Cahalane, V.H. 1965. Cougars in the U.S. are Barely Holding Their Own. Audubon 67:108-109.

The cougar has been eliminated from much of its eastern range except for an estimated 100-300 animals in Florida and an estimated 25 in New Brunswick, Canada. Optimistic observers believe that no more than 10 still inhabit the swamps of east and west Louisiana. A minimum of 3300 to a maximum of 11,000 are estimated to live in Canada. The total population in the western U.S. is estimated at a minimum of 4000 to a maximum of 6500 plus. A cougar distribution table is provided for selected states and provinces of the U.S. and Canada and estimated populations are furnished.

Cahill, J.L. 1971. Puma. Sierra Club Bull. 56(3):18-22.

Cougars have been reported to high-jump at least 14 feet, broad-jump more than 40 feet, and kill and drag away prey weighing more than 750 pounds. Records exist in the United States for the cougar in every state except Indiana and Alaska, and possibly the province of Manitoba in Canada. Cougars have been recorded above 15,500 feet in the Andes of South America. The most recent estimate (1963) of lion numbers in North America (north of Mexico) was between 7000 and 17,500 animals, with 10,000 of the maximum total from British Columbia alone. In Arizona, 5454 lions were reported killed between 1947 and 1969 with $350,685 in bounties paid on 4954 animals. The California Division of Fish and Game paid $388,730 in bounties for 12,461 mountain lions from 1907 to 1963. Bounties were discontinued in British Columbia in 1955; Utah and Idaho in 1959; Oregon and Washington in 1961; Montana in 1962; California in 1963; Colorado in 1965; and Arizona in 1970.

Calkins, F.W. 1902. About the Cougar. Outing 40:448-455.

The author disputed that the cougar was not found in Michigan and Indiana and believed it was almost equally certain that there was no territory covered by any State in the Union which did not harbor cougars at the earliest date of settlement. The cougar was heard to scream in 1875 by the author and the entire prospecting camp and was located upon a point of rock 60-80 feet above their heads. Many fired upon the cat and he was brought down and measured, laying a string along the curves, four feet eleven inches from tip of nose to root of tail. The largest cougar that the author had ever seen unknowingly came upon him near French Creek, South Dakota. The cougar appeared not afraid but rather astonished at the sight of the author and trotted noiselessly away down the gulch, stopping now and then to look back. The author also discovered a newly abandoned lair under a bush-grown edge of a rock with just enough of a shelf to keep the rain off. There was no bone or sign of feasting about the lair because the dam had carried her kill to the creek bench in every instance. The diet consisted mostly of minor game, rabbits, marmots, grouse and an occasional small deer and a family of badgers. The cougar sneaks close or lies in wait upon the level and goes from cover in a straight rush and seizes the lower throat or shoulder with its teeth and twists the prey's head in its forearms until the neck is broken. The largest specimen of cougar authentically reported was killed in Texas and measured eight feet three inches. The author discounted the statement made by W.A. Perry, quoted by Lydekker, that the cougar may sometimes reach a total length of eleven feet. The biggest lions are found where the rigors are great and strenuous effort is necessary to support life such as the Tetons and Bitter Root mountains and on the

elevated lands of Washington and British Columbia. The worst enemy of the cougar is the gray wolf and in bitter cold weather the wolves will watch a treed cougar until the cougar's feet are frozen, and powerless to cling, the cougar falls into the wolves waiting jaws. Cougars will tree everywhere in wolf country by the smallest dogs, but in South America where there are no wolves, the cougar will attack any number of dogs.

Campbell, D. 1976. California Cougars are Not Threatened. Outdoor California. March/April, Pgs. 1-4.

It was determined that the cougar in California is not threatened with extinction and that their status was good. This report was the result of a two-phase study conducted by the California Department of Fish and Game over a four and a half year period. Legislation in 1971 changed the status of the cougar from game animal to protected nongame mammal and established a four-year moratorium on the taking of lions which was extended in 1974 to January 1, 1977. There was approximately 74,000 square miles of lion habitat in California with an approximate population of 2400 cougars. Fourteen lions were collared and two cubs were ear tattooed only. Radio locations of collared lions were made 334 times from February 10, 1974 through November 1975. Ranges, as determined from radio-reported locations, was about 50 square miles for males and 30 square miles for females including occasional wanderings and 25-35 square miles for males and 18-25 square miles for females excluding wanderings. Exclusive ranges for either males or females were not encountered.

Carlstead, K., J.L. Brown, S.L. Monfort, R. Killens and D.E. Wildt. 1992. Zoo Biology 11(3):165-176.

The potential of assessing adrenal responses to psychological stressors through the radioimmunoassay of free cortisol in urine was examined in the domestic cat (Felis catus) and in three nondomestic felid species (Felis geoffroyi, Felis bengalensis, and Felis concolor). To determine the approximate clearance rate of an acute increase in glucocorticoid secretion, serial plasma and bladder urine samples were collected from eight domestic cats after a 0.125 mg adrenocorticotropic hormone (ACTH) challenge. Within 30 min of administration, mean serum cortisol concentrations increased tenfold. Urinary cortisol concentrations increased twofold by 2 hr post-ACTH and were correlated with the serum responses. Also, 16 domestic cats were anesthetized, injected with 0.125 mg ACTH, and serially bled for 3 hr. All urine was collected for 24 h post-ACTH. Urinary cortisol concentrations were significantly elevated compared to pretreatment concentrations and were correlated to the serum cortisol response (net area under the response curve). In another experiment, urine was collected daily for a 7-day baseline period from 16 domestic cats housed in standard laboratory cages. Subsequently, 8 cats were subjected to 8 consecutive days of "stress," consisting of relocation, physical restraint, and jugular venipuncture. The other 8 cats were neither moved, nor handled, nor bled for the same period of time. Two patterns of response were observed among the "stressed" cats: urinary cortisol concentrations either increased or decreased between baseline and treatment periods. These response profiles differed from those of controls, which remained basal and unchanged over time. A fourth experiment involved relocating a female Geoffroy's cat, 4 leopard cats, and 2 pumas to a novel environment for 8-10 days. Urinary cortisol concentrations rose on the first day of relocation and remained elevated above baseline for 5-7 days. Overall, these data suggest that adrenal responsiveness to psychological stressors in these four felid species can be assessed noninvasively by measuring cortisol in 24-hr urine samples. This research strategy may be useful for optimizing captive habitats to improve overall animal

welfare and/or reproductive performance.

Carr, W.H. 1971. Living with Lions. Am. Forests 77:4-5, 52-54.

The author tells stories about a male and female mountain lion housed at the Ghost Ranch Museum. This outdoor living museum is located along the main highway sixty-five miles northwest of Santa Fe, New Mexico.

Carrel, W.K. 1980. Aging Arizona Game Animals by Annuli in Dental Cementum. Final Rep., P-R Proj. W-78-R. Wk. Pl. 1, Job 8. Arizona Game and Fish Dep. 7pp.

This report describes in detail recent developments in procedures for cutting, cleaning, staining, and mounting sections of teeth from Arizona ungulates, javelina, and carnivores. A summary is given of the use of cementum annuli counts for aging elk, deer, bighorn sheep, javelina, and carnivores. Research procedures are suggested for determining the annular regularity of cementum incremental lines. It was noted that the canine was the preferred tooth for extraction and sectioning in the mountain lion. Tetracycline should be administered to captured mountain lions to better understand the deposition of cementum, because it is a proven calciphic marker in bone and teeth that fluoresces under ultra-violet light. The marker is used as a known date reference point in interpreting tooth sections of an animal recaptured or killed later. With the known interval from injection to extraction of the tooth, the deposition rate and annular nature of annuli can be determined to verify present readings.

Carter, C.H., R.G. Rummel, A. Huffman, and P.D. Hartfield. 1979. Status of the Florida Panther in Mississippi. Mississippi Acad. Sci. 24:112.

The existence of the Florida panther Felis concolor coryi has long been a subject of debate in many southern states. In recent years extensive surveys have been conducted in some of these states to determine the existence and status of the panther. To date, the presence of cougars Felis concolor sp. has been confirmed in Florida, South Carolina, Arkansas, and Louisiana. The present status of this species in Mississippi, however, is unknown. Although the last confirmed specimen taken in the state was in 1900, continued sightings are reported on an irregular basis to the Natural Science Museum. The Mississippi Museum of Natural Science began its search for conclusive evidence of the presence of the Florida panther in September 1978. Our approach has been through an appeal to the public, including newspaper articles and posters, as well as the compilation of existing data. To this date, the results have been favorable, with reports coming in from 23 Mississippi counties. The most reliable reports have generally come from a strip of appropriate habitat paralleling the Mississippi River and across the coastal swamps. To date, intensive field searches have failed to provide conclusive evidence of the panther's existence in the form of tracks, scrapes, scat, or kills.

Cawthon, J. 1957. The Day the Panther Prowled. West Virginia Conservation. November, p. 13.

An account of a panther hoax in Richwood, West Virginia is presented. Evidently a panther was shipped from New Mexico and was rumored to be a trapped wild panther from West Virginia until the truth was made public about the stunt.

Chandler. J.D. 1962. Red Fox and Possible Mountain Lion at Shaunavon. Blue Jav

20(4):166.

A report of a mountain lion being sighted seven miles northeast of Shaunavon as it passed within 50 yards of an oil drilling rig. It was later rumored that it was roaming Pine Creek Park, 18 miles southwest of Shaunavon.

Charlton, E.R. Jr. 1976. Just Lion Around. Virginia Wildlife 37(5):23.

A pair of full grown cougars were sighted by the author and his brother while bowhunting on top of Potts Mountain in Craig County, Virginia. The pair of cougars were first spotted in the middle of the road about 150 yards away. The Chief Warden was notified and they were told that he and two other wardens had observed one for a half hour two years before on Potts Mountain in the same general area.

Clark, J., and H. Vriend. 1980. History of Cougar Management in Alberta. Energy and Natural Resources, Fish and Wildl. Div., Lethbridge, Alberta, Canada. 20pp.

A bounty was placed on cougars in Alberta in 1937 and continued until 1964. The average number taken during these years was 41 with a range of 22-73 annually. There are no known records of harvest from 1964 to 1970. The first hunting season was initiated in 1969. The cougar received official status as a game animal in 1971 and it became mandatory to register cougar kills and a limit of 1 cougar per year was imposed on hunters. Since 1971 the annual harvest steadily increased from 11 to 44 in 1977 with a slight decline in the 1978 and 1979 season. Since 1975 the success rate for resident hunters has remained at approximately 20% and non-residents usually over 50%. Since 1971 approximately 75% of the cougars harvested were taken in the foothills region south of the North Saskatchewan River. Since 1971, 53 of 104 cougars registered have been females. Forty-two and 51% of the population, respectively, were in the subadult and young adult age classes. Management implications are presented.

Clinite, E.W. 1981. Biochemical Analysis of Mountain Lion and Bobcat Scat: Differences Between Species and Sex. M.A. Thesis, San Jose State Univ., 27pp.

In order to study sex-specific food habits, it is necessary to know the species and sex of the animal which deposited each scat. Before this investigation began there was no reliable, consistent method for this determination. This research attempted to identify the species of felid depositing a scat using thin layer chromatography (TLC) to compare banding patterns of fecal steroids from bobcats and mountain lions. A banding pattern was found more frequently in bobcats than in mountain lions. Androgens were removed from the TLC plate and quantified using gas chromatograph techniques. Levels of androgens in the plasma should differ between males and females, and a portion of these androgens are excreted in the bile. The amount of androgen in scats were found to be significantly different between males and females.

Clyde, V.L., G.V. Kollias, Jr., M.E. Roelke, and M.R. Wells. 1990. Disseminated Coccidioidomycosis in a Western Cougar (Felis concolor). J. Zoo and Wildl. Medicine 21(2):200-205.

Examination of a juvenile western cougar (Felis concolor) presented for routine vasectomy revealed thoracic and abdominal effusions. After a thorough diagnostic workup, the cause of the effusions remained unclear and the animal was euthanized.

Coccidioidomycosis was diagnosed on necropsy, and postmortem serologic testing was positive for precipitating antibodies to Coccidioides immitis. Twenty other cougars from the same population were negative for precipitating antibodies to C. immitis. Coccidioidomycosis is a rare disease in cats, and this is believed to be the first case reported in a cougar. The unusual findings of thoracic and abdominal effusions presented similarities to feline infectious peritonitis and made antemortem diagnosis difficult.

Coggin, J.L. and L. Crane. 1977. Cougar Investigations, Virginia. Perf. Rep., Virginia Comm. of Game and Inland Fisheries. Proj. No. E-l-R-l, Wk. Pl. 6, Job A. 3pp.

SUMMARY

One week was spent by Larry Crane, Refuge Supervisor, in an area where cougar reports have been frequent on Potts Mountain in Craig County, Virginia. Scent stations were established and the area was searched thoroughly for evidence of cougars, but no evidence was found. Cougar sightings that appeared reliable were recorded and mapped.

Coggin, J.L. and L. Crane. 1979. Endangered Species Investigations: Cougar Investigations. Proj. No. E-001-R-03/Wk. Pl. 06, Job A. VA. Comm. Of Game and Inland Fisheries. 3pp.

SUMMARY

Seventeen new reports of cougars were received through June 1979 and added to our list of sightings. No tracks or evidence could be found to confirm the sightings although scent stations were operated in Botetourt and Bedford Counties.

Coles, F. 1984. Harvest Strategies. Pgs. 230-266 In: J. Roberson and F. Lindzey (eds.), Proc. of the Second Mountain Lion Workshop. Utah Div. Wildl. Res. and Utah Coop. Wildl. Research Unit. Zion National Park. 271pp.

Since harvesting seasons vary throughout the western United States, the author invited three representatives to discuss year-round hunting, restricted hunting, and quota systems in Arizona, Montana, and Nevada, respectively. A question and answer session follows which provides more in-depth information.

Colorado Division of Wildlife. 1969. Colorado Big Game Harvest; Mountain Lion Regulations and Harvest. Fort Collins, Colorado.

