

ARTICLES

A QUANTITATIVE STUDY OF DENVER'S BREED-SPECIFIC LEGISLATION

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In August of 1989, the City and County of Denver, Colorado enacted legislation that prohibits the presence of all 'pit bull-type dogs' (PBTs) within the city limits. In Denver, PBTs are defined as: American pit bull terrier, American Staffordshire terrier, or Staffordshire bull terrier. In the thirty years the 'pit bull ban' has been in place, the City and County of Denver and its animal control agency, Denver Animal Protection, have committed substantial resources to removing PBTs from the community, including patrolling communities and responding to complaints made by neighbors, conducting thorough breed evaluations of suspected PBTs, and kenneling PBTs found in the city limits. The Social-Environmental-Economic Impact Assessment (SEELA) underlying this Article examines how the City and County of Denver's Breed-Specific Legislation (BSL) policy has impacted the economic and social systems of the Denver community.

An economic assessment of BSL identified that the City and County of Denver has spent at least \$5.8 million on enforcing the legislation, with additional economic analyses estimating BSL resulted in approximately \$107 million in lost direct and indirect economic activity related to lost pet care revenue. BSL in the City and County of Denver resulted in an extended length of stay for PBTs in the care of animal shelters and also placed undue strain on transfer partnerships with shelters in surrounding communities. An estimated \$1 million has been spent by shelters in surrounding communities to care for the PBTs that are transferred as a result of BSL. An assessment of the social impacts of BSL determined that the removal of a single breed of dog is inconsistent with the documented benefits of increasing opportunities for pet-keeping in the community. Furthermore, the disproportionate enforcement of BSL in underserved communities and communities of color perpetuates historic trends of discrimination and marginalization in the United States, and negatively impacts social cohesion of these communities.

Despite some of the more negative impacts of the legislation, there appear to be a number of social factors that have sustained Denver's pit bull ban. While in the minority of opinions, 19.4% of Denver residents who participated in an online survey about BSL (n = 252) said that the City and County of Denver's breed ban positively impacted their perception of Denver and 24.6% of Denver residents said that the breed ban makes them feel safer. This perceived increase in sense of safety, even if only reported for a minority percentage of Denver residents, may continue to serve as the primary reason for policymakers to continue the ban in the present day.¹

gram for Master of Social Work (MSW) students, as well as the Animals and Human Health Professional Development Certificate, nationally and internationally recognized programs regarded as leading academic curricula of study for HAI and Animal Assisted Interventions (AAs). Kevin N. Morris, Ph.D., is the American Humane Endowed Chair and a Research Associate Professor in the Graduate School of Social Work at the University of Denver. As the Director of Research for the University of Denver's Institute for Human-Animal Connection, his research focuses on the effects of incorporating animals into therapeutic environments and the impacts of companion animals on people and communities. We are grateful for the outstanding research assistance provided by Tess Hupe, M.S.W., Alexandria Kurtz, M.S.W., Julia Senecal, M.S.W., and Jennifer Tuuk, M.S.W.

¹ See Jared J. Maher, *3,497 Dead Dogs and Other Numbers from Denver's Pit Bull Ban*, WESTWORD (Sept. 25, 2009, 2:50 PM), <https://www.westword.com/news/3-497-dead-dogs-and-other-numbers-from-denvers-pit-bull-ban-5834767> [https://perma.cc/

The breed ban's prioritization of human public safety at the expense of the welfare of a specific type of dog, particularly without a substantial impact on the former, represents a diversion from the components that contribute to a humane community. In conclusion, we recommend alternatives to BSL that will address the root causes of the issue of dangerous dogs, including: building the City and County of Denver's capacity to support residents in caring for their pets by identifying and expanding the pet-support infrastructure such as affordable and accessible veterinary and behavior services, implementing robust non-breed-specific Dangerous Dog laws that include opportunities for early pet education and intervention with at-risk individuals, and implementing evidence-based interventions for challenges to social cohesion, and interpersonal and interspecies violence.

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MGY6-7REE] (accessed May 26, 2020) ("In hopes of preventing severe dog attacks, Denver has maintained a controversial twenty-year prohibition on any dog that appears to be more than 50 percent pit bull."). Recently Denver's pit bull ban was almost repealed, however, the mayor vetoed the repeal. *See Denver City Council Fails to Overturn Mayor Hancock's Veto of Pit Bull Ban Repeal*, DENV. POST (February 24, 2020), <https://www.denverpost.com/2020/02/24/denver-pit-bull-repeal-fails/> [https://perma.cc/L4LE-KXUY] (accessed May 26, 2020) (discussing a failed attempt to repeal Denver's pit bull ban with Mayor Michael Hancock citing "fear of irresponsible pet owners, should the repeal pass").

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I. INTRODUCTION

A 'humane community,' as defined by the University of Denver's Institute for Human-Animal Connection (IHAC), is characterized by "the presence of leaders[hip], institutions, and policies working collaboratively across systems to create and implement sustainable human, animal, and environmental welfare."² Some of the key components encompassed by a humane community include:

A multi-system approach to addressing social problems; education and programming that promote and provide access to humane activities to individuals in their everyday lives; and a cultural shift that recognizes the ways in which humane policies serve as a foundation upon which other public health and safety concerns can be addressed more holistically.³

² Sloane Hawes et al., *Humane Communities: Social Change Through Policies Promoting Collective Welfare*, J. URB. AFF. 1, 5 (2019).

³ *Id.*

In order to implement and sustain advances in collective welfare, “a [h]umane [c]ommunity will have a system of policies promoting collective health that transverse all aspects of public life.”⁴

In humane communities, “[c]ollaboration across governmental and nonprofit agencies is also critical, so they may work together to identify and implement holistic solutions that address the ways a social problem may manifest in the human, animal, and environmental domains.”⁵ In this way, animal control policies have a significant impact on the degree to which a humane community is achieved. Municipal shelters play a particularly important role in humane communities by fulfilling a duty “to ‘protect’ the public from any risk that may occur due to increased pet-keeping in communities.”⁶ These risks include zoonotic disease transmission (e.g., rabies), dog bites, nuisance issues, and improper care or cruelty.⁷ In this way, animal control activities serve important animal welfare, human public health, and law enforcement functions.⁸ Animal shelters serve as a safety net for people and pets in need within humane communities by providing temporary housing, affordable veterinary care, and accessible behavioral support.⁹ Animal shelters also provide end-of-life care and relinquishment services to people who can no longer keep their pet.¹⁰

Risks related to the presence of dogs in a community have historically been mitigated through local animal control ordinances requiring dog licensing, rabies vaccinations, and restrictions placed on animals deemed to be dangerous.¹¹ Examples of model ordinances include: leash requirements, tethering restrictions, licensing, animal welfare advisory boards, investigation of cruelty and neglect cases, and establishing standards for basic care, including rabies vaccination.¹² These ordinances preserve the well-being of companion animals in the community while also maintaining the health and safety of the human residents and greater environment.

Studies show animal-related complaints are an ongoing area of concern for municipalities as rates of pet-keeping continue to increase.

⁴ *Id.*

⁵ *Id.* at 6.

⁶ *Id.* at 6–7, 20.

⁷ See generally STEPHEN ARONSON, *ANIMAL CONTROL MANAGEMENT: A NEW LOOK AT A PUBLIC RESPONSIBILITY* 144, 145 (Purdue Univ. Press, 2010) (discussing the scope of municipal shelter services).

⁸ *Id.* at 13.

⁹ *Id.* at 145–46, 152–53.

¹⁰ *Id.* at 148.

¹¹ See Rebecca F. Wisch, *State and Municipal Regulation of Dogs*, MICH. ST. U.: ANIMAL LEGAL & HIST. CTR. (2003), <https://www.animallaw.info/article/state-and-municipal-regulation-dogs> [<https://perma.cc/U8KM-CTT9>] (accessed May 26, 2020) (“[The] often strict exercise of police power over dogs by the state and its associated municipalities may well be rooted in the fear of their sometimes vicious tendencies and their legacy of rabies infestation.”).

¹² Laura A. Reese & Kellee M. Remer, *Best Practices in Local Animal Control Ordinances*, 49 ST. & LOC. GOV'T. REV. 117, 117–21, 123 (2017).

In a survey conducted in 1974, mayors in major cities in the United States indicated animal-related issues as one of the most common complaints received by their offices.¹³ A more recent estimate cites that there are anywhere from 1.5 to 4.5 animal control complaints per 1,000 people in major cities in the United States.¹⁴ Therefore, it is becoming increasingly important that the fields of animal welfare and municipal management establish a series of guidelines for what constitutes effective animal control ordinances.

Breed-Specific Legislation (BSL) remains a controversial animal control ordinance aimed at reducing the risks associated with ‘dangerous dogs.’ Despite the prevalence of Dangerous Dog laws in most cities in the United States, some cities have placed additional restrictions on certain breeds of dogs (most commonly, American pit bull terriers, American Staffordshire terriers, and Staffordshire bull terriers).¹⁵ While there are many disagreements regarding the identification of breeds and the genetic basis of behavior that inform the use of this term (further discussion of these issues are included later in this Article), pit bull-type dogs (PBTs) will be used throughout this report for conciseness and is intended to include all dog breeds identified for restriction in BSL legislation. Current estimates have identified over 900 cities in the United States with some form of restriction placed on PBTs (e.g., mandatory sterilization, explicitly identified as ‘dangerous,’ or banned).¹⁶

A number of studies have been conducted to date assessing the impact of BSL on a variety of public health metrics including: dog bites,¹⁷ adoption from shelters, euthanasia rates,¹⁸ and responsible pet-keeping practices.¹⁹ The underlying study in this Article aims to

¹³ ELIZABETH A. CLANCY & ANDREW N. ROWAN, COMPANION ANIMAL DEMOGRAPHICS IN THE UNITED STATES: A HISTORICAL PERSPECTIVE 9, 14 (Salem & Andrew N. Rowan eds., 2003).

¹⁴ Merritt Clifton, *Animal Control Is People Control*, ANIMALS 24-7 (June 15, 2018), <https://www.animals24-7.org/2018/06/15/animal-control-is-people-control/> [<https://perma.cc/3EMS-ME8K>] (accessed May 26, 2020).

¹⁵ See, e.g., *Colorado Breed Specific Laws*, DOGSBITE.ORG, <https://www.dogsbite.org/legislating-dangerous-dogs-colorado.php> [<https://perma.cc/K5SW-J6HE>] (accessed May 26, 2020) (listing restrictions on various breeds of dogs in Colorado cities).

¹⁶ *Breed-Specific Laws State-by-State*, DOGSBITE.ORG, <https://www.dogsbite.org/legislating-dangerous-dogs-state-by-state.php> [<https://perma.cc/6CCN-LW3Y>] (accessed May 26, 2020).

¹⁷ See generally Jessica M. Cornelissen & Han Hopster, *Dog Bites in the Netherlands: A Study of Victims, Injuries, Circumstances and Aggressors to Support Evaluation of Breed Specific Legislation*, 186 VETERINARY J. 292, 292–98 (2009) (analyzing dog bite data and canine population in the Netherlands to evaluate mitigation strategies—including BSL—and finding that prevention of dog bites should focus not on breeds but rather a better understanding of dog handling practices).

¹⁸ Lisa M. Gunter et al., *What’s in a Name? Effect of Breed Perceptions and Labeling on Attractiveness, Adoptions, and Length of Stay for Pit-Bull-Type Dogs*, 13 PLOS ONE 1, 11 (2016).

¹⁹ Daniel McCarthy, *Dangerous Dogs, Dangerous Owners, and the Waste Management of an Irredeemable Species*, 50 Soc. 560, 563, 569–70 (2016).

identify the social and economic impacts of BSL in the City and County of Denver. It is the third in a portfolio of studies conducted by IHAC that assess the impacts of various animal welfare policies on communities.²⁰

II. METHODOLOGY

A Social-Environmental-Economic Impact Assessment (SEEIA) provides the opportunity to conduct an interdisciplinary evaluation of the potential impacts of a given policy, event, or organization on a community's well-being.²¹ *Well-being* is conceptualized in a holistic manner to include socioeconomic, physical, mental, and emotional health of humans; however, it also includes relationships with animals and the environment as integral components of the health of a community.²² Consistent with good impact assessment practice, this study was conducted by a multidisciplinary team including experts in the fields of economics, business, social work, law, and research design. This process of utilizing a multidisciplinary team to integrate research evidence, local data, and the knowledge of stakeholders, particularly members of the affected communities, is congruent with impact assessment industry standards.²³

In general, linear regression analysis was used to identify simple monotonic increases or decreases in trends in the data over time. All slopes were calculated as the average change per year. Slopes with p values less than 0.05 were considered to have slopes significantly different than zero. Slopes with p values greater than 0.05, but less than 0.10, were reported as approaching significance. Slopes with p values greater than 0.10 were considered to represent trends that had not changed significantly over the study period. The most recent value for any given data set is calculated as the y-intercept plus or minus the slope of the linear trend times the number of years until the year of interest.

