

Human-Wildlife Conflict and Coexistence: Urban Coyotes in Newton, Massachusetts

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Abstract: The coyote's ability to adapt to a wide variety of environments allows for this species to live, travel, and hunt in regions that are affected by human development and urbanization. However, this also increases the potential for human-coyote interactions, a topic which has not been thoroughly studied in the northeastern United States. Nine key themes emerged from this study: (a) physical and emotional distance, (b) aversive conditioning, (c) reliability of the source, (d) affinity for the abstract, (e) willingness to coexist, (f) human initiation, (g) coyote fear of humans, (h) food, and (i) disease. We encourage empathy towards coyotes which promotes peaceful coexistence and meaningful emotional connections.

Keywords: Coyote, Education, Interactions, Urban, Wildlife-Tracking Apps

A rise in coyote sightings in Newton, Massachusetts, similar to situations currently being faced within many other urban and suburban areas, has led to safety concerns for these communities. According to Dave Wattles, a biologist with the Massachusetts Division of Fisheries & Wildlife, "All available habitat [in Massachusetts] is occupied by coyotes" (Tuoti, 2017). This study will examine human perceptions of coyotes within the Massachusetts city of Newton, an area of high urban coyote activity that has not been thoroughly studied. Human attitudes toward predatory species impact the ways in which humans handle interactions with them. Understanding residents' perceptions of coyotes helps expose the limits of the community's knowledge, which could serve to improve environmental education.

LITERATURE REVIEW

As a generalist species, coyotes are able to adapt and survive in a variety of environments (Gese et al., 2012). Perhaps the most common trend in research regarding urban coyotes is their rapidly increasing prevalence within urban and residential areas. Positive,

negative, and neutral perceptions of coyotes are all present within the literature. College biology students in the Washington, DC, area were found to have a "neutral" stance on urban coyotes and had a foundational knowledge about coyote ecology and wanted to see them protected. This interplay between knowledge and overall perception of coyotes is also present within a study by Elliot et al. (2016), which found that "[a]s an abstract concept, the coyote is viewed relatively positively (e.g., as an important part of nature) but the actual animal is not welcome so close as the respondents' own neighbourhoods" (p. 1345). Lawrence and Krausman (2011) found that the percentage of people living in areas with urban coyotes that view coyotes as a nuisance has decreased within the past decade. Similarly, participants in a 2015 study by Jackman and Rutberg demonstrated a growing acceptance of urban coyotes.

Many of the participants in Lawrence and Krausman's (2011) study knew that harassment of urban coyotes was advised; however, many reported silently observing the coyotes instead of practicing harassment. Similarly, Elliot and colleagues (2016) found that individuals knew the risks about leaving pets outdoors unattended, yet still engaged in the behavior. It is important to research discrepancies between knowledge and behavior.

The current literature pertaining to human-coyote conflict in urban settings often utilizes online and in-person surveys to assess human understanding of, experiences with, and sentiments toward coyotes (Draheim et al., 2014; Elliot et al., 2016; Jackman & Rutberg, 2015; Kellert, 1985; Lawrence & Krausman, 2011). Studies using surveys frequently create indices to organize the data, e.g., attitudes toward coyotes, knowledge about coyote ecology, awareness of coyotes, and how likely the participants' activities are to attract coyotes (Draheim et al., 2013; Elliot et al., 2016).

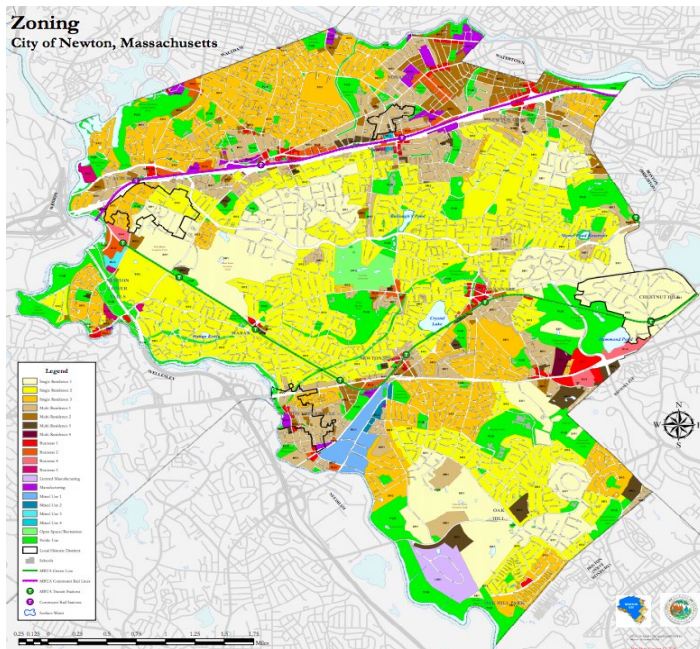
Context

Eastern coyotes are well-established throughout Massachusetts, with the exception of Nantucket and Martha's Vineyard (*Learn about coyotes*, n.d.). The city of Newton, MA, is largely considered an

urban/suburban space. With a population of approximately 87,018 people, the majority of Newton consists of residential areas which are indicated in shades of yellow and brown on Newton's zoning map, shown as Figure 1.

