

Briefing Memo on Coyotes (*Canis latrans*)

SUBJ: Briefing Memorandum on Coyotes

TARGET AUDIENCE: U.S. National Park Service (Glacier National Park)

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ISSUE: The coyote (*Canis latrans*) is a case study in adaptation. Their expansive range pervades the diverse regions of the United States (see Figure 1 in Appendix), especially alongside the steady surge of human development (Arjo 2004). This increases the likelihood of human wildlife conflict, and qualifies the coyote as a problematic species that needs to be monitored and managed using case-specific methods. Nationwide, human-coyote conflict has proved a product of adaptability, and has incurred crop and infrastructure damage, livestock predation, attacks on humans and pets, and the spread of disease such as rabies, canine distemper, canine hepatitis, and mange (Arthur 2005).

The fact that coyotes are hardy and adaptable, and thus occur in so many varied habitats is a testament to the need to tailor coyote management to the specific ranges in which they are found. In Glacier National Park, coyotes live under a unique set of circumstances, and the increasing number of Park visitors, as well as the expanding symptoms of climate change, will produce more coyote-human interaction, in addition to observable behavioral and biological coyote responses to changes in temperature, fire ecology, availability of prey, edible plants, and cover, and threats from natural predators. Coyote management should be holistic and cognizant of the dynamic nature of this species (Source date).

BACKGROUND: Larger than the red fox and smaller than the gray wolf, the coyote (in the family Canidae) has the appearance of a medium-sized dog with a bushier tail and a more pointed nose (Denver Parks & Recreation 2009; Figures 2 and 3 in Appendix). Its characteristic black-tipped tail is typically held between its legs as it runs, and its fur color is region-dependent (from gray to reddish gray to buff), with a lighter-colored throat and belly area (Arjo 2004). The coyote can weigh between 30 and 45 pounds, with a length of between 4 and 5 feet (Denver Parks & Recreation 2009). They boast more vocalizations than any other wild mammal in North America, and can travel up to 40 miles per hour (City of Calabasas date). Originally situated in the Great Plains and native only to North America, their range has expanded profusely. Coyotes can be found from northern Alaska down to Costa Rica, and throughout the United States and Canada (Di Silvestro 1996). Coyote populations are usually sparse where grey wolves are dominant (Di Silvestro 1996). Coyotes can thrive in semiarid sagebrush grasslands, deserts, shortgrass steppe, alpine areas, shrubby woodlands, grassy fields, suburbs, and some urban areas; generally, where prey exists, coyotes can live (Tersky 1995). Home ranges typically support a family containing two or more generations, a mated pair, or an adult loner, and can range from 5 to 100 square miles (White 2012).

Coyotes are opportunistic omnivores. In Glacier National Park, coyotes focus on plants, invertebrates, birds, small mammals, fawns, sheep, adult deer, elk and pronghorn (Arjo 2004). Coyotes commonly hunt in semi-open areas and use cover for resting and denning (White 2012). Coyotes are preyed upon by humans, mountain lions, gray wolves, black bears, grizzly bears, and golden eagles (Denver Parks & Recreation 2009). Coyotes will mate with the same individual through the years, and occasionally for life with 6-pup average litter sizes and 63-day gestation cycles (Arthur 2005). Juveniles disperse either alone or in groups between 6 to 9 months of age in late fall through early winter and can range up to 100 miles from their den (Arjo 2004). Coyotes are most active at sunrise and sunset. In captivity, coyotes can live up to 18 years, while in the wild, coyotes live between 6 to 8 years (City of Calabasas date). Coyotes have no federal legal status, and their status varies depending on state and local laws. In most western states, coyotes are classified as predators and can be hunted throughout the year independent of livestock predation. In other states, coyotes may be taken during specific hunting seasons by specific methods such as trapping, or they are considered game animals, furbearers, or protected species (Tersky 1995).