The City and County of Denver enacted Breed-Specific Legislation (BSL) in 1989.²⁴ Standard economic methods were used to estimate

²⁰ See Kevin Morris et al., *Oklahoma Humane Society Compassion Center Economic Impact Study*, 2 HUMANE SOC. RESCUE ORG. 1, 3–4 (2017) (discussing a study conducted by IHAC in Oklahoma). See generally Sloane Hawes et al., *Legislating Components of a Humane City: The Economic Impacts of the Austin, Texas “No Kill” Resolution (City of Austin Resolution 20091105-040)*, HUMANE SOC'Y: ANIMAL STUD. REPOSITORY (Oct. 16, 2017), <https://animalstudiesrepository.org/cgi/viewcontent.cgi?article=1000&context=anilleg> [<https://perma.cc/BQ4S-XH5S>] (accessed May 26, 2020) (exploring the social and economic impacts of a ‘no kill’ resolution in Austin, Texas).

²¹ See Hawes et al., *supra* note 2, at 1.

²² See *id.* at 5.

²³ See generally, e.g., Jennifer S. Mindell et al., *A Review of Health Impact Assessment Frameworks*, 122 PUB. HEALTH 1177, 1177–87 (2008) (regarding a study that views several health impact assessment frameworks in a systematic, comparative, and holistic way).

²⁴ Kory A. Nelson, *Denver's Pit Bull Ordinance: A Review of Its History and Judicial Rulings*, DENV. CITY ATT'Y'S OFF. (Apr. 15, 2005), <https://www.dogsbite.org/pdf/denver->

the impact of the changes in enforcement practices regarding specific dog breeds in the City and County of Denver over the study period of 1989 to 2017. This new activity was first measured by calculating the direct costs to Denver Animal Protection (DAP) to implement the legislation. Standard economic models were then used to calculate the economic impact of the new activity on the City and County of Denver and the surrounding communities (i.e., Longmont, Colorado). Broader effects, including the community's reaction to BSL, were estimated using surveys and publicly available data sources. Data were analyzed using multiple methodologies—including time series event analysis (e.g., before and after analysis) and cross-sectional comparisons—to evaluate the impact of the new animal control activity.

To estimate the broader, but less quantifiable, social and environmental impacts of the City and County of Denver's BSL, data from other stakeholders in the policy, such as public health agencies, community members, and those agencies more indirectly involved in operationalizing the policy, were considered. DAP provided access to all data regarding shelter operations at Denver Animal Shelter (DAS) (e.g., intake source and outcome of pit bull-type dogs (PBTs) in their care), dog licensing, and bite rates in the City and County of Denver from the years 2007 to 2017. Data were not available from DAS on these variables prior to 2007 due to changes in shelter data software. DAP provided access to all budget data regarding staff who were involved in enforcing BSL for the years 1989 to 2017. Data on dog attacks and dog bites in the City and County of Denver were obtained for the years 1989 to 2006 through public information requests submitted by journalist Jared Maher for his 2009 *Westword*²⁵ articles.²⁶ Longmont Humane Society provided access to data regarding animals DAS transferred into its care from 2008 to 2017.

Overall, this study assessed both the narrow and broad economic, environmental, and social impacts of the event under investigation, creating a comprehensive model of the effects of this animal welfare policy in the Denver community. Detailed descriptions of specific analyses are included throughout the body of this report.

III. BACKGROUND

A. Legislative History

Nationally, there are jurisdictions in thirty-five states that have enacted some form of Breed-Specific Legislation (BSL).²⁷ However, fif-

pitbull-ordinance-history-judicial-rulings.pdf [https://perma.cc/VG33-T4SY] (accessed May 26, 2020).

²⁵ *Westword* is a weekly newspaper published in Denver that covers current events in the community.

²⁶ Since these data were obtained prior to the use of the current data collection system, DAP could not verify these data.

²⁷ See *Breed-Specific Laws State-by-State*, *supra* note 16 (showing a list of municipalities with links to descriptions of each state's particular BSL).

teen states, including Colorado, have adopted preemption laws that prohibit such legislation.²⁸ Of the 271 cities in Colorado, just five have active BSL. Those cities are Aurora, Commerce City, Denver, Lone Tree, and Louisville. In May of 2018, the city of Castle Rock, Colorado repealed its breed ban policy, which had been in effect since 1992, in favor of a two-tiered system for enforcing dangerous dog policy.²⁹ Fort Lupton, Colorado, repealed its BSL in February 2019, which took effect in March 2019.³⁰ In February 2020, Denver City Council proposed a breed-restrictive licensing system to replace the breed ban, but it was ultimately vetoed by Denver's Mayor Michael Hancock due to concerns about responsible pet-keeping practices.³¹

Mayor Federico Peña enacted the City and County of Denver's BSL on August 2, 1989, following a series of reports on severe dog bites by pit bull-type dogs (PBTDs).³² Under the City and County of Denver's Animal Control Ordinance Section 8-55 (also referred to as the "pit bull ban"), PBTDs are banned in the City and County of Denver.³³ This ordinance defined PBTDs as "any dog that is an American Pit Bull Terrier, American Staffordshire Terrier, Staffordshire Bull Terrier, or any dog displaying the majority of physical traits of any one (1) or more of the above breeds, or any dog exhibiting those distinguishing characteristics which substantially conform to the standards established by the American Kennel Club or United Kennel Club for any of the above breeds."³⁴ American bulldog, wolf hybrid, presa canario, bull terrier, cane corso, and rottweiler dogs are not included in the list of restricted breeds for the City and County of Denver.

The BSL has persisted with controversy during the thirty years it has been in place in Denver. Following the initial implementation of

²⁸ Rebecca F. Wisch, *Overview of States that Prohibit Breed-Specific Legislation by State Law*, MICH. ST. U.: ANIMAL LEGAL HIST. CTR. (2019), <https://www.animallaw.info/article/overview-states-prohibit-bsl> [https://perma.cc/6F6A-KBGE] (accessed May 26, 2020).

²⁹ See *infra* Appendix A.

³⁰ Second Reading of Ordinance 2019-1039 Chapter 7 Animal Ordinance, Fort Lupton City Council, Regular Meeting (Feb. 4, 2019) (introduced by Michael Long, Member, Fort Lupton City Council), <https://fortlupton.org/agendacenter/viewfile/item/2706?fileID=16666> [https://perma.cc/7J9B-V4LB] (accessed May 21, 2020) (stating that the repeal passed on February 4, 2019 and would become effective March 15, 2019).

³¹ See DENV. POST, *supra* note 1 ("Citing a fear of irresponsible pet owners, should the repeal pass, [Mayor Michael] Hancock vetoed Councilman Chris Herndon's measure, which council approved earlier this month . . .").

³² Nelson, *supra* note 24.

³³ DENV., COLO., CODE ORDINANCES, § 8-55 (1989) (repealed 2018). Effective July 31, 2018, this ordinance was repealed and recodified under Section 8-67 (Pit Bulls Prohibited). For purposes of this Article, the ordinance in force during the time of the underlying study, Section 8-55, is referenced throughout the text because the study assessed took place before the recodified version was enacted. The citations are hereinafter updated to the corresponding recodified sections. DENV., COLO., CODE ORDINANCES, § 8-67 (2020).

³⁴ *Id.* Note: The definition of *pit bull* has been omitted in the current version of the ordinance, effective July 31, 2018. The definition of *pit bull* is now located at Section 8-2(u). DENV., COLO., CODE ORDINANCES, § 8-2(u) (2020).

the ban, a group of animal welfare organizations filed suit against the City and County of Denver, which led to the 1992 Colorado Supreme Court ruling that held that the city had a rational basis for outlawing PBTDS.³⁵ In 2003, the Colorado State Assembly passed legislation to strengthen the state's Dangerous Dog laws with an additional provision that would prevent local governments from having breed-specific regulations.³⁶ The City and County of Denver filed suit to protect its right to continue enforcing its breed-specific legislation, with the city council stating that "the Colorado constitution protects the ability of a home-rule municipality to create and maintain its own laws."³⁷ Although a Denver district court judge agreed with the City and County of Denver on the home-rule issue, the Colorado attorney general's office presented the argument that new research on dog bites and attacks could be presented as proof that PBTDS bans are irrational.³⁸ In these proceedings, the City and County of Denver argued "the ban was justified not necessarily because evidence showed [PBTDS] bite more frequently, but because the history and physiological traits of [the breeds categorized as PBTDS] make [them] more likely to cause severe injury and death if they do bite."³⁹ The ban was temporarily inactive while this litigation was underway.⁴⁰ In April 2005, the judge ruled that the state failed to prove the City and County of Denver had no rational basis for prohibiting PBTDS, and the ban remains in effect to this day.⁴¹ Therefore, the City and County of Denver's breed ban is unique in that it has been constitutionally upheld on two separate occasions and is consequently considered a 'model ordinance' for breed ban-type policies.

B. Social History

BSL has been implemented throughout the United States as a means of promoting public safety by decreasing the presence of dangerous dogs in communities.⁴² However, Claire Molloy suggests that by proposing a definition of which companion animals make suitable pets for 'responsible' pet owners, "the processes that led to this legislative intervention raised questions about the role of dogs in contemporary urban environments and the social identities of dangerous dog

³⁵ Jared J. Maher, *For Two Decades, Pit Bulls Have Been Public Enemy #1 in Denver. But Maybe It's Time for a Recount.*, WESTWORD (Sept. 24, 2009, 4:00 AM), <https://www.westword.com/news/for-two-decades-pit-bulls-have-been-public-enemy-1-in-denver-but-maybe-its-time-for-a-recount-5105359> [<https://perma.cc/3JL9-ARY7>] (accessed May 26, 2020) (citing *Colo. Dog Fanciers, Inc. v. Denver*, 820 P.2d 644 (Colo. 1991)).

³⁶ *Id.*

³⁷ *Id.*

³⁸ *Id.*

³⁹ *Id.*

⁴⁰ *Id.*

⁴¹ *Id.*

⁴² Anna Jones, *Brief Summary of Breed Specific Legislation (BSL)*, MICH. STATE U.: ANIMAL LEGAL & HIST. CTR. (2017), <https://www.animallaw.info/intro/breed-specific-legislation-bsl> [<https://perma.cc/D2PD-2B2M>] (accessed May 26, 2020).

owners.”⁴³ In the late twentieth century, as the United States population increased over time due to immigration, pit bulls became increasingly employed as an affordable means of protection for people in inner cities.⁴⁴ The introduction of BSL marked a transition in how policy makers would act upon the social stigma of certain breeds of dogs and the individuals that keep them to regulate the presence of specific dogs in communities.

Historically, the breeds of dogs associated with individuals of lower socioeconomic status (i.e., American bulldog, wolf hybrid, presa canario, bull terrier, cane corso, pit bull, and rottweiler) have been subjected to discriminatory legislation due to a higher perceived risk for public safety issues—such as disease and violence—than the pets kept by individuals in more affluent areas.⁴⁵ Over the course of history, the dogs labeled as ‘dangerous’ and subjected to the highest penalties are also linked to historically marginalized populations, namely Black and Brown individuals.⁴⁶ This discrepancy in political power for people of color has made them more vulnerable to issues like over policing by human and animal law enforcement.

Arnold Arluke describes the ways in which PBTDs became a mechanism through which human and animal law enforcement integrated racial profiling into their patrol of communities.⁴⁷ In the 1990s, the co-occurrence of animal cruelty-related offenses and criminal activity, such as drug use on dog fight sites, resulted in partnerships between local police and humane law enforcement.⁴⁸ These enforcement efforts then led to regular sweeps of neighborhoods to spot ‘suspicious’ dog owners who may be utilizing their PBTDs for illicit activities.⁴⁹ Finally, an increase in media coverage of dog attacks by PBTDs ultimately resulted in significant fear of PBTDs throughout United States communities.⁵⁰ Both media portrayals of severe dog bites by PBTDs and the research literature on the risks of ownership of ‘high-risk’ dogs has led to a controversial discussion in policy-making around which

⁴³ Claire Molloy, *Contested Meanings and Canine Bodies*, in HUMAN AND OTHER ANIMALS 93 (Bob Carter et al., 2011).