Figure 1

Zoning Within the City of Newton, Massachusetts

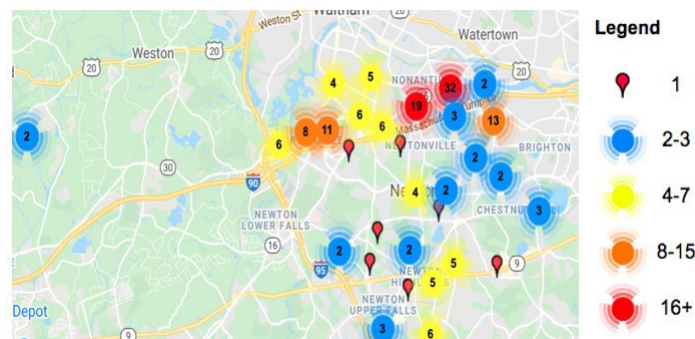


Note: Source: City of Newton, n.d.

By comparison, areas zoned as open space, recreation, and public use within the city, designated in green shades (Figure 1), are fragmented and disconnected. Such fragmentation leads to increased human interaction with coyotes as they are forced to move through human-dominated environments to reach open, natural spaces. According to the city of Newton's coyote reporting app (City of Newton, 2020), there were 162 coyote sightings in Newton from May 7, 2020, to November 5, 2020. The locations of these sightings are shown in Figure 2.

Figure 2

Coyote Reports Within the City of Newton, Massachusetts



Note: Each color marker represents the frequency of coyote sightings in that area, depicted as ranges in the legend. Specifically, the number in the center of each marker is the exact number of reported coyote sightings within that area of Newton. Source: City of Newton, 2020.

METHODS

Participants and Confidentiality

We employed a purposive sample which targeted a specific group of people with a vested interest in the subject of the survey. The participants in this study were residents of Newton, MA who were members of either the "Newton Parents & Neighbors" or "Newton MA – What's Happenin'" Facebook groups. These groups consist of people who are interested in sharing their experiences with and knowledge about coyotes in their neighborhoods. The recruitment method consisted of one researcher posting a link to a Google Form in the Facebook groups. To encourage more participation with our survey, our group reposted the link one week after its initial posting to the Facebook groups. The Google Form was first posted to "Newton Parents & Neighbors" on April 7, 2020, and to "Newton MA – What's Happenin'" on April 9, 2020. The data collection period continued until May 5, 2020. All responses were anonymous; we did not ask participants for their names or signatures.

Instrumentation

This study referenced the works of Draheim et al. (2013), Elliot et al. (2016), Kellert (1985), and Lawrence and Krausman (2011) while creating the Google Form survey. Our instrument consisted of a combination of open-ended and multiple-choice questions. The instrument had seven sections and covered topics including demographics; individual interactions; stories about coyotes; understanding comfort, opinions, and knowledge; and attraction factors.

Data Analysis

We employed a combination of quantitative and qualitative research methods in this study. To analyze the qualitative data, we identified key results from various sections of our survey and then established themes based on these results. We then used descriptive statistics to make inferences from the data.

RESULTS

Demographics

Our study engaged a total of 17 participants, nine of whom identified as male and eight as female. The age range was similar for both genders: Male participants were between 21 and 56 years of age with an average age of 42, while female participants were between the

ages of 23 and 57 with an average age of 43. The average age for all participants was 42 years old.

Out of the 17 participants, 88.2% ($n = 15$) reported holding a bachelor's degree or higher, while 11.8% ($n = 2$) had some college education. Just under half of the participants (47%) held a graduate-level degree. These data suggest that our participants were a highly educated group.

Seven participants (41%) had children under the age of 10 years old at the time of data collection. When asked about owning companion animals, 10 participants (58.8%) reported having companion animals in their households.

Six participants (35.3%) reported that they live in Newton, MA generally, but did not provide a specific location. Of the participants who did identify a specific location, the most common areas of residence were Newtonville/Newton, Newton Center, and West Newton, with three participants living in each location. Two participants reported Newton Highlands as their location of residence.

Participant Interactions with Coyotes

In this study, we operationalized a coyote encounter as being in the presence of or seeing a coyote. Only four participants indicated that they had not had an encounter with coyotes, while the other 13 participants had encountered coyotes in the Newton area.

Two of these participants (11.8%) described experiences in which they felt the coyote directly acknowledged them. The first participant said her dog was the first to notice the coyote and alerted her to the coyote's presence. The coyote ran away into the neighborhood, but "not before stopping across the street in a neighbor's yard and watch[ing them] run back into the house." The second participant mentioned that the coyote "looked at" him before moving away. Another two participants indicated uncertainty that the animal they saw was a coyote or a dog.

When the participants were asked about the most appropriate way to react to a coyote interaction, 11 responses (64.7%) were related to keeping or creating distance between them and the coyote. Eight participants (47.1%) mentioned aversive conditioning (AC) techniques. Of those eight, half specifically said they would make loud noises to scare the coyote, one said they would throw rocks, and the other three did not specify which AC technique they would use but simply stated that they would "scare [the coyote] away." About half of all participants (53%) wrote that the best practice during coyote sightings is to make loud noises to scare the coyote away. However, in their responses about their own experiences, none of the participants reported using this or any other AC technique. Only two participants said they would report their sighting on the City of Newton's coyote-tracker app.