A total of 58 lions were harvested by 450 licensed hunters during the 1969 calendar year. This is the same number of lions taken during 1967 and is 11 animals above the average of 47 lions bagged 1957 through 1964. Last year only 50 lions were taken by license holders. The Division of Wildlife Services reported taking only 3 lions, the same as in 1968. Thirty males and 17 female lions were taken by 23 resident and 24 non-resident hunters. The average successful hunter spent 3.87 days hunting. All of the hunters used dogs. For 36 years, 1929 to 1965, the Division was required to pay a $50 bounty for each lion harvested. In 1965, the lion was declared a protected animal (except when in the vicinity of livestock) and the mountain lion license was established.

Colorado Division of Wildlife. 1970.

Forty-seven lions were harvested in 1970 by licensed hunters, one more than the average of 46 lions which were bagged annually the previous five years, 1965-1969 by licensed hunters. The 1970 lion harvest was down 11 animals from the 58 taken in 1969 and three less than the 1968 harvest of 50 lions. Three reports were received of individuals taking lions according to the provisions of the game damage law. The Division of Wildlife Services reported only taking one lion in 1970 compared to three in 1968 and 1969. Twenty-four lions were taken on sportsman's licenses. The average successful hunter spent 4.57 days hunting. All guides used dogs, as did all but three of the successful hunters. Thirty male and 27 female lions were taken by 31 resident and 29 non-resident hunters.

Colorado Division of Wildlife. 1971.

Twenty-nine lions were harvested by licensed hunters, twenty-three less than the average of 52 lions which were bagged annually the previous five years, 1966-1970 by licensed hunters. The 1971 harvest was down 18 animals from the 47 taken in 1971 and exactly half the 1969 harvest of 58 lions. Six reports were received of individuals taking lions according to the provisions of the game damage law. The Division of Wildlife Services reported taking no lion in 1971 compared to one in 1970 and 3 in 1969. Five lions were taken on resident sportsman's licenses. The average successful hunter spent 2.9 days hunting. All guides used dogs, as did all but two of the successful hunters who reported. On a statewide basis, 65.5 percent of the lions harvested were males. Nineteen males and 10 female lions were taken by 8 resident and 21 non-resident hunters.

Colorado Division of Wildlife. 1972.

Thirty-five lions were harvested by licensed hunters, 6 more than in 1971 but 13 less than the average of 48 lions which were bagged annually the previous five years, (1967-1971). Residents harvested 11 lions while non-residents took 24, or 68 percent of the total harvest. Only six lions were harvested by the 6,900 resident sportsman's license holders. The average successful hunter spent 3.2 days hunting. All guides used dogs, as did all but 5 of the successful hunters who reported. On a statewide basis, 82.9 percent of the lions harvested were males. Of these, 24 were mature males, 2 were yearlings, and three were of unknown age. Four mature females, one yearling female and one female of unknown age were also taken. None of the females were lactating. Four reports were received of individuals taking lions according to the provisions of the game damage law. The Division of Wildlife Services took one lion in 1972, compared to none in 1971, one in 1970, and three in 1969. Fieldmen estimated the weight of 31 lions taken to average 145 pounds. The 24 mature males weighed an estimated 155 pounds, while 4 mature females averaged 126 pounds. Weight estimates ranged from 70 pounds for a yearling female to 195 for a mature male. Lengths varied from 5'6" for a yearling male to 9' for a mature male.

Colorado Division of Wildlife. 1973.

Sixty lions were harvested by an estimated 115 licensed hunters, for a 52 percent success ratio. The mountain lion season provided 584 days of recreation for an average of 5.1 days per hunter and 9.7 days per animal harvested. Thirty-three male and 27 female lions were taken by 31 resident and 29 non-resident hunters.

Colorado Division of Wildlife. 1974.

Fifty-two lions were harvested by licensed hunters. Twenty-seven male and 25 female lions were taken by 24 resident and 28 non-resident hunters.

Colorado Division of Wildlife. 1975.

A record high of 90 mountain lions were taken in 1975 by 143 lion hunters, affording 1,016 recreation days in total. Forty-seven male and 43 female lions were taken by 41 resident and 49 non-resident hunters.

Colorado Division of Wildlife. 1976.

The state population is estimated to be around 1,100 lions. In 1976, 81 percent of the guided hunters were successful, accounting for 69 percent of the total annual harvest. Thirty-seven percent of all lion hunters were professionally guided. Sixty-five lions were harvested in 1976, with 152 hunters having a success rate of 43 percent. An average of 16 days per animal harvested and 1,062 total recreational days were reported. Forty-four males and 21 females were taken by 38 resident and 27 non-resident hunters. Two male lions were taken under game damage law and are not included in the above figures.

Colorado Division of Wildlife. 1977.

The state population is estimated to be around 1,100 lions. Eighty-three lions were harvested in 1977, with 195 hunters having a success rate of 43 percent. An average of 16 days per animal harvested and 1,331 total recreational days were reported. Two female lions taken (one under game damage law; the other was a road kill) were not included in the above figures. Forty-four males and 39 females were taken 45 resident and 38 non-resident hunters.

Colorado Division of Wildlife. 1978.

The state population is estimated to be around 1,100 lions. In 1978 a record of 91 lions were taken by 243 hunters for a 37 percent success ratio. An average of 18 days per animal harvested and 1,660 total recreational days were reported. Forty-eight males and 43 females were taken by 52 resident and 39 non-resident hunters.

Colorado Division of Wildlife. 1979.

Seventy-four lions were harvested in 1979 by 209 hunters having a success rate of 35 percent. An average of 19 days per animal harvested and 1,425 total recreational days were reported. Forty-nine male and 25 female lions were taken by 39 resident and 35 non-resident hunters.

Colorado Division of Wildlife. 1980.

Eighty-two lions were harvested in 1980 by 200 hunters having a success rate 41 percent. An average of 19 days per animal harvested and 1,565 total recreational days were reported. Forty-one males and 41 female lions were taken by 53 resident and 29 non-resident hunters. The above information does not include 11 lions taken

by the Fish and Wildlife Service, animal damage control.

Colorado Division of Wildlife. 1981.

One hundred and seven lions were harvested in 1981 by 248 hunters having a success rate of 43 percent. An average of 17 days per animal harvested and 1,824 total recreational days were reported. Sixty-seven male and 40 female lions were taken by 72 resident and 35 non-resident hunters. The above information does not include six lions taken by Fish and Wildlife Services, animal damage control.

Colorado Division of Wildlife. 1982.

One-hundred and thirty-seven lions were harvested in 1982 by 327 hunters having a success rate of 42 percent. An average of 17 days per animal harvested and 2,363 total recreational days were reported. Seventy-seven male and 60 female lions were taken by 92 resident and 45 non-resident hunters. The above information does not include six lions taken by Fish and Wildlife Services, nor 2 game damage, 2 road kills, one by snare, and one of starvation.

Colorado Division of Wildlife. 1983.

One hundred and twenty-five lions were harvested in 1983 by 362 hunters having a success rate of 28 percent. A total of 453 licenses were sold and 2,606 recreation days were reported. Seventy-eight male and 47 female lions were taken by 69 resident and 56 non-resident hunters. The above figures do not include game damage.

Colorado Division of Wildlife. 1984.

The estimated statewide population is listed at 2,000 to 3,000 mountain lions. One hundred and one lions were harvested in 1984 by 257 hunters spending an average of 6.7 days per hunter. Recreational days were reported at 1,742, with 359 licenses being sold.

Colorado Division of Wildlife. 1986.

One hundred and fifty-five lions were harvested in 1985 by 363 hunters spending an average of 7.2 days per hunter. Recreational days were reported at 2,614, with 460 licenses sold. One hundred and sixty-six lions were harvested in 1986 by 310 hunters spending an average of 7.2 days per hunter. Recreational days were reported at 2,232, with 386 licenses sold.

Conger, W.B. 1938. The Real Cougar. Nature 31(8):491-492.

The author states that of all the large animals of this country, the cougar is the most maligned and has been the victim of misinformation and false tales. There had been less than a dozen authentic accounts of attacks on human beings.

Connolly, E.J. Jr. 1949. Food Habits and Life History of the Mountain Lion (Felis concolor hippolestes). M.S. Thesis., Univ. of Utah, Salt Lake City. 176pp.

Mountain lions were tracked in the snow from January 8, 1948 until May 8, 1948 and

from December 19, 1948 until January 26, 1949 in the Lost Creek area of Morgan County, Utah. They were tracked from January 27, 1949 until March 18, 1949 in the Book Cliff Mountains, Carbon County, Utah for a total of 87 days of cougar activity. A mature lion killed an average of one deer every 9.67 days and one porcupine every 7.2 days. Possibly the role of the mountain lion as a livestock predator during the winter months has been highly overrated. Hair of mature deer, fawn, porcupine, rabbits, and rodents, in order of decreasing quantities, has been found in lion stomachs and scats. No special preference for sex or age classes or the physical condition of the deer was observed. Deer seem to be chosen on the basis of proximity and accessibility.

Corts, K.E. and F.G. Lindzey. 1984. Basal Metabolism and Energetic Cost of Walking in Cougar. J. Wildl. Manage. 48(4):1456-1458.

Two cougars (one male and one female) were raised in captivity and were familiarized with experimental equipment and procedures. The first set of trials were conducted at six months of age and continued for four months. The male and female ranged from 24.5 to 32.7 kg and 24.1 to 27.7 kg, respectively, over this period. The second set of trials was conducted at 17 months of age when the male weighed 59.1 kg and the female 43.6 kg. The cost of walking 1.6 km/hour ranged from 3.85 to 5.90 kcal/$kg^{0.75}$/hour for the female and 3.94 to 5.92 kcal/$kg^{0.75}$/hour for the male. The average cost to the male for locomotion was 0.11 kcal/$kg^{0.75}$ less than the female probably because of a general decrease in heat production with increasing body size.

Cosper, P.M. 1971. The Status and Management of the Cougar in Arizona. Pgs. 93-95 In: Jorgensen, S.E. and L.D. Mech (eds.), Proc. of a Symposium on the Native Cats of North America, Their Status and Management. U.S. Dept. Int., Fish and Wildlife Service, Twin Cities, Minnesota.

Much of the information in this paper was taken from a paper prepared by John Russo and John Carr and presented at the Western Association of State Game and Fish Commissioners Conference at Victoria in 1970. The total estimated lion population was 1440 animals in 1969.

Cowan, I.M. 1971. Summary of the Symposium on the Native Cats of North America. Pgs. 2-8 In: Jorgensen, S.E. and L.D. Mech (eds.), Proc. of a Symposium on the Native Cats of North America, Their Status and Management. U.S. Dept. Int., Fish and Wildlife Service, Twin Cities, Minnesota.

At the time of European colonization of North America, the cougar occurred in every Canadian province except Manitoba and Newfoundland. In British Columbia, it was found north to the 58th parallel of latitude and possibly into extreme southern Yukon territory. Cougars occur in very small numbers in southern Ontario, Quebec, south of the St. Lawrence River, New Brunswick, Nova Scotia, Maine, and Pennsylvania. No recent sightings have occurred for New York state, even though much suitable habitat exists. Although apparently eliminated before 1900 in New Hampshire, recent reports of sightings may be authentic. A self-maintaining population of 50-100 cougars exists in Florida with a few animals sighted and killed in Georgia, Alabama. and Louisiana. However, there is no evidence to indicate that these populations are surviving. When the approximate mean annual recorded kill for each of the political areas with major populations is converted into figures of square miles per cougar killed per year, the densities represented by continuing kill are: Arizona, 456 square miles per kill; Washington, 460 square miles; Oregon, 647 square miles; and British Columbia and California each with 790 square miles per kill per year. There

was no basis for converting kill figures into total population, however, an attempt was made in Washington where it was estimated to vary from one in ten to one in four. It seemed unlikely from cougar population vital statistics that a kill of 20% could be sustained. Under some circumstances, a large bounty system ($40-$75) can bring about a decrease in cougar populations.

Cox, M.K. and S. Stiver. 1997. Status and Management of Mountain Lions in Nevada. Pages 17-18 *in* W.D. Padley, ed., Proc. Fifth Mountain Lion Workshop: 27 February- 1 March 1996; San Diego, California.

Mountain lions (*Puma concolor*) are found throughout Nevada primarily on mountain ranges that are surrounded by low elevation valleys. Using data from harvested lion numbers, the population trend for mountain lions from 1990-1995 is stable to increasing. The Nevada Division of Wildlife (NDOW) in 1994-1996 developed a comprehensive mountain lion management plan. Over the last five years, there have been less than ten reported cases of lions attacking humans in Nevada. An average of 161 mountain lions were taken by sport hunters from 1993-1995. NDOW encourages research that can be directly applied to management of lion populations.

Craig, D.L. 1986. The Seasonal Food Habits in Sympatric Populations of Puma (Puma concolor), Coyote (Canis latrans), and Bobcat (Lynx rufus) in the Diablo Range of California. M.A. Thesis. San Jose State Univ., 61pp.

Eighty-one puma scats were collected and analyzed from July, 1983 to September, 1985. Most were found in creek drainages, primarily on benches. Ungulates were the most frequently-occurring item in the annual sample, the majority being black-tailed deer. Non-sciurid rodents were the second most common prey item. The annual average number of items per scat was 1.42. Seasonal differences in utilization were not statistically significant for any food item. Pig and opossum were the second most common food items in the wet season and small rodents were the second most common in the dry season. Non-sciurid rodents occurred in 12% of the scats, representing 10 scats. All but two of the ten scats were scrape-associated. Cow remains occurred in a small percentage of the scats and sheep remains were not observed in any scats. The annual frequency of occurrence for deer obtained in this study was consistent with those found in other studies but the percentage was higher than all others in the literature except for 2 studies in California (Dixon, 1925; Smith, 1981). Absence or limited distribution of alternate prey found in other states may account for the comparatively high utilization of deer. A possible trend was that pigs were primarily preyed upon in the wet season. Small rodents may be more prevalent in the diet of pumas because they had recently increased in density or vulnerability due to the burn of 1983. This prevalence may also be linked to the decreased utilization of pigs as alternate prey. Elk remains occurred in one scat. Four scats contained the remains of opossum. No other published study had found opossum to be a food item of pumas.

Crane J. 1931. Mammals of Hampshire County, Massachusetts. J. Mammal. 12:270.

