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 was 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 were 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.

Elbroch, M., C. Saucedo and H. Wittmer. 2010. Swimming by Pumas (Puma concolor) in Patagonia: Rethinking Barriers to Puma Movement. Studies on Neotropical Fauna and Environment 45(3):187-190.

Abstract

Observations of pumas (Puma concolor) swimming across large bodies of water remain anecdotal in the scientific literature. Here we report long-distance swimming by a foraging male puma in Chilean Patagonia, as revealed by Argos and GPS technology. Our observation raises the question as to what might constitute a barrier to puma movements and gene flow in southern South America. Pumas are a flagship species used in identifying wildlife corridors and in landscape-scale conservation efforts in North America, and we feel a better understanding of puma metapopulation dynamics in South America is essential to both future conservation of the species and landscape-scale conservation efforts in southern South America as well.

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.

Ernest, H.B., M.C. Penedo, B.P. May, M. Syvanen and W.M. Boyce. 2000. Molecular Tracking of Mountain Lions in the Yosemite Valley Region in California: Genetic Analysis Using Microsatellites and Faecal DNA. Mol. Ecol. 9(4):433-441.

Abstract

Twelve microsatellite loci were characterized in California mountain lions (*Puma concolor*) and sufficient polymorphism was found to uniquely genotype 62 animals sampled at necropsy. Microsatellite genotypes obtained using mountain lion faecal DNA matched those from muscle for all of 15 individuals examined. DNA from potential prey species and animals whose faeces could be misidentified as mountain lion faeces were reliably distinguished from mountain lions using this microsatellite panel. In a field application of this technique, 32 faecal samples were collected from hiking trails in the Yosemite Valley region where seven mountain lions previously had been captured, sampled, and released. Twelve samples yielded characteristic mountain lion genotypes, three displayed bobcat-type genotypes, and 17 did not amplify. The genotype of one of the 12 mountain lion faecal samples was identical to one of the mountain lions that previously had been captured. Three of the 12 faecal samples yielded identical genotypes, and eight new genotypes were detected in the remaining samples. This analysis provided a minimum estimate of 16 mountain lions (seven identified by capture and nine identified by faecal DNA) living in or travelling through Yosemite Valley from March 1997 to August 1998. Match probabilities (probabilities that identical DNA genotypes would be drawn at random a second time from the population) indicated that the samples with identical genotypes probably came from the same mountain lion. Our results demonstrate that faecal DNA analysis is an effective method for detecting and identifying individual mountain lions.

Ernest, H.B., E.S. Rubin and W.M. Boyce. 2002. Fecal DNA Analysis and Risk Assessment of Mountain Lion Predation of Bighorn Sheep. J. Wildl. Manage. 66(1):75-85.

Abstract

We analyzed fecal DNA to identify individual mountain lions (*Puma concolor*) associated with kills of federally listed endangered bighorn sheep (*Ovis canadensis*) in the Peninsular Ranges of California from 1993-1999. We identified 18 different mountain lions at 26 bighorn sheep kill sites, as well as 5 mountain lions not associated with bighorn sheep mortalities. Thirteen genotypes were each identified at only 1 kill site, while 2 genotypes were unambiguously detected at multiple kill sites. We developed a Monte Carlo simulation model incorporating the DNA data to evaluate the benefits (bighorn sheep saved and reduction in extinction risk) and costs (mountain lions removed) of mountain lion removal under 2 management strategies for a 5-year period. One strategy removed individual mountain lions only after they killed 1 bighorn sheep (kill-site removal), while the other strategy removed mountain lions found anywhere in bighorn sheep habitat (habitat removal). The habitat removal strategy was equal or superior to the kill-site removal in terms of reducing extinction risk for all sizes of ewe populations. However, the kill-site strategy more efficiently targeted bighorn sheep predators and resulted in the removal of fewer non-bighorn sheep-killing mountain lions than the less selective habitat removal strategy. Removal of 1-2 mountain lions per year by either strategy effectively decreased extinction risk for populations consisting of 15-30 ewes, while more intensive removal (3-4 mountain lions per year) was necessary to reduce the risk for smaller populations containing <15 ewes. Removal of mountain lions for a short period of time may be the best option available for bighorn sheep populations in immediate danger of extinction due to mountain lion predation. Given that site-specific information and several assumptions were incorporated in our model, we strongly recommend that individualized and updated assessments be performed on the potential costs and benefits of predator control actions so that the rescue of 1 species or population does not jeopardize another.

Ernest, H.B., W.M. Boyce, V.C. Bleich, B. May, S.J. Stiver and S.G. Torres. 2003. Genetic Structure of Mountain Lion (*Puma concolor*) Populations in California. J. Conservation Genetics 4(3):353-366.

Abstract

Analysis of 12 microsatellite loci from431 mountain lions (*Puma concolor*) revealed distinct genetic subdivision that was associated with geographic barriers and isolation by distance in California. Levels of genetic variation differed among geographic regions, and mountain lions that inhabited coastal areas exhibited less heterozygosity than those sampled

inland. The San Francisco Bay and Sacramento-San Joaquin River Delta, the Central Valley, and the Los Angeles Basin appeared to be substantial barriers to gene flow, and allele frequencies of populations separated by those features differed substantially. A partial barrier to gene flow appeared to exist along the crest of the Sierra Nevada. Estimated gene flow was high among mountain lions inhabiting the Modoc Plateau, the western Sierra Nevada, and northern section of the eastern Sierra Nevada. Southern California mountain lion populations may function as a metapopulation; however, human developments threaten to eliminate habitat and movement corridors. While north-south gene flow along the western Sierra Nevada was estimated to be very high, projected loss and fragmentation of foothill habitat may reduce gene flow and subdivide populations. Preservation of existing movement corridors among regions could prevent population declines and loss of genetic variation. This study shows that mountain lion management and conservation efforts should be individualized according to region and incorporate landscape-level considerations to protect habitat connectivity.

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.

Facemire, C. F., T. S. Gross, and L. J. Guillette Jr. 1995. Reproductive Impairment in the Florida Panther: Nature or Nurture? Environmental Health Perspectives 103:79–86.

Abstract

Many of the remaining members of the endangered Florida panther (*Felis concolor coryi*) population suffer from one or more of a variety of physiological, reproductive, endocrine, and immune system defects including congenital heart defects, abnormal sperm, low sperm density, cryptorchidism, thyroid dysfunction, and possible immunosuppression. Mercury contamination, determined to be the cause of death of a female panther in 1989, was presented as the likely cause of thyroid dysfunction. As genetic diversity in the species was less than expected, all of the other abnormalities have been attributed to inbreeding. However, exposure to a variety of chemical compounds, especially those that have been identified as environmental endocrine disrupters (including mercury, *p.p'*-DDE, and polychlorinated biphenyls), has elicited all of the listed abnormalities in other species. A number of these contaminants are present in south Florida. An exposure pathway has been identified, and evidence presented in this paper, including the fact that there appears to be no significant difference between serum estradiol levels in males and females, suggests that many male panthers may have been demasculinized and feminized as a result of either prenatal or postnatal exposure. Thus, regardless of the effects of inbreeding, current evidence seems to indicate that environmental contaminants may be a major factor contributing to

reproductive impairment in the Florida panther population.

Farrell, L.E., J. Roman and M.E. Sunquist. 2000. Dietary Separation of Sympatric Carnivores Identified by Molecular Analysis of Scats. Molecular Ecology 9(10):1583-1590.

Abstract

We studied the diets of four sympatric carnivores in the flooding savannas of western Venezuela by analysing predator DNA and prey remains in faeces. DNA was isolated and a portion of the cytochrome b gene of the mitochondrial genome amplified and sequenced from 20 of 34 scats. Species were diagnosed by comparing the resulting sequences to reference sequences generated from the blood of puma (*Puma concolor*), jaguar (*Panthera onca*), ocelot (*Leopardus pardalus*) and crab-eating fox (*Cerdocyon thous*). Scat size has previously been used to identify predators, but DNA data show that puma and jaguar scats overlap in size, as do those of puma, ocelot and fox. Prey-content analysis suggests minimal prey partitioning between pumas and jaguars. In field testing this technique for large carnivores, two potential limitations emerged: locating intact faecal samples and recovering DNA sequences from samples obtained in the wet season. Nonetheless, this study illustrates the tremendous potential of DNA faecal studies. The presence of domestic dog (*Canis familiaris*) in one puma scat and of wild pig (*Sus scrofa*), set as bait, in one jaguar sample exemplifies the forensic possibilities of this noninvasive analysis. In addition to defining the dietary habits of similar size sympatric mammals, DNA identifications from faeces allow wildlife managers to detect the presence of endangered taxa and manage prey for their conservation.

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.

Fecske, D.M. and J.A. Jenks. 2001. The Mountain Lion Returns to South Dakota. South Dakota Conservation Digest 68(4):3-5.

Mountain lions have historically lived throughout South Dakota and in the late 1800's were relatively common, especially in the Black Hills. A bounty was placed on lions in 1889 and by 1905 they were virtually eliminated from the state with only two reported killed between 1906 and 1958 in the Black Hills. Mountain lions were listed as threatened in 1978 and have re-colonized areas in the Black Hills and may have come from the Big Horn Mountains in Wyoming. A lion action plan was drafted by the South Dakota Department of Game, Fish and Parks to deal with the controversial potential human/lion interactions. Twelve lions were radio-collared in the Black Hills for the previous 3 years to determine how large an area they use, their spatial relationships with each other and to estimate the current population. Black Hill home ranges can be as large as 400 square miles for males with female ranges up to 150 square miles. It was determined that the Black Hills may support 40-50 breeding individuals. It was believed that 15-25 animals inhabited the Black Hills 3 years ago and the population appeared to be healthy with an abundant prey base and quality habitat found in the Black Hills. Even though lion attacks on humans are rare, lions and humans may often come into close contact and the authors provide information on reducing the probability of an attack by a lion.

Fecske, D.M., 2003. Distribution and Abundance of American Martens and Cougars in the Black Hills of South Dakota and Wyoming. Dissertation. South Dakota State University, Brookings, SD, USA.

American martens (*Martes americana*) and cougars (*Puma concolor*) are 2 carnivores that have become reestablished in the Black Hills of South Dakota and Wyoming. I predicted current distributions and estimated population sizes for both species in the Black Hills. Using geographical information system technology, I constructed and tested ranked habitat-relation models for martens and cougars in the Black Hills National Forest to predict their current distributions. For martens, I modeled the population and spatial structure using data derived from a marten habitat-relation model a track-plate box population survey, a sample of radiocollared martens (n = 13), and a marten Habitat Suitability Index model. I

estimated the resident adult population size of martens based on mean home range size of radiocollared martens in high-quality habitat patches. Cougar population size was estimated using a population program, incorporating parameters obtained from radiocollared cougars (*n* = 12), the literature, and habitat quality derived from the cougar habitat-relation model. Results indicated the American marten distribution in the Black Hills coincided with white spruce-dominated (*Picea glauca*) forests and associated contiguous forests of other types (predominantly ponderosa pine, *Pinus ponderosa*). High quality marten habitat consisted of mature, dense canopied (>50%), spruce dominated forests, in riparian areas, and at relatively high elevations. The marten population in the Black Hills was distributed in a metapopulation structure, containing 2 subpopulations; a 246-km^2 area in the northern Black Hills and a 121-km^2 area that included the Norbeck Wildlife Preserve and vicinity in the central Black Hills; marten presence was lower intermediate to the 2 subpopulations where spruce-dominated forests were more fragmented. Based on mean home range sizes (15.8 km^2 for males, and 5.8 km^2 for females) of radio-collared martens, 124 resident adult martens were estimated to occur in 492 km^2 of high-quality habitat patches. High-quality cougar habitat (6,702.9 km^2; based on macro-habitat characteristics of prey, stalking topography, and concealment habitat) occurred throughout the Black Hills. However, the distribution of the highest ranked habitats was not uniformly distributed, suggesting densities of cougars varied locally within the Black Hills National Forest. Mean annual home-range size of 3 established adult male cougars (*n* = 9 annual ranges) was 809.2 km^2, and was significantly larger (*P* = 0.001) than that of adult females (*n* = 7 annual ranges, 182.3 km^2). Three and 5 females were documented in home ranges of 2 adult male cougars. Total number of cougars in the Black Hills was estimated as 127–149, with an estimated carrying capacity of 152 cougars. A minimum of 5,277 km^2 of high quality habitat was necessary to maintain the cougar population long-term.

Fecske, D.M., and J.A. Jenks. 2003. Status Report of Mountain Lions in South Dakota. Pages 22-24 *in* L. A. Harveson, P. M. Harveson, and R.W.Adams, eds. Proceedings of the Sixth Mountain Lion Workshop. Austin. Texas.

Abstract

Mountain lions historically occurred in South Dakota but were nearly extirpated in the 1900s due to bounties placed on this animal from 1899 to 1966. Since receiving legal protection in 1978, the population has reestablished in the Black Hills, SD, to the point that South Dakota Department of Game, Fish, and Parks (SDGF&P) is seeking to determine research and monitoring needs and establish a mountain lion population goal. In 1998, a 5-year research project was begun by the Department of Wildlife and Fisheries Sciences at South Dakota State University in cooperation with SDGF&P, to determine distribution, estimate the current population size, and evaluate potential surveys for monitoring population trends of mountain lions in the Black Hills. A habitat-relation model was constructed to identify potential mountain lion habitat in the Black Hills. Eleven mountain lions (6 males, 5 females) were radio-collared between January 1999 and April 2000. Mean home range size for 3 male mountain lions was 798.6 km^2 and for 3 females, 158.9 km^2. A scent station survey was conducted during summer 2000 in habitat most likely to be used by mountain lions, but the survey was not effective at documenting lion presence.