Stories from Friends, Family, and the Community

Nine participants (52.9%) heard stories of coyote sightings or attacks in their communities. Five of those participants reported hearing stories related to companion animals, of which three specifically used language such as "kill" and "attack" to describe what had happened in the story. Of those nine participants, the remaining two did not specify that a coyote had killed a companion animal, but instead described the disappearance of a companion animal and implied that they believed their disappearance was caused by a coyote. One participant said they heard about "a number of small dogs" who had "disappeared," then continued, saying "there are frequent [coyote] sightings in the neighborhood." The other participant reported that a "neighborhood cat went missing at the same time as an uptick in local coyote sightings."

Participant Perceptions of Animals/Nature

The majority of participants (94.1%) claimed to be animal lovers, with the remaining participants indicating they may be animal lovers. No participants indicated they were not animal lovers. All participants said they enjoy seeing wildlife in their backyards and being in nature.

Participant Perceptions of Coyotes

Six participants (35.3%) believed coyote attacks could be blamed on human instigation. Reasons included "humans [getting] too close," "humans exhibiting aggressive behavior," "any attempt to interact with the animal," and "humans encroaching on their land." Similarly, three participants (17.6%) believed a coyote's fear of humans may lead to an attack. These responses included statements like "they feel threatened," "they're scared," and "animal is afraid/has [pups]." Resources were also cited as reasons for coyote attacks, with three participants reporting food could cause coyotes to attack humans. One participant went a step further, specifically clarifying that coyote attacks may occur because "coyotes think humans are prey." Disease was another commonly identified factor, with three participants mentioning rabies in their responses.

Eight participants (47.1%) stated that they were not afraid of coyotes. Two participants said they were afraid, and the remaining participants had mixed perceptions about their feelings toward coyotes. One participant said, "I'm not afraid they will attack me, but I wouldn't go near one," and another similarly said that coyotes might be a "possible threat" to humans. One respondent expressed admiration for coyotes while indicating their potential for harm by saying, "I have a healthy respect for them. I wouldn't approach one."

When asked where they would like to see a coyote, one participant said "nowhere," and another said "anywhere." Two participants specifically stated they would not want to see a coyote

in their own yard. Other responses included locations such as “zoo,” “from a distance,” “larger parks and non-urban green spaces,” and “from my house.” Five respondents wanted to see coyotes in the “forest,” “woods,” “wild,” or their “natural habitat.”

Thirteen participants (76.5%) indicated they would not classify coyotes as pests or nuisance animals while two said they would. Other responses included conditional criteria including “if the population is too large, yes,” and “no, but I’m not a farmer.” Another respondent said they would not classify a coyote as a pest because they do not “harm my yard.”

Participant Perceptions of Coyote Management

Figures 3-8 (Appendix A) compare participants’ receptiveness to coyote euthanization for injuring or killing a human adult or child, as well as for injuring or killing a companion animal. In this article, euthanasia is defined as the shooting, or trapping (e.g., foot or neck snare) and then shooting, of coyotes by Wildlife Services or Animal Control (Draheim, 2017).

According to Figures 3-6 (Appendix B), when considering the injury or death of a human, the majority of participants believed the coyote responsible for the injury or death should be euthanized. Two participants did not think a coyote should be euthanized for injuring an adult and one participant did not think a coyote should be euthanized for injuring a child, but no participants believed a coyote should be allowed to live if they killed a human adult or child. About one quarter of participants believed it would depend on the situation.

On the other hand, fewer participants believed a coyote should be euthanized for injuring or killing a companion animal (Figures 7-8, Appendix B). Most participants did not feel a coyote should be euthanized for injuring a companion animal, and participants were split (41.2% in favor, 41.2% opposed) on the issue of euthanasia in response to the death of a companion animal.

DISCUSSION

Our research has provided insight into how residents of Newton, MA view local, urban coyotes. Nine key themes emerged when exploring the stories and experiences with coyotes provided by participants. These themes are not mutually exclusive, for many are intertwined or related.

The first theme was *physical and emotional distance*. When describing their personal experiences with coyotes, most participants noted physical distance between themselves and the coyotes to qualify the nature of their interactions. Many described backing away from the coyote or returning to their home in response to a coyote sighting. Respondents were less fearful of coyotes when they were physically separated. This suggests an aspect of emotional distance as well, as the creation of physical distance also encouraged apathy

toward coyotes. For example, while most participants described their own feelings about the interaction, few paid attention to the coyote’s behavior. With the majority of participants lacking this awareness, this may indicate a one-sided, anthropocentric worldview that fails to acknowledge the agency of coyotes.

We labeled our second theme as *aversive conditioning* (AC), which provided new insights into Mazur (2010). Mazur (2010) defined AC as “an operant technique that uses a negative stimulus to cause pain, avoidance, or irritation in an animal engaged in an unwanted behavior” (p. 48). When investigating the effectiveness of different forms of AC on bears, Mazur (2010) found rubber slugs to be the most effective method. However, our research indicates that residents may not feel comfortable causing an animal pain, opting for a more humane approach instead. The most common form of AC suggested by participants was making loud noises, and only one participant considered throwing rocks. This suggests that AC techniques with the potential to physically harm coyotes were not generally accepted by the community.

