

Status of the Mountain Lion in Colorado

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INTRODUCTION

Historically, mountain lions were most common west of the Continental Divide, but also occurred on the eastern slope of the Rocky Mountains and along the major drainages east to Kansas (Young 1946:16). Eastern slope populations were greatly reduced during the early period of settlement. But around 1900 portions of western Colorado were considered to support the "best populations of mountain lions in the United States" (Armstrong 1972:295). A 227 pound male mountain lion killed by President Theodore Roosevelt in 1901 near Meeker, Colorado remains among the heaviest mountain lions recorded from North America (Young 1946; Anderson 1983). Statewide, mountain lion numbers were believed to have declined since the early 1900's (Armstrong 1972). In 1967, the mountain lion population was characterized as low but stable (Colo. Division of Wildlife 1969).

CURRENT STATUS

There are no reliable estimates of the total number of mountain lions currently within Colorado. Early estimates ranged from 613 - 726 (Sandfort And Tully 1971:75) To 1,100 - 1,500 lions (Currier 1976:48). Currently, most in-

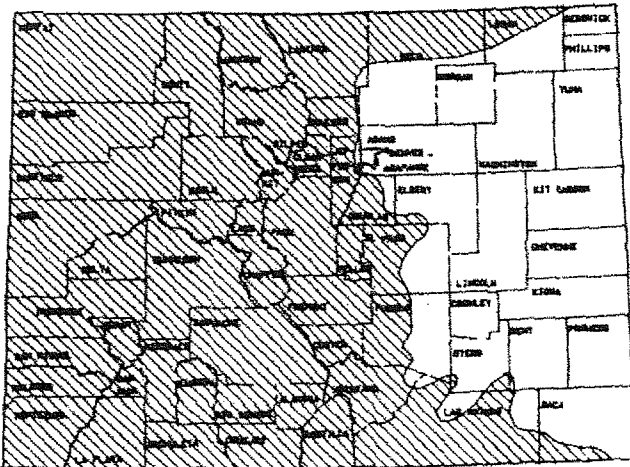


Fig. 1. Stippled area approximates distribution of mountain lion in Colorado. Modified from Sandfort and Tully (1971).

formed opinion, both within the Division of Wildlife and among guides and outfitters holds that mountain lion are increasing statewide. A 1970 approximation of mountain lion distribution included about 66,425 square miles. A 1989 approximation (Fig. 1) included 70,654 square miles or about 67 percent of the total area of Colorado.

MANAGEMENT PROGRAMS

Laws And Regulations. Season dates, manner of take, hunting laws, bag limits, use of dogs and related sport harvest regulations are established annually each spring by the Colorado Wildlife Commission, an eight-member policy and rule-making body for the Division appointed for a four-year term by the Governor.

The current 1988-1989 mountain lion season is nearly identical to that of the past five years; May 1, 1988 through August 12, 1988 and November 15, 1988 through April 30, 1989. A harvest quota system provides nearly unlimited recreational opportunity, but places a maximum limit on the number of mountain lion that may be taken in any Game Management Unit (GMU) or combination of Units. Quotas, which vary from 1 to 30 mountain lions are established in about sixty GMU's. The total harvest quota for 1988 was 334 mountain lion. After obtaining a license, the license holder is required to obtain a free hunting permit valid for up to seven different GMU's. Successful hunters must present the carcass to the Division for inspection and legal seal attachment to the hide or head within 48 hours of take.

As the season progresses, a record of harvest is maintained by GMU, and when the harvest quota is achieved in any GMU, permit issuance is terminated. Permit issuers in that area are notified by telephone that the harvest quota has been reached and that the GMU is closed to further hunting. The hunter may then receive a permit for another open GMU.

Mountain lions of either sex may be taken one-half hour before sunset to one-half hour after sunset by any firearm, crossbow or standard archery equipment. Baiting is permitted but seldom used as most successful persons hunt with the aid of dogs, often using the services of a licensed guide or outfitter. No kittens or mountain lion ac-

STATUS REPORTS

Table 1. Number of mountain lion reported killed in Colorado, 1916-1965. Modified from Table 1 in Sandfort and Tully (1971).

