

STATUS OF THE MOUNTAIN LION IN NEW MEXICO, 1971-2000

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Abstract: The mountain lion (*Puma concolor*) is an important species in New Mexico. A long-range plan for mountain lion management in New Mexico was developed in 1997. New Mexico currently conducts 2 mountain lion control programs. There were 156 (58F, 98M) mountain lion pelts tagged from 63 game management units during the 1999-2000 hunt season. Hunter survey cards, implemented since the 1984-85 hunt season, have provided New Mexico Game and Fish (NMDGF) with information to aid in managing cougar populations. Currently, NMDGF is designing a population study to estimate the statewide mountain lion population using a DNA technique. The NMDGF received \$100,960 in revenue from mountain lion hunting license sales during the 1999-2000 license year.

MANAGEMENT HISTORY

The mountain lion (*Puma concolor*) became a protected species in New Mexico in 1971. Since then, New Mexico Department of Game and Fish (NMDGF) has assumed management authority and established regulations on hunting seasons, bag limits, and depredation resolution. In 1971 the State Game Commission (Commission) passed a regulation protecting spotted kittens and female lions with young from harvest. Also in 1971, NMDGF initiated a 4-month hunting season in the southwestern quarter of the state with a bag limit of 1 mountain lion. In subsequent years hunting areas expanded and the hunting season was gradually extended. Between 1979 and 1983 the bag limit was increased to 2 lions and the season was 11 months throughout most of the state. In 1979 the Commission initiated mandatory pelt tagging by NMDGF personnel. In 1983 the agricultural industry, concerned with livestock depredation, introduced a bill to New Mexico's House of Representatives to eliminate the mountain lion's protected status. The bill was tabled but more information was requested. In response, NMDGF produced a detailed report of mountain lions in New Mexico (Evans 1983). Based on recommendations from this report the 1984 hunting season was reduced to 3 months in most areas of the state. From 1985-1999 the season was extended to 4 months and the bag limit reduced to 1. In 1999, after NMDGF made presentations to the Commission and the public, the mountain lion harvest structure was revised to implement a harvest quota system. In this system New Mexico would be divided into 10 mountain lion management zones (Fig. 1). Each zone would be open to mountain lion hunting from 01 October to 31 March, or until the total number of kills (as determined by mandatory check-in for successful hunters) reached the harvest quota for that zone. A harvest quota hotline is available for hunters to obtain the status of a particular zone, and for NMDGF officers to report pelt tag information. Harvest objectives within each zone were based upon mountain lion distribution, habitat, and desires expressed by the public and the Commission to maintain, increase, or decrease mountain lion populations within various parts of New Mexico. The yearly harvest goal for the 2000-01 and 2001-02 hunting seasons was set at 176 mountain lions (Table 1). A long-range plan for mountain lion management in New Mexico was developed in 1997 (NMDGF 1997). The projects listed in this plan addressed the major issues that were identified through 18 public meetings held throughout the state. In addition to listing a series of tasks and strategies to achieve each task, this plan describes the schedule, personnel, and budget required for implementing actions. The plan will be revised in 2001. Beginning with the 2000-01 season, NMDGF will collect a tooth from all lions killed in the state for more accurate aging of kills.

