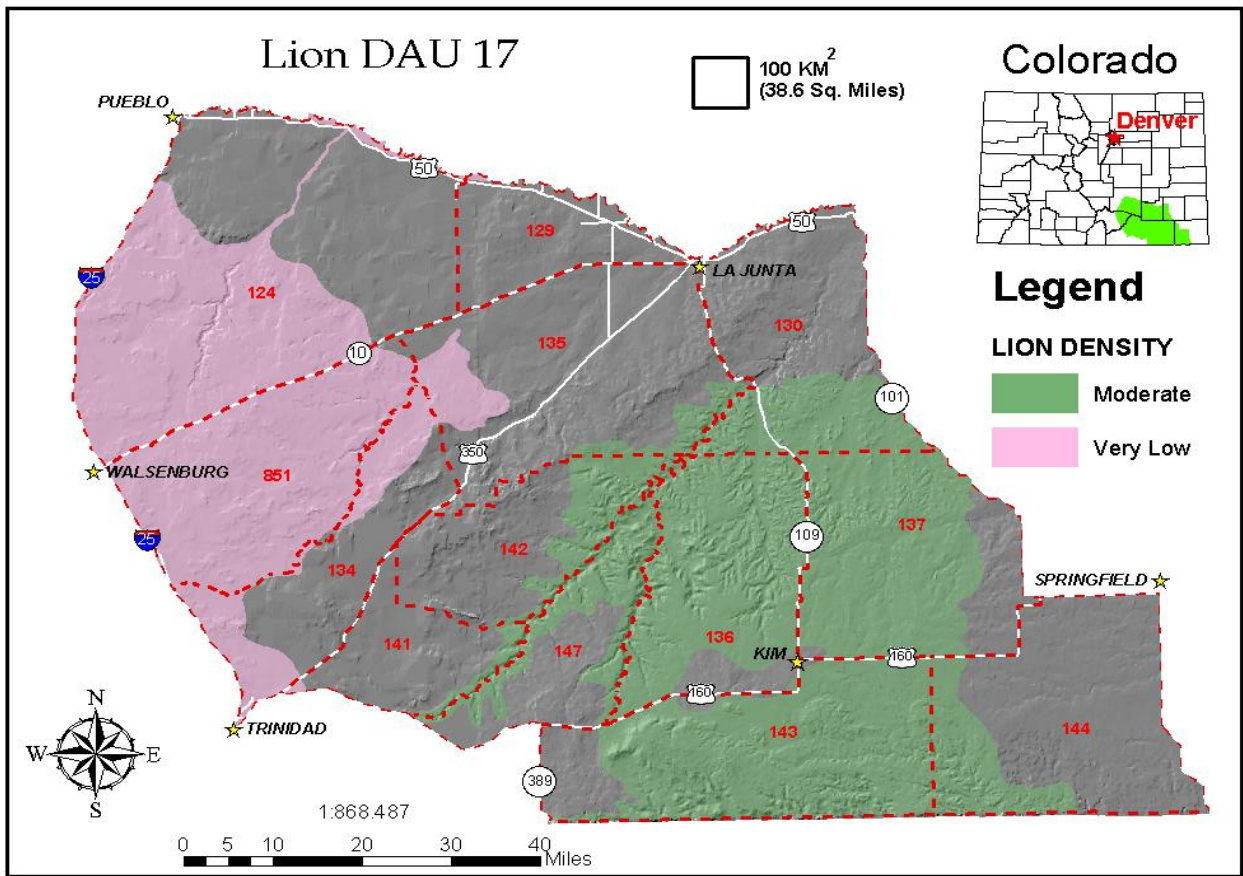
**Figure 6 – GIS Vegetation Map of L-17**



From the GIS data two distinct areas were delineated on the maps (Figure 7). The first area is

comprised of pinion/juniper and mountain shrub communities including canyon lands. The second is shortgrass prairie and fringe areas. Two separate lion densities are assigned to these areas in order to come up with an overall lion population estimate. The pinion/juniper area is designated as moderate lion density (green on map) while the shortgrass/fringe area (light purple on map) is assigned very low lion density based on work by Logan and Sweanor, 2001. Typically shortgrass prairie is not considered lion habitat, however, this is a high desert prairie interspersed with canyons, intermittent juniper trees, and drainages which do harbor good numbers of deer and small numbers of lions.