The author reports that the Adirondack cougar is generally considered extinct in the state but presents a record of its recent appearance in the mountainous country around Huntington in Hampshire County. The Reverend Mr. J. Chapin told the author that on January 18, 1926, he had a good view of an animal, undeniably a cougar, as evidenced by the cat-like form, the size, the color, and the very long tail. Dogs set upon the trail refused to follow it. The following morning the animal was seen by a

neighbor. Tracks have been seen since at wide intervals, but a specimen has not yet been taken. Cougars were undoubtedly once more or less common in New England. John Josselyn refers to occasional "lyons" seen on Cape Ann and killed by the Indians. Wood, 1634, mentions "Plimouth Men" hunting for "lyon skins." One was killed by Northampton hunters in 1764, at which time a bounty of four pounds was in force, which bounty would indicate that they were still numerous enough to cause some apprehension. Their best and last stronghold was in the Adirondacks, so that their appearance in Massachusetts is quite believable.

Creekmore, C. 1991. The Paradox. National Wildlife 30(1):22-25.

The research of John Laundre, Idaho State University biologist, is highlighted. A portion of this research investigates why lions in some parts of the country kill livestock. Some ranches in Graham County, Arizona, may lose between 25 and 45 percent of their calves to hunting cats as opposed to other areas of the country where lions have not taken a head of livestock in more than 30 years. Wildlife officials estimate the United States population at between 16,000 and 20,000 cats. Maurice Hornocker, biologist with the Wildlife Research Institute in Idaho explained that mountain lions throughout the U.S. feed on livestock in only a few areas and that taxpayers spend more money controlling these lions than the ranchers lose to depredation. Harley Shaw, retired Arizona Game and Fish biologist suggested that ranchers move their calves out of lion country and onto safer pastures during the calving season. Hornocker's studies indicate that killing off large numbers of lions may create vacant territories where transient lions (usually younger and less experienced) may be more inclined than older, more mature cats to feed on livestock. Allowing a lion population to stabilize into set territories may reduce depredation. Laundre's research involves 11 to 15 adult lions in southeastern Idaho. They will study patterns of lion movements and activities and survey kill sites. Genetic relationships will also be determined by DNA "fingerprinting" of mountain lion tissue samples.

Cronemiller, F.P. 1948. Mountain Lion Preys on Bighorn. J. Mammal. 29(l):68.

Portions of a recently killed desert bighorn (Ovis canadensis nelsoni) including the complete head were found in the San Bernardino National Forest in southern California. The tracks of a mountain lion were found in the immediate vicinity and showed that a struggle had taken place before the bighorn had been killed.

Culbertson, N. 1978. Status and History of the Mountain Lion in the Great Smoky Mountains National Park. National Park Service, Management Report #15. 70pp.

Forty-three reliable lion sightings were gathered for the park vicinity. It is believed that there were three to six mountain lions living in the park in 1975, and other lions were reported to the southeast and northeast of the park as well. Lions were seen most frequently near areas of high deer density. There are probably enough high deer density areas in the park vicinity to support as many as 60 lions, but it is doubtful that the population will ever reach this level. The greatest risk to the present lion population will be the public's attitude towards the animal. Any management programs should emphasize that a few lions will not harm deer or other game species in this area and may benefit the herd and range through dispersal of herds. Visitors to the park should be encouraged to report any lions or lion sign they see, and all such reports should be investigated. Future studies should try to provide a more accurate population count of lions in the park, and should try to assess the reproductive

success of these lions.

Cumberland, R.E. and J.A. Dempsey. 1994. Recent Confirmation of a Cougar, Felis concolor, in New Brunswick. Can. Field Nat. 108(2):224-228.

The presence of cougar (Felis concolor) in the northeast, specifically New Brunswick, has been a controversial topic for decades, due primarily to an abundance of reports and sightings confounded by a lack of physical evidence. However, on 16 November, 1992, characteristics and measurements of tracks and identification of hair from a scat found near Deersdale New Brunswick were determined to be that of a cougar. Confirmation of the endangered subspecies, the eastern cougar (Felis concolor couguar) is not possible with the collected data.

Cunningham, E. B. 1971. A Cougar Kills an Elk. The Canadian Field Naturalist 85:253-254.

On December 19, 1967, a cougar, Felis concolor killed an adult male elk, Cervus canadensis in Banff National Park. The carcass and kill site were examined in detail the following day. Fresh snow permitted reconstruction of the probable sequence of events leading up to the kill. These events and the manner in which the cougar fed on the elk are described in detail. The six point elk was in poor physical condition. The skin, portions of the left rib cage and associated musculature had been eaten. An estimated 4 pounds of flesh had been eaten from the back, as well as portions of the posterior upper shoulder and anterior hind quarter. There was no evidence that any attempt was made to feed on any of the internal organs. The elk's neck was cleanly broken at the atlas. It was speculated that the cougar had been on the back and had hooked the elk in the muzzle with its right paw and bent the head back until the neck broke. There was no evidence of claw or teeth marks in the throat region or back of the neck. From the point of initial physical contact to the kill-site was estimated to be about 250 yards. The cougar continued to visit the kill-site for over a month. During this time it removed or consumed all portions of the elk except the hair and paunch.

Cunningham, S.C., L.A. Haynes, C. Gustavson and D.D. Haywood. 1995. Evaluation of the Interaction Between Mountain Lions and Cattle in the Aravaipa-Klondyke Area of Southeast Arizona. Final Report. Proj. No. W-78-R; Ariz. Game and Fish Dept., Tech. Rep. 17, Phoenix. 64pp.

We investigated the ecology of mountain lions (Felis concolor) from February 1991 to September 1993 near Klondyke, Arizona, with respect to prey selection and the effects of predation on commercial cattle operations. We found that mountain lion track surveys have value for comparing mountain lion density among areas despite some inherent biases. Mountain lion track survey indices from our study area were higher than any recorded elsewhere in the state. During our study, mountain lions selected deer (Odocoileus spp.) less frequently than their availability would suggest, selected calves slightly more their availabilty, and took javelina (Tayassu tajacu) as expected. We speculate that lions selected calves because they were more vulnerable to predation than deer. Radio-collared mountain lions in our study experienced the lowest overall annual survival rate (0.55) found in any lion study; depredation control was the leading cause of mortality. Male mountain lions were more likely to be killed in depredation cases than females. Mountain lion density and predation on calves remained high despite losses of substantial numbers of mountain lions to depredation control. The sex ratio within our study population was almost even; the age structure was similar to that reported in unexploited populations.

Cunningham, S.C. 1997. Population Demographics of an Exploited Mountain Lion Population. Page 85 *in* W.D. Padley, ed., Proc. Fifth Mountain Lion Workshop: 27 February- 1 March 1996; San Diego, California.

We investigated the population demographics of an exploited mountain lion (*Puma concolor*) population in the Aravaipa-Klondyke Area of southeastern Arizona from February 1991 to September 1993. By comparing mountain lion track surveys on the Aravaipa-Klondyke study area with surveys from around Arizona, we found lion density on our study area was as high as any recorded in the state. Radio-collared mountain lions in our study experienced the lowest overall annual survival rate (0.55) found on any lion study; depredation control was the leading cause of mortality. Male mountain lions were more likely to be killed in depredation cases than females. The sex ratio within our study population was almost even, and mountain lion age structure was similar to that reported in unexploited populations.

Cunningham, S.C. 1997. Prey Availability and Selection by Mountain Lions in the Aravaipa-Klondyke Area of Arizona. Page 85 *in* W.D. Padley, ed., Proc. Fifth Mountain Lion Workshop: 27 February- 1 March 1996; San Diego, California.

Cunningham, S.C., C.R. Gustavson and W.B. Ballard. 1999. Diet Selection of Mountain Lions in Southeastern Arizona. J. Range Manage. 52(3):202-207.

Prey selection by mountain lions (*Puma concolor*) in the Aravaipa-Klondyke area in southeastern Arizona was studied from February 1991 to September 1993. Overall diet as determined from frequency of occurrence in 370 scats was 48% deer (*Odocoileus virginianus cousi* and *O. hemionus* combined), 34% cattle, 17% javelina (*Tayassu tajacu*), 6% rabbit (*Sylvilagus* spp. and *Lepus californicus* combined), 4% rodent, and 2% desert bighorn sheep (*Ovis canadensis mexicanus*). With respect to biomass consumed, cattle composed 44%, deer 40%, javelina 10.9%, rabbits 2.9%, and rodents 0.02%. Based on mean weights of prey consumed, the proportion of individuals killed and eaten changed to rabbits 52.7%, deer 16.3%, rodents 12%, javelina 10%, cattle 8%, and desert bighorn sheep 0.5%. Mountain lions selected deer less frequently than their availability would suggest, selected calves slightly more than their availability, and javelina as expected. We speculated that lions selected calves because they were more vulnerable to predation than deer.

Currier, M.J.P. 1976. Characteristics of the Mountain Lion Population Near Canon City, Colorado. M.S. Thesis. Colorado State Univ., Fort Collins. 88pp.

The study site selected for the first season (winter 1974-75) was located between Canon City and Cripple Creek and covered approximately 900 km^2 (350 square miles). The second segment of the study was located on a 1950 km^2 (750 square mile) area between Canon City and Salido. Two lions were marked and released on the study area during the first season. Seventeen lions were marked and released on the expanded study area the second season and 3 were subsequently re-treed for a total of 20 captures the second season. A total of 37 sets of lion tracks were found on the study area the first season. An analysis of these tracks led to a population estimate of between 15 and 25 lions or one lion per 36-60 km^2 (14-23 square miles). A total of 135 sets of lion tracks were found on the study area the second season. An analysis of the captures and tracks from the second season resulted in an estimate of 35-65 lions or one lion per 30-56 km^2 (12-21 square miles).

Currier, M.J.P., S.L. Sheriff, and K.R. Russell. 1977. Mountain Lion Population and Harvest Near Canon City, Colorado, 1974-77. Colorado Div. Wildl. Special Rep.

#42. 12pp.

The mountain lion population on tracts of 900 and 1,950 square kilometers (350 and 750 square miles) of the Arkansas River drainage from Canon City west to near Salida was evaluated during three winters beginning in December 1974 and ending in April 1977. The terrain was rough and mountainous, mostly between 2000 meters (6500 feet) and 3000 meters (9700 feet) in elevation. Twenty-nine lions were captured and marked on the study area. Six were recaptured and two were killed by hunters during the study period. Two hundred and sixty-two sets of tracks were recorded. Population density estimates of one lion per 36-60 square kilometers (14-23 square miles), 30-56 square kilometers (12-22 square miles), and 30-56 square kilometers were made after successful field seasons on the basis of track data. A density estimate of one lion per 13-55 square kilometers (5-21 square miles) was calculated by use of the Petersen Method after the third season. At least 187 lions had been killed by hunters in the management units that intersect the study area during the 10 years preceding the conclusion of this study. The principal conclusions from all available information were that the mountain lion population on the study area is relatively high and does not appear to be in danger of being overharvested.

Currier, M.J. 1978. Mountain Lion. Colorado Outdoors 27(1):1-7.

The mountain lion was an unprotected, bountied animal until 1965, when it was declared a big game animal. Based on bounty records, the first minimum estimate of the number of lions in Colorado was 124. A questionnaire survey was conducted in 1970 and these results indicated a minimum population estimate of 406 and a maximum of 769. A three year study was initiated on a 350 square mile area between Cripple Creek and Canon City during winter 1974-75. The study area was enlarged and shifted southward to a 750 square mile area between Canon City and Salida for the second and third seasons. During the three seasons, 27 lions were marked and 292 sets of tracks were recorded. A population of from 15 to 25 lions was estimated in the study area the first season (one lion/14-23 square miles), and between 35 and 65 were estimated to inhabit the enlarged study area during the second and third seasons (one lion/12-22 square miles). It was estimated that between 1100 and 1500 mountain lions inhabit Colorado.

Currier, M.J.P. 1979. An Age Estimation Technique and Some Normal Blood Values for Mountain Lions (Felis concolor). Ph.D. Thesis, Colorado State Univ., Fort Collins. 81pp.

The age-estimation formula developed for females included the following blood parameters: globulins, blood urea nitrogen, total proteins, percentage monocytes, and zinc; and morphological measurements: gumline recession from the premolars and rear tarsal length. The age-estimation formula developed for males included the following blood parameters: globulins, alkaline phosphatases, and percentage neutrophils; and morphological measurements: gumline recession from the upper canine and total body length. Both formulas had an r^2 of about 0.80. Blood, hair, and vibrissae samples, and tooth and body measurements were taken from 46 captive and 31 free-ranging mountain lions. Eight animals were sampled each year for three years, 22 for two years, and 50 only once, for a total of 52 female and 34 male captive lion samplings, and 21 female and 11 male wild lion samplings. The blood samples were evaluated for hematocrit, amount of zinc in the plasma, 18 serum parameters, and white blood cell differentials. The hair and vibrissae samples were stretched until they broke to measure elasticity. Two upper and two lower teeth were measured for gumline recession and measurements of six body characteristics were

made. Normal (mean) values and 95 percent confidence intervals for all 38 parameters were determined. The entire 118 samplings were divided into several sets of subgroups and selectively tested for significant differences (P less than or equal to 0.10) in each of the 38 parameters. Three male mountain lions were raised from age 3 weeks. Eighteen summer and 17 winter blood samples were taken and tested for summer-winter differences. Ten blood and two morphological parameters were significantly different between the wild, and captive, non-kitten mountain lions. Two blood and five morphological parameters were significantly different between female, and male, non-kitten mountain lions. Eight blood and all morphological parameters were significantly different between wild kittens and wild non-kittens. Six blood parameters were significantly different between summer and winter blood collections. Twenty-six parameters (the 12 determined to be significantly different between wild and captive lions were omitted) were initially evaluated for the development of the age-estimation formulas with multiple regression analysis. Of the eight blood parameters found to be significantly different between wild kittens and wild non-kittens, two were included in the female age-estimation formula and three in the male age-estimation formula. Winter-summer significant differences were probably not seasonal differences, but for the most part due only to restraint or method of immobilization.

Currier, M.J.P., K.R. Russell. 1982. Hematology and Blood Chemistry of the Mountain Lion (Felis concolor). J. Wildl. Dis. 18:99-104

Normal values for 10 hematologic and 18 blood chemical parameters were calculated for non-kitten mountain lions, Felis concolor. A significant difference (P less than or equal to 0.10) existed between the wild and captive mountain lions sampled for 10 parameters. A significant difference (P less than or equal to 0.10) existed between the female and male mountain lions sampled for two parameters.