Fecske, D.M., J.A. Jenks and F.G. Lindzey. 2003. Characteristics of Mountain Lion Mortalities in the Black Hills, South Dakota. Pages 25-29 *in* L. A. Harveson, P. M. Harveson, and R.W.Adams, eds. Proceedings of the Sixth Mountain Lion Workshop. Austin. Texas.

Abstract

Mountain lions (Puma concolor) are a state threatened species in South Dakota, and few sightings were documented from the early 1900's until recently. In 1985, the South Dakota Department of Game, Fish and Parks (SDGF&P) began compiling and verifying sightings of mountain lions in the Black Hills. Since then, sightings have increased but little is known of population characteristics for this species. We documented deaths of mountain lions in the Black Hills from 1996 to 2000. Mountain lion carcasses were obtained from SDGF&P, transported to South Dakota State University, necropsied and cause of death determined. Carcasses were sexed and aged based on tooth wear. Nutritional condition was assessed based on kidney fat (ranked as high, medium, or low), and foods consumed documented from identification of intestinal tract contents or evidence on the carcass. A total of 12 mountain lion deaths were documented between 1996 and 2000. Mountain lions were killed by vehicle collisions (3), shootings (5), died from capture-related or trap injuries, or injuries inflicted by another mountain lion. One mountain lion sought refuge in a cave during a fire and was asphyxiated. Sex ratio of the dead lions was 50:50 and age ranged from 4 months to 9 years (n=12). Of the 9 mountain lions we assessed, 6 had high levels of kidney fat suggesting they were in relatively good nutritional condition. Eight of the 12

mountain lions showed evidence of porcupine (Erethizon dorsatum) consumption.

Fecske, D.M., J.A. Jenks, F.G. Lindzey and S.L. Griffin. 2003. Effect of Roads on Habitat Use by Cougars. Page 120 *in* S.A. Becker, D.D. Bjornlie, F.G. Lindzey, and D.S. Moody, eds. Proceedings of the Seventh Mountain Lion Workshop. Lander, Wyoming.

Abstract

We examined effect of roads on habitat use by cougars, *Puma concolor*, in the Black Hills, South Dakota. A total of 768 daytime locations of 12 radio-collared cougars were obtained during weekly flights (1999 - 2001) using aerial telemetry techniques. Locations were incorporated into a geographic information system (GIS) of roads (Class 1, 2, 3, and 4). We tested the null hypotheses that cougars select habitat at random distances to roads and at random road densities and cougar use of habitat near roads did not differ with respect to road class, sex, age class, and habitat quality (based on a ranked cougar habitat-relation model). We examined use of habitat near roads for an adult female cougar fitted with a Global Position System (GPS) collar during crepuscular, diurnal, and nocturnal periods. Also, we identified road classes where cougar snow tracks were located and cougar/vehicle collisions occurred. During daylight hours, cougars avoided habitat near Class 3 roads ($P < 0.001$), the predominant road class in the Black Hills. However, on occasions where cougars were located near Class 3 roads, high quality habitat was selected. Cougars in the 5 to 6-year age class were located farther from Class 1 roads than younger animals ($P < 0.0001$). Females in the 1 to 2-year age class were located closer to Class 1 and Class 2 roads than older females ($P < 0.0001$). Females in 5 to 6 and 7 to 8-year age classes were located closer to Class 4 roads ($P = 0.0047$) than younger females. Road densities (km road/km^2) in annual home ranges of male cougars did not differ ($P = 0.5000$) from road densities throughout the Black Hills study area but densities in annual ranges of females were greater ($P = 0.0078$) than those of the study area. Cougars in the Black Hills have adapted to a heavily roaded landscape but presence of roads is impacting cougar use of habitat and survival. We suggest use of habitat near Class 3 roads by cougars would increase if roads were closed or had limited access, and if thinned ponderosa pine stands adjacent to Class 3 and 4 roads were managed for understory vegetation.

Fecske, D.M., J.A. Jenks, F.G. Lindzey, C.S. DePerno and T.L. Serfass. 2006. Distribution and Abundance of Cougars (Puma concolor) in the Black Hills of South Dakota and Wyoming. Page 34 in H.J. McGinnis, J.W. Tischendorf and S.J. Ropski editors. Proceedings of the Eastern Cougar Conference 2004, Morgantown, West Virginia, USA.

Abstract

Since removal of a bounty and subsequent legal protection as a state threatened species in 1978, cougars (Puma concolor) have recolonized a portion of their former range in South Dakota and Wyoming. We determined the current distribution and estimated abundance of cougars in the Black Hills. A ranked habitat-relation model for cougars was constructed based on macro-habitat characteristics of prey, stalking topography, concealment habitat and anthropogenic influences. During the winters of 1998 – 2001, 12 cougars were captured, radio-collared and monitored weekly using aerial radio-telemetry techniques. Annual home ranges were estimated for cougars monitored <=8 months and percent home-range overlap was determined for established males. The habitat-relation model was tested with locations of radio-collared cougars. Cougar population size was estimated using program PUMA, incorporating parameters obtained from research animals, the literature and habitat quality derived from the habitat-relation model. Additionally, population growth was modeled based on population parameters of cougars in an unhunted population and under varying conditions of immigration and habitat loss. Cougars selected high-ranked (high-quality) habitat (ranks <=13), and avoided habitat with <=12). The Black Hills was estimated to be 8,400 km^2 and contained 6,702.9 km^2 of high-quality habitat. Mean annual home range size of 3 established adult male cougars (n = 9 annual ranges) was 809.2 km^2, and was significantly larger (P = 0.001) than that of adult females (n = 7 annual ranges, 182.3 km^2). Three and 5 females, respectively, were documented in home ranges of 2 adult male cougars. Percent overlap for 3 established cougars averaged 33% (range 18.0 - 52.0%). Total number of cougars in the Black Hills was estimated as 127 -149, with an estimated carrying capacity of 152 cougars. Regardless of number of male (0 - 9) and female (0- 5) immigrants per decade, the population increased to a mean of 166 cougars (range 164 - 171 cougars). A minimum of 5,277 km^2 of high-quality habitat was necessary to maintain the cougar population for 100 years.

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.

Filoni, C., J.L. Catao-Dias, G. Bay, E.L. Durigon, R.S. Jorge, H. Lutz and R. Hoffmann-Lehmann. 2006. First Evidence of Feline Herpesvirus, Calicivirus, Parvovirus, and Ehrlichia Exposure in Brazilian Free-Ranging Felids. J. Wildl. Dis. 42(2):470-477.

Abstract

Serum samples from 18 pumas (*Puma concolor*), one ocelot (*Leopardus pardalis*), and two little spotted cats (*Leopardus tigrinus*) collected from free-ranging animals in Brazil between 1998 and 2004 were tested by indirect immunofluorescence (IFA) for antibodies to feline herpesvirus 1 (FHV 1), calicivirus (FCV), coronavirus (FCoV), parvo-virus (FPV), Ehrlichia canis, Anaplasma pha-gocytophilum, and Bartonella henselae. Serum samples also were tested, by Western blot and ELISA, for feline leukemia virus (FeLV) specific antibodies and antigen, respectively, by Western blot for antibodies to feline immunodeficiency virus (FIV), and by indirect ELISA for antibodies to puma lentivirus (PLV). Antibodies to FHV 1, FCV, FCoV, FPV, FeLV, FIV, PLV or related viruses, and to B. henselae were detected. Furthermore, high-titered antibodies to E. canis or a closely related agent were detected in a puma for the first time.

Findholt, S.L. and B.K. Johnson. 2005. Cougars in Oregon: Biopolitics of a Research Project. Page 210 *in* R.A. Beausoleil and D.A. Martorello, editors. Proceedings of the Eighth Mountain Lion Workshop, Olympia, Washington, USA.

Abstract

In 2001 we initiated research on the potential causes of low elk *(Cervus elaphus)* calf recruitment in portions of northeast and southwest Oregon. We hypothesized elk calf recruitment was being depressed because of poor nutritional condition of cow elk resulting in low pregnancy rates, neonatal calf mortality, and winter starvation versus predation on calves, mostly from cougars *(Puma concolor*). Like many research projects conducted by state wildlife agencies, ours is funded primarily through the U. S. Fish and Wildlife Service (USFWS) via the Pittman Robertson Act. An important aspect of our study was to kill 50% of the cougars in 2 of our 4 study areas if we found that >50% of radiocollared calves died and that cougars killed >30% of these calves. This may have resulted in the death of up to 16 cougars in each of two study areas. We believed it was necessary to manipulate cougar populations to understand whether predation on elk calves was additive or compensatory mortality. Because of the controversial nature of our research the USFWS required us to write an Environmental Assessment (EA). The USFWS analyzed the EA and subsequently released a FONSI (Findings of No Significant Impact) and approved our federal aid contract. Shortly afterwards, 9 animal rights and environmental groups and one individual filed a lawsuit in U.S. District Court to stop our research based primarily on the NEPA process. Judge Dennis Hubel ruled that we could continue our research but could not reduce the cougar population in 2 study areas until we prepared a full Environmental Impact Statement (EIS) that addressed the environmental effects of killing cougars on their population viability. On January 6, 2003 the USFWS filed a notice of intent to appeal the ruling with the U.S. District

Court; however, an appeal has not yet been filed. Research is continuing but Oregon Department of Fish and Wildlife decided not to prepare an EIS. From our experience we suggest anyone conducting potentially controversial research using Pittman Robertson funding prepare an EIS rather than an EA. The time commitment is about the same and the outcome for conducting controversial research is more certain.

Findholt, S.L. and B.K. Johnson. 2008. Estimating Cougar Population Abundance in Northeast Oregon. Page 248 in Toweill, D. E., S. Nadeau and D. Smith, editors. Proceedings of the Ninth Mountain Lion Workshop, May 5-8, 2008, Sun Valley, Idaho, USA.

Abstract

Cougars (*Puma concolor*) are wide-ranging, long-lived, and very secretive. Like other large carnivores, obtaining reliable estimates of cougar population densities is difficult. As part of a large study on factors influencing calf recruitment of Rocky Mountain elk (*Cervus elaphus*), we estimated population densities of cougars, thus far over a 6-year period in 2 study areas of northeast Oregon. To determine population densities we used a capture-recapture (Lincoln-Petersen) estimator and a reconstructed population method at three different spatial scales. These results were compared to minimum population estimates of all adult (male and female) and subadult female cougars derived from radiocollaring individuals in each study area. We discuss the challenges of estimating population densities of cougars, reliability of different approaches, and management implications of our findings.

Findholt, S.L., B.K. Johnson, D.H. Jackson, J.J. Akenson and M. Henjum. 2008. Survival and Ages of Cougars Harvested After Cougar Hunting With Dogs Was Banned in Oregon. Page 249 in Toweill, D. E., S. Nadeau and D. Smith, editors. Proceedings of the Ninth Mountain Lion Workshop, May 5-8, 2008, Sun Valley, Idaho, USA.

Abstract

Cougar (*Puma concolor*) management changed in Oregon when Ballot Measure 18 passed in 1994, making it unlawful to use dogs for cougar hunting. In addition to Ballot Measure 18, several other changes were made that impacted cougar management in the state. The Oregon Department of Fish and Wildlife (ODFW) Commission changed cougar hunting from controlled hunts with a limited number of hunters having access to trained dogs, to a statewide season with unlimited tags beginning in 1995. The hunting season was also expanded from 2 ½ to 4 months in 1994, and then to 7 months in 1995. The Oregon Legislature reduced the price of a cougar tag from $50.00 to $10.00 in 1997. Also in 1997, the Sport Pac license was developed for Oregon residents and it included a cougar tag with purchase of the license package. By 2001, the general cougar hunting season had been expanded to 10 months within the calendar year. ODFW also instituted a quota-based system of harvest management. Beginning in 2005, hunters could harvest a second cougar in all of eastern Oregon. Data will be presented from a statewide perspective and also from three intensive research studies conducted within the state. We will discuss changes to survival and ages of cougars harvested in response to the initiative that banned using dogs to hunt cougars. Additionally, we will discuss statutory and regulatory changes implemented since 1994 that have affected cougar management in Oregon. Initially, cougar harvest declined after the use of dogs was prohibited. In recent years, although cougar harvest has increased to levels observed prior to 1994, the proportion of total statewide cougar mortality caused by hunters has declined. Concurrent with the decline in harvest, the proportion of total cougar mortality attributed to hunting fell below 50% of the total known mortality for several years. Age composition of the harvest has also changed. With dogs available for hunting, hunters took mostly older male cougars, whereas without the use of dogs, the median age of cougars taken by hunters has declined. Overall annual survival appears higher now compared to when dogs were used to hunt cougars. However, numbers of cougars illegally killed may have increased.

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.

Fiorello, C.V., M.W. Cunningham, S.L. Cantwell, J.K. Levy, E.M. Neer, K. Conley and P.M. Rist. 2007. Diagnosis and Treatment of Presumptive Postobstructive Pulmonary Edema in a Florida Panther (*Puma concolor coryi*). Journal of Zoo and Wildlife Medicine 38(2):317-322.