⁴⁴ Daniel Rivero, *The Racist Story Behind the Pit Bull’s Fall from American Icon to Demon Dog*, SPLINTER (May 5, 2016), <https://splinternews.com/the-racist-story-behind-the-pit-bull-s-fall-from-america-1793857029> [https://perma.cc/RP9S-AX77] (accessed May 26, 2020).

⁴⁵ McCarthy, *supra* note 19, at 561–62.

⁴⁶ BRONWEN DICKEY, PIT BULL: THE BATTLE OVER AN AMERICAN ICON 217–18 (2016).

⁴⁷ See Arnold Arluke, *Ethnozoology and the Future of Sociology*, 3 INT’L J. SOC. & SOC. POL’Y 26, 37 (2003) (“Driving through certain high-risk urban neighborhoods allowed for opportunistic spotting of African Americans walking with pit bulls on sidewalks or sitting on stoops with their animals, the assumption being that these dogs were not mere pets but illegal and dangerous weapons.”).

⁴⁸ *Id.* at 35–36.

⁴⁹ *Id.* at 37.

⁵⁰ Hillary Twining et al., *Managing the Stigma of Outlaw Breeds: A Case Study of Pit Bull Owners*, 8 SOC’Y & ANIMALS 25, 26 (2000).

types of dogs communities should be permitted to keep and led to policies such as BSL.

IV. THE IMPACTS OF THE CITY AND COUNTY OF DENVER'S BSL

While it is important for policy-makers to acknowledge how social attitudes have informed our current understanding of pit bull-type dogs (PBTDs) and the individuals that keep them, it is equally important to ensure that the policies, such as Breed-Specific Legislation (BSL), enacted based on these social attitudes are also evaluated objectively for their impacts on other components of community health. As Claire Molloy articulates: “[c]anine-human interactions are not without material risks and there is no question that dog bites and fatalities resulting from companion dog attacks do occur. What is of concern here however are the outcomes of the processes by which such incidents are selected, mediated, and constructed as ‘risks.’”⁵¹ In the interest of advancing the discussion on the strengths and limitations of BSL policy, this report will evaluate the impacts of BSL on animal welfare, community health, and the economic and legal systems of the City and County of Denver.

V. IMPACTS ON ANIMAL WELFARE

A. *Overview of Denver Animal Protection and Denver Animal Shelter*

Denver Animal Protection (DAP) is the enforcement agency for animal control and protection ordinances in the City and County of Denver.⁵² In addition to being the primary agency enforcing the City and County of Denver’s Breed-Specific Legislation (BSL), DAP also manages the Denver Animal Shelter (DAS) facility.⁵³ The new DAS shelter facility opened in June 2011 and was designed to reflect Denver’s commitment to both animal welfare and sustainability.⁵⁴ The construction of the \$17 million facility was funded by the citizens of Denver through the Better Denver Bond Program and offers amenities including cat colonies and animal visitation rooms.⁵⁵ In May 2012,

⁵¹ Molloy, *supra* note 43, at 94.

⁵² See *Animal Protection*, CITY & CTY. DENV.: DENV. ANIMAL SHELTER, <https://www.denvergov.org/content/denvergov/en/denver-animal-shelter/animal-protection.html> [https://perma.cc/L9HL-324S] (accessed May 26, 2020).

⁵³ *About*, CITY & CTY. DENV.: DENV. ANIMAL SHELTER, <https://www.denvergov.org/content/denvergov/en/denver-animal-shelter/about.html> [https://perma.cc/93EV-NCPY] (accessed May 26, 2020).

⁵⁴ *New Animal Shelter Complete!*, CITY & CTY. DENV.: DENV. ANIMAL SHELTER, <https://www.denvergov.org/content/denvergov/en/better-denver-bond-program/project-archive/health-and-human-services/new-animal-shelter.html> [https://perma.cc/V57C-C6CU] (accessed May 26, 2020).

⁵⁵ *Id.*; Sheba R. Wheeler, *At New Denver Animal Shelter, Focus on Health and Wellness Brings Happy Tails*, DENV. POST (June 13, 2011), <https://www.denverpost.com/>

DAS was awarded the Platinum Leadership in Energy and Environmental Design (LEED) designation, which certifies that the building meets the green standards for an energy- and environmentally-efficient structure.⁵⁶ DAS handles a significant portion of stray and otherwise unhoued companion animals in the City and County of Denver, taking in approximately 4,500 dogs in 2017.⁵⁷

B. General Guidelines Under the City and County of Denver's Section 8-55 Ordinance (the "Pit Bull Ban")

The City and County of Denver's BSL ordinance, Section 8-55, is enforced in two primary ways: through animal protection officer activities, and through the intake and adoption policies of the DAS municipal sheltering facility.⁵⁸ These enforcement processes were added as additional DAP responsibilities when the ordinance was passed in 1989.⁵⁹ Ongoing efforts have been made to evaluate the effectiveness of these procedures, and adjustments have been made over time to ensure the policy is adequately enforced. These adjustments include the number of officers out in the field and the personnel involved in the breed identification process.⁶⁰

Under Section 8-55, all dogs suspected to be one of the restricted breeds that are found within Denver's city limits are subject to evaluation by DAP.⁶¹ The cost of this evaluation has remained at \$25.⁶² In most cases, owners are also expected to pay the cost of boarding their dog over the evaluation period, which may take anywhere from one to

2011/06/13/at-new-denver-animal-shelter-focus-on-health-and-wellness-brings-happy-tails/ [https://perma.cc/C893-WWNL] (accessed May 26, 2020).

⁵⁶ Denver Animal Shelter, *About*, FACEBOOK, https://www.facebook.com/pg/Denver-AnimalShelter/about/?referrer=services_landing_page [https://perma.cc/6QN3-E3UC] (accessed May 26, 2020).

⁵⁷ *Denver Animal Shelter*, CITY & CTY. DENV.: DENV. ANIMAL SHELTER, <https://www.denvergov.org/content/denvergov/en/denver-animal-shelter.html> [https://perma.cc/WAF2-7FMZ] (accessed May 26, 2020).

⁵⁸ See *infra* Appendix B.

⁵⁹ *Sec. 8-55. – Pit Bulls Prohibited*, MICH. ST. U.: ANIMAL LEGAL & HIST. CTR., <https://www.animallaw.info/local/co-denver-breed-sec-8-55-pit-bulls-prohibited> [https://perma.cc/Y3DY-TSGT] (accessed May 26, 2020).

⁶⁰ DENV. ANIMAL PROT., ANIMAL CARE AND CONTROL PERFORMANCE AUDIT (2012) (on file with author); E-mail from R. Picassari, Data and Project Adm'r, Animal Prot., City & Cty. of Denv., Dep't of Pub. Health & Env't, to Sloane Hawes, Research Assoc., Inst. for Human-Animal Connection, Graduate Sch. of Soc. Work, Univ. of Denv. (Dec. 20, 2017, 8:55 AM) (providing quantitative data and qualitative responses from field officers on staff enforcement over the study period) (on file with authors).

⁶¹ See *Breed Specific Legislation*, CITY & CTY. DENV.: DENV. ANIMAL SHELTER, <https://www.denvergov.org/content/denvergov/en/denver-animal-shelter/animal-protection.html> [https://perma.cc/4B57-AC2W] (accessed May 26, 2020) (describing Denver's pit bull breed ban and its specific rules and regulations).

⁶² E-mail from R. Picassari to Sloane Hawes, *supra* note 60 (providing data with a detailed breakdown of cost of enforcement).

five days.⁶³ The owner of a suspected restricted breed can comply voluntarily with this ordinance by presenting his or her dog at DAS for an evaluation, or an animal protection officer may encounter a suspected restricted breed in the field and confiscate it for transport to the municipal shelter under a Section 8-55 Hold.⁶⁴ The animal may be confiscated if the officer has reason to believe the dog's owner will not comply voluntarily with the evaluation; if the dog is in violation of another City and County of Denver ordinance (i.e., abandonment, barking, nuisance, dangerous dog, spay-neuter); or if the officer has previously requested that the dog be brought in for a voluntary evaluation and the owner did not comply.⁶⁵

A dog presented for evaluation at the DAS facility will receive a breed evaluation by DAP staff. While all stray dogs that are suspected to be restricted breeds will also receive a behavior evaluation,⁶⁶ owned dogs will not.⁶⁷ The breed determination at DAP is completed by three independent evaluators and is based on the criteria outlined in the ordinance: "any dog displaying the majority of physical traits of any one of the American Pit Bull Terrier, American Staffordshire terrier, or Staffordshire bull terrier breed, or any dog which substantially conforms to the standards established by American Kennel Club or United Kennel Club."⁶⁸ The three evaluators complete their respective assessment independently to reduce potential bias.⁶⁹ As of 2005, DAP's policy requires consensus among the three independent evalu-

⁶³ See *Breed Specific Legislation*, *supra* note 61 ("If your dog is impounded as a result of the pit bull ordinance & determined to be a pit bull breed, you will be responsible for all fines and boarding fees.").

⁶⁴ *Id.* See DENV., COLO., CODE ORDINANCES § 8-67 (2020) (detailing the authority of DAP to "immediately impound any pit bull found in the City and County of Denver").

⁶⁵ E-mail from R. Picassari to Sloane Hawes, *supra* note 60 (containing narrative from Officer Daniel Ettinger and Officer Jenna Humphreys).

⁶⁶ *Breed Specific Legislation*, *supra* note 61. Denver Animal Shelter uses the Pueblo Canine Assessment Tool (PCAT), developed by the Associate Certified Applied Animal Behaviorist, Jennifer Barg, for its behavior evaluation. During this evaluation, the dog goes through a series of handling exercises, including a test for any food, rawhide (considered a food item), or toy/ball guarding behaviors. All dogs who are over 40 pounds, dogs who have shown any concerning behavior towards other dogs while in the shelter, or dogs who have a history of not behaving well with other dogs are then observed in multiple dog-to-dog interactions as a component of their assessment. Efforts are made to observe these dog-to-dog interactions with at least one other male and one other female dog. Finally, a comprehensive assessment is completed that takes into account the results of the PCAT behavior evaluation, the dog-to-dog interactions, the dog's general behavior in the field, the dog's behavior during its general intake and processing at the shelter, the dog's behavior during its veterinary physical examination, the dog's behavior when being handled by staff and volunteers at DAS, and, finally, any history provided by the previous owner, when applicable. This evaluation process is also used for any dog involved in a bite or attack. See E-mail from R. Picassari to Sloane Hawes, *supra* note 60 (containing narrative from Officer Daniel Ettinger and Officer Jenna Humphreys).

⁶⁷ E-mail from R. Picassari to Sloane Hawes, *supra* note 60.

⁶⁸ *Breed Specific Legislation*, *supra* note 61.

⁶⁹ E-mail from R. Picassari to Sloane Hawes, *supra* note 60.

ators.⁷⁰ If any one of the three evaluators determine that the dog is not primarily one of the three restricted breeds, then the dog cannot be held under Section 8-55.⁷¹

DAS uses a visual assessment to determine banned breeds under BSL.⁷² However, existing research indicates that there may be limitations to the visual evaluation processes used by animal shelters to assess the breed and behavior of unhoused dogs in their care. One study showed a high degree of disagreement in shelter workers on the breed of an animal following a visual breed assessment.⁷³ Another study found that shelter staff and veterinarians using physical traits to determine breed were correct only 25% of the time when comparing their identification to the dog's genetic structure.⁷⁴

Most studies suggest that DNA testing is a more accurate predictor of breed than physical evaluation.⁷⁵ However, there are limitations to DNA testing, particularly with mixed breed dogs. One study found genetic variance even among dogs within the same American Kennel Club (AKC)-certified breed.⁷⁶ Another study on DNA testing results of shelter dogs found that as the number of pit bull-type relatives in a dog's heritage increased, so did the shelter's ability to match the results of DNA analysis through visual identification.⁷⁷ Ultimately, the study concluded that due to the variability in how genetics might manifest for an individual dog, focusing resources on communicating the physical and behavioral characteristics of shelter dogs is likely the

⁷⁰ *Id.* This policy was revised in 2005 following a lawsuit. See Interview with Alice Nightengale, Dir., Animal Prot., City & Cty. of Denv., Dep't of Pub. Health & Env't, in Denv., Colo. (Oct. 13, 2017) (stating that consensus across the three evaluators was established as the internal policy for breed evaluations to address some of the known issues with visual breed identification) (on file with authors).