Currier, M.J.P. 1983. Felis concolor. Mammalian Species 200:1-7.

Eleven cougar type localities and 30 subspecies are described. Diagnosis, general characteristics, distribution, fossil record, form, function, ontogeny and reproduction, ecology, behavior, and genetics are discussed with citations from many previous authors.

Dahne, B. 1958. The Truth About Black Panthers. Florida Wildlife 12(6):26.

In the strictest sense, there is no species or variety of animal anywhere in the world that can be properly called "black panther". What most people know and call "black panther" is a black color phase of the leopard. The puma has never been recorded in a black color phase (unusual coloration in a group of animals of one species). Single specimens of melanistic panthers have been found in South America, but never in North America. The best estimate of the Florida panther population was from 35-50 in the wild, and the odds are heavily against the birth of either an albino or melano, but it is not utterly impossible.

Danvir, R.E. and F.G. Lindzey. 1981. Feeding Behavior of a Captive Cougar on Mule Deer. Encyclia 58:50-56.

This study was designed to document the feeding behavior of a caged, wild cougar on mule deer under simulated natural winter conditions. A 15-month-old female cougar was utilized at the beginning of the trials and increased in weight from 25 kg (Oct. 1979) to 32 kg (March 1980). Road-killed deer were fed whole to the cougar and

complete feeding on a carcass varied from four to eleven days with average quantity eaten per day highest during the first 24-hour feeding interval. The mean quantity consumed for the first day of the feeding period was 6.8 + or - 3.1 kg with a mean of 4.3 + or - 2.5 kg for days 2 through 4; mean daily consumption for the entire period was 4.0 + or - 2.3 kg. In later trials (Mar.-Apr. 1980) on a diet consisting entirely of boned muscle tissue offered ad libitum, the amount consumed was not significantly greater than amounts consumed on subsequent days. Mean daily consumption for these trials was 3.8 + or - 0.8 kg, with a maximum of 5.1 kg/day. Feeding began on the thoracic cavity of four carcasses and on the anterior abdominal cavity of the fifth carcass. The heart, lungs, liver and diaphragm were consumed initially, along with small quantities of rib bones, thoracic muscle, hair and hide. The head, femurs, humeri, and lower leg bones were unconsumed and often remained attached to the intact hide. On one occasion during a particularly cold period the cougar cracked open femurs for marrow and gnawed on the skull. The cougar consumed an average of 73.5% + or - 4.2% by weight of each carcass.

Dattilo, J.J. 1974. Introduction of Five Cougars into One Enclosure. AAZPA Reg. Conf. Proc. 248-253.

An enclosure at Opryland in Nashville, Tennessee was consisted of woven wire fencing around a ravine and measured 13 feet high with a 3 foot overhang and was buried 3 feet underground. Background information was provided on each of the five cougars. Three males were aged 6 years, 7 months and 7 months. Two females were aged 7 months and 4 months. Each cougar was turned into the ravine and brought in each night where separate quarters were provided and they were fed when the park was closed (Sept.-March). When the park was open, they were fed both in the ravine and inside their quarters at night. Observations of the interactions of these cougars are provided over a period of just over one year.

Davies, R.B. 1991. Lion Damage to Pets in Urban Colorado Springs, Colorado. Pgs. 79-80 In: Mountain Lion-Human Interaction Symposium, C.E. Braun (ed.), Col. Div. Wildl., Denver. 114pp.

During the past 20-25 years, the killing of up to 5-6 dogs per year by mountain lion was not uncommon in the Colorado Springs area. During this time, no public outcry called for the removal of mountain lions. A few of these attacks are described by the author, and in particular an incident which occurred on 24 January 1991, 10 days after 18-year-old Scott Lancaster was killed by a mountain lion near Idaho Springs, Colorado. A tied cocker spaniel was attacked and killed in a kennel in southwest Colorado Springs. The dog's owners videotaped part of the attack and subsequent attempts of the mountain lion to escape with the prey and this was aired on local television. The lion was shot and killed and found to be 5-6 years old and in prime condition. A public meeting was held and a task force was organized to determine actions and to whom to report sightings of mountain lions. An aggressive education program about mountain lions in the media and in the public schools is currently underway. The greater public seems to support actions of responding to all calls, removing lions which kill pets or habituate to housing areas, and relocating lions. If an unprovoked attack occurs on a human, every effort is made to locate and destroy the animal. To date, no confirmed mountain lion-human contacts or aggressive acts by mountain lions have occurred in the Colorado Springs area.

Davis, G.P. 1969. Status of the Mountain Lion in Ten Western States. Defenders of Wildl. News (Oct/Nov/Dec).

Of the ten western states reviewed, only five had given the mountain lion big game status (Washington, Oregon, Nevada, Utah, and Colorado). Four of the remaining five had strong legislation pending to reclassify the lion as a game animal. Only Arizona still paid a bounty on the lion. A brief description of Hornocker's study in Idaho is presented.

Davis, J.L., C.B. Chetkiewicz, V.C. Bleich, G. Raygorodetsky, B.M. Pierce, J.W. Ostergard, and J.D. Wehausen. 1996. A Device to Safely Remove Immobilized Mountain Lions from Trees and Cliffs. Wildl. Soc. Bull. 24(3):537-539.

A simple device which safely restrains partially immobilized mountain lions from distances less than or equal to 8 meters is described. The device was constructed by attaching an angle-iron type snare-lock onto a 1 meter length of 4-mm flexible steel cable and forming a noose. Cable clamps, lightweight nylon line, "S" hooks, and ski poles were also utilized. The construction of the device is illustrated and explained in detail.

Dear, L.S. 1955. Cougar or Mountain Lion in Northwestern Ontario. Can. Field Nat. 69:26.

A mountain lion was seen on July 23, 1953 on the side of the road on the Trans-Canada Highway near Martin, about 30 miles west of Fort William. It was estimated to be about 5½ feet long and to stand about 30 inches high. On August 6, 1953, a mountain lion was seen about 25 miles west of Fort William and seen again in the same vicinity four days later. A cougar with two cubs was seen crossing a road about 5 miles east of Beardmore. The adult was between five and six feet long, had a long tail and stood at least 30 inches high. Another report was published in an issue of the Times-Journal of Fort Williams dated April 17, 1954. It describes a report of a cougar that was seen on April 13, 1954 about 43 miles west of Fort Arthur. The cougar cut across the tracks in front of the train and leaped upon a rock cut about six feet high without any trouble. The cougar was described as about five feet long and brown in color. At one point it was not more than 25 feet from the observers. The author states that although only sight records are available, the evidence appears conclusive and beyond doubt. There had been at least 21 sight records from Minnesota during the previous five years. Several of these records are from the northeastern portion of the state, bordering on Ontario, and at least three were at no great distance from Fort William. One of these was at Cascade River, about 100 miles south of Fort William on June 22, 1950. Another was at Crow Creek, about 166 miles south of Fort William on June 8, 1951. The other was at Two Harbors about 175 miles south of Fort William in the fall of 1948.

Dearborn, N. 1927. An Old Record of the Mountain Lion in New Hampshire. J. Mammal. 8:311-312.

A mountain lion was killed on November 2, 1853 by William F. Chapman in the township of Lee, Rockingham County, New Hampshire. The cat weighed 198 pounds and measured 8 feet and 4 inches from tip to tip. The badly mounted skin is located at the Woodman Institute, a public museum in Dover, New Hampshire. This was the only record of a mountain lion being killed in the state that the author could recollect.

DeBlieu, J. 1991. The Panther Versus Florida. Pgs. 249-274 In: Meant to be Wild. Fulcrum Publ., Golden, Colorado.

The author describes the history and management of the panther in Florida.

Dedera, D. 1973. Calling Ford Bird; His Lion is Busy. Outdoor Arizona 45:13.

The author posed the question in the daily press as to whether or not the mountain lion screams. Many replies were received that claimed that the animal does and does not scream.

Denton, B.L. and W.L. Kent. 1956. Habits of Mountain Lion. Trans. First Central Mountains and Plains Section Conf., The Wildlife Society. 3pp.

The authors hunted and trailed mountain lions for hundreds of miles and believed that the only food item that lions prefer more than deer is colt meat. The authors checked many kills and did not ever encounter a kill where the neck was not broken. It was found that the lion will eat its first meal by tearing into the heart and liver behind the shoulder. They disagreed with the notion that the lion only kills sick or wounded deer and even had their doubts as to whether a lion would even eat a sick deer. The mountain lion may travel from 20 to 25 miles in one night following ridges and crossing through the low gaps or saddles. The female lion makes a sound like a child screaming and the male makes a low grunting noise. Kittens make a noise like a screech owl. A female with kittens will make approximately three kills a week to feed her young. Traps must be set on a run and over 100 miles are usually traversed when hunting for every lion caught.

Dewar, P., and P. Dewar. 1977. The Status and Management of the Puma in British Columbia. The World's Cats 3:4-19.

Three subspecies of cougar are found in British Columbia: F. c. vancouverensis, F. c. oregonensis, and F. c. missoulensis. Bounty records indicate that a relatively high concentration of cougars were found on Vancouver Island and the Interior South, with lower concentrations on the Mainland Coast and the Kootenays. Relatively few appeared to be in the Interior North and northern British Columbia. To date there had been 15 verified cases of cougars attacking humans in British Columbia and may possibly be attributed to the more aggressive nature of the subspecies rather than a higher concentration of cougars in the area. The bounty was removed in 1957 and in 1970 a tag system was introduced for hunting cougars. In 1966, the cougar was given big game status. In 1970, it became mandatory for a nonresident to hire a resident guide before hunting cougars.

Dies, K.H., and J.R. Gunson. 1984. Prevalence and Distribution of Larvae of Trichinella sp. in Cougars, Felis concolor L., and Grizzly Bears, Ursus arctos L., in Alberta. J. Wildl. Dis. 20(3):242-244.

Most of the 57 cougars examined were taken by hunters during January of the years 1979-1982 in the Rocky Mountains or adjacent foothills. Larvae of Trichinella sp. were recovered from 32 of 57 cougars. Twenty-five of 50 cougars collected from Banff National Park south to the Alberta-Montana border were positive. All 7 cougars from north and east of Jasper National Park were infected. The lone cougar from a zoo was negative. Previous authors had reported that in these areas where grizzly bears and cougars inhabit the same immediate area, grizzly bears were more commonly infected than cougars. However, 56% of the cougars examined from the Rocky Mountain regions were positive whereas all of the grizzly bears collected from

the same area were negative.

Dixon, J. 1925. Food Predilections of Predatory and Fur Bearing Mammals. J. Mammal. 6:34-46.

An examination of 43 mountain lion stomachs from various parts of California has shown that domestic stock constitutes, on the average, less than 10 percent of all food eaten. Thirty-four of the stomachs contained remains of deer. Statements to the effect that each mountain lion in the western states kill on the average $1000 worth of domestic stock each year appears to need considerable reduction. Bounty has been paid on over 4000 mountain lions killed in California since October 1907 by the California State Fish and Game Commission.

Dixon, K.R. and R.J. Boyd. 1967. Evaluation of the Effects of Mountain Lion Predation. Colorado Div. Wildl., Proj. No. W-38-R-2l, Wk. Pl. 4, Job 4. 24pp.

Bounties were paid on mountain lions by the Denver Post newspaper from 1900-1939, a total of 890 lions being bountied at $50 each. The state of Colorado initiated a bounty system on lions in 1929, paying $50 for 1,457 lions of any age until 1965. Five counties in Colorado provided nearly 3/4 of the total lion kill from July 1956 to June, 1965; three of these counties: Fremont, Garfield and Rio Blanco provided 53% of the total kill. Of 8 actual lion kills of mule deer examined, all were bucks with antlers averaging 4 points to a side and an age of 7-9 years. Domestic sheep kills by mountain lions in 1965 totaled 139 head out of a total predator loss of 15,815 head, or 0.8%.

Dixon, K.R. 1982. Mountain Lion. Pgs. 711-727 In: J.A. Chapman and G.A. Feldhamer (eds.), Wild Mammals of North America: Biology, Management and Economics. John Hopkins Univ. Press, Baltimore. 1147pp.

The mountain lion is described and many previous authors are cited. Mountain lion distribution, physiology, reproduction, ecology, food habits, behavior, mortality, age determination, census techniques, economic status, and research and management needs are discussed.

Dobie, J.F. 1943. Tales of the Panther. Sat. Eve Post. Dec. 11:23.

Many folklore stories of the panther are presented.

Donaldson, B. 1974. Mountain Lion Research. Perf. Rep., Proj. No. W-93-l6, Wk. Pl. 15, Job 1. New Mexico Game and Fish Department. 11pp.

Six wildlife management units were surveyed from August 10, 1973 through March 21, 1974. A portion of another unit was surveyed from April 6, 1974 through June 21, 1974. This area included the eastern portion of the Gila Wilderness and was used to compile a better foundation for estimating lion population numbers. The number of individual animals bayed in each unit ranged from 1 to 4 and averaged 2.4 lions per unit. The known sex and age classes of lions bayed included 3 adult males, 3 immature males, 5 adult females, 1 subadult female, 3 immature females, and 2 immature animals sex unclassified. Twenty-four kills judged to have been made by lions were observed: 16 mule deer, 1 whitetailed deer, 1 elk, 1 javelina, 1 beaver, 3 domestic cattle, and 1 mountain lion. The number of kills in each unit ranged from 0-6, and averaged 3.4 per unit. The 16 mule deer kills comprised 67% of the total and

included 2 adult bucks, 2 yearling bucks, 3 adult does, 4 unclassified fawns, 2 unclassified adults, and 3 unclassified as to sex and age. The lion that was killed was found approximately 40 feet from the remains of a Hereford cow. The investigators assumed that the lion was killed in a fight concerning the cow or killed by the cow in the process of the kill. It was reported that 132 lion licenses were sold and harvest results projected from a questionnaire survey indicated that 118 hunters took 56 lions for an implied hunter success of 47.75%. The statewide projected harvest included 40 males and 16 females.

Donaldson, B.R. 1974. Mountain Lion Research (1973-74). Final Report. Proj. No. W-93-R-16, Job 1, Wk. Pl. 15. New Mexico Dept. of Game and Fish. 6pp.

