

A New Technique in Coyote Conflict Management: Changing Coyote Behavior through Hazing in Denver, Colorado

LYNSEY A. WHITE, Urban Wildlife Specialist, The Humane Society of the United States, Gaithersburg, MD, USA
ASHLEY C. DELAUP, Wildlife Ecologist, City and County of Denver Parks & Recreation, Denver, CO, USA

ABSTRACT Conflicts between people and coyotes (*Canis latrans*) in urban and suburban communities are becoming increasingly common as coyotes have expanded their range across the U.S. and settled into human-dominated landscapes. A newly emerging community-based model for resolving human-coyote conflicts involves the training of local residents, park staff, or animal control officers in simple hazing techniques. Communities such as Denver, Colorado have achieved considerable success in reducing coyote conflicts by holding training workshops about coyote hazing for county staff and local residents. Hazing has been successful in reversing aggressive and undesirable behaviors in coyote family groups and solitary coyotes, reducing pet attacks in neighborhoods, and reducing the overall number of complaints from residents.

KEY WORDS coyote, *Canis latrans*, Denver, Colorado, hazing, education, human-coyote conflict, coyote attack.

Interactions between people and coyotes (*Canis latrans*) in urban and suburban communities are becoming increasingly common as coyotes have expanded their range across the U.S. and settled into human-dominated landscapes. Although coyotes are naturally wary of humans, and even those living in very urbanized landscapes have been shown to avoid people (Gehrt 2004c, Gehrt et al. 2009), conflicts between coyotes, people, and domestic pets do occur. Human-coyote conflicts in residential areas and parks have become serious challenges for community leaders, who must find solutions that both appease the public and reduce the conflicts.

Conflicts between people and coyotes in urban areas generally fall into 3 categories: coyote sightings, attacks on domestic pets, and aggression towards people. Although the sighting of a coyote, even during the daytime, does not necessarily indicate a danger towards people or pets, people are often alarmed when they see a coyote in their neighborhood. This sense of alarm is usually based on concerns for the safety of themselves, their family, and pets. Coyotes generally exhibit a shift toward nocturnal activity in urban areas (Grinder and Krausman 2001; McClennen et al. 2001; Riley et al. 2003, Atwood et al. 2004), but those living in close proximity to humans may be seen during the daytime hunting or crossing roads. These coyotes will generally run away upon encountering people. Coyotes that appear to have lost their fear of people and exhibit bold behavior, such as languishing in parks during the daytime or not running away upon encountering people, are generally referred to as habituated. It's

commonly thought that the habituation of coyotes results from food attractants in neighborhoods (such as pet food, unsecured garbage, and fallen fruit) and repeated exposure to humans without negative consequences (Timm et al. 2004).

Coyotes in urban areas generally hunt small mammals such as mice, voles, and rabbits (Gehrt 2004c), but are opportunistic predators and will prey on domestic pets such as cats and small dogs if given the opportunity (Grinder and Krausman 1998, Gehrt 2004c). Attacks on larger-breed dogs are less common and generally involve more than one coyote. Predation on cats and small dogs generally occurs year-round, while attacks on larger-breed dogs cluster during the coyote breeding season (January-April) and are therefore suspected to be territory-related (Gehrt 2004c).

Coyote attacks on people are uncommon but have occurred throughout the U.S. and Canada. A recent review of coyote attacks on people (White and Gehrt 2009) found less than 150 cases from 1960–2006, involving an equal number of adult and child victims. Most injuries were minor, with just one bite to the victim. Several attacks were pet-related, involving a person walking a pet or intervening in a coyote's attack on a pet. In a third of the cases, people were feeding the offending coyote. A small number of cases involved rabid coyotes or coyotes that were cornered or protecting their den and pups.

A lack of standardized record keeping of coyote attack incidents has made it difficult to determine the true

cause of coyote attacks on people (White and Gehrt 2009). However, there is a general sense of agreement among wildlife practitioners that attacks by healthy (non-rabid) coyotes on people are caused by habituated coyotes (Grinder and Krausman 1998).

METHODS OF HUMAN-COYOTE CONFLICT RESOLUTION

Successfully resolving human-coyote conflicts involves changing the behavior of both people and coyotes. Educating the public about the need to eliminate food attractants in neighborhoods is crucial for preventing coyote habituation to people. Communicating proper pet care and safety (such as keeping cats indoors and dogs on-leash, especially in parks and during the coyote breeding season) is also essential for preventing coyote attacks on pets. Teaching children how to recognize a coyote, what to do if they encounter a coyote (e.g. call for an adult and never run away from a coyote), and to never approach or feed any animal they don't know, is also critical for preventing coyote attacks on children.