**Figure 7 – Estimated Lion Density in L-17 Based On Habitat Type and Quality**



Using mountain lion age structure information (Ross and Jalkotzy, 1992 and Logan and

Sweanor, 2001) lion population demographics are estimated to contain 52% adult lions, 14% sub-adults, and 34% kittens. Applying these percentages to the combined moderate and very low population projections from the GIS maps produces the following (Table 1).

**Table 1 - Mountain Lion Population Estimate in L-17 Based on Moderate and Very Low**

<b>Lion Density Estimates</b>				
<u>Lion Density</u>	<u>Sq. Kilometers</u>	<u>Density Estimate (100 sq. km)</u>	<u>Lions</u>	
Moderate	5,710.0	3.0	171	
Very Low	3,799.3	0.6	<u>23</u>	
			<b>Total Lions</b>	<b>194</b>

If the lion population is actually higher than estimated in the very low density area and a low estimate is used in place of very low the following population density is obtained (Table 2).

**Table 2 - Mountain Lion Population Estimate in L-17 Based on Moderate and Low**

<b>Lion Density Estimates</b>				
<u>Lion Density</u>	<u>Sq. Kilometers</u>	<u>Density Estimate (100 sq. km)</u>	<u>Lions</u>	
Moderate	5,710.0	3.0	171	
Low	3,799.3	2.0	<u>76</u>	
			<b>Total Lions</b>	<b>247</b>

Using the projections from Table 1 and Table 2 the lion population density is estimated to range from 194 - 247 lions spread over 9,509.3 square kilometers. Multiplying these numbers by the demographic percentages above gives the following lion population breakdown (Table 3).

**Table 3 – Population Projections with Moderate/Very Low & Moderate/Low Lion Densities**

Moderate and Very low

$$194 \times .52 = 101 \text{ Adults}$$

$$194 \times .14 = 27 \text{ Sub-adults}$$

$$194 \times .34 = 66 \text{ Kittens}$$

**194 Total lions**

Moderate and Low

$$247 \times .52 = 128 \text{ Adults}$$

$$247 \times .14 = 35 \text{ Sub-adults}$$

$$247 \times .34 = 84 \text{ Kittens}$$

**247 Total lions**

## **MORTALITY OBJECTIVE**

### **Total Mortality Objective**

The total mortality objective is the total annual lion mortality including hunter harvest, road kills, accidents, and game damage kills. In the case of L-17 total mortality is comprised mainly of hunter harvest and the occasional damage kill. The DAU has few paved roads and a low number of county roads through the best lion habitat, thus there are very few road kills.

The off-take range for a stable lion population is 8-15% of the legally harvestable population (Logan and Sweanor, 2001). To suppress the population an off-take of at least 16-18% is needed. In Colorado the harvestable population is comprised of adult and sub-adult cats, no kittens. Using the previous estimates from Table 3 above gives the moderate to very low category a legal harvest number of 128 cats and the moderate to low category a legal harvest of 163 cats. Using 17% as the median percentage (16-18) for suppression off-take produces a total mortality range of 22-28 lions.