A total of 191 days were spent hunting with dogs in eight management units: 129 days were spent in seven selected units and 62 days were spent in a special unit (Unit 11). Tracks of 301 lions were observed and 166 lions were trailed. After eliminating duplicate tracks there were 268. The minimum population estimate was 115 lions. The projected total population estimate was 2060. Twenty nine lions; 5 adult males, 4 kitten males, 13 adult females, 5 kitten females, and 2 unclassified kittens, were treed. Three were killed, 18 were tagged and released and 8 were only bayed. Thirty one kills of prey were found; 21 mule deer, 3 white-tailed deer, 3 cows, 1 elk, 1 javelina, 1 beaver, and one unclassified species. A total of 1839 scrape sites were observed. The average number of scrapes per site was 2.1. Scrapes were observed more frequently in the pinyon-juniper-ponderosa vegetative type (41.1 percent), and on ridge tops (53.8 percent).

Donaldson, B.R. 1975. Mountain Lion Research (1971-75). Final Report. Proj. No. W-93-R-17, Job 1, Wk. Pl. 15. New Mexico Dept. of Game and Fish. 18pp.

This preliminary study was conducted from 1972-1974 to estimate population numbers and harvest and to observe some physical and behavioral characteristics of mountain lions in southwest New Mexico. An investigating team equipped with horses and lion dogs surveyed eight randomly selected areas for lion and lion sign. These investigators captured or treed 29 lions of which 18 were tagged and released. During the surveys the observers found 268 nonduplicated sets of lion tracks of which 55 percent were adult animals. They also found 864 scrape stations. The 40 lion kills observed indicated mule deer (68%) was the most important large herbivore in the diet. Acceptably reliable minimum population estimates indicated there were at least 493 mountain lions in southwest New Mexico. Annual recruitment into the breeding population was estimated to be about 15 percent while the reported harvest was at most only 13 percent of the breeding population. The sex ratio of the adult population was in favor of females, but was approximately equal in the kitten-yearling age class.

Douglass, E.M. 1980. Oxylate Nephrosis in Captive Pumas. Modern Vet. Practice 61:758-760.

The pumas described developed signs of severe oxylate poisoning after consuming feed which was accidentally contaminated with pure oxalic acid. The major lesions observed at necropsy were in the kidneys and intestinal tract. Potential sources of oxylates and treatments are discussed.

Doutt, J.K. 1969. Mountain Lions in Pennsylvania? Am. Midl. Nat. 82(l):281-285.

A mountain lion was killed in Pennsylvania on 28 October 1967. Although

considered extinct here since the 1890's, numerous reports of mountain lions during the past 68 years have caused some people to doubt this. This article reviews some of the reports of their occurrence in northeastern North America since 1900. The evidence seems to indicate that there may be some individuals living in the wilder parts of Pennsylvania at the present time.

Downing, R.L., and V.L. Fifield. 1978. Differences Between Tracks of Dogs and Cougars. Worcester Science Center, Worcester, MA. 2pp.

Parameters used to correctly identify cougar tracks and differentiate the tracks of dogs and cougars are described.

Downing, R.L. 1979. Eastern Cougar Newsletter. USDI, U.S. Fish and Wildlife Service, Dept. Forestry, Clemson Univ., Clemson, SC. 6pp. May.

The author located a track that was almost certainly that of a cougar in the southern Appalachians. Also encouraging was the fact that the track was within 10 miles of where a female was seen with 3 kittens in 1975 and again with 2 kittens in 1977. Techniques for obtaining track casts in snow are provided.

Downing, R.L. 1979. Status of the Eastern Cougar in the Southern Appalachians. Pg. 3 In: Eastern Cougar Newsletter, R.L. Downing (ed.), USDI, Fish and Wildl. Service, Dept. Forestry, Clemson Univ., Clemson, SC. January.

A cooperative effort had been worked out where the author would spend half-time for the following five years looking for cougars and cougar sign in the mountains of Georgia, South Carolina, North Carolina, Tennessee and Virginia. The primary approach was to search for cougar tracks in the snow. Considerable progress had been made by Dr. Mark Johnson and associates at Mississippi State University in identifying predator scats using thin layer and gas chromatography analysis of the different bile acids that the scats contain and this may prove useful for confirming the presence of cougars. Each state in the southern Appalachians had a clearinghouse where reports were evaluated and filed.

Downing, R.L. 1981. The Current Status of the Cougar in the Southern Appalachian. Proc. of Nongame and Endangered Wildlife Symposium, Athens, GA. Pgs. 142-151.

This paper summarizes historical evidence of cougars in the southern Appalachians and elsewhere in the East and presents evidence of their continued existence. Wide-reaching searches for sign have produced one track and one scat suspected to be cougar. Hundreds of reports of sightings, screams, and tracks have been received as the result of publicity generated by the study, but in only three cases has there been accompanying substantial evidence of cougars. Future efforts will be expended where the two most promising bits of evidence were collected to establish beyond doubt that viable populations of cougars are present there. Research will also be directed toward describing the normal frequency and variability of observing positive cougar sign, based on intensive surveys in several areas in Florida, the West, and elsewhere known to contain cougars. Such information is needed to plan large-scale searches of potential habitat in the future.

Downing, R.L. 1982. Eastern Cougar Newsletter. USDI, USFWS, Dept. Forestry,

Clemson Univ., Clemson, SC. 6pp.

The author presents 4 case histories of deer killed within 200 miles of Clemson, South Carolina which could probably not be attributed to any other native animal other than the cougar.

Dratch, P.A., J.S. Martenson and S.J. O'Brien. 1991. The Mexican Onza: What Cat is That? Animal Genetics 22(Supplement 1):66.

Mitochondrial DNA was used in 1986 to identify the carcass of a Mexican onza that was brought to authorities in the Sierra Madre. The rare onza had been known for over 100 years and it was speculated to be a subspecies of the cougar or jaguar, or a hybrid and some claim it to be a descendent of the extinct North American cheetah. The analysis showed 18% bands shared with the jaguar, 28% between the cheetah and 100% of 122 bands in common with the cougar which provided stong evidence that this onza was a cougar.

Dubost, G. and J. Royere. 1993. Hybridization Between Ocelot (Felis pardalis) and Puma(Felis concolor). Zoo Biology 12:277-283.

A captive living male Felis pardalis and female Felis concolor produced four litters between 1990 and 1992. Both the body size and spot pattern of the offspring showed characteristics intermediate between those of the parents, but, in general, there was greater phenotypic similarity to the sire. Contrary to previous cases of felid hybridization, neither equal body size of the partners nor male physical dominance was necessary for copulation in these felids. This successful interbreeding confirms the position of the puma in the genus Felis, but also raises questions about phylogenetic relationships within the genus.

Dunbar, M.R. 1984. Florida Panther Biomedical Investigations. Final Perf. Rep., Study No. 7506. Florida Game and Fresh Water Fish Commission, Gainesville. 53pp.

Veterinary medical management to reduce capture-associated mortality, provide medical care to promote health and increase survival, and to conduct biomedical research to further the understanding of disease, nutrition, and reproductive physiology continued as an integral part of the Florida panther (Felis concolor coryi) recovery. Since veterinary involvement began in 1983, 159 immobilizations involving 58 individuals have been accomplished with one mortality (0.63%) in 1983, possibly capture-related. This fiscal year resulted in re-collaring 9 panthers and the capture and radio-instrumentation of 2 newly captured panthers. In addition, 8 kittens were hand-caught, examined, and released at 3 den sites. A total of 22 kittens have been hand-caught during this 4-year period. A range of 18 to 23 individual panthers have been monitored by telemetry during this 4-year period. Presently, 18 panthers (8 males, 10 females) are being monitored. The panther population estimate is 30 to 50 adults. Serologic evidence indicates that they were exposed to or were infected with several potentially pathogenic agents: feline calicivirus, feline panleukopenia virus, feline rhinotracheitis virus, feline enteric coronavirus/feline infectious peritonitis, feline immunodeficiency virus/puma lentivirus. However, panthers were serologically negative for Brucella sp., Toxoplasma gondii, feline leukemia virus, and pseudorabies virus. Twenty-one deaths were documented during this 4-year period. In fiscal year 93/94, 71% of the 7 deaths were due to road kills, 14% to intraspecific mortality, and 14% to bacterial infection. Panthers were positive for 2 trematodes, 2 cestodes, 6 nematodes, 1 acanthocephalan, and 1

protozoan. No major changes in endoparasite loads were found compared to previous studies of the Florida panther (Forrester et al. 1985). Two studies were initiated this fiscal year, one on vitamin A and one on estradiol levels in panthers. No vitamin A deficiency was found, although, vitamin A levels were correlated with several variables, including age and prey base. Apparently high estrogen levels in male panthers were suggestive of exposure to environmental estrogenic chemicals. There were no attempts to breed panthers in captivity during this period. One captive adult (#200) was euthanized this year due to a severe neurological disorder, leaving a total of 9 panthers currently in captivity.

Dunbar, M.R., M.W. Cunningham and C.F. Facemire. 1994. An Evaluation of Vitamin A and Possible Exposure to Estrogenic Chemicals as Causes of Congenital Abnormalities in the Florida Panther. Pgs. 73-74 In: Program and Abstracts of Papers Presented at the 43rd Annual Conf. of the Wildl. Dis. Assoc. July 17-22, Monterey, CA.

We evaluated the possibility that vitamin A deficiency and/or exposre to estrogenic chemicals (i.e., some pesticides and PCB's, etc.) are causing congenital abnormalities (cardiac atrial septal defects and cryptorchidism, respectively) in Florida panthers (Felis concolor coryi) in lieu of the present hypothesis of inbreeding and genetic depression. We examined liver samples from necropsies of 22 free-ranging panthers and multiple serum samples from 51 free-ranging panthers for levels of vitamin A (total retinol and retinyl esters) and compared these values to those of other felids to assess possible vitamin A deficiencies. We also examined sera from 24 Florida panthers for estradiol and testosterone levels and compared these values to those of normal and cryptorchid panthers. We found that vitamin A levels in panther sera (x=1589.6 pmol/ml, SD=929.3) and liver (x=26055.2 nmol/g dry wt., SD=18973.4) were apparently normal, based on comparisons to limited data from apparently normal felids. However, we did find both abnormally high vitamin A levels (5391.5 pmol/ml and 3985.5 pmol/ml) in sera from two panthers and abnormally low vitamin A levels, i.e., 2930.9 nmol/gm, dry wt., in liver from some panthers. We found no significant difference (F2, 21=1.13) between mean estradiol levels (228 pg/ml, SE=48) of normal male panthers (n=5) and levels 267 pg/ml, SE=32) from cryptorchid males (n=14). However, we did find unusually high estrogen levels (545-670 pg/ml) in three males and skewed estrogen/testosterone ratios in some males and females indicating a possible exposure to estrogenic chemicals. However, we could not demonstrate that vitamin A or possible exposure to estrogenic chemicals were factors contributing to the development of congenital abnormalities. In conclusion, we could not dispute the hypothesis that inbreeding and genetic depression is the primary cause of congenital abnormalities in the Florida panther.

East, B. 1979. Cougar Comeback in the East. Am. Forests 85(11):21, 54-59.

The author explores reports of cougars in the east, where they have been considered extinct for half a century or more. He believes that there have been enough sightings, tracks, scats, cougar kills, and even dead cougars to leave little room for doubt. It is not understood what percentage of these cougars are wild or represent pets which have escaped or were released from captivity. Most of the reports have come from the mountainous areas of Georgia, South Carolina, North Carolina, Virginia, and Tennessee. Robert L. Downing, a wildlife researcher with the U.S. Fish and Wildlife Service was to spend the next five years looking for cougars and cougar sign in these areas. In addition, his office at Clemson University in South Carolina was to act as a clearinghouse for information on cougar sightings. A small isolated colony of approximately 10-15 animals is believed to exist in the southern Everglades region of Florida. The statewide Florida population was estimated at less than 30 to more than

100. A unusual incident of two black cougars running across a road was reported in Florida and according to the author probably represented the only case of black individuals reported anywhere on the continent. The author furnishes accounts of cougar sightings and sign from several eastern states.

Eaton, R.L. 1971. Florida Panther. National Parks and Conservation Magazine 45(12):18-20.

The cougar may have been more common 150 years ago in the eastern deciduous forest east of the Mississippi River where whitetail deer were abundant than it ever was in the West. The eastern races of the cougar still exist but are endangered. There is reason to believe that northeastern cougar numbers are increasing and that the panther has extended its range from New Brunswick into eastern Quebec and south into the United States. The Florida panther is also endangered and is very rare. Most reports of panthers in upstate Florida come from the northwestern part of the state. The most northerly sightings of Florida panther had been recently made in Alabama and North and South Carolina. Estimates of total population range from 50 to 300 individuals. It is difficult to assess how many panthers are killed illegally. The best hope for continued existence appeared to be in the Everglades National Park, in wildlife refuges like Loxahatchee, and on suitable federal lands like Eglin Air Force Base in northwestern Florida.

Eaton, R.L. 1973. The Status, Management and Conservation of the Cougar in the United States. The World's Cats. Vol. 1, Ecology and Conservation. Pgs. 68-89.

Information is presented on the status, management and conservation of the cougar from all of the western United States. The author's preliminary research findings on the Florida panther and recommendations for actions to conserve the American lion are also provided.

Eaton, R. 1975. Puma-Mystery Cat. Pacific Search 9(10):6-8.

The puma is only distantly related to most other wild cats and its evolution has been distinct for much longer than that of the African lion, for example. Studies show that it is most closely related to the jaguarundi and the cheetah. The puma is the most widespread of terrestrial mammals except for man. States such as Texas, Montana, and Wyoming offer no protection and bounties are still legal in Texas. The Washington Game Department estimated the puma population to be 1500 in 1974. There was reason to believe that a lithium fluoride coating on a lamb's wool may diminish depredations by pumas as had been the case in trials with the coyote. Studies suggested that the present population of pumas in California may be 1800. Zoos may be the salvation of some subspecies, such as the Florida panther, where captive breeding programs may provide animals which could be restocked. Gary Bogue and Mark Ferrari of the Lindsay Nature Center near Berkeley, California have made great strides in habituating captive-reared pumas to leading a wild predator's life.