Traditionally, lethal control was the sole means used to address problematic behavior in coyotes. In some instances, bounties or large-scale lethal control programs have been used to try to reduce coyote population sizes. This has generally been unsuccessful, as coyotes in controlled populations may exhibit compensatory reproduction by breeding at an earlier age, having larger litters, and experiencing increased survival rate among young (Connolly and Longhurst 1975, Connolly 1978). Lethal control has also been used more selectively in an attempt to eliminate problem coyotes from a population. However, it can be extremely challenging to identify and locate an offending coyote and eliminate that particular individual from the population. Additionally, empty home ranges created when coyotes are lethally removed may be quickly filled by transient coyotes (Gehrt 2004a) and if the root cause of conflict is not addressed (e.g. food attractants in a neighborhood), new coyotes may quickly develop the same undesirable behaviors. In urban and suburban environments, lethal control may additionally be problematic due to the close proximity of people and pets, and demand from the public for non-lethal solutions.

Coyote Hazing

A newly emerging technique for addressing problematic coyote behavior is aversive conditioning, or coyote

hazing. Coyote hazing entails using a variety of simple techniques to reintroduce the natural fear of humans back into habituated coyotes. Techniques include running toward a coyote while waving your arms and yelling, using noise-making devices such as an air horn or whistle, or using a hose or a water gun to shoot water at a coyote. Hazing teaches a coyote that his behavior at a particular place and time is not acceptable and will not be tolerated by people. Just as some coyotes in urban areas have learned that people are not a source of danger and have become habituated, hazing can teach coyotes that humans are a source of danger and should be avoided. Hazing does not involve removing problematic coyotes from a population, but instead reshapes coyote behavior to eliminate undesirable activity.

There is speculation in the literature that hazing is not effective with problem coyotes, especially for coyotes that have attacked pets or exhibited bold or aggressive behavior towards people (Timm et al. 2004). However, there is no published data to demonstrate either the effectiveness or the lack of effectiveness of hazing. There are likely several reasons for this. Given the extremely opportunistic nature of coyote hazing, it is difficult to design a scientific experiment to evaluate its effectiveness. In addition, there is no standardized protocol for coyote hazing, making it difficult to compare the validity of anecdotal attempts and failures at hazing. Finally, successes in the field with coyote hazing have yet to be published in the literature.

CASE STUDY: DENVER, COLORADO.— In the fall of 2009, after two years of fairly serious human-coyote conflicts including coyote attacks on small and large dogs, bold and aggressive coyote behavior towards people (including one human attack) and hundreds of coyote sightings, Denver Parks & Recreation worked with neighboring communities and local experts (including local biologists, ecologists, and the Colorado Division of Wildlife), to develop new coyote management guidelines (Denver Parks & Recreation 2009). These guidelines, which went into effect in October 2009, focused on three main strategies for resolving human-coyote conflicts:

- Monitor and collect data
- Education and outreach
- Haze for behavioral change in resident coyotes.

The new guidelines called for the establishment of a coyote hotline and tracking system to identify coyote sightings and incidents, public awareness campaigns and literature to educate the public, and a coyote hazing program to address problematic coyote behavior. Coyote hazing and public education were designated as the primary tools for addressing coyote sightings, coyote attacks on pets, and unusually bold behavior or aggression towards people. (Lethal control of coyotes was reserved as an option for human attacks only.)

In addition to training park staff and animal control officers in coyote hazing techniques, Denver Park & Recreation conducts coyote hazing training program for the public in coyote hazing. Informal trainings (held in parks or recreation centers and free to the public) are scheduled in neighborhoods experiencing coyote conflicts. Attendees learn basic coyote ecology and the difference between normal and habituated coyote behavior, as well as how to reduce coyote attractants in their neighborhoods, protect their pets, and haze a coyote. One of the novel and cost-savings aspects of the program is its hands-on and empowering nature—it gives local residents the ability and confidence to address coyote conflicts in their own backyards, without outside help.

Coyote Hazing Guidelines

Denver Parks & Recreation's Coyote Management Plan also established guidelines for the effective hazing of coyotes. Experience from park staff has shown that unsuccessful coyote hazing generally occurs when one of these 5 rules is not followed:

1. You must make a connection with the coyote while hazing. In order for a coyote to associate hazing with a danger from people, the coyote must know that the hazing is directed towards him. There must be eye contact between the hazer and the coyote and action must be directed at the coyote. (For example, throwing rocks from behind a bush or a car is not effective because the coyote does not associate a human with the action.)