⁷¹ Interview with Alice Nightengale, *supra* note 70.

⁷² E-mail from R. Picassari to Sloane Hawes, *supra* note 60 (providing quantitative data and qualitative responses from field officers on the evaluation process).

⁷³ See generally Christy L. Hoffman et al., *Is That Dog a Pit Bull? A Cross-Country Comparison of Perceptions of Shelter Workers Regarding Breed Identification*, 17 J. APPLIED ANIMAL WELFARE SCI. 322, 322–39 (Mar. 27, 2014), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4160292/pdf/haww-17-322.pdf> [<https://perma.cc/UXU2-NCN8>] (accessed May 26, 2020) (describing the variation shown in a study where shelter workers made breed determinations based on pictures of dogs).

⁷⁴ Victoria L. Voith et al., *Comparison of Visual and DNA Breed Identification of Dogs and Inter-Observer Reliability*, 3 AM. J. SOC. RES. 17, 22–24 (2013).

⁷⁵ Lisa M. Gunter et al., *A Canine Identity Crisis: Genetic Breed Heritage Testing of Shelter Dogs*, 13 PLOS ONE 1, 2 (2018); see Katie B. Barnett, *Breed Discriminatory Legislation: How DNA Will Remedy the Unfairness*, 4 J. ANIMAL L. & ETHICS 161, 174, 176–77 (2011) (referencing a DNA test that identified first-generation crossbred dogs with ninety percent accuracy, as well as instances where physical examinations were proved inaccurate after DNA testing identified the true breed makeup of mixed-breed dogs); Adam R. Boyko et al., *A Simple Genetic Architecture Underlies Morphological Variation in Dogs*, 8 PLOS BIOLOGY 1, 1 (2010) (describing the array of genetic variants linked to breed-specific physical traits through DNA testing).

⁷⁶ Heidi G. Parker et al., *Genetic Structure of the Purebred Domestic Dog*, 304 SCI. 1160, 1161, 1163 (2004).

⁷⁷ Gunter et al., *supra* note 75, at 13.

most effective approach to supporting responsible adoption efforts.⁷⁸ While some cities with BSL utilize DNA testing, DAP does not use this practice in its evaluations of suspected restricted-breed dogs.⁷⁹

If a dog is determined not to be a restricted breed through DAP's visual breed identification process, the Section 8-55 citation is voided; the evaluation fees are typically waived; and the dog is returned to its owner with a letter certifying that the dog is a legal breed that can reside in the City and County of Denver.⁸⁰ The owners of the dogs that are certified as a restricted breed are issued a Section 8-55 Enforcement Letter in which they are notified that the dog must be removed from the Denver city limits, and that if found in the City or County of Denver again, the dog will be impounded.⁸¹ Owners then sign this letter certifying that they will take immediate actions to relocate the dog. Dogs impounded under Section 8-55 may either be transferred to another shelter outside of Denver or euthanized.⁸² All evaluation results are logged in DAP's records so that dogs are not inadvertently evaluated multiple times.⁸³ Animal protection officers will periodically follow up with owners of a cited dog, when necessary, to ensure alternative accommodations for the dog have been secured.⁸⁴

C. Impacts on Denver Animal Shelter's Dog Intake

To assess the impact of the City and County of Denver's BSL on DAS's rates of intake, data were first analyzed on the rates of intake of all dogs in the care of DAS. An analysis of the trends in DAS's total intake informs the discussion of the impacts of the breed ban insofar as it provides evidence for how removing certain breeds of dogs from the community is impacting the municipal shelter's capacity to serve other people and pets in need in the community. As a municipal facility, DAS's primary sources of intake are stray animals, animals surrendered by their owners, and animals obtained through confiscation.⁸⁵ The upward trend in total intake between 2007 to 2017, the period for which data were available through DAS, was approaching significance with an average increase of eighty dogs per year ($p = 0.06$) to a total of 4,509 dogs in 2017.⁸⁶ However, when the growth in human population

⁷⁸ *Id.* at 12.

⁷⁹ Barnett, *supra* note 75, at 176; *see also* Gunter et al., *supra* note 75, at 2 (citing Denver's breed-specific legislation as being among the numerous municipal pit bull bans enforced through physical characteristic-based identification).

⁸⁰ DENV., COLO., CODE ORDINANCES § 8-67.

⁸¹ Interview with Alice Nightengale, *supra* note 70.

⁸² DENV., COLO., CODE ORDINANCES § 8-67; *see infra* Section V.D.

⁸³ E-mail from R. Picassari to Sloane Hawes, *supra* note 60 (providing quantitative data and qualitative responses from field officers on the evaluation process).

⁸⁴ Interview with Alice Nightengale, *supra* note 70.

⁸⁵ *See infra* Figure 1; *see also* E-mail from R. Picassari to Sloane Hawes, *supra* note 60 (containing narrative from Officer Daniel Ettinger and Officer Jenna Humphreys).

⁸⁶ E-mail from R. Picassari to Sloane Hawes, *supra* note 60.

in Denver⁸⁷ is accounted for, there was no significant trend ($p = 0.72$), with a total intake of an average of 6.8 dogs per 1,000 residents per year. These trends contrast with an overall decrease in dogs taken into animal shelters and rescue organizations across the entire state during a similar period (2008 to 2015).⁸⁸

The rate of owner surrenders at DAS decreased significantly at an average rate of 56 dogs per year ($p < 0.01$) to 456 dogs surrendered in 2017.⁸⁹ A decreasing trend of 0.11 dogs per year ($p < 0.01$) was also seen when the growth in human population was taken into account.⁹⁰ In 2017, 0.52 dogs per 1,000 residents were surrendered to DAS by their owners. The number of stray dogs taken into the shelter has increased significantly at an average rate of 126 dogs per year ($p < 0.01$) to 3,476 dogs in 2017.⁹¹ This increasing trend is also significant on a per capita basis, with an increase from 4.4 stray dogs to 5.7 stray dogs per 1,000 residents in 2017 ($p = 0.05$). The trend in the number of dogs transferred into the care of DAS from other facilities was approaching significance ($p = 0.09$), increasing by an average of nine dogs per year to seventy-seven dogs in 2017. However, there was no significant trend ($p = 0.67$) on a per capita basis at an average of 1.3 dogs transferred into DAS's care per 1,000 residents each year. The trend in the number of dogs that entered into DAS's care as returned adoptions increased by an average of nine dogs per year ($p < 0.05$) to eighty-seven dogs in 2017.⁹² There was also an increasing trend on a per 1,000 capita basis from 0.02 dogs in 2007 to 0.10 dogs in 2017.⁹³ The declining trend in the number of dogs confiscated approached statistical significance ($p = 0.08$), with a decrease by an average of nine dogs per year to 413 dogs in 2017. A statistically significant ($p = 0.02$) decreasing trend was found when the growth in human population⁹⁴ is accounted for at -0.02 dogs per year to 0.58 dogs per 1,000 residents in 2017.

Rates of shelter intake are indicators of community-wide animal welfare needs.⁹⁵ As the community's animal welfare safety net, a municipal shelter's intake rates will reflect a community's capacity to care for the companion animals it keeps. DAS's pet retention programs, such as the Hope program, offer financial assistance to address medi-

⁸⁷ *City and Town Population Totals: 2010–2018*, U.S. CENSUS BUREAU, <https://www.census.gov/data/tables/time-series/demo/popest/2010s-total-cities-and-towns.html> [<https://perma.cc/AU6P-QRAD>] (accessed May 26, 2020).

⁸⁸ Hawes et al., *supra* note 20.

⁸⁹ E-mail from R. Picassari to Sloane Hawes, *supra* note 60 (containing data on animal intake and outcomes pulled directly from the municipal shelter's records).

⁹⁰ *City and Town Population Totals: 2010–2018*, *supra* note 87.

⁹¹ E-mail from R. Picassari to Sloane Hawes, *supra* note 60.

⁹² *Id.*

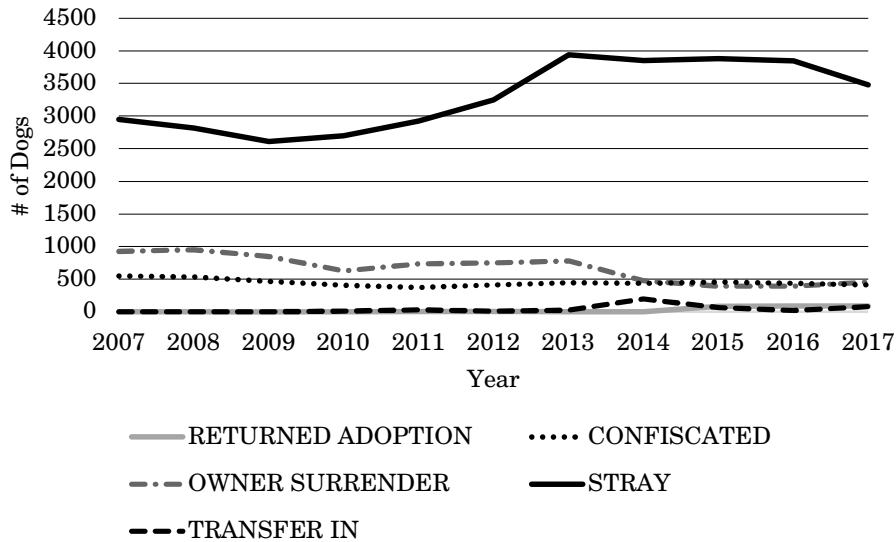
⁹³ *Id.*

⁹⁴ *City and Town Population Totals: 2010–2018*, *supra* note 87.

⁹⁵ See *2016 Animal Sheltering Statistics*, SHELTER ANIMALS COUNT, <https://shelteranimalcount.org/docs/default-source/DataResources/2016animalshelteringstatistics.pdf?sfvrsn=12> [<https://perma.cc/7DMX-NSTM>] (accessed May 26, 2020) (using intake rates, among other sheltering statistics, to assess animal welfare and community need).

cal or behavioral challenges.⁹⁶ These pet retention programs appear to have influenced the observed decrease in rates of intake by owner surrender.⁹⁷ DAS's partnership with the Dumb Friends League in Denver, Colorado—through the Denver Stray project⁹⁸—may have influenced the rates for both stray intake and intake via transfer. To decrease the number of shelter locations a Denver resident needs to contact to find a lost pet, the Denver Stray project encourages the Dumb Friends League to refer all stray dogs to Denver Animal Shelter,⁹⁹ which likely influenced the observed increase in stray intake at DAS.¹⁰⁰ Increases in the returned adoptions may be related to the introduction of an adoption consultation process that works one-on-one with adopters who wish to care for the dogs with more challenging behavior.¹⁰¹ These dogs may be returned several times before identifying the best home for them.¹⁰²

Figure 1. Trends in Intake for All Dogs at DAS from 2007 to 2017



In more recent years, the City and County of Denver's BSL has been enforced within this context of decreasing rates of owner surrender, and increasing rates of stray and returned adoptions. Restricted breeds that are subject to the Section 8-55 ordinance come into the

⁹⁶ Hope, CITY & CTY. DENV.: DENV. ANIMAL SHELTER, <https://www.denvergov.org/content/denvergov/en/denver-animal-shelter/programs.html#HopeProgram> [<https://perma.cc/R7CY-VD24>] (accessed May 26, 2020); Interview with Alice Nightengale, *supra* note 69.

⁹⁷ Interview with Alice Nightengale, *supra* note 70.