Eaton, R.L., and K.A. Velander. 1977. Reproduction in the Puma: Biology, Behavior and Ontogeny. The World's Cats 3:45-70.

The signs of a female in estrus included: 1) rubbing the fence between herself and the male, 2) backing up to the fence and presenting the anogenital area to the male, 3) assuming the copulatory stance, posterior end oriented toward the male, and 4) passage of bloody fluid from the vulva (usually females first estrus). Blood clots in

the urine may indicate proestrum, and may not only occur in virgin females. Length of estrus, from first day to last day of active mating was measured for 8 estrus periods for 6 females and also for 8 estrus periods for 4 females. Length of estrus for both groups ranged from 4-12 days with a mean of 7.8 days and 8.12 days, respectively. All mating bouts but one were less than one minute in duration. Frequency of copulation was variable. The longest period during which the number of copulations was noted was 10 hours, where a pair mated 23 times and averaged 2.3 per hour. The highest frequency was for a shorter observation period in which there were 9 copulations in one hour. Measured from the last day of mating, the average of 10 periods was 89.9 days, and from the first day, 9 periods averaged 99.2 days. From 40 litters, it appeared that peak months for birth are April and August, with the spring and summer months constituting a definite birth season. The average size of 24 litters was 2.58 with a range of 1-5, and for 11 additional litters was 2.7 with a range of 2-4. The combined sex ratio of litters at birth was 22 males, 17 females, plus 28 of unknown sex. The behavioral ontogeny of a mother-raised litter is presented along with physiometric parameters and activities of the family group. It was hypothesized that if the young were removed before July (before decreasing day length) the mother is likely to initiate cycling and conceive, regardless of how long the litter was raised. Conversely, if the litter is removed after July, the female would not recycle until the following spring.

Ebert, P.W. 1971. The Status and Management of the Felids of Oregon. Pgs. 68-71 In: Jorgensen, S.E. and L.D. Mech.(eds.), Proc. of a Symposium on the Native Cats of North America, Their Status and Management. U.S. Dept. Int., Fish and Wildlife Service, Twin Cities, Minnesota.

The Territorial Government established a bounty for the cougar in 1843. This bounty was repealed by the state legislature in 1961. Bounties ranged from $15 in 1913 to $50 in 1961. The number of cougars bountied varied from a high of 337 in 1930 to 27 in 1961. It was predicted by analysis that the cougar would have become extinct in the state by 1973 if the bounty had continued. The cougar population was estimated at 350 animals. Thirty-one cougars were removed by government hunters on the basis of complaints between 1962 and 1968. The cougar was legislated a game animal where damage was not anticipated in 1967 and a statewide closed season was established in 1968 except for depredating animals. A controlled season was established in December, 1970 over a 1,350 square mile area in northeastern Oregon with a quota of 25 tags costing $5.00 each.

Egbert, A.L. 1987. Policies and Philosophies on Florida Panther Captive Breeding and Reintroduction. AAZPA Regional Proc., Pgs. 767-772.

Florida panthers continue to exist in the wild only in the south one-fourth of peninsular Florida. The habitats of south Florida continue to be under tremendous pressure. The author, Assistant Executive Director of the Florida Game and Fresh Water Fish Commission, was concerned about the political issues of panther relocation. One County Commission had already gone on record in opposition to receiving any Florida panthers, due to concerns by hunters. The Commission would probably recommend that a reintroduced population of panthers be designated a "nonessential experimental population" by the U.S. Fish and Wildlife Service. It was stressed that everyone with an interest must be involved and that compromises would probably have to be made. The focus of the panther restoration team must consider public relations and public information. Captive breeding and wildland conservation can proceed concurrently.

Elmer, M., K.A. Logan, L.L. Sweanor, and M.G. Hornocker. 1997. Mountain Lion Food Habits in a Desert Environment: Preliminary Results. Page 85 *in* W.D. Padley, ed., Proc. Fifth Mountain Lion Workshop: 27 February- 1 March 1996; San Diego, California.

From 1985 through 1995 Kenny Logan and Linda Sweanor conducted lion research in the San Andres Mountains of New Mexico. During their field studies the researchers collected one of the largest samples of lion scats and stomach contents ever compiled. In my study each individual scat and stomach is being analyzed for content. Using the results, food habits will be compared between years as well as between seasons. Ultimately, these data along with a kill sample collected over the ten year period will be used to determine possible impacts of lion predation on some prey populations. After analyzing approximately 500 scats and stomach contents I have observed 12 different prey species. Preliminary data shows that mule deer (*Odocoileus hemionus*) is the primary food item throughout the year with several small mammal species varying in importance seasonally. I expect this pattern to hold throughout the analysis of the remaining scats.

Emmons, L.H. 1987. Comparative Feeding Ecology of Felids in a Neotropical Rainforest. Behav. Ecol. Sociobiol. 20:271-283.

SUMMARY

Diet and habitat use of jaguar, puma, and ocelot, and populations of their mammalian prey, were studied in an undisturbed rainforest in southeastern Peru. Analysis of scats (feces) showed terrestrial mammals to be the chief prey of all three felids, but reptiles and birds were also important in the diets of ocelot and jaguar. Prey diversity is high and the cats evidently take any readily captured vertebrate. For major terrestrial mammal prey of felids, density, biomass, prey/predator ratios and annual offtake from the study area are estimated. All three cat species seem to hunt by opportunistic encounter of prey. Most mammalian prey species were taken in about the ratios of occurrence, but peccaries were taken by jaguar more often than expected. Most prey of jaguar have a body weight of > 1kg, those of ocelot, < or = 1kg. Jaguar often used waterside habitats, where they captured caiman and river turtles. Puma did not use these habitats or resources, although the puma prey sample was too small for much inference. The possible effects of felids on study area prey populations are discussed. Large and small cats partition prey at the body weight region where prey switches from low to high reproductive rates.

Engstrom, M.D. and T.C. Maxwell. 1988. Records of Mountain Lion (Felis concolor) from the Western Edwards Plateau of Texas. Texas J. Sci. 40(4) :450-452.

Mountain Lions are currently confined mostly to remote areas of the Trans-Pecos region of Texas. Although apparently never common, individuals have occasionally been reported from the western Edwards Plateau. A few of the more reliable of these reports are recorded.

Ernest, H., M. Syvanen, and W. Boyce. 1997. DNA from Mountain Lion Scat: Preliminary Studies. Page 86 *in* W.D. Padley, ed., Proc. Fifth Mountain Lion Workshop: 27 February- 1 March 1996; San Diego, California.

DNA analysis can prove valuable for assessments of mountain lion population size, predator-prey interactions, and lion-human interactions. A three year study to examine several aspects of individual and population genetic structure of mountain

lions in California by the use of molecular markers in blood, tissue, and scat (feces) was begun in June 1995. Objectives for the study include the following. First, techniques to extract and analyze DNA mountain lion scat will be developed and validated. Use of genetic markers in scat samples will be evaluated as a method of mark-recapture for population density estimates and for tracking movements of specific individuals. Scat collected at prey kill sites (particularly bighorn sheep) will be tested for both predator and prey DNA. Second, geographical patterns of mountain lion distribution in California will be examined from a genetic perspective. Among populations of special interest are those of the Sierra Nevada and Sonoran Desert regions of Southern California. Preliminary results of the scat DNA portion of this study will be presented. Fecal and blood or tissue samples were collected from captive animals housed at rehabilitation facilities and from carcasses presented for necropsy. DNA was extracted from fecal samples using a standard phenol-chloroform protocol, then purified using gel filtration columns. Polymerase chain reaction (PCR) technique was used to amplify genetically variable microsatellite regions in DNA extracted from scat, tissue, and blood samples. The results of preliminary research will be presented, comparing the identity and quality of DNA extracted from feces with DNA extracted from tissue of the same individuals. The use of scat DNA for identification of species, gender, and individuals will be discussed. This work will provide a foundation for studies in population genetics, forensics, population demographics, and predator-prey ecology.

Evans, W. 1983. The Cougar in New Mexico: Biology, Status, Depredation of Livestock, and Management Recommendations. Report to New Mexico House of Representatives, New Mexico Dept. of Game and Fish. 40pp.

House Memorial 42 directs the "State Game Commission and the Department of Game and Fish to study the population of (cougars) and depredations caused by cougars" and report the findings to the legislature in January 1984. The cougar's biology render their populations uniquely unsusceptible to most forms of wildlife management. Efforts to reduce depredations on livestock and wildlife through cougar hunting and control on problem areas have failed. Studies in Idaho indicate cougar losses (from hunting and control) are replaced through influx of transients and increased reproduction. However, when social structures are allowed to remain intact, the cougar's territorial matrix tends to make the population self-limiting in terms of density, growth, and reproduction. Present range of the cougar includes the western 2/3 of New Mexico with concentrations in the more mountainous regions of the north and southwest. The cougar apparently recovered from intensive hunting and control in the first half of the 20th Century, but in recent years the killing of cougars may have reached an all-time high and the statewide population is again declining. Despite these trends, the species is not threatened or endangered and some regions of the state may not be part of the general trend. Verified depredations affect less than 1 percent of New Mexico ranchers each year. Current estimates of annual depredation loss (primarily domestic sheep) is $29.5 thousand per year. Incidents of verified depredations have declined in the northeast, increased in the southeast and remained stable in the western half of the state. Short of exterminating the cougar, there is no biological means, in terms of cougar management, for achieving greater reductions in depredations. While of biological origin, depredations of livestock are essentially a political concern. Cougar management should recognize that present know-how and technologies are not sufficient to artificially calibrate cougar populations short of extirpation. Management should take advantage of the cougar's self-limiting potential by allowing development of stable social structures over most of the occupied range. Sport hunting should be restricted to permanent areas on no more than 1/3 of the occupied range. Control of individual depredating cougars may continue, for the present, but management should recognize that depredations will

also continue and the ranchers involved (average 11.2 per year) may be severely impacted. The inequities should be recognized and a system of reimbursing ranchers for at least part of their loss should be developed. While the Department may contribute in some manner, it should not be expected to absorb the cost of such a program.

Faulkner, C.E. 1971. The Legal Status of the Wildcats in the United States. Pgs. 124-125 In: Jorgensen, S.E. and L.D. Mech (eds.), 1971. Proc. of a Symposium on the Native Cats of North America., Their Status and Management. U.S. Dept. Int., Fish and Wildlife Service, Twin Cities, Minnesota.

The current legal status of the wildcats is summarized for every state in the continental United States. The majority of states did not offer protection. The cougar was protected in 9 states and unprotected in 10 states, two of which paid bounties.

Fergus, C. 1991. The Florida Panther Verges on Extinction. Science 251:1178-1180.

A 6-month-old panther kitten was captured from the wild by the Florida Game and Fresh Water Fish Commission and will become the first animal in the captive breeding program at White Oak Plantation near Yulee, Florida. Animal rights proponents opposed the plan and sued the U.S. Fish and Wildlife Service to stop it, but the suit was settled and the program continued. Last year Florida panther DNA was tested and it was found that some panthers carry genes from Central or South American cougars- probably inherited from cats released into the wild two or three decades ago. The question of whether a genetically impure subspecies deserves protection under the Endangered Species Act was posed. Inbreeding has become so severe that most animals have one or more abnormal traits. At present there were 20 animals being radio-monitored by the Florida Game Commission and National Park Service biologists. It was determined by a computer program (VORTEX) which was designed to forecast the future of a species, that without captive breeding, there was an 85% probability that the panther would die out in 25 years with a mean time of 20 years to extinction. As a result a "Species Survival Plan" for the panther was devised. The goal would be to have 130 breeding animals in a combination of wild and captive environments by the year 2000 and 500 by 2010. VORTEX indicated that this would assure a 95% probability that the panther would survive in the wild for 100 years and retain 90% of its current genetic diversity. Scientists will collect and cryopreserve semen from free-ranging males and up to 50 panthers will be captured over the next 3 to 6 years and placed in breeding facilities run by zoos. A total of 4 panthers had been taken from the wild to date for the breeding program. Since January of 1990, eight wild panthers have died and seven of these represented genetic founders.

Finley, W. 1925. Cougar Kills a Boy. J. Mammal. 6(3):197-199.

An authentic case of a cougar killing a 13 year-old boy on December 17, 1924 in Okanogan, Washington is presented. From analysis of stomach contents of a cougar killed in the same area, it was found that this was the killer cougar in question. Mr. F.S. Hall gives a complete account of the tragedy in the May 1925 issue of the Murrelet.

Fischthal, J.H., and R.L. Martin. 1977. Alaria (Alaria) marclanae (LaRue 1917) Walton 1950 (Trematoda: Diplostomatidae) From a Mountain Lion, Felis concolor

acrocodia Goldman, from Paraguay. J. Parisitol. 63:202.

Nine specimens of Alaria marclanae, fixed (in situ) were collected from the small intestine of a mountain lion trapped on September 30, 1973, along the Rio Verde in Chaco Boreal in the Estancia Juan de Zalazar. Both the host species and the geographic distribution of this trematode represented new records.

Fitzgerald, J.W. 1982. The Utah Cougar Harvest Book, 1981-1982. P-R Proj. No. W-65-R-D-30, Job A-7, Publication No. 82-12. Utah Dept. Nat. Resources.

Cougar harvest permit sales increased from the previous season. Five hundred twenty-one permits were sold in 1981 as compared to 479 permits in 1980. Twenty-seven of the 521 permits were validated to be used only in specific counties in the northern and central portions of the state. A reported harvest of 216 cougar for 1981-82 included 11 cougars taken due to livestock depredation problems and six cougars taken in the counties having a restricted number of permits. This is an increase of 15 cougars from the 201 reported in 1980-81. There were 432 hunters afield in 1981-82 which was an increase of 21 from the previous year.

Fitzhugh, E.L. 1984. Lion Track Counts in California. Pgs. 130-133 In: J. Roberson and F. Lindzey (eds.), Proc. of the Second Mountain Lion Workshop. Utah Div. Wildl. Res. and Utah Coop. Wildl. Research Unit. Zion National Park. 271pp.

A lack of current data may be used as an argument to extend the moratorium on hunting lions that is due to expire at the end of 1985. The study continues to build a data base for lion population trends in four National Forest areas in northern California by remeasuring intensive 5-day track counts from an earlier study performed by Kutilek, et al. (1981). Eleven lions were detected from all study areas as opposed to five in the previous study. This difference was possibly due to a less conservative approach. A large amount of data is needed to distinguish statistical trends in the populations.

