Taber, A.B., A.J. Novaro, N. Noris and F.H. Colman. 1997. The Food Habits of Sympatric Jaguar and Puma in the Paraguayan Chaco. Biotropica 29(2):204-213.

Abstract

Food habits of jaguar and puma were studied in two regions of the Paraguayan Chaco. Biochemical analysis of 280 scats attributed 106 to jaguar and 95 to puma. Overall dietary overlap was 65 percent and they shared six of seven main prey types. For both cats 43 percent of prey items and 15 percent of prey biomass taken were mammal species kg, 23 percent of items and 29 percent of the biomass were from species 1–15 kg, and 27 percent of items and 53 percent of the biomass were from larger species. Birds, reptiles, and insects made up the remainder. In a developed region no significant differences between their diets were found, while in an undeveloped area more small mammals were taken by both species, and jaguar took more large prey than puma. The potential roles of competition and of differences in habitat structure and prey availability between the two areas on these species' diets are discussed.

Taketa, F., M.H. Attermeier, and A.G. Mauk. 1972. Acetylated Hemoglobins in Feline Blood. J. Biol. Chem. 247:33-35.

Abstract

The ß chain amino terminus of one or more hemoglobins in the blood of members of the Felidae family is substituted with an acetyl group. Such acetylated hemoglobins occur together with nonacetylated components in variable proportions in blood of different members of the family. In the lion, tiger, and snow leopard, the acetylated component comprises about 90% of the total hemoglobin; in the serval and caracal it comprises about 70%; in the cheetah, puma, fishing cat, and jungle cat it comprises about 50%; and, among domestic cats it comprises 10 to 50%. The occurrence of such ß chain-substituted hemoglobins as major components in animal blood is unusual. Except for the minor fetal human component hemoglobin F_i and the minor adult human component hemoglobin A_{ic2}, no animal hemoglobin thus far examined has been found to contain amino-blocked ß (non α_2) chains. Domestic cat hemoglobins with *N*-acetylated ß chain amino termini are insensitive to the modifying influence of organic phosphates on oxygen affinity, whereas cat hemoglobins with unsubstituted ß chain amino termini are sensitive.

Taylor, J.W. 1974. The Eastern Panther. Virginia Wildlife 35 (Dec.):24.

The last authentic case of the Eastern panther in Virginia was nearly one hundred years ago. However, recent sightings by reliable observers have stirred new interest. There are also indications that the panther is making a comeback in other areas of the East. If panthers do exist in Virginia, they are on the brink of extinction. Because they are still listed as an endangered species, they are fully protected.

Taylor, S.K., E.D. Land, M. Lotz, M. Roelke-Parker, S.B. Citino and D. Rotstein. 1998. Anesthesia of Free-ranging Florida Panthers (*Felis concolor coryi*), 1981–1998. Proceedings of American Association of Zoo Veterinarians 1998:26–29.

Abstract

The Florida panther (Puma concolor coryi) is one of the most endangered mammals in the world. The free-ranging population is estimated to be between 30–50 adult animals. Historically, this species of mountain lion ranged from eastern Texas or western Louisiana and the lower Mississippi River Valley east through the southeastern United States, including Arkansas, Louisiana, Mississippi, Alabama, Georgia, Florida and parts of Tennessee and South Carolina. Up until 1966, they were hunted to protect livestock and for sport. South Florida landscape has under gone significant changes including habitat loss from human development, changes in land use to housing and citrus groves, fragmentation by roads, and introduction of exotic plants and animals. The Florida Game & Fresh Water Fish Commission began studying the panther in 1972 and it was listed by the United States Fish & Wildlife Service as an endangered species in 1981. Panthers are now only known to inhabit south Florida and a subset of the population has been studied using radio telemetry since 1981. Between 1981 and 1998, 72 panthers have been anesthetized multiple times (1–10 times per cat) for a total of 183 capture events. Panthers have ranged from 6-mo- to 16-yr-old.

Direct or indirect capture related mortality has occurred in 3 (0.016%) of the 183 captures. These mortalities included: A cat that died less than 8 min after being darted and was most likely a result of either a negative anesthetic reaction or a dose miscalculation; A cat died of cellulitus and toxemia which resulted from a dart that penetrated the abdomen; And a cat that died approximately 3 days post handling but was too autolytic to evaluate further. The field capture event involved a core capture team composed of a hounds man, veterinarian, and two biologists. The first phase involved the hound man who, with two to six hounds, located the felid scent and pursued the panther until it "treed." Actual chases were relatively short and usually ranged from 5–10 min. The second phase involved rapidly assessing the cat's physical condition, determining the appropriate anesthetic drugs and dose, and the preparation of a 3-cc dart with 1.5 x 30mm uncollared needle. ACO2 powered rifle with scope (Teleinject, Saugus, California USA) was used to deliver most darts. The third phase usually involved catching the anaesthetized panther in a net as it fell from the tree. If the fall distance was greater than about 5 m, a portable wildlife cushion was used. Occasionally an anaesthetized cat would remain in the tree and a biologist had to climb up and lower the cat to the ground with a rope. The fourth phase involved biomedical monitoring and research and involved: Physical examination and collection of blood, hair, feces, urine, and external parasites; Full thickness skin punch biopsies were taken. Panthers were vaccinated for rabies, panleukopenia, calicivirus and rhinopneumonitis. Anthelmintics were usually administered. Panthers may also have received long acting penicillin, vitamins, and iron. Intravenous and/or subcutaneous saline was usually administered. Panthers were then fitted with radio collars (Telonics, Inc., Mesa, Arizona USA). These collars are equipped with both an activity switch and a mortality sensor. The cats were usually monitored 3 days/wk through aerial telemetry. For additional permanent identification the cat's ears were tattooed and a subcutaneous transponder chip was implanted. Body measurements were taken and the animal was weighed. Special studies such as semen evaluation by electro ejaculation may periodically have been conducted. Handling time to complete these tasks has ranged from 12min–3hr. Since 1982, anesthesia on the panthers has been conducted by one biologist and eight veterinarians. Not all records have complete information and the brand of the specific drug may not have been listed. Anesthetic drugs used in free-ranging Florida panthers have included acepromazine (10 mg/ml), ketamine (100 mg/ml or 200 mg/ml) (Ketaset, Fort Dodge Laboratories, Inc., Fort Dodge, Iowa USA), tiletamine hydrochloride/zolazopam hydrochloride (100 mg/ml) (Telazol, Fort Dodge Laboratories Inc., Fort Dodge, Iowa USA), diazepam (5 mg/ml), midazolam (5mg/ml) (Versed Roche Laboratories, Mutley, New Jersey USA), and xylanzine hydrochloride (100 mg/ml). Drugs were reconstituted with sterile water as necessary.

Taylor, S.K., C.D. Buergelt, M.E. Roelke-Parker, B.L. Homer and D.S. Rotstein. 2002. Causes of Mortality of Free-Ranging Florida Panthers. J. Wildl. Dis. 38(1):107-114.

Abstract

The Florida panther (*Puma concolor coryi*) is one of the most endangered mammals, with the entire population estimated to consist of only 30-50 adult animals. Between 1978 and 1999, 73 free-ranging Florida panther carcasses were submitted for postmortem evaluation, of which 47 (64%) were radiocollared and 26 (36%) were uncollared cats. Overall, mortality of panthers > 6-mo-old was due to vehicular trauma in 25 (35%), intraspecific aggression in 19 (26%), illegal kill in seven (10%), research activities in two (3%), infectious diseases in two (3%), esophageal tear in one (1%), pleuritis in one (1%), pyothorax in one (1%), aortic aneurysm in one (1%), atrial septal defect in one (1%), and causes of death were undetermined in 13 (18%) due to autolysis. Of the 25 panthers that were killed by vehicular trauma, 20 (80%) died between October and April. This coincides with increased number of winter visitors to south Florida. Among radiocollared panthers, intraspecific aggression was the primary cause of mortality for 19 (41%) dead cats. Of these cats, 16 (84%) were males and 14 (88%) were either less than 3 or more than 8-yr-old. These animals were probably fighting to establish or retain territory. Among the 26 uncollared panthers, vehicular trauma was the primary cause of mortality and was responsible for 16 (62%) deaths. This study documents the causes of mortality and the age, sex, and seasonal mortality trends for both radiocollared and uncollared free-ranging endangered Florida panthers over a 21-yr-period.

Teel, T.L., R.S. Krannich, and R.H. Schmidt. 2002. Utah Stakeholders' Attitudes Toward Selected Cougar and Black Bear Management Practices. Wildl. Soc. Bull. 30(1):2-15.

Abstract

We examined Utahns' attitudes (n=901) toward use of recreational hunting to manage black bears (Ursus americanus)

and cougars (Puma concolor), use of hounds to hunt these species, and the practice of bear baiting. Independent variables included urban versus rural residence, gender, educational attainment, age, duration of in-state residence, and stakeholder group classification. Most Utahns disapproved of the cougar and black bear management practices examined. Differences in responses were associated with sociodemographic characteristics and with participation in wildlife-related recreation. The following groups were less opposed to the selected practices than their counterparts: rural residents, men, those with lower levels of education, longtime residents, younger respondents, and hunters. Survey analyses can help wildlife managers identify areas of controversy where public involvement and educational efforts might be prescribed.

Tennesen, M. 1992. Ruler of the Canyons. Wildlife Conservation 95(6):38-43.

Laura Small, a five-year-old from El Toro, California was attacked by a mountain lion in Ronald W. Caspers Wilderness Park in the Santa Ana Mountains on March 23, 1986. The area was searched by wildlife authorities and a lion was killed which was found roaming the park boundaries. Six months later, another lion attacked six-year-old Justine Melon in the same park. California's mountain lion population has been protected since 1971 and the population has grown to an estimated 5,100 animals. Livestock owners report about 130 lion damage incidents each year. In 1990, Proposition 117 was passed by a 52.5 percent majority which prohibited hunting mountain lions. There is concern that as more people move into lion habitat that more problems will arise. Paul Beier of the Orange County Cooperative Mountain Lion Study is monitoring 12 adult cougars of an estimated 20-25 adults and 10-15 cubs in the 800-square-mile study site in the middle of Camp Pendleton Marine Corps base. In most states, the principle cause of mountain lion mortality is gunfire, where in California it is cars. The Santa Ana population may be in jeopardy of going extinct if the two corridors which allow migration of dispersing lions are blocked by proposed construction of homes in the area. California Fish and Game estimates that mountain lions inhabit over 80,000 square miles in California with densities ranging from one adult per 100 square miles in the southeastern deserts to 10 adults per 100 square miles in portions of the western slopes of the Sierra Nevada. In North America from 1890 to 1990, mountain lions attacked 58 humans, resulting in 10 fatalities. This is minuscule compared with fatalities caused by dogs, bees, rattlesnakes, and black widow spiders each year. A nine-year-old boy, Darron Arroyo of Lompoc, California, was attacked by a mountain lion as he biked with his family about 20 miles north of Santa Barbara as the author was gathering information for this article. The boy needed 600 stitches to close 50 puncture wounds.

Terwee, J.A., J.K. Yactor, K.S. Sondgeroth, and S. Vandewoude. 2005. Puma Lentivirus is Controlled in Domestic Cats after Mucosal Exposure in the Absence of Conventional Indicators of Immunity. J. Virol. 79(5):2797-2806.

Abstract

A high percentage of free-ranging pumas (Felis concolor) are infected with feline lentiviruses (puma lentivirus, feline immunodeficiency virus Pco [FIV-Pco], referred to here as PLV) without evidence of disease. PLV establishes productive infection in domestic cats following parenteral exposure but, in contrast to domestic cat FIV, it does not cause T-cell dysregulation. Here we report that cats exposed to PLV oro-nasally became infected yet rapidly cleared peripheral blood mononuclear cell (PBMC) proviral load in the absence of a correlative specific immune response. Two groups of four specific-pathogen-free cats were exposed to PLV via the mucosal (oro-nasal) or parenteral (i.v.) route. All animals were PBMC culture positive and PCR positive within 3 weeks postinfection and seroconverted without exhibiting clinical disease; however, three or four oro-nasally infected animals cleared circulating proviral DNA within 3 months. Antibody titers reached higher levels in animals that remained persistently infected. PLV antigen-induced proliferation was slightly greater in mucosally inoculated animals, but no differences were noted in cytotoxic T-lymphocyte responses or cytokine profiles between groups. The distribution of virus was predominantly gastrointestinal as opposed to lymphoid in all animals in which virus was detected at necropsy. Possible mechanisms for viral clearance include differences in viral fitness required for crossing mucosal surfaces, a threshold dose requirement for persistence, or an undetected sterilizing host immune response. This is the first report of control of a productive feline or primate lentivirus infection in postnatally exposed, seropositive animals. Mechanisms underlying this observation will provide clues to containment of immunodeficiency disease and could prompt reexamination of vaccine-induced immunity against human immunodeficiency virus and other lentiviruses.

Tewes, M.E. 2003. Historical Biogeography of Wild Cats and Their Environment in Texas. Page 76 *in* L. A. Harveson, P. M. Harveson, and R.W.Adams, eds. Proceedings of the Sixth Mountain Lion Workshop. Austin. Texas.

Abstract

Historically, 6 species of wild cats are recorded for Texas: mountain lion (Puma concolor), jaguar (Panthera onca), ocelot (Leopardus pardalis), margay (Leopardus weidii), jaguarundi (Herpailurus yaguarondi), and bobcat (Lynx rufus). Our knowledge of the historical distribution of these felids is strongly related to human history, particularly from accounts of early settlers and the expansion of the frontier. Human settlements were influenced by presence of rivers, fertile soils, and climate. Reports of mountain lion, jaguar, ocelot, and bobcat cover most of occupied eastern Texas during the 1800s. Range constriction occurred for mountain lion, ocelot, and jaguar during the late 1800s and early 1900s with the last documented jaguar in southern Texas occurring during 1948. The jaguarundi was never documented north of the Rio Grande Valley during the 1800s or 1900s. Only a single margay is recorded from Eagle Pass along the Rio Grande. Consequently, the 4 felids currently occupying Texas are the mountain lion, bobcat, ocelot, and possibly jaguarundi.

Thatcher, C.A., F.T. Van Manen and J.D. Clark. 2006. Identifying Suitable Sites for Florida Panther Reintroduction. J. Wildl. Manage. 70(3):752-763.

Abstract

A major objective of the 1995 Florida Panther (*Puma concolor coryi*) Recovery Plan is the establishment of 2 additional panther populations within the historic range. Our goal was to identify prospective sites for Florida panther reintroduction within the historic range based on quantitative landscape assessments. First, we delineated 86 panther home ranges using telemetry data collected from 1981 to 2001 in south Florida to develop a Mahalanobis distance (D^2) habitat model, using 4 anthropogenic variables and 3 landscape variables mapped at a 500-m resolution. From that analysis, we identified 9 potential reintroduction sites of sufficient size to support a panther population. We then developed a similar D^2 model at a higher spatial resolution to quantify the area of favorable panther habitat at each site. To address potential for the population to expand, we calculated the amount of favorable habitat adjacent to each prospective reintroduction site within a range of dispersal distances of female panthers. We then added those totals to the contiguous patches to estimate the total amount of effective panther habitat at each site. Finally, we developed an expert-assisted model to rank and incorporate potentially important habitat variables that were not appropriate for our empirical analysis (e.g., area of public lands, livestock density). Anthropogenic factors heavily influenced both the landscape and the expert-assisted models. Of the 9 areas we identified, the Okefenokee National Wildlife Refuge, Ozark National Forest, and Felsenthal National Wildlife Refuge regions had the highest combination of effective habitat area and expert opinion scores. Sensitivity analyses indicated that variability among key model parameters did not affect the high ranking of those sites. Those sites should be considered as starting points for the field evaluation of potential reintroduction sites.

Thatcher, C.A., F.T. van Manen and J.D. Clark. 2009. A Habitat Assessment for Florida Panther Population Expansion into Central Florida. J. Mammal. 90(4):918-925.

Abstract

One of the goals of the Florida panther (*Puma concolor coryi*) recovery plan is to expand panther range north of the Caloosahatchee River in central Florida. Our objective was to evaluate the potential of that region to support panthers. We used a geographic information system and the Mahalanobis distance statistic to develop a habitat model based on landscape characteristics associated with panther home ranges. We used cross-validation and an independent telemetry data set to test the habitat model. We also conducted a least-cost path analysis to identify potential habitat linkages and to provide a relative measure of connectivity among habitat patches. Variables in our model were paved road density, major highways, human population density, percentage of the area permanently or semipermanently flooded, and percentage of the area in natural land cover. Our model clearly identified habitat typical of that found within panther home ranges based on model testing with recent telemetry data. We identified 4 potential translocation sites that may support a total of approximately 36 panthers. Although we identified potential habitat linkages, our least-cost path analyses highlighted the extreme isolation of panther habitat in portions of the study area. Human intervention will likely be required if the goal is to establish female panthers north of the Caloosahatchee in the near term.

Thomas, 0. 1901. On a New Form of Puma from Patagonia. Annals and Magazine of Natural History, Series 7, 8(45):188-189.

A new subspecies of puma, Felis concolor pearsoni, is described by skin characteristics. Taken from Santa Cruz, Patagonia, about 70 miles inland, this subspecies was distinguished from F.c. puma by its different general color, shorter tail, light-colored ear backs, and the absence of dark markings around the digital pads.

Thome, J.H., D. Cameron and J.F. Quinn. 2006. A Conservation Design for the Central Coast of California and the Evaluation of Mountain Lion as an Umbrella Species. Natural Areas Journal 26(2):137-148.

Abstract

Conservation planners use several methods to select conservation target areas. These include the use of umbrella species for large area requirements, site-specific locations of important biodiversity elements, and indications of ecosystem health. We tested the adequacy of using an umbrella species to represent finer-scale biodiversity elements on 45,205 km^2 of the central coast of California. A network of core and linkages for mountain lion (*Puma concolor* [Kerr]) was developed and 22,069 km^2, or 49% of the region, was selected. We analyzed network representation of a variety of biodiversity elements. The conservation network contained between 8% and 27% of five different endangered species locations in the region. It captured 77% of mapped serpentine rock, a surrogate for rare plants, 88% of the old-growth redwood (*Sequoia sempervirens* [(D. Don) Endl.]), 55% of the The Nature Conservancy conservation portfolio areas, a surrogate for biodiversity, a majority of three types of oak woodlands, and 79% of the watersheds with extant steelhead (*Oncorhynchus mykiss*) populations. The mountain lion network more than proportionally represented most of the biodiversity elements examined. However, endemic amphibian, reptile, and mammal populations were less than proportionally represented, suggesting the need for testing levels of biodiversity representation in conservation designs that are based on carnivore habitat. We discuss implications for conservation plans based on this approach, and the potential synergies of linking aquatic health assessments with terrestrial umbrella species for conservation planning. Finally, we discuss the rankings of cores and corridors in the region.

Thompson, B.C. 1984. Texas-Cougar Status Report. Pgs. 56-59 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.

The mountain lion is classified as a nongame mammal and is not subject to any specific protective regulations. The population had been estimated to number no more than 500; although kill records indicate that a substantially larger population may exist.

Thompson, D.J. and J.A. Jenks. 2005. Long-Distance Dispersal by a Subadult Male Cougar from the Black Hills, South Dakota. J. Wildl. Manage. 69(2):818–820.

The authors report of a long-distance dispersal of a subadult male cougar from the Black Hills of South Dakota and Wyoming to east-central Oklahoma. Cougars were captured during the winters of 2003-2004 using hounds or walk in live-traps and were then immobilized, aged and fitted with radio transmitters. A total of 23 cougars (12 female, 11 male) and 6 kittens were captured and fitted with collars during the 2003-2004 capture seasons. A 1 year old subadult male (M16) was captured in February 2003 and subsequently dispersed beyond the area surveyed for radio signals via aircraft. The maximum distance documented with telemetry was 92.4 km in August 2003. This subadult male was found dead in May 2004 3.6 km south of Red Rock, Oklahoma (266 days since last located). The straight line distance since the last telemetry location in the Black Hills to the site of mortality was 1,067 km and was the farthest dispersal movement documented for a subadult cougar.

Thompson, D.J., J.A. Jenks and B.D. Jansen. 2008. Dispersal Movements of Subadult Cougars from the Black Hills of South Dakota and Wyoming: Concepts of Range Edge, Range Expansion, and Repatriation. Page 203 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

Dispersal plays a vital role in cougar (*Puma concolor*) population ecology, increasing genetic viability and maintaining gene flow between populations. The Black Hills cougar population is at the eastern edge of cougar range in North America and completely surrounded by the Northern Great Plains. In addition, the population rebounded from practical extirpation to that of a flourishing breeding cougar population within the 20th century. Because of the semi-isolated nature of the re-established cougar population, we wanted to document dispersal movements of subadult cougars captured within the Black Hills ecosystem. Subadult cougars were captured during the winters of 2003-2006, fitted with VHF radio-transmitters, and monitored weekly. Locations were plotted in ArcGIS and dispersal distances calculated from capture point/natal home range to: site of death, last known location, or post-dispersal home range centerpoint. Kittens were captured by hand from radioed females to document age of independence and dispersal. A total of 29 subadult cougars were captured in the Black Hills (n=19 males, n=10 females). Cougars reached independence an average of 13.5 months from parturition; with dispersal occurring 1-3 months post independence. Males dispersed (mean = 302.5 km; range: 29.9-1,067.0 km) farther than females (mean = 48.5 km; range 12.5-110.1 km). Female cougars exhibited 40% philopatry, with no successful recruiting of subadult males to the Black Hills population. We documented several (n=5) long distance dispersal movements (>250 km) by male cougars and suggest that males making long-distance movements were in essence seeking an available mate. Dispersal movements away from the study area crossed atypical cougar habitat (i.e., prairie/grassland, agricultural and interstate highway systems). Our results suggest that cougar population connectivity, range expansion and habitat repatriation are occurring across North America. Furthermore we suggest that agencies react proactively to cougar movements and increase public knowledge of cougar ecology in areas where cougars have been devoid for long periods.