Years	Div. of Wildlife Services, FWS (a)	Bountied (b)	Licensed Hunters	Av. All Rep. Harvests
1916-1919	35	--	--	11.7
1920-1929	58	15	--	7.3
1930-1939	13	563	--	57.6
1940-1949	34	84(c)	--	11.8
1950-1959	117	503	--	62.0
Totals	257	1165		
1960	6	31	--	37
1961	13	38	--	51
1962	7	34	--	41
1963	12	45	--	57
1964	2	79	--	81
1965	5	64(d)	17(e)	86
Totals	45	291	17	353

(a) Division of Wildlife Services, USF&WS reports based on fiscal year. Data derived from fiscal year reports originating with July 1 for years and periods shown.

(b) Bounties on fiscal year basis.

(c) Data for 1941, 1942, 1943, and part of 1944 incomplete. It is believed the take and bountied numbers were much higher than herein reported.

(d) Bounty law repealed and no bounties paid after June 30, 1965.

(e) Animals taken by holders of mountain lion licenses during the open season extending from October through December 31, 1965.

accompanied by a kitten may be taken. The mountain lion is the only big game species that does not need to be prepared and used for human consumption.

Harvests. Prior to July 1, 1965, the mountain lion was classified as a predator and carried a bounty from 1929 through June 30, 1965. Legislative removal of the bounty and establishment of the mountain lion as a protected big game species, effective July 1, 1965, was followed by Colorado Wildlife Commission annual regulations setting forth bag limits, open areas, season dates and the manner in which the species could be taken by sport hunting. Trapping has not been permitted since 1965, except by Division, USFWS or USDA, Animal, Plant and Health Inspection Service (APHIS) employees in damage control efforts. Minimal numbers of lion killed by federal, State, and private entities from 1916 to 1965 totaled 1,775 (Table 1).

From 1966 to 1987, 4,974 licenses were purchased and a minimum of 1,831 mountain lion were killed by 3,674 sport hunters (Table 2). Percent success during the 1973-1987 period ranged from 28 to 48 percent. A 3-year moving average plot of total harvest and total hunters over time shows a marked increase in both hunters and total harvest from 1973 to 1987 (Figure 2). The upward trend of hunters and harvest, 1973-1980, accelerated in 1980 with the advent of either-sex harvest regulations

Table 2. Mountain lion harvest, hunters, license sales, percent success and recreation days, 1966-1987.

Year	Sportsmen's Harvest (a)			Total	No. Hunters	Success	% (b) Total Licenses (c)	Rec. Days
	Male	Female	Unkn					
1966	?	?	--	47	unk	-	121	unk
1967	?	?	-	58	unk	-	102	unk
1968	16	4	30	50	unk	-	30	unk
1969	31	25	-	56	480	-	36	unk
1970	30	17	-	47	unk	-	30	unk
1971	19	10	-	29	unk	-	36	unk
1972	29	6	-	35	unk	-	72	unk
1973	33	27	-	60	115	52	115	584
1974	27	25	-	52	185	28	185	1314
1975	47	43	-	90	143	63	143	1016
1976	44	21	-	65	152	43	174	1062
1977	44	39	-	83	195	43	225	1331
1978	48	43	--	91	243	37	285	1660
1979	49	25	-	74	209	35	264	1425
1980	41	41	-	82	200	41	280	1565
1981	67	40	-	107	248	43	352	1824
1982	77	60	-	137	327	42	410	2363
1983	69	56	-	125	362	34	453	2606
1984	55	48	-	103	257	40	359	1742
1985	101	54	-	155	363	43	460	2614
1986	61	44	-	105	310	34	386	2232
1987	125	55	-	180	365	48	456	2627
Totals	1013	683	30	1831	3674	-	4974	-

(a) Does not include 92 lions taken by Division, USF&WS, or private individuals under damage control. Harvest regulations were: 1965, 1 lion, either sex; 1966, 3 lions, es; 1967-1970, 1 lion es; all within specified Game Management Units (GMU) and seasons except during 1966 which was statewide and year long; 1971-79, males-only gr es within specified GMU and seasons; 1980-87, es in all specified GMU and seasons. Harvest data from mandatory check and independent survey.