Fitzhugh, E.L. 1985. Genetic Isolation in California Mountain Lions. Unpubl. Rep., Wildl. Ext., Univ. of Ca., Davis. 10pp.

Urban development probably has caused genetic isolation of mountain lions in the Santa Monica mountains of Southern California and may do so in the San Bernardino and Santa Ana mountains within the next 20 years. The genetic effect of inbreeding among mountain lions is unknown, but assuming the worst case, management to overcome the problem would involve removal of the dominant male and any transient males followed by introduction of a new male from similar habitat elsewhere. The source of introduced males should be rotated, and an introduction would be required approximately every 5-10 years to simulate natural changes in dominance. Care should be taken to maintain the effective population size, which would mean introducing more than one male if more than one were removed. Another possible method of introducing new genetic material would be to capture and inseminate a female. Another option is to do nothing, in which case removal of genetically deteriorated may ultimately be necessary. In either situation, local populations may be extirpated by chance events and reintroductions may be necessary. Extirpation is less probable with positive management. Detectable homozygosity does not mean that all genetic variability is absent. There still may be reason to maintain a genetic mixing even in "homozygous" populations.

Fitzhugh, E.L., and W.P. Gorenzel. 1985. Variation in Tracings of Mountain Lion Tracks. Wildl. Ext., Univ. of Ca., Davis.

Four observers drew tracings of the footprints of all four feet of a pet mountain lion walking on various types of terrain. A 95% confidence interval was calculated from measurements of heel pad width and length, measured from the prints in the dust, for each foot separately. The widest confidence interval found was for length of the right front heel pad, 41.3 2.8mm., with a sample size of 6. The greatest interval for width of the pad was 52.1 3.2 mm., for the right front pad, with a sample size of 9. If a single lion made 100 prints of each foot along a dirt road with terrain similar to the test, 95 of the 100 measurements of the same foot would be between the confidence intervals stated and would be useful in determining whether two tracings came from the same lion or from different lions.

Fitzhugh, E.L., S. Smallwood, and R. Gross. 1985. Mountain Lion Track Count, Marin County, 1985. Unpubl. Rep. to Marin Rod and Gun Club. 9pp.

A standardized 5-day survey of mountain lion tracks was conducted in Marin County, California, September 16-20, 1985. Two sets of tracks were recorded on Blithedale Ridge road, 3-tenths of one mile south of the intersection with Hoo-Koo-E-Koo trail and 6-tenths of a mile north of the intersection with Corte Madera Ridge road. No other lion tracks were observed. It is possible that the two tracks found were those of a mother and kitten which would indicate that they are permanent residents.

Fitzhugh, E.L. and W.P. Gorenzel. 1985. Design and Analysis of Mountain Lion Track Surveys. Pgs. 78-87 In: W.F. Laudenslayer Jr. (ed.), Cal-Neva Wildlife 1985. Western Section, The Wildlife Society.

In this paper we examine practical and theoretical aspects of the study design and data analysis of a mountain lion track survey. A survey route should consist of 64-96 km of dusty dirt roads or snow, resurveyed periodically. Roads closed to traffic, or roads with logging traffic or other frequent vehicle traffic are not acceptable. Of the three choices of vehicles for the survey, pickup trucks, all-terrain vehicles or motorcycles, the latter offers advantages of economy, maneuverability and superior visibility of tracking surfaces. Train personnel in motorcycle operation, track identification and track tracing techniques prior to the survey. Schedule surveys when dust conditions or roads are optimum, but prior to hunting or hound training seasons. Starting shortly after sunrise, two trackers ride motorcycles at 4.8-8.0 km per hour, each surveying half of the route. Document any mountain lion tracks found by photographs and by tracings using plate glass and transparent film. At the track site record heel pad width and length for all tracks, odometer reading, road condition rating, soil surface type, depth of surface layer and habitat name. Optimize finding tracks by surveying during periods of optimum light condition (early to mid-morning), riding the motorcycle so as to keep tracks between the observer and sun, being alert for visual cues such as flattening or color change of tracking surfaces and paying particular attention to potential mountain lion travel routes. Distinguish tracks of individual mountain lions by size, shape, angle patterns, on-site evidence and gaits. Use a decision matrix when assigning track sets to individual mountain lions. Different amounts of judgement may be accepted for different purposes. The number of track sets may be more useful than the number of lions for statistical comparisons. Different route and home range patterns provide different sampling probabilities, making comparison of different areas invalid. Research is needed to quantify the variation in the tracks of individual mountain lions in different soil and surface

conditions and the variation in the tracking and survey sampling techniques.

Fitzhugh, E.L., and W.P. Gorenzel. 1985. Mountain Lion Track Surveys in California, 1984. Wildl. Ext., Univ. of Ca., Davis. Unpubl. 74pp.

We conducted mountain lion (Felis concolor) track surveys in the summer of 1984, on four study areas in California, in parts of the Los Padres, Mendocino, Shasta-Trinity, and Sierra National Forests. Using motorcycles, we intensively surveyed 40 to 60 miles (64 to 96 km) of dirt roads per day for five days in each study area. Any mountain lion track sets found were traced and later compared to identify individual lions. Using a method of identifying individual lions that was designed to equalize error in either direction, we identified eight track sets and five individual lions in the Los Padres area, two track sets and two lions in the Mendocino area, seven track sets and one lion in the Shasta-Trinity area, and eight track sets and three lions in the Sierra area. However, the more conservative analytical approach of previous workers resulted in a minimum number of lions, in the same order, of one, one, one, and two. Several years of data collection will be needed before population trends can be assessed. Factors influencing the data included logging, recreational vehicle traffic and related activities, rain, and route changes. In one area, the transect included parts of the home ranges of five radio-collared mountain lions. None of them were detected, but at least two to four other mountain lions were detected. Factors affecting the probability of finding the track of an individual animal are discussed. Better definition of observer and track variability is needed before track surveys can be interpreted well. Routes should be completed before any hunting or hound training season. Rain or other serious disturbances should cause abandonment of the route until the disturbance is over. When track studies are done, if possible they should be done in areas where radio-collared mountain lions occur. The type of survey reported here cannot yield statewide population trends. A large number of dispersed and less intensively studied transects would be appropriate for a statewide population trend.

Fitzhugh, E.L. 1986. Mountain Lion Attacks May Continue. News Release. Wildlife Extension, Univ. Ca., Davis. 2pp.

Conditions in Orange County, and possibly in other parts of southern California, seem to be predisposing mountain lions to attack humans. The second attack upon a child in 6 months had just occurred and a close encounter with an adult occurred between those two attacks. At least 4 conditions were contributing to the attacks: 1) mountain lions are living in close proximity to urban development 2) mountain lion populations are unusually high 3) A large number of people are using lion habitat for dispersed recreation which allows lions to become gradually accustomed to people as another natural element of their habitat and 4) when the lion comes upon a human that is behaving so as to release the natural prey attack behavior, an attack will occur naturally. Behavior that would stimulate an attack by a lion includes running, quick movements, and excited conversation, especially by children. Adults alone are probably more at risk than adults in groups, but lions are not deterred by groups of children. The author had identified 66 attacks on humans, not including the two in Orange County. Six of these attacks were in California, and the most recent was in 1925. Reductions in mountain lion numbers in the Santa Ana Mountains may only help to reduce the number of attacks since the lions have been accustomed to people as potential prey. Removing the offending animal is certainly necessary but is not a solution due to the above stated factors.

Fitzhugh, E.L., and W.P. Gorenzel. 1986. Biological Status of Mountain Lions in

California. Proc. 12th Vert. Pest Conf. (T.P. Salmon, ed.), Davis, Ca. Pgs. 336-346.

The history, management, and legal status of mountain lions in California is presented. The political situations leading to the present status of a hunting moratorium is reviewed. Many of the biological factors, particularly population status and trends which have been controversial are explored. Forty human/mountain lion contacts involving potentially dangerous situations were identified in California. Research projects and management studies which have been completed or are ongoing in California are listed.

Fitzhugh, E.L., and K.S. Smallwood. 1988. Techniques for Monitoring Mountain Lion Population Levels. Pgs. 69-71 In: R.H. Smith (ed.), Proc. of the Third Mountain Lion Workshop. Arizona Chapter, The Wildlife Society and Arizona Game and Fish Department, Prescott, Arizona. 88pp.

Several methods are available to monitor mountain lion populations. Information to manage moderate hunting levels can be achieved inexpensively. For example, a statewide mountain lion track count designed to provide only an index to the statewide population can be done for approximately $1,000 plus 82 person-days of expert tracking labor once the system and equipment are established. Objectives dictated by political or legal constraints by a desire to manage close to maximum sustained yield throughout the state, or to reduce statewide populations could require monitoring as costly as $2,000 or more. Monitoring for intensive management on local areas is less expensive than on large areas. Any reasonable population index, size, or density information can be obtained using techniques presently available, but the cost can vary widely.

Fitzhugh, E.L. 1988. Managing with Potential for Lion Attacks Against Humans. Pgs. 74-77 In: R.H. Smith (ed.), Proc. of the Third Mountain Lion Workshop. Arizona Chapter, The Wildlife Society and Arizona Game and Fish Department, Prescott, Arizona. 88pp.

Conclusion

People in responsible positions should not dismiss encounters between humans and lions as merely curious events, but should seriously assess the potential danger and take action when it appeared to be warranted. Wildlife experts who provide advice about preventing lion attacks should follow professional standards and be prepared to defend their recommendations in court if necessary. Once the attack occurs, the incident should be investigated as thoroughly as a felony crime, because a major court action could occur. Also, results should be sent to a central location to assist in predicting future attacks. Any mountain lion that attacks a human should be removed from the population, not only to provide information that will help refine the assessment of danger, but more importantly, to reduce the possibility of a second attack. However, simply removing the offending lion may not change conditions that stimulated the attack, and another one could occur.

Fitzhugh, E.L. 1991. Answers To Common Questions About Mountain Lions. Coop. Ext., Univ. Ca., Davis. 7pp.

Thirty-three of the most common questions concerning mountain lions are presented and answered by the author.

Fjelline, D.P., and T.M. Mansfield. 1988. Method to Standardize the Procedure for Measuring Mountain Lion Tracks. Pg. 49 In: R.H. Smith (ed.), Proc. of the Third Mountain Lion Workshop. Arizona Chapter, The Wildlife Society and Arizona Game and Fish Department, Prescott, Arizona. 88pp.

A technique was developed that could establish a standard procedure for use in mountain lion (Felis concolor) track studies. This technique relies on factors that do not change, or change very little, in different soil or substrates. This method had been applied on a number of study areas in California. It had minimized the errors made in past measuring attempts. This technique is useful for documenting lion densities and when used in conjunction with more labor and cost intensive methods of population surveys, can identify individual animals that might otherwise be unaccounted for in a given population.

Flowers, C. 1989. Searching for the One True Cat. National Wildlife 27(6):24-28.

For nine years, teams of biologists and trackers have been collaring Florida panthers with radio transmitters. At the present time, 33 cats have been captured and released, for the most part in the Everglades/Big Cypress Swamp region of South Florida. Hemmed in on all sides, threatened by habitat loss, speeding automobiles and poachers bullets, the Florida panther numbers no more than 50 animals. In addition, scientists fear that part of the wild panther population may in fact be descended from another non-Floridian cougar subspecies. Abnormally developed sperm has been noted in 95% of Florida panther males, and cryptorchidism-when one testicle does not descend-occurs frequently. Both are considered to be signs of in-breeding. Florida's panthers have been thought to consist of two isolated populations: one in the Big Cypress Swamp, and a smaller group in the Everglades, with the two populations apparently separated by 30-mile-wide Shark River Slough. However, a panther believed to be of the Big Cypress population was captured as close to the Everglades group as to the Big Cypress group. This raised doubts that maybe there is only one population which would help to preserve the true panther pedigree. Fortunately, more than 1.5 million acres, including a 30,000 acre tract added in June, have already been set aside in South Florida as either National Park or national or state preserves, and cannot be developed.

Foose, T.J., and U.S. Seal. 1986. Species Survival Plans for Large Cats in North American Zoos. Pg. 179 In: Cats of the World: Biology, Conservation, and Management. S.D. Miller and D. Everett (eds.). Nat. Wildl. Fed., Wash. D.C.

The authors list the puma as having 29 living subspecies, two of which are listed in the Red Data Book. There were 69 institutions listed in ISIS that held pumas with a population of 173 animals. Two subspecies could be managed as SSP populations with a population size of 100 animals and only one subspecies could be managed with a population size of 250 animals.

Forrester, D.J., J.A. Conti, and R.C. Belden. 1985. Parasites of the Florida Panther (Felis concolor coryi). Proc. Helminthol. Soc. Wash. 52(1):95-97.

Between 1978 and 1983 twelve Florida panthers (Felis concolor coryi Bangs) were examined for parasites. Seven were examined at necropsy and the other five were live animals examined during capture operations. Findings included one species of protozoan, 2 trematodes, 3 cestodes, 7 nematodes, 6 ticks, and one flea. All panthers were infected with at least six species of parasites. Intensities varied from 263 to 10,094 parasites per animal. The two most prevalent and abundant parasites were the

diplostomatid trematode Alaria marcianae (La Rue, 1917) and the hookworm Ancylostoma pluridentatum (Alessandrini, 1905).

Forstenzer, M. 2000. Clawing Its Way to the Top. Nat. Wildl. 38(2):36-42.

The Sierra Nevada bighorn sheep population decreased to 250 in the late 1970's primarily due to diseases contracted from domestic sheep. An intensive reintroduction effort bolstered the population to 310 by the mid-1980's but the population plummeted to 100 in 1999 and was listed as an endangered species. The cause of the downfall is attributed to cougar predation. From a low of perhaps only 6,500 in the late 1960's, the country's cougar population has rebounded to an estimated 20,000 or more today, although accurate counts are unavailable. The absence of competitors such as grizzly bears and wolves coupled with hunting moratoriums and high numbers of potential prey may have allowed cougars to expand beyond historic population levels according to John Wehausen, a researcher at the University of California's White Mountain Research Station who has been studying bighorns since the 1970's. In addition to predation, cougars caused the bighorns to not move to the base of the mountain in winter to get the forage they need. Cougars were also found to be a factor in the decline of the peninsular bighorn, which ranges between Palm Springs and Mexico; the eastern Mojave Desert and the San Andres Mountains in southern New Mexico. Cougars are also blamed for virtually wiping out an entire population of porcupines in the northwestern corner of Nevada. A cougar-prey unbalance may result in a loss of genetic diversity in the prey animals. It is possible that much of the damage in some of these cases may be the work of a single cougar and that removal of the offending lion may improve the survival rate. However, the political climate concerning cougar management in the West is tenuous and there are no easy answers.