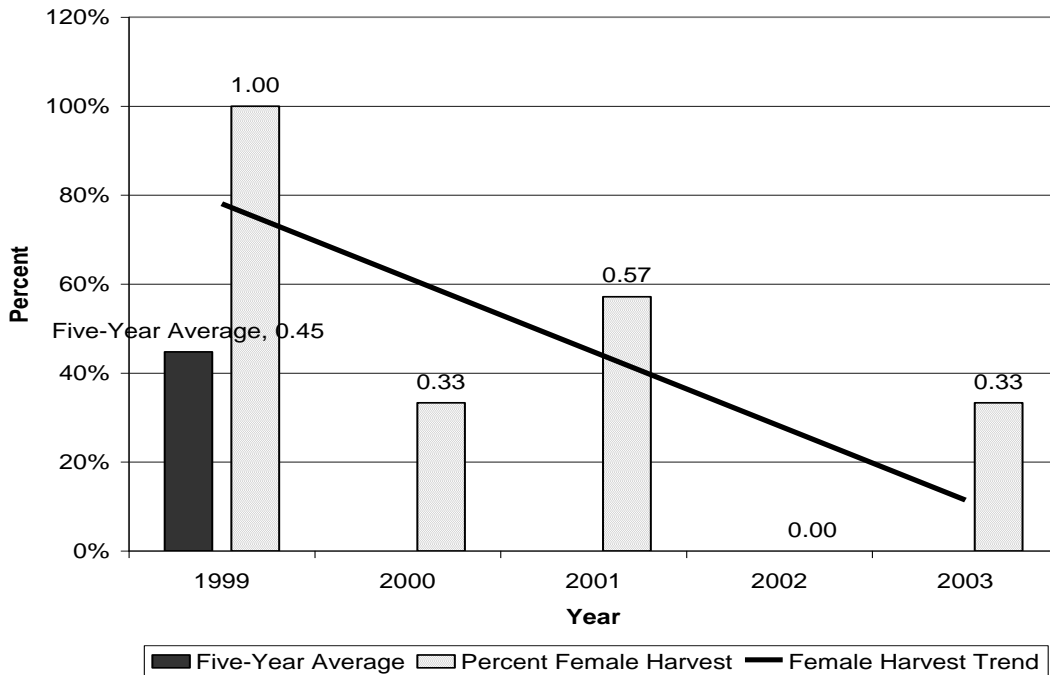
### **Hunter Harvest Objective**

The hunter harvest objective for L-17 is the same as the total mortality objective due to the low number of non-hunter mortalities in the DAU. In order to suppress the lion population in L-17 the harvest objective will be 22 legal lions calculated from the “Moderate to Very Low” population estimate (128 lions  $\times$  17% = 21.76). Even though the current quota of 14 has never been filled

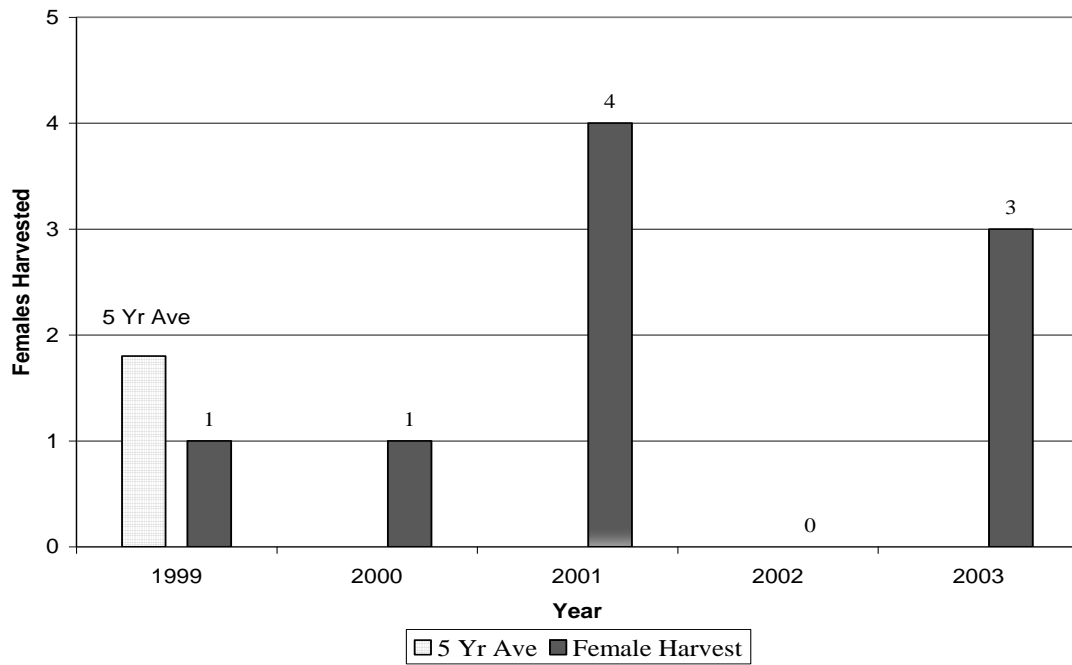
through hunter harvest or thorough non-hunter mortality combined with harvest mortality, to suppress the population much greater harvest is needed. The highest number of lions taken in a single calendar year was nine in 2003.

The percentage of females in the harvest has averaged 45% over the past five years (Figure 7). This number used as a percentage can seem fairly high until the total number of females actually harvested per year is looked at. In the case of lion DAU's with low harvest numbers such as L-17 harvest of a single female lion can be 100% of the harvest, such as in 1999 when that very thing happened (Figures 8 and 9). Furthermore, the five-year average harvest for females is less than 2 females per year (Figure 9).

**Figure 8 - L-17 Percent Female Lion Harvest And Five-Year Average**



**Figure 9 -Total Female Harvest**



**HARVEST SUMMARY**

Lion harvest in L-17 averaged less than four lions per year over the past 10 years with the annual male harvest 2.2 lions and the female average 1.2 lions (Table 4). Harvest can fluctuate greatly on an annual basis and is highly dependent on snow and tracking conditions. In years with several good snows that remain on the ground for several days harvest increases. In years with little snow, or snow that melts rapidly, harvest decreases correspondingly.