⁹⁸ *Id.*

⁹⁹ *Id.*

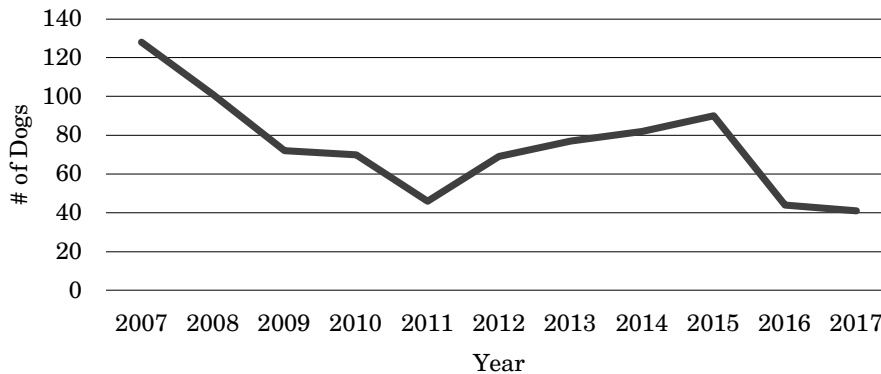
¹⁰⁰ *Id.*

¹⁰¹ *Id.*

¹⁰² *Id.*

shelter's care primarily as strays or confiscations, but can also be admitted by owner surrender. Overall, the rate of intake due to Section 8-55 citations appears to have decreased from 2007 to 2017,¹⁰³ which would indicate that either there are fewer pit bull-type dogs (PBTBs) in Denver or that DAS has seen a decrease in breed ban-related enforcement actions.¹⁰⁴ However, the linear trend through these data is not statistically significant due to fluctuations in the rates of restricted breed intake from 2007 to 2017 ($p = 0.80$). When the growth in human population in Denver¹⁰⁵ was accounted for, there was a statistically significant decreasing trend ($p = 0.01$) of -0.03 dogs per year to 0.12 dogs per 1,000 residents at the end of the study period, which indicates that human population growth in Denver may impact the number of restricted breeds brought into DAS. In 2017, there were forty-one dogs in the care of DAS under the Section 8-55 ordinance; twenty-five of these dogs were taken in as confiscations, and sixteen dogs were taken in as strays.¹⁰⁶ No dogs surrendered by owners to DAS in 2017 were held under the Section 8-55 ordinance.¹⁰⁷ DAP largely attributes this decrease in number of dogs held under Section 8-55 to a decrease in the number of PBTBs in the City and County of Denver and an increased utilization of the voluntary evaluation process.¹⁰⁸ This decreasing number of Section 8-55 holds may also indicate that the need for BSL is diminishing.

Figure 2. Number of Dogs Brought into the Care of DAS Through a Section 8-55 Hold from 2007 to 2017



While the overall number of PBTBs held by DAS is decreasing, dogs that were identified as restricted breeds consistently experienced

¹⁰³ E-mail from R. Picassari to Sloane Hawes, *supra* note 60.

¹⁰⁴ See *infra* Figure 2.

¹⁰⁵ *City and Town Population Totals: 2010–2018*, *supra* note 87.

¹⁰⁶ E-mail from R. Picassari to Sloane Hawes, *supra* note 60. See *infra* Figure 2.

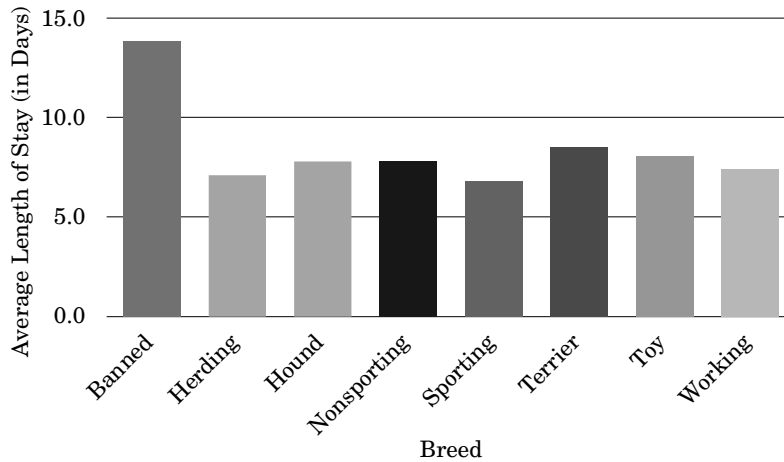
¹⁰⁷ E-mail from R. Picassari to Sloane Hawes, *supra* note 60.

¹⁰⁸ *Id.*

a longer length of stay at DAS.¹⁰⁹ The average length of stay for all dogs in the care of the shelter from 2007 to 2017 was 8.4 days, while the average length of stay for restricted breeds was 61% longer at 13.8 days over the same period.

There is limited scientific literature on the relationship between increased lengths of stay in shelters and the quality of life for a dog. Currently, there is no standardized definition in animal welfare for what specifically constitutes quality of life. Some studies have documented a stress and health risk that results from increases in the length of stay at shelters.¹¹⁰ Advancements in veterinary medicine addressing chronic disease and illness now equip shelters with the ability to extend the lifespan of shelter animals through medical and behavioral support programs.¹¹¹ However, what constitutes an appropriate length of stay within a shelter system remains a highly debated topic in the field of animal welfare and requires more in-depth research. More data are needed to evaluate how the increased average length of stay has impacted the quality of life for PBTDS in the care of DAS.

Figure 3. Average Length of Stay (in Days) for All Breeds of Dogs in the Care of DAS from 2007 to 2017



¹⁰⁹ *Id.* Length of stay was calculated by taking the date of outcome minus the date of intake for each dog. An average of breed group's length of stay was then calculated using all of the dogs in each breed group who were in the care of DAS that year. See *infra* Figure 3.

¹¹⁰ Michael B. Hennessy et al., *Plasma Cortisol Levels of Dogs at a County Animal Shelter*, 62 *PHYSIOLOGY & BEHAV.* 485, 489 (1997); Alexandra Protopopova, *Effects of Sheltering on Physiology, Immune Function, Behavior, and the Welfare of Dogs*, 159 *PHYSIOLOGY & BEHAV.* 95, 95–103 (2016).

¹¹¹ Sloane Hawes et al., *Factors Informing Outcomes for Older Cats and Dogs in Animal Shelters*, *ANIMALS* 8, 36, 44 (2018).

D. Impacts on Denver Animal Shelter's Dog Outcomes

Most breeds of dogs leave the care of DAS having been either adopted or returned to their owner.¹¹² Over the study period, the trend in all dog adoptions was not statistically significant ($p = 0.23$), remaining constant at an average of 1,203 dogs per year. The trend in all dog adoptions on a per capita basis was also unchanged ($p = 0.92$) at 1.87 dogs adopted per 1,000 residents. The trend in the number of dogs returned to their owners has increased at an average rate of eighty-nine dogs per year ($p < 0.01$) to 2,125 dogs in 2017.¹¹³ The trend was also increasing ($p < 0.01$) on a per capita basis at 0.10 dogs per year to 2.2 dogs per 1,000 residents in 2017. The trend in the number of dogs transferred to other facilities was not statistically significant ($p = 0.61$) at a constant rate of 733 dogs per year. The trend was also unchanged ($p = 0.67$) at 1.31 dogs per year per 1,000 residents throughout the study period. The declining trend in dogs euthanized was approaching significance ($p = 0.07$), with an average decrease of fifty dogs per year to 681 dogs in 2017.¹¹⁴ However, there was no statistically significant trend ($p = 0.12$) when the growth in human population was accounted for at an average of 1.47 dogs per year per 1,000 residents. The trend in number of dogs that die in care was not statistically significant ($p = 0.17$) at a constant rate of fourteen dogs per year.¹¹⁵ The trend is also not statistically significant ($p = 0.27$) when growth in human population¹¹⁶ is accounted for at 0.03 dogs per year per 1,000 residents.

These steady and increasing rates of positive outcomes (adoptions and returned to owner) and decreasing rate of negative outcomes (euthanasia) indicate that DAS is contributing positively to the lives of the animals that enter the shelter's care.

¹¹² See *infra* Figure 4; see also E-mail from R. Picassari to Sloane Hawes, *supra* note 60 (containing data on animal intake and outcomes pulled directly from the municipal shelter's records).

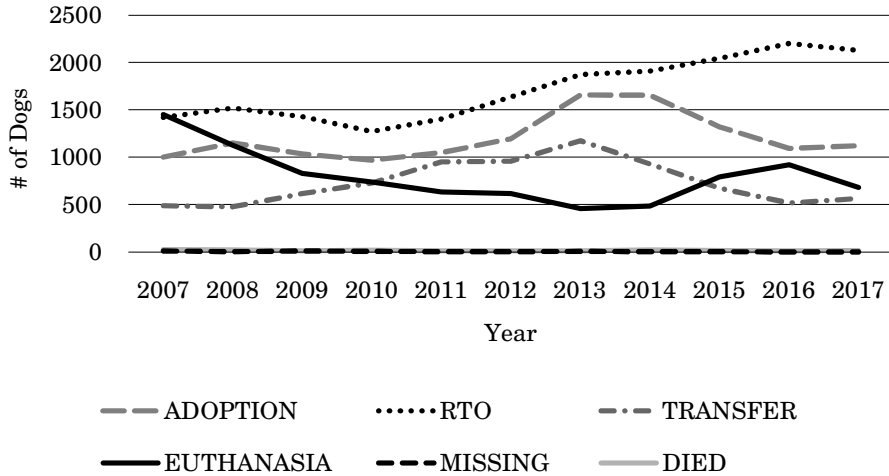
¹¹³ E-mail from R. Picassari to Sloane Hawes, *supra* note 60.

¹¹⁴ *Id.*

¹¹⁵ *Id.*

¹¹⁶ *City and Town Population Totals: 2010–2018*, *supra* note 87.

Figure 4. Trends in Outcomes for All Dogs at DAS
from 2007 to 2017



The trends in outcomes for dogs of restricted breeds under BSL differ from those seen in the greater population of dogs in DAS's care. Under the ordinance, no PBTDs can be adopted out to residents of Denver; however these dogs could be returned to their respective owner, transferred to other shelters or rescues outside of Denver, or euthanized.¹¹⁷ Of the forty-one dogs held under Section 8-55 in 2017, one dog was adopted,¹¹⁸ nineteen were returned to their owners, two were transferred, and nineteen were euthanized.¹¹⁹ Beyond the forty-one dogs entering the care of DAS under a Section 8-55 hold in 2017, additional PBTDs came to DAS through sources other than Section 8-55 holds. Of these dogs, forty-four were returned to their owners, thirty-three were transferred, forty-eight were euthanized, and one died in the care of DAS.¹²⁰

Because the City and County of Denver's breed ban does not permit dogs of restricted breeds to be adopted,¹²¹ there was no data over the 2007 to 2017 study period on the number of restricted breed dogs adopted out of the shelter to be analyzed. According to the scientific literature, PBTDs are less likely to be adopted and more likely to be euthanized in a shelter, even in communities without BSL.¹²²

¹¹⁷ Interview with Alice Nightengale, *supra* note 70. See *infra* Figure 5.

¹¹⁸ After further examination, it appears this dog was ultimately determined to be an American bulldog and not a restricted breed; therefore, the dog was eligible to be placed up for adoption. See E-mail from R. Picassari to Sloane Hawes, *supra* note 60 (containing data on animal intake and outcomes pulled directly from the municipal shelter's records).

¹¹⁹ *Id.*

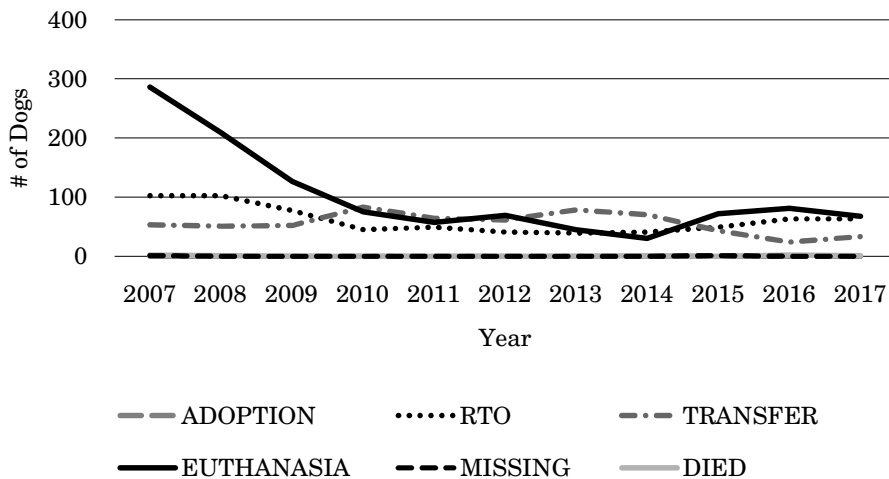
¹²⁰ *Id.*

¹²¹ DENV., COLO., CODE ORDINANCES § 8-67.