MANAGEMENT/POLICY RECOMMENDATIONS: Local community outreach programs should be created and implemented for both Montana residents and visitors to Glacier National Park. Community education should separate facts from myths, inform the residents and visitors of appropriate coyote interaction and preventative measures, and distinguish what constitutes coyote threats versus coyote coexistence. Park visitors should be educated on coyotes' function as a vector for certain canine disease (e.g., rabies, canine parvovirus, mange, and others), and not to feed coyotes, to secure garbage, to use hazing and other deterrents where necessary (Arthur 2005). Greater Glacier Ecosystem residents should be informed of coyote deterrent methods such as fencing, corralling of livestock, keeping pet food and water indoors, fencing in areas with potential coyote food items, and minimizing shrubs or other potential plant cover (establishing buffer zones) near places with human activity, such as playgrounds or pastures (Denver Parks & Recreation 2009). Both workshops and print and virtual materials should be readily available, and park rangers should be equipped with this knowledge to share with visitors when they engage with them. Park locals should be able to easily access information on problematic individuals and preventative measures and deterrents that they can implement and install in and around their homes.

Public outreach by Glacier National Park staff will determine how the public views coyotes, so educational materials should also include information on coyotes' role as a keystone species, and the benefits that this species imparts on the Greater Glacier National Park ecosystem. Specific benefits include seed dispersal, suppression of predators and therefore protection of other native or endangered prey species, and intrinsic cultural value to Native American tribes. Coyotes benefit sage grouse populations by suppressing jackrabbit populations that attract eagles that prey on sage grouse, and by reducing the number of sage grouse competitors for plants (Chadwick 2010). Coyotes' impacts on other Park species help maintain the food web as they fulfill their ecological niche. Armed with information and access to Park resources, a knowledgeable public should be equipped to prevent problematic interactions with coyotes, act if problems arise, and recognize the threshold at which methods such as lethal removal of problematic individuals may be required.

A holistic, community-based model for mitigating human-coyote conflicts involves the training of Park staff, Park visitors, and local residents — involving multiple Park stakeholders. Communities such as Denver, Colorado, have reduced coyote conflicts through coyote hazing workshops for county staff and residents (White 2012). In this particular case, hazing has thus far decreased aggressive behavior in local coyotes (White 2012). Lethal removal was not necessary. In Glacier National Park, lethal removal has also not been necessary. Coyotes aid in seed dispersal and can therefore rehabilitate habitat after forest fires (Tersky 1995). From a fire ecology perspective, park management can utilize prescribed burning, as it favors small mammals and different patches of vegetation, and reduces vegetation height, which in turn augments both the coyote prey base and hunting habitat quality. However, if the prey are listed as endangered or threatened species such as ptarmigans, fire control measures only should be locally attempted under closely watched conditions.

Lethal predator control can have a population effect on coyotes. Coyotes naturally regulate their populations in accordance with prey availability, territory, weather, topography, vegetation, and diseases/parasites. It has been shown that extermination attempts through sport hunting, bounties, fur trapping, and lethal removal programs actually increase coyote population numbers (Di Silvestro 1996). When an alpha pair is killed, subordinate pack members (betas and gammas) breed larger litters of pups with higher survival rates, which may induce alterations in hunting habits to include larger or unnatural prey such as livestock or pets (see Figure 4 in Appendix). Increased persecution leads to bigger populations, increased predation and conflict. To this end, preventative, non-lethal measures are the recommended alternatives to coyote management at Glacier National Park, particularly as relocation has been proven ineffective (White 2012). Coyote behaviors should play a larger role in their management. For example, predicting seasons during which coyote aggression is common should help dictate the intensity of community outreach and preventative measures. In the

late winter, coyotes establish territories and become aggressive. In the early spring and summer, they are procuring food for their pups (Chadwick 2010). These seasons should correspond with increased conflict management of by using better livestock husbandry practices, fencing upgrades, community adherence to no-feeding bylaws, and deterrent methods such as confining small pets, removing excess food from bird feeders, and removing outdoor pet food bowls (Denver Parks & Recreation 2009).

PROGNOSIS: As human development in the U.S. continues to grow, we continue to alter more of the environment. Some species, like the Pika, have very particular habitat requirements, and these inflexible species are disappearing with their habitats, while adaptable species are thriving (Manville 2016). When environmental change happens rapidly as it is now, adaptably plastic species like the coyote have an advantage. They will alter their habitat use and behaviors in response to humans, while adjusting to shifts in prey distribution and abundance (Angelici 2016). However, their adaptability also makes their management more difficult; no single approach will always be successful, and decreases in natural prey abundance may result in increased coyote reliance on livestock or small pets, which can then lead to retributive persecution of the species. I believe that the coyote will remain stable as long as effective public education and management and deterrent methods keep them from coming into conflict with humans.