Abstract

A free-ranging, adult male Florida panther (*Puma concolor coryi*) was immobilized and evaluated for hematuria following routine capture. Prior to anesthetic recovery, the panther was fitted with a telemetry collar. After an initially quiet recovery, the panther began thrashing in the transport cage, and was again immobilized. Pink foam was evident from the nostrils, and crackles were ausculted over the chest, indicating pulmonary edema. Postobstructive pulmonary edema was diagnosed based on history, clinical signs, radiographic evaluation, and blood gas analysis. The animal was treated intensively for several hours with diuretics, oxygen, and manual ventilation. The panther responded rapidly to therapy and was released back into the wild 48 hr after presentation. Postobstructive pulmonary edema, also called negative-pressure pulmonary edema, may be underrecognized in veterinary medicine. In this case, the telemetry collar, in conjunction with anesthetic recovery in a small transport crate, may have contributed to tracheal obstruction. Wildlife veterinarians and biologists should be aware of the risk of airway obstruction when placing tracking collars, and animals should be continuously monitored during anesthetic recovery to ensure the presence of a patent airway.

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 judgment 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.

Fitzhugh, E.L. 2003. Changing Dynamics of Puma Attacks on Humans. Page 58 *in* L. A. Harveson, P. M. Harveson, and R.W.Adams, eds. Proceedings of the Sixth Mountain Lion Workshop. Austin. Texas.

Abstract

Claude T. Barnes (1960) compiled an extensive list of attacks by puma (Puma concolor) on humans. This stimulated a chain of publications treating puma attacks on humans. Most recent are those by Harold P. Danz (1999) and Kathy Etling (in press). My analysis includes data from all of the previous accounts. In addition, I have considered attacks from Latin America and many unverified attacks and "attacks" that did not involve contact between humans and pumas. The various types of data are categorized to allow direct comparison with Beier's (1991) and other lists. I consider a few accounts in which the puma behavior appeared not to be an attack behavior, at least at first. I analyzed the data in various ways to illustrate a possible decline in attacks extending from 1890 through 1950, with an increase above the 1881-1890 level beginning in 1970. The increased number of documented attacks also allows some speculation about clues to puma behavior.

Fitzhugh, E.L., S. Schmid-Holmes, M.W. Kenyon and K. Etling. 2003. Lessening the Impact of a Puma Attack on a Human. Pages 89-103 *in* S.A. Becker, D.D. Bjornlie, F.G. Lindzey, and D.S. Moody, eds. Proceedings of the Seventh Mountain Lion Workshop. Lander, Wyoming.

Abstract

We reviewed current data on puma (*Puma concolor*) attacks and near-attacks on humans to identify better ways for people to protect themselves. Not since Paul Beier's paper in 1991 has anyone documented, established criteria for validity, and analyzed puma attacks on humans, and much more data are now available. In attempting to examine human-puma behavioral interactions to 2003, the authors have collected accounts of 16 fatal and 92 nonfatal attacks that meet Beier's criteria. In addition, we have an additional 32 fatal and 84 non-fatal attacks that failed to meet Beier's criteria, either for lack of physical contact, lack of verification, occurrence in Latin America, occurrence prior to 1890, or because they were attacks on hunters. We also have accumulated 155 accounts of behavioral interactions between pumas and humans at close proximity that did not result in an attack. We contrasted these with incidents that resulted in an attack. We analyzed the use of Beier's fatal:non-fatal attack ratio to predict missing incidents, and suspect that the criterion of validation may bias data for attacks prior to 1950. However, most of Beier's statements and conclusions are confirmed. While the analysis is yet incomplete, this presentation includes highlights of our tentative analysis concerning common questions

about puma attacks, illustrated by stories of real situations. Being aggressive and making loud noises helps protect people from a possible puma attack. Warning gunshots are much less effective than is yelling. Charging the puma seems to make it run away, but may result in some injury to the person who is charging. Groups of 5 people or more are relatively safe, but children in those groups may still be attacked. Hunters imitating animal sounds or smells may attract pumas, but these situations usually do not result in serious injuries. People attacked while sleeping on the ground often receive only minor injuries because the puma runs away when the person or companions awake, yell, and resist. The strategies will usually work, but not always, because pumas have different personalities and seem to react differently to the same situation.

Fitzhugh, L., S. Schmid-Holmes, M.W. Kenyon and K. Etling. 2006. Reducing the Impact of Puma Attack. Page 138 in H.J. McGinnis, J.W. Tischendorf and S.J. Ropski editors. Proceedings of the Eastern Cougar Conference 2004, Morgantown, West Virginia, USA.

Abstract

Based on a vast data set, this paper examines methods for minimizing injury resulting from puma attacks on humans. The researchers continue to collect and evaluate data on the circumstances surrounding puma attacks and near attacks. The research team cautions that while the strategies they suggest to minimize attack or injury are usually effective, they may not always work due to individual and/or situational differences. People involved in close encounters with pumas must be prepared to appropriately adjust their responses and behavior according to that of the puma.

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.

Fleming, D. M., J. Schortemeyer, and J. Ault. 1994. Distribution and Abundance of White-tailed Deer in the Florida Everglades. Pages 247–273 in D.B. Jordan, Editor. Proceedings of the Florida Panther Conference, 1–3 November 1994, Ft. Myers, Florida, USA.

The large size of white-tailed deer, their role as a major herbivore in the Everglades, as well as significant and well-publicized die-offs related to high water conditions, and their importance as a key prey base for the endangered Florida panther, have focused attention on the Everglades deer herd. However, no data are available on the relative distribution and abundance of deer in the Everglades in relation to systemwide landscape patterns and temporal characteristics. Objectives of this study, therefore, were to (1) document seasonal and annual changes in their relative distribution and abundance systemwide, (2) identify environmental correlates influencing the distribution and abundance patterns observed, with particular reference to hydrologic parameters, and (3) assess changes in deer distribution and abundance in response to intensive, regional water management regulation initiated in the early 1960s. Systematic aerial surveys were conducted over the freshwater, interior wetlands of the system during the wet (August/September) and late dry season (May/June) months from 1985–1989 to document deer distribution and abundance. Annual productivity estimates (number of fetuses per adult doe) from harvested does in the northern Everglades and annual recruitment indices (number of 3+ month old fawns in population) for the entire study area were also obtained during this study period. Highest average densities of deer observed occurred in wetlands characterized by seasonal water level fluctuation and intermediate hydroperiods. Estimated average breeding date occurred on 30 July, and ranged from 26 July to 1 August. Estimated breeding dates of individual deer (n = 69) ranged from 13 May to 10 September. Annual average productivity over the study period was 1.18 (n = 69) and ranged from 1.0–1.33. Annual productivity was related to average marsh water depths during the gestation period (September–January). Peak fawning was well synchronized with seasonal changes in the hydrologic regime and occurred during the middle of the dry season (February/March), at a time when numerous dry sites are normally available for fawning. Fawn survivorship was inversely related to average marsh water depths

during the fawning season (January–May) of each study year in drainage basins with pronounced seasonal water level fluctuations. In such drainage basins, total numbers of deer fluctuated in relation to seasonal and annual changes in marsh water depths. Comparison of deer herd population estimates from this study with those of previous studies conducted in the 1950s suggest that a major reduction in deer numbers within the northern Everglades has occurred. Environmental factors believed related to this decline, including wetland drainage and impoundment associated with intensive, regional water management practices initiated in the 1960s, are discussed along with critical hydrologic restoration elements.

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.

Foley, J.E., P. Foley, M. Jecker, P.K. Swift and J.E. Madigan. 1999. Granulocytic Ehrlichiosis and Tick Infestation in Mountain Lions in California. J. Wildl. Dis. 35(4):703-709.

Forty-seven mountain lions (*Puma concolor*) collected year-round in 1996 to 1998 from the Sierra Nevada foothills, the northern coast ranges, and in Monterey County (California, USA) were examined for infestation with *Ixodes pacificus* and *Dermacentor variabilis* ticks. Ticks were found predominantly in winter and spring. The seroprevalence of granulocytic ehrlichiae (GE) antibodies (*Ehrlichia equi* or the agent of human granulocytic ehrlichiosis) was 17% and the PCR-prevalence of DNA characteristic of GE in blood was 16%. There were eight polymerase chain reaction (PCR)-positive but seronegative mountain lions, one that was PCR-positive and seropositive, and eight that were PCR-negative and seropositive. Nineteen percent of engorged tick pools from mountain lions were PCR-positive. Because mountain lions inhabit tick-infested habitat and are frequently bitten by *I. pacificus*, surveillance for GE antibodies and DNA in mountain lions and other vertebrate hosts may be useful as indicators for geographical regions in which humans are at risk of GE infection.

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.

Fortier, J.L., N.G. Alaniz and F.F. Mallory. 2007. An Investigation into the Status of the Cougar (Puma concolor) in the Sudbury Area. Pages 8-9 in Abstracts of Presentations of the 3rd Midwestern-Eastern Puma Conference, Trent University, Peterborough, Ontario.

Abstract

The present distribution of the cougar (Puma concolor) in North America is restricted to mainly mountain ranges in western Canada and eastern United States, primarily in Florida. Recent evidence from 1992 has suggested that cougars occur in New Brunswick. The presence of cougars in Ontario has been controversial, as an abundance of sightings have been reported for many decades, but confirmation has been confounded by a lack of physical evidence (DNA, bodies etc.). The objective of this study was to attempt to obtain evidence in support of claims that cougars exist in Ontario. Approximately one hundred hair traps were constructed out of Velcro, carpet nails, and 5'X 7' strips of carpet. This design was successfully tested on five species of felids (jaguar, cougar, ocelot, jaguarundi and margay) in a zoo in Chiapas, Mexico by N.G.A. Hair traps were nailed to the base of trees, approx. 0.5 m from the ground along 2 km transects at two sites in the Sudbury region, where numerous cougar sightings had been made. Each hair trap was sprayed with catnip and baited with Feline Lure #2 with the objective of inducing rubbing by passing felines. Feline Lure #2 was also placed approximately 2 m above ground on each tree to allow air currents to disperse the odor. All animal hairs were removed from the traps, microscope slides of hair imprints in clear nail polish were made to analysis scale and medulla patterns (approx. 250 hairs). Hairs will be identified morphologically and further genetic testing will be done on all potential cougar hairs.

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, G.W., M.W. Cunningham, J.M. Kinsella, G. McLaughlin and D.J. Forrester. 2006. Gastrointestinal Helminths of Free-Ranging Florida Panthers (Puma concolor coryi) and the Efficacy of the Current Anthelmintic Treatment Protocol. J. Wildl. Dis. 42(2):402-406.

Abstract

Thirty-five Florida panthers (*Puma concolor coryi* [Bangs, 1899]) collected from six counties in southern Florida between 1978 and 2003 were examined at necropsy for gastrointestinal helminths. The panthers were placed into two groups: 1) treated with anthelmintics (n = 17), and 2) untreated (n = 18). Nine species of helminths (one trematode, six nematodes, and two cestodes) were identified in the untreated panthers. The most prevalent helminths were *Alaria marcianae* (LaRue, 1917) (100%), *Spirometra mansonoides* (Mueller, 1935) (91%), and *Ancylostoma pluridentatum* (Alessandrini, 1905) (89%). *Ancylostoma caninum* (Ercolani, 1859) is reported from the Florida panther for the first time. The intensities of helminths with prevalences >10% did not differ between untreated panthers collected in 1978-1983 and 1996-2003. Treated panthers had helminth faunas similar to those of untreated panthers. The current anthelmintic treatment being used reduced the intensity of both *A. marcianae* and *A. pluridentatum* in panthers < or =6 mo posttreatment (PT); however, treated panthers between 6 and 9 mo PT, and >9 mo PT were similar to untreated panthers. Treatment was less effective on *S. mansonoides* and *Taenia omissa* Luhe, 1910. Treated panthers had slightly lower intensities of *S. mansonoides* at < or =6 mo PT; however, between 6 and 9 mo PT and >9 mo PT they had significantly higher intensities than untreated panthers. At all periods PT, the intensity of *T. omissa* for the treated panthers was similar to that of untreated panthers. We suggest that *Mesocestoides* sp. may not be present in the Florida panther population as reported earlier by Forrester et al. (1985), due to parasite misidentification by those authors.

Foster, G.W., J.M. Kinsella, B.J. Sheppard and M.W. Cunningham. 2009. Transmammary Infection of Free-Ranging Florida Panther Neonates by *Alaria marcianae* (Trematoda: Diplostomatidae). Journal of Parasitology 95(1):238-239.

Abstract

Two freshly-dead female Florida panther (FP) neonates, *Puma concolor couguar* (=*Puma concolor coryi*), an 11-day-old and a 17-day-old, were collected in the Florida Panther National Wildlife Refuge (26°14'N, 81°36'W), Collier County, Florida. The 2 neonates were siblings and had presumably fed only on milk from the dam since birth. A 12-day-old female FP neonate was collected in the Big Cypress National Preserve (26°05'N, 81°15'W), Collier County, Florida and had also fed only on milk from the dam since birth. Milk was the only food item found in the gastrointestinal tract of these neonates. Mesocercariae and diplostomula of *Alaria marcianae* were collected from the lungs of the 3 neonates, indicating a transmammary route of infection. No mesocercariae, diplostomula, or mature *A. marcianae* were seen in the stomach or small intestine. The probable paratenic host for the *A. marcianae* infection in the adult Florida panther is the raccoon (*Procyon lotor*).

