

# INVESTIGATIONS ON THE STATUS OF THE CALIFORNIA MOUNTAIN LION

Larry W. Sitton  
Department of Fish and Game  
Sacramento, California

Abstract. The paper reviews the historical legal status of mountain lions (Felis concolor californica) within California, and outlines the study program initiated by the California Department of Fish and Game. Methods of population determination, capture and telemetric follow-up are given and accumulated data is discussed. An estimated 1,224 lions exist in 14,325 square miles of lion habitat. This is about 40% of the State's lion habitat. Project purposes and the future guidelines upon which the study will proceed are explained.

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## INTRODUCTION

In recent years much concern has been generated in professional and public sectors on the status of the mountain lion in California. Pro and anti-lion hunting contingents have argued the relative extinction and bountiful proliferation of this cat with no factual evidence to back up their claims. The California Department of Fish and Game began limited investigations in the 1970-71 fiscal year and initiated a full-scale study in July 1971.

Public sentiment for the mountain lion was aroused by various protectionist organizations and created enough concern that legislative action was deemed necessary and Assembly Bill 660 was introduced by Assemblymen Dunlap, McAlister, Sieroty, Brown, Stull, LaCoste, Keysor, and Warren before the California Legislature, 1971 Regular Session. This bill establishes a 4-year moratorium on the hunting of mountain lions during which time the California Department of Fish and Game shall conduct a study (the study will be a continuation of the program already initiated by the Department prior to the introduction of Assembly Bill 660) on the mountain lion and determine the number of lions within the State. The "popular" estimate of 600 lions for the State has been in use since 1919 and was based on the formula of one lion to each township of mountain lion habitat within California's boundaries.

In the early part of this century public sentiment was generally against the mountain lion. It was considered an impediment to the development of California's deer herds and a threat to the livestock industry. In 1907 legislation established a bounty on the mountain lion.

The lion bounty remained in effect until 1963 when claims payment was suspended by the Legislature. After a 4-year moratorium on bounty payment Department-sponsored legislation abolished the system. During the 26 years the bounty was in effect 12,461 lions were bountied and \$389,345 paid by the State in claims. In addition to hunting pressure the bounty established, the California Department of Fish and Game employed predator control hunter-trappers who persistently pursued and took lions until 1959 when the positions were eliminated.

From 1963 to 1969 the mountain lion was classified as a nonprotected mammal. In 1969 lions were reclassified as game animals and restrictions were placed on their take. The first season, 1970-71 license year, required tags for the hunting of lions. The moratorium on taking lions took effect in March 1972, allowing the implementation of the 1971-72 mountain lion hunting season from November 15, 1971, through February 29, 1972, or until 50 lions are taken, whichever occurs first.

The Department of Fish and Game's mountain lion investigation, as initiated in 1970 and further defined by legislative dictates included in Assembly Bill 660, has as its major project goals (1) the establishment of a population estimate for the lion in California, and (2) the production of a management plan based on life history information. This study was supported by Federal aid to Fish and Wildlife Project W-51-R "Big Game Investigations."

#### METHODS AND MATERIALS

Mountain lion population investigations were initiated in June 1971. As of December 31, 1971, 14,325 square miles of mountain lion habitat have been investigated and population estimates for this area have been made. Lion hunters, houndsmen, Department field personnel, allied State and Federal wildlife and field personnel, ranchers, and those individuals with intimate knowledge of local mountain lion populations have been contacted by a California Department of Fish and Game representative. Interviews with more than 150 individuals were conducted, and data on local lion population numbers, population trends, hunter success ratio, hunter method (camera vs. gun) trends, and natural history were obtained. Interviews were conducted at the convenience of the contact and most were carried on within private residences. With very few exceptions those interviewed were extremely anxious to aid in the study. At the same time interviews were carried out, substantive field investigations were made into areas of alleged lion concentrations. A Department representative, field trained in lion "sign" recognition, would evaluate the estimations made by interview contacts. By using interview and substantive field investigations local lion populations were surveyed. An information form letter was mailed to all those individuals who have or who may have knowledge of mountain lion numbers requesting data on population numbers with reference to geographical area. These forms are to be used as a check on the field established population approximation.