(b) Percent success is the harvest divided by number of hunters.

(c) During the period 1967 through 1975, the Division issued a Sportsman's License at \$30.00 for a resident and \$135.00 for a nonresident. This permitted fishing, small game hunting and the taking of deer, elk, black bear and mountain lion on one license with several carcass tags. Data for 1973 through 1975 includes both regular mountain lion license and sportsman's license holders who utilized the mountain lion tag.

statewide, increased kill quotas within many GMU, and an increase in the number of GMU's hunted.

From 1971 to 1979, males predominated in the total harvest, when the kill was limited to male mountain lion on some GMU and either-sex on others, and from 1980 to 1987 when an either-sex regulation applied to all GMU. During the latter period, significantly more males (Chi-square = 39.44, $P < 0.001$) were reported. This differs from harvest sex ratios in other states which generally did not differ ($P > 0.05$) from equality (Anderson 1983:58).

Long-Term Management Plans. The past long range or strategic plans of the Division (dated 1974, 1977 and 1983) as well as the draft plan under consideration in 1988 have the same statewide objectives. Those include:

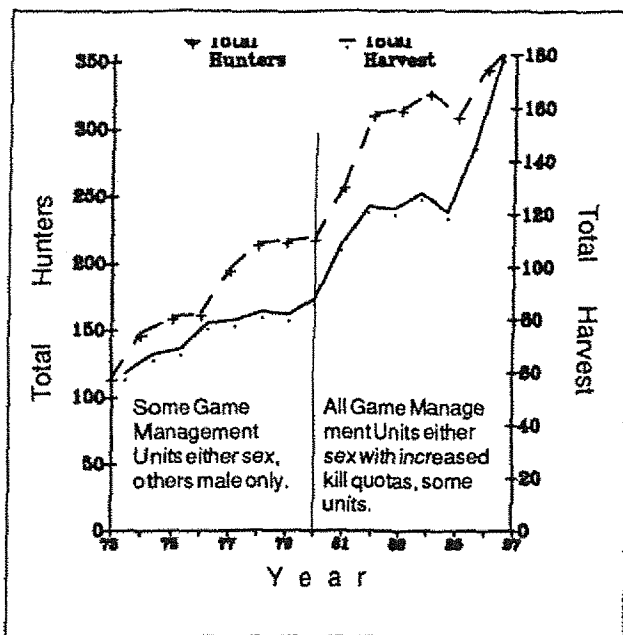


Fig. 2. Three year moving average of mountain lion hunters and harvest in Colorado. Data are from mandatory check and independent survey, 1973-87.

(1) maintain about the same mountain lion population level, (2) increase the number of sport hunters, and (3) provide for an increase in lion harvest.

Management strategies include: (1) maintaining optimum recreational opportunity and maintenance of the population through a controlled harvest quota system by area, (2) reduce damage to livestock by selective removal of problem lions using sport harvest where possible, and (3) inform the public about mountain lion biology, the value of the mountain lion and harvest opportunities compatible with resource capabilities. Continue management and research programs to improve knowledge and management of the species as a harvestable big game resource.

Depredation. The state of Colorado became liable for damage to real or personal property caused by mountain lion in July, 1965, when the species was defined as big game. Any person owning property may file a claim for reimbursement with the Colorado Division of Wildlife. A claimant is required to notify the Division of damage within 10 days of discovery so that preventative efforts can be initiated, where possible. This initial notification, which is usually immediate and verbal, must include the location, type, estimated amount of damage, and the date such loss was discovered. A written notice, which is generally submitted at both the start and the end of the damage period, is also required. A proof of loss or affidavit certifying the type, extent and value of damage must be filed on forms provided by the Division within 90 days after the last notice of damage is submitted.