2. Only use hazing techniques when the coyote is present. Hazing techniques are only effective when you have a connection with the coyote. Banging pots and pans every time you walk out into your yard, for example, will not be effective. (The coyote will quickly habituate to the sound and will not associate it with a danger from humans.)

3. Put yourself between the coyote and your pet or child. If you are with your child or pet when you encounter a coyote, place yourself in-between the coyote and pet or child (pick up the pet if it is small), and focus the coyote's attention on you.

4. Continue hazing until the coyote completely leaves the area. Habituated coyotes that have never been hazed will commonly not react at first to hazing. It may be necessary to approach the coyote more closely, or intensify hazing until the coyote runs away (or both). Sometimes, the coyote will run a short distance and then stop and turn towards you again. It is important to continue hazing until the coyote completely leaves the area (otherwise the coyote learns to "wait you out").

5. A variety of methods and hazers is important. The more techniques you use and the more people who haze, the more quickly coyotes will learn to associate all people with danger.

Other important points: Based on anecdotal feedback from Denver's hazing program, only 2–3 hazing sessions per coyote or coyote family group is generally needed to eliminate undesirable behavior. However, some level of hazing must be maintained perpetually so that coyotes do not re-habituate to people. It is never recommended for small children to haze coyotes or for anyone to haze a sick, injured, or cornered coyote.

Bible Park.— Bible Park, a popular family-friendly park in Denver, was the site of some fairly serious human-coyote conflicts in the fall of 2008. A family group of coyotes was frequently spotted in the park during the daytime, had been approaching leashed pets and attacking pets (including large dogs), and had even been following joggers on the running trails. Instead of closing down the park and setting coyote traps, Denver Parks & Recreation trained about twenty park staff members to haze coyotes and equipped them with a coyote hazing tool kit (containing items such as air horns, soda cans with pennies inside, squirt guns, etc.). Each morning for 3 weeks, 2–3 park staffers went out to the park to find and haze the coyotes. While they were there, park staff also educated visitors about what they were doing and how residents could help with hazing. After the third week of hazing, park staff hardly saw the coyotes in the park and undesirable coyote behavior towards people and

pets had been eliminated. More than 2 years later, the coyotes continue to live near the park (they are sometimes seen hunting rodents during the early morning hours), but have not caused further conflicts with park-goers and pets.

Bill Roberts Elementary School.— One of the most alarming human-coyote conflicts for parents is the presence of coyotes in and around schoolyards. These situations often result in panic calls for the coyotes to be trapped and even for the temporary closing of schools while the trapping is done. The reality is that coyotes may congregate around schools not because they view children as prey, but because children walking to school or at recess often have food (in lunchboxes or backpacks) and may drop food scraps or even intentionally feed coyotes.

Bill Roberts Elementary School in Denver is situated next to an open space and features walking trails that many students use to walk to school. In the fall of 2009, 1–2 coyotes were regularly seen along the pathways to the school in the mornings and outside the fence at recess. (It was later learned that children had been feeding coyotes through the fence.) Denver Parks & Recreation responded by distributing educational literature to the school and neighborhood, teaching children in the school to recognize coyotes, and holding hazing training programs in the neighborhood surrounding the school. Neighborhood residents took on the task of hazing coyotes and more than 1 year later, there have been no more sightings of coyotes around the school.

Denver: Demonstrating Success with Hazing

Now in its third year of implementation, Denver has demonstrated great success in reducing human-coyote conflicts by using their coyote management guidelines (Denver Parks & Recreation 2009). The City and County of Denver have not used lethal control of coyotes since inception of the program; hazing has been used as the principle method for addressing problematic coyote behavior.

Sightings or observations of coyotes have decreased more than 85% from 2009 to 2010, and have further decreased during the first quarter of 2011. Encounters (defined as unexpected, direct meetings between a coyote and a person without incident and may include a coyote approaching a person or pet, or

a person hazing a coyote) decreased more than 75% from 2009 to 2010, and have also decreased further in 2011 (with only 1 reported as of April).

Attacks on pets throughout Denver have decreased overall since the implementation of the guidelines, with none yet reported in 2011 as of April (this is significant, because attacks on pets during the coyote breeding season in January–April were common in previous years). Preliminary results also indicate a reduction in pet attacks in neighborhoods where hazing programs have been implemented. Separating out pet attack data geographically by city council districts, most districts experienced a peak in pet attacks, followed by a sharp drop-off after hazing was implemented. The only exception was district 4, which had 2 peaks in pet attacks, possibly due to two different problematic coyote family groups.