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.

Foster, R.J., B.J. Harmsen, and C.P. Doncaster. 2010. Habitat Use by Sympatric Jaguars and Pumas Across a Gradient of Human Disturbance in Belize. Biotropica 42(6):724-731.

Abstract

Jaguars (*Panthera onca*) and pumas (*Puma concolor*) are sympatric across the entire jaguar range, where they coexist in increasingly fragmented landscapes under threat of persecution mainly in response to livestock predation. Pumas are known to inhabit a greater variety of natural habitats than jaguars, but little is known about the influence of anthropogenic factors on the coexistence of these two similar-sized cats. This study compares habitat use of jaguars and pumas in Belize, Central America, using 1380 jaguar and puma photo captures from 3 yr of camera trapping, comprising 64-74 individual jaguars and an unknown number of pumas. Jaguars and pumas did not differ in their use of a large block of relatively homogenous secondary rain forest. However, pumas were scarce outside this forest block, whereas jaguars were detected throughout the human-influenced landscape. Reasons for this discrepancy may include differential tolerance to human disturbance, and resource limitation for pumas outside the forest block. Intra-specific variation in jaguar activity in the form of sex-dependent habitat use was detected across the landscape. Male jaguars were detected at more locations than female jaguars and more frequently at each location, with a declining difference from a 50-fold greater

detection in the protected forest, through forest buffer, savannah, pastures, to negligible difference in the disturbed forest.

Foster, R.J., B.J. Harmsen, B. Valdes, C. Pomilla, and C.P. Doncaster. 2010. Food Habits of Sympatric Jaguars and Pumas Across a Gradient of Human Disturbance. J. Zoology 280(3):309-318.

Abstract

Jaguars *Panthera onca* coexist with pumas *Puma concolor* across their entire range. In areas where they occur together their coexistence may be facilitated by differences in diet. This study compared food habits of jaguars and pumas in Belize, Central America, across a protected lowland rainforest and the neighbouring human-influenced landscape. Diets were determined from 362 jaguar scats and 135 puma scats, identified by genetic analysis. In the protected forest, dietary breadths were low for jaguars and pumas and showed little overlap. In this habitat each relied heavily on a single medium-sized (5-10 kg) prey species: armadillos *Dasypus novemcinctus* for jaguars, and pacas *Agouti paca* for pumas. Both cats also took larger prey (>10 kg), mainly white-lipped peccaries *Tayassu pecari* by jaguars and red brocket deer *Mazama americana* by pumas. In unprotected fragmented lands, jaguar scats rarely contained large wild prey species; rather, a diet of relatively small wild prey was supplemented with larger domestic species. Pumas did not take domestic species and were scarce outside the protected forest, possibly indicating competition with humans for pacas and deer, which are also prized game species in the region. This study is the largest analysis to date of sympatric jaguar and puma diets in both forest and farmland. We suggest that jaguar predation on cattle may be reduced by ensuring that game hunting is sustainable and potentially by augmenting forests within the human matrix with large wild ungulates. The supplementation could benefit both of the cat species, and the local game hunting economy.

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, S.P., J.L. Troyer, J.A. TerWee, L.M. Lyren, W.M. Boyce, S.P.D. Riley, M.E. Roelke, K.R. Crooks and S. Vandewoude. 2007. Frequent Transmission of Immunodeficiency Viruses among Bobcats and Pumas. J. Virol. 81:10961-10969.

Abstract

With the exception of human immunodeficiency virus (HIV), which emerged in humans after cross-species transmissions of simian immunodeficiency viruses from nonhuman primates, immunodeficiency viruses of the family Lentiviridae represent species-specific viruses that rarely cross species barriers to infect new hosts. Among the Felidae, numerous immunodeficiency-like lentiviruses have been documented, but only a few cross-species transmissions have been recorded, and these have not been perpetuated in the recipient species. Lentivirus seroprevalence was determined for 79 bobcats (*Lynx rufus*) and 31 pumas (*Puma concolor*) from well-defined populations in Southern California. Partial genomic sequences were subsequently obtained from 18 and 12 seropositive bobcats and pumas, respectively. Genotypes were analyzed for phylogenic relatedness and genotypic composition among the study set and archived feline lentivirus

sequences. This investigation of feline immunodeficiency virus infection in bobcats and pumas of Southern California provides evidence that cross-species infection has occurred frequently among these animals. The data suggest that transmission has occurred in multiple locations and are most consistent with the spread of the virus from bobcats to pumas. Although the ultimate causes remain unknown, these transmission events may occur as a result of puma predation on bobcats, a situation similar to that which fostered transmission of HIV to humans, and likely represent the emergence of a lentivirus with relaxed barriers to cross-species transmission. This unusual observation provides a valuable opportunity to evaluate the ecological, behavioral, and molecular conditions that favor repeated transmissions and persistence of lentivirus between species.

Franklin, S.P., J.L. Troyer, J.A. TerWee, L.M. Lyren, R.W. Kays, S.P.D. Riley, W.M. Boyce, K.R. Crooks and S. Vandewoude. 2007. Variability in Assays Used for Detection of Lentiviral Infection in Bobcats (*Lynx rufus*), Pumas (*Puma concolor*), and Ocelots (*Leopardus pardalis*). J. Wildl. Dis. 43:700-710.

Abstract

Although lentiviruses similar to feline immunodeficiency virus (FIV) are known to infect numerous felid species, the relative utility of assays used for detecting lentiviral infection has not been compared for many of these hosts. We tested bobcats (*Lynx rufus*), pumas (*Felis concolor*), and ocelots (*Leopardus pardalis*) for exposure to lentivirus using five different assays: puma lentivirus (PLV), African lion lentivirus (LLV), and domestic cat FIV-based immunoblots, a commercially available enzyme-linked immunosorbent assay (ELISA) kit, and nested polymerase chain reaction (PCR). Puma lentivirus immunoblots identified more seropositive individuals than the other antibody-detection assays. The commercial ELISA provided a fair ability to recognize seropositive samples when compared with PLV immunoblot for screening bobcats and ocelots, but not pumas. Polymerase chain reaction identified fewer positive samples than PLV immunoblot for all three species. Immunoblot results were equivalent whether the sample tested was serum, plasma, or whole blood. The results from this study and previous investigations suggest that the PLV immunoblot has the greatest ability to detect reactive samples when screening wild felids of North America and is unlikely to produce false positive results. However, the commercial ELISA kit may provide an adequate alternative for screening of some species and is more easily adapted to field conditions.

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.

Franklin, W.L., W.E. Johnson, R.J. Sarno and J.A. Iriarte. 1999. Ecology of the Patagonia Puma *Felis concolor patagonica* in Southern Chile. Biol. Cons. 90(1):33-40.

Abstract

The ecology of the Patagonia puma was studied in Torres del Paine National Park, Chile. Thirteen pumas were captured from 1986 to 1989 and equipped with radio transmitters. During the winter of 1988 there was one puma per 17 km^2 in the 200 km^2 study area. Home ranges varied from 24 to 107 km^2. Female home ranges overlapped with those of other males and females extensively, but male ranges overlapped each other for only short time periods. Seven adult pumas had home ranges extending outside the park boundaries and at least three preyed on sheep. Guanacos *Lama guanicoe*, especially young animals, were the puma's most important prey item by biomass, but European hares *Lepus capensis* were preyed upon more than expected relative to available biomass. Of 731 guanaco skulls collected from 1979 to 1988, 33% showed clear evidence of having been killed by pumas. Over the past decade puma numbers are believed to have increased in the park, perhaps in response to an increase in guanaco numbers and continued protection. With decreased hunting pressure and harassment by horses and dogs, pumas have habituated to people and are being observed more

often by park visitors.

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 animal 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.

Galentine, S.P. and P.K. Swift. 2007. Intraspecific Killing Among Mountain Lions (Puma concolor). Southwestern Naturalist 52(1):161-164.

Abstract

Reports of intraspecific strife among mountain lions (*Puma concolor*) have been presented in the literature. However, there are no published accounts of an actual field observation of lion behavior during an incidence of intraspecific strife. Here we provide a report of such an incident, in which a female mountain lion was killed by a male mountain lion in rural El Dorado County, California, in 2002. Observations from a field investigation of the site and the results of the necropsy of the female also are presented. The investigation indicated that the female lion was healthy and was not pregnant, lactating, or in estrus. Mortal injury was a skull fracture resulting in brain damage and hemorrhage. We suspect the female might have been killed while defending a deer kill or as prey of the male lion.

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 are reviewed along with the two accounts mentioned above.

Gasson, W. and D. Moody. 1995. Attitudes of Wyoming Residents on Mountain Lion Management. Planning Rep. #40, Wyoming Game and Fish Department, Cheyenne. 7pp.

The survey objective was to determine the attitudes and knowledge of Wyoming residents with respect to mountain lions and mountain lion management. Survey objectives and methodology are described. Over 71% of respondents believed lions were beneficial to Wyoming mostly due to the role of lions in ecosystems, their intrinsic value and rarity as opposed to 11.2% that felt lions were not a benefit due to threats to livestock, big game and humans. Roughly 17.1% did not know or gave no answer concerning benefit. A slight majority (51%) knew that lion hunting was legal with 10.6% believing it was not and 38.4% did not know or gave no answer. Future lion hunting attitudes showed that 49.6% agreed or strongly agreed that hunting should continue while 43.8% were neutral, disagreed or strongly disagreed with 6.6% not knowing or gave no answer. Most did not know it was legal to hunt with dogs (52.4%) and 31.5% knew it was and 16.1% believed it was not. Most did not know if more lions were harvested with the use of dogs (59.6%) and 28.5% knew they were and 12% thought they were not. Most did not know that female lions with kittens and kittens were protected from hunting (58%) with 28.5% knowing they were protected and 13.5% not. Respondents knew that harvested lions must be checked by WGFD personnel (60.6%) but 35.9% did not know and 3.6% believed the requirement did not exist. Respondents agreed

or strongly agreed (80.7%) that lion hunting seasons should be modified to avoid killing or running females with kittens with 8% disagreeing or strongly disagreeing and 11% neutral and 4.8% did not know or gave no answer. Respondents were strongly opposed to pursuit seasons (71.1%) with 12.2% agreeing to or strongly agreeing to using dogs to run and tree lions, but not kill them. Eleven percent were neutral and 5.8% did not know or gave no answer. Over 76% of respondents agreed that the rancher or landowner had the right to kill a lion that posed a threat to livestock but declined to 47.4% when the threat was to other forms of private property. Many (21.1%) did not know or gave no answer. Respondents were not in favor of decreasing lion populations to reduce the killing of livestock with 83.9% favoring removal of problem lions while only 12.4% favoring lion reduction and 3.8% not knowing or giving an answer. Respondents were also very much opposed to the sale of lion body parts (claws, hides and skulls) with 79.9 expressing opposition and only 14.1% with support and 6% not knowing or gave no answer. Recommendations are suggested to inform and educate, be prepared, and to not do anything rash at this time.

Gau, R.J., R. Mulders, T. Lamb and L. Gunn. 2001. Cougars (Puma concolor) in the Northwest Territories and Wood Buffalo National Park. Arctic 54(2):185-187.

Abstract

Extralimital reports of cougars (Puma concolor) at the northern limits of their range are rare. We documented at least 21 individual occurrences of cougars from the Northwest Territories and the Wood Buffalo National Park area between the years 1983 and 2000. Our evidence suggests that, at a minimum, transient cougars are regular visitors to northern Alberta and the Northwest Territories.

Gauthier, M., C. Lanthier, F.J. LaPointe, L.D. Lang, N. Tessier and V. Stroeher. 2005. Cougar Tracking in the Northeast: Years of Research Finally Rewarded. Pages 86-88 *in* R.A. Beausoleil and D.A. Martorello, editors. Proceedings of the Eighth Mountain Lion Workshop, Olympia, Washington, USA.

Abstract

Although the last North American eastern cougar was reportedly killed in 1938 near the Quebec-Maine border, cougar sightings in the northeast have never stopped. However, despite a growing number of credible observations, objective evidence of the existence of a wild cougar population is still lacking. The goal of our long-term project is to collect hard data of the cougar presence in the East, and to determine if the origin of these cougars is mainly from western migrants, from escaped animals, or from eastern remnant specimens. Our project combined the use of pheromones to attract cougars to hair poles, and DNA analyses of collected hair samples to confirm animal identification. Recent results have demonstrated that cougars are present in New Brunswick and in at least three regions of Quebec.

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.

Gay, S. and T.L. Best. 1996. Relationships Between Abiotic Variables and Geographic Variation in Skulls of Pumas. Zool. J. Linnean Soc. 117(3):259-282.

Abstract

Relationships between patterns of geographic variation in cranial morphology and selected abiotic variables were studied in the puma (*Puma concolor* Linnaeus). Our dataset consisted of 11 cranial, 6 dental, and 2 mandibular measurements of 1700 adults, which were separated by gender and age class and analysed by univariate and multivariate statistical procedures. Variation in size was correlated with precipitation, but size was more highly correlated with latitude and temperature. The pattern of geographic variation in size of *P. concolor* is consistent with Bergmann's rule; populations with larger pumas occur more distant from the equator than populations with smaller pumas. A combination of climatic and biotic factors contribute to patterns of geographic variation in size of *P. concolor* in North and South America.