Our third theme, *reliability of the source*, considers the formation of coyotes as both real and imagined figures (Kelly, 2019). Most participants reported having heard stories about coyotes from friends, family, or other community members, highlighting the role of the oral tradition in the formation of our understanding of other animals (Kelly, 2019). As a story is passed from one person to another, the nature of the interaction can change, implying a different type of interaction than what actually occurred. Just over one quarter of participants related the loss of a companion animal to coyotes in their stories. There were two separate approaches to how stories were portrayed. Some participants used language such as “attack” or “kill” to describe how a coyote had caused the death of a companion animal. However, the majority described the situation vaguely, saying the companion animal “disappeared” or “went missing,” then subsequently associated the disappearance with frequent coyote sightings in the area. This disparity in language used to communicate stories highlights the differences in how participants may choose to retell an event. As a result, it can be difficult to discern the veracity of a story without knowing the details behind an alleged attack. This lack of reliability in the source emphasizes the importance of maintaining systematic records of attacks, which can then be provided to the community for educational and outreach purposes (Kelly et al., 2019).

The fourth theme that emerged was the *affinity for the abstract*. This theme relates to the work of Elliot et al. (2016), which highlighted how participants’ perceptions varied based on whether coyotes were understood as an abstract concept or as a physical presence with participants’ backyards. Elliot et al. (2016) argued there are polarizing attitudes toward coyotes: An appreciation of

general wildlife in one's neighborhood is indicative of an abstract understanding, but a coyote, specifically, within one's own neighborhood is less welcome. Half of Elliot et al.'s (2016) respondents appreciated the presence of wildlife in their neighborhoods. Similarly, all participants in our study said they enjoyed seeing animals in their backyards and being in nature. The majority also described themselves as animal lovers. Our participants' proclaimed affinity for animals suggests a more positive perception of coyotes. However, the majority also agreed that a coyote should be euthanized for killing a human adult or child, indicating participants' affinity for coyotes only extended so far as the coyotes were considered a conceptual part of nature, but not a direct risk to their neighborhoods. This suggests a more anthropocentric worldview, as the life of the human is valued over the life of the nonhuman animal.

This leads into our fifth theme, which we identified as a *willingness to coexist*. Most participants expressed discomfort at the thought of a close coyote encounter – which contrasts with most participants also saying that they would enjoy seeing a coyote and that they do not fear them. This contradiction indicates that Newton residents seek positive interactions with wildlife in their area, but their appreciation of coyotes depends on distance, such as forested areas close to but not physically in front of their homes, and barriers such as home windows and zoo exhibits. This corroborates findings by Schauer (2021), in which Ticos and Cabécares, indigenous groups of Costa Rica, were “willing to coexist with large felines through a change in husbandry practices,” but these new practices included “electric fences, enclosures, and keeping livestock away from the forest” – creating barriers and distance (p. 7). While Newton residents did want to be more accepting and understanding of wild animals such as coyotes, they harbored many preconceived notions and rigid views of acceptable coyote behavior.

We also identified themes related to what participants classified as significant reasons behind coyote attacks. Four major themes emerged from these data: *human initiation*; *coyote fear of humans*; *food*; and *disease*. These themes are similar to the four categories of large carnivore attacks outlined by Kelly et al. (2019): provoked; unprovoked; diseased; and unclassified.

The themes of *human initiation* and *food* most closely align with the category of provoked attacks, as they illustrate how human behaviors and practices can lead to coyote attacks. *Coyote fear of humans* most closely aligns with Kelly et al.'s (2019) definition of unprovoked attacks. Though coyotes' fear of humans, and the defense mechanism of an attack response, is not rooted in a principal attraction to the human as Kelly et al.'s (2019) definition outlines, we found it significant that in this type of situation, the human is not intentionally exhibiting any behavior or practice that incites the

coyote to attack. The final theme, *disease*, is directly related to the diseased category by Kelly et al. (2019), and all the participants who mentioned disease specifically cited rabies as the reason behind coyote attacks.

Human initiation was participants' most commonly cited reason behind coyote attacks. This general awareness of how humans can cause coyote attacks indicates that the majority of participants understand how their behaviors can affect other wild animals within their environment – a sentiment that is more suggestive of an ecocentric worldview than the majority of anthropocentric attitudes reflected in earlier themes.

Limitations

This sample size ($n = 17$) was limited by the ongoing COVID-19 pandemic and the restricted access to Facebook groups, which limits participation to those who have access to a computer or mobile phone, had a Facebook account, and were members of one of the specifically targeted Facebook groups. While we were able to gain insight into how participants felt toward coyotes as well as how they should respond if they see one, it would have been beneficial to ask where they had acquired their knowledge about coyotes, which would have allowed us to provide feedback on the reliability and accuracy of their sources. Also, due to the limited sample size, we did not consider how the residents' responses related to the demographic information collected, such as race, age, gender, or education level.

Implications

This research highlights the importance of distributing information promoted by Project Coyote and Massachusetts Division of Fisheries & Wildlife. Both organizations have published factsheets (Appendix B, Appendix C) that promote the use of preventative measures for avoiding coyote encounters, such as removing bird feeders from nearby one's home. Project Coyote also promotes the use of loud noises as an AC technique in the event of an encounter.

Fourteen study respondents asserted that coyotes should be allowed to live in urban spaces, but one of the major themes identified during data analysis was *physical and emotional distance*. Additionally, Newton residents have a *willingness to coexist* with coyotes but are concerned with doing so safely. Through wider distribution of reputable information about coexistence practices such as preventative measures and AC, Newton residents may feel more at ease sharing neighborhoods with local wildlife. Moreover, the circulation of factsheets may initiate the crucial process of understanding coyotes through an empathetic lens, which could facilitate connection between coyotes and humans in a shared space and encourage coexistence.