¹²² Jamie Clevenger & Philip H. Kass, *Determinants of Adoption and Euthanasia of Shelter Dogs Spayed or Neutered in the University of California Veterinary Student Sur-*

According to the City and County of Denver's BSL ordinance, a dog that has been certified as a restricted breed can be microchipped and then returned to its owner after the first offense if the owner can verify that he or she resides outside of the city's limits, or on the condition that the ownership of the dog is transferred to a residence outside of Denver.¹²³ Any dog of a restricted breed that is encountered within the City and County of Denver a second time can no longer be returned to its owner regardless of if the owner resides, or intends to relocate the animal, outside of Denver.¹²⁴ Over the study period, the declining trend in number of dogs of a restricted breed that were returned to their owners was approaching significance ($p = 0.06$) with an average decrease of four dogs per year to sixty-three dogs in 2017.¹²⁵ This was also true on a per capita basis ($p = 0.09$), with a decrease of 0.01 dogs per year to 0.11 dogs per 1,000 residents in 2017. These decreasing trends in the return of these dogs to their owners, while the trend increases for all other breeds in DAS's care, can be attributed directly to BSL.¹²⁶ The trend in return-to-owner (RTO) for restricted breeds demonstrates the ways in which BSL in Denver continues to regulate the types of dogs 'responsible' pet owners can keep.

Figure 5. Trends in the Outcomes for Dogs of a Restricted Breed at DAS from 2007 to 2017



Similar to that of all dogs at DAS, the trend in the number of dogs of restricted breeds that were transferred has not changed significantly ($p = 0.21$) over the study period, remaining constant at fifty-five

gery Program Compared to Other Shelter Dogs, 30 J. VETERINARY MED. EDUC. 372, 372-77 (2003); Gunter et al., *supra* note 18 at 11, 13.

¹²³ Interview with Alice Nightengale, *supra* note 70.

¹²⁴ E-mail from R. Picassari to Sloane Hawes, *supra* note 60.

¹²⁵ *Id.*

¹²⁶ *Id.*

dogs per year.¹²⁷ However, on a per capita basis there was a decreasing trend approaching statistical significance ($p = 0.07$) at 0.01 dogs per year to 0.11 dogs per 1,000 residents in 2017. DAS utilizes transfers to optimize the flow of animals through the shelter, to give a dog access to specialized resources like medical or behavioral care that DAS may not be able to offer, and to increase the likelihood that a dog will be adopted.¹²⁸ DAS primarily transfers animals to other shelters and rescues in Denver and Boulder Counties.¹²⁹ The dogs transferred to other shelters and rescues within Denver County do not include PBTDS.¹³⁰

While there were no statistically significant trends in the number of dogs transferred in or out of DAS, transfer partnerships and community partnering are emerging as effective approaches to increasing live outcomes for all at-risk animals in shelters, particularly when an individual organization's resources are limited.¹³¹ Throughout the state of Colorado, animal shelter rescues and organizations have experienced a 77.1% increase in the number of dogs transferred to other organizations within the state from 2000 to 2015.¹³²

¹²⁷ *Id.*

¹²⁸ *Id.*

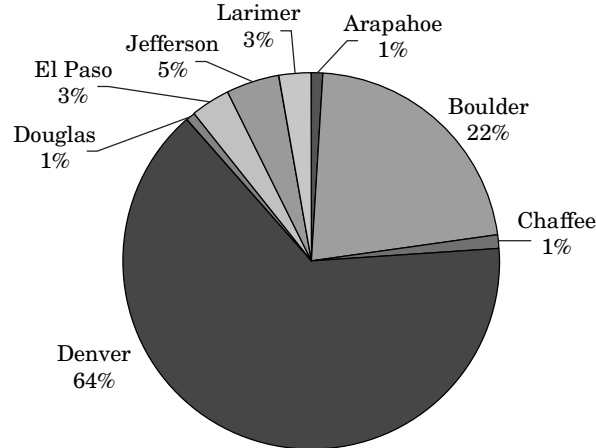
¹²⁹ See *infra* Figure 6; see also E-mail from R. Picassari to Sloane Hawes, *supra* note 60 (containing data on animal intake and outcomes pulled directly from the municipal shelter's records).

¹³⁰ E-mail from R. Picassari to Sloane Hawes, *supra* note 60.

¹³¹ See Laura A. Reese & Minting Ye, *Minding the Gap: Networks of Animal Welfare Service Provision*, 47 AM. REV. PUB. ADMIN. 503, 511 (2017) (discussing the different 'networks' of animal rescues and shelters that exist, stating, "[t]his is the only network area where licensed shelters are connected to each other . . . [s]helters transfer animals to each other depending on volume or type of animal served and the shelters with large veterinary hospitals spay and neuter animals under contract to other shelters"); see generally Emily Weiss et al., *Community Partnering as a Tool for Improving Live Release Rate in Animal Shelters in the United States*, 16 J. APPLIED ANIMAL WELFARE SCI. 221, 221–238 (2013) (discussing how collaboration increased rates of live release of shelter animals).

¹³² Hawes et al., *supra* note 20; Sloane Hawes et al., Trends in Intake Category Data for Animal Shelters in Colorado, 2008 to 2016: The Impacts of Transfers (Nov. 2019) (unpublished study) (on file with authors).

Figure 6. Counties Where DAS's Transfer Partners Are Located, with Percentages of Total Dogs Transferred to Each



Finally, any dogs that are not adoption candidates or eligible for transfer to another facility are humanely euthanized.¹³³ The trend in the number of dogs of a restricted breed euthanized at DAS has decreased by an average of seventeen dogs per year ($p = 0.01$) for a total of sixty-seven dogs in 2017.¹³⁴ There was also a decreasing trend on a per capita basis ($p = 0.03$) of 0.02 dogs per year to 0.04 dogs per 1,000 residents in 2017. While the number of dogs euthanized in Denver under the BSL has decreased since its enactment, the euthanasia of any dogs based purely on their physically identifiable breed remains at the heart of the controversy surrounding the legislation. This trend indicates that DAP's proactive efforts to identify and relocate PBTDS in the Denver community have correlated with a decrease in the number of PBTDS euthanized as a result of the City and County of Denver's BSL.¹³⁵ However, it is difficult to assess whether these PBTDS would have been euthanized if BSL were not present in Denver.

Overall, the trend in the Live Release Rate¹³⁶ for all dogs in the care of DAS has increased by 1.5% each year ($p = 0.02$) to 84.6% in 2017.¹³⁷ For restricted breeds, the trend in the Live Release Rate at DAS appears to be increasing;¹³⁸ however, this trend is not statisti-

¹³³ E-mail from R. Picassari to Sloane Hawes, *supra* note 60. The cost of the euthanasia procedure, including syringes, drugs, and cremation, is approximately \$19.43 (for a 55-pound dog). *See id.* (containing data on the cost to euthanize in 2017).

¹³⁴ E-mail from R. Picassari to Sloane Hawes, *supra* note 60.

¹³⁵ *Id.*

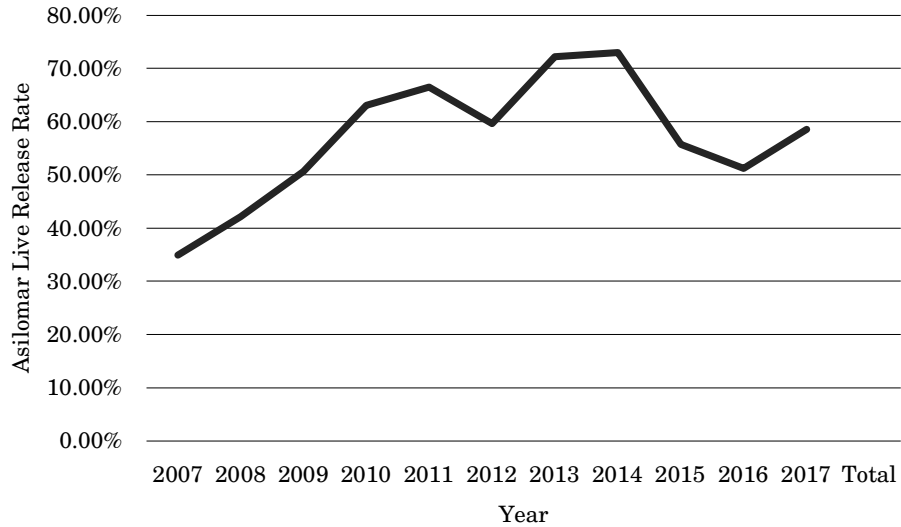
¹³⁶ *Position Statement on Data Collection & Reporting*, ASPCA, <https://www.aspc.org/about-us/aspc-policy-and-position-statements/position-statement-data-collection-reporting> [<https://perma.cc/5XQZ-5SU5>] (accessed May 26, 2020).

¹³⁷ E-mail from R. Picassari to Sloane Hawes, *supra* note 60.

¹³⁸ *Id.*

cally significant ($p = 0.12$), remaining constant at an average of 57.1%.¹³⁹

Figure 7. Trends in DAS's Live Release Rate for Restricted Dog Breeds from 2007 to 2017



E. Denver Animal Shelter's Behavior Evaluation Process

DAP's behavior evaluation process is intended to gather the information needed to maintain the standard that all dogs placed back into the Denver community or surrounding communities through adoptions, returns to owners, or transfers (regardless of breed) are safe.¹⁴⁰ Underlying the justifications for BSL are concerns regarding the association of aggressive behavior with PBTDS.¹⁴¹ The behavior evaluation process at DAS is often used to determine whether a PBTDS will be transferred to another shelter in surrounding communities or be euthanized.¹⁴² However, there are a number of limitations to behavior evaluations conducted in shelters.

There are many different types of tests and evaluations that are used to predict or evaluate aggression among dogs in the United

¹³⁹ See *infra* Figure 7.

¹⁴⁰ See *Animal Behavior Levels*, CITY & CTY. DENV.: DENV. ANIMAL SHELTER, <https://www.denvergov.org/content/denvergov/en/denver-animal-shelter/adoptables/animal-behavior-levels.html> [<https://perma.cc/35WN-HQPU>] (accessed May 26, 2020) (describing the different behavior levels used to recommend matches between dogs and human families, ranging from "Level 1 Dogs" (dogs that do well in most homes) to "Level 5 Dogs" (dogs with specialized behavior needs)).

¹⁴¹ Stefanie A. Ott et al., *Is There a Difference? Comparison of Golden Retrievers and Dogs Affected by Breed-Specific Legislation Regarding Aggressive Behavior*, 3 J. VETERINARY BEHAV. 134, 140 (2008).

¹⁴² *Breed Specific Legislation*, *supra* note 61.

States.¹⁴³ A number of researchers have studied the reliability and accuracy of behavior evaluations for shelter dogs.¹⁴⁴ The American Temperament Test Society (ATTS), for example, promotes uniform temperament evaluation of all dogs.¹⁴⁵ The average pass rate of all breeds on the ATTS test in 2017 was 83.7%.¹⁴⁶ Out of the 931 pit bulls that were tested in 2017, 814 passed, or 87.4%.¹⁴⁷ Compared to other dogs that were tested in 2017 with similar numbers, dogs identified as pit bulls outperformed many common breeds that are not affected by breed bans; some examples are the Australian shepherd at 82.2%, Akita at 77.8%, Bouvier des Flandres at 85.4%, collie at 80.8%, Golden retrievers at 85.6%, and Shetland sheepdogs at 68.9%.¹⁴⁸

Gary Patronek and Janis Bradley discuss real concerns regarding the use of behavior evaluations as diagnostic tools in shelters despite their lack of scientific validation.¹⁴⁹ The literature indicates that the breed of a dog is less indicative of whether they will pass a shelter behavior evaluation than other factors, such as owner behavior, socialization of the dog, and spay-neuter status.¹⁵⁰ One study found behavior evaluation results differed greatly after three days at a shelter likely due to acclimation to the stressors of the shelter.¹⁵¹ Jamey Medlin argues the behavior and actions of owners are more accurate predictors of dog behavior than a breed label.¹⁵² Furthermore, a 2008

¹⁴³ J. Fratkin et al., *Personality Consistency in Dogs: A Meta-Analysis*, 8 PLOS ONE 1, 2 (2013).

¹⁴⁴ *Id.*

¹⁴⁵ *General Information About the American Temperament Test Society, Inc. (ATTS)*, AM. TEMPERAMENT TEST SOC'Y, INC., <https://atts.org/about-atts/> [<https://perma.cc/Y4CP-NJHD>] (accessed May 26, 2020).

¹⁴⁶ *ATTS Breed Statistics*, AM. TEMPERAMENT TEST SOC'Y, INC. (2017), <https://atts.org/breed-statistics/statistics/> [<https://perma.cc/TM53-86T2>] (accessed May 26, 2020).