Thompson, D.J., D.M. Fecske, J.A. Jenks and A.R. Jarding. 2009. Food Habits of Recolonizing Cougars in the Dakotas: Prey Obtained from Prairie and Agricultural Habitats. The American Midland Naturalist 161(1):69-75.

Abstract

Food habits of cougars (*Puma concolor*) in North America have been documented for western populations in the United States, Canada and Mexico. Most studies assessed diets of cougars occupying typical habitats, and within established populations. We evaluated food habits of cougars in prairie and agricultural landscapes in the Dakotas (regions that had been devoid of the species for roughly a century) located well outside of known resident populations. We obtained stomach and gastrointestinal (GI) tracts from 14 cougars (10 male; 4 female) from 2003–2007, and evaluated contents via frequency of occurrence (%) of various prey items. Deer (*Odocoileus* spp.) had the highest frequency of occurrence (50.0%). Other native mammalian prey included jackrabbit (*Lepus townsendii*, *L. californicus*), porcupine (*Erethizon dorsatum*), beaver (*Castor canadensis*), badger (*Taxidea taxus*), mink (*Mustela vison*) and rodent species (e.g., vole). No domestic livestock species were documented as part of the cougar diet in the Dakotas, although remains of domestic housecat (*Felis silvestris*) were found in GI tracts of two animals. Based on our results, cougars occupying non-typical, newly recolonized habitats were successfully adapting predation techniques for capture of natural and newly confronted prey species. The wide range of prey encountered suggested that prey was being obtained opportunistically in prairie and agricultural landscapes of the Dakotas.

Thompson, M.J. and W.C. Stewart. 1994. Cougar(s), Felis concolor, with a Kill for 27 Days. Can. Field Nat. 108(4):497-498.

We observed a cougar (Felis concolor) beside a freshly killed adult female elk (Cervus elaphus) near Missoula, Montana, on 13 March 1994. We returned on 12 of the next 26 mornings, including 8 April, and always observed one cougar with the kill, but on 31 March we observed two cougars. On 9 April we did not observe a cougar, but a golden eagle (Aquila chrysaetos) was present on the kill. This is evidence for the longest reported association of a cougar with a kill.

Thomson, S.C. 1974. Sight Record of a Cougar in Northern Ontario. Can. Field Nat. 88(1):87.

A cougar was spotted on August 13, 1973, near Highway 11, less than 10 miles west of Hearst, in the District of Cochrane, Ontario. One imperfectly registered, fist-sized footprint was all that could be found.

Thornton, J.F. 1954. Mountain Lion Comeback in Alabama. Alabama Conservation. March/April p. 30-31.

A mountain lion was killed in St. Clair County, Alabama, on March 16, 1948, and was positively considered a wild lion. Mountain lions have been seen in the Bankhead National Forest, Winston and Lawrence Counties, in the 1940's to 1950. In 1950, The Bankhead deer were hit hard by disease and no reports of lions have been made there since. Persistent reports of mountain lions in the Choccolocco Division of the Talladega National Forest had recently been reported, although unconfirmed.

Tiefenbacher, J.P., M. Shuey and D.R. Butler. 2003. A Spatial Evaluation of Cougar-Human Encounters in U.S. National Parks: The Cases of Glacier and Big Bend National Parks. Pages 43-50 *in* L. A. Harveson, P. M. Harveson, and R.W.Adams, eds. Proceedings of the Sixth Mountain Lion Workshop. Austin. Texas.

Abstract

Tourist visitation to national parks in the western United States has climbed to record numbers over the past few decades. With changing levels of tolerance to large carnivores during this time and reduced persecution of the mountain lions in some areas, it appears that their population in the West has rebounded. The chance of human encounters with mountain lions has increased due to these trends. Human response to encounters is guided by a number of characteristics that might be represented by awareness, attitudes and motivations. To improve the chances of avoiding negative outcomes from encounters reports of encounters with mountain lions in two western parks are evaluated to determine the spatial settings of these events. Large-scale analyses of the patterns of the encounters in Glacier National Park, Montana and Big Bend National Park, Texas help to understand the landscapes within which encounters occur. Evaluation of these settings provides information that can assist in the development of effective hazard-communication tools.

Tischendorf, J.W. 1990. The Eastern Panther on Film? Results of an Investigation. Cryptozoology 9:74-78.

A privately-owned, poor quality, 10-minute videotape of an unidentified felid in New Brunswick was viewed by the author and Department of Resources and Energy biologists. The videotape was made by Roger and Donna Noble in Waasis, New Brunswick. After intensive scrutiny and research, which included the services of the Royal Canadian Mounted Police crime lab in Ottawa, it was determined that the animal in question was a subadult puma, possibly representing the presumed extinct Eastern puma subspecies, Felis concolor couguar.

Tischendorf, J.W. 1994. The Puma in the Central Mountains and Great Plains- A Synopsis. Blue Jay 52(4):218-223.

A synopsis and discussion of current knowledge and recent events relating to the puma in Saskatchewan, Manitoba, Minnesota, Wisconsin, North and South Dakota, Nebraska, and Kansas are presented.

Tischendorf, J.W. 1994. Are Cougars Back in the Northeast? AMC Outdoors 60(10):21-23.

The author presents evidence that the cougar may be making a comeback in the east and may not have ever been eliminated. A map of recent reports of cougar sightings in the northeast is provided.

Tischendorf, J.W., D.J. Scott, S.D. Scott and B. Heicher. 1995. A Sighting of a Large Group of Pumas (Puma concolor). Southwestern Naturalist 40(2):226-227.

The authors were unaware of any records of free-ranging groups of more than 6 pumas and the nocturnal gathering of 10-11 pumas is described. The pumas were observed on 26 September 1992 in a canyon 21 km south of Gypsum in west central Colorado from a car at 15 m. Three or four of the pumas were wrestling in the roadside drainage ditch and the others were lying on the road or were standing or walking around in loose association. This gathering may

have been the result of two adult females with four to five full-grown kittens.

Tischendorf, J.W. 2003. Cryptic Cougars – Perspectives on the Puma in the Eastern, Midwestern, and Great Plains Regions of North America. Pages 71-86 *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

The subject of cougars in eastern North America continues to intrigue and perplex wildlife biologists, managers, and nature enthusiasts. Almost uniformly considered extirpated throughout states and provinces in eastern and midwestern North America over a century ago, growing numbers of reports, some accompanied by incontrovertible evidence such as full specimens, blood, scat, track, or film documentation, suggest that *Puma concolor* is re-establishing, or has re-established, itself in some areas of this vast region. Similar evidence exists for the Great Plains. This paper, while probably raising more questions than it answers, examines the best and most current evidence for the occurrence of cougars in the East, Midwest, and Great Plains; discusses the official status of the species; and provides a perspective on the scientific, social, and political opportunities and challenges posed by this fascinating and compelling situation.

Tischendorf, J.W. 2006. Evaluating Puma Reports: Art, Science, Objectivity…and Diplomacy. Pages 100-107 in H.J. McGinnis, J.W. Tischendorf and S.J. Ropski editors. Proceedings of the Eastern Cougar Conference 2004, Morgantown, West Virginia, USA.

Abstract

Sightings and other reports of wildlife, including pumas, can play an important role in documenting the presence of a rare species, as well as provide preliminary and/or fundamental insight into its population structure, ecology, and ethology. The purpose of this paper is to not only establish a more rigorous framework and objective, evidence-based standard for evaluating reports of pumas and other wildlife, but also to highlight positive approaches to interacting and communicating with the principal observers or other interested parties. Five reports of pumas are discussed, with details of the sightings or encounters provided. Individualized approaches to dealing professionally, systematically, and diplomatically with each of these reports—and their respective observers—are presented.

Tischendorf, J. and K. Johnson. 2006. Return of the “Prairie Panther” and “Midwest Mountain Lion”. Pages 41-43 in H.J. McGinnis, J.W. Tischendorf and S.J. Ropski editors. Proceedings of the Eastern Cougar Conference 2004, Morgantown, West Virginia, USA.

Abstract

The possible existence of free-ranging pumas (Puma concolor) and/or their populations in eastern North America has been debated for decades. In the Great Plains, and midwestern regions of the continent, however, recent events more definitively indicate the presence of pumas. Over the past decade or so a surprising and growing number of pumas have been confirmed across a large geographic range from North Dakota to Minnesota, Iowa, Illinois, Kentucky, Arkansas, Missouri, and eastern Texas. This paper provides details of some of these confirmations, discusses the possible origins of these cats, and evaluates the status of other predators as a biological and social benchmark for habitat suitability and public acceptance of puma recolonization eastward.

Tischendorf, J.W. and J.R. Greenwell. 2006. The Jaguar in the Southwest: Implications for Puma Recovery in Eastern North America. Pages 149-153 in H.J. McGinnis, J.W. Tischendorf and S.J. Ropski editors. Proceedings of the Eastern Cougar Conference 2004, Morgantown, West Virginia, USA.

Abstract

Recent jaguar (Panthera onca) presence in the American Southwest is characterized by sporadic confirmations dating back to the early 1900s. This pattern is similar to that observed with the puma (Puma concolor) in the Great Plains, Midwest, and East. These two species provide a unique framework for evaluation and discussion of predator parallels

and contrasts, as well as for speculation on the potential for viable, ecological recovery of these large carnivores. Across North America, numerous species of wildlife, including many predators, are demonstrating success in range expansion, recolonization, and/or recovery. This paper also looks at these other species, both mammalian and avian, benchmarking their historical and present occurrences in relation to behavioral, ecological, political, and social aspects, with that of the jaguar and puma.

Tischendorf, J.W. 2007. 25 Years in the Cougar Game—A Biologist's Eclectic Insights and Musings. Page 7 in Abstracts of Presentations of the 3rd Midwestern-Eastern Puma Conference, Trent University, Peterborough, Ontario.

Abstract

This paper discusses several dimensions of the cougar-in-the-East topic, from promising new applications of old technology to old applications of new technology. Potential pitfalls and opportunities are discussed, with the caution that we should avoid reinventing broken wheels. Developments related to pumas in the Great Plains and Midwest are discussed. Suggestions for dealing with puma reports are proffered, as are recommendations for future research possibilities, outreach, and technology transfer.

Tischendorf, J.W. 2007. The Lion and the Jewel: Researching Pumas in Yellowstone National Park - A Keynote Address. Page 8 in Abstracts of Presentations of the 3rd Midwestern-Eastern Puma Conference, Trent University, Peterborough, Ontario.

Abstract

The mountain lion, or puma, was a native inhabitant of the area today known as Yellowstone National Park. Predator control activities in the 1800s and early 1900s for al intents and purposes exterminated the cat from the area. Occasional, sporadic confirmations of pumas were made over the ensuing years, however, leading to speculation as to the exact status of the species. A wintertime survey for evidence of pumas across the northern range of the Park was undertaken in 1986. This brief study confirmed the presence of a resident breeding population of pumas in the Park. Subsequent and yet-ongoing research employing radio-telemetry further quantified and characterized this puma population. This presentation, geared for all ages, discusses this research, highlights key ecological findings, and provides the audience with a close up and personal perspective of the rigors of large carnivore research in one of North America's most spectacular settings.

Tischendorf, J.W. 2007. The Yellowstone Lion- Implications in the Search for the Puma in Eastern and Midwestern North America. Page 9 in Abstracts of Presentations of the 3rd Midwestern-Eastern Puma Conference, Trent University, Peterborough, Ontario.

Abstract

The mountain lion, or puma, was a native inhabitant of the area today known as Yellowstone National Park. Predator control activities in the late 1800s and early 1900s largely extirpated the cat from the area. Occasional, sporadic confirmations of pumas were made over the ensuing years, however, leading to speculation as to the exact status of the species. A wintertime survey for evidence of pumas was completed in 1986. This brief study confirmed the presence of a breeding population of pumas in the Park. This effort provides a useful comparison or benchmark for similar efforts to document pumas elsewhere in North America, including the East and Midwest where the presence and status of the species is uncertain.

Toops, C. 1995. Cats of One Color. National Parks 69(7-8):30-35.

No specimen of a black mountain lion exists in North America. Several authorities on mountain lions are interviewed. About two dozen adults and 8-12 offspring are believed to live in Big Bend National Park which was about the limit that the Park would sustain. In the Southwest, cougars are doing extremely well. Habitat is not as critical of an issue as local shooting. California banned hunting of mountain lions and established a $30-million annual fund to buy and preserve habitat. The California lion population is estimated to be 4,000-6,000 along with more than 30 million people. Yellowstone National Park lion numbers vary between 16 and 22 as they wander in and out of the park. Western lion

populations may have increased 20-40 percent since the mid-1960s. More people are using remote areas where lions have retreated and it is now challenging to protect lions and people. A female jogger was killed by a lion in California in April 1994; a high school boy was killed four years ago in Colorado; and several other non-fatal attacks and near attacks have occurred in recent years. Lions have caused 11 fatalities and 48 injuries in the past century, which is a much smaller number than are attacked and/or killed by dogs each year. Another challenge is curbing attacks on livestock. The Eastern subspecies is listed as endangered and is treated as though it has been extirpated from the Northeast in spite of sightings from Vermont, New Hampshire and Maine. Many sightings are believed to be released pets. The Florida panther, estimated to number about 50 animals, is also in severe trouble from many different sources which are discussed.

Torres, S.G., T.M. Mansfield, J.E. Foley, T. Lupo, and A. Brinkhaus. 1996. Mountain Lion and Human Activity in California: Testing Speculations. Wildl. Soc. Bull. 24(3):451-460.

We compiled and analyzed 24 years (1972-1995) of verified incidents of mountain lions killing domestic animals (n = 2,663) to examine trend, distribution, and types of conflicts in California. To model the relationships between mountain lion depredation and various human activity and habitat factors, we tested 2 predictive models. Domestic sheep depredation in counties was significantly ($P< 0.05$) related to amount of suitable mountain lion habitat. We hypothesize that increasing domestic sheep depredation may reflect regional increases in the distribution and abundance of mountain lions. A regression model of percent pet depredation indicated a significant ($P < 0.05$) association with average annual new house development (1979-1993). Counties with significant pet depredation are in the same regions where public safety problems have occurred and reflect a radiation of human activity into mountain lion habitat. Mountain lion depredation data may be a useful index of regional mountain lion activity. Livestock and pet depredation problems are increasing in different regions of the state for different reasons; pet depredations are increasing the most rapidly. Pet depredation may be a useful indicator of mountain lion proximity to humans.

Torres, S., H. Keough and D. Dawn. 2003. Puma Management in Western North America: A 100-Year Retrospective. Page 148 *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

Puma (*Puma concolor*) populations have had a diverse and long history of management in western North America. For the most part of the last century, pumas were a bountied predator. By the early 1970s, they had transitioned to game mammal status. In the period since bounties ended, most states and provinces have reported increased puma activity that has been simultaneous with increased human populations and land conversion. We will present an analysis of the political and biological effects influencing puma populations during this period to provide perspective on the potential effects of bounty removals as they may relate to hypothesized increased populations in the latter part of the last century. This presentation will also explore the changing philosophy of predator management and the importance of maintaining predator-prey systems and redefining puma management to include their beneficial role in defining large blocks of habitat and movement corridors.

Tougias, R. 2006. Craftsbury Catamounts and the Ghost of Quabbin: Evidence in New England Neglected. Pages 26-33 in H.J. McGinnis, J.W. Tischendorf and S.J. Ropski editors. Proceedings of the Eastern Cougar Conference 2004, Morgantown, West Virginia, USA.

Abstract

Some of the best evidence in favor of the existence of relic cougar populations in the East has come from New England. In fact, there are two specific locations— northern Vermont and central Massachusetts—that have produced consistent reports and physical evidence. Such evidence has includes confirmed tracks, hair identified by physical characteristics, and more recently, by DNA analysis. Recently, one of these regions, known as the Quabbin Reservoir, has yielded actual tangible proof that at least one of them is of North American origin. This paper will discuss the recent history of sightings in those areas, mention research efforts, and give a general overview of reports from New England.

Toweill, D.E., and E.C. Meslow. 1977. Food Habits of Cougars in Oregon. J. WildI. Manage. 41:576-578.

The stomach contents of 13 male and 12 female cougars (Felis concolor) killed in Oregon by hunters was examined. Mule deer (Odocoileus hemionus) or black-tailed deer (Odocoileus h. columbianus) remains occurred in amounts ranging from a trace to 4 kg in 13 of the stomachs. Elk (Cervus elaphus) remains were found in 2 stomachs and remains of porcupine (Erethizon dorsatum) including flesh, bones, and large amounts of flaccid quills, were found in 3 stomachs. No damage attributable to the ingestion of the quills was found. Weight ranges of the cougars were: males (N=12) 39.5-75.8 kg (mean 54.9); females (N=12) 28.1-48.0 kg (mean 39.6). The remains of hares (Lepus sp.) and other small mammals were not found. No evidence of domestic animal remains were found in the stomachs examined in this study even though cattle, sheep, and horses were normally available. This was perhaps attributable to the domestic animals often being confined near human habitation in December when these stomachs were collected.

Toweill, D.E., C. Maser, M.L. Johnson, and L.D. Bryant. 1984. Size and Reproductive Characteristics of Western Oregon Cougars. Pgs. 176-184 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.

We examined 87 cougars (Felis concolor oregonensis) collected from Oregon's Cascade Mountains by sport hunters and U.S. Fish and Wildlife animal control personnel between 1978 and 1984. The sex ratio favored males (1.2 males:female), but did not differ significantly from 1:1. Females were more commonly killed during December and males were commonly taken during January. Male cougars averaged nearly 1.5 times the weight of females, and were also significantly larger in total body length and heart girth. Of 18 males whose testes were examined microscopically, 8 (44 percent) showed spermatozoa in the epididymides and were considered sexually mature. Reproductive tracts of 34 females were examined, 22 (65 percent) from animals believed to be adults. Over one-third of the 22 adult tracts examined showed no evidence of past reproductive activity. Mean litter size, based on placental scars present in the uteri of 11 cougars, averaged 2.8 kittens. Variability in numbers of Graafian follicles and corpora lutea precluded their use in estimation of individual fecundity.

Toweill, D.E., and C. Maser. 1985. Food of Cougars in the Cascade Range of Oregon. Great Basin Nat. 45(1):77-80.

Animal and nonanimal items were identified in the digestive tracts of 61 cougars (Felis concolor) collected between 1978 and 1984 from the western slopes of the Cascade Range in Oregon. Forty-two (69%) of the cougars were taken by hunters in December and January, 18 (30%) were killed at other times of the year because of their proximity to livestock, and one animal was illegally killed in November. Black-tailed deer (Odocoileus hemionus columbianus) was the most common prey item, although domestic sheep (Ovis aries), porcupines (Erethizon dorsatum), and a variety of small mammals were also recorded. Masticated grass was the most common nonanimal item.

Toweill, D.E. 1986. Notes on the Development of a Cougar Kitten. Murrelet 67(1):20-23.

One male cougar (Felis concolor missoulensis) was raised from approximately four days of age until it died of panleukopenia at 45 days of age. Information is presented on its behavioral development and growth.

Toweill, D.E., C. Maser, L.D. Bryant, and M.L. Johnson. 1988. Reproductive Characteristics of Eastern Oregon Cougars. Northwest Science 62(4):147-150.

Knowledge of reproductive characteristics and reproductive rates are a critical concern to wildlife managers, but such data are difficult to obtain for free-ranging predators. In order to obtain these data, we examined the reproductive tracts of 46 male and 51 female subadult and adult cougars (Felis concolor missoulensis) killed by hunters during the month of December, 1976-1982. Among males, 24 (52%) showed evidence of spermatogenesis. Sexually mature males may lack sperm during a portion of the year. Of the 51 females, 23 (45%) were classified as reproductively active based on evidence of corpora lutea in ovaries or sites of embryo implantations in uteri. Corpora lutea of pregnancy appear to be short-lived. Four females (8%) were pregnant in December. Placental scars of females may be used to estimate the minimal level of fecundity in the population. Estimated mean litter size based on placental scars (n=10)

was 2.4 ± 1.08 kittens. These data indicate that previously published guidelines for assessing sexual maturity of cougars based on body weight may lead to erroneous conclusions. The best estimator of cougar fecundity is provided by counts of placental scars.

Trainer, C.E., and G. Matson. 1988. Age Determination in Cougar from Cementum Annuli Counts of Tooth Sections. Pg. 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.