CONCLUSION

The Massachusetts Division of Fisheries & Wildlife, as well as Project Coyote, both have published factsheets (Appendix B, Appendix C) with guidelines for coexisting with coyotes, which were distributed to participants in this study following data collection. In their survey responses, participants demonstrated knowledge of many suggestions found in the materials, including AC, supervising small children, and not leaving companion animals unattended. While it is promising to know that Newton residents may already be educated on coyote response best practices, previous studies have found that this knowledge of expected behavior is not always an indication of actual behavior. For example, Elliot et al. (2016) found that participants were aware that leaving companion animals unattended might make them vulnerable to coyote attacks yet continued to leave them outside unsupervised.

This discrepancy between knowledge and practice was represented within our study as well. While eight participants cited an AC technique as an appropriate response to a coyote encounter, no participant reported engaging in these actions when recounting their own experiences. Fear, or lack thereof, may play a role in why participants did not choose to engage in AC. 47.1% of participants described themselves as unafraid of coyotes. This lack of fear could mean that participants did not see coyotes as credible threats, and therefore did not feel compelled to employ AC techniques in their presence. On the other hand, the two participants (11.8%) who said they did fear coyotes may not have used AC techniques out of a desire to avoid drawing attention to themselves. These individuals may have found it more appropriate to remove themselves from the situation instead.

Recommendations

The cost of AC (\$400 per year), which includes training, weapons, and ammunition, is comparable to the cost of lethal methods (Mazur, 2010). Our recommendations include using AC solely for the purposes of reducing human-coyote conflict and preventing coyote habituation, rather than using destructive methods on already-habituated coyotes. This is because destructive methods, such as the use of rubber bullets, have been demonstrated to cause severe and even lethal injuries (Kobayashi & Mellen, 2009). Further study of AC methods that may reduce conflict between humans and wildlife, as well as prevent habituation, should also be conducted to assess their relative success across other species of large predators and to ensure they do not pose physical or emotional harm to the species. We also recommend humans become familiar with the animals in their backyards and recognize them as a part of their community, which should begin with having access to accurate, up-to-date

information on the animals and how to coexist within the same urban spaces.

The City of Newton sponsors a free coyote-tracker app citizens can use to monitor coyote sightings. Only two respondents in our study mentioned this app. However, research corroborates the importance of detailed citizen monitoring, as the regular use of coyote-tracking apps within a community will improve systematic record-keeping of coyote encounters (Kelly et al., 2019). We recommend that Newton should further promote the coyote-tracker app on local social media platforms, including the two Facebook groups from this study, in combination with the factsheets, in order to encourage residents to log their sightings and start conversations with others regarding steps they can take to correctly navigate encounters.

Additionally, we suggest that Newton's coyote-tracker app be altered to require residents to include details about coyote encounters when reporting. Currently, the app requires the date and time of a sighting and includes an optional textbox for "descriptions and/or comments" (City of Newton, 2020). The City of Newton can encourage coexistence by allowing residents to describe the coyote they encounter, the nature of the interaction, the number of both humans and coyotes present, and the feelings of the individual regarding the interaction, along with the perfunctory date and location. Through our careful consideration of the topic of coyote management and coexistence in urban settings, we stress the necessity of human empathy toward coyotes and their activities. It is becoming increasingly apparent that the culling and ostracization of coyotes is both impractical and unethical. Empathy is a strong force that would promote coexistence between humans and coyotes by fostering emotional connections between our species – from a safe and appropriate distance.

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APPENDIX A

Figure 3

Injured Adult – Participant Receptiveness to Coyote Euthanization

If a coyote injures an adult (human), should the coyote be euthanized?

17 responses

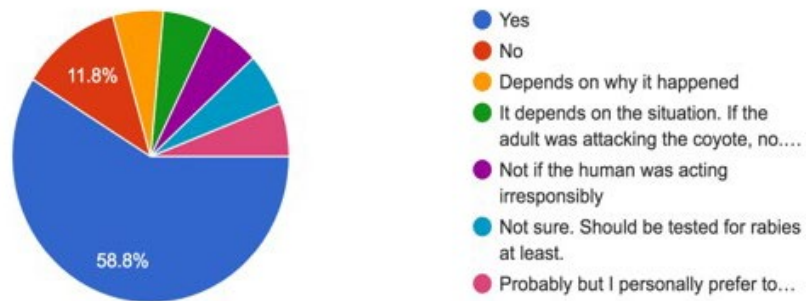


Figure 4

Injured Child – Participant Receptiveness to Coyote Euthanization

If a coyote injures a child, should the coyote be euthanized?

17 responses

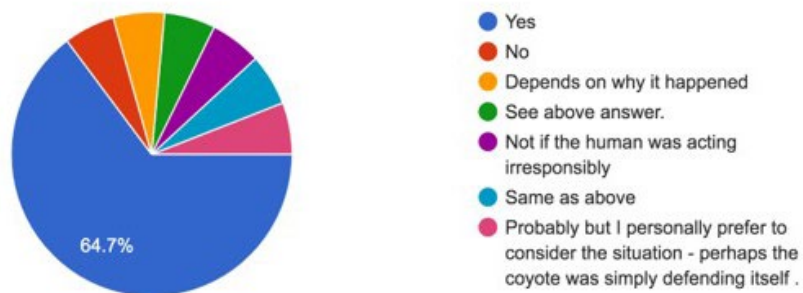


Figure 5

Killed Adult – Participant Receptiveness to Coyote Euthanization

If a coyote kills an adult (human), should the coyote be euthanized?