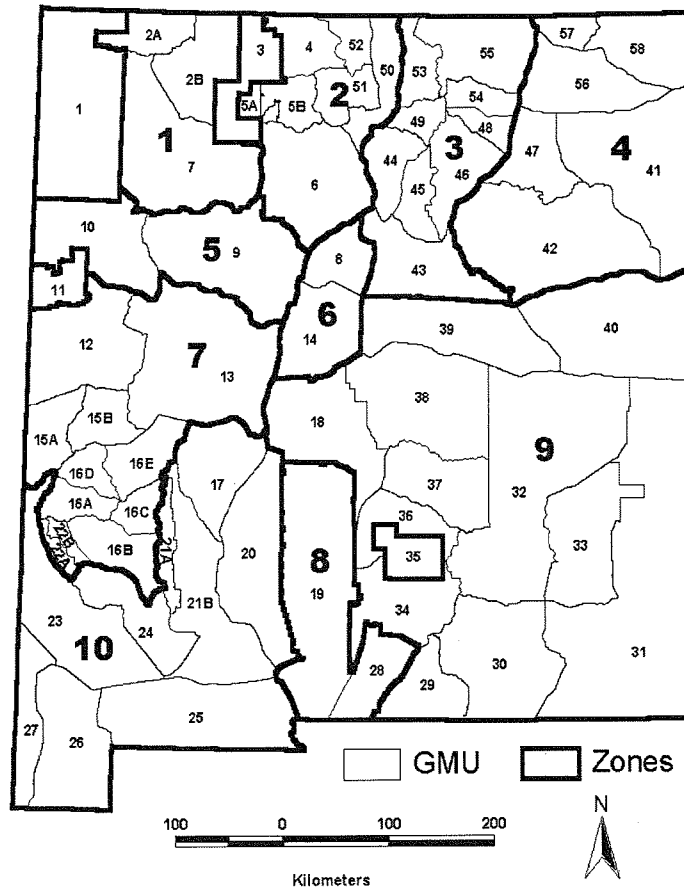


Fig. 1. Current cougar management zones (Zones) and game management units (GMU) in New Mexico, New Mexico Department of Game and Fish, 2000.

Table 1. Details of New Mexico's mountain lion harvest quota including zone, zone area description, game management units in each zone, and allowable lion harvest for the 2000-01 and 2001-02 hunting seasons, New Mexico Department of Game and Fish.

Zone	General Description of Area in Zone	Game Management Unit Numbers in Zone	# Lion Kills Allowed
I	San Juan Mountains	2,7	11
II	Jemez Mountains	4,6,50-52	34
III	Sangre De Cristo Mountains	43-46,48,49,53-55	18
IV	High Northeast Plains	41,42,47,56-58	12
V	West Central Mountains	9,10	3
VI	Sandia & Manzano Mountains	8,14	6
VII	Gila Mountains	12,13,15,16,22	18
VIII	Military Reservations	19,28	3
IX	Southeast	18,29-34,36-40	18
X	Southwest Deserts	17,20,21,23-27	53
Total			176

HARVEST

There were 156 (58F,98M) mountain lion pelts tagged from 63 game management units during the 1999-2000 hunt season (Table 2). This harvest represents a 1% increase over the 1998-99 hunting season. The 5-year (1995-96 through 1999-2000) average mountain lion harvest in New Mexico is 155 mountain lions (57F,98M); the 10-year average harvest (1990-91 through 1999-2000) is 138 (51F,87M).

Mountain lion hunting license sales have increased in New Mexico. Sales began to escalate during the 1990-91 hunting season and increased 62% (482 to 781) from the previous year (Table 2). Since that time, numbers have fluctuated but continued in an upward trend. In the past 5 years hunting permit sales have increased 102% (842 to 1702).

Table 2. Mountain lion hunting licenses issued and sex of harvest in New Mexico, 1981-2000, New Mexico Department of Game and Fish.

Hunt Year	Licenses Issued	Male Harvest	Female Harvest	Unknown Sex	Total Harvest
1981-82	360	78	44	3	125
1982-83	481	55	44	1	101
1983-84	661	67	65	0	132
1984-85	443	47	32	0	79
1985-86	472	56	48	0	104
1986-87	437	55	46	0	101
1987-88	456	43	35	0	78
1988-89	450	56	35	0	91
1989-90	482	70	42	0	112
1990-91	781	72	36	0	108
1991-92	765	77	42	0	119
1992-93	826	68	37	0	105
1993-94	926	75	52	0	127
1994-95	1145	87	61	2	150
1995-96	842	74	45	0	119
1996-97	980	114	62	1	177
1997-98	974	108	58	2	168
1998-99	1485	95	58	0	153
1999-00	1702	98	58	0	156