By law it is the claimant's responsibility to prove that he/she suffered damages to the real or personal property designated, and that such damage was caused by moun-

tain lion and the dollar value is equal to the actual value of the property at the time and place of loss as set forth in the claim. The Division pays the claim after an investigation by the Division to determine the cause of injury, damage, or death of livestock and verification of its value. In the case of lambs, the value is based on the market value of the lamb. When a claim cannot be agreed upon, or it is recommended for denial, the claimant is so notified by certified mail with the reason(s) for such recommendation and offered an opportunity to provide additional information at a regularly scheduled Wildlife Commission meeting when claims are considered.

If a settlement offer is not accepted, or if the Commission denies a claim, the claimant may within 60 days file an action for damages and review of the Division's decision in the district court of the judicial district in which the damage is alleged to have occurred. Claims are denied for the following reasons: (1) damage was caused by species other than mountain lion, bear or other big game, (2) no proof or tangible evidence of damage, (3) lack of 10-day notification of damage, (4) submission of claims over 90 days from the occurrence or last notice of damage, (5) no hunting is allowed, or there is an unreasonable restriction on hunting or access, (6) claimant charges a fee in excess of \$25.00 per person, per season, for hunting or access, (7) claimant has refused to accept or use prevention efforts furnished by the Division.

Damage prevention efforts are normally regulated through sport hunting. Under a cooperative agreement with the APHIS, (previously USFWS), depredating lions are taken through the use of steel traps, snares, or with the aid of dogs.

The first claim of \$390.00 for loss of sheep was paid on July 5, 1965. The highest single claim paid was approximately \$10,000.00 for loss of sheep during 1979-1980. At the present time, however, a claim for \$32,000 is pending. In that case, between 350 and 400 sheep were injured or killed by mountain lions during a two-week period in the summer of 1988 in northwestern Colorado. The Division verified \$20,000 in loss and is negotiating the remaining \$12,000. Five lions were taken immediately from 7 known to be present.

Interagency Coordination. Other than the damage control efforts planned and carried out with the State Department of Agriculture and the USDA, APHIS and described under "Depredation", there are no special planning efforts with land management agencies or private landowners. Mountain lions are occasionally noted and potential impacts mentioned in required environmental assessments and environmental impact statements especially those related to water projects, transportation, and energy or industrial development. Mitigation for impacts have not been required for any project we are aware of. In a limited number of cases, mountain lion have been considered during land use planning activities by state and county planning and zoning officials.

Table 3. Claim payments due to damage by mountain lion, 1965-1988.

Year	No. of Claims	Payment ^a	Average
1965-66	10	\$2,860.00	286.00
1966-67	4	--	0
1967-68	0	--	0
1968-69	4	12,646.44	4,161.41
1969-70	9	5,817.00	646.33
1970-71	5	2,475.00	495.00
1971-72	5	2,748.31	549.66
1972-73	9	3,223.86	358.21
1973-74	11	4,897.34	445.21
1974-75	4	3,498.27	874.57
1975-76	3	2,310.00	770.00
1976-77	6	3,704.00	617.33
1977-78	6	2,396.75	399.46
1978-79	1	225.00	225.00
1979-80	8	22,492.26	2,811.53
1980-81	13	8,928.45	686.80
1981-82	13	13,567.98	1,043.69
1982-83	16	10,917.54	682.34
1983-84	20	17,662.38	883.11
1984-85	17	9,476.94	557.47
1985-86	15	10,515.84	701.06
1986-87	22	22,137.45	1,006.25
1987-88	40	34,245.98	856.15
Totals	241	\$296,746.79	\$ 816.38

(a) Two claims totalling \$24,210 were settled for \$10,390 by arbitration in 1968-1969.