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.

Germaine, S.S., K.D. Bristow and L.A. Haynes. 2000. Distribution and Population Status of Mountain Lions in Southwestern Arizona. Southwestern Naturalist 45(3):333-338.

The authors report results of a survey conducted in 18 mountain ranges and along the Colorado and Gila rivers in southwestern Arizona to document the presence, sex, and age class of mountain lions (*P.c. browni*). Presence or absence of mountain lions was detected using track and sign searches, trained hounds, and remote photography. The presence of mountain lions were confirmed in two mountain ranges by tracks believed left by males and these tracks were the only sign documented during the study. It was concluded that mountain lions in the study area probably immigrated from adjacent populations and that a distinct, self-sustaining population does not currently exist in southwestern Arizona.

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.

Ghikas, D.M., M. Jalkotzy, I. Ross, R. Schmidt and S.A. Richards. 2003. Modeling Offspring Sex Ratios and Growth of Cougars. Page 169 *in* S.A. Becker, D.D. Bjornlie, F.G. Lindzey, and D.S. Moody, eds. Proceedings of the Seventh Mountain Lion Workshop. Lander, Wyoming.

Abstract

We further examined data from the Sheep River cougar study conducted in southwest Alberta from 1981-94. We asked is there evidence of an equal or constant offspring sex ratio, or do sex ratios vary over time, as a function of the mother's age, geographic location or population size. Logan and Sweanor (2001) analysed offspring sex ratios as a function of mother's age and found that sex ratios of first litters were significantly different from subsequent litters and 1:1. Logan and Sweanor (2001) suggested that offspring sex ratios might be influenced by the mother's physical state (i.e., young mothers produce less-costly females so energy can be allocated to growth). We investigated possible relationships between offspring sex ratios and cougar growth, and whether growth varied by sex and geographic location. The study area was divided into east and west locations based coarsely on prey abundance and cougar mortality. Probabilistic models were formulated for the sex-ratio analysis. A deterministic model based on the flexible Richards curve (Maehr and Moore 1992) was used to predict mass growth. Model predictions that were the most parsimonious with the data were identified using corrected Akaike Information Criterion. Parameters were estimated using maximum log-likelihood. The most parsimonious model predicted that offspring sex ratios vary yearly. Evidence was not strong for sex ratios varying as a linear function of mother's age. The growth model predicted that females attain 91-92 % of adult mass by 25-26 mos, indicating that growth is largely completed prior to first reproduction (mean =30.0 ± 1.8 mos SE, Ross and Jalkotzy 1992). In years with poor resource conditions, the mother's physical state may result in more female offspring being reared than male. Predicted mean mass at age of independence for male and female offspring was 48.8 kg and 34.1 kg, respectively, inferring males are more costly to rear. The growth model that varied by sex only had the highest weight of evidence; adding geographic location did not result in a more parsimonious model. All growth models were unable to accurately estimate birth mass, which was also found by Maehr and Moore (1992).

Ghikas, D., M. Jalkotzy and P.I. Ross. 2008. Variation in Cougar (Puma concolor) Survival by Individual Traits, Density, and Seasonal Weather. Page 170 in Toweill, D. E., S. Nadeau and D. Smith, editors. Proceedings of the Ninth Mountain Lion Workshop, May 5-8, 2008, Sun Valley, Idaho, USA.

Abstract

The vital rates (fecundity, survivorship) and migration rates of an animal population determine its size and composition, and represent the combined life-history performances of its constituents. Understanding how individual traits, population characteristics, and extrinsic factors influence fecundity and survivorship is fundamental to explaining the dynamics of a population. It can also reveal valuable insights about the species' life-history strategies. In addition, being able to predict changes in vital rates, based on known associations with key explanatory variables, is important when managing for a stable population. To examine how survival varied with a cougar's identity (e.g., age, sex) and behavior (e.g., habitat use), conspecific density, and seasonal weather, we analyzed long-term data from a hunted population of cougars in South West Alberta studied by Jalkotzy and Ross during 1981-1994. We developed generalized-linear models to identify different influences on cougar survival. Habitat use was measured in a novel way, which accounted for extreme behavior, and out-performed measuring the average habitat used. Cougars died mostly during winter. Recently-independent offspring, older individuals (>8 yrs), and males, experienced greater mortality. During winter, survival increased significantly if cougars frequented habitats >1.4 km (♀) or >2.2 km (♂) from a highway, between 1445-1678 m (♀) or 1513-1646 m (♂) elevation, and with <3% (♀) or <41% (♂) closed-canopy cover (>50% and >45% open-canopy cover, respectively) within 1 km^2 of a

cougar's location. Winter survival was higher during dry winters and following wet springs. Density-dependent effects on winter survival were not evident. We suggest that future challenges will be linking vital rates to habitat use, studying the effects of weather on survival, and applying extensive analytical techniques to long-term demographic data of cougars.

Ghikas, D., M. Jalkotzy and P.I. Ross. 2008. Variation in the Reproductive Success of Female Cougars by Individual Traits, Density, and Seasonal Weather. Page 256 in Toweill, D. E., S. Nadeau and D. Smith, editors. Proceedings of the Ninth Mountain Lion Workshop, May 5-8, 2008, Sun Valley, Idaho, USA.

Abstract

The vital rates (fecundity, survivorship) and migration rates of an animal population determine its size and composition, and represent the combined life-history performances of its constituents. Understanding how individual traits, population characteristics, and extrinsic factors influence fecundity and survivorship is fundamental to explaining the dynamics of a population. It can also reveal valuable insights about the species' life-history strategies. In addition, being able to predict changes in vital rates, based on known associations with key explanatory variables, is important when managing for a stable population. To examine how the short-term reproductive success of adult female cougars varied with an individual's identity (i.e., age, size) and behavior (i.e., habitat use), conspecific density, and weather, we analyzed long-term data of a hunted population of cougars in SW Alberta studied by Jalkotzy and Ross during 1981-1994. We developed generalized-linear models to identify different influences on female reproductive output. Habitat use was measured in a novel way, which accounted for extreme behavior, and out-performed measuring the average habitat used. Productive females were older and frequented habitats with <32% closed-canopy cover (>49% open-canopy cover) within 1.0 km^2 of a female's location. Productivity varied negatively with the density of independent cougars. Litter sizes were large when mothers occupied mid-elevation habitats (summer: 1437-1745 m, winter: 1445-1678 m). Female-biased litters were reared when cougar density was low or when mothers experienced harsh conditions: cold snowy winters and springs or poor-quality habitat. Plausible explanations for sex-biased litters are presented. Future challenges: Further studies are needed to investigate the mechanism by which a mother rears a sex-biased litter; links between reproductive output, adult female physiology, and habitat and weather conditions; and, density-dependent effects on offspring sex ratios.

Gigliotti, L.M., D. Fecske and J.Jenks. 2002. Mountain Lions in South Dakota: A Public Opinion Survey. South Dakota Department of Game, Fish, and Parks, Pierre, SD, and South Dakota State Univ., Brookings, SD.

Executive Summary and Selected Results

Currently the mountain lion is listed as a South Dakota state threatened species. The Game, Fish and Parks Department (GFP) is currently funding a multi-year research project through South Dakota State University to learn more about the status of the mountain lion in South Dakota. The information will be used by GFP to develop a mountain lion management plan for South Dakota. Public opinion and understanding of mountain lions will be a critical component of developing and implementing any mountain lion plan. This public opinion survey is the first step in developing the social component (human dimensions) of the South Dakota mountain lion plan by helping to shape management policies and actions. This survey was a joint project by South Dakota State University and South Dakota Game, Fish and Parks Department.
The survey results were used to develop a model of attitudes towards mountain lions in South Dakota. The model selected was based on a fact that there is a range of attitudes towards mountain lions ranging along a continuum of strong support for mountain lions in South Dakota to strong opposition. This continuum was divided into five groups:

Strongly Pro-lion *(strongly favorable towards mountain lions)* Number = 242 (22.7%);
Slightly Pro-lion *(slightly favorable towards mountain lions)* Number = 360 (33.7%);
Neutral *(neutral about mountain lions in South Dakota)* Number = 120 (11.3%);
Slightly Contra-lion *(slightly dislike mountain lions)* Number = 240 (22.5%);
Strongly Contra-lion *(strongly dislike mountain lions)* Number = 105 (9.8%).

The results are first presented in descriptive form and compared with a small sample of college students that were enrolled in a wildlife human dimensions class at South Dakota State University. Overall, about 56% of the public (corrected for non-response bias) enjoy having mountain lions in South Dakota, with 16% not enjoying mountain lion and 28% undecided. Overall, about 47% of the public (corrected for non-response bias) is worried about problems that may be caused by having mountain lions in South Dakota, with 25% not worried and 28% undecided. Overall, about 30% of the public

(corrected for non-response bias) want the mountain lion population to remain at the current level, 25% would like it to increase and 17% would like it to decrease, with 28% having no opinion. The following 12 questions were used to classify the sample into the attitude model. The overall response to these questions are summarized here to provide an overall picture of how South Dakota residents think about mountain lions. The following is a brief summary of each question: Most (72.2%) residents feel that "the presence of mountain lions is a sign of a healthy environment," with only 11.5% disagreeing. Most (79.6%) residents feel that "mountain lions help maintain deer populations in balance with their habitats," with only 10.1% disagreeing. Only 39.5% of the residents felt that "the presence of mountain lions in South Dakota increases my overall quality of life," 34.4% were neutral and 26.2% disagreed. And, fewer (23.9%) of the residents felt that "the presence of mountain lions near my home increases my overall quality of life," 34.1% were neutral and 42.0% disagreed. Most (56.7%) residents feel that "mountain lions do not compete with hunters for deer," with only 27.0% disagreeing. Residents were about split on "mountain lions are an unacceptable threat to livestock," with 42.0% agreeing and 38.0% disagreeing. Almost half (47.4%) of the residents felt that "having a healthy, viable population of mountain lions in South Dakota is important to me," with 28.1% neutral and 24.6% disagreeing. Only 24.8% of the residents were "concerned about mountain lions killing too many game animals," with 51.6% not being concerned. Most (61.8%) residents did not feel that "having mountain lions in South Dakota is too dangerous a risk to people," with 25.3% feeling that it was too dangerous. Most (80.7%) residents feel that "by following some simple precautions, people can safely live in areas occupied by mountain lions," with only 11.7% disagreeing. Also, most (83.7%) residents feel that "people who live in mountain lion country should modify certain behaviors (e.g., hiking or jogging alone on trails, hunting alone, feeding deer) to decrease the chance of a negative interaction with a mountain lion," with only 8.9% disagreeing.
A profile of the general attitudes, beliefs and expected behaviors of each of the five lion attitude groups is presented. This was summarized by indicating that the strongly pro-lion group tended to place more responsibility on the individual for learning to live peaceably with mountain lions with the agency only stepping in on special "problem" mountain lion cases while the strongly contra-lion group tended to place more responsibility on the agency to take action to remove even the slightest potential threat from mountain lions.
Some might conclude that since the majority of South Dakota residents are favorable towards mountain lions that making decisions about mountain lions will be easy. However, that overlooks the complexity of attitudes and beliefs held about mountain lions. The most significant finding was that the full range of attitudes towards mountain lions exists among South Dakota residents, ranging from strongly favoring mountain lions to strongly opposing mountain lions. This means that managing mountain lions in South Dakota can be very controversial. Every mountain lion incident has the potential to develop into a controversial issue depending on how it is handled. One point of almost universal agreement is the response necessary if a mountain lion attacks and injures or kills a person; namely to destroy the mountain lion responsible. And, two additional points of relatively high agreement for when a responsible mountain lion should be destroyed is when it is repeatedly killing pets in a residential area or is repeatedly killing livestock in a rural area. But even these types of incidences can be controversial. For example, an agency's response could be viewed as either too quick or too slow. In almost all other instances there will be disagreement on the type of response an agency should take on various types of mountain lion incidences. The key to keeping mountain lion incidences from becoming controversial will be to quickly release as much information as possible. Reducing controversy in mountain lion management will depend upon maintaining a high level of education and information dissemination, quickly responding to mountain lion incidences, and providing opportunities for public involvement in the development of policy, guidelines and management plans. Press releases, open houses and informational meetings are good strategies for keeping the public informed. A mountain lion citizen adversary group or focus groups may be a good strategy for providing citizen involvement.

Gigliotti, L.M., D.M. Fecske and J.A. Jenks. 2003. Mountain Lions in South Dakota: Results of a 2002 Public Opinion Survey. Page 171 *in* S.A. Becker, D.D. Bjornlie, F.G. Lindzey, and D.S. Moody, eds. Proceedings of the Seventh Mountain Lion Workshop. Lander, Wyoming.