¹⁴⁷ *Id.*

¹⁴⁸ *Id.* It is important to note that individuals with dogs with poor temperaments may be unlikely to subject their dog to a voluntary temperament evaluation, such as the ATTS test, so the results of these data should be interpreted accordingly.

¹⁴⁹ Gary J. Patronek & Janis Bradley, *No Better Than Flipping a Coin: Reconsidering Canine Behavior Evaluations in Animal Shelters*, 15 J. VETERINARY BEHAV. 66, 69 (2016) (explaining that aggressive behaviors are “defined more by circumstance and institutional policy rather than behavioral science, and . . . has little value as a reference standard”).

¹⁵⁰ Kelly S. Bollen & Joseph Horowitz, *Behavioral Evaluation and Demographic Information in the Assessment of Aggressiveness in Shelter Dogs*, 112 APPLIED ANIMAL BEHAV. SCI. 120, 134 (2008); see also Stephanie A. Ott et al., *supra* note 141, at 140 (“In this research project, no significant differences in the occurrence of aggressive behavior in inappropriate situations were found when comparing golden retrievers and 6 dog breeds affected by legislation.”). See generally S. Bennett et al., *Comparison of SAFER Behavior Assessment Results in Shelter Dogs at Intake and After a 3-Day Acclimation Period*, 18 J. APPLIED ANIMAL WELFARE SCI. 153, 153–68 (2015) (presenting a study that found that canines in shelters were “more likely to show aggression on Day 0, compared with Day 3”).

¹⁵¹ Bennett et al., *supra* note 150, at 153.

¹⁵² Jamey Medlin, *Pit Bull Bans and the Human Factors Affecting Canine Behavior*, 56 DEPAUL L. REV. 1285, 1318 (2007).

study found that there is a poor level of agreement between two different shelter staff members scoring the same dog on ‘fear-aggressive’ and ‘pushy-aggressive’ responses in a behavior evaluation.¹⁵³ The findings of these studies indicate that behavior evaluations in shelters should not be considered reliable predictors of a dog’s behavior in a home; instead, shelters should consider focusing resources on evaluating a dog’s behavior in settings that more closely mirror those it would be in once it is adopted (e.g., walking on the leash, playgroups with other dogs, engaging in training).¹⁵⁴

In a broader context, Maria Kaspersson argues that breed is not an accurate predictor of aggression in dogs because of the overriding differences between each individual dog and its living circumstances.¹⁵⁵ A study by the United States Centers for Disease Control (CDC) found that 84% of incidents with dogs that resulted in harm to humans or other animals were a result of negligent owners who tethered or otherwise inappropriately confined their dogs or permitted the dogs to play with children without adult supervision.¹⁵⁶ Randall Lockwood and Kate Rindy addressed five factors that interact to influence a dog’s tendency to bite: a dog’s genetic predisposition to aggression, history of socialization, training for obedience or fighting, quality of care received as well as supervision, and the bite victim’s behavior at the time of the incident.¹⁵⁷ Deirdre S. Franklin found that dog training experts identify human action and responsible pet ownership as critical variables to addressing dog behavior.¹⁵⁸

Due to the existing research on breed identification and behavioral assessments, a number of national animal welfare organizations have advocated for laws that focus on the actions of the owners rather than banning a specific breed of dog altogether.¹⁵⁹ By understanding

¹⁵³ See Gillian Diesel et al., *Reliability of Assessment of Dogs’ Behavioral Responses by Staff Working at a Welfare Charity in the UK*, 115 APPLIED ANIMAL BEHAV. 171, 176 (2008) (indicating that there is a poor level of agreement among staff members for the “fear-aggressive” and “pushy-aggressive” responses of dogs, but as they gain experience and training their level of agreement tended to increase).

¹⁵⁴ Bennett et al., *supra* note 150, at 153.

¹⁵⁵ Maria Kaspersson, *On Treating the Symptoms and Not the Cause: Reflections on the Dangerous Dogs Act, Address Before the British Criminology Conference (July 9–11, 2008)*, in 8 PAPERS FROM THE BRITISH CRIMINOLOGY CONFERENCE, 205, 221 (2008).

¹⁵⁶ Devon MacPherson, *6 Unintended Consequences of Breed-Specific Legislation (BSL)*, ANYTHING PAWSABLE (Mar. 17, 2016), <https://www.anythingpawsable.com/6-unintended-consequences-breed-specific-legislation-bsl/> [<https://perma.cc/XZU4-RG8Z>] (accessed May 26, 2020).

¹⁵⁷ Randall Lockwood & Kate Rindy, *Are “Pit Bulls” Different? An Analysis of the Pit Bull Terrier Controversy*, 1 ANTHROZOOS 2, 7 (1987).

¹⁵⁸ Deirdre S. Franklin, Thesis, *Public Policy: Community Safety Through Breed Bans?*, HUMANE SOC’Y: ANIMAL STUD. REPOSITORY (2013), <http://animalstudiesrepository.org/anippol/1> [<https://perma.cc/GN8H-FHNW>] (accessed May 26, 2020).

¹⁵⁹ Ledy Van Kavage, *Why Breed-Specific Legislation Is Ineffective*, BEST FRIENDS (2009), <https://bestfriends.org/resources/bsl-why-breed-specific-legislation-all-bark-and-fiscal-bite> [<https://perma.cc/9XN9-D3YN>] (accessed May 26, 2020) (explaining that public ordinances restricting reckless dog owners can prevent recidivists).

the strengths and limitations of the evaluation process, DAS is capable of making informed decisions regarding an animal's suitability to be placed back in the City and County of Denver community, regardless of breed. To assess the degree to which DAP has been fulfilling its duty to protect the human and animal residents of the Denver community, the research team assessed the impacts of BSL on a variety of measures of public health.

VI. IMPACTS ON PUBLIC HEALTH

Animal control agencies serve at the intersection of the human and animal system. However, animal-related nuisances are often a manifestation of human health concerns or conflicts. Therefore, animal control policies have as much to contribute to the health of human communities as they do to animal welfare outcomes. The effects of BSL on public health were assessed through an extensive literature review on the social impacts of dogs in communities and an analysis of data from Denver Animal Protection (DAP) on standard public health metrics for animal control agencies (dangerous dog citations, dog bites, and leash laws).

A. Impacts on Dangerous Dog Citations

According to Sections 8-51 and 8-52 of the Denver, Colorado Code of Ordinances, an individual may not possess an animal who has caused serious bodily injury to a person, domestic animal, or livestock.¹⁶⁰ However, an individual can possess a dog of any breed (with the exception of a pit bull) that has caused less than serious bodily injury to a person, domestic animal, or livestock within the city as long as he or she has a 'potentially dangerous dog' permit.¹⁶¹ The dog must also be confined within an escape-proof location on the property, such as an enclosure that is secure with sides and a top, or with sides that are above eight feet high.¹⁶² As of July 2018, these ordinances were revised to allow for two separate classifications of dogs as either 'potentially dangerous' or 'dangerous,' with different levels of enforcement based on these classifications.¹⁶³ In the City and County of

¹⁶⁰ DENV., COLO., CODE ORDINANCES § 8-51–8-52 (1987) (repealed 2018). Effective July 31, 2018, these ordinances were repealed and recodified under Sections 8-61 (Dog Bite), 8-62 (Dangerous Dog) and 8-63 (Potentially Dangerous Dog). For purposes of this Article, the ordinance in force during the time of the underlying study, Sections 8-51 and 8-52, are referenced throughout the text because the study assessed took place before the recodified versions were enacted. The citations are hereinafter updated to the corresponding recodified sections. DENV., COLO., CODE ORDINANCES, §§ 8-61–8-63 (2020).

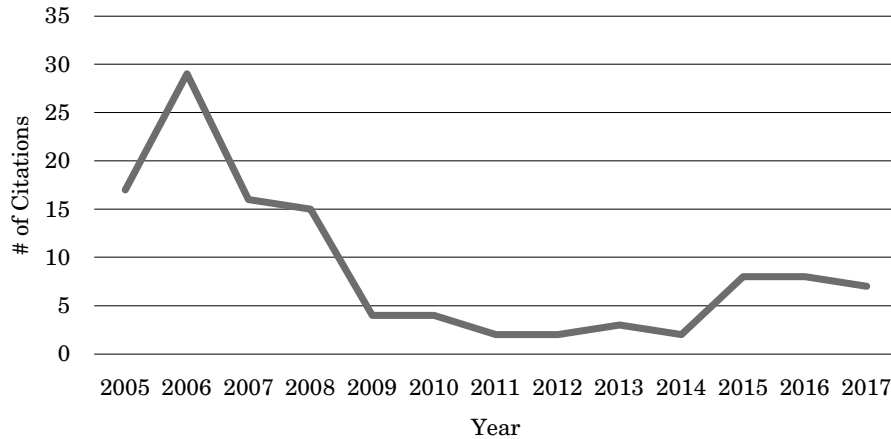
¹⁶¹ DENV., COLO., CODE ORDINANCES § 8-63 (2020). See DENV., COLO., CODE ORDINANCES § 8-64 (2020) (describing the process for obtaining a potentially dangerous animal permit).

¹⁶² DENV., COLO., CODE ORDINANCES § 8-64. See DENV., COLO., CODE ORDINANCES § 8-2(w) (2020) (defining a *secure enclosure*).

¹⁶³ DENV., COLO., CODE ORDINANCES §§ 8-63–8-64.

Denver, during the study period, the number of dog owners with dogs who had been identified as ‘potentially dangerous’ and then found to be in violation of these court orders (thus receiving a Section 8-52 citation) was generally a relatively small number of individuals.¹⁶⁴

Figure 8. Section 8-52 (Dangerous Dog) Citations from 2005 to 2017



Note: DAP was only able to provide data on these citations from 2011 to 2017.¹⁶⁵ Data obtained prior to 2011 were obtained by *Westword* journalist Jared Maher via public records requests.¹⁶⁶

The decreasing rate of dangerous dog citations is congruent with the observed decrease in restricted breed intake at Denver Animal Shelter (DAS), which may indicate that the overall state of public safety related to dangerous dogs in Colorado is improving. However, no conclusions can be drawn, based on this data, on whether BSL specifically is driving these decreases in dangerous dog citations.¹⁶⁷ In theory, BSL acts as a supplement to the more general Dangerous Dog laws by banning the specific breeds of dogs who are more likely to be dangerous. Studies suggest that legislation that goes beyond identifying potentially dangerous dogs, and instead takes into account the responsibility of the dog owner in the provision of proper training and care for his or her animal, may be more effective.¹⁶⁸ While dangerous dog citations may prevent future harm to other humans or animals, they do not address the human social issues that drive the incidence of behaviorally challenged dogs or dogs left unattended.¹⁶⁹

¹⁶⁴ See *infra* Figure 8.

¹⁶⁵ E-mail from R. Picassari to Sloane Hawes, *supra* note 60 (containing data on dangerous dog citations pulled directly from the animal control agency’s records).

¹⁶⁶ Maher, *supra* note 1.

¹⁶⁷ Maher, *supra* note 35; Maher, *supra* note 1.

¹⁶⁸ Devin Burstein, *Breed Specific Legislation: Unfair Prejudice and Ineffective Policy*, 10 ANIMAL L. 313, 323 (2004); see also Maher, *supra* note 35 (arguing for laws that punish negligent pet owners instead of BSL).

¹⁶⁹ Burstein, *supra* note 168, at 323–24.

B. Impacts on Dog Bites

One of the primary goals of breed ban policies is to reduce human injuries from animals through the prevention of dog bites. Given that dogs can inflict serious harm, there is a significant number of studies investigating the factors informing dog bite trends. A consistent research finding is that children—particularly children under ten—are much more likely to be involved in dog bites than any other age.¹⁷⁰ Further, children are most likely to be bitten by dogs that are familiar to them.¹⁷¹ One study also found that hospitalization due to dog bites was more likely to occur in rural communities and in communities with lower socioeconomic status.¹⁷² Another study revealed that biting dogs were more likely to “live in neighborhoods where the residents’ median incomes [are] less than” the median income of the county.¹⁷³ However, more research is needed to understand the complex relationship between the prevalence of dog bites and factors such as increased number and density of dogs, the types of dogs in these neighborhoods, inconsistent enforcement practices across communities, or the availability of resources.