**Table 4 - Mountain Lion Harvest by Sex (Males/Females) in L-17 by GMU 1994-2003**

GMU	Year										10 Year Total	
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Males	Females
123	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0	0
124	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0	0
125	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0	0
126	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0	0
127	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0	0
128	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0	0
129	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0	0
130	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0	0
132	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0	0
133	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0	0
134	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0	0
135	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0	0
136	0/0	0/0	1/1	1/0	0/0	0/0	1/1	2/3	1/0	4/0	10	5
137	0/0	0/0	0/0	1/0	0/0	0/0	0/0	0/0	0/0	0/0	0	0
138	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0	0
139	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0	0
141	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0	0
142	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0	0
143	1/0	1/0	0/1	2/1	1/0	0/1	0/0	1/0	2/0	2/2	10	5
144	0/0	0/0	0/0	0/0	1/0	0/0	0/0	0/1	0/0	0/0	1	1
145	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0	0
146	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0	0
147	0/0	0/0	0/0	0/0	0/0	0/0	1/0	0/0	0/0	0/1	1	1
<b>Sex Total</b>	1/0	1/0	1/2	4/1	2/0	0/1	2/1	3/4	3/0	6/3	<b>Mean 2.2</b>	<b>Mean 1.2</b>
<b>DAU Total</b>	1	1	3	5	2	1	3	7	3	9	<b>Mean 3.4</b>	

## **Potential Refuge Areas**

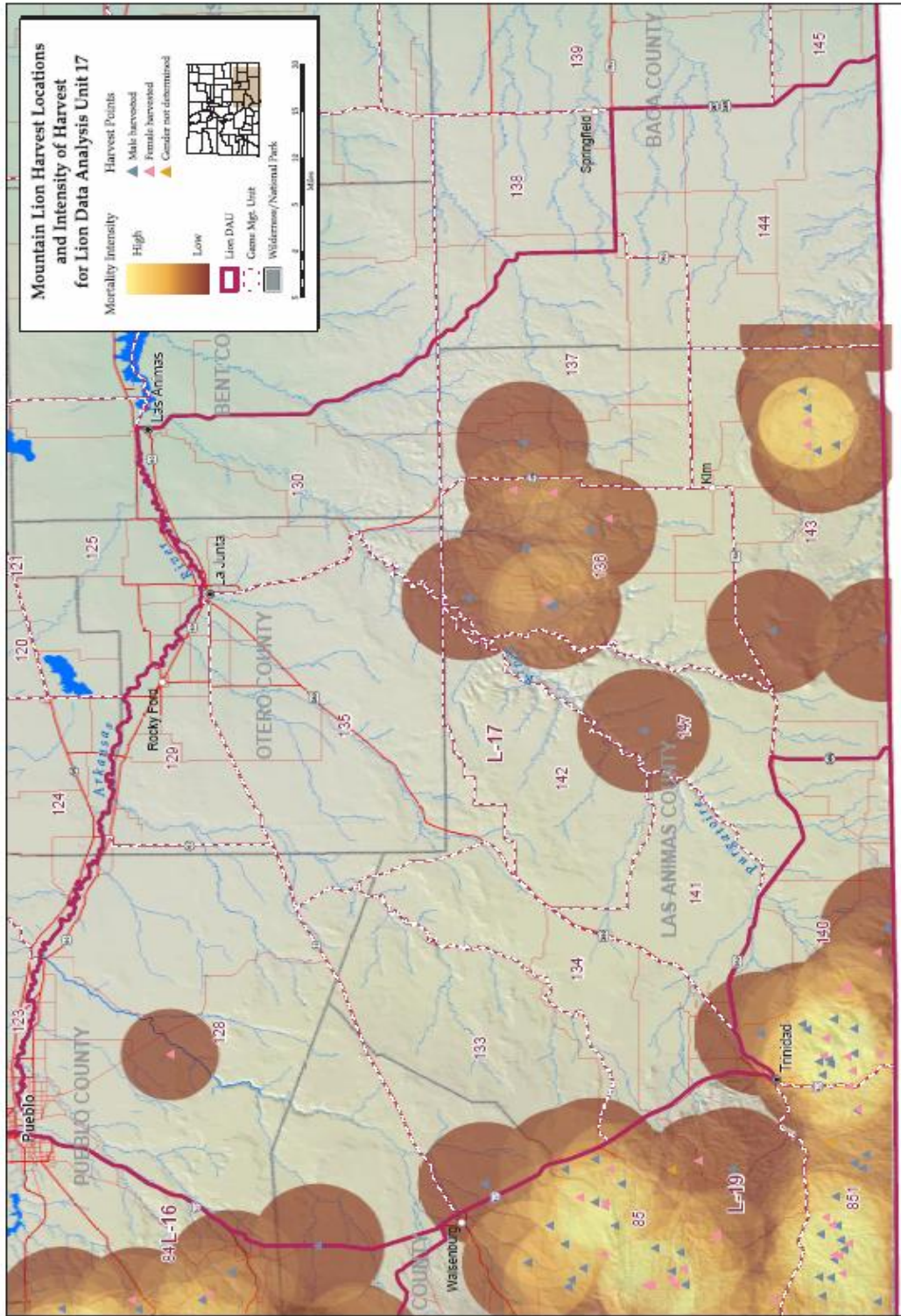
Several areas of the DAU can be considered potential refuges for lions. These include large tracts of land where lion hunting is not possible, the terrain is very difficult to traverse, lion density is very low, or a combination of these factors. A spatial map of L-17 shows harvest points for lions from 1997-2002. The majority of harvest points occur in GMU's 136 and 143. Pinon Canyon and the western portion of the DAU show very little to no harvest (Figure 10).