Abstract

Mountain lions (*Puma concolor*) are a state threatened species in South Dakota, although there is an established breeding population in the Black Hills. The Department of Game, Fish and Parks (GFP) is currently funding a multi-year research project through South Dakota State University to learn more about the status of mountain lions. The information will be used by GFP to develop a mountain lion management plan. Public opinion and understanding of mountain lions will be a critical component for developing and implementing a management plan. This public opinion survey was the first step in developing the social component (human dimensions) of the plan. The survey was conducted in the early spring of 2002. Of 1,783 deliverable questionnaires mailed to South Dakota residents, 1,114 usable questionnaires were returned for a

total return rate of 62.57%. A one-page survey of non-respondents also was conducted; of those, 103 (19.5%) were returned. Overall, the majority of respondents (>50%) believed that presence of mountain lions was an indication of a healthy environment, lions and hunters did not compete for deer, if people modified a few behaviors they could coexist with lions, and lions should be able to exist wherever they occurred in South Dakota. Survey results were used to develop an attitude model to provide a framework for understanding public opinion of mountain lions. The model was intuitive, but derived empirically using a cluster analysis procedure from respondents' answers to 12 questions. The model represented a continuum of attitudes ranging from strongly supportive of to strongly disliking mountain lions. Based on the model, 22.7% of the respondents were strongly pro-lion, 33.7% slightly pro-lion, 11.3% neutral, 22.5% slightly contra-lion, and 9.8% of the respondents strongly contra-lion. Cluster names were descriptive of the general attitudes held toward mountain lions in South Dakota, and responses provided to other questions in the survey were used to further describe each cluster-group.

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+)

Glass, K. 1987. Lions-Mountain or Mounted? Sierra 72(4):12-13.

After 15 years of protected status, Governor George Deukmejian (R) vetoed the extension of the California mountain lion hunting moratorium in 1985. The California Fish and Game Commission decided to allow lion hunters to pursue, tree, and shoot lions by a 3-2 vote in April. The mountain lion population was estimated to have increased to 5100 animals according to California Fish and Game since hunting was banned. Controversy between hunters and non-hunters continues and a coalition of groups, including the Sierra Club has filed suit against the California Fish and Game Department to gain an injunction against the hunt.

Goertz, J.W. and R. Abegg. 1966. Pumas in Louisiana. J. Mammal. 47:727.

Two men observed puma tracks in an area of dense hardwood thicket along the Cypress Bayou bottoms between Springridge and Keatchie, Louisiana in Caddo Parish. In addition, two deputies of Caddo Parish saw a puma on the Old Mansfield Road about 2 miles north of the Desoto Parish line, directly behind the KV Bar near Keithville in Caddo Parish on November 30, 1965. The puma was shot as it stood near the road in the glare of the headlights. This puma weighed 114 pounds twelve hours after death. Standard body measurements in millimeters were: total length, 2070; tail, 775; hindfoot, 275; ear, 94; height at shoulders, 660. The length and width across the toe pads of the left hind foot were 88 and 62; across those of the left front foot, 80 and 68. The length of the testis was 28. All of the recent records of the puma were in or near the three bordering parishes of Natchitoches, DeSoto, and Caddo in northwest Louisiana.

Goldman, E.A. 1936. A New Puma from Texas. Proc. Biol. Soc. Wash. 49:137-138.

A new geographic race of puma, Felis concolor youngi, is described from Bruni Ranch, near Bruni, southeastern Webb County, Texas.

Goldman, E.A. 1938. A Substitute Name for Felis concolor youngi. Proc. Biol. Soc. Wash. 51:63-64.

Because a fossil species of felid from the lower Pleistocene of China, Felis youngi pei, already possessed the name youngi, the puma of southern Texas designated Felis concolor youngi was changed to Felis concolor stanleyana.

Gómez-Ortiz, Y., O. Monroy-Vilchis, V. Fajardo, G.D. Mendoza, and V. Urios. 2011. Is Food Quality Important for Carnivores? The Case of *Puma concolor*. Animal Biology 61(3):277-288.

Abstract

The composition and energetic content of puma (*Puma concolor*) diet in Sierra Nanchititla Natural Reserve (SNNR), Mexico, were determined. We collected 183 scats, where 27 components were identified by occurrence (88.07% mammals). The puma's diet was mainly composed of armadillo (*Dasypus novemcinctus*, 40.33%), white-nosed coati (*Nasua narica*, 11.93%) and white-tailed deer (*Odocoileus virginianus*, 6.17%). Energetic analysis of prey indicates that the puma prefers those with higher energetic content (kcal/kg). The prey with the most energetic contribution is armadillo (2398.70 kcal/kg), followed by white-nosed coati (2225.25 kcal/kg) and finally white-tailed deer (2165.52 kcal/kg). The differences in energetic content between prey species were statistically significant. The number of individuals killed/year on average to support a puma was 51 armadillos, 16 white-tailed deer and 7 white-nosed coatis. The results indicate a greater consumption of prey that provide more kilocalories to the predator, and suggests the importance of quality meat in the diet of pumas.

Gonzalez, C.A.L., G.L. Pina and B. McRae. 2003. Lions and Tigers and Cows: Jaguar Densities in Sonoran Country. Page 58 *in* L. A. Harveson, P. M. Harveson, and R.W.Adams, eds. Proceedings of the Sixth Mountain Lion Workshop. Austin. Texas.

Abstract

As recently as the middle part of the 20th century, a small population of jaguars (Panthera onca) lived in the temperate forests of Arizona and New Mexico. Currently, the northernmost breeding population of jaguars lives 135 mi south of the international border, in the Mexican State of Sonora. The principal habitat in this area consists of a mosaic of oak woodlands and thornscrub, with cattle ranching being the primary use. Our purpose was to assess the number of jaguars present in this population; from July 1999 to August 2000, we deployed camera traps covering an approximate area of 700 km², with sample units varying in size from 40-130 km². We obtained 579 records encompassing 22 species, and computed mark-resight estimators of jaguar abundance using Program NOREMARK. Estimated jaguar densities were 1.3 ± 0.6 ind/100 km², and local population sizes varied from 1-6 jaguars on a given sample unit. Jaguars had a capture success rate of 2.76%, compared with 2.07% for mountain lions (Puma concolor). Efforts to maintain the resilience of this population should concentrate on restricting poaching and improving ecological understanding of the species.

Gonzalez, C.A.L. and S.E.C. Percastegui. 2003. Ecology of Sympatric Pumas and Jaguars in Northwestern Mexico. Page 121 *in* S.A. Becker, D.D. Bjornlie, F.G. Lindzey, and D.S. Moody, eds. Proceedings of the Seventh Mountain Lion Workshop. Lander, Wyoming.

Abstract

Pumas (*Puma concolor*) are usually considered subordinate species where jaguars (*Panthera onca*) are present. Most of the current information on resource partitioning by these two species comes from tropical sites. Out study area is located in the limits of the tropical realm and consequently could be characterized as puma habitat. Our objectives were to describe the ecology of both large felids in an area located 135 s. of the United States border, in the state of Sonora, Mexico. From July 1999 to December 2002 using a suite of methodologies (camera-traps, radio-telemetry, scat, track and prey surveys), we surveyed an area ≈1000 km². The study area is a matrix of oak-woodland, tropical thornscrub, and upper sonoran desert; ranging in elevation from 200 to 1200 m. The main economic activity within the region is ranching. We determined through radio-telemetry a density of 3 pumas/100 km², and through camera-trap surveys a density of 1.4 ± 0.4 jaguars/100 km². Camera-trap capture rates are three times higher for pumas than jaguars. Both species are feeding on white-tailed deer and to a lesser extent on livestock. Pumas are a cathemeral species whereas jaguars are nocturnal-crepuscular. Jaguars are using oak woodlands more than expected by chance, where pumas are using habitats according to availability. The number of pumas present may be an artifact of less prosecution by cowboys (only 1 puma killed since 1999), where jaguars are constantly prosecuted as they are perceived as liable of most livestock depredations (22 jaguars killed since 1999). During 2002 we began a program to help local ranchers on maintaining infrastructure, and apparent result has been less pressure on the jaguar population within the area.

Goodwin, G.G. 1936. Big Game Animals in the Northeastern United States. J. Mammal. 17:50.

The Adirondacks appear to have been the final stronghold of the cougar in the east. Several were reported to have been

killed in New York about 1877. The last record for the state was in 1894, when Game Protector R.B. Nichols saw a cougar 7 miles above Indian Lake Corners on the Cedar River. In Pennsylvania, bounties were paid for "panther" in 1866, and two were killed in Clearfield County in 1891. In New Jersey the last cougars were destroyed between 1830 and 1840. At one time they were not uncommon in southern Massachusetts and in Connecticut; but they disappeared in this region some time before 1800. Linsley, 1842, stated that he saw a specimen in Mix's Museum that was supposedly killed in northern Connecticut. A few remained in northern Vermont and New Hampshire until about 1888; two were reported in 1907 as having been seen 50 miles from Norcross, Maine, and one, according to accounts, was shot in that state about September 1, 1906. The last cougar reported killed in Vermont was shot by Alexander Crowell near Barnard, November 24, 1881. This was a large animal weighing 182 pounds and measuring 7 feet in length. The specimen now is in the state collection at Montpelier. It is reported that two men, while hunting in 1891 near Andover, Maine, saw and shot at a cougar.

Gordon, L.S. and J.P. McClellan. 1954. Effect of Predation on Game Species. Proj. No. W-61-R-3. New Mexico Game and Fish Department.

SUMMARY

During the past three year period a total of twenty definite cases of predation were recorded. These are broken down as follows: lions, 8 kills; coyotes, 7 kills; bobcats, 2 kills; golden eagle, 1 kill; and stray dogs, 2 kills. It is believed that the lion is a far more serious predator than the relative figures indicate. Only about 20 percent of the coyote and bobcat stomachs examined showed game animal remains, and a part of this may have been carrion. Three lion stomachs examined all contained fresh deer meat and hair. It is recognized that predators are responsible for a considerable loss of game animals on the Gila Forest; however, there is no evidence to indicate that predators reduce game populations below the carrying capacity of the range. It is recommended that moderate predator control be continued over most of the forest to keep predator populations at their present low level.

Gratson, M.W., P. Zager, O. Garton and L. Bomar. 2003. Mountain Lion Population Estimation Using Aerial Sampling of Tracks in Snow. Page 59 *in* L. A. Harveson, P. M. Harveson, and R.W.Adams, eds. Proceedings of the Sixth Mountain Lion Workshop. Austin. Texas.

Abstract

There are few methods available to estimate mountain lion (Puma concolor) population sizes. We hybridized LIPS (line intercept probability sampling) and SUPE (sample unit probability estimation) approaches of aerial sampling of tracks in snow. In 13 hours flying time, we sampled 42, 2-km^2 polygons using a helicopter in our 880 km^2 study area of rugged, timbered and brush habitats in north-central Idaho. Polygons were long, thin, and followed elevation contours, and were thus uniquely shaped, in contrast to line transects, which are difficult and inefficient to fly in rugged terrain, and large blocks, which likely decrease the probability of detecting long track lengths (compared to line transects) but increase the probability (over line transects) of meeting an assumption of perfect sightability. Use of a Geographic Information System (GIS) allowed us to identify unique polygons. Using SUPE algorithms, we estimated 76 (90% CI, 8-163) lions after detecting 8 lions, for a density of 8.6 lions/100 km^2. Although bias is unknown and must be investigated, precision should improve with additional sampling and knowledge of stratification.

Gratson, M.W. and P. Zager. 2003. Mountain Lion Predation on Elk Calves in North-Central Idaho. Page 59 *in* L. A. Harveson, P. M. Harveson, and R.W.Adams, eds. Proceedings of the Sixth Mountain Lion Workshop. Austin. Texas.

Abstract

Knowledge of variation in mountain lion (Puma concolor) predation on elk (Cervus elaphus) neonates in relation to elk numbers, lion numbers, other predators, and other prey is poor. We investigated lion predation on elk calves from 1997-2000 in 3 study areas in north-central Idaho using radiocollared elk neonates. On 2 areas, elk populations declined 50% from the early 1990's, calf:cow ratios are poor, and there are few deer (Odocoilius spp.). On the third area, the elk population has remained fairly stable, calf:cow ratios are generally good, and there are many deer. Lions generally took a slightly smaller proportion of calves than black bear (Ursus americanus) each year and, despite large differences in calf survival rates among areas, the proportion of calves killed by lions was generally constant among areas. In contrast to black bear, which were generally unbiased in their selection of calves with regard to predicted body mass at birth, blood

trace mineral values, and serum parameters, lions took calves that were a biased subset. Interpretation of our findings would be greatly improved with estimates of lion populations in each area.

Gray, Robert. 1979. The Ghost Cat. ZooNooz 52(10):6-10.

The author recalls his experiences with mountain lions in western Montana when he was a 10 year-old boy. The American Indians called the mountain lion the "Cat of God," because of its regal bearing. They also named it "Father of Game" and "Greatest Hunter," in deference to its skill as a predator. There were only 31 confirmed cases of mountain lion depredation in California in 1978.

Green, K.A. 1991. Summary: Mountain Lion-Human Interaction Questionnaires, 1991. Pgs. 4-9 In: Mountain Lion-Human Interaction Symposium, C.E. Braun (ed.), Col. Div. Wildl., Denver. 114pp.