17 responses

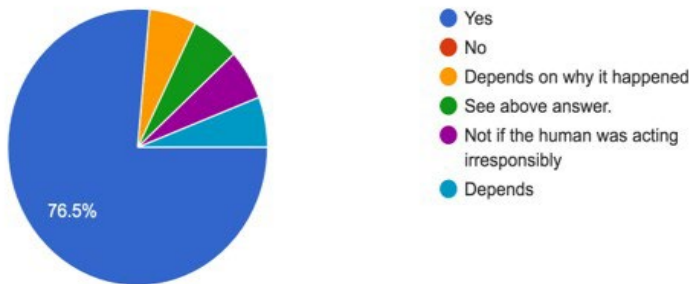


Figure 6

Killed Child – Participant Receptiveness to Coyote Euthanization

If a coyote kills a child, should the coyote be euthanized?

17 responses

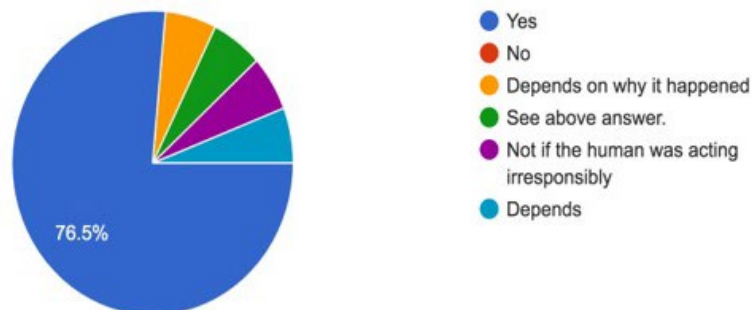


Figure 7

Injured Companion Animal – Participant Receptiveness to Coyote Euthanization

If a coyote injures a companion animal (pet), should the coyote be euthanized?

17 responses

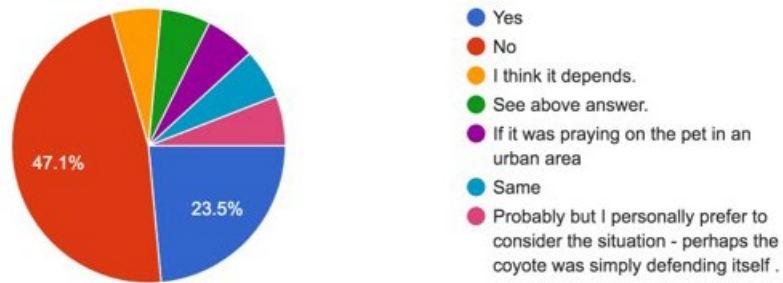
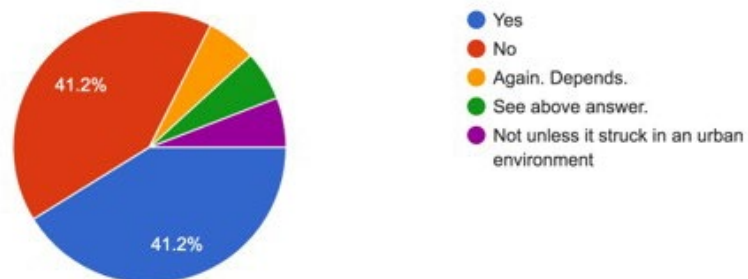


Figure 8

Killed Companion Animal – Participant Receptiveness to Coyote Euthanization

If a coyote kills a companion animal (pet), should the coyote be euthanized?

17 responses



APPENDIX B

Project Coyote Factsheet: Coexisting with Coyotes

Coexistence is an active neighborhood effort. Help your neighborhood by sharing this brochure and by downloading the free resources available at www.ProjectCoyote.org/resources

Help keep coyotes wild. Lock around – what unnatural food sources may you be offering wildlife? A fed coyote is a dead coyote.

COYOTE ENCOUNTERS

Coyotes are usually wary of people and will avoid us whenever possible. Bold behavior is unusual and is most often a result of habituation due to intentional or unintentional feeding, the presence of a dog, or the coyote defending a den and young. If you encounter a coyote, remember the following:

- Never feed or try to "tame" a coyote; appreciate coyotes from a distance.
- Walk dogs on leashes; pick up small dogs if a coyote is near.
- If approached, be BIG and LOUD. You can also scare the animal by blowing a whistle, shaking a can with coins inside, popping open an umbrella, or throwing objects (forward but not at the coyote). Do not run from a coyote; calmly leave the area.

COYOTE CONFLICTS

The very traits that have allowed coyotes to thrive, adapt, and coexist with people even in the most populated regions of North America have also led to conflicts with us and our domestic animals. Most coyotes fear people. However, those who associate people with food may become habituated to our presence. The abundance of food, water, and shelter offered by urban landscapes—coupled with unsecured garbage, unfenced gardens, and unattended domestic animals—can lead to conflicts. Documented cases of coyotes injuring people are very rare and most often related to people intentionally or unintentionally feeding them and/or the presence of a dog. Coyotes become more active, vocal, and territorial during mating and pupping seasons (see chart reverse). Pay particular attention to your companion animals' safety during these times and do not let them roam.