The United States Army's Pinon Canyon Maneuver Site occupies all of game management unit 142 and is excellent lion habitat with very restrictive public access. Fort Carson only allows hunters on the property during specific times of the year and only during specific hours each day. Additionally, no public access is allowed during training exercises at Pinon Canyon. These restrictions make it difficult for lion hunters to access the property at optimal hunting times and to get all their dogs back to the vehicles by closing time each day.

The western half of L-17 is, for all intents, a refuge area for lions due to the relatively low density of lions and the corresponding lack of lion hunting pressure there. Comments from lion hunters at public meetings indicate it is very difficult terrain to hunt lions with lots of open space and a low density of large trees. The lion prey base in the western half of the DAU consists of deer, some elk, and potentially antelope (several landowners have found evidence of lions killing antelope around flat topped mesas interspersed with pinon and juniper trees). While a population of lions does indeed occur here, harvest is minimal at best in this large portion of the DAU.



Figure 10 - Map of lion harvest in L-17 with locations of male/female harvest (1997-2002), intensity of harvest, and lack of harvest in potential refuge areas for lions.



## **GAME DAMAGE AND HUMAN/LION CONFLICT**

As noted earlier livestock damage from lions in this area is a highly contentious issue and should be given serious consideration when developing lion management plans and setting harvest objectives. This issue has been addressed under the Mammalian Predator Management Policy of the Colorado Wildlife Commission (September 1999) and by CDOW game damage policy. Damage claims have been on an increasing trend in L-17 over the past several years (See Figure 4).

Because of the low human population in L-17 there are very few human/lion conflict issues. The conflicts that occur are generally either game damage related or public perception that lions are suppressing local populations of deer and bighorn sheep.

### **SUMMARY**

The goals established for L-17 are to suppress the lion population in order to reduce livestock damage claims and human conflicts, minimize lion predation on bighorn sheep and mule deer, and maintain a healthy self sustaining lion population. Hounds-men and outfitters are promoting the benefits of reducing female lion harvest and methods to identify male lions in the field. The current quota of 14 lions for L-17 could be raised to 22, but given the low historic harvest level the quota will be left at 14 for now. This will allow for a greater off-take in the future if the harvest level begins reaching 14. This level of harvest should help reduce lion numbers and lion-human conflicts while maintaining a healthy lion population. The CDOW will continue to monitor all known lion mortalities statewide and mandatory checks of harvested lions will be used to gather biological information on all harvested cats. As new information on lion biology and management becomes available it will be incorporated into future updates of lion management plans.

## **LITERATURE CITED**

Anderson, A. E. 1983. A critical review of literature on puma. Colorado Division of Wildlife Special Report Number 54.

Logan, K. A. and L. L. Sweanor. 2001. Desert puma: evolutionary ecology and conservation of an enduring carnivore. Island Press. Washington, DC.

Ross, P. I. and M. G. Jalkotzy. 1992. Characteristics of a hunted population of cougars in southwestern Alberta. *Journal of Wildlife Management*. 56(3):417-426.