RESEARCH

Sheriff (1978) developed a population model which appeared to simulate an actual mountain lion population. Currier (1979) developed 2 (male-female) regression equations using selected physiological and morphological variables to predict age of individual mountain lions. Their usefulness was limited by very low precision. Currier and Russell (1982) described the hematology and blood chemistry of wild and captive mountain lions. Currier et al. (1977) described some population characteristics and the harvest of one mountain lion population. They estimated size of that population using a mark-recapture method but without aid of radio telemetry. Anderson (1983) and Currier (1983) reviewed the literature on mountain lion through about mid-1982. Anderson (1988) made an unsuccessful attempt to assess the effects of sport hunting on a southwestern Colorado population, 1981-88. In that study 57 mountain lions were handled and 49 radio collared animals were aerially located at approximate weekly intervals. Seven resident males and 9 residents females were radio tracked for periods ranging from one to about seven years per individual. Analyses of home range dynamics, survival rates and social interactions are in process.

Table 4. Mountain lion hunting license revenues and damage claim payments compiled from Colo. Div. Wildlife. files.

Year	Licenses Sold	License Revenues ^a	Damage Claim Pmts.
1976 ^a	resident 127 nonres. 47 174	\$3,175 9,400 12,575	\$3,704.00
1977	resident 163 nonres. 62 225	4,075 12,400 16,475	2,396.75
1978	resident 220 nonres. 80 300	5,500 16,000 21,500	225.00
1979	reside 191 nonres. 73 264	4,775 10,950 15,725	22,492.26
1980	resident 225 nonres. 55 280	4,500 8,250 12,750	8,928.45
1981	resident 280 nonres. 72 352	5,600 10,800 16,400	13,567.98
1982	resident 320 nonres. 90 410	6,400 13,500 19,900	10,917.54
1983	resident 350 nonres. 103 453	7,000 15,450 22,450	17,662.38
1984	resident 268 nonres. 91 359	8,576 16,835 25,411	9,476.94
1985	resident 336 nonres. 124 460	10,752 22,940 33,692	10,515.84
1986	resident 317 nonres. 69 386	10,144 12,765 22,909	22,137.45
1987	resident 334 nonres. 121 455	10,688 22,385 33,073	34,245.98
	Total residents 3,131 Total nonres. 987 4,118	\$ 81,185 171,675 \$252,860	\$156,270.57

(a) Effective 1976, non-resident fee increased from \$50 to \$200 and effective Jan. 1, 1979 non-resident fee decreased from \$200 to \$150.

ECONOMIC VALUES

From 1976 to 1987 there were marked increases in mountain lion hunting pressure and harvest (Figure 2),

number of damage claims and damage claim payments (Table 3). During that period, damage claim payments exceeded hunting license sale revenues during 1979 and 1987 and overall comprised about 62 percent of total hunting license sale revenues (Table 4). Nonresident hunting licenses included about 24 percent of the total number of licenses sold but accounted for about 68 percent of the total mountain lion hunting license revenues. The annual trend in the percentages of nonresident mountain lion hunting licenses sold was fairly constant; from 19.6 (1980) to 28.8 (1979) with fluctuations in hunting license costs apparently exerting little long-term effect on numbers of licenses sold (Table 4). Perhaps future damage claim payments may be partially offset by increasing nonresident mountain lion hunting license revenues. Increasing statewide harvest of mountain lion does not appear to be a feasible method of reducing damage claim payments statewide.

Currently, hunting licenses are available to residents (\$32.25) and non-residents (\$185.25) at license agents and Division offices throughout the state. Hunting permits, issued free of charge, are available only at Division offices.

Total benefits to the state's economy from direct and indirect expenditures by hunters are estimated to be approximately \$520,000 annually. This figure is based on an average expenditure of \$1,500 per hunter using the last 3-year average of 346 hunters spending about \$212.00 per day over 7.2 recreation days per person. Direct expenditures involve transportation, lodging, meals, guide and outfitting services, hunting dogs and other normal hunting expenses (unpublished data, Colo. Div. Wildl. 1988).

Public interest is relatively high, with numerous inquiries regarding the status, harvest and interesting facts about the mountain lion. Non-consumptive observation, photography or other beneficial uses and enjoyment of this resource is nearly absent due to the nature and habits of this species.

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