FINAL RECOMMENDATIONS: The National Park Service should allocate funds to research coyote abundance and distribution. This enables Park managers to incorporate specialized coyote management plans. There is no blanket solution; each area will have its unique set of geology, topography, flora, and fauna that will render one method more effective than other available methods. Having the data to decide which method to implement is critical, so consistent and adequate funding of coyote population research at Glacier National Park is crucial to keeping a finger on the pulse of this dynamic species in this changing ecosystem. The research should investigate the efficacy of various methods of preventing coyote livestock predation and conflict with humans in and around human settlements like the Blackfeet Reservation in Browning, developed and populated tourism areas like West Glacier, and trailside on the different Glacier National Park sites. Research should also be done on den relocation; not much is known about why coyotes move their young from den to den, though disturbances such as parasites seem likely (Arthur 2005). More information on these disturbances can be applied towards management of their fecundity and population. Additional research should be executed on juvenile turnover and mortality; just as little is known about this, though the existing research states that there is between 50 – 85% mortality in a coyote's first year, though adult mortality rates are lower (Arjo 2004).

Coyotes survive predation and persecution by developing behavioral and biological adaptations and compensatory mechanisms. They also provide ecosystem services and hold intrinsic value, particularly in the Greater Glacier ecosystem, which should be taken into consideration in the evaluation of this species. As they have become ingrained in our national landscape, our conflicts and encounters with coyotes will likely increase with the increased number of humans using our parks. Sound science, public education, and park policy and management should be able to identify ways to coexist with these wily, ingenious predators as the space between us fades.

APPENDIX:

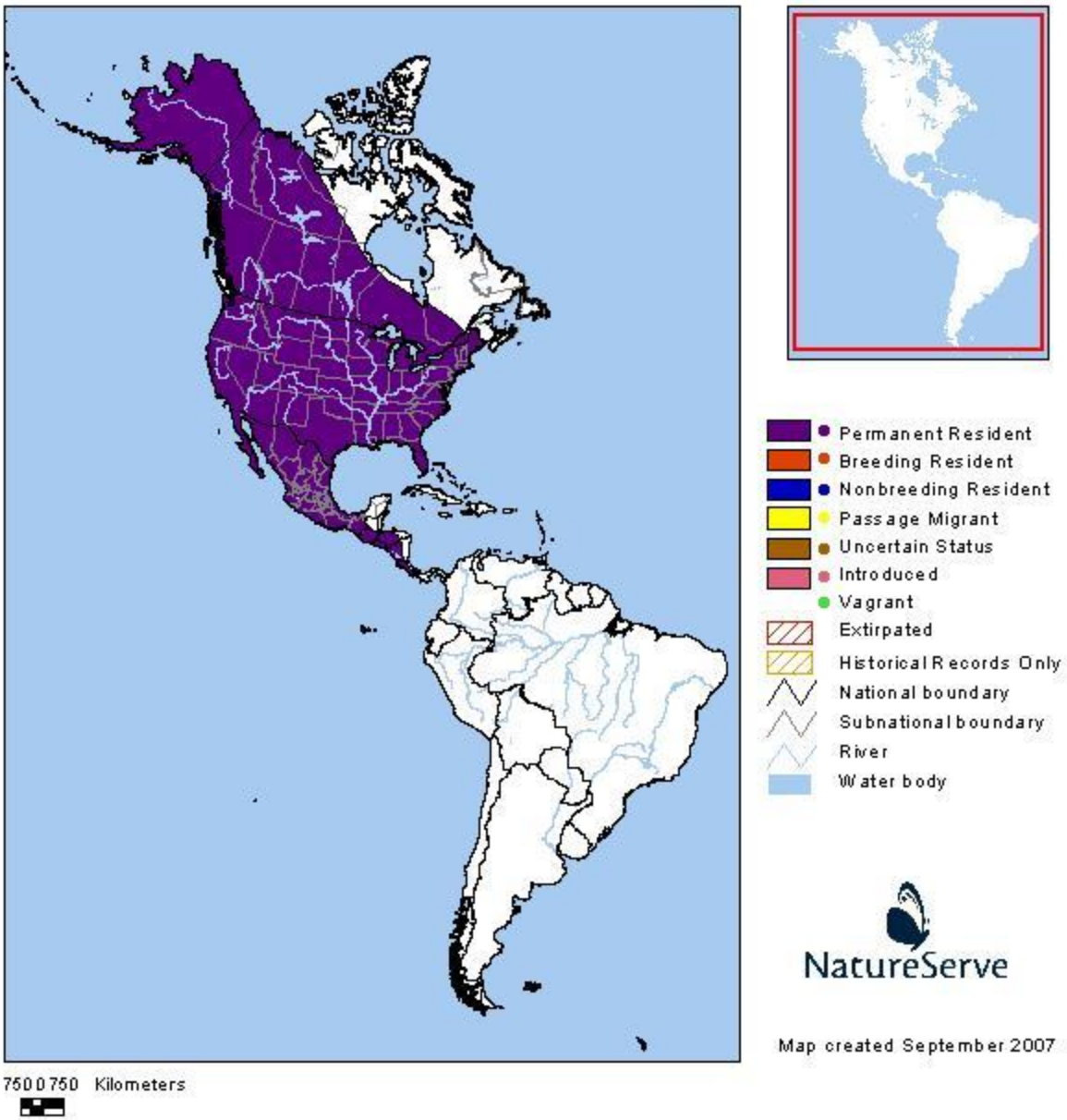


Figure 1: Coyotes' Range

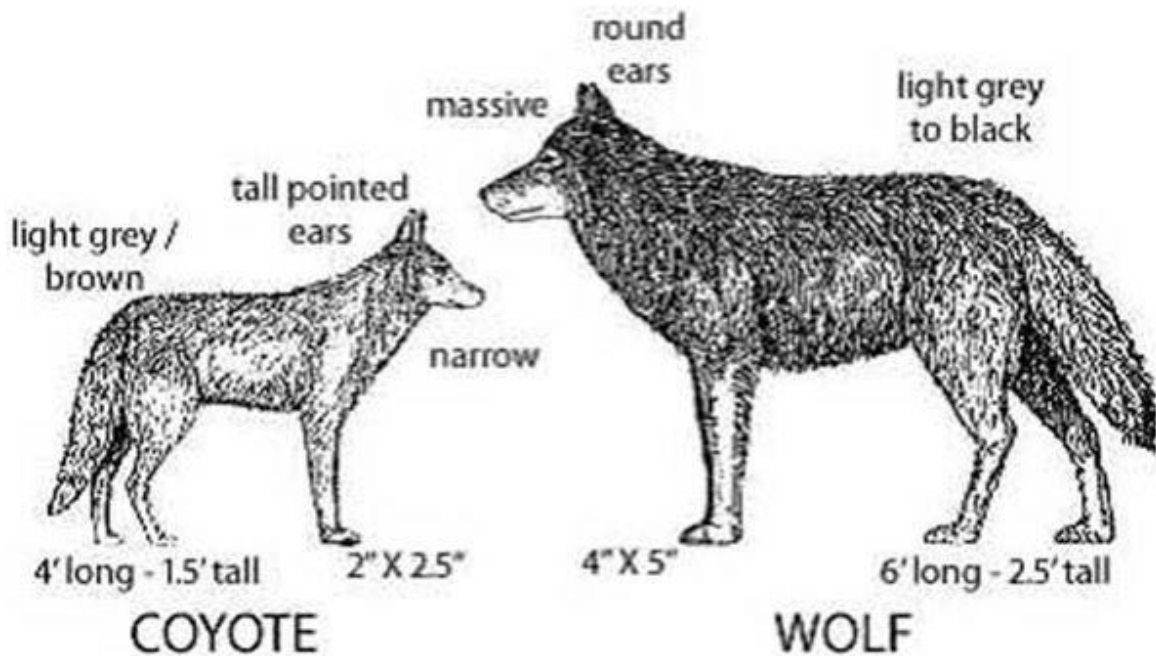