Fosburgh, P.W. 1951. Panther. The New York State Conservationist 5:12-13.

In the early days, panthers ranged widely over most, if not all of the state of New York until about 1850 when the Adirondack wilderness remained their last stronghold. The state placed a bounty of $20 on the panther in 1871 and from that time until 1894 a total of 99 panthers were redeemed, all from the Adirondacks. More were killed than were bountied, however, including the largest ever recorded in the state, a 200-pounder killed by Verplank Colvin on Seventh Lake Mountain, Hamilton County, in 1887.

Foster, M.L. and S.R. Humphrey. 1995. Use of Highway Underpasses by Florida Panthers and Other Wildlife. Wildl. Soc. Bull. 23(1):95-100.

Wildlife, including endangered Florida panthers, successfully used constructed underpasses. Conservation implications are reviewed.

Francis, C.S. 1960. Mountain Lion at Torch River, Saskatchewan. Blue Jay 18(3):139.

A mountain lion was observed for 10 minutes in the northwest part of the Torch River District. There had been several reports of cougars seen in this area for several years.

Frankenberger, W.B., R.C. Belden, and J.C. Roof. 1989. Florida Panther Distribution. Perf. Rep., Study No. II-C-l 7501. Florida Game and Fresh Water Fish

Commission, Tallahassee. 7pp.

Field searches for panther (Felis concolor coryi) sign were conducted this year in a study area made up of selected sites in Glades, Highlands, and Polk counties where surveys were done systematically and along the St. Johns River drainage where surveys were conducted less frequently. No panther sign was found in the areas in Glades, Highlands, and Polk counties, and only scattered sign was found along the St. Johns. The Florida Panther Record Clearinghouse received 290 panther reports, of which 25 were investigated. None of these were confirmed to be panthers. Two reports from Osceola County, incidental to the Clearinghouse reports, were verified as panthers.

Franklin, W.L. 1991. Patagonian Puma: The Lord of Land's End. National Geographic. January. Pg. 102.

The Patagonian Puma (Felis concolor patagonica) was studied for six years in Torres del Paine National Park, a 935 square mile reserve in southern Chile's portion of Patagonia. Guanacoes and European hares were the principal prey species. The Patagonian puma is one of 27 recognized subspecies and is the southernmost and one of the largest. Research was concentrated on a 40 square mile finger of land flanked by lakes with one of the highest densities documented with an estimated population of between 13 and 18 individuals. The study indicated that both males and females stake out large, overlapping home ranges, often as much as 40 square miles. The killing of pumas was prohibited in Chile in 1980. More than 50 sheep ranchers in the study region had switched to cattle due to puma depredations.

Fraser, P., O. Pall and H.D. Carr. 1983. The 1981-82 Cougar Hunt in Alberta. Energy and Natural Resources, Fish and Wildl. Div., Calgary, Alberta, Canada.

The results of the 1981-82 cougar hunt and harvest in Alberta were summarized from compulsory registration forms. Cougar skulls submitted by hunters were aged and measured. Because of the better snow conditions compared to last year, cougar license sales increased by 33%. However, the 1981-82 license sales were still 11% less than the total sold in 1979-80. Forty-two cougars were harvested legally in Alberta (20 males, 21 females and 1 of unknown sex) with residents accounting for 90% of the kills. This was the second highest harvest since 1971 when compulsory registration of cougar kills was initiated. Seventy-four percent of the cougar harvest was taken from W.M.U.'s south of the Bow River, an area that has accounted for 63% of the kill since 1971. Fall harvests in 1981-82 accounted for 16.7% of the total cougar kill. This is similar to the average fall harvest from 1973-74 to 1980-81 of 17%. The decrease in the length of the fall season by 20 days (23%) since 1979-80 appeared to have little effect on the average fall kill. Approximately 43% of the winter cougar harvest in 1981-82 came from Big Game Zone 11. The reduction in the length of the winter season in this zone from 2 months to 1 month in 1978-79 had not effectively reduced harvests in the foothills. None of the harvested cougars were of trophy status as designated by the Boone and Crockett Club. Age data indicated that 57%, 20% and 23% of the cougars harvested were subadult, young and mature adult age groups, respectively.

Fraser, P., O. Pall and H.D. Carr. 1985. The 1983-84 Cougar Hunt in Alberta. Energy and Natural Resources, Fish and Wildl. Div., Calgary, Alberta, Canada.

The results of the 1983-84 cougar hunt and harvest in Alberta were summarized from compulsory registration forms. Cougar skulls submitted by hunters were aged and

measured. Cougar license sales in 1983-84 remained the same as in 1982-83 (127 licenses). Cougar hunting was permitted for 67 days in the fall season (no dogs allowed) and 27 days in the winter season (dogs allowed). Twenty-eight cougars were legally harvested in Alberta (17 males and 11 females) with residents accounting for approximately 86% of the kills. This represented a 33% increase in the cougar harvest from 1982-83 but was 7% lower than the 10 year average of 30 kills per year between 1973 and 1983. Seventy-five percent of the cougar harvest was taken from W.M.U.'s south of the Bow River, an area that has accounted for 63% of the kill since 1971. The 1983-84 fall harvest accounted for only 7% of the annual cougar kill compared to the average fall harvest of 17% between 1973 and 1983. Approximately 58% of the winter cougar harvest in 1983-84 came from Big Game Zone 11. The 1978-79 shortening of the winter season in this Zone from 2 months to 1 month has not effectively reduced harvests. Age data from skulls indicated that 9%, 13% and 78% of the cougars harvested were subadult, young adult and mature adult, respectively. Only 1 of 17 skulls submitted for measurement was of trophy status as defined by Boone and Crockett. Preliminary data show that the majority of the cougars collected harbor 3 major species of parasites, a cestode Taenia omissa and 2 nematodes, Trichinella spiralis and Toxascaris leonina.

Frome, M. 1979. Panthers Wanted-Alive, Back East Where They Belong. Smithsonian 10(3):82-88.

Recent sightings in the Great Smoky Mountain National Park indicate that the eastern panther may be coming back from the brink of extinction. The three National Parks in the Appalachians-Great Smokies, Shenandoah, and the Blue Ridge Parkway, are cooperating with field biologist Robert L. Downing (Clemson University) in his 5-year project to search for panthers and their sign. Reports and sightings in New Hampshire and Massachusetts along with a young male which was killed by a farmer in 1976 near Droop Mountain State Park, West Virginia, provided strong evidence.

Gabbert, A. and F.R. Henderson. 1990. Puma in Kansas. Coop. Ext., Kansas State Univ., Manhattan. 8pp.

The last documented case of a puma in Kansas was one shot August 15, 1904, in Ellis County near Catherine. General information on the puma is provided, including habitat, range, body color and size, tracks, traveling patterns, kills, and reproduction. Each year numerous reports are received from people who see puma in Kansas. As of July 1, 1989, it became unlawful to harvest puma in Kansas.

Galentine, S. and E.L. Fitzhugh. 1997. Standardizing Photographs of Puma Tracks For Digital Processing. Pages 37-39 *in* W.D. Padley, ed., Proc. Fifth Mountain Lion Workshop: 27 February- 1 March 1996; San Diego, California.

We designed a portable camera mount that provides photographs of animals tracks, taken perpendicular to the substrate, of consistent quality and size. The camera sits on a folding black box. Opposing flash units are mounted at different levels depending on the depth of the track. We identified appropriate filters for the film, aperture, and flash units we used, although these will vary and may be improved upon.

Garcelon, D. 1977. An Expandable Drop-off Transmitter Collar for Young Mountain Lions. Ca. Fish and Game 63(3):185-189.

The Alexander Lindsay Jr. Museum's wildlife rehabilitation program was to release a

young, captive-reared mountain lion after predatory training. Because the cat's neck would increase in circumference as he grew, there was a need to devise an expandable collar as well as one that would wear and drop off after a period of time. A compact, inconspicuous transmitting collar was used because changes in the normal silhouette of familiar objects tend to upset mountain lions. In addition, due to the need of the lion to be able to tuck its chin to avoid being kicked by hooves while trying for a neck bite, a large transmitter package located under the chin would be a possible source of injury. A detailed description of the construction of the collar and initial results are presented.

Gashwiler, J.S., and W.L. Robinette. 1957. Accidental Fatalities of the Utah Cougar. J. Mammal. 38:123-126.

The authors discovered the remains of two cougars whose deaths were attributed to accidents. Most accidents seem to result from the animals method of securing food. Cougars hunt by stealth, sneaking as close to the prey as possible before charging and springing upon it. They must attain considerable speed on their charge and their momentum plus the struggles of their victims sometimes result in injury. A brief account of some reported non-fatal accidents is presented. Accounts of fatalities in recent literature is reviewed along with the two accounts mentioned above.

Gay, S.W. and T.L. Best. 1995. Geographic Variation in Sexual Dimorphism of the Puma (*Puma concolor*) in North and South America. Southwestern Nat. 40(2):148-159.

Because of its extensive range and the diverse habitats occupied in North and South America, the puma (*Puma concolor*) is an excellent animal in which to document the presence of sexual dimorphism in size, elucidate the pattern of geographic variation in secondary sexual dimorphism in size, and examine the relationship between geographic variation in sexual dimorphism and environmental components, including sympatric taxa. The dataset included 14 cranial and 5 mandibular measurements for 1,201 pumas. Of the 19 morphologic characters, all exhibited secondary sexual dimorphism in size; males were significantly larger than females. No apparent pattern of geographic variation in sexual dimorphism was detected, and none of the environmental variables was correlated with sexual dimorphism. Because none of the broad patterns of environmental variation coincided with the pattern of variation in sexual dimorphism, the causes of sexual dimorphism likely are associated with intraspecific and interspecific interactions. Sexual selection seems to be the most probable explanation for secondary sexual dimorphism in size of the puma.

Gay, S.W. and T.L. Best. 1996. Age-Related Variation in Skulls of the Puma (Puma concolor). J. Mammal. 77(1):191-198.

Measurements of skulls were used to determine if growth continues throughout the lifetime of a puma (Puma concolor) and if growth patterns differ between sexes. The dataset included 1,201 adult pumas and consisted of 14 cranial and 5 mandibular measurements. Ages (estimated by the amount of staining and wear of teeth) of specimens examined during our study suggested that few pumas live past ca. 9 years of age in the wild (16 of 609 adult males and 35 of 592 adult females). For both sexes, all of the characters showing no significant variation among age groups were those related to measurements of dentition, indicating that teeth reach their full-grown size by ca. 2 years of age. Growth of the cranium of pumas continues throughout most of the animal's life; males continue to grow to 7-9 years of age, and females

continue to grow to 5-6 years of age.

Germaine, S.S. and K.D. Bristow. 1997. Mountain Lion Kill Rates, Habitat Use, and Feeding Behavior in Southern Arizona. Final Report. Arizona Game and Fish Dept., 18pp.

We investigated kill rates and feeding behavior of mountain lions (Puma concolor) in desert habitats in southern Arizona. We attempted to determine kill frequency, mean duration of carcass utilization, mean daybed distance from cache sites, and habitat selection while preying upon ungulates. We captured 5 mountain lions (lions) using both hounds and snares, fitted each with a radiotransmitter, and radiotracked them nocturnally to determine movement patterns and location of kill sites and daybeds. We used trained hounds to locate cache sites associated with suspected feeding events. Only 2 cache sites during a 3-month period were located. We were unable to address original project objectives with currently available study methods. Recommendations for future research methodology are discussed.

Germaine, S.S., K.D. Bristow and W. Zarlingo. 1997. Mountain Lion Surveys in Southwestern Arizona. Final Report. Arizona Game and Fish Dept., 16pp.

We surveyed mountainous and riparian habitats in southwestern Arizona to document presence of mountain lions (Puma concolor) in the range of the Yuma mountain lion (P. c. browni). We used trained hounds when possible and visually searched for lion sign in remaining areas on foot, horseback, or from trucks. We used remote photography to document lion presence at water holes and routinely searched for sign near water developments. We employed 5 survey methods in 16 mountain ranges and 3 national wildlife refuges. We documented the presence of 2 lions in the Growler Mountains and 1 lion in the Mohawk Mountains. Our methods provided no direct density measurement, however, given the time invested, area covered, and limited sign encountered we conclude that lion density within the study area was extremely low. Our results suggest that the lions of this area may represent dispersing individuals from adjacent populations.

Gerson, H.B. 1988. Cougar, Felis concolor, Sightings in Ontario. Can. Field Nat. 102(3):419-424.

Three hundred and eighteen sightings of cougars, Felis concolor, were reported in Ontario for the period 1935 to 1983, and were evaluated by Ontario Ministry of Natural Resources staff. Most sightings were made in wilderness areas. About half of the sightings were reported from areas outside the deer range. None of the sightings were confirmed by positively identified cougar tracks or other sign. Six areas in Ontario, relatively free from human disturbance and with good tracking conditions and repeated cougar sightings, have been recommended as areas in which systematic searches for cougar sign should be initiated.

Glass, C.M., R.G. McLean, J.B. Katz, D.S. Maehr, C.B. Cropp, L.J. Kirk, A.J. McKeirnan and J.F. Evermann. 1994. Isolation of Pseudorabies (Aujeszky's Disease) Virus from a Florida Panther. J. Wildl. Dis. 30(2):180-184.

Pseudorabies virus was isolated in cell culture from the brain tissue of a 3.5-year-old male Florida panther (Felis concolor coryi). The virus was not isolated from other tissues collected at necropsy. Based upon a nested polymerase chain reaction (PCR), the virus was determined to have the classical wild-type virulent genotype, glycoprotein I+ (gI+) and thymidine kinase+ (TK+)

Next