Using canines and small premolar teeth (PM2) located posterior to the upper canines, ages of cougar harvested in Oregon were determined by cementum analysis. Cementum bands were difficult to identify in both types of teeth, but annuli were more distinct and of a more regular pattern in PM2's than in canines. To test precision in determining ages, Matson aged 74 "blind pairs" of PM2's without knowing which members of a pair were from the same animal. In 41 of 74 pairs, the assigned ages agreed exactly; in 24, the ages varied by 1 year, and 9, by 2-5 years. Compared to age classes designated by measurements of cementum ridge lengths of upper canines in 71 cougars, ages determined from cementum annuli counts of PM2's agreed exactly in 21 of 22 cats of the 0-3 year age class, and were either the same or 1 year younger in 28 of 49 cats judged to be 4 years or older. In the remaining 22 animals, ages assigned by cementum analysis averaged 2 years younger than those assigned from cementum ridge measurements. Findings to date indicate that cementum analysis of PM2 teeth for age determination in cougar can yield consistent results and has potential for sampling age structures. Validation of the accuracy of the technique, however, must come through examination of teeth of known-age animals. In studies where free-ranging mountain lions are tagged, there may be opportunities to collect teeth from mortalities of known-age adults.

True, F.W. 1889. The Puma, or American Lion: Felis concolor of Linnaeus. Smithsonian Inst. Annual Report: 591-608.

A general account of the puma is presented and many previous authors are cited. Several measurements of pumas are furnished. The puma had not been found in New Hampshire, Rhode Island, New Jersey, Delaware, Michigan, or Indiana. The puma was extirpated in Ohio prior to 1838, and probably more recently in Illinois and Indiana. The author could find no record of the puma in Nevada. With these exceptions, there were recorded instances of puma occurring in every other state and territory of the Union, dating back to 1800. The localities in several states and territories in which individual pumas have been captured or seen are provided.

Trulio, L.A. 1988. Preliminary Results: Survey on Mountain Lion Research Methods. Pgs. 44-46 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.

SUMMARY

Respondents listed the three primary problems with research today as funding, study length/intensity, and methodology problems. These problems all impede the understanding of mountain lions and prevent us from addressing the threats which face this species. These threats are numerous and range from habitat loss and grazing pressure, which were top choices by respondents, to long-term management direction. The purpose of this survey was to help address some of the problems surrounding methodology. The results are preliminary and a final summary will be available early in 1989.

Tsukamoto, G. 1984. Nevada-Cougar Status Report. Pgs. 44-48 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.

Mountain lion populations in Nevada were never very dense but appeared to rise with increasing mule deer populations in the 1930's and 1940's. Lion harvests increased from 46 animals harvested from 1917 to 1931 to an average of 90 lions/year in the 1950's. In 1965 the mountain lion was given the status of a game animal and in 1968 tags were required to take a lion. In 1970, a limit of one lion per hunter per year was imposed and a checkout of lions harvested was mandated. Populations declined into the early 1970's until severe restrictions were implemented and

populations have generally increased since the mid 1970's. A table is provided which outlines the 5-year harvest and season summary from 1979-1983. Either sex may be taken, but the taking of females with kittens is discouraged. Harvest objectives are determined by estimating lion populations and setting a 25%-30% harvest rate.

Tully, R.J. 1991. Results, 1991 Questionnaire on Damage to Livestock by Mountain Lion. Pgs. 68-74 In: Mountain Lion-Human Interaction Symposium, C.E. Braun (ed.). Col. Div. Wildl., Denver. 114pp.

Three one-page questionnaires were sent to wildlife management agencies where cougar populations have been reported in recent literature. Four states and two provinces were liable for damage to livestock by mountain lions and compensate property owners for injury or death of livestock. Colorado had paid more per year than any other state or province. Considerable funds are also expended in damage control and the amount varies by agency. Several agencies spend considerably more for damage prevention and livestock damage claims than received from license fee income. Property owners in all states and provinces may kill mountain lions that inflict damage. The kill must be reported and, in some locations, the carcass must be presented to the agency for investigation. A kill permit is required by several management agencies, but is often issued after the fact. Domestic sheep on open range are considered the most significant problem. During 1987-1990, agency personnel took about 1,160 mountain lions, an average of 290 per year. Recommendations and tables are provided concerning damage to livestock by mountain lions.

Turbak, G. 1982. The Cougar's New Cloak. National Wildlife 20(3):47-54.

By 1900, cougars had virtually disappeared from the eastern United States. In 1965, Colorado reclassified the cougar from predator to game animal, and most other western states quickly followed suit. Only Texas does not protect its cougars with a closed season. California claims to possess 2400 resident cougars, New Mexico 2500, Arizona 2500, Washington 2000, Oregon 1200, and Wyoming 750. University of Idaho biologist Maurice Hornocker studied cougars for ten winters and compiled the first significant scientific data on the species. The cougar is an expert stalker and creeps to within a few feet of its prey and leaps to the back of its victim. If the quarry is a deer, the lion will bite it in the head or back of the neck, instantly severing the spinal cord. However, if the prey is an elk, the cat must kill the elk by grasping the head with its paws and breaking the elk's neck with a sudden twist. Hornocker never once heard a lion scream in his 10 years of cougar studies. He has heard the birdlike whistles which they use to communicate with each other and the yowl's during the breeding season. Lions are capable of such sounds but screaming is counter to their shy and secretive nature and way of life.

Turbak, G. 1985. Myth Buster. National Wildlife 23(5):38-42.

The career of wildlife researcher Maurice Hornocker who pioneered the study of the mountain lion is highlighted.

Turner, J.W., Jr., L.M. Wolfe and J.F. Kirkpatrick. 1992. Seasonal Mountain Lion Predation on a Feral Horse Population. Can. J. Zool. 70(5):929-934.

A population of feral horses (Equus caballus) was studied from 1986 to 1991 to determine the demographic impact of predation by the mountain lion (Felis concolor). The population, inhabiting a 600-km^2 area on the central California - Nevada border comprised approximately 162 individuals > 1 year old, with an average of 9 yearlings, 8 two-year-olds, and 144 adults. Numbers of horses varied by only 4 - 8% and showed no consistent trend. The parturition peak spanned May and June, when 80% of foaling occurred. One-third of the average annual cohort of 33 foals was missing by July and only half of the cohort remained by October. The mean first-year survival rate estimated from the differential incidence of foals and yearlings in successive years was 0.27, which was less than one-third of the foal survival rate reported for other feral horse populations. A minimum of four adult mountain lions used the study area each year between May and October. Of 28 foal carcasses located from May to mid-July, at least 82% were the result of mountain lion kills. No evidence of predation on older horses was observed, but mountain lions preyed on mule deer (Odocoileus hemionus) during winter. We conclude that the growth of this horse population is limited by predation.

Turner, J.W. Jr. and M.L. Morrison. 2001. Influence of Predation by Mountain Lions on Numbers and Survivorship of a

Feral Horse. Southwestern Naturalist 46(2):183-190.

Abstract

In an effort to expand our knowledge of the ecology of feral horses (*Equus caballus*), we initiated a study of the Montgomery Pass Wild Horse Territory (MPWHT), located along the California-Nevada border at the northern end of the White Mountains. We report on 11 years (1987-1997) of data on numbers, productivity, and survivorship of the feral horse population in the MPWHT. The majority of the MPWHT is located in pinyon-juniper (*Pinus-Juniperus*) wood- land. The adult horse population averaged 150 individuals, with a significant decrease occurring across the study. The number of foals born ranged between 29 and 35 through 1993, dropped to 22 to 24 for 1994-1996, and rebounded to 31 in 1997. Although mule deer (*Odocoileus hemionus*) are the primary prey of mountain lions (*Felis concolor*), extensive predation on foals occurred in MPWHT. The average number of foals killed each year by mountain lions was 13.5 (45.1% of foals produced). There was a significant difference in the proportion of foals killed by coat color relative to the distribution of colors born into the population. Annual survival (May to April) rate for foals averaged 0.32, ranging from a low of 0.23 during 1987-1988, to a high of 0.48 in 1996-1997. Yearling survival averaged 0.88, ranging from a low of 0.5 in 1994-1995, to a high of 1.0 in 5 of the annual periods. Adult survivorship averaged 0.92, ranging from a low of 0.81 in 1992-1993, to a high of 1.0 in 4 of the annual periods. The lion population was 4 to 5 from 1987 through 1991, increased to 8 in 1992, and then slowly decreased through 1996. Number of lions dropped to 3 animals in 1997. The resident mountain lion population is significantly influencing number of horses in the MPWHT, primarily through predation of foals. Increased foal survival during the latter part of our study, and especially during 1997, was apparently related to a substantial decrease in number of lions.

United States Department of the Interior Fish and Wildlife Service. 1985. Fakahatchee Strand: A Florida Panther Habitat Preservation Proposal. Final Environmental Assessment. Southeast Region, Atlanta, Georgia.

This final environmental assessment considers the biological, environmental and socioeconomic effects of protecting and preserving approximately 88,000 acres of Florida panther habitat in the Fakahatchee Strand area of the Big Cypress Swamp. The impacts of alternative actions and the degree to which each alternative would accomplish habitat preservation goals are examined and evaluated. The Proposed Action (Alternative 6) of the U.S. Fish and Wildlife Service provides for a "team approach" to preservation involving the Fish and Wildlife Service, the State of Florida, and the National Park Service. The primary means of preservation will be fee title and easement acquisition; however, other methods such as land exchanges, management agreements, and leases may be used.

U.S. Fish and Wildlife Service. 1987. Florida Panther (Felis concolor coryi) Recovery Plan. Prepared by the Florida Panther Interagency Committee for the U.S. Fish and Wildlife Service, Atlanta, Georgia. 75pp.

This is the completed revision of the Florida Panther Recovery Plan which was originally approved in 1981. It was not possible to adequately summarize the Florida Panther Recovery Plan. The reader should refer to the plan for content.

U.S. Fish and Wildlife Service. 1989. Status Report on Mercury Contamination in Florida Panthers. Prepared by the Technical Subcommittee of the Florida Panther Interagency Committee. Atlanta, Ga. 44pp.

Extremely high levels of mercury (100 parts per million) were found in the liver of a Florida panther that died in the Everglades on July 26, 1989 and mercury toxicosis was suspected. Analysis of tissue samples from other dead panthers recovered since 1978 also contained mercury at levels of concern. Panthers with higher elevated mercury levels were found in the Fakahatchee Strand and East Everglades area and these areas appeared to be mercury "hot spots". The presumed source of contamination was from contaminated prey, probably raccoons. The "hot spots" were correlated with low availability of deer and hogs and high consumption rates of small mammals such as raccoons. Reproductive success was lower in these areas and could be due to poor nutritional status and possibly is compounded by mercury contamination.

U.S. Fish and Wildlife Service. 2008. Florida Panther Recovery Plan (*Puma concolor coryi*), Third Revision. U.S. Fish and Wildlife Service. Atlanta, Georgia. 217pp.

Executive Summary

Current Species Status

The Florida panther is the last subspecies of *Puma* still surviving in the eastern United States. Historically occurring throughout the southeastern United States, today the panther is restricted to less than 5% of its historic range in one breeding population located in south Florida. The panther population has increased from an estimated 12-20 (excluding kittens) in the early 1970s to an estimated 100 - 120 in 2007. However, the panther continues to face numerous threats due to an increasing human population and development in panther habitat negatively impacts recovery. The panther is federally listed as endangered (see Appendix A for definitions) under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) and is on the State endangered lists for Florida, Georgia, Louisiana, and Mississippi. The panther has a recovery priority number of 6c.

Habitat Requirements and Limiting Factors

Panthers are wide ranging, secretive, and occur at low densities. They require large contiguous areas to meet their social, reproductive, and energetic needs. Panther habitat selection is related to prey availability (i.e., habitats that make prey vulnerable to stalking and capturing are selected). Dense understory vegetation provides some of the most important feeding, resting, and denning cover for panthers. Telemetry monitoring and ground tracking indicate that panthers select forested habitat types interspersed with other habitat types that are used in proportion to their availability. Limiting factors for the Florida panther are habitat availability, prey availability, and lack of human tolerance. Habitat loss, degradation, and fragmentation is the greatest threat to panther survival, while lack of human tolerance threatens panther recovery. Panther mortality due to collisions with vehicles threatens potential population expansion. Potential panther habitat throughout the Southeast continues to be affected by urbanization, residential development, road construction, conversion to agriculture, mining and mineral exploration, and lack of land use planning that recognizes panther needs. Public support is critical to attainment of recovery goals and reintroduction efforts. Political and social issues will be the most difficult aspects of panther recovery and must be addressed before reintroduction efforts are initiated.

Recovery Strategy

The recovery strategy for the Florida panther is to maintain, restore, and expand the panther population and its habitat in south Florida, expand this population into south-central Florida, reintroduce at least two additional viable populations within the historic range outside of south and south-central Florida, and facilitate panther recovery through public awareness and education. The panther depends upon habitat of sufficient quantity, quality, and spatial configuration for long-term persistence, therefore the plan is built upon habitat conservation and reducing habitat-related threats. Range expansion and reintroduction of additional populations are recognized as essential for recovery. Similarly, fostering greater public understanding and support is necessary to achieve panther conservation and recovery.

Recovery Goal

The goal of this recovery plan is to achieve long-term viability of the Florida panther to a point where it can be reclassified from endangered to threatened, and then removed from the Federal List of endangered and threatened species.

Recovery Objectives

1. To maintain, restore, and expand the panther population and its habitat in south Florida and expand the breeding portion of the population in south Florida to areas north of the Caloosahatchee River.
2. To identify, secure, maintain, and restore panther habitat in potential reintroduction areas within the historic range, and to establish viable populations of the panther outside south and south-central Florida.
3. To facilitate panther recovery through public awareness and education.

Recovery Criteria

Reclassification will be considered when:

1. Two viable populations of at least 240 individuals (adults and subadults) each have been established and subsequently maintained for a minimum of twelve years (two panther generations; one panther generation is six years [Seal and Lacy 1989]).
2. Sufficient habitat quality, quantity, and spatial configuration to support these populations is retained / protected or secured for the long-term.

A viable population, for purposes of Florida panther recovery, has been defined as one in which there is a 95% probability of persistence for 100 years. This population may be distributed in a metapopulation structure composed of subpopulations that total 240 individuals. There must be exchange of individuals and gene flow among subpopulations. For reclassification, exchange of individuals and gene flow can be either natural or through management. If managed, a commitment to such management must be formally documented and funded. Habitat

should be in relatively unfragmented blocks that provide for food, shelter, and characteristic movements (e.g., hunting, breeding, dispersal, and territorial behavior) and support each metapopulation at a minimum density of 2 to 5 animals per 100 square miles (259 square kilometers) (Seidensticker et al. 1973, Logan et al. 1986, Maehr et al. 1991a, Ross and Jalkotzy 1992, Spreadbury et al. 1996, Logan and Sweanor 2001, Kautz et al. 2006), resulting in a minimum of 4,800 – 12,000 square miles (12,432 – 31,080 square kilometers) per metapopulation of 240 panthers. The amount of area needed to support each metapopulation will depend upon the quality of available habitat and the density of panthers it can support.

Delisting will be considered when:

1. Three viable, self-sustaining populations of at least 240 individuals (adults and subadults) each have been established and subsequently maintained for a minimum of twelve years.
2. Sufficient habitat quality, quantity, and spatial configuration to support these populations is retained / protected or secured for the long-term.

For delisting, exchange of individuals and gene flow among subpopulations must be natural (i.e., not manipulated or managed).

Interim Recovery Goal

Due to the challenging nature of attaining the recovery criteria, an interim recovery goal has been established to assist in determining progress towards the ultimate goals of reclassification and delisting. This interim goal is to achieve and maintain a minimum of 80 individuals (adults and subadults) in each of two reintroduction areas within the historic range and to maintain, restore, and expand the south / south-central Florida subpopulation.

The interim goal will be met when:

1. The south / south-central Florida panther subpopulation has been maintained, restored, and expanded beyond 80 to 100 individuals (adults and subadults).
2. Two subpopulations with a minimum of 80 individuals each have been established and maintained within the historic range.
3. Sufficient habitat quality, quantity, and spatial configuration to support these three subpopulations is retained / protected or secured for the long-term. There must be exchange of individuals and gene flow among these subpopulations. This exchange of individuals and gene flow can be either natural or through management.

Actions Needed

1. Maintain, restore, and expand the panther population and its habitat in south Florida.
2. Expand the breeding portion of the population in south Florida to areas north of the Caloosahatchee River.
3. Identify potential reintroduction areas within the historic range of the panther.
4. Reestablish viable panther populations outside of south and south-central Florida within the historic range.
5. Secure, maintain, and restore habitat in reintroduction areas.
6. Facilitate panther conservation and recovery through public awareness and education.

Total Estimated Cost of Recovery

Cost estimates reflect costs for specific actions needed to achieve Florida panther recovery. Estimates do not include costs that agencies or other entities normally incur as part of their mission or normal operating expenses. A table is provided that estimates the cost of recovery for 5 years by Recovery Action Priority. These costs reflect an estimate of funding that could come from FWS and / or its many partners listed in the Implementation Schedule. Costs for some recovery actions were not determinable; therefore, the total cost for recovery during this period is higher than this estimate.

Date of Recovery

If all actions are fully funded and implemented as outlined, including full cooperation of all partners needed to achieve recovery, criteria for reclassification from endangered to threatened could be accomplished within 30 years; criteria for delisting could be accomplished within 45 years following reclassification. However, due to the challenging nature of panther recovery these are estimates that will be reevaluated as recovery actions are implemented.

U.S. Fish and Wildlife Service and Florida Panther Recovery Team. 1981. Florida Panther Recovery Plan. Atlanta, Georgia. 32pp.

The Florida Panther Recovery Team was appointed by the U.S. Fish and Wildlife Service in July 1976 to prepare and assist in coordinating the implementation of a recovery plan. Consistently documented evidence of the animal's presence was available only from the Fakahatchee Strand, Big Cypress National Preserve, Everglades National Park, and Collier-Seminole State Park in Collier, Dade, and Monroe Counties, Florida. The recovery objective was to prevent extinction and reestablish viable populations of the Florida panther in as much of the former range as feasible.

The plan is outlined and steps which are necessary to complete the recovery objective are delineated. An implementation schedule is provided which lists priority actions necessary to prevent extinction, maintain population status, and other actions necessary for full recovery of the species. It was deemed vital that the Department of Natural Resources acquire the remaining acres of the Fakahatchee Strand and adjacent prairies and cypress forests to insure a unified management strategy and provide an extremely important permanent corridor of natural habitat between the Fakahatchee Strand, the Big Cypress National Preserve, and the Everglades National Park. It was recommended that hunting be discontinued in the Fakahatchee Strand and that portion of the Big Cypress National Preserve where panthers were presently known to occur.

Uzal, F.A., R.S. Houston, S.P.D. Riley, R. Poppenga, J. Odani and W. Boyce. 2007. Notoedric Mange in Two Free-Ranging Mountain Lions (*Puma concolor*). J. Wildl. Dis. 43:274-278.

Abstract

Two mountain lions (*Puma concolor*) were found dead in the Simi Hills area of southern California (Ventura County). Postmortem examination and toxicological analyses indicated that the cause of death was anticoagulant rodenticide intoxication. In addition, both lions had marked alopecia and skin crusts, caused by *Notoedres cati*. The diagnosis of notoedric mange was confirmed by histology and direct examination of mites obtained from skin scrapings of the two animals. Histologically, the affected skin showed acanthotic epidermis with parakeratosis and parasitic tunnels in the stratum corneum. This is the first report of the pathological changes associated with notoedric mange in free-ranging mountain lions.

Vales, D.J. and R.D. Spencer. 2003. A Case of Mountain Lion Limiting an Elk Population: The Green River Watershed, Washington. Pages 76-77 *in* L. A. Harveson, P. M. Harveson, and R.W.Adams, eds. Proceedings of the Sixth Mountain Lion Workshop. Austin. Texas.

Abstract

Predation by mountain lions (Puma concolor) is well known to potentially affect prey populations. We report on a case of mountain lion limitation on an elk (Cervus elaphus) population in a 598 km^2 watershed of which approximately 400 km^2 are restricted-access to protect public water supply. Early spring elk numbers in the Green River watershed were estimated at 612 in 1994 but by 1997 were down to 227. Known hunter-harvest mostly regulated by permit-only hunting during that time was 131 of which 91 were antlerless elk. Elk hunting was stopped for the restricted-access portion of the watershed starting in 1997. Based upon territory overlap from a mountain lion telemetry study mountain lion numbers were estimated to be about 18 to 25 in the early 1990's. Mountain lions have not been hunted in 2/3 of the watershed since the mid-1980's when the watershed was closed to public access. To assess mortality rates and causes we radio-marked adult cow elk and calves starting in April 1998. Annual adult cow mortality rates due to mountain lion predation were 16%. Annual calf mortality rates due to mountain lion were at least 40% in 1998 and 79% in 1999. We captured and radio-marked 7 adult mountain lions. Individuals were also identified using DNA analyses of fecal samples collected from kill sites. The mountain lion population during the 1998 to 1999 period was estimated at 7 to 12 adults. Alternative prey included black-tailed deer and mountain goat while the primary alternative predator is black bear. The data clearly show the potential impact unregulated mountain lion numbers have on a prey population resulting in restricted opportunity for hunter harvest.

Vales, D.J. 2005. Modeling Prey and Cougar with an Approach for Managing Cougars to Meet Prey Population Objectives. Page 170 *in* R.A. Beausoleil and D.A. Martorello, editors. Proceedings of the Eighth Mountain Lion Workshop, Olympia, Washington, USA.