Figure 2: Coyote's Appearance Juxtaposed to that of the Gray Wolf

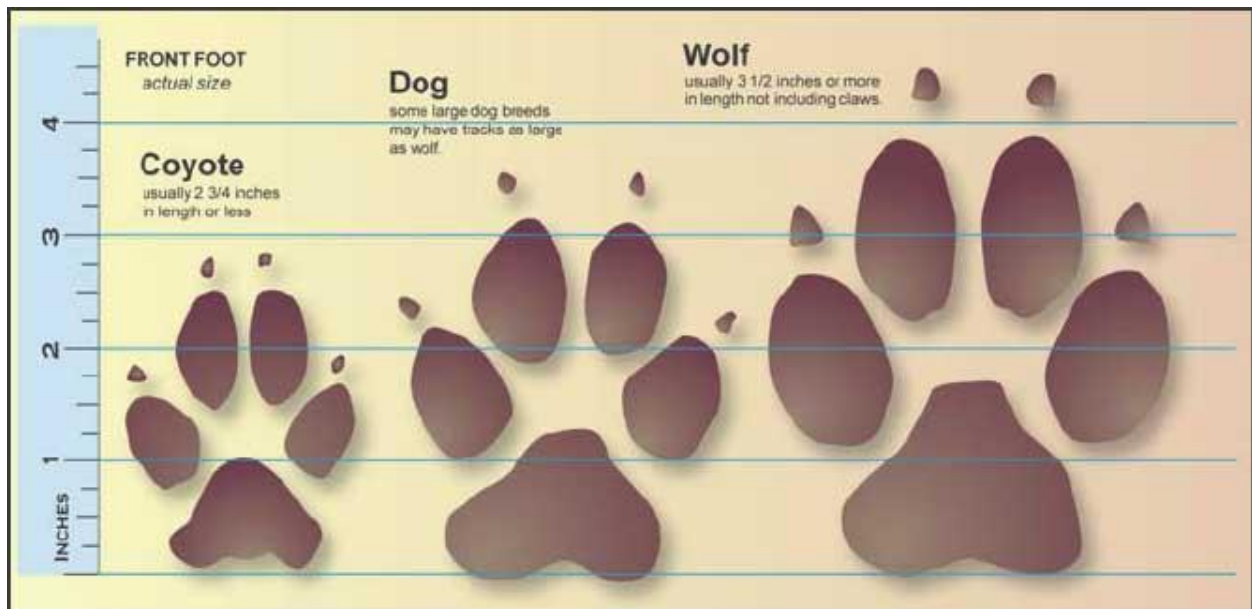
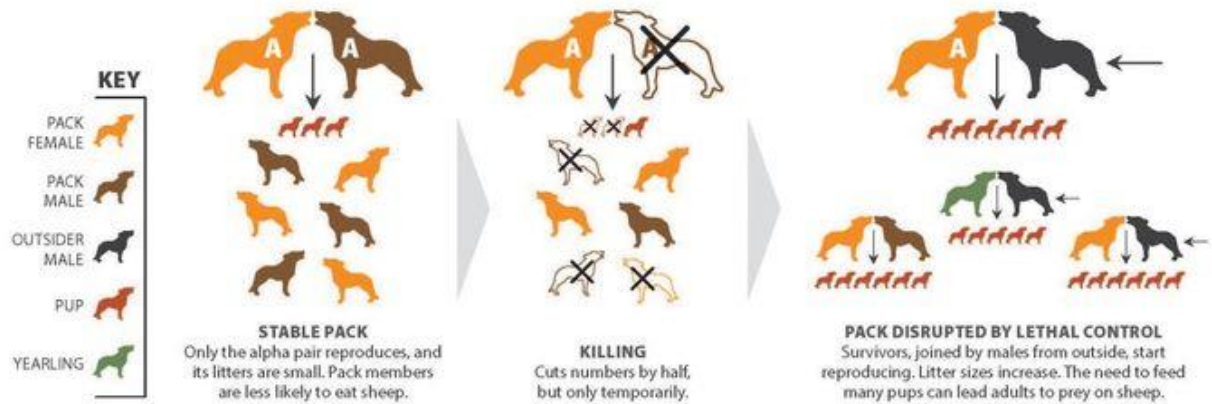