Many studies have attempted to identify which breeds of dogs are more likely to bite, but the conclusions are inconsistent. For instance, researchers found that German shepherds and Dobermans were significantly more likely to bite than other breeds.¹⁷⁴ In addition to German shepherds, one study found collies and cocker spaniels are responsible for biting most frequently.¹⁷⁵ Another study found pit bulls as the most prevalent breed in dog bite incidents.¹⁷⁶ However, a different study found pit bull-type dogs (PBTs) to be the perpetrator in

¹⁷⁰ Daniel C. O’Brien et al., *Dog Bites of the Head and Neck: Evaluation of a Common Pediatric Trauma and Associated Treatment*, 36 AM. J. OTOLARYNGOLOGY 32, 35 (2015), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4261032> [<https://perma.cc/6L4U-WDN9>] (accessed May 26, 2020) (finding that 57% of patients with head and neck bite injuries were “below the age of 10, and these bites to the head and neck accounted for 70% of all the dog bite injuries experienced by individuals under the age of 18”); see also Paraic Ó Súilleabháin, *Human Hospitalizations Due to Dog Bites in Ireland (1998–2013): Implications for Current Breed Specific Legislation*, 204 VETERINARY J. 357, 358 (2015) (finding that children under ten years of age accounted for 49% of hospitalizations); see Michael S. Golinko et al., *Characteristics of 1616 Consecutive Dog Bite Injuries at a Single Institution*, 56 CLINICAL PEDIATRICS 316, 317 (2016) (finding that half of all dog bite patients in their study were children between 5 and 12 years of age).

¹⁷¹ Cornelissen & Hopster, *supra* note 17, at 296.

¹⁷² Malathi Raghavan et al., *Exploring the Relationship Between Socioeconomic Status and Dog-Bite Injuries Through Spatial Analysis*, 14 RURAL & REMOTE HEALTH 2846, 2846 (2014).

¹⁷³ Carrie M. Shuler et al., *Canine and Human Factors Related to Dog Bite Injuries*, 232 J. AM. VETERINARY MED. ASS’N 542, 542 (2008).

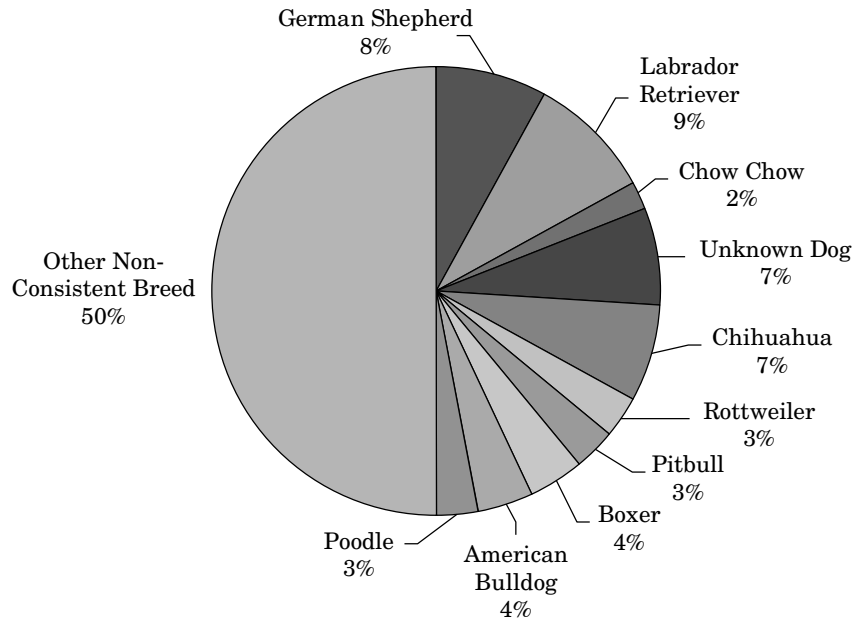
¹⁷⁴ Johannes Schalamon et al., *Analysis of Dog Bites in Children Who Are Younger Than 17 Years*, 117 PEDIATRICS e374, e376 (2006).

¹⁷⁵ Thomas L. Hanna & Lloyd A. Selby, *Characteristics of the Human and Pet Populations in Animal Bite Incidents Recorded at Two Air Force Bases*, 96 PUB. HEALTH REP. 580, 582 (1981).

¹⁷⁶ Golinko et al., *supra* note 170, at 319.

only 4% of dog bite reports.¹⁷⁷ In Denver, from 2007 to 2017, the following breeds were consistently among the top ten breeds reported in bite cases: German shepherd, Labrador retriever, chow chow, Chihuahua, boxer, rottweiler, pit bull, American bulldog, poodle, and unknown.¹⁷⁸ Given the lack of agreement among dog bite studies, some experts, including the American Veterinary Medical Association (AVMA), feel that breed may not be the best indicator in assessing risk factors for dog bites.¹⁷⁹

Figure 9. Top Ten Breeds in Denver Bite Cases from 2007 to 2017



It is difficult to determine which breeds of dogs are more likely to bite, particularly due to issues with data collection and reporting on dog bites. Unfortunately, there is no uniform system for collecting and verifying dog bite reports in the United States, and there is no reliable data available that reports on number of dog bites by breed.¹⁸⁰ There is also the issue of how to accurately report on the incidence of bites by mixed breed dogs (e.g., accurately identifying, then reporting on the breeds that a mixed breed dog consists of in bite cases). Furthermore, there may be bias in breed-specific dog bite data due to the overreporting of bites related to specific breeds, challenges in breed identifica-

¹⁷⁷ Van Kavage, *supra* note 159.

¹⁷⁸ See *infra* Figure 9.

¹⁷⁹ *Why Breed-Specific Legislation Is Not the Answer*, AM. VETERINARY MED. ASS'N, <https://www.avma.org/public/Pages/Why-Breed-Specific-Legislation-is-not-the-Answer.aspx> [<https://perma.cc/SL7M-RVJC>] (accessed May 26, 2020); Medlin, *supra* note 152, at 1314.

¹⁸⁰ *Why Breed-Specific Legislation Is Not the Answer*, *supra* note 179.

tion, and inaccurate reporting of the number of specific breeds in the overall pet population.¹⁸¹ The AVMA cautions that when data is collected on breed regarding a dog bite incident, the breed of the dog is seldom reported accurately.¹⁸² Since large dog breeds tend to cause more serious injuries that require medical care when they bite, they are more likely to be overrepresented in reported dog bite incidents.¹⁸³ Reporting bias against PBTDs appears to be perpetuated through the frequency of media coverage on bite cases involving PBTDs.¹⁸⁴ Some researchers advocate for independent verification of the dog's breed when data is collected from medical records.¹⁸⁵

The Coalition of Living Safely with Dogs completed a study on dog bite data in Colorado from July 2007 to June 2012 with 22 animal control agencies.¹⁸⁶ There were 11,484 bites recorded over the 5 years, and 8,449 of those bites were from the same set of the 11 agencies that reported throughout the whole study.¹⁸⁷ Based on the number of households in the studied jurisdictions and estimates of the number of dogs per household, approximately 952,177 dogs were included in the study.¹⁸⁸ The most notable findings of the study included that (1) less than 1% of all dogs in the community were involved in a reported bite incident; (2) only 0.6% of reported incidents consisted of a mauling or fatality; and (3) most bites were preventable.¹⁸⁹ The study showed that 57% of all bites occurred at home, whether that be inside or outside, and over 70% of the bites were considered a minor bite.¹⁹⁰ There was not enough information gathered through the study to conclude whether one breed of dog bites more often than another.¹⁹¹ However, the study identified 93 breeds of dogs who appeared in bite case reports 10 times or more.¹⁹² Consistent with the literature, the most likely victim of a dog bite was a child under 10 years old, with approxi-

¹⁸¹ Lockwood & Rindy, *supra* note 157, at 2.

¹⁸² *Dog Bite Risk and Prevention: The Role of Breed*, AM. VETERINARY MED. ASS'N (May 15, 2014), <https://www.avma.org/KB/Resources/LiteratureReviews/Pages/The-Role-of-Breed-in-Dog-Bite-Risk-and-Prevention.aspx> [<https://perma.cc/TDB4-9X4Y>] (accessed May 26, 2020); Voith et al., *supra* note 74, at 17.

¹⁸³ See Peter L. Borchelt et al., *Attacks by Packs of Dogs Involving Predation on Human Beings*, 98 PUB. HEALTH REP. 57, 63 (1983) ("In general, serious dog bites are more often attributed to larger dogs.").

¹⁸⁴ Twining et al., *supra* note 50, at 33.

¹⁸⁵ Golinko et al., *supra* note 170.

¹⁸⁶ See generally COAL. FOR LIVING SAFELY WITH DOGS, *DOG BITES IN COLORADO JULY 2007–JUNE 2012: DATA, CONCLUSIONS, AND TIPS FOR KEEPING COMMUNITIES SAFER*, https://cdn.ymaws.com/colovma.site-ym.com/resource/resmgr/CLSD_Data_Presentation_Sept2.pdf [<https://perma.cc/6RB6-GPEQ>] (accessed May 26, 2020) (presenting information on dog bite data in Colorado between the span of 2007–2012).

¹⁸⁷ *Id.*

¹⁸⁸ *Id.*

¹⁸⁹ *Id.*

¹⁹⁰ *Id.*

¹⁹¹ *Id.*

¹⁹² *Id.*

mately 25% of all bites occurring in that age range.¹⁹³ From this data, it can be concluded that in Colorado, the general incidence of dog bites is very low; children are most likely to be bitten; and a wide variety of breeds are perpetrating the bites.¹⁹⁴

According to Section 8-51 of the Denver, Colorado, Code of Ordinances, no dog is permitted to attack or bite another animal or a person on any private property or in public.¹⁹⁵ The Section 8-51 citation is a criminal charge with a substantial penalty that is issued and reported for all breeds of dogs.¹⁹⁶ A Section 8-51 citation could also lead to a dangerous dog designation.¹⁹⁷ While Section 8-51 citations could be an indicator of the number of potentially dangerous animals in Denver, these citation numbers are not necessarily the only indicator of an aggressive dog. Some bite cases could ultimately be an isolated incident that does not escalate to the level of a dangerous dog citation because it is a first offense, or the bite did not result in serious bodily injury to a person or domestic animal.¹⁹⁸ The research team assessed the trends in the Section 8-51 citations in the City and County of Denver from 1990 to 2017 by compiling data from two sources.¹⁹⁹ Based on the available data,²⁰⁰ there has been an overall decrease of 83% in the number of Section 8-51 citations over the 27 year period ($p < 0.01$). However, there have been decreases in these bite citations for all breeds of dogs, so no conclusions can be drawn on the specific impacts of BSL in informing this downward trend.

¹⁹³ *Id.*

¹⁹⁴ *Id.*

¹⁹⁵ DENV., COLO., CODE ORDINANCES § 8-51.

¹⁹⁶ DENV., COLO., CODE ORDINANCES § 8-52.

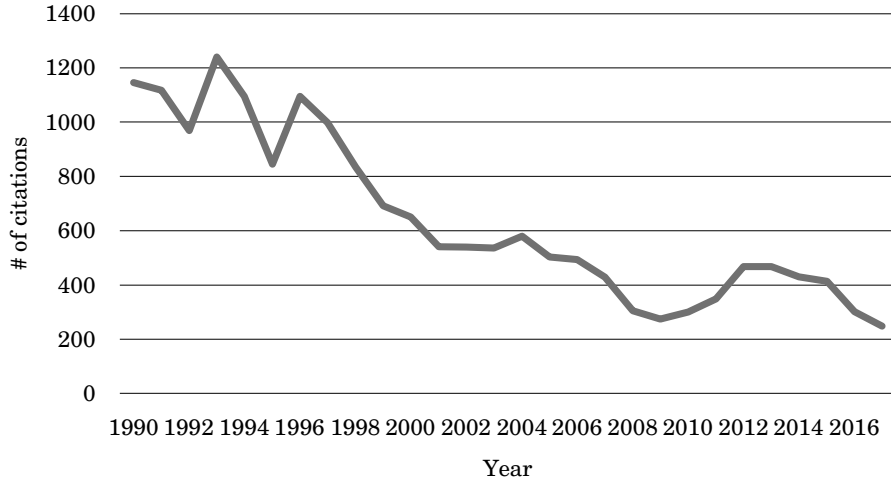
¹⁹⁷ DENV., COLO., CODE ORDINANCES § 8-52.

¹⁹⁸ Interview with Alice Nightengale, *supra* note 69; DENV., COLO., CODE ORDINANCES § 8-51.

¹⁹⁹ *See infra* Figure 10. Denver Animal Protection noted a number of