Abstract

Wildlife population objectives for predator and prey are often developed independent of each other and without rigorous population analyses. I present a modeling and management approach developed by the Muckleshoot Wildlife Program to bring balance between cougar *(Puma concolor*) and their principal prey, elk *(Cervus elaphus*) and black-tailed deer *(Odocoileus hemionus columbianus*) in western Washington. The modeling approach will help managers

set population objectives and conduct management actions necessary to reach those objectives. The model is based upon empirical data collected on radio-marked animals over 6 years. Prey population estimates are fundamental inputs to the model. The Tribe's approach is to radio-mark and monitor the predicted core cougar population compatible with prey population objectives. The model is used to predict the allowed increase in cougar numbers as elk and deer numbers increase. The approach is hands on and involves micromanagement, but is necessary to understand and preserve a way of life that tribal members depend on. In this presentation I describe the conflicting management objectives set within the Washington Department of Fish and Wildlife and between the Muckleshoot Tribe and WDFW, data needs for the model approach, predictions, anticipated management actions, and need for a balanced analytical approach toward conserving both predator and prey.

Vanas, J. 1976. The Florida Panther in the Big Cypress Swamp and the Role of Everglades Wonder Gardens in Past and Future Captive Breeding Programs. Pgs. 109-111 In: Pritchard, P.C.H., (ed.), Proc. Florida Panther Conf., Orlando, Florida. 121pp.

The Florida panther seems to have had a historic stronghold in southwest Florida in the Big Cypress Swamp. Between the early 1930's and early 1950's perhaps as many as 40 panthers were killed in the Big Cypress. A deer eradication program was in effect during the late 1930's and early 1940's to help wipe out the fever tick and rancher feline hunting efforts increased due to increased livestock losses to panthers. The Everglades Wonder Gardens, a private zoological park in southern Lee County, possessed four male and four female panthers which accounted for their original breeding stock. Five or six captive raised panthers had been released into Everglades National Park.

Vandewoude, S., S.J. O'Brien, and E.A. Hoover. 1997. Infectivity of Lion and Puma Lentiviruses for Domestic Cats. J. Gen. Virol. 78:795-800.

Abstract

Infection of domestic cats with feline immunodeficiency virus (FIV) causes progressive immunological deterioration similar to that caused by human immunodeficiency virus (HIV). Lentiviruses related to but phylogenetically distinct from FIV have been detected in several non- domestic feline species. Serological cross-reactivity of these viruses raises the question as to whether inter-species transmission may occur. To address this issue, we asked whether lion lentivirus (FIV-Ple) or two strains of puma lentivirus (FIV-Pco) could replicate or cause disease in domestic cats. We found that domestic cats inoculated with FIV-Ple developed persistent cell-associated viraemia, transient cell- free viraemia and antiviral antibody. Clinical disease was not detected throughout a 6 month observation period. Two of four cats inoculated with FIV-Pco developed cell-associated viraemia, seroconverted and exhibited transient lymphadenopathy. No changes in white blood cell parameters or other haematological abnormalities were detected in any of the infected cats. Virus-specific RNA was detected in co-cultivated lymphocytes of all infected cats by RT-PCR. These findings reveal that non-domestic cat lentiviruses are infectious for domestic cats and can establish persistent infection in the absence of disease.

Vandewoude, S., S.J. O'Brien, K. Langelier, W.D. Hardy, J.P. Slattery, E.E. Zuckerman and E.A. Hoover. 1997. Growth of Lion and Puma Lentiviruses in Domestic Cat Cells and Comparisons with FIV. Virology 233(1):185-192.

Abstract

Feline immunodeficiency virus (FIV-Fca) is a lentivirus that causes gradual immunological deterioration in domestic cats. Lentiviruses related to FIV have been detected in several nondomestic feline species; the biologic significance of these viruses remains to be defined. To examine the in vitro cell tropism of these nondomestic cat lentiviruses, prototypical puma and lion lentiviruses (FIV-Pco and FIV-Ple) were cultured in a variety of feline cell cultures. A domestic cat T lymphoma cell line, 3201, best supported the replication of both FIV-Pco and FIV-Ple. Moreover, FIV-Ple was lytic for these cells. RT-PCR amplification of a conserved pol gene region demonstrated species-specific primer homology. Sequence and phylogenetic analyses of this amplification product confirmed the identity of the replicating viruses and classified two previously uncharacterized viruses within predictable lion and puma clades. Sequence analysis of a conserved pol region demonstrated homology with previously characterized FIV-Ple and FIV-Pco. Western blot analysis using domestic cat anti-FIV-Fca sera showed that both FIV-Pco and FIV-Ple were

antigenically related, to differing degrees, to three serotypes of FIV-Fca. These studies demonstrate that though nondomestic cat lentiviruses differ significantly from FIV-Fca and that a viral-specific protocol may be necessary for sensitive viral detection, these viruses can replicate in cells of domestic cats. suggesting the potential for cross-species transmission.

VandeWoude, S., C.A. Hageman, S.J. O'Brien and E.A. Hoover. 2002. Nonpathogenic Lion and Puma Lentiviruses Impart Resistance to Superinfection by Virulent Feline Immunodeficiency Virus. J. Acquir. Immune. Defic. Syndr. 29(1):1–10.

Summary

Lion lentivirus (LLV) and puma lentivirus (PLV) exist as highly divergent virus clades among populations of indigenously infected nondomestic felidae. The feline immunodeficiency virus (FIV) is highly divergent from LLV and PLV and is pathogenic for domestic cats. When domestic cats are infected with LLV or PLV, they have immunologically and clinically silent persistent infections. We examined whether LLV or PLV infection might impart resistance to FIV superinfection in vitro by infecting domestic cat lymphoid cells with PLV and assessing resistance of these cells to FIV. We found that infection with FIV was highly restricted by prior established PLV infection. To examine whether this resistance applied in vivo, domestic cats were asymptomatically infected with either LLV or PLV and then challenged with pathogenic FIV. Although all cats became infected with FIV, prior LLV or PLV exposure blunted CD4 + cell depletion and suppressed plasma and peripheral blood mononuclear cell FIV loads relative to FIV-challenged controls not infected with LLV or PLV, despite the lack of prechallenge neutralizing antibody activity against FIV. Thus, as compared with naive controls, cats previously infected with LLV or PLV were able to more effectively control FIV infection and resist its immunologic effects, despite the substantial genetic divergence between these lentiviruses-raising the possibility that superinfection may impart resistance to lentivirus infection by heightening innate immune mechanisms.

Vandewoude, S., C.L. Hageman and E.A. Hoover. 2003. Domestic Cats Infected with Lion or Puma Lentivirus Develop Anti-Feline Immunodeficiency Virus Immune Responses. J. Acquir. Immune. Defic. Syndr. 34:20-31.

Abstract

Attenuated live viral strains have afforded significant protection against virus challenge in HIV vaccine models. Although both cellular and humoral immunity are assumed to be vital for protection specific parameters consistently associated with control of infection have been elusive. Our previous studies have shown that lentiviruses from 2 nondomestic feline species-lion (*Pathera leo*) and puma (*Felis concolor*)-persistently but nonpathogenetically infect domestic cats (*Felis domestica*). Moreover, infection with either the puma lentivirus (PLV) or lion lentivirus (LLV) conferred partial protection against superinfection with virulent feline immunodeficiency virus (FIN), the feline equivalent of HIV. To determine whether domestic cats infected by the lentiviruses of pumas or lions generate cross-reactive immune responses, we infected groups of 5 domestic cats with PLV, LLV, or a sham control and then monitored virus load, hematologic parameters, antibody protection, proliferative responses, and the ability of blood mononuclear cells to inhibit LLV, PLV, and FIV replication in vitro. All cats inoculated with LLV or PLV developed persistent infection, and low-level cell-associated viremia has been previously described Infected cats also generated robust antibody titers and lymphocytes that proliferated in response to viral antigens and downregulated PLV, LLV, and FIV replication in vitro. This latter activity was CD8 cell associated for PLV and LLV inhibition but not for FIV inhibition. Thus, cats infected with the phylogenetically more ancient and less pathogenic feline lentiviruses generated humoral and cell-mediated immune responses reactive against both the homologous viruses and the heterologous FIV of domestic cats, which correlated with decreased viral load. These results are analogous to protection studies with attenuated primate immunodeficiency viruses and provide a system by which to examine adaptation. interference, and cross protection among lentiviruses.

Van Dyke, F. 1983. A Western Study of Cougar Track Surveys and Environmental Disturbances Affecting Cougars Related to the Status of the Eastern Cougar (Felis concolor couguar). Ph.D. Thesis, State Univ. of New York, Syracuse. 245pp.

Cougars (Felis concolor) in Utah and Arizona were studied to address problems related to the status of the eastern cougar (Felis concolor couguar). Sighting and track reports appear unreliable as indices of cougar population status. The reported sighting frequencies among professional cougar hunters, western deer hunters and western campers were low (one cougar sighting per 8.8, 13.4 and 16.2 years respectively) and statistically unrelated (P>0.15) to days afield or seasonal patterns of outdoor activity. Sixty-eight percent of western deer hunters, 59% of western campers and 74% of eastern deer hunters interviewed could not describe the diagnostic features of a cougar track. Searches of sites which cougars had visited indicated that finding tracks or other physical evidence of cougar was independent of substrate (snow or dirt) or site age (1 to 9 days after cougar visit). However, searches were more successful where ground cover was absent (94% successful) than where ground cover was present (36% successful, (P<0.05). Movements of radio-collared cougars indicated one road crossing, especially of unimproved dirt roads, every 5 to 12 days. Road crossing frequencies were related (r_s=0.57) to total home area road densities of cougars. Improved dirt and hard-surfaced roads occurred less often in home areas and appeared to have been crossed less frequently than unimproved dirt roads. Track searches of roads indicated that, under ideal conditions, track numbers were sensitive (r^2=0.61) to changes in the density of adult females, but sensitivity was less for other cohorts and declined further under less-than-ideal conditions. All residents were detected by searches over a 14-month period, but effort required for detection varied with cougar characteristics. Logged areas were not used by long-term resident cougars up to 6 years after logging. Cougars, normally crepuscular, shifted peak activity to after sunset and before sunrise when close to human disturbance. Transient cougars encountered disturbances more often and more frequently than residents. Areas selected by cougars for residence generally had low road densities, absence of timber sales and few or no human residences. Disturbances evaluated appeared potentially most adverse to transient cougars.

Van Dyke, F.G., R.H. Brocke, and H.G. Shaw. 1986. Use of Road Track Counts as Indices of Mountain Lion Presence. J. Wildl. Manage. 50(1):102-109.

Interactions of mountain lions (Felis concolor) with roads and the effectiveness of searches for tracks on roads as a means of assessing mountain lion populations were examined in Arizona and Utah on 3 study areas. Road crossing frequencies were related to total home area road densities of individual lions. Unimproved dirt roads were crossed most frequently. Improved dirt roads and hard-surfaced roads were crossed less often and were less likely to occur within lion home areas, suggesting possible avoidance. Seventy searches for mountain lion tracks on roads were conducted in southern Utah in areas where densities and distributions of radio-collared mountain lions were known and where tracking conditions on roads were measured objectively. Changes in the density of resident female lions explained 61% (r^2= 0.61) of the variation in track finding rates under ideal conditions. Under all tracking conditions, resident females required the least effort to detect (51.1 km searched/track set found) of all population cohorts. All resident lions, 78% of transient lions, and 57% of cubs were detected by track searches. Use of road track searches as indices of mountain lion populations is discussed.

Van Dyke, F.G., R.H. Brocke, H.G. Shaw, B.B. Ackerman, T.P. Hemker, and F.G. Lindzey. 1986. Reactions of Mountain Lions to Logging and Human Activity. J. Wildl. Manage. 50(l):95-102.

Reactions of mountain lions (Felis concolor) to logging and to various human activities were studied in northern Arizona from 1976 to 1980 and in south-central Utah from 1979 to 1982. Resident mountain lions rarely were found in or near (1 km) sites logged within the past 6 years. Younger (2 or 3 year-old) mountain lions were found in logged areas more often than older mountain lions, but 4 of 5 young mountain lions that visited logged areas did not maintain residence there. In the absence of human disturbance, mountain lions showed peak activity less than or equal to 2 hours of sunset and sunrise. Near human presence, lion activity peaks shifted to after sunset. Other activity was concentrated during night hours and there was no peak of activity at sunrise. Dispersing juvenile mountain lions encountered human disturbances more frequently than resident lions (P< 0.05). Established residents and young mountain lions that ultimately became residents selected home areas with road densities lower than the study area average, no recent timber sales, and few or no sites of human residence. All disturbances examined appeared to have at least potential adverse impacts on mountain lions, especially on dispersing juveniles.

Van Dyke, F.G. and R.H. Brocke. 1987. Sighting and Track Reports as Indices of Mountain Lion Presence. Wildl. Soc. Bull. 15(2):251-256.

SUMMARY AND CONCLUSIONS

Mountain lion sightings are rare events among individual campers and deer hunters, widely separated in time, and unrelated to amount or seasonal pattern of outdoor activity. Hunting or driving were activities most commonly associated with lion sightings. Most campers and hunters could not identify a lion track or describe its diagnostic features. Indiscreet solicitation of lion sightings by management agencies is an inefficient, inappropriate, and unreliable method of determining lion status. When combined with other presence indicators of lions, reliable sightings may contribute to a determination of lion presence, but sightings alone should never be used for describing mountain lion distribution and abundance. Sighting reports are less efficient, less systematic, and less reliable than other methods of checking for mountain lion presence. Sighting reports alone make it difficult to evaluate the reliability of an individual sighting. Current literature and research is best served by a de-emphasis of sightings as a basis for evaluating mountain lion status, especially in the East, and should never serve as a basis for describing the distribution or abundance of mountain lions.

Van Dyke, F.G. and R.H. Brocke. 1987. Searching Technique for Mountain Lion Sign at Specific Locations. Wildl. Soc. Bull. 15(2):256-259.

CONCLUSION

It was proposed that agencies or individuals investigate sighting reports on sites that meet the following criteria: (1) the witness can assign the sighting to an exact location, (2) the substrate is snow or bare soil, (3) the site can be investigated within 9 days of the sighting and (4) the site is undisturbed by precipitation, high winds, or other factors between the time of the sighting and the time of the search. Criteria 2 and 4 may not always be assessable until the site is visited, but should still be used. Whenever possible, an experienced observer should go to the site to focus the search on spots most likely to yield lion sign. Sites that meet these criteria and still fail to confirm mountain lion presence render the sighting report suspect.

Van Meter, V.B. 1988. The Florida Panther. Florida Power and Light Company Booklet. 40pp.

This booklet provides general information on Florida panther life history and ecology.

Van Pelt, A.F. 1977. A Mountain Lion Killed in Southwest Texas. Southwest Nat. 22:271.

Two attacks were observed by mountain lions on javelinas in Big Bend National Park. The first attack was on July 16, 1971 in Ward Canyon at an altitude of 1616 meters. A large male javelina was attacked by a mountain lion which emerged from brush cover in a talus seep area and ran to the bottom of the canyon where the javelina defended itself for 15 seconds. The cat then departed. The second encounter occurred below Panther Junction at an altitude of 1022 meters on July 5, 1975. Both the mountain lion and the javelina emerged from an Arroyo and galloped at full speed for 200 meters with little regard for terrain. The female javelina was brought down with a bite around the neck and carried to the edge of an arroyo where it was partially consumed. The severed forelegs and scapulae and pieces of hide were left behind after the carcass was eventually carried to a more protected area. The cougar bounded into the air every 20-25 meters, possibly to gain better vision. The author reported hearing the pounding of the cat's feet.

Van Sickle, W. 1990. Methods for Estimating Cougar Numbers in Southern Utah. M.S. Thesis, University of Wyoming, Laramie. 73pp.

Road track counts conducted on the Boulder-Escalante study area indicated a strong relationship (R^2=0.73) between cougar (Felis concolor) track sets found and density, as determined by home range overlap. Monthly road track counts indicated road tracks could be used as a relative index to detect changes in cougar number over time. Numerous factors affecting road track counts limit the techniques use as an index to compare between areas. Road surface enhancement techniques did not significantly improve tracking medium and did not increase track finding frequency. A mark-recapture estimator using tracks left on roads by marked and unmarked cougars estimated 22.5 cougars (SE=6.5) in an area of 23 resident cougars. Line-intercept probability sampling using aerially located snow tracks left

by cougars appeared to be a viable technique for estimating cougar numbers. One aerial survey estimated 11.5 (SE=6.5) cougars in an area with 14 resident cougars. Additional helicopter flights proved requirements of the technique could be met. Computer simulated surveys run on empirical movement patterns of a cougar population showed increased estimator precision with transects oriented perpendicular to drainages, increased density, increased transects per systematic sample, surveys conducted 2 days after snowfall, and with the exclusion of kitten tracks. The mark-recapture estimate using snow tracks left by radio collared and non-radio collared cougars was 12.5 (SE=2.2) cougars in an area of 14 known residents.

Van Sickle, W.D., and F.G. Lindzey. 1991. Evaluation of a Cougar Population Estimator Based on Probability Sampling. J. Wildl. Manage. 55(4):738-743.

We used probability sampling of snow tracks which were located from the air as a method of estimating cougar (Felis concolor) numbers. Computer-simulated surveys were conducted on empirical movement data from a known population of cougars to evaluate survey design and the influence of density on the estimator. Estimator precision increased when transects were oriented perpendicular to major drainages, flown 2 days rather than 1 day after a snowfall, and if additional transects were included in each systematic sample. Precision also increased as density of cougars increased. An actual survey flown in an area with 14 cougars estimated 14.2 plus or minus 6.3 (SE) cougars.

Van Sickle, W.D. and F.G. Lindzey. 1991. Evaluation of a Cougar Population Estimator Based on Probability Sampling. Pg. 58 In: Mountain Lion-Human Interaction Symposium, C.E. Braun (ed.), Col. Div. Wildl., Denver. 114pp.

Sampling of aerially located snow tracks was evaluated as a method of estimating cougar (Felis concolor) numbers. Computer-simulated surveys were conducted on empirical movement data from a known population of cougars to evaluate survey design and the influence of density on the estimator. Precision of the estimator increased when transects were oriented perpendicular to major drainages and flown 2 days rather than 1 day after snowfall and when additional transects were included in each systematic sample. Precision also increased as density of cougars increased. An actual aerial survey in an area with 14 resident cougars estimated 14.4 (SD = 6.3) cougars.

Van Sickle, W.D. and F.G. Lindzey. 1992. Evaluation of Road Track Surveys for Cougars (Felis concolor). Great Basin Naturalist 52(3):232-236.

Road track surveys were a poor index of cougar density in southern Utah. The weak relationship we found between track-finding frequency and cougar density undoubtedly resulted in part from the fact that available roads do not sample properly from the nonuniformly distributed cougar population. However, the significantly positive relationship (r^2= .73) we found between track-finding frequency and number of cougar home ranges crossing the survey road suggested the technique may be of use in monitoring cougar populations where road abundance and location allow the population to be sampled properly. The amount of variance in track-finding frequency unexplained by number of home ranges overlapping survey roads indicates the index may be useful in demonstrating only relatively large changes in cougar population size.

van Zyll de Jong, G.G, and E. van Ingen. 1978. Status Report on Eastern Cougar (Felis concolor couguar) in Canada. Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Available from Canadian Nature Federation, Ottawa.

Past and present distribution of the eastern cougar is summarized. Recent sightings indicate that cougars are present in Nova Scotia, New Brunswick, Quebec and Ontario. The eastern cougar is protected by law in Nova Scotia, New Brunswick and Ontario. No reliable estimates of the number of cougars in eastern Canada exist or can be made, but numbers are probably quite low. The number of reported sightings increased in the forties and has since then leveled off or decreased slightly. Limiting factors may include low and fluctuating deer densities in the present distributional range of the eastern cougar, and human activities. However, next to nothing is known of the general biology and ecology of the cougar in eastern Canada and limiting factors cannot be identified until a field investigation is undertaken. The taxonomic status of the eastern cougar is uncertain and needs clarification. It is recommended that a field study be initiated to confirm and document the existence of a cougar population in New Brunswick and to gather ecological information that can be used in formulating management plans. Taxonomic studies should also be

undertaken in due time to assess the subspecific status of the eastern cougar.

Vasseur, L., E. Tremblay, R. Wissink and J. Bridgland. 2006. Cougar Sightings in the Maritimes: Myth or Reality? Pages 16-20 in H.J. McGinnis, J.W. Tischendorf and S.J. Ropski editors. Proceedings of the Eastern Cougar Conference 2004, Morgantown, West Virginia, USA.

Abstract

A lack of information on cougar (Puma concolor) occurrence and possible distribution in the eastern provinces of Canada prevents the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) from developing any local recovery plans to restore or protect suitable habitat for this large carnivore. The purpose of the present study is to verify whether or not cougars remain in eastern Canada. Eight scent-lure posts equipped with triggered 35-mm cameras with infrared sensors were installed in New Brunswick and Nova Scotia national parks. Sightings and other reliable evidence of cougar activity are currently being collected across the Maritimes to map cougar movements within the mosaic landscape (i.e., forestry, agriculture and urbanization). A better knowledge and understanding of cougar response to human-caused habitat alterations could allow us to maintain or rehabilitate this species in the northeastern part of its range through appropriate conservation plans or recovery programs.