COYOTE MANAGEMENT

Historically, our society has attempted to solve human-coyote conflicts through killing. However, despite decades of poisoning, trapping, and shooting coyotes, there are more coyotes in North America today. Why?

The coyote's remarkable success appears to be closely related to human attempts to control their populations. As with many wild species, coyote populations are naturally regulated by available food and habitat. Lethal control, however, can disrupt the group hierarchy, allowing more coyotes to reproduce, encouraging larger litter sizes because of decreased competition for food and habitat, and increasing pup survival rates. It is also highly likely that lethal control favors the survival of the most resilient and genetically robust coyotes.

At least half a million coyotes are killed each year—one per minute—by federal, state and local governments and by private individuals in North America. The U.S. Department of Agriculture's Wildlife Services program kills approximately 90,000 coyotes each year. Most of this killing is carried out in the name of "livestock protection" and is a taxpayer subsidy for agribusiness/ranchers. Despite scientific evidence suggesting this approach is misguided and ultimately ineffective, the emphasis on lethal coyote control persists. Coyotes are also killed for their fur, for "sport," and in "body-count" contests where prizes are awarded for killing the most coyotes. Most states set no limit on the number of coyotes that may be killed, nor do they regulate the killing methods.

Killing to reduce coyote populations or relocating individual coyotes is not recommended. Disruption of family groups can cause more coyotes to be born or increase pup survival rates; orphaned juveniles may act unpredictably and other coyotes will simply move into vacant areas.

EDUCATED COEXISTENCE

Urban landscapes offer an abundance of food, water, and shelter for coyotes. Take the following steps to prevent coyotes from being attracted to your home.

- Wildlife-proof garbage in sturdy containers with tight fitting lids.
- Don't leave pet food outside.
- Take out trash the morning pick up is scheduled.
- Keep compost in secure containers.
- Keep fallen fruit off the ground. Coyotes eat fruit.
- Keep birdseed off the ground; seeds attract rodents which then attract coyotes. Remove feeders if coyotes are seen in your yard.
- Keep barbecue grills clean.
- Eliminate accessible water sources.
- Clear away brush and dense weeds near buildings.
- Close off crawl spaces under decks and around buildings where coyotes may den.
- If you frequently see a coyote in your yard, make loud noises with pots, pans, or air horns, and haze the coyote with a water hose.
- Share this list with your neighbors; coexistence is a neighborhood effort.

APPROXIMATELY ONE COYOTE IS KILLED EVERY MINUTE OF EVERY DAY. HELP STOP THE KILLING BY PRACTICING PEACEFUL COEXISTENCE AND SUPPORTING PROJECT COYOTE.

COYOTE IN COMPARISON TO PETS & FOX

- Coyote with distinctive black-tipped bushy tail.
- Livestock guardian is twice the weight of a coyote.
- The average fox is much smaller than the coyote.
- Domestic cats can appear as prey.

If coyotes are left to self-regulate, generally one litter of pups per year are born with 30-50% pup survival.

Coyotes provide an ecological service by helping to keep rodent and rabbit populations in check.

The "song dog" has many different vocalizations for communicating with other coyotes.

Livestock guard animals can effectively reduce or eliminate coyote conflicts on farms and ranches.

COYOTE ECOLOGY

Two hundred years of costly persecution has not eliminated the resilient coyote from our landscape. In fact, coyotes have expanded their range two to threefold since the 1850s, largely in response to human changes to the environment and the eradication of wolves. Coyotes have adapted to living close to people and now inhabit even the most densely populated metropolitan cities from Boston to San Francisco, Austin, and Seattle. Estimates are that 2,000 coyotes are on a self-appointed "patrol" in the Chicago metropolitan area.

At least 19 subspecies of coyote roam North and Central America, from California to Newfoundland and Alaska to Panama, occupying a broad range of habitats. Coyotes play an important ecological role helping to maintain healthy ecosystems and species diversity. As the top carnivore in some ecosystems, coyotes help regulate the number of mesocarnivores (such as skunks, raccoons, and foxes) which helps to boost biodiversity.

Western coyotes typically weigh 18 to 30 pounds and look similar to a small Shepherd or collie-type dog but have longer, denser fur and pointed, erect ears. Coyotes have a long, bushy, black-tipped tail that is usually carried pointed down. Their eastern counterparts may be larger, averaging 35-55 pounds, which is believed to be a result of interbreeding with wolves 50-70 years ago. Coyotes are usually grayish brown with reddish tinges behind the ears and around the face, but coloration can vary from silver-gray to black.

LIFE HISTORY

Coyotes may live as solitary individuals, in pairs, or in small family groups, both in rural and urban areas. Coyotes are generally monogamous, with pair bonds frequently lasting for many years, and some for life. Both male and female coyotes actively maintain territories that may vary in size from 2 to 30 square miles.

Reproduction is generally once per year and limited to the group's leaders, while other females remain behaviorally sterile. Breeding season peaks in mid February, followed by 4-8 pups born in a den in April or May. Pup mortality is high, with an average of 50-70% dying within their first year. Some juveniles disperse in late fall to seek new territory, and some individuals remain with their parents and form the basis of the pack.

COYOTE LIFE CYCLE

Dec-Feb	Breeding Activity
Feb-Apr	Den Site Selection
Apr-May	Birth
May-Aug	Raising Pups
Sep-Nov	Pup Dispersal

DISEASE CONCERNS Rabies is rare and coyotes are not commonly implicated in the transmission of the disease to humans or domestic animals.