HUNTER SURVEY CARDS

Hunter survey cards, implemented since the 1984-85 hunt season, have provided NMDGF with information to aid in managing cougar populations. Although less reliable for determining harvest trends than actual pelt tag data, surveys provide valuable hunter and harvest statistics such as hunter effort, method of take, and whether aids such as guides and dogs were used. Furthermore, surveys allow this information to be obtained from hunters who do not make a kill. According to the 1999-2000 survey, hunters spent an average of 8 days hunting lions, 57% of

successful hunters utilized guides and hounds, 32% hunted with hounds only, and 10% hunted without aid. In the past 5 hunt seasons, the average survey return rate was 37%; in the past 10 hunt seasons, the average return rate was 38% (Table 3). In an effort to increase the return rate, NMDGF is considering making changes to the mail-in survey. Providing the survey with the hunting license at time of purchase would eliminate mailing costs, increase sample size by eliminating mailing address errors (due to illegibility), and may provide more accurate information if the time between the hunt and survey response is reduced. Another possibility is to send several surveys throughout the season. Although more costly, this may increase survey response rate and data accuracy by reducing the time between the hunt and survey return.

Table 3. Mountain lion hunter surveys mailed, number returned, and return rate in New Mexico, 1984-2000, New Mexico Department of Game and Fish

Year	# Surveys Mailed	# Surveys Returned	Return rate
1984-85	386	139	36%
1985-86	403	235	51%
1986-87	437	120	27%
1987-88	456	108	24%
1988-89	450	N/A ^a	N/A ^a
1989-90	482	120	25%
1990-91	781	388	50%
1991-92	765	318	41%
1992-93	826	333	40%
1993-94	735	281	38%
1994-95	1145	368	32%
1995-96	842	302	43%
1996-97	895	297	33%
1997-98	974	269	28%
1998-99	1346	537	40%
1999-00	1601	646	40%

^aData are not available

DEPREDATION

It is the policy of NMDGF to resolve depredation and to minimize property damage, conflict, and threat to human safety by mountain lions. The legal definition of depredation in New Mexico is "property damage by protected wildlife on privately owned or leasehold interest land, where the damage value exceeds applicable income earned on that site from the wildlife species causing damage." When a depredation complaint is received, a NMDGF investigator and the complainant visit the complaint site within 24 hours, or as soon as the complainant is available. The on-site investigation is to identify the complaint type as a depredation, conflict, or human safety problem and to verify if any human actions are contributing to the problem. If a depredation situation exists, a permit authorizing a kill is issued to the investigator or directly to the landowner. Permits issued have a specific start and end date and all kills are reported immediately. When the permit expires, the investigating officer submits a detailed narrative of the incident and outcome to the depredation coordinator. In the previous 5 years, NMDGF has issued an average of 31 permits per year, the highest being 45 permits in 1999 (Table 4).

Table 4. Number of mountain lion depredation permits issued and lions killed in New Mexico, 1981-1999, New Mexico Department of Game and Fish.

Year	# Depredation Permits Issued	# Male Lions Killed	# Female Lions Killed	# Unknown Sex Killed	Total # Lions Killed
1981	13	0	0	0	0
1982	22	0	0	0	0
1983	11	3	4	0	7
1984	6	0	0	0	0
1985	5	0	0	0	0
1986	14	4	1	2	7
1987	15	3	2	2	7
1988	7	0	1	0	1
1989	17	2	3	1	6
1990	24	1	3	0	4
1991	31	7	3	0	10
1992	32	3	5	0	8
1993	23	4	5	0	9
1994	16	5	4	0	9
1995	27	3	2	0	5
1996	26	6	4	0	10
1997	29	6	3	0	9
1998	28	3	2	0	5
1999	45	5	14	1	20

MOUNTAIN LION CONTROL PROGRAMS

New Mexico currently conducts 2 mountain lion control programs. The first program was passed by the Commission in January 1985 in response to the increasing number of livestock being killed by lions in game management unit 30 (Fig. 1). This Order instructed NMDGF to remove lions on ranches that had more than 4 verified depredations in a 4-year period. Each year, NMDGF could remove up to 14 lions from all ranches combined. In 1986 the Order was revised and the number of verified depredations required for lion removal was increased to 6 within a 3-year period; the maximum number of lions that could be removed yearly remained at 14. This program still operates according to those parameters. Fourteen lions were killed in 1999 (Table 5).

Table 5. Preventative lion control permits issued and number of mountain lions killed in Unit 30, New Mexico, 1985-1999, New Mexico Department of Game and Fish.