Vukelich, J.P., M. Stefanich, and F.G. Lindzey. 1989. Domestic Sheep Losses to Mountain Lions in the Southern Bighorn Mountains of Wyoming. Wyoming Coop. Fish and Wildl. Res. Unit, Laramie, Wyoming. 23pp.

SUMMARY

Levels of mountain lion depredation should be expected to vary between pastures in an area and between years in the same pasture. Number and distribution of mountain lions and number and distribution of sheep, weather patterns, phenology of vegetation, and husbandry practices are among the variables that may influence predation rates. The range of values for the contribution of mountain lion predation to total sheep loss within a pasture, although based on small samples, should provide insight into the potential size of this depredation problem. Although trends in total loss and percent of dead sheep attributed to mountain lion predation may appear similar, the correlation may be found to be poor. Reported total loss decreased by 21% between the 1987 and 1988 grazing seasons and 38% between the 1988 and 1989 seasons while the annual contribution of mountain lions to total loss decreased 15% and 41% respectively. Strip transects should provide relatively unbiased samples of dead sheep, but they require large amounts of effort. Our analyses were based on visually-located carcasses however, allowing the possibility that the sample from which we worked was biased if some carcasses were very difficult to detect because of characteristics related to cause of death. Because the vegetation type in which dead sheep are found may be related to cause of death, transects should be oriented to proportionately sample major vegetation types found within the area occupied by the sheep.

Wade, G. 1929. Mountain Lion Seen Killing a Doe. Ca. Fish and Game 15:73-75.

A female mountain lion and two kittens were observed from a lookout tower in Sequoia National Park about 200 yards away. The female was training her kittens on grasshoppers, with butterflies also attracting considerable attention. An old doe and a fawn were feeding on a hillside and she was just raising her head when the lion hit her. The lioness was spread out and landed full length on the doe with the left forefoot striking at the back of the deer's shoulder and catching into the chest or lower ribs. The lion's right foot hit the deer in the neck and knocked the head clear around toward the shoulder. The lion grasped the neck of the deer and pulling with her shoulder and back, half-carried the carcass about 10 or 15 feet to a more level area where she placed her left foot on the flank and ripped the stomach open with the right. She ate her fill and summoned the cubs and stood guard while they ate. She returned later that afternoon to feed but did not return again to this kill. All of the major activities were performed with the right foot and it was suggested that mountain lions may be "right-handed".

Waid, D.D. and D.B. Pence. 1988. Helminths of Mountain Lions (Felis concolor) from Southwestern Texas, with a Redescription of Cylicospirura subaequalis (Molin, 1860) Vevers, 1922. Can. J. Zool. 66(10):2110-2117.

Nine nematode and two cestode species were recovered from the viscera of 53 mountain lions (Felis concolor)

collected from four counties in southwestern Texas. The distribution patterns of the common (>20% prevalence) helminth species (Taenia omissa, Physaloptera praeputialis, Physaloptera rara, Cylicospirura subaequalis, Ancylostoma tubaeforme, Toxascaris leonina, Metathelazia cailfornica, and Vogeloides felis) were overdispersed and did not change with host age or sex. Abundances of the common helminth species were examined relative to sex and age- groups of the lions. Significant differences were found for abundances of T. omissa, C. subaequalis, and T. leonina between host age-groups, and for T. omissa between host sexes. Only 2 of 29 were shared among the helminth communities of mountain lions from Texas, Oregon, and Florida, indicating a basic disparity of species common to this host across its geographic range in North America. Taenia omissa is regarded as the single core species across the host's range in North America. New host records are reported for the occurrence of Taenia multiceps, P. rara, Gnathostoma procyonis, A. tubaeforme, and V. felis. Cylicospirura subaequalis is redescribed and compared with Cylicospirura felineus, a species commonly found in Felis lynx and Felis rufus. In addition to previously described bifid versus trifid teeth in C. subaequalis and C. felineus, respectively, differences were noted in the length of spicules in males and the location of the vulva in females.

Waid, D.D. 1990. Movements, Food Habits, and Helminth Parasites of Mountain Lions in Southwestern Texas. Ph.D. Diss., Texas Tech Univ., Lubbock. 129pp.

Information on the behavior and ecology of mountain lions (Felis concolor) in Texas is limited. This study reports on aspects of the movements and food habits of lions from Big Bend National Park, in the Trans-Pecos region of Texas. Eleven lions were captured and radio-collared, and their movements monitored by ground and aerial radio tracking during 1984 and 1985. Aerial tracking was conducted in 3, 20-day periods in March-April, July-August, and November, representing spring, summer, and winter seasons, respectively. Six of the lions (1 adult male, 5 adult females) were resident to the study area; each exhibited a single, continuous home area. The male's area encompassed 792.3 km^2. The average size of the female's areas was 159.3 km^2 (range 76.5-192.5 km^2). Size and degree of overlap of the female's areas varied with the habitat type (montane versus desert) in which the home areas were located. An adult female transient and three dispersing juvenile lions (2 males, 1 female) also were collared. Movements of the collared lions, and resident and transient lions identified by track sign, indicated the resident population was socially organized, with home areas established and maintained through a system of land tenure. No significant seasonal differences were found in distances traveled, areas traversed, or elevations used by the lions. Lion food habits were determined by analysis of 546 scats and evaluation of 89 lion kills. Carmen Mountains white-tailed deer (Odocoileus virginianus carmeni), desert mule deer (O. hemionus crooki), and collared peccary (Tayassu tajacu) were the primary prey of the lions. Frequency of occurrence of primary prey in scat was similar to levels reported 4 years prior to this study. Based on estimates of lion numbers and the relative abundance of the 3 primary prey species, lions appeared to be limiting the abundance of white-tailed deer. Lion predation also may have retarded increase in mule deer numbers, but abundance of peccary remained stable. In addition, a survey was conducted on helminth parasites of mountain lions from 4 counties in southwestern Texas. Nine nematode and 2 cestode species were recovered from the viscera of 53 lions. The distribution patterns of the common (> 20% prevalence) helminth species (Taenia omissa, Physaloptera praeputialis, P. rara, Cylicospirura subaequalis, Ancylostoma tubaeforme, Toxascaris leonina, Metathalazia californica, and Vogeloides felis) were overdispersed and did not change across host age or sex. Abundances of the common helminth species are examined relative to sex and age group of the lions. Significant differences were found for abundances of T. omissa, C. subaequalis, and T. leonina between age groups, and for T. omissa between sexes. Helminth communities from mountain lions in Texas, Oregon, and Florida were compared, showing only 2 of 29 species of helminths to be common to all 3 regions. Four of 17 species were common to lions from Texas and Oregon, and 2 of 21 species common to lions from Texas and Florida. New host records are reported for the occurrence of T. multiceps, P. praeputialis, Gnathostoma procyonis, A. tubaeforme, and V. felis. Cylicospirura subaequalis is redescribed and compared to C. felineus, a common species in the genus Lynx. In addition to previously described bifid versus trifid teeth in C. subaequalis and C. felineus, respectively, differences were noted in the length of spicules in males and the location of the vulva in females.

Wainwright, C.J. and C.T. Darimont. 2008. Cougars in British Columbia: Conservation Assessment and Science-Based Management Recommendations. Page 253 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

At present, British Columbia (BC) lacks a comprehensive cougar management strategy. In anticipation of a new management plan, British Columbians have an opportunity to contribute to cougar conservation. Based on our review of cougar ecology, research and management in BC and elsewhere, we provide a comprehensive conservation assessment that supports a science-based cougar conservation plan for BC. We find that current provincial management policies, which depend on hunting regulations only, likely are inadequate to protect cougar populations and habitat in the long-term. Accordingly, we provide a set of 'best' principles of precautionary harvest management. Specifically, we recommend moving from a general open cougar hunting season to low male quotas and very low female quotas. Moreover, populations in BC should be managed within a framework that better reflects a metapopulation structure. We note, however, studies consistently show most British Columbians do not support trophy hunting of large carnivores. In addition, our review suggests that long-term conservation strategies for BC cougars should include the protection of a large network of connected habitat for cougars and their prey. We conclude by highlighting several urgent research priorities, among them the initiation of a study in coastal BC where cougar-human conflict is particularly severe.

Wakeling, B.F. 2003. Status of Mountain Lion Populations in Arizona. Pages 1-5 *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

Arizona's mountain lion (*Puma concolor*) population numbers about 1,000-2,500 animals, and just over 350 mountain lions were harvested through sport and depredation take in 5 of the last 6 years. Arizona bag limit is 1 lion per person per year annually, except in a few units where multiple bag limits have been implemented; no multiple bag limit has been reached to date. Management for this big game animal is guided by strategic plan, species management guidelines, hunt guidelines, and a predation management policy. Management is currently under review by an internal team that is examining several predator species, including mountain lions. The internal review should be complete by the end of 2003. Public safety incident reports have increased substantially since 1998.

Walker, C.W., L.A. Harveson, M.T. Pittman, M.E. Tewes and R.L. Honeycutt. 2000. Microsatellite Variation in Two Populations of Mountain Lions (*Puma concolor*) in Texas. Southwestern Naturalist 45(2):196-203.

Abstract

Genetic variation at 10 microsatellite loci was examined for mountain lion populations from south and west Texas. Texas mountain lions had less genetic variation than previously reported for the species in other parts of its range. The sampled genetic variation defined the two surveyed localities as distinct groups of mountain lion in south and west Texas with evidence of reduced gene flow between these groups. These data suggest that mountain lions within the state should be partitioned into at least two management units.

Walker, M., D. Phalan, J. Jensen, J. Johnson, M. Drew, V. Samii, G. Henry and J. McCauley. 2002. Meniscal Ossicles in Large Non-Domestic Cats. Veterinary Radiology & Ultrasound 43(3):249-254.

Abstract

Radiographs of the stifles of 6 species of 34 large, non-domestic cats were reviewed foremost for the presence of meniscal ossicles and then for the presence of the other potential four sesamoids. The animals in the review included 12 lions, 7 tigers, 7 cougars, 3 leopards, 3 bobcats, and 2 jaguars. Fluoroscopy, arthrography, computed tomography, necropsy, and histology were also used to evaluate the stifles of one tiger after euthanasia. Ossicles were found in the region of the cranial horn of the medial meniscus in most of the lions, tigers, leopards, and jaguars. These ossicles were found in half of the cougars but in none of the bobcats. Among the large, non-domestic cats, meniscal ossicles had been reported previously only in Bengal tigers. The lions, tigers, and leopards having meniscal ossicles appeared to have a lateral but often not a medial fabella of the gastrocnemius muscle, an observation previously unreported. Popliteal sesamoids and patellas were present in all the skeletally mature cats.

Wallace, J. 1986. Has the Big Cat Come Back? Sierra 71(3):20-21.

Reports continue to pour in that Felis concolor couguar, a subspecies of cougar long thought extinct, may still roam the country's eastern woodlands. Biologist Ranier Brocke contends that there may be a few transient animals but that no viable cougar population exists north of Florida and east of the Mississippi. Biologist Bob Downing was in charge of a five-year project searching for cougars in the southern Appalachians, mostly in Georgia and the Carolinas, but found no verifiable evidence. Biologist Virginia Fifield of the Massachusetts Eastern Cougar Survey Team leads the search in New England where she has found but a single pawprint. She is confident that there are cougars out there, particularly in the area west of the Connecticut River.

Walsh, B. 1956. Panthers Are Popular. Pennsylvania Game News 27(1):4-10.

In Pennsylvania, the last known panther was killed in either 1871 or 1891, depending on which final report you consider. The largest panther on record was a 276-pound animal killed in Arizona in 1917. The largest ever bagged by Teddy Roosevelt was a 227-pounder taken in Colorado. The author compiled a list from records of the years in which panthers probably became extinct in several states. These are New York (1908), Ohio (1838), Maryland (1851), West Virginia (1936), Virginia (est. 1880), Massachusetts (1869) with one report in 1926, Michigan (1875), Maine (1891), Kentucky (1894), New Hampshire (1888) with one report in 1920-22, New Jersey (1840), Rhode Island (1848), Tennessee (1900) with one report in 1937, and Vermont (1881). The author states that there are probably 5500 panthers in the far west and fewer than 10,000 all told.

Waters, J. Jr. 1984. The Florida Panther-Living on the Edge. Florida Wildl. 38(2):22.

The Florida panther has been found only in the Big Cypress and Everglades regions of south Florida and just recently, signs have been confirmed which indicate panthers may also live in Volusia County. Eight panthers had been captured and fitted with transmitting collars thus far. A female in the Fakahatchee Strand was found to occupy 40 square miles of territory and a male was tracked over 200 square miles in the Big Cypress Preserve. Panthers swim readily and travel both day and night in the winter. They travel more at night during the summer to avoid the heat.

Watkins, W.G. 2007. The Status of Cougar in Manitoba. Page 6 in Abstracts of Presentations of the 3rd Midwestern-Eastern Puma Conference, Trent University, Peterborough, Ontario.

Abstract

The shooting of a cougar at Stead, 70 km northeast of Winnipeg in 1973, and a detailed assessment of 281 documented sightings from 1879 to 1975 first established the likelihood that the species was resident in the province of Manitoba. However, subsequent field surveys failed to find evidence of resident cougars, and a 31 year hiatus in the reporting of any dead specimens significantly cooled interest in the species. In 2004, two dead cougars were reported from Manitoba's Western Upland Natural Region and in 2006 a cougar was photographed from the same general area. Although there has been no evidence of breeding to date, an increase in the number of credible sightings has focused interest on the potential of the Western Uplands to provide habitat for a small population of these big cats. The cougar is a protected species under Manitoba's Wildlife Act, and the death of the two cougars in 2004 generated an interest by the public that has continued to the present day.

Weaver, J.L., P.C. Paquet and L.F. Ruggiero. 1996. Resilience and Conservation of Large Carnivores in the Rocky Mountains. Conservation Biology 10(4):964-976.

Abstract

Large carnivores evolved behaviors and life-history traits that conferred resilience to environmental disturbances at various temporal and spatial scales. We synthesize empirical information for each large carnivore species in the Rocky Mountains regarding three basic mechanisms of resilience at different hierarchical levels: (1) behavioral plasticity in foraging behavior that ameliorates flux in food availability, (2) demographic compensation that mitigates

increased exploitation, and (3) dispersal that provides functional connectivity among fragmented populations. With their high annual productivity and dispersal capabilities, wolves (*Canis lupus*) possess resiliency to modest levels of human disturbance of habitat and populations. Cougars (*Puma concolor*) appear to have slightly less resiliency because of more specific requirements for stalking habitat and lower biennial productivity. Grizzly bears (*Ursus arctos horribilis*) possess much less resiliency because of their need for quality forage in spring and fall, their low triennial productivity, and the strong philopatry of female offspring to maternal home ranges. Based upon limited information, wolverines (*Gulo gulo*) appear more susceptible to natural fluctuations in scavenging opportunities and may have lower lifetime productivity than even grizzly bears. By accelerating the rate and expanding the scope of disturbance, humans have undermined the resiliency mechanisms of large carnivores and have caused widespread declines. Both the resiliency profiles and the historical record attest to the need for some form of refugia for large carnivores. With their productivity and dispersal capability, wolves and cougars might respond adequately to refugia that are well distributed in several units across the landscape at distances scaled to successful dispersal (e.g., less than five home range diameters). With their lower productivity and dispersal capability, grizzly bears and wolverines might fare better in a landscape dominated by larger or more contiguous refugia. Refugia must encompass the full array of seasonal habitats needed by large carnivores and should be connected to other refugia through landscape linkages.

Weaver, R.A. and L.W. Sitton. 1978. Changing Status of Mountain Lion in California and Livestock Depredation Problems. Proc. Vert. Pest Conf. 8:214-219.

The California Department of Fish and Game studied depredation by mountain lions on livestock from 1971 through 1977 to determine the scope of the problem. Information was needed on the physical characteristics of a stock killer, the frequency and trend of predation, the livestock types preyed upon, and the geographic distribution of incidents. Department of Fish and Game verified 134 incidents of mountain lion predation on livestock which occurred between April 1971 and December 1977. Forty-five mountain lions (28 males and 17 females) were killed on depredation during this time. Approximately 42 percent of the predation incidents involved sheep, 22 percent goats and 16 percent cattle, with horses, pigs, poultry and pets composing most of the remaining prey. California's south coast region from Santa Clara to Ventura County reported 44 percent of the predation incidents, 28 percent from the Sierra Nevada, 20 percent from the north coast from Napa and Sonoma counties to Humboldt County and nearly 8 percent from southern California. There does not appear to be a stock-killer profile of common sex, age or health factors. Present depredation policy appears adequate to handle the problem, but efficiency could be increased by coordinating incident verification investigations and available depredation resources, such as U.S. Fish and Wildlife Service and county predator control agents.

Weaver, R.A. 1982. Status of the Mountain Lion in California with Recommendations for Management. California Dept. Fish and Game. 24pp.

EXECUTIVE SUMMARY

In August of 1981, House Resolution No. 35, authored by Assemblyman Dominic L. Cortese, requested the Department of Fish and Game to report on the status of the mountain lion and to provide recommendations for its management. The purpose of this report is to review the current literature and to concisely present information to provide direction on the future management of the resource. The mountain lion (Felis concolor), commonly called puma, cougar, panther, is the largest and most majestic member of the cat family in California. The large cats have one of the more extended ranges than other native land mammal. The lion prefers dense vegetation or rocky terrain and ranges from the low deserts of Imperial County to the wet north coast mountains and the sub-alpine forest of the Sierra Nevada. They are usually found in association with deer (60-80 percent of their diet); but lions also select other prey species, enabling them to exist well out of prime deer habitat. The mountain lion was classified as a bountied predator in 1907, but it has since been reclassified a number of times. In 1963, the bounty was rescinded and the lion was classified a nonprotected mammal until 1969, when it was reclassified as a big game mammal. The first regulated hunting season occurred during the 1970-71 license year (July 1 through June 30). License tag sales totaled 4,726, and 83 lions were taken. A one-lion limit was in effect from November 15, 1971 through February 29, 1972. Tag sales totaled 227, and 35 lions were taken. Game animal status gave the mountain lion a measure of protection in that limited seasons and a bag limit were imposed. Public concern for this species resulted in Assembly Bill 660 (Dunlap) adopted by the Legislature in 1971. This bill amended sections of the Fish and Game Code and directed the

Department to study the mountain lion population of the state. The bill also changed the status of the mountain lion from a game animal to a protected nongame animal and established a four-year moratorium on sport hunting of the species. The Legislature has extended the moratorium until January 1, 1983. Historically, mountain lions have always preyed on livestock in California. Predation is one of the reasons that the Legislature enacted bounty law in 1907. Confirmed annual depredation incidents increased from 5 in 1972 to 51 in 1979 and may reflect an upward trend in the population during that period. Forty is the average number of depredation incidents occurring annually for the last 5 years. Mountain lions are a very secretive, solitary animal and difficult to study. Following the 1971 legislation, the Department commenced a series of studies to determine the number of mountain lions in the state and to determine the most effective methods for managing this resource. During Phase I of the field investigation, the Department contacted field personnel and people who were familiar with mountain lions and their habits. As a result of this survey the statewide estimate of the number of animals was 2,400. Phase II of the field investigations consisted of an intensive study in Monterey County to verify previous estimates. Department personnel believe that the 1977 estimate of 2,400 animals is indeed reasonable and tends to be on the conservative side. Concurrent with the Department studies, Dr. Carl Koford was contracted by several private groups to independently census the lion population of the state. Koford estimated the lion population by studying tracks over selected routes for a period of time. He estimated that in 1977 there were 1,000 lions in California. The Department's initial studies and subsequent follow-up survey conflicted with Koford's findings on two issues; (1) The Department's statewide population estimate of approximately 2,400 and Koford's of 1,000 animals; and (2) our estimate of approximately 70,000 square miles of mountain lion habitat while Koford considered only 15,000 square miles of habitat. Subsequently, studies by the Pacific Southwest Range and Experimental Station on the North Kings Deer Range, Fresno County; the Department's track surveys in Orange, Riverside and San Diego counties; and San Diego State Universities' studies on Mount Hamilton, Santa Clara County, have verified or indicated a higher density of lions than the Department's estimate in 1977. The University researchers concluded that the population in the Hamilton Range was stable at 5 to 6 resident adult lions per 100 square miles. This density is comparable to the Department's findings in Monterey County where an estimated total population of 10 mountain lions per 100 square miles which converts to approximately 6 to 7 adults. In addition, in southern California where Dr. Koford stated that the replacement of breeding females may be inadequate, the Department's surveys found kittens 4 out of 5 years, which indicates recruitment into the population. The Department's estimate of 70,000 square miles of habitat corresponds to the known presence of deer. By contrast, Koford's figure of 15,000 square miles of lion habitat pertains only to resident animals, and he tended to dismiss other signs or sightings as that of wandering or transient animals. The Department recognizes that mountain lions inhabiting the riparian habitat along the Colorado River and adjacent desert are very uncommon. With further investigation, the Department, through the Fish and Game Commission, has the authority to afford complete protection under the California Endangered Species Act of 1970. That the mountain lion population undoubtedly was suppressed during the years that lions were bountied (1907 to 1963) and during the years that the state employed lion hunters (1919 to 1959). Since the legislature repealed the bounty law and established a moratorium on sport hunting, evidence indicates that lion populations are increasing. Data collected on depredation incidents, sightings and road kills all suggest that the lion population has increased since the moratorium. Although the actual number of mountain lions cannot be precisely determined, on the basis of current knowledge the Department can provide a reasonable estimate of the total number of lions in California. This estimate is thought to be between 2,400 and 3,000 animals. The populations cannot increase indefinitely, as there is an upper limit that any given area can support, and perhaps not more than 10 per 100 square miles as found in Monterey County. Mountain lion numbers seem to be limited by social interactions rather than by the abundance of prey and are regulated through the mortality and dispersal of the young. The lion population overall is healthy and is expected to stay that way. The number of additional lions which the various habitats could hold is unknown. In some of the better habitats, densities might sustain an increase of 2 to 4 adult lions per 100 square miles. A potential for similar increase in the good or poorer habitats also exist. This could equate to several hundred more lions than presently exists. Habitat constraints and the solitary nature of the animal are important factors that will prevent any substantial increase over this level. Therefore, under the best of conditions we would not expect maximum lion populations to exceed the 2400-3000 current population by more than 800-1000 animals. Under conditions where continued and expanding loss of critical lion habitat is occurring, a reduction in populations would be expected. Fortunately much of the wildlands preferred by lions is either in public ownership or not particularly vulnerable to development. The actual reduction in numbers below current levels could be determined by the scope and severity of habitat degradation, particularly that occurring on private lands. Major management options relate primarily to investigations into the status of lions and population controls. The Department envisions that any legislation enacted would allow population control that would take individual depredating animals and/or a limited and strictly controlled take in areas of high lion density. If this is the case, studies other than periodic investigation to

provide trend information and lion population and habitat condition status would not be indicated. Current data with appropriate updates on lion population and habitat quality and quantity, are adequate for conservative management programs. Intensive studies to obtain more precise population figures would be indicated only where more liberal harvest options were to be considered. The Department is confident that whatever management directive is provided by the Legislature, it has the management capability of assuring that the mountain lion will continue to occupy its role as the state's premier predatory animal.

Weddle, F. 1965. A Cougar is Killed- A Deer is "Saved". Sierra Club Bulletin 50(7):13-15.

The question of what price bounties and runaway predator control programs have on the health of deer herds is examined. It was estimated that California has around 1½ million deer occupying approximately 57 million acres of range including 8 million acres of private land. From 1907 to October 1963, bounties were collected on 12,461 mountain lions. Millions of dollars are spent every year for predator control and this in a state with surplus deer and few predators which mean deer suffer from disease, parasites, malnutrition, and reduced productivity. In addition, deer overpopulation means overgrazing and depletion of the range which adversely affects other forms of wildlife and man. Many big game studies throughout the west indicate that the cougar is an invaluable aid in helping control excess deer and elk.

Wehausen, J. D. 1996. Effects of Mountain Lion Predation on Bighorn Sheep in the Sierra Nevada and Granite Mountains of California. Wildl. Soc. Bull. 24(3):471-479.

Mountain lion (Puma concolor) predation caused populations of bighorn sheep (Ovis canadensis) in 2 mountain ranges in California to decline to low densities. In the Granite Mountains in the eastern Mojave Desert, lion predation reduced the sheep population to 8 ewes and held it at that level for 3 years, after which the predation abated and the population has increased at 15%/year for 3 years. Annual survivorship of radiocollared ewes was 62.5% for the first 3 years of study and all mortalities were from lion predation. Mountain lion activity increased in the southern Sierra Nevada on winter ranges between1976-1988. During this period, 49 sheep killed by lions were found on the winter ranges of the Mount Baxter population. Beginning in 1987, the larger subpopulation of this herd abandoned use of its low-elevation winter range. Increasing mountain lion predation is the best explanation for these habitat shifts. The Mount Baxter sheep that remained at high elevations missed a growing season on the winter range, which was reflected in lower fecal nitrogen levels. The population has declined to <20% of earlier census totals as a result. Mountain lions effectively halted a previously successful restoration program for bighorn sheep in the Sierra Nevada and reversed the overall population trend.

Wehinger, K.A., M.E. Roelke and E.C. Greiner. 1995. Ixodid Ticks from Florida Panthers and Bobcats in Florida. J. Wildl. Dis. 31:480–485.

Abstract

Ixodid ticks were present in all 189 samples examined from 53 Florida panthers (*Felis concolor coryi*, 104 collections) and 85 bobcats (*Felis rufus floridana*) in Florida (USA) between 1974 and 1991. We identified 3,251 ticks from panthers and 918 from bobcats. Specimens of *Dermacentor variabilis*, *Ixodes scapularis*, *I. affinis*, *Amblyomma maculatum*, and *A. americanum* were present on 49, 39, 17, seven, and two of the 53 Florida panthers, respectively, and comprised 36%, 55%, 7%, 1%, and <1% of the 3,251 ticks collected from panthers. *Ixodes scapularis*, *D. variabilis*, and *I. affinis* were present on 61, 56, and 11 of the 85 bobcats respectively, and comprised 58%, 39%, and 2% of the 919 ticks collected. *Amblyomma americanum* and *A. maculatum* were found infrequently and comprised <1% of the total ticks collected from bobcats. Only adult ticks were found on the cats, except for one *D. variabilis* nymph and three *A. americanum* nymphs that were found on bobcats. The most common tick (*I. scapularis*) also commonly infests white-tailed deer and wild hogs. It is possible that some of these were transmitted via prey.

Welch, B. 1979. Mountain Lion Research (1977-78). Performance Report, Proj. No. W-124-R-2, Job 1. New Mexico Dept. of Game and Fish. 3pp.

All radio collars that were attached to lions in previous segments quit functioning early in this segment. Six new lions

were captured-- one adult male, three adult females, and two female yearlings. The adult male was caught in Silver City and moved to the study area. He returned to his home range within one week. Two of the adult females were killed by dogs during capture. One of the females killed was found to be in poor condition. She had a fractured jaw, which was nearly healed. A piece of wood, presumably from a shrub or tree, was found in the wound. The radio collar worn by lion No. 31 (female) was found in October near Highway US 180. Earlier reports were received that a lion was hit by a car in that vicinity but it was not confirmed.

Weybright, D. 1995. Big Game Surveys: Mountain Lion Management Information. Final Report, Proj. No. W-93-R-36, Job 9, Segments 32-36. New Mexico Dept. Game and Fish, 44pp.

There were 128 mountain lion (Felis concolor) pelts tagged during the 1994-95 hunt season, this is a 23% increase over the 14 year average of 103.9 pelts. Hunter harvest questionnaires projected a large increase in the 1994 harvest, 30% over the 5-year average of 146 lions. Depredation complaints resulted in an average additional 9.5 lions harvested, annually. Game Management Unit 30, the Preventive Lion Control Program took fewer lions in 1994, 40% fewer than the 6-year average of 6.7. Lions also died from collisions with cars, poaching and accidents.

White, C.G., P. Zager and L. Waits. 2003. Mountain Lion Survey Techniques in Northern Idaho: A Three-Fold Approach. Page 170 *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

Management of mountain lions (*Puma concolor*) in Idaho relies largely on harvest data. This type of data is limited in scope and relays little information to the manager regarding population trend or density. Intensive radio telemetry studies involving capture and recapture can provide an estimation of density but are expensive. Currently researchers are exploring techniques to index or estimate population size by identifying individuals by their DNA. We outline three different techniques to “capture” and “recapture” mountain lion hair and/or tissue for DNA analysis: biopsy darts, rub tree stations, and legally harvested lions. Techniques are being implemented on two study areas in north-central Idaho, the Lochsa/North Fork of the Clearwater River and the South Fork of the Clearwater River. Efforts by both volunteer houndsmen and hired houndsmen over 1½ lion harvest seasons have resulted in >= 15 DNA samples from lion treed and released. Over the same period >= 15 DNA samples have been turned in from legally harvested lions. In 2002, we placed 51 rub stations and recorded 42 visits over the 3 sampling periods. Seventeen of the visits resulted in >= 1 hair. Preliminary results indicate that 1 visit was from a lion, 7 visits were by bear, and 7 visits were possibly a lion or bear, and 2 visits by other species. Improvements to the techniques are ongoing. This study will allow us to identify individuals in the mountain lion populations within our study areas and thus obtain a minimum population size. Number of captures each year will serve as an index of population trend. We will also explore the use of capture-recapture modeling to estimate population sizes. Our approach attempts to limit resources expended in capturing and marking animals, while still providing an index and potential population estimate within our study areas.

White, D.C. 1956. Panthers A-Plenty. Pennsylvania Game News 27(5):49.

The author had written the editor to say that when he was 19 years of age (about 1904) he saw a black panther while hunting for rabbits about 3 miles west of Altoona. About 1 year later his uncle spotted a big panther while on horseback that was situated on the limb of a tree that reached out over the road.

White, P.A. and D.K. Boyd. 1989. A Cougar, Felis concolor, Kitten Killed and Eaten by Gray Wolves, Canis lupus, in Glacier National Park, Montana. Can. Field Nat. 103(3):408-409.

The partly consumed body of a freshly killed cougar (Felis concolor) kitten was discovered along the tracks of a gray wolf (Canis lupus) pack in Glacier National Park, Montana. Tracks indicated that the wolves chased and killed the kitten after it left the security of a large conifer where it had been treed.

White, T. 1963. Cougars in Saskatchewan. Blue Jay 21:32-34.

The author reports that he had recently compiled over 100 reports of sightings of cougars, their tracks, or kills over the previous few years. He believes a portion of these to be correct. The two areas in the province which have suitable cougar range conditions are the Pasqua Hills between the Carrot and Red Deer rivers and the vast forest area to the north and to the southeast in the Porcupine Hills and Riding Mountains. More than 75 alleged sightings have been reported in the Pasqua Hills and adjacent areas. Over 30 sightings were reported from the Cypress Hills area east to Avonlea and Milestone.

White, T. 1967. History of the Cougar in Saskatchewan. Blue Jay 25:84-89.

The author recorded stories he had collected over the previous six years. Only two of the reports could be verified by hides obtained from the animals. The author states that since 1948, the cougar appears to be expanding its range due to increased reports of sightings in Saskatchewan.

White, T. 1973. Cougar Kittens Reported Near Antler, Saskatchewan. Blue Jay 31:42-43.

Sight reports, specimens obtained in 1939 and 1948, and plaster casts of tracks confirm that the cougar is a rare inhabitant of Saskatchewan. Sightings were made in 1970 and 1972 southeast of Moose Mountain, Saskatchewan, near the town of Antler. The 1972 sighting included two kittens. Although cougars are rare in the province, the author believes these sightings are reliable and that they provide additional evidence of the cougar's existence in the province.

White, T. 1976. Cougar Shot at Cutknife, Saskatchewan. Blue Jay 34:181.

A cougar was shot and killed on November 15, 1975. One-hundred yards from where the cougar was first sighted, a deer was found with its belly slit open and the shoulder and neck cut. This cougar was a female weighing 125 pounds with a body 50 inches from tip of nose to base of tail and a further 27 inches for the tail. The cougar was given to the Museum of Natural History in Regina.

Wilbert, C., M. Bock, and F. Lindzey. 1988. Losses of Domestic Sheep to Mountain Lions in the Southern Bighorn Mountains. Wyoming Coop. Wildl. Res. Unit.

The objective of this study was to locate and determine the cause of death of domestic sheep on pastures and to determine if vegetation and topography had any affect on the detection of dead sheep. The study was conducted on the east slope of the southern Bighorn Mountains in Johnson County, Wyoming. Four pastures were included in the study which began in May 1988. A total of 52 sheep carcasses were found with 12 (23%) of these killed by mountain lions. Sixty percent of all carcasses (N=31) were lambs and all sheep killed by mountain lions were lambs. Sex of the dead lambs was determined for only 29% of the carcasses (6 males, 3 females). Only one carcass of a lion-killed sheep was intact, while 20 carcasses (50%) of sheep that died of other causes were whole when found. Carcasses of sheep that were killed by mountain lions were less visible and proportionately more carcasses of lion-killed sheep were scattered than were carcasses of sheep that died of other causes. Intact carcasses were detected at significantly greater distances. Carcasses of lion-killed sheep appeared to be found in areas of denser vegetation even within the same vegetation type.

Wildt, D.E., L.G. Phillips, L.G. Simmons, P.K. Chakraborty, J.L. Brown, J.G. Howard, A. Teare, and M. Bush. 1988. A Comparative Analysis of Ejaculate and Hormonal Characteristics of the Captive Male Cheetah, Tiger, Leopard, and Puma. Biol. Reprod. 38:245-255.

Male cheetah, tigers, leopards, and pumas maintained under the same conditions were anesthetized and 1) serially bled before, during, and after electroejaculation (EE); 2) serially bled only (AO); or 3) serially bled before and after receiving adrenocorticotropin hormone (ACTH). Ejaculates from leopards contained higher ($p<0.05$) sperm concentrations than cheetahs or pumas but lower ($p<0.05$) sperm motility ratings than all other species. Tigers produced a larger seminal volume and the greatest number of motile sperm/ejaculate ($p<0.05$). The percentage of morphologically abnormal spermatozoa was greater ($p<0.05$) in cheetahs (64.6%), leopards (79.5%), and pumas

(73.5%) than in tigers (37.5%). The most prevalent spermatozoal deformities included a tightly coiled or bent flagellum, a deranged midpiece, or a residual cytoplasmic droplet. Mean baseline serum cortisol concentrations in leopards were 2- and 4-fold greater ($p<0.05$) than in tigers and cheetahs, respectively. Basal cortisol concentrations in pumas were similar to those of tigers, but irrespective of treatment increased 2-fold ($p<0.01$) during the bleeding period. An acute rise and fall in cortisol attributable to EE was observed only in cheetahs. In tigers and leopards, mean peak cortisol concentrations after ACTH were similar to maximal values observed after EE. However, peak cortisol levels in cheetahs and pumas after ACTH were greater ($p<0.01$) than the concentrations measured after EE, indicating that these manipulatory procedures were not eliciting a maximal adrenal response. In the EE groups, luteinizing hormone (LH) and testosterone levels in cheetahs were lower ($p<0.05$) than in other species, whereas levels of both hormones were comparable ($p>0.05$) in tigers, leopards, and pumas. Elevated cortisol levels in cheetahs and pumas had no discernible effect on LH/testosterone patterns; however, the results were equivocal in tigers, and, among leopards, testosterone concentrations consistently declined over time. In this study, using a standardized approach, we identify different ejaculate and endocrine characteristics of captive cheetahs, tigers, leopards, and pumas. The data extend earlier observations and demonstrate that some, but not all, Felidae species ejaculate high numbers of pleiomorphic spermatozoa. However, inter-species differences in sperm integrity do not appear related to inter-species variations in cortisol, LH, or testosterone. The observation of continuously declining testosterone concentrations only in leopards after AO, EE, or ACTH treatment suggests that rising and/or elevated cortisol appears to exert a species-specific influence on reproductive hormone activity.

Wilkins, L. 1994. Practical Cats: Comparing *coryi* to Other Cougars: An Analysis of Variation in the Florida Panther, *Felis concolor coryi*. In: Dennis Jordan, (ed.), Proc. of the Florida Panther Conf., USFWS. 17pp.

This study reviewed the morphological characters of the Florida panther (Felis concolor coryi). Physical traits of color, cranial morphology and pelage features in the context of the geographic variation expressed by the species throughout its range are examined. Measurements were taken and variation analyzed for 79 museum specimens of panther (F.c. coryi) and from 200-600 specimens (depending on the trait being examined) representing cougars throughout their range. Only adults were included in the study. Color variables were normally distributed (p less than 0.05 test for normality) in subspecies consisting of large sample sizes, and approached normality in less well represented groups. No observable color differences could be detected between males and females, or between historic and recent *coryi* so these classes were combined in subsequent procedures. *F. c. coryi* was found to be darker than western and northern inland populations from North America. There was virtually no difference in color measures between *F. c. coryi* and coastal populations from Oregon and Washington (F. c. oregonensis and F.c. olympus). *F.c. coryi* is less red than tropical subspecies from Guatemala, Costa Rica, Panama, Venezuela and Brazil (F. c. mayensis, costaricensis, concolor), although the latter cannot themselves be separated from one another. White flecking on the head, neck and shoulders is more prevalent in the Florida subspecies and the density on any particular animal increases with age. Flecking is believed to be caused by ticks, especially *Ixodes scapularis*. The whorl, or cowlick, is a structural reversal of hairs that occurs mid-back and/or at the base of the neck. The mid-dorsal whorl can be an abbreviated narrow ridge of only four centimeters, but is more often a pronounced oblong or tear drop shape up to 30 cm in length. The whorl at the base of the neck is chevron-shaped and may be up to 10 cm long. It is quite distinct from the usual swirl that is caused by the change in direction of hairs in this region. Whorls occur in both sexes and are present at birth. Florida animals frequently display the mid-dorsal whorl, sometimes the neck whorl, and in a few instances both are present in the same animal. The kinked or crooked tail results from a modification of the distal caudal vertebrae. Often the third vertebra from the end is shortened and curved, resulting in a 90 degree bend in the tail. The last tail vertebra is often truncated and sometimes it too is curved, resulting in a double kink. Although not linked genetically, the kinked tail with the whorling is considered a genetic marker of the Florida subspecies. Both kinked tails and whorls are more prevalent in southwestern Florida than in southeastern Florida. In the skulls of most *coryi* the frontal region is flat relative to the highly arched nasals, so the inflated nasal region becomes the highest point on the *coryi* skulls (Roman nose). Results of 18 cranial measurements taken on 18 adult specimens are provided.

Williams, J.S. 1992. Ecology of Mountain Lions in the Sun River Area of Northern Montana. M.S. Thesis, Montana State Univ., Dept. Biol., Bozeman, Montana.

Mountain lion (Felis concolor missoulensis) habitat use, foraging habits, and home area characteristics were investigated in the Sun River area of northern Montana. Twenty-five mountain lions were monitored in 1991-1992. Mountain lions selected closed-conifer, open-conifer, aspen-conifer, deciduous tree, and shrubland cover types.

Mountain lions avoided grassland and vegetated rock cover types. Mountain lions preferred areas near a stream course (0-200 m). They did not avoid roads or USFS recreational trails. They were found on slopes ranging from gentle (less than 20%) to steep (greater than 69%). Mountain lions preferred eastern aspects, elevations ranging from 1219 m to 1828 m, and were located in both broken and unbroken topography. Mean annual home area size was among the smallest reported in the literature. Mean annual home area size for prairie-front mountain lions was smaller than mountain lions that utilized interior areas. Home area size for prairie-front males was larger than for prairie-front females. Interior male home area size did not significantly differ from interior females. There was considerable overlap in female home areas. Mountain lions used core areas within their individual home areas. Mountain lions primarily killed deer, bighorn sheep, and elk. Bighorn sheep, elk, and mule deer were killed more often during winter (Nov. - Apr.). White-tailed deer, and smaller mammals were killed more often during summer (May - Oct.). Overall, elk contributed more biomass to the diet of mountain lions than deer and bighorn sheep. Specifically, elk bulls, cows, bighorn sheep ewes, and mule deer bucks contributed the most biomass to mountain lion diets. Three instances of cannibalism by mountain lions were documented.

Williams, J. 2005. A Cat Race Tale… of Houndsmen, Biologists, Administrators, Committees and Lawmakers in Northwest Montana – A History of Montana HB 142. Page 91 *in* R.A. Beausoleil and D.A. Martorello, editors. Proceedings of the Eighth Mountain Lion Workshop, Olympia, Washington, USA.

Abstract

Cougar hunting has been part of the fabric of northwest Montana's hunting heritage for over 100 years. From the late 1970's to the mid -1990's cougar populations increased dramatically throughout western Montana. Along with the cougar population increase, the number of houndsmen and cougar hunters coming to northwest Montana from out of state increased as well. Popular press magazines were advertising northwest Montana as a destination cougar hunt for non-resident hunters. The high number of non-resident hunters that subsequently came to northwest Montana, in part, created challenges for FWP's existing cougar management program. Harvest quota management, allocation of the recreational opportunity and quality of the hunting experience were all issues that were raised by both houndsmen and FWP staff. A potential solution presented itself in the form of a new law or Montana statute. This law became known as House Bill 142. The trials and tribulations of implementing a new law and subsequent hunting season regulations were explored in detail for this presentation. Following the implementation of Montana HB 142, hunting season quota over-runs decreased, percent nonresident harvest decreased and the opportunity for resident cougar hunting increased. This was accomplished by people dedicating countless hours at regional and statewide houndsmen, advisory, legislative, FWP Commission and public meetings over a two-year period.

Williams, J. 2008. Montana Mountain Lion Status Report. Page 37 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 total harvest of mountain lion in Montana in 2007 was 309. This represents a slight increase from 2006. Northwest Montana completed its second year of limited entry-only hunting for pumas with female sub-quotas. Approximately 70% of the permits offered in northwest Montana were filled, with the female puma harvest representing 20%. The region is experimenting with incorporating life-history metrics from long-term puma research projects to manage populations. Region 2 based out of Missoula will be implementing limited-entry permit hunting for pumas in 2008. In Montana, when hunting is offered via limited-entry permits, nonresidents are limited to 10% of the permits offered via the drawing. In addition to habitat conservation projects, Montana's two issues for the future are how to appropriately apply the results of long-term puma research to set hunting seasons with our Fish, Wildlife, and Parks Commission and to maintain tolerance through the work of conflict specialists and existing staff for this highly prized game animal. Montana is also planning on completing and publishing the Garnet Mountain Puma Research Project

and updating the 1996 Puma Management Plan.

Williams, L.E. Jr. 1976. Florida Panther. Pgs. 13-15 In: J.N. Layne (ed.), Mammals Vol. 1, In: Rare and Endangered Biota of Florida (P.C.H. Pritchard, series ed.), Univ. Presses of Florida, Gainesville. 52pp.

The Florida panther is described as at least 6 feet-long with feet being over 3 inches wide. Up to six kittens are born about every two or three years but most panther families contain only two or three young. Adults are promiscuous and probably do not breed until two or three years old. There were only five convincing records of Florida panthers from 1967 through 1975. Many of the more convincing records recently had been north of Lake Okeechobee. Other reports were from the Everglades, but the six tame, captive reared panthers released there since 1960 make these reports questionable as to whether they were true Florida panthers. The Everglades-Big Cypress Swamp area had produced the largest number of unverified reports of the species in Florida. It seemed unlikely that there could be more than 30 panthers in Florida. Although protected from legal hunting since 1958, the Florida panther had not recovered. Overhunting had evidently killed out the panther in spite of legal protection and no legal conviction had ever been made for shooting a panther in Florida.

Williams, T. 1994. The Lion's Silent Return. Audubon 96(6):28-35.

The mountain lion first made it into old-world literature in 1500, when Italian explorer Amerigo Vespucci described one he had seen on a beach in what is now called Central America. Some biologists estimate that the U.S. may have as many as 50,000 lions. Of the 12 humans known to have been killed by lions since 1890, eight have died in the past 23 years. The author describes Maurice Hornocker's White Sands Missile Range lion project which was in its 10th and final year and also provides Hornocker's reflections on past and present research and philosophy. A viable lion population according to biologists is one capable of persisting for 100 years and requires 250 breeding adults of each sex. Based on Ken Logan's data from New Mexico, 500 breeding lions would need 10,000 square miles, an area equal to 13 times the size of the San Andres mountains. A future for New Mexico lions will require sound hunting regulations and at least two large safe havens the size of the White Sands study area where lions can breed and young can disperse.

Willoughby, K., D.F. Kelly, D.G. Lyon, and G.A.H. Wells. 1992. Spongiform Encephalopathy in a Captive Puma (Felis concolor). Vet Record 131(19):431-434.

A captive adult puma developed ataxia, a hypermetric gait and whole body tremor. The signs progressed over a period of six weeks. Histopathological examination following euthanasia demonstrated spongiform encephalopathy, gliosis and mild non-suppurative meningoencephalitis. Immunostaining with a polyclonal antiserum revealed prion protein (PrP) associated with these changes in sections of cervical spinal cord and medulla. This is the first confirmed case of a scrapie-like spongiform encephalopathy described in a non-domestic cat in the United Kingdom.

Wilson, B. 2006. The Use of Camera Traps as a Tool for Wildlife Research. Pages 80-81 in H.J. McGinnis, J.W. Tischendorf and S.J. Ropski editors. Proceedings of the Eastern Cougar Conference 2004, Morgantown, West Virginia, USA.

Abstract

Effective management of predator species requires accumulating, screening and interpreting hard data, which can then be evaluated through the peer review process. Securing such data is difficult, time consuming and at times frustrating to the point of failure. Because visual sightings are so frequently subject to the erroneous anticipations of what an individual “wishes” to see, they fall outside the boundaries of acceptable data. Photographs, however, provide a mechanism for review whose worth can be weighed by the scrutiny of a scientific error correction bar. This presentation will offer suggestions for the placement, attachment and securing of camera traps that are used in wildlife studies. By using photos that have been taken with remote equipment, several themes dealing with camera setup and interpretation will be emphasized. These points will include the need for a reference point, the use of attractants and the importance of third party photo interpretation. Although this session deals with photographs taken in a riparian environment, the basic fundamentals for receiving permission to establish camera traps on private land

and the means for fostering positive working relationships with land owners should be applicable to any camera trapping endeavor. The session will end with a series of photographs that illustrate the difficult and harsh world in which predators live.

Wilson, P. 1984. Puma Predation on Guanacos in Torres del Pain National Park, Chile. Mammalia t. 48, n 4. Pages 515-522.

SUMMARY

Direct observations and information from 29 puma-killed guanacos indicated that pumas generally attacked their prey from an elevated, hidden position, and killed with a throat bite. Adult and subadult males were killed less than their proportion in the population, while young were killed twice their proportion. Kills were more aggregated on the winter range than the summer range, possibly due to differences in habitat. Sex-differential mortality of female guanacos on the winter range may have been due to sex-class differences in behavior or movements.

Wilson, R. 1984. Wyoming-Cougar Status Report. Pgs. 88-92 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.

Mountain lion classification changed from predator to a trophy game animal in 1980. During the five-year period (1979-1983) a total of 130 lions were taken. Management program goals are presented and major management problems are identified. The highest lion densities are found in northwest and northcentral Wyoming. The financial burden of mountain lion management is illustrated by 222 mountain lion licenses sold in 1983 for a revenue of $6,200, while management costs were $232,000.

Wilson, S., J.D. Hoffman and H.H. Genoways. 2010. Observations of Reproduction in Mountain Lions from Nebraska. Western North American Naturalist 70(2):238-240.

Abstract

Occurrences of mountain lions (Puma concolor) in Nebraska have been steadily increasing; however, reproductive activity in mountain lions has not been documented in the state. We present the first evidence of mountain lion reproduction in Nebraska since mountain lions recolonized the state in the early 1990s, On 28 February 2007, a spotted kitten was hit by a vehicle in northwestern Nebraska; and based on body length and weight, we estimate its age at 3.9 months. On 20 December 2008, a female mountain lion and spotted kitten were photographed in the northwestern part of the state. On 9 May 2009, a female mountain lion with a juvenile was also photographed. All records were from the Pine Ridge region of Dawes County, Nebraska, Our records suggest that mountain lions are establishing a permanent population in at least one region of Nebraska.

Winters, J.B. 1969. Trichiniasis in Montana Mountain Lions. Bull. Wildl. Dis. Assoc. 5:400.

From December, 1968, to April, 1969, six adult mountain lions were examined for Trichinella spiralis. Five lions originated from western Montana and one from south-central Montana. Fifty percent (3/6) of the lions were infected with T. spiralis and were from western Montana. The highest larval concentration was found in the diaphragm whereas the lowest occurred in the masseter. This was apparently the first record of a trichina infection in a mountain lion under wild conditions.

Witsell, T., G.A. Heidt, P.L. Dozhier, T. Frothingham, and M. Lynn. 1999. Recent Documentation of Mountain Lion (Puma concolor) in Arkansas. Journal of the Arkansas Academy of Science 53:157–158.

The authors report of 5 localities and describe details where hard evidence (scat, plaster casts, photographs) of mountain lions were found in late 1998 and early 1999. All hard evidence was later deposited into the vertebrate collections at the University of Arkansas at Little Rock. All evidence was found within a 40km radius and it was suggested that the evidence may represent one or more mountain lions.

Wolfe, L.L. and M.W. Miller. 2005. Suspected Secondary Thiafentanil Intoxication in a Captive Mountain Lion (*Puma concolor*). J. Wildl. Dis. 41(4):829-833.

Abstract

Inadvertent ingestion of thiafentanil oxalate by a captive adult female mountain lion (*Puma concolor*) caused a prolonged clinical syndrome that included sedation and depression, muscle tension, and myopathy that was incompletely antagonized by naltrexone HCl. A serum chemistry profile revealed markedly elevated creatinine phosphokinase (CK; 490,450 IU/l), alanine aminotransferase (ALT; 1,896 IU/l), and aspartate aminotransferase (AST; 4,321 IU/l) 2 days after onset. The affected animal's condition gradually improved over the next 15 days in response to supportive therapy that included diazepam (5 mg as needed), Normasol R (3 l/day), dexamethasone (tapering dose starting at 1 mg/kg), and ketoprofen (1 mg/kg). She eventually recovered completely. Based on these observations, carcasses of animals immobilized with thiafentanil should be marked and disposed of properly to preclude opportunities for secondary exposure and potential intoxication in scavenging species. In addition, caution is advised when using thiafentanil in animals that could be preyed upon before full metabolism of the drug.

Wolfe, M.L., B. Bates and D.M. Choate. 2003. An Evaluation of Cougar Management Strategies in Utah. Pages 77-78 *in* L. A. Harveson, P. M. Harveson, and R.W.Adams, eds. Proceedings of the Sixth Mountain Lion Workshop. Austin. Texas.

Abstract

Recently several western states have increased the sport take of cougars (Puma concolor) substantially, thus prompting concerns regarding the sustainability and demographic effects of these removals. We analyzed statewide statistics for the sport take and other mortality of cougars in Utah for the past two decades. The years 1993-1999 witnessed a period of aggressive efforts to reduce cougar numbers in many areas of the state, including implementation of a quota system in 1997 on approximately one third of the management units. From the early 1970's to 1996 the annual sport take increased approximately 5-fold from 92 to 452 animals, while hunter numbers increased from approximately 200 to 800. An average of 69 additional cougars (21.4% of the sport take) was killed annually between 1990 and 1996 due to depredation control, highway mortality and miscellaneous causes. Adoption of the quota system resulted in a further increase of 75% in hunter numbers and an additional 27.4% increase in the kill. This level of exploitation occasioned changes in certain parameters of demographic importance. These included an increase in the average proportion of females in the kill from 35.1% to 47.5%, attenuation of the age structure of the kill and an 8.9% decrease in time-specific adult survival rates from 0.67 to 0.61. Population projections revealed that recent levels of exploitation are not sustainable. We compare cougar survival rates across ecoregions within the state and discuss the influence of environmental variables, including terrain ruggedness, road density, and weather conditions, on an index of cougar mortality.

Wood, D.A., Stanberry, F.W. and R.M. Brantly. 1980. Participation Schedule for the Florida Panther Recovery Plan. Proj. No. E-1-R-5, Study 2, Job E. Florida Game and Fresh Water Fish Commission. 30pp.

This Participation Schedule is intended for the joint benefit and use by the Commission and the U.S. Fish and Wildlife Service toward the implementation of the Florida Panther Recovery Plan. Current implementation efforts indicated that eight (40%) of the 20 tasks identified in the Recovery Plan were ongoing to varying extents. Past, present and future Commission participation is presented and a participation schedule is provided. Appendix A furnishes panther records in Florida on file at the Florida Panther Record Clearinghouse. Appendix B is the Florida Panther Act, Section 372.0725. Appendix C provides the Program Narrative of Florida Endangered Wildlife Project E-1-5. Appendix D consists of a letter from the Commission to the Fish and Wildlife Service concerning hunting in the Fakahatchee Strand.

Woodruff, S. 2006. Characteristics of Wolf and Cougar Kill Sites in the Southern Yellowstone Ecosystem. M.A. Thesis. Prescott College.

Abstract

We examined kill site habitat characteristics of sympatric wolves (*Canis lupus*) and cougars (*Puma concolor*) in the southern Yellowstone ecosystem. We tracked radiocollared wolves and cougars to locate and describe kill sites from December 1999 - May 2006. Using computer mapping techniques, we: 1) identified kill site characteristics (elk density, vegetation cover type, distance to waterways, slope, aspect, elevation, and terrain roughness) associated with wolf and cougar kill sites; 2) compared and contrasted characteristics between wolf and cougar kill sites; and 3) compared and contrasted winter versus spring kill site characteristics. Analysis indicated wolf kill sites were not randomly selected; cougar kill sites generally did not differ from random sites. Wolf kills occurred on less steep slopes in more open areas, and in areas with mid to high elk density. Cougar kill sites were characterized by rougher terrain and greater canopy cover and appear unaffected by elk density. We concluded that variation in kill site habitat likely stems from differences in hunting techniques.

Wright, A.L, K. Kunkel, M.G. Hornocker and H. Quigley. 2003. Cougars and Desert Bighorn Sheep in the Fra Cristobal Range: Scale, Geography, and Seasonality. Page 78 *in* L. A. Harveson, P. M. Harveson, and R.W.Adams, eds. Proceedings of the Sixth Mountain Lion Workshop. Austin. Texas.

Abstract

Desert bighorn sheep (Ovis Canadensis mexicana) (n = 44) were translocated to the Fra Cristobal Range of southcentral New Mexico during 1995 and 1997. This population has grown (September 2000, n = 57) despite documented predation by cougars (Puma concolor) on both naive and non-naive (surviving > 1 year after translocation) sheep. Of 11 cougar-caused mortalities of non-naive sheep 10 occurred during lambing season (January - May). During February 1999 - August 2000 the average number of observations/month of cougar sign was 31.3 + 8.2 (95% C.I.) during lambing season versus 12.0 + 5.3 (95% C.I.) during other months. This difference may reflect a pulse of subadult dispersal into the area during winter as well as reduced movements by females with litters during summer and fall. The Rio Grande River and Elephant Butte Lake form both a barrier to east-west dispersal and a riparian corridor for north-south movement. Thus, the Fra Cristobal Range and Caballo Mountains, which lie parallel to and just east of the river valley, are spatially ideal as a dispersal corridor for subadult cougars. The composite home ranges of 7 cougars that used the Fra Cristobal Range (66 km^2 of sheep habitat) covered approximately 2,000 km^2. Because the cougar population functions at a geographic scale at least 2 orders of magnitude greater than the sheep population, non-targeted removal of cougars probably will not reduce predation on desert bighorn sheep in the Fra Cristobals unless cougar numbers are reduced over a broad portion of southern New Mexico. If lambing and an influx of dispersing cougars typically are synchronous, occasional removal of specific cougars may be necessary to increase the sheep population to the point where it is regulated by food supply. Whether targeted predator control will be needed over the long-term to maintain the sheep population near this level is still unknown and may be largely a function of habitat quality. We warn against generalizing these results to other bighorn sheep ranges in different geographic contexts and where mule deer (Odocoileus hemionus) are not the primary prey of cougars as they are in the Fra Cristobal Range.

Wright, B.A. 1973. The Cougar is Alive and Well in Massachusetts. Massachusetts Wildlife 24(4):2-8, 19.

In 1764, a four-pound bounty was paid for killing a panther. As civilization advanced, the original forest was decimated, the deer were killed, and the cougar was retreated to the great forests to the north. As deer habitat conditions improved and numbers increased, so did the mountain lion numbers. The author tells of the comeback of the cougar by recounting reports of cougar sightings from 1926 to 1971. The cougar had never been photographed alive and all that is known is from skins, skeletons, and mounted specimens. The cougar was officially considered extinct in the northeast about 1860, but was rediscovered breeding in the Fundy Hills of New Brunswick in 1947. In 1966, the International Union for the Conservation of Nature and Natural Resources removed the Eastern panther from the extinct list and placed it on the Rare and Endangered List. In 1972, the panther was officially protected under the Endangered Species Act. The type locality of the Eastern panther is Pennsylvania and its range extends from southern Canada to where it joins the southern subspecies at the Florida state line.

Wright, B.S. 1948. Survival of the Northeastern Panther (Felis concolor) in New Brunswick. J. Mammal. 29(3):235-246.

The history of the "panther" in New Brunswick is presented. The presence of the panther has always been doubtful, and at best appears to have always been rare. Records of the panther in Quebec, which is the farthest north for the eastern species, end about 1880. Forty-three sight records and track reports are presented from New Brunswick, three from Maine, and the only record known to exist from Nova Scotia is cited.

Wright, B.S. 1953. Further Notes on the Panther in the Northeast. Can. Field Nat. 67:12-28.

SUMMARY AND CONCLUSIONS

The early panther reports from New Brunswick have been screened and any that might have originated in the sighting of a wild dog have been eliminated. Over one hundred reports remained from New Brunswick, Maine, and Nova Scotia, and these are analyzed for physical characteristics and life history data. The accounts of the killing of six panthers in New Brunswick and Maine are given, and a number of cases where panthers have been wounded and escaped are discussed. The northeastern race is found to be similar in gross dimensions to the western races, but generally darker in color, particularly on the back and head. Accounts of calling up a panther are given, as is a report of the finding of a den. The young are described from eye-witness testimony. Food habits include deer, caribou, bobcat, otter, partridge, and frogs. The habit of standing on the hind-legs is discussed. Two incidences of predation on domestic stock, and accounts of two recent attacks on man are given. Swimming ability is discussed and the status of the species in the northeast is reviewed.

Wright, B.S. 1960. The Return of the Cougar. Audubon 62(6):262.

There are two subspecies of the cougar in the East. The southern subspecies, Felis concolor coryi, ranged from Florida to the South Carolina/Georgia border and westward along the southern border of Tennessee to the Oklahoma border. The country to the north and east of this to New Brunswick was the range of the northern subspecies, Felis concolor couguar. By 1850, most states and provinces along the Atlantic coast had apparently lost their cougars. By 1910, the eastern cougar was considered extinct in all of its northeastern range. The author started accumulating reports of cougars in 1938 and it became apparent that there were survivors in New Brunswick, Maine-New Hampshire-Vermont border area, in the eastern mountains, and at the head of the Great Lakes. Most reports were in direct relation to increases in deer numbers in many areas where they had historically been depleted and in a few instances where they had pioneered new territory. The cougar was unprotected at any season of the year in every state or province where it was found in the northeast.

Wright, B.S. 1961. The Latest Specimen of the Eastern Puma. J. Mammal. 42:278-279.

The author reports that a specimen of the long-supposed extinct Felis concolor couguar, reported to have been the last taken in the northeast had been obtained. The specimen was described and was placed in the collection of the Northeastern Wildlife Station at the University of New Brunswick, in March 1931. The last complete specimen to be preserved in the northeast was apparently that killed near Barnard, Vermont, on 24 November 1881.

Wright, B.S. 1965. The Cougar in Eastern Canada. Can. Audubon 27:144-148.

The farthest east that the cougar was known to have reached in early times in eastern Canada was New Brunswick. This suggests that in the 1840's the cougar was driven out of the greater part of the northeastern states by civilization and had retreated into the great undisturbed forests of New Brunswick. Over 200 reports of cougar in the east were collected at the Northeastern Wildlife Station at the University of New Brunswick and a systematic analysis showed that by 1960 cougars had been reported for every county of the province and appeared to be expanding its range. There were only two provinces in Canada-Newfoundland and Prince Edward Island that had not reported cougars in the previous 10 years. The only specimen taken in the east since the "comeback" of the cougar that were found was one in New Brunswick in 1931, and one from the Maine/Quebec border around 1938. The author relates a few accounts of cougar encounters selected from over 240 on file from New Brunswick alone.

Wright, B.S. 1967. The Status of the Cougar in the Northeast. Trans. 31st Fed./Prov. Wildl. Conf., Ottawa, Ontario.

Pgs. 76-82.

The Game Act had not specifically stated that the few remaining panthers were protected in New Brunswick. A casualty list of 31 panthers killed and injured by man east of the Mississippi and north of Florida (1900-1965) is presented. The northeastern panther was still inadequately protected (if protected at all) in every state or province in its range except New Hampshire. The greatest danger to the panther was from the "shoot it to prove I saw it" philosophy of most deer hunters.

Wright, B.S. 1971. The Cougar in New Brunswick. Pgs. 108-119 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.

Between 1920 and 1970, panthers were reported in the southwest corner (Southwest Range) of the province 38 times. Between 1900 and 1970, panthers were reported in the areas between the St. John River and the Maine border (Western Range) a total of 45 times. Between 1937 and 1970, panthers were reported in the area contiguous with the Southwest range to the west (Base Gagetown area) a total of 38 times. Between 1904 and 1970, panthers were reported in the area along the East bank of the St. John River from Sheffield to the Becaguimec Game Refuge (Central Sector) a total of 56 times. Between 1907 and 1969, panthers were reported 24 times in the Juniper Sector. Between 1930 and 1963, panthers were reported in the watershed of both the Restigouche and Nepisiguit Rivers and the smaller rivers between a total of 12 times. Between 1900 and 1968, panthers were reported in the central highlands of northern New Brunswick along the Miramichi River from the Juniper country in the west over a hundred miles to the Bartibog in the east (Miramichi Sector) a total of 18 times. The first record of a panther shot in New Brunswick appears on page one of the St. John Telegraph Journal on November 24, 1923. A total of eight sightings were reported for the area south of the Kent-Northum Berland line to the Nova Scotia border (Kent-Westmorland Sector). Up to 1970, panthers were reported in the area between Grand Lake and the Bay of Fundy from the Petitcodiac River in the east to the St. John River in the west (St. John-Albert Sector) a total of 46 times. The author reported that "it seems evident from these records that the eastern panther has covered all of the great central forest in the Past 70 years and may be found now anywhere in this 20,000 square mile area". A greater concentration of panthers seems to be along the south forest and in the southwest corner. The author's best guess at a population estimate for New Brunswick is 25-50 maximum. Records since 1952 may constitute a recent extension of range for the panther from tide water on the Baie des Chaleurs to tide water on the upper Gulf of St. Lawrence, through the mountainous heart of the great peninsula where it had never before been recorded. Sightings of a group of panthers along the northwest end of Montral Island, in Montreal, Canada, were reported from about March 7-April 18, 1959. Panthers were never captured, but plaster casts of the track of one of them was accepted as genuine by two scientists at McGill University's Redpath Museum. Other reports have come from Quebec and the southern deer range of Ontario. Deer were not known in Nova Scotia prior to 1890, when they were introduced from New Brunswick. The first report of what appears to have been a panther in Nova Scotia was in June of 1923. Since 1923, a total of 36 sightings have been made. Plaster casts of tracks have been identified as panther at the U.S. National Museum. The author reports that the range of the supposedly extinct eastern panther runs across the Laurentians from central Ontario to the Atlantic Coast of Cape Breton Island, and between the Mississippi and the Atlantic south to where it merges with the range of F. c. coryi at the Florida line. A table gives 20 descriptions of black specimens of panthers seen at close range in daylight in New Brunswick, Quebec, and Nova Scotia from 1951 to 1970. The author accepts the word of eye-witnesses who have seen black panthers in northeastern North America and that they are not particularly rare (about 7% in New Brunswick and Nova Scotia). Another table shows a list of 45 panthers killed or injured by man between the Mississippi and the sea north of Florida, 1900-1968.

Wright, L.M. 1934. Cougar Surprised at Well Stocked Larder. J. Mammal. 15:321.

The author surprised a cougar at Mt. Hamilton, California in 1919. The cougar fled and two fawns were found nearby. One was completely buried and partially eaten. The author returned three days later and nearly all fleshy parts were gone and concluded that the cougar had stayed in the vicinity and guarded its kill against all carrion feeders for its own consumption.

Yabsley, M.J., S.M. Murphy and M.W. Cunningham. 2006. Molecular Detection and Characterization of *Cytauxzoon*

felis and a *Babesia* Species in Cougars from Florida. J. Wildl. Dis. 42(2):366-374.

Abstract

Piroplasms, morphologically indistinguishable from *Cytauxzoon felis*, previously were detected in 36% of cougars in Florida. We utilized a nested 18S rRNA assay, which amplifies DNA from all piroplasms, to screen blood samples collected from 41 cougars from Florida (39 native Florida panthers [*Puma concolor coryi*] and two translocated Texas cougars [*P. c. stanleyana*]) from 1989-2005. Thirty-nine of the 41 cougars (95%) were positive for piroplasms; however, sequence analysis and restriction enzyme digestion revealed that only five were positive for *C. felis*. Samples from 32 cougars were positive for a *Babesia* sp. Two cougars were co-infected with both *C. felis* and the *Babesia* sp. Phylogenetic analysis of 18S rRNA gene sequence indicated that the Florida panther *Babesia* sp. was most closely related to a *Babesia* sp. reported from *Ixodes ovatus* from Japan, *Babesia divergens*, and *Babesia odocoilei*. This study indicates that Florida panthers harbor two distinct piroplasms, *C. felis* and a *Babesia* sp., and that some individuals are infected with both organisms. The infectivity and pathogenicity of this *Babesia* sp. for domestic cats is unknown. This represents the first report of a feline *Babesia* sp. in North America.

Yanai, T., T. Masegi, M. Hosoi, K. Yamazoe, T. Iwasaki, T. Yagi and K. Ueda. 1994. Gastric Adenocarcinoma in a Cougar (*Felis concolor*). J. Wildl. Dis. 30:603-608.

Abstract

Diffusely invasive tumors occurred in the stomach of a 9-year-old female cougar (*Felis concolor*) from a zoo in Japan. The tumors consisted of tubular adenocarcinoma cells, and had infiltrative growth to the submucosa and muscularis propria. Tumor cells were positive for carcinoembryonic antigen (CEA), lysozyme, epithelial membrane antigen (EMA), gastrin, alpha-1-fetoprotein (AFP), keratin, and B72.3. Mucin-like materials occurred within cytoplasmic vacuoles.

Yanez, J.L., J.C. Cardenas, P. Gezelle and F.M. Jaksic. 1986. Food Habits of the Southernmost Mountain Lions (Felis concolor) in South America: Natural Versus Livestocked Ranges. J. Mammal. 67(3):604-606.

The first quantitative report on the food habits of mountain lions in Chile is presented. Mountain lion scats were collected in July and August 1983, and October 1983 through January 1984 from four sections of Torres del Paine National Park. During this same time interval, scats were also collected on four ranches adjacent to the park. The introduced European hare (Lepus capensis) was by far the most numerous prey detected in the scats in the park, followed by ungulates (mainly guanaco), birds, rodents, and carnivores, with horses being a minor fraction of the prey. The winter diet had a higher prevalence of hares, which decreased during Spring/Summer, when all other prey groups increased in occurrence. Some sheep remains were found in park scats which indicated that either resident lions sometimes hunted outside of the park on ranches or that lions from outside enter the park, or both. Hares were again the most numerous prey detected in scats outside the park on the ranches. However, there was a dramatic increase in the representation of livestock as prey (particularly sheep). It was not known to what extent these sheep were killed by mountain lions or whether they were eaten as carrion.

Yenke, W.H. 1982. History and Present Distribution of Felis concolor coryi in Louisiana. M.S. Thesis, Louisiana State Univ., Ruston. 56pp.

Abstract

Occasional reports of cougars (Felis concolor) in Louisiana were known in the early 1900s after they were eliminated from most areas of the state. The reports continued through the 1930s and 1940s. In 1949-50 tracks were verified from Natchitoches Parish. On 30 November 1965, a cougar was killed near Keithville, Caddo Parish. A single track was verified in 1975 from Catahoula Parish. Sighting reports were regular and increased during the 1970s. Some were investigated, but no physical evidence was found. No clearinghouse exists in Louisiana to process reports or to verify them. Reports of "black panthers" and obviously fallacious reports cloud the issue. Seventy-one recent reports were assembled, plotted, and likely areas sampled. Many credible reports were received from biologists, foresters, and other professionals. Sign searches produced no evidence. An organized extensive search by qualified biologists

is needed to resolve the questions raised by sighting reports. Many credible appearing reports suggest that a small number of cougars may still exist in Louisiana.

York, E.C. and R.V. Ward. 2008. Mountain Lion Movement Patterns in Grand Canyon National Park. Page 157 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

Grand Canyon National Park received over 4.5 million visitors in 2007. From March to November between 110,000 and 160,000 cars per month enter the Park. Backpacker use in the backcountry amounts to between 280,000 and 300,000 nights per year. Each of these statistics presents Grand Canyon with significant challenges for mountain lion management. In order to begin to understand how mountain lions and humans relate in the canyon we analyzed movement data from 8 lions that were fitted with GPS collars between November 2003 and December 2006. Individual mountain lions were tracked from 8 to 408 days. Four collared lions died during the study with all mortality attributed to humans. Of the 8 mountain lions tracked during this study 7 crossed the major paved roads of the Park. While mean number of crossings per hour for all mountain lions combined was significantly higher for crepuscular and night periods (12.2) than for daylight hours (2.6), at least 1 mountain lion crossed major roads during all hours of the day. Home ranges varied from 437 km^2 to 480 km^2 for males and 198 to 445 km^2 for females. Of 63 kill sites investigated, elk < 1 year old were the most common prey item with numerous caches located near the developed area. Although most of the radio collared cats had some GPS locations less than 1 km from the developed area of the South Rim, no mountain lions were located directly within the developed area. Data from the study have been provided to decision makers involved in on-going transportation and backcountry planning efforts in the Park.

Young, J.H., M.E. Tewes, A.M. Haines, G. Guzman and S.J. DeMaso. 2010. Survival and Mortality of Cougars in the Trans-Pecos Region. The Southwestern Naturalist 55(3):411-418.

Abstract

We analyzed data from studies of cougars (Puma concolor) completed during 1982–1997 in Big Bend, Carlsbad Caverns, and Guadalupe Mountains national parks, and Big Bend Ranch State Park. We estimated annual and seasonal (hunting and non-hunting periods) rates of survival and rates of cause-specific mortality for 31 males and 29 females. In the three studies, annual rates of survival for females were higher than those for males. Seasonal rates of survival were variable between sexes and among studies; however, pooling males and females revealed that rates of survival at Carlsbad Caverns and Guadalupe Mountains national parks and Big Bend Ranch State Park were lower during hunting periods (1 September–31 March) compared to non-hunting periods (1 April–31 August). However, pooled rates of survival for males and females at Big Bend National Park were equal during hunting and non-hunting periods. Trapping was the greatest annual source of cause-specific mortality in all study areas. Shooting and unknown sources were the next greatest sources of mortality. Mortalities from intraspecific strife and natural causes were documented only in Big Bend National Park. Rates of survival for cougars in Texas and the Guadalupe Mountains of New Mexico are among the lowest in the United States. Low rate of survival should be considered when developing management plans; however, we caution against extrapolating results from limited study areas to the entire region.

Young, S.P. 1927. Mountain Lion Eats its Kittens. J. Mammal. 8(2):158-160.

In February, 1925, a hunter was dispatched to the Wetmore district of the San Isabel National Forest to kill lions which were considered too abundant in the area. A nursing female was killed on February 10 and on February 11 the den of this female was found and the remnants of two lion kittens were discovered, parts of which had been devoured. It was concluded that it was the work of the male which was trapped several days later and was similar in habit to the ordinary house tom-cat which eats up the young when the female is not around to guard them.

Young, S.P. 1933. Hints on Mountain Lion Trapping. USDA Bur. Biol. Sur. Leaflet No. 94. 8pp.

Mountain lions may travel 25 miles or more in a night in search of food. When making a kill, the lion brings its victim to the ground by the stunning impact of its entire weight, generally attacking at the throat and breast. The use of trained hounds is the principal means employed where the control of lions is required. Kentucky fox hounds and the walker/bloodhound cross have been found most satisfactory for trailing lions. A lion that fights at bay instead of treeing may kill all the dogs. The use of poison in mountain lion control is not recommended. Techniques for setting traps to catch mountain lions are described. Catnip may also be used as a lure and its application is detailed.

Young, S.P. 1945. Mountain Lion Trapping. USDI, Fish & Wildlife Service. Circular 6, 7pp.

Mountain lions may travel 25 miles or more in a night in search of food. When making a kill, the lion brings its victim to the ground by the stunning impact of its entire weight, generally attacking at the throat and breast. The use of trained hounds is the principal means employed where the control of lions is required. Kentucky fox hounds and the walker/bloodhound cross have been found most satisfactory for trailing lions. A lion that fights at bay instead of treeing may kill all the dogs. The use of poison in mountain lion control is not recommended. Techniques for setting traps to catch mountain lions are described. Catnip may also be used as a lure and its application is detailed.

Young, S.P. 1946. On the Scream of the Puma. American Forests 52(9):408- 409; 442.

Twenty-five subspecies of the puma were recognized. The puma originally occurred in every state, but is now extinct east of the Mississippi River except in Florida where it exists in limited numbers. It was a question as to whether the puma screams or not and the author presents some early citations and personal field observations and experiences which tended to verify that the puma does make a piercing scream. A critical study of the anatomy of the puma's skull revealed that the distance between the glottis and the base of the tongue is usually no more than 1 to 1-1/2 inches. This and the fact that the puma is seldom able to extend its tongue more than approximately one inch, makes possible the piercing scream.

Young, S.P. 1954. The Return of the Indian Devil. Pennsylvania Game News 25(12): 8-14.

The record weight attained by a puma was a 227 pound animal killed by Theodore Roosevelt on February 14, 1901, near Meeker, Colorado. Thirty geographic races of the puma are recognized. The track of the puma is from 4 - 6-3/4 inches wide. The author states that Christopher Columbus was the first to bring the puma to the attention of Europeans during his fourth voyage in the year 1502. The puma was first recorded in the literature in Pennsylvania by William Penn in August of 1683.

Young, S.P. 1967. Our Wild Lyric Soprano. American Forests 73(8):26, 51.

Twenty-five recognized subspecies exist for the mountain lion and eight of the nine geographic races originally occurring in the United States are still found here. The subspecies which occurred east of the Mississippi River is considered extinct except in Florida. The mountain lion was historically found in every state of the Union with the possible exception of New Hampshire, Rhode Island, and Delaware. Pumas bring their victims to the ground by the stunning impact of their entire weight attacking at the throat, back of the neck, and breast. The author measured a broad jump of 13 feet made from a normal standing position. Columbus was the first to record the puma in the Western Hemisphere during his fourth voyage in the year 1502 while exploring the coasts of Nicaragua and Honduras. Many historic accounts of the scream of the puma are recorded. There is only about an inch or an inch and a half between the glottis and the base of the tongue making it anatomically impossible to utter anything other than a high, piercing shrill cry.

Ziegler, F.W. 1991. The Recovery or Demise of the Florida Panther- Recovery Programs and Zoos. AAZPA Annual Conf. Proc., Pgs. 511-517.

Since 1976, the Florida panther has been the most intensely studied endangered animal in the United States. The numbers are down to less than 50 and they are isolated to 6 counties in south Florida. During the two-year period of 1989-90, 44% of the genetic founders had died. This summer, the last two known breeding females in the Everglades

National Park died. Mercury contamination has caused great concern over the past few years and in 1989 it was identified as the probable cause of death of female panther #27. There appears to be a correlation between mercury levels and habitat preference of individual cats as well as prey source and age. Thus far 16 deaths have been documented as road mortalities, 75% occurring on State Road 29 and 84, better known as Alligator Alley. A plan was devised to collect up to six juvenile cats per year over the first 3-6 years of the project based on genetic representation of the wild population. A lawsuit was filed by the Fund For Animals, Inc., and a Holly Jensen of Florida in order to stop the capture of panthers and placing them in zoological parks for breeding purposes. A settlement was reached and a Supplemental Environmental Assessment was produced and awaits approval in December. The survival of the Florida panther depends on the federal government's support of zoos as valuable conservation centers.

Zimmer, M.A., A.W. Confer, D.U. Reavis, R.D. Tyler and B.E. Gordon. 1983. Osteolipomatoid Polyps in the Bronchi of a Cougar. Vet. Pathol. 20(4):494-496.

An adult cougar (Felis concolor) died after progressive loss of appetite, weight, and eventual depression. Generalized icterus, dark red urine, collapsed lungs, a crural diaphragmatic hernia containing a 15-cm length of viable large intestine (not incarcerated), and a few adult Ancylostoma sp. in the small intestine were found upon necropsy. Two polyps were found; one in the main bronchus of the right cranial lobe and the other in the left primary bronchus. The ultimate cause of death was most likely a hemolytic crisis of unknown origin and the degree that the bronchial polyps contributed to the hypoxia could not be determined.

Zinn, H.C. and M.J. Manfredo. 1996. Societal Preferences for Mountain Lion Management Along Colorado's Front Range. Project Rep. 28. Project Report for Colorado Division of Wildlife. Fort Collins, CO. Colorado State University, Human Dimensions in Natural Resources Unit.

Executive Summary Excerpts

The purpose of this study was to determine the Front Range public's attitudes towards mountain lions (*Felis concolor*), knowledge about how to respond to mountain lions, and preferences for management actions towards mountain lions along the Front Range. Four populations were served: the Denver Metro area, the Colorado Springs area, the Foothills area west of Denver, and individuals who have reported encounters with mountain lions to the Colorado Division of Wildlife's (CDOW) Central Region office. Out of 4,559 deliverable questionnaires, 2,668 were returned, for a response rate of 59%. Results showed that a majority in each population had positive attitudes towards mountain lions. The proportion with positive attitudes towards mountain lions ranged from 84% (±2.4% at the 95% confidence level) in the Foothills population to 79% (±3.0% at the 95% confidence level) in the Denver Metro population. Those with positive attitudes were likely to believe that mountain lions are beautiful, that mountain lions are a sign of a healthy environment, and that mountain lions pose little real risk to people living near them. Those with negative attitudes were likely to believe that mountain lions are dangerous and unlikely to believe that mountain lions are a sign of a healthy environment or that mountain lions pose little real risk to people living near them. Regardless of attitude, most subjects would respond to seeing a mountain lion with interest, surprise, fear, and happiness. To assess public knowledge of how to minimize risk in an encounter with a mountain lion, subjects were asked if they agreed or disagreed with several possible responses to seeing a mountain lion. Responses to a mountain lion recommended in CDOW education materials include "stand tall, talk loudly, and try to back away slowly"; "notify the authorities as soon as possible" and "if attacked, fight back." In all four samples, majorities agreed with these responses. Standing still and doing nothing may be an appropriate response in some situations. Majorities in three samples agreed with this response, but among individuals who have reported encounters with mountain lions to the CDOW's Central Region office, fewer agreed. Playing dead if attacked, crouching down and trying to hide from a mountain lion, trying to scare a mountain lion away, and running away are not recommended responses. Few agreed with any of these responses. Two-thirds of the respondents agreed that steps should be taken to limit the number of mountain lions coming into Front Range residential areas. However, respondents also expressed concern about how mountain lions are treated. Monitoring a situation involving a mountain lion in a residential area was widely accepted if the lion had done no harm, but became less acceptable as incidents grew more severe. Capture and relocation was acceptable to a majority, regardless of the severity of an incident. Frightening mountain lions away with rubber bullets or fireworks was unacceptable to a majority, regardless of the severity of an incident. Destroying a mountain lion was highly unacceptable unless a human had been injured or killed. Fifty percent of respondents reported that they would accept destroying a lion that had injured a person, and 60% reported that they would accept destroying a lion that had killed a person. Among

strategies to reduce the frequency of contact between mountain lions and humans in Front Range residential areas, restricting residential development in areas where mountain lions live was acceptable to nearly 80% of respondents. Increasing public opportunities to hunt mountain lions or deer was acceptable to 40% and unacceptable to the same number. Conducting controlled mountain lion hunts with trained hunters was acceptable to 30% - 40% depending on the study population. Developing sterilization or birth control methods for mountain lions was found acceptable by 27-30% of each sample. Male respondents and respondents living in rural areas were typically more tolerant than others of the presence of mountain lions in residential areas and less likely to report a mountain lion sighting to authorities. Individuals who view hunting as a positive and humane activity were more likely than others to believe mountain lions pose a real risk to people and more likely to accept management actions that involve hunting or destroying mountain lions. Individuals who were sympathetic to the idea that wildlife should have rights similar to the rights of humans were less likely than others to believe mountain lions pose a real risk to people and less likely to accept management actions that involve hunting or destroying mountain lions.
Implications for management: Education and public information regarding mountain lions and their interactions with humans should continue to be a key component of the CDOW's mountain lion management strategies. A majority in each sample endorsed three recommended actions in response to interactions with mountain lions (stand tall, talk loudly, and try to back away slowly; notify the authorities as soon as possible; and if attacked, fight back). This is evidence that the CDOW information campaign about living with mountain lions has raised and can continue to raise the level of public knowledge of how to minimize risk in interactions with mountain lions. Additionally, education may serve to widen the range of acceptable options available to managers. Among management actions towards mountain lions in residential areas, capture and relocation was the only management action that was widely accepted, regardless of the severity of a situation. There may be little public understanding of why managers sometimes choose others ways to handle mountain lions in residential areas. An educational campaign informing the public about why capture and relocation is not always used may help people understand and accept a wider range of management actions. Among mountain lion population control options, increased mountain lion hunting, increased deer hunting, and controlled mountain lion hunts using trained hunters were more widely accepted than sterilization or birth control for mountain lions. In each sample, the group that found increased hunting for mountain lions and deer acceptable was large enough that, given adequate public information and careful design and implementation of hunting opportunities, it should be possible to preserve hunting as a part of the CDOW's mountain lion management toolkit.

Zinn, H.C., M.J. Manfredo, J. Jones, and L. Sikorowski. 1997. Societal Preference for Mountain Lion Management Along Colorado's Front Range. Pages 95-96 in W.D. Padley, ed., Proc. Fifth Mountain Lion Workshop: 27 February- 1 March 1996; San Diego, California.

This study examined public attitudes toward mountain lions and mountain lion management along Colorado's Front Range. Three populations were surveyed using mail-back questionnaires during spring of 1995: the Denver Metro area, the Colorado Springs area, and the Foothills area west of Denver. An overall response rate of 58% was obtained. Data were tested for non-response bias and weighted appropriately. A majority of respondents had positive attitudes toward mountain lions and were likely to believe that mountain lions are a sign of a healthy environment and pose little real risk to people living near them. In a test of knowledge of recommended responses to a mountain lion encounter, two out of three people were aware of actions recommended in CDOW educational materials. Two out of three subjects agreed that steps should be taken to control the number of mountain lions coming into Front Range residential areas. Among strategies to control mountain lion populations, public hunting for mountain lions or deer was somewhat more acceptable (40%) than using trained hunters (30% - 40%) or developing sterilization techniques for mountain lions (30%). In response to incidents involving mountain lions in residential areas, monitoring a mountain lion was widely acceptable if a lion had done no harm, but less acceptable as incidents grew more severe. Capture and relocation was acceptable to a majority in all situations. Frightening a mountain lion away with rubber bullets or fireworks was unacceptable to a majority in all situations. Destroying a mountain lion was highly unacceptable unless a human had been injured or killed. Fifty percent reported that they would accept destroying a lion that had injured a person, and 60% reported that they would accept destroying a lion that had killed a person. Individuals sympathetic to the idea that wildlife should have rights similar to the rights of humans were less likely than others to believe mountain lions pose a real risk to people and less likely to accept hunting or destroying mountain lions. Results demonstrated that, in dealing with mountain lions at the population level, strategies involving public hunting were more acceptable than anticipated. Results also highlighted the importance of continued public education. Public education appears to have increased awareness of how to minimize risk in encounters with mountain lions. Public education may also widen the range of publicly acceptable options available to wildlife managers by clarifying why capture and relocation is

not always used.