Radio telemetric studies have been initiated to gather life history information on such factors as range, migration, inter and intra specific interactions and territorial structuring. Preliminary studies have been conducted to determine the most effective methods of capture, immobilization, tagging, radio collaring, and telemetric follow-up.

Lion capture was accomplished by the use of lion dogs and immobilizing drugs. Experienced lion hunters and their dogs were used to trail and tree the mountain lion. The lion was then administered immobilizing drugs by means of a Cap-Chur gun and syringe. Sernylan (Bio-Ceutic), a muscle relaxant, and Acepromazine (Ayerst), a tranquilizer, were used in combination to sedate the lions. Injections were given with a 2 cc Cap-Chur syringe fired from a powder-type Cap-Chur gun. Dosages were based on estimates of the lion's weight and physical condition. The average dose administered was .6 mg Sernylan per pound estimated body weight with the Acepromazine dosage being 2 cc per Sernylan dosage. These drugs were chosen because of the wide margin of safety they have in felids. No deaths or apparent severe reaction occurred in any drugged lion.

Captured lions were marked in a number of ways. Aluminum ear tags and ear tattoos were used in combination or separately. Collar tags were attached to all but one lion. Tattoos, using a numerical code, were placed on the ear's inner surface. Any identifying feature on the lion's body was noted.

Radio transmitting collars, operating on frequencies 31.22 and 31.18, were attached to all but one lion. Radio transmitters were similar to those described by Hornocker (Equipment and techniques for radio-tracking mountain lions and elk. Forest, Wildlife and Range Experiment Station Bulletin No. 6) and operate on pulses between 79 and 138 per minute. The apparatus was applied by bolting the collar (transmitting antenna) to the transmitter case. In addition to marking and applying radio collars to the lions, biological data were recorded.

Telemetric relocation was accomplished aerielly. Ground relocation was attempted on several occasions, but was never successful. A Fish and Game aircraft was equipped with antenna and receiver and effected relocation by flying 1/4 mile interval parallel transects over the area of suspected range. Suspected range was the general vicinity of the previous spot location. Transect lines were approximately 10 miles long and were flown at 1/4 mile parallel intervals within a 10-square mile area whose center is the spot of last relocation. If the collared lion was not monitored within this area, transect lines were increased to 20 miles long at 1/4 mile parallel intervals within a 20-square mile area whose center is the spot of last relocation. If the transmitter signal was not picked up in the second attempt, the lion was assumed inactive in a location where signals were masked. Relocation was dependent on flying conditions. Poor weather conditions grounding the aircraft caused many lost days of relocation effort.

Successful relocations were marked on topographic maps, and additional information was recorded on a supplementary data form. Relocation with ground receivers in coordination with the aerial receiver was attempted several times without success. Signals were received aerielly but not on the ground.

#### RESULTS AND DISCUSSION

In the 14,325 square miles of California's mountain lion habitat investigated, approximately 1,224 lions exist. Areas investigated include the Squaw Creek drainage, Shasta County, 612 square miles with 60 lions; Slinkard Valley, Mono County, 12 square miles with 4 lions; the Stonyford-ElkoCreek-Paskenta area of Glenn and Colusa Counties, 294 square miles with 70 lions; all of Madera-Fresno-Tulare and Kern Counties, 8,628 square miles with 729 lions; and Monterey County, 4,671 square miles with 232 lions. Additional spot location information has been gathered on 129 lions in other areas yet to be investigated. The area investigated represents approximately 40% of the lion habitat within the State according to county records and tag returns. The highest concentrations of lions in areas thus far studied are found in southern Tulare-northern Kern counties and southern (coastal range) Monterey County.