FOOD

Coyotes eat a wide variety of food, and like most animals, prefer food that is easiest to obtain. They are true omnivores, and will eat a wide variety of foods, including rodents, rabbits, insects, lizards, snakes, vegetables, and fruits. They will also take advantage of unsecured garbage and pet food left outdoors. As scavengers, they provide an ecological service by helping to keep our communities clean of carrion. In suburban, coyotes have been known to take smaller pets if left unprotected. Animal guardians are advised to keep cats indoors, and dogs under control during the day and indoors at night.

HABITS

In rural habitats, coyotes hunt by day and night. In urban areas, coyotes appear to be more nocturnal but can often be seen during daylight hours, especially at dawn and dusk. They communicate by vocalizing, scent marking and through a variety of body displays. It is common to hear howling and yipping at night, or even during the day in response to sirens and other loud noises. Indeed, the coyote's scientific name is *Canis latrans* which means "barking dog." With approximately a dozen different vocalizations, it is common to mistake a few coyotes communicating with each other for a large group. Coyotes are fast and agile; they can run at speeds of 25-40 mph (65 km/h) and jump 6 feet. Coyotes are also highly intelligent and social animals; they learn quickly and are devoted parents.

KEEPING DOMESTIC ANIMALS SAFE

Although free roaming pets are more likely to be killed by automobiles than by wild animals, coyotes may view cats as potential prey and dogs as competition. Other domestic animals including sheep, chickens and rabbits may also be seen as food and must be protected. Consider the following:

- Don't let domestic animals roam; keep them securely enclosed and protected at night.
- Fence your property. The fence must be at least 6 feet tall with the bottom extending at least 6 inches below the ground. Fences are more effective by using wire mesh, outwardly inverting the top of the fence, by using electric fencing along the top and bottom (more stands for protecting livestock), or by installing the CoyoteRoller® which makes it difficult for predators to gain the "foothold" they need to pull up and over the top of an enclosure (see: www.coyoteroller.com).
- Llamas, donkeys, and livestock guard dogs are effective in reducing coyote-livestock conflicts.
- Don't leave animal foods outside; keep all food well secured.
- Install motion-sensor lights near buildings.
- Walk dogs on leashes, particularly during coyote mating and pupping seasons (see chart).
- Spay or neuter your dogs. Though uncommon, coyotes are attracted to, and can mate with, dogs.

Project Coyote is a healthy sponsored organization of our supporters use the information to help us protect our wild neighbors. We have a variety of educational outreach programs and resources; contact us at info@projectcoyote.org or visit our website at ProjectCoyote.org. Please join our growing community of educators and empowered citizens by becoming a member. All donations are tax-deductible (see reverse form).

PROMOTING COEXISTENCE BETWEEN PEOPLE & WILDLIFE THROUGH EDUCATION, SCIENCE & ADVOCACY

Note: Source: Project Coyote, n.d.

APPENDIX C

Massachusetts Division of Fisheries & Wildlife Factsheet: Eastern coyotes in Massachusetts



LIVING WITH WILDLIFE EASTERN COYOTES IN MASSACHUSETTS



The eastern coyote is well established throughout Massachusetts except on Nantucket and Martha's Vineyard. A medium-sized predator, it is an opportunistic feeder and extraordinarily adaptable to a wide range of habitats. Coyotes thrive in suburban, urban, and rural areas. They will utilize whatever food is naturally available, including small animals, birds, insects and fruits, as well as artificial sources such as garbage, pet food, birdseed, and compost.

DESCRIPTION

The eastern coyote resembles a medium-sized dog in body size and shape, but has longer, denser fur and pointed, erect ears. The tail is long, black-tipped, and bushy. Typical coat color is a grizzled gray but can vary from creamy blonde to red or nearly solid black. Typical weights for females are 33–40 pounds, while males typically weigh 34–47 pounds. A very large male may weigh in the neighborhood of 60 pounds, but such an animal is exceptional. Coyotes often look heavier than they are because of their thick fur.

LIFE HISTORY

An adult male and female will actively maintain a territory that may vary in size from 2 to 30 square miles. Breeding

season peaks in mid-February. They give birth in a den to 4–8 pups in April or May. Coyotes maintain seasonal social units that consist of the adult pair and the pups until the pups disperse on their own in late autumn.

FOOD, HABITS, AND HABITAT

Coyotes are typically shy and elusive, but they can frequently be seen individually, in pairs, or in small groups where food is commonly found. They communicate by vocalizing, scent marking, and through a variety of body displays. It is common to hear them howling and yipping at night, or even during the day in response to sirens and other loud noises. Coyotes remain active year-round and do not hibernate. They are opportunistic feeders, meaning they will feed on whatever is most readily available and easiest to obtain. Their omnivorous diet consists of a variety of foods including rodents, rabbits, deer, birds, insects, reptiles, fruits, and berries. They will scavenge roadkills, rodents, and birds killed by cats, as well as garbage and pet food left outdoors. In suburbia, they have been known to prey on unprotected pets, including house cats and small dogs. Pet owners are advised to keep cats indoors, and dogs under control during the day and in secured kennels or indoors at night.

MASSWILDLIFE

Note: Source: Massachusetts Division of Fisheries & Wildlife, n.d.