There have been no coyote attacks on humans since implementation of the guidelines. Incidents (aggressive behavior towards people, defined as a coyote approaching a person and growling, baring teeth, or lunging towards a person) have also decreased from 1 incident in 2009 to none in 2010 or 2011. The incident in 2009 involved a coyote that growled at a person inside a car and then ran away as the car drove off; the person was not injured and did not come into contact with the coyote.

A recent survey of Denver residents that have completed Denver Park & Recreation's coyote hazing training sessions has also revealed that participants have a reduced fear of coyotes and have taken steps to reduce coyote attractants in their neighborhoods and protect their pets (L. White, The Humane Society of the United States and A. DeLaup, Denver Parks & Recreation, unpublished data). The survey also found that residents were comfortable using the coyote hazing techniques and shared what they had learned with family, neighbors, and friends. Several residents have reported that they have used the techniques learned at the training and, with 2–3 sessions of hazing, eliminated the undesirable coyote behavior they had experienced in their neighborhood.

RESEARCH NEEDS

Denver's coyote hazing program demonstrates that hazing can be effective for changing behavior in habituated coyotes, when certain hazing guidelines are

followed. However, further research and data collection from the field is needed to support these findings. A standardized coyote incident report form among communities would be especially beneficial for tracking successes and failures in coyote hazing attempts, and for determining, if applicable, any limitations or refinements needed when using hazing to address problematic coyote behavior.

ACKNOWLEDGMENTS

We give special thanks to the City and County of Denver Parks & Recreation for their conscientious collection of data upon which this paper relied and for sharing information about the hazing program's implementation.

LITERATURE CITED

- Atwood, T. C., H. P. Weeks, and T. M. Gehring. 2004. Spatial ecology of coyotes along a suburban-to-rural gradient. *Journal of Wildlife Management* 68:1000–1009.
- Connolly, G. E. 1978. Predator control and coyote populations: a review of simulation models. Pages 327–345 in M. Bekoff, editor. *Coyotes: biology, behavior, and management*. The Blackburn Press, Caldwell, New Jersey, USA.
- Connolly, G. E., and W. M. Longhurst. 1975. The effects of control on coyote populations: a simulation model. *University of California Division of Agricultural Science Bulletin* 1872.
- Gehrt, S. D. 2004a. Chicago coyotes part II. *Wildlife Control Technologies* 11(4):20–21, 38–9, 42.
- Gehrt, S. D. 2004b. Ecology and management of striped skunks, raccoons, and coyotes in urban landscapes. Pages 81–104 in N. Fascione, A. Delach, and M. Smith, editors. *People and predators: from conflict to coexistence*. Island Press, Washington, D.C., USA.
- Gehrt, S. D. 2004c. Urban coyote ecology and management: The Cook County, Illinois, coyote project. *Ohio State University Extension Bulletin* 929, Columbus, Ohio, USA.
- Gehrt, S. D., C. Anchor, and L. A. White. 2009. Home range and landscape use of coyotes in a metropolitan landscape: conflict or coexistence? *Journal of Mammalogy* 90(5):1045–1057.
- Grinder, M. I., and P. R. Krausman. 1998. Coyotes in urban areas: conflicts and solutions. in *Rocky Mountain Research Station Proceedings RMRS-P-5—Cross border waters: fragile treasures for the 21st century*. USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO, USA.
- Grinder, M. I., and P. R. Krausman. 2001. Home range, habitat use, and nocturnal activity of coyotes in an urban environment. *Journal of Wildlife Management* 65:887–898.
- McClennen, N., R. R. Wigglesworth, S. H. Anderson, and D. G. Wachob. 2001. The effect of suburban and agricultural development on the activities of coyotes (*Canis latrans*). *American Midland Naturalist* 158:147–161.
- Denver Parks & Recreation. 2009. *Coyote Management Plan*. Natural Areas Program, Natural Resources Division. Denver, Colorado, USA.
- Riley, S. P. D., R. M. Savajot, T. K. Fuller, E. C. York, D. A. Kamradt, C. Bromely, and R. K. Wayne. 2003. Effects of urbanization and habitat fragmentation on bobcats and coyotes in southern California. *Conservation Biology* 17:566–576.
- Timm, R. M., R. O. Baker, J. R. Bennett, and C. C. Coolahan. 2004. Coyote attacks: an increasing suburban problem. *Transactions of the North American Wildlife and Natural Resources Conference* 69: 67–88.
- White, L.A., and S. D. Gehrt. 2009. Coyote attacks on humans in the United States and Canada. *Human Dimensions of Wildlife* 14:419–432.