SYNOPSIS

In recent years, human-mountain lion interactions have been increasing in many Western states, including in Colorado. It can be difficult to maintain an appropriate perspective of mountain lion habitat when interactions between humans and mountain lions are on the rise. This questionnaire was designed to provide this perspective. Perspective is a subjective evaluation of relative significance or point of view. Twenty-six states and provinces provided information. Six states did not have mountain lion populations. Thirteen states reported mountain lion populations ranging in size from 635 to 5,100+ animals. Twelve states allow hunting and their harvests average 150 mountain lions/state/year. Population sizes of the remaining states are small or undetermined. Populations are believed to be stable in six states and increasing in eight; the status of mountain lions in other states is unknown. However, 10 states reported increasing levels of interaction with people. In the past 5 years, people were injured by mountain lions in Arizona, California, Texas, Alberta, Colorado, and Washington. In Washington, injuries were to two researchers of mountain lions. Four fatalities occurred in Colorado, Montana, and British Columbia. In California and Colorado, mountain lions take an average of 53 pets/year. Other states reported several incidents/year. Forty mountain lions/year were killed by private parties to prevent injury to people or animals. Wildlife agencies killed another 130 for the same purpose. Eight states relocated about 50 cats. Ten states do not relocate mountain lions. Problems occur when mountain lion and deer hunting are either allowed or prohibited. Density of people in areas with conflicts ranges from very low to quite high. Only British Columbia reported decreasing encounters that, however, are from levels higher than totals in many states. Data on sex and age of mountain lions in incidents with either pets or humans were available from California, Montana, Nevada, British Columbia, and Colorado. In the under age 3 class, 29 males and 44 females were involved. In the over age 3 class, 59 males and 37 females were involved. The data indicate that encounters between humans and mountain lions are increasing. Populations of mountain lions are at least stable or increasing in most states, although some states do not have a firm assessment of numbers. The number of injuries have been low, but four were fatal. Hunting and animal damage control are used to prevent conflicts. In addition, some states are working with the media and homeowners to disseminate information to reduce or prevent mountain lion-human interactions.

Green, K.A. 1991. Development of a Data Base for Analysis of Information About Lion Sightings and Lion-Human Interactions. Pg. 18 In: Mountain Lion-Human Interaction Symposium, C.E. Braun (ed.), Col. Div. Wildl., Denver. 114pp.

SYNOPSIS (summarized)

Data bases were developed by McGrath, Halfpenny, and Sanders in Visicalc and DBase III. These data bases included general information for mapping and listing sightings. Two additional database structures are now also used. The first, in Dbase IV, can be used for several objectives and meets the need for recording more than sighting information. A set of response guidelines for handling calls using the categories of sighting, encounter, incident, and attack was initiated. Temporal, spatial, geographic, and behavioral comparisons of the data were other goals. DBase IV allows analysis and reporting from multiple data files by common field linking. To ensure adequate data collection and simplified data entry, form screen entry (with direct data file access) was chosen. DBase IV does not require knowledge of programming because it is menu-prompted. The data entry format mimics the data collection form. Data can be entered on the form or directly onto the screen. The screen allows multiple choice selections for several fields. The data collection form was produced with Formtool software. The second data analysis structure was established by Halfpenny and Sanders to

analyze behavioral data. The structure is a Lotus Symphony Spreadsheet with the same field names as the DBase IV structure. Symphony includes word processing and database capability and can communicate with DBase data files through its ASCII files or other translators. These structures are available from the Colorado Division of Wildlife on DBase III or IV, Lotus 123 versions 1, 2, and 3, and Symphony.

Green, L.L. 1991. Mountain Lion Tagging in the Upper Eagle Valley. Unpubl. Report. Colorado Div. Wildl. 7pp. + 5 Figures.

Fifteen mountain lions (Felis concolor) were captured, marked, and released in the Colorado River and Eagle River drainages from 1986 through 1990. The male to female ratio was 88:100 and the male:female:kitten ratio was 66:100:83. A young radio collared male moved >50 kilometers from an area west of Delta, CO into GMU 25. The lion remained in this area until it died. Two male lions from this study emigrated >50 kilometers and were harvested by sport hunters.

Greenly, J.C., M. Humphreys, G.C. Christensen and N.N. Nilsson. 1965. Big Game Surveys and Season Recommendations. Proj. No. W-28-R-8, Job 1. Nevada Fish and Game Commission.

It is recommended that serious consideration be given by the sportsmen, Commission, and others to removing the cougar, or mountain lion, from the predator list and placing this animal on the game animal list. In the near future the value of this animal as well as other predators, will assume major importance to the hunting public. The smaller predators can sustain relatively heavy harassment and harvest, but the lion cannot. At present two states afford the lion complete protection--Florida and South Dakota. An open season, beginning with deer season and continuing through March 31, with no bag limit is a realistic beginning. It is not expected that this season will result in many lions being taken, but it does show we recognize the value of the species and allow for future management. If damage to livestock should arise in these areas there are both private and federal lion hunters to take care of any depredation complaint. It is estimated that there are no more than 6,500 cougars left in the United States and possibly as few as 4,000. The elimination of this species from this or any state is not something to be proud of. He should be afforded nominal protection.

Greenly, J.C. 1966. Big Game Survey and Season Recommendations. Proj. No. W-43-R-1. Nevada Fish and Game Commission.

The type of season was either sex statewide with no closed season. There were no limits, quotas or tags required. The only requirement was a current hunting license. As a game animal, it is unlawful to hunt the cougar with any revolver or self-loading pistol; or by the use of or with the aid of any flashlight, spotlight, automobile headlight, lamp, or other artificial light of any kind; or at any time other than between sunrise or sunset; or in any manner other than with shotgun, rifle, or bow and arrow, held in hand, but excluding the crossbow and bolt. Any cougar causing livestock losses should be reported to the Commission so that appropriate action may be taken. The Commission may authorize the taking of depredating cougars by any manner or means or at any time.

Greenly, J.C. 1971. The Status of the Mountain Lion in Nevada. 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 mountain lion was classified as a predatory animal with no protection at all until classified as a game animal in 1965. Lion population levels were apparently very low until the 1930's, when domestic sheep kills increased with enough frequency to require a lion control program. The annual kill of lions by the Bureau of Sport Fisheries and Wildlife during the 33 year period, 1916-1949 ranged from 0-10. A full-time lion hunter was employed in 1949. In 1950, the kill increased to 54 and has ranged from 50-181 annually until 1969. Following classification as a game animal in 1965, a license was required for hunters and guides, and a permit was required to capture and hold a lion in captivity. In 1968, a tag was required in addition to the hunting license, with no limit placed on the number of tags an individual could purchase. In 1970, the hunting season was reduced and tags were limited to one per license holder. All lions harvested had to be checked with Department Officers for tag validation and sealing of the hide. A tooth, a stomach sample, and the reproductive tract of the females were taken. For the five years prior to fiscal year 1965, an average of 93 lions were killed annually. During the five years since 1965, the average annual kill had been 55.

Greer, K.R. 1974. Mountain Lion Studies (1973-1974). Montana Fish and Game Department. Job Progress Report. Proj. No. W-120-R-5, Wk. Pl. IV, Job L-1.2(R). 13pp.

A total of 314 mountain lion hunting licenses, including 71 nonresident, were issued for the 1973-74 season and 72 lions were taken. Thirteen lions were also taken for other reasons. The license issue was 46% below, and the hunting harvest was 25% above, those of the previous year. A decreased hunting license issue resulted mostly from the change from a no-fee to a five dollar fee. Lions were taken from 26 hunting districts throughout the state. Males accounted for 71% of all 1973-74 mortalities. Age class groupings indicate 36% sub-adults (age class II or less) and 36% young adults (age classes III and IV). Successful hunters provide information about their lion on a special trophy application form soon after their hunt, and also at the end of the season on a special inquiry. Tissue samples from 63% of the lions were positive for Trichinella larvae. Various recommendations are presented.

Greer, K.R. 1975. Mountain Lion Studies (1974-1975). Montana Fish and Game Department, Job Progress Report. Proj. No. W-120-R-6, Wk. Pl. IV, Job L-l.2. 10pp.

During the 1974-1975 mountain lion season, 352 licensees including 93 nonresidents, trophied 91 lions from 31 hunting districts throughout the state. The license issue was 12% above and the hunting harvest was 26% above, those of the previous year. Female mortalities of 46% compares to 29% in 1973-74. Age class groupings indicate 41% subadults (age class II or less) and 38% young adults (age class III and IV). Information from licensees was also obtained from questionnaires.

Greer, K .R. 1976. Montana Mountain Lion Studies (1975-76). Proj. No. W-120-R-7, Wk. Pl. IV, Job L-l.2. 16pp.

During the 1975-76 mountain lion season, 406 licensees including 118 nonresidents, trophied 76 lions from 27 hunting districts throughout the State. The license issue was 15 percent above, and the hunting harvest 16 percent down, from the previous year. Female mortalities of 40 percent compares to 46 percent in 1974-75. Age class grouping indicates 42 percent subadult and 16 percent young adults. Several lion hunters also harvested bobcat and lynx. A program resulted in 20 marked mountain lions released in the population. Various recommendations are presented.

Greer, K.R. 1977. Montana Mountain Lion Studies. Proj. No. W-120-R-8, Program V, Study No. L-l.1, Job 3. 10pp.

During the 1976-77 mountain lion season, 587 licensees (including 70 nonresidents) trophied 70 lions from 31 hunting districts throughout the State. A total of 14 lion mortalities also occurred by nonhunting causes. The license issue was 45 percent above, and the hunting harvest 8 percent down, from the previous year. The proportion of 48 percent females among known mortalities compares to 40 percent in 1975-76. Age class grouping indicates 43 percent sub-adults and 35 percent young adults and 22 percent adults. Several lion hunters also harvested bobcat and lynx. A tagging program resulted in 11 marked lions released in various populations. Recommendations are presented.

Greer, K.R. 1978. Montana Mountain Lion Studies, (1977-78). Proj. No. W-120-R-9, Program V, Study L-l.l, Job 3. 14pp.

During the 1977-78 mountain lion season, 676 licensees (including 102 nonresident) trophied 88 lions from 36 hunting districts throughout the State. The license issue was 15 percent above, and the hunting harvest 26 percent above the previous year. The mortality of 40 percent females was down from 48 percent of the year before. Age designation of the lion harvest was 34 percent subadult, 41 percent young adult and 25 percent adult. Several lion hunters also harvested bobcat and lynx. The tagging studies provided 13 marked lions in the western populations. Management considerations are presented.

Greer, K.R. 1979. Montana Mountain Lion Studies (1978-79). Proj. No. W-120-R-10, Program V, Study L-l.l, Job 3. 14pp.

During the 1978-79 mountain lion season, 765 license holders (including 123 nonresidents) trapped 75 lions from 39 hunting districts throughout the State. The license issue was 13 percent above, and the hunting harvest 15 percent below, the previous year. The mortality of 51 percent females was up from 40 percent of the year before. Age designation of the

lion harvest was 36 percent subadult, 44 percent young adult, and 20 percent adult. Several lion hunters also harvested bobcat and lynx. The tagging studies resulted in 11 marked lions. Two wild known-age skulls were obtained from the tagging program. Management considerations are presented.

Greer, K.R. 1983. Montana Mountain Lion Mortality Studies (1982-83). Proj. No. W-120-R-14 (5891), Program V, Study WL-l. 0, Job 3. 18pp.

A total of 109 mountain lions were taken by hunters from 48 hunting districts during the 1982-83 season. The 1,118 licenses issued were a 16 percent increase over those for 1981-82. Harvest data are summarized since the first season in 1971-72. Management considerations are presented.

Greer, K.R. 1980. Montana Lion Collections (1979-80). Proj. No. W-120-R-11 (5891), Program V, Study L-l.1, Job 3. 8pp.

During the 1979-80 mountain lion season, 725 license holders (including 111 nonresidents) harvested 82 lions from 37 hunting districts throughout the State. The license issue was 5 percent below, and the hunting harvest 9 percent above, the previous year. The mortality of 41 percent females compares to 51 percent of the year before. Age designation of the lion harvest was 34 percent subadult, 47 percent young adult, and 19 percent adult. The tagging studies resulted in 9 marked lions. Two known-age skulls were obtained from the tagging program. Management considerations are presented.

Greer, K.R. 1981. Montana Mountain Lion Mortality Studies (1980-81). Proj. No. W-120-R-12 (5891), Program V, Study WL-1.0, Job 3. 10pp.

During the 2 ½-month 1980-81 mountain lion harvest season, 848 license holders (including 61 nonresidents) harvested 64 lions from 37 hunting districts throughout the State. The license issue was 17 percent above, and the hunting harvest 22 percent below, the previous year. A 45 percent decline in nonresident lion hunters was due to a three-fold fee increase. A decreased lion harvest is attributed to delayed and below average snow cover during the season. The mortality of 43 percent females compares to 41 and 51 percent for respective prior seasons. Age designation, by skull suture closure, in the lion harvest was 37 percent subadult, 31 percent young adult, and 32 percent adult. Three marked lions were harvested during 1980-81, with one having a probable known age of 4½ years. Management considerations are presented.

Greer, K.R. 1982. Montana Mountain Lion Mortality Studies (1981-82). Proj. No. W-120-R-13 (5891), Program V, Study WL-1.0, Job 3. 7pp.

A total of 113 mountain lions were taken from 49 hunting districts during the 1981-82 season. The 963 licenses were a 14 percent increase over 1980-81. Harvest data indicate: 39 percent of females; age of both sexes were 40 percent subadult, 36 percent young adult, and 24 percent adult. Six marked lions were reported with only one being a probable known age of 6½ years. Management considerations are presented.

Greer, K.R. 1984. Montana Mountain Lion Mortality Studies (1983-84). Proj. No. W-120-R-15, Program V, Study WL-l.0, Job 3. 12pp.

A total of 140 mountain lions were taken by hunters from 49 hunting districts during the 1983-84 season. The 1,153 licenses issued to 1,021 residents and 132 nonresidents were a small increase over the previous season. Harvest data are summarized since the first season in 1971-72. Management considerations are presented.

Greiner, E.C., M.E. Roelke, C.T. Atkinson, J.P. Dubey, and S.D. Wright. 1989. Sarcocystis sp. in Muscles of Free-ranging Florida Panthers and Cougars (Felis concolor). J. Wildl. Dis. 25(4):623-628.

Sarcocysts of Sarcocystis sp. were found in the striated muscles from 11 of 14 wild Florida panthers (Felis concolor coryi) and four of four cougars (two wild F. concolor stanleyana and two captive F. concolor of undetermined subspecies). The

common occurrence of sarcocysts in muscles of top carnivores such as panthers and cougars is unexplained. This stage of the life cycle is normally confined to the muscles of the prey species. Because large felids are rarely preyed upon, it is unlikely that a species of Sarcocystis has evolved using large cats as intermediate hosts. Therefore, the presence of these sarcocysts might be an indication of immune compromise in these felids, enabling the atypical development of the sarcocysts.

Grigione, M.M. 1997. Testing of a Rigorous Technique for Identifying Individual Mountain Lion (*Puma concolor*) By Their Tracks. Page 86 *in* W.D. Padley, ed., Proc. Fifth Mountain Lion Workshop: 27 February- 1 March 1996; San Diego, California.

In 1993, Smallwood and Fitzhugh introduced a rigorous method to make individual animal identification by tracks more objective than previously possible. Working with nine mountain lions, they were able to correctly group 100% and 92% of the tracks from the left and right rear feet, respectively. While they worked with lions that were geographically separated, the identity of the mountain lions was unknown. In order to refine the "ground truth" the Smallwood-Fitzhugh method, 324 photographs of radio-collared mountain lion tracks were collected during the winter and spring of 1994 in Round Valley, Bishop, California. Tracks were photographed during different times of the day in different soil substrates, including snow. Linear, area, and angle measurements were taken directly from the photographs and subsequently analyzed statistically using Fisher's linear discriminant analysis for more than two groups. Track dimensions were measured both manually and by various computer programs, including ArcInfo geographical information systems. Preliminary results suggest that, based on the three types of measurements, approximately 80% of the track sets correspond with the appropriate radio-collared mountain lion.

Grigione, M.M., P. Burman, V.C. Bleich and B.M. Pierce. 1999. Identifying Individual Mountain Lions *Felis concolor* by Their Tracks: Refinement of an Innovative Technique. Biological Conservation 88:25-32.

Abstract

This study refines a method reported by Smallwood and Fitzhugh (Smallwood, K.S., Fitzhugh, E.L., 1993. A rigorous technique for identifying individual mountain lions Felis concolor by their tracks. Biological Conservation 65, 51-59) that attempted to discriminate between individual mountain lions by certain measurements of their tracks in the field. During the months of January-March 1996, we followed 10 radio-collared mountain lions in the Sierra Nevada of California and obtained photographs of their tracks in the soil and snow under many different environmental conditions. Linear and area measurements were determined from track photographs and Fisher's discriminant analysis was used to differentiate between each track set. Unlike the Smallwood and Fitzhugh analysis, we were certain about the identity of most of the mountain lions that made tracks. Our results indicate that track sets had both correct and incorrect ``groupings'' and that these groupings were sensitive to the type of substrate in which a track set was found, the time of day it was photographed, and the number of tracks in a set. In general, it is important to minimize variation associated with substrate and time of day between track sets and to concentrate on sets that contain three or more tracks. This technique has potential application in wildlife conservation; however, the cautionary guidelines, developed in this paper, should be considered.

Grigione, M.M., P. Beier, R.A. Hopkins, D. Neal, W.D. Padley, C.M. Schonewald and M.L. Johnson. 2002. Ecological and Allometric Determinants of Home-Range Size for Mountain Lions (Puma concolor). Animal Conservation 5(4):317-324.

Abstract

We examined how several ecological factors influenced home-range size for 57 mountain lions inhabiting three regions of California. Our specific objectives were to investigate: (1) the relationship between home-range size and sex, age and reproductive status; (2) how broad-scale habitat differences and prey relative abundances influenced home-range size; (3) how seasonality, within these habitats, affected home-range size; (4) whether there was a significant relationship between body mass and home-range size. Results indicate that the effects of season on home-range size influenced the study areas differently. Both intrinsic factors, such as sex and body mass, and extrinsic factors, such as deer relative abundance and study site, influenced home-range size for mountain lions in this analysis. Linear relationships, however, between body mass and home-range size were not evident for any of our study locations. Curvilinear relationships, in contrast,

existed between body mass and home range size for all study areas during particular seasons, influenced strongly by animal sex. Conservation strategies designed to protect mountain lions and their habitats should reflect the above balance between intrinsic and extrinsic factors which influence home-range size.

Grigione, M.M. and P. Burman. 2003. What is Revealed in a Mountain Lions Heel: Using Heel Shape to Ascertain Identity. Page 60 *in* L. A. Harveson, P. M. Harveson, and R.W.Adams, eds. Proceedings of the Sixth Mountain Lion Workshop. Austin. Texas.

Abstract

This study refines a method developed by Smallwood and Fitzhugh (1993), which attempted to discriminate between individual mountain lions (Puma concolor) in the field by using measurements of their tracks. During January-March 1996, we followed 10 radio-collared mountain lions in the Sierra Nevada mountains of California and obtained photographs of their tracks in the soil and snow. In addition, track measurements were obtained from 4 mountain lion carcasses from different parts of California in 1996-1997. We analyzed heel pad variability to discriminate between mountain lions. Measurements of each track were taken every 10 degrees from the center of the heel pad until the entire heel pad was characterized by a series of linear measurements, corresponding to a particular angle measurement. After measurements of each heel pad were made, a curve was produced by cubic spline modeling which was indicative of a particular heel pad for each mountain lion. Confidence bands were placed around each curve and a graphical comparison was then made between track sets. The results of this analysis indicate that for both types of track sets, it is difficult to distinguish between mountain lions based on levels of heel pad variability. We conclude that measurements associated entirely with mountain lion heel pad lack discriminatory power and make recommendations about what types of measurements could be used to efficiently and accurately assess an animal's identity.

Grinnell, J. and J. Dixon. 1923. The Systematic Status of the Mountain Lion of California. Univ. Ca. Publ. in Zoology 21(11):325-332.

No author had previously made any special effort to determine the systematic status of the mountain lions in California. A new race, Felis oregonensis californica May, revived name, is described. After study of 30 skulls, the authors found, as did Merriam (1901) that "the limits of variation for adults of each sex fall within surprisingly narrow bounds." Skull measurements of Felis oregonensis californica are provided.

Griswold, T., J. Briggs, G. Koehler and Students at Cle Elum-Roslyn School District. 2003. Assessing GPS Radiotelemetry Reliability in Cougar Habitat. Page 162 *in* S.A. Becker, D.D. Bjornlie, F.G. Lindzey, and D.S. Moody, eds. Proceedings of the Seventh Mountain Lion Workshop. Lander, Wyoming.

Abstract

Studies evaluating the effectiveness of GPS radiotelemetry have shown that the positional accuracy and rate of GPS fixes declines with increased forest canopy coverage (D'Eon, Serrouya, Smith, and Kochanny, 2002. Wildlife Society Bulletin, 30(2):430-439). Since GPS collars are being used to mark and monitor cougars (*Puma concolor*; Koehler and Nelson, 7th Mountain Lion Workshop), students, faculty, and volunteers at the Cle Elum-Roslyn Middle School, Washington, tested GPS location accuracy as part of Project CAT (Cougars and Teaching). We fitted domestic dogs (*Canis familiaris*) with the same GPS collars used to mark cougars and locational accuracy was measured in areas of known cougar habitat. GPS fixes were recorded and compared with UTM coordinates obtained from hand-held GPS receivers and 7.5-minute topographic maps. Environmental factors, vegetation types, and physiographic parameters were recorded. It was felt that the dogs would closely approximate cougar movement patterns and give an index of reliability of GPS fixes for free-ranging cougars. While previous studies have addressed the reliability of GPS collar fixes, none have tested reliability of data collected in the rapidly suburbanizing ponderosa pine (*Pinus ponderosa*) and Douglas fir (*Pseudosuga menziesii)* forests of the eastern Cascade Mountains. This project gives the middle school students an opportunity to participate in the school-wide educational effort of cougar ecology. Students proposed and tested hypotheses and analyzed the data.

Griswold, T., S. Osbolt, S. Gronostalski, J. French, B. Wagsholm, K. White, G.M. Koehler and B.T. Maletzke. 2008. Project CAT (Cougars and Teaching)…What the Community Has Learned. Page 190 in Toweill, D. E., S. Nadeau and D. Smith, editors. Proceedings of the Ninth Mountain Lion Workshop, May 5-8, 2008, Sun Valley, Idaho, USA.

Abstract

Washington Department of Fish and Wildlife began Project CAT (Cougars and Teaching) in collaboration with the Cle Elum/Roslyn school district and local community in 2001. Researchers involve 8 – 12th grade students, teachers, and community members in the captures of cougars (*Puma concolor*) from kittens to adult age and monitoring their movement patterns and the spatial organization in the foothills of the North Cascades near Cle Elum, WA. Students have assembled a skeleton of a cougar to learn the bone structure, performed necropsies to learn the anatomy and discover how cougars have died. In the field, students learn to identify tracks and sign of wildlife while accompanying researchers on killsite inspections and captures. They learn about orienteering and using GPS and telemetry. After teaming up with researchers for 7 years, students and teachers share their experiences and what Project CAT has meant to them.

Gross, R., and E.L. Fitzhugh. 1985. Reported Mountain Lion Observations from Marin County. Unpubl. Rep. to the Marin Rod and Gun Club. 7pp.

A list of 148 reports of mountain lion observations from Marin County is presented. The reliability of the observations was unknown.

Gross, R., and E.L. Fitzhugh. 1986. A Brief Survey for Mountain Lions in the San Joaquin River Drainage: Fresno and Madera Counties. Wildl. Ext., Univ. of Ca., Davis. 8pp.

A section of the San Joaquin River drainage approximately ten miles long on the north side of the city of Fresno was checked for mountain lion sign. On September 24-26, 1985, dirt roads and other areas of trackable soil and dew covered golf course fairways were surveyed for tracks and other signs of mountain lions. The survey was conducted by an experienced tracker riding a motorcycle. No mountain lion sign was found, but local residents reported six sightings of mountain lions, four of them following the highway death of a mountain lion in the same vicinity.

Grove, E.H. 1956. Old Panthers Never Die. Pennsylvania Game News 27(3):30.

Deer hunters which were night spotting the country for bucks that they intended on hunting the next day spotted a panther along a brushy fencerow in 1940 or 1941. They wrote in to dispute an article entitled "Panthers are Popular" which appeared in the January issue.

Guiguet, C.J. 1962. The Cougar on Vancouver Island. Can. Audubon 24(l):6-9.

Fifteen subspecies of the cougar are differentiated. Vancouver Island appeared to be the center of abundance in the Pacific Northwest and the author felt it likely that, on an area basis, there were more cougars on Vancouver Island than anywhere else on the continent. Since 1916 (in the past 45 years) there have been eight incidents involving cougar attacks on man in British Columbia. Only one of these resulted in fatality, that of a child at Kyuquot on the west coast of Vancouver Island. Three other attacks were fairly serious but not fatal. The majority of these cougars were young animals. Suggested possible reasons for cougars attacking man were that cougars may mistake man for deer, and that the cougar may have initially been after a pet dog when the boy or man became involved. No bounty is offered for cougar in British Columbia. Cougars too close to settlements or molesting stock are killed by government hunters. One government hunter disagrees with the generality that the cougar is largely nocturnal on Vancouver Island. He had often "read sign" that indicated the cat prowls by day.

Guzman, G.J. 1998. Characteristics of Mountain Lion Home Ranges on Big Bend Ranch State Park, Texas. M.S. Thesis. Div. of Range Animal Science, Sul Ross State Univ., Alpine, TX.

Twenty-one mountain lions (*Puma concolor*) were captured on Big Bend Ranch State Park, 22 January 1993 through 28 March 1996, using leghold snares and trained hounds. Captured mountain lions were examined, aged, and a series of morphological measurements were recorded. Sixteen mountain lions were fitted with radio transmitters operating on specific frequencies. Radio-collared mountain lions were monitored from the ground and fixed-wing aircraft. A total of 711

locations were recorded for 10 male and 5 female mountain lions. Home ranges were delineated for 6 male and 5 female mountain lions. Average annual ranges (100% minimum convex polygon) for adult male mountain lions (348.6 square km) were larger ($P < 0.05$) than for adult female mountain lions (205.9 square km). Average percent overlap (100% minimum convex polygon) of annual female-female, male-male, and female-male mountain lion ranges were 26.1, 22.9, and 28.9, respectively. Annual shifts were apparent ($P < 0.05$) for female mountain lions and for the cumulative male mountain lion ranges. Mountain lion density (No./100 square km) ranged from 0.26-0.59. Mountain lion mortalities were attributed to predator control practices on private land ($n = 15$), hunting ($n = 1$), and other causes ($n = 3$) on the study area. The mountain lion population level on BBRSP was limited by high mortality rates of female and male mountain lions.