Figure 3: Comparison of Coyote, Dog, and Wolf Paw Prints. Source: <http://fwp.mt.gov/fishAndWildlife/management/wolf/wolfCoyote.html>

Why **KILLING** Doesn't Work

Shoot or poison coyotes and you will have just as many again within a year or two. Kill one or both members of the alpha pair (A)—the only one that normally reproduces—and other pairs will form and reproduce. At the same time, lone coyotes will move in to mate, young coyotes will start having offspring sooner, and litter sizes will grow.



humanesociety.org/coyotes

Figure 4: Illustration of Contradictory Effects of Lethal Coyote Population Control

Number of coyotes trapped by nuisance wildlife control operators in the Chicago Region

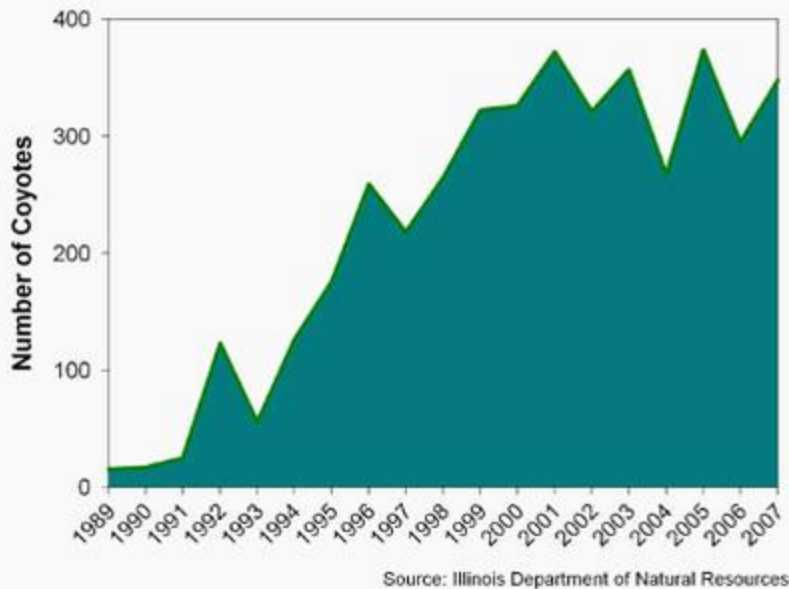


Figure 5: Graph Illustrating the Rise in Coyote-Human Conflict

LITERATURE CITED:

- Angelici, F. M., editor. 2016. Problematic Wildlife: A Cross-Disciplinary Approach. Springer International Publishing, AG Switzerland.
- Arjo, W.A., D.H. Peltscher. 2004. Coyote and Wolf Habitat Use in Northwestern Montana. USDA National Wildlife Research Center – Staff Publications. Paper 71.
- Arthur, S.M. 2005. Interrelationships of Dall Sheep and Predators in the Central Alaska Range. Alaska Department of Fish and Game, Division of Wildlife Conservation Research Performance Report, Juneau, Alaska, USA.
- Chadwick, D. H. 2010. The Wolverine Way. Patagonia Books, Ventura, California, USA.
- City of Calabasas. 2016 [?] Coyote management plan. Public Works Department, Environmental Services Division, Calabasas, California, USA.
- Denver Parks and Recreation. 2009. Coyote management plan. Natural Areas Program, Natural Resources Division, Denver, Colorado, USA.
- Di Silvestro, R. 1996. Studies of coyotes in Yellowstone National Park show that wolf reintroduction is changing the canine social hierarchy. National Wildlife Federation. Archives: 1996.
- Manville, A. 2016. Class Notes. The Johns Hopkins University, Washington, District of Columbia, USA.
- Tersky, J.L. 1995. *Canis latrans*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). <http://www.fs.fed.us/database/feis/animals/mammal/cala/all.html> Accessed 11 July, 2016.

White, L.A., A.C. DeLaup. 2012. A New Technique in Coyote Conflict Management: Changing Coyote Behavior through Hazing in Denver, Colorado. Humane Society Proceedings of the 14th WDM Conference. [http://www.humanesociety.org/assets/pdfs/wild_neighbors/coyote_conflict_management. pdf](http://www.humanesociety.org/assets/pdfs/wild_neighbors/coyote_conflict_management.pdf)> Accessed 10 July, 2016.