

**CCTWS Plenary Session
Carnivore Ecology and Conservation
Thursday February 16, 2017 – 8AM -NOON
Fort Collins, CO**

Presentation Abstracts

Canivoran Ecology – an update

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Abstract. Carnivoran ecology has become the most multifaceted and dynamic taxonomic niche of mammalian ecology, for several reasons. The Carnivora are more varied than any other eutherian order in terms of body size, diet, locomotor adaptations, metabolic specializations, and reproductive delays. They interact strongly with other community members: herbivores, vegetation, and other carnivoran species. They alter densities, habitat use and activities of potential prey, with cascading effects to the foods of those prey. They pose mortal threats to members of other carnivoran species, especially those smaller than themselves by a factor of 2.5 – 4. At the same time, they are threatened by carnivores larger than themselves by the same margin. The importance interspecific competition among carnivores depends heavily on morphological/ecological specialization, with some families (e.g. Mustelidae) having up to seven species in local sympatry in North America. Canid species, much more morphologically uniform, are much less tolerant of each other's sympatry. Habitat diversity and physical structure mediate these competitive interactions as well; tree climbing and burrow use allow several species to coexist with potentially deadly competitors. Mammalian carnivores variously complete or interrupt the life cycles of various parasites and pathogens, and may play important roles in the limitation or evolution of important diseases of species of concern to wildlife managers. Carnivores have limited importance in transporting limiting nutrients—nitrogen, phosphorus, and polyunsaturated fatty acids—from aquatic systems to terrestrial ones. With the development of genomic resources, the conservation of some carnivores is taking new and highly technological directions, with the endangered black-footed ferret a candidate for interspecies somatic cell nuclear transfer. If successful, this initiative would require managers to be newly creative in explaining conservation goals and methods to the wildlife-loving public.

Research addressing carnivore management, challenges and future investigations

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Abstract. Wildlife management programs require solid understanding of population dynamics, predator-prey relationships, and human-wildlife interactions to make informed management decisions. Equally important are the social aspects of wildlife management decisions, especially concerning management of large carnivore species in North America. Historically, carnivore populations in the US were greatly suppressed or extirpated during European settlement, largely due to real or perceived risks associated with livestock conflicts, competition for game species, and threats to human safety. Increased understanding from ongoing management and research efforts, to some degree, along with changing perceptions and shifts from rural to urban

dominated human populations have recently provided for increase and expansion of most mid to large carnivore species in the US. Research opportunities have expanded along with carnivore populations, but questions remain and some results have been contradictory. Future investigations will benefit by being applied at appropriate scales with informative study designs while addressing questions using manipulative experimentation where feasible. Addressing the social aspects of carnivore management is a less developed area of research that should be expanded. Enhancing our understanding of wildlife-human interactions, especially as this relates to carnivore management, will require more formal approaches to investigation, but will continue to be challenging given the strong opinions associated with large, charismatic species.

Carnivore Management in Colorado

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Abstract. A brief overview of carnivore management activities in Colorado, circa 1970s to the present day is presented. Included in this is a discussion of the evolution of population monitoring methods. The emphasis of this presentation is on game species; primarily black bear (*Ursus americanus*) and mountain lions (*Puma concolor*), but corollaries with swift fox (*Vulpes velox*), Canada lynx (*Lynx canadensis*), bobcat (*Lynx rufus*), and river otter (*Lontra canadensis*) are provided. The presenter will offer perspectives on some challenges carnivores face in the foreseeable future as well as some challenges facing wildlife managers in Colorado.

An overview of Black-footed ferret recovery efforts in the Great Plains and Intermountain West

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Abstract. Despite a successful captive propagation and reintroduction program, the black-footed ferret (*Mustela nigripes*) remains one the most endangered mammals in North America due to widespread lethal control of prairie dogs (*Cynomys spp.*), diseases such as sylvatic plague, and conversion of rangeland to rowcrop agriculture. Black-footed ferrets have been reintroduced at 28 separate sites throughout the Great Plains and Intermountain West, primarily on public lands. Non-federal rangelands throughout the Great Plains, the historic core of black-footed ferret range, represent a unique opportunity to recover the species, provided that regulatory concerns, financial incentives, disease management, and prairie dog management issues can be addressed to the satisfaction of private landowners, tribal interests, agricultural producer groups, state wildlife agencies, and local governments. We provide an update on the implementation of the Black-footed Ferret Programmatic Safe Harbor Agreement and other regulatory assurance mechanisms, their potential future use, and an update on ongoing challenges to black-footed ferret recovery rangewide.

Swift fox ecology and conservation in southeastern Colorado

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Abstract. The swift fox (*Vulpes velox*) is one of North America's smallest canids and historically inhabited much of the Great Plains. In the mid-1990's, the U.S. Fish and Wildlife Service was petitioned to list the swift fox under the Endangered Species Act. In response to the petition, the Department of Defense, U.S. Army, which owns a large tract of shortgrass prairie in southeastern Colorado, initiated a study to examine several questions, including: 1) what survey methods are best used to monitor swift fox abundance? 2) What is the interaction between coyotes (*Canis latrans*) and swift foxes? 3) What regulates swift fox populations? 4) What is the social and spatial ecology of swift foxes? From January 1997 to August 2004, we captured, radio-collared, and monitored 304 swift foxes on the 1,040-km² U.S. Army Piñon Canyon Maneuver Site in southeastern Colorado. This presentation describes the results of this 8-year study on swift fox ecology and conservation.

Characterizing habitat of Canada lynx through the lens of habitat use, functional responses, and demography

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Abstract. Based on >20 years of monitoring lynx in the Northern Rockies, we improved current understandings of lynx resource-use by examining habitat selection, availability, and functional responses across scales, seasons, and sexes. In winter, lynx preferentially foraged in multilayer, mature mixed mid and late seral forests dominated by Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*) in the overstory and midstory. In summer, habitat use expands into younger forest structures. Across seasons, lynx use forests that provide the high horizontal cover necessary to support snowshoe hare (*Lepus americanus*) populations. In addition, we used remotely-sensed covariates of forest composition and structure to evaluate resource use and availability at landscape and home range scales. Our assessment of functional responses in habitat use by lynx provided additional insights concerning lynx ecology. For example, we demonstrated that female lynx during the winter avoided stand initiation and sparse forest, but that avoidance increased as stand initiation and sparse forests were more prevalent in home ranges. In contrast, females exhibited consistent selection of advanced regenerating forest structure across its range in availability (~10-40%); mature forest was used in proportion to its availability, but 66% of female lynx occupied home ranges containing ≥50% mature forest. Finally, to better characterize habitat quality we evaluated the role that habitat condition plays on female reproductive performance. We characterized performance using 2 metrics: 1) produced a litter (yes/no), and 2) litter size. Our analysis concluded that reproductive output of Canada lynx was primarily habitat-dependent, and the important forest attributes were 1) abundant and highly connected mature forest, and 2) low-intermediate amounts of small-diameter regenerating forest arranged in simple shapes. Our research demonstrates the strength of integrating approaches characterizing habitat use, selection, and demography for conservation planning, as well as highlights the strong impact forest structure has on lynx resource-use and demography.