Year	# Preventative Permits Issued in Unit 30	# Males Killed in Unit 30	# Females Killed in Unit 30	# Unknown Sex Killed in Unit 30	Total # Lions Killed in Unit 30
1985	16	9	4	0	13
1986	18	4	9	0	13
1987	17	9	5	0	14
1988	14	6	8	0	14
1989	19	2	4	0	6
1990	11	4	3	0	7
1991	14	8	6	0	14
1992	14	6	8	0	14
1993	12	6	2	4	12
1994	11	9	2	0	11
1995	8	6	2	0	8
1996	11	5	5	1	11
1997	11	6	2	2	10
1998	12	8	2	2	12
1999	14	5	7	2	14

The second lion control program was initiated in response to declining Rocky Mountain and desert bighorn sheep populations. Currently, 5 wild populations of Rocky Mountain bighorns totaling 600 sheep and 7 wild populations of desert bighorns totaling 200 sheep occupy New Mexico (W.C. Dunn, personal communication). Of 50 radiocollared bighorn mortalities between 1995 and early 2000, 37 (74%) were killed by cougars (Dunn 2000). In 1997, the Commission passed a regulation that instructed NMDGF to kill any lion that was known to have killed a bighorn sheep. Eight lions were killed that year but lion predation remained high. In 1999, the Commission passed another regulation allowing the removal of up to 34 lions per year, for 5 years, in 4 bighorn sheep ranges. This number is included in the harvest quota but allows for removal after the sport-hunting season if the unit quota was not met during the season. Four houndsmen were contracted in 1999 to remove lions, but to date no lions have been removed under this program.

RESEARCH

The first study of mountain lions in New Mexico began in 1934 (Hibben 1937), documenting life history attributes in the northern and western portion of the state. From 1971 until 1980, NMDGF conducted research in southwestern New Mexico, investigating food habits and movement ecology and using radio telemetry (Donaldson 1975, Johnson 1982). The National Park Service funded a research study in southeastern New Mexico between 1982 and 1985, within Carlsbad Caverns and Guadalupe Mountains National Parks (Smith et al. 1986). This study focused on population dynamics and provided basic ecological information of mountain lions in that region. From 1983-1985, NMDGF performed a study to determine the extent of illegal commercialization of mountain lions (Anonymous 1985). Most recently, NMDGF contracted Hornocker Wildlife Institute to conduct an intensive study of mountain lion ecology (Logan et al. 1996). This 10-year study examined population dynamics, social organization, interactions between mountain lions and mule deer and desert bighorn sheep, and mountain lion translocation as a management tool (much of this information was presented at the Fifth Mountain Lion Workshop).

In 1996, the Geography Department at New Mexico State University was contracted to delineate mountain lion ranges and expected densities throughout New Mexico by analyzing characteristics of actual mountain lion locations that were obtained during the study conducted by Logan et al. (1996). The result was a predictive GIS model of cougar habitat in New Mexico (Campbell 1998).

Currently, NMDGF is designing a population study to estimate the statewide mountain lion population using a DNA technique. This evolving technique for population monitoring is based on microsatellite analysis (Paetkau and Strobeck 1994). Essentially, DNA can be used as marks to identify individuals in the capture and recapture segments of the study. These data can then be incorporated into capture-recapture population models to generate a population estimate.

ECONOMIC IMPACTS

The NMDGF received \$100,960 in revenue from mountain lion hunting license sales during the 1999-2000 license year. Currently, the cost for a license to hunt lions in New Mexico is \$30 for residents and \$200 for non-residents. These fees have remained constant since the 1996-97 season when the resident license fee rose from \$10 to \$30. Non-residents accounted for 17% of the total revenue from lion hunting license sales in 1999-2000 and an undetermined amount of income to local economies in the form of accommodations, hunting supplies, and outfitting services. Guides and outfitters play a significant role in mountain lion hunting. For the 1995-96 through 1999-2000 hunt seasons, an average of 56% of hunters that harvested a lion employed guides or outfitters. Although the fees charged by guides and outfitters vary, the revenue from these services almost certainly exceeds the total revenue generated from lion license sales.

Mountain lions can have negative economic impacts on some livestock operations. Lions occasionally prey on domestic sheep or other livestock. Although the number of these depredation incidents in New Mexico is relatively small (10 in 1999), there may be significant economic impacts to individual ranchers that suffer from chronic lion depredation losses.

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