Nearly universal in the opinion of those interviewed is the belief that lion populations have at least doubled in the last decade. This feeling is based on the increase in lion sign and the relative ease with which lions may now be found in areas previously lion poor. Two factors which probably play an important part in this increase are the elimination of State lion hunters and the removal of the bounty system. State lion hunters were responsible for approximately 50% of the yearly lion harvest prior to the positions elimination in 1959. The economic stimuli to hunt lions provided by a bounty undoubtedly was responsible for the non-sport taking of many lions. Bounty records tend to substantiate this assumption. The names of many private hunters are repeatedly found in the bounty claims records. The increase in lion numbers, after the elimination of the above factors, even during the period of unrestricted take (1963-70) seems to indicate that the sport utilization of this animal offers no threat to its survival. Diminishing returns data cited by anti-lion hunting contingents do not take into account the elimination of the above take stimuli, coupled with a decrease in public lands and private lands available for lion hunting and the lack of recruitment of new lion hunters. Even with the increased availability of lions within the State, lion hunting lays all the odds in the animal's favor. Hunt-capture ratios obtained from those actually involved in the taking of lions vary from 7:1 to 15:1 with an average of 10 hunts: 1 cat treed. This factor along with the extensive training necessary for lion dogs and the extremely physically demanding chase involved in lion hunting has tended to reduce the recruitment of new lion hunters. Although 4,719 lion tags were sold to hunters during the first (1970-71) lion season, most of these were obtained by deer hunters hoping to get a chance shot at a lion. For the 1971-72 lion season which opened subsequent (November 15) to the deer season only 133 lion tags had been sold by December 30, 1971.

There has been a general upward trend, with lion hunters, in the use of camera versus gun in hunting mountain lions. Many of the hunters interviewed cited numerous instances where treed lions were subsequently released after pictures were taken. An approximate value of 40% can be assigned to hunters using cameras, at least partially, in their hunting effort. Cameras utilized range from the Brownie box type to the sophisticated 16 mm movie type; the most common being the inexpensive, rugged 8 mm movie cameras.

Five lions have been captured in tagging efforts in three widely separated areas of the State. The first lion was taken near Greenfield in Monterey County April 28, 1971, where problems with the telemetric collar (size) prevented radio tagging; however, a rope collar with numbered tag and ear tag were attached to the animal. Two lions have been captured, tattooed and radio-collared in the Tehama and Glenn County locale. One of the lions was captured in the Rocky Cabin vicinity of Tehama County on July 27, 1971, the other on Bowman Ridge in Glenn County, October 13, 1971. Both of these captures were made with the aid of Jerry Spurlock, a Willows, California, rancher. The last two lions were captured in the Sierra Nevada within Madera and Fresno counties. The first lion was captured July 31, 1971, near Ross Crossing in Fresno County, the second in the area of Swartzels Camp, Madera County, on September 18, 1971. Both of these lions were tagged, tattooed and radio collared. Capture of these lions was made with the cooperation and aid of Mike Michaels, a licensed guide of Sanger.

Of the five lions thus far captured, two have been female and three were male with weights ranging from 80-115 lb. The two females were the Monterey and Tehama County cats weighing 85 and 85 lb respectively. The Fresno, Madera, and Glenn County cats weighed 92, 81, and 115 lb. respectively. All captured lions were in good condition and, according to tooth wear, were between the estimated ages of 2-5.

Aerial relocation on all lions has been successful, and movements have been monitored at approximately weekly intervals. Preliminary interpretation of relocation data indicates that lions have a slightly smaller range than previously supposed. Male lions have occupied an area of approximately 10 miles long by 3 miles wide following the course of major drainages, with females occupying a smaller area (approximately 7 miles by 3 miles) but also following the major drainages. Through the experience gained in these preliminary capture-relocation activities, many modifications have been made to perfect techniques for preparation of the intensive effort to begin on completion of the population survey. As the sample size increases with the increased effort, we expect to establish more detailed parameters for the daily and seasonal movements of the mountain lion.

Department efforts will be concentrated, during the first half of 1972, on the establishment of a statewide population estimate and is expected to continue utilizing methods currently in use. Upon completion of the population survey, the Department will embark upon an intensive capture effort in a predetermined area of high lion concentration in an attempt to establish the parameters of a localized lion population.

Emotionalism, with little or no substantiative data, has reigned on the part of both pro and anti-lion hunting contingents of the State's population. With the information gained in this project, the California Department of Fish and Game will be able to change speculation to fact, and thereby manage this magnificent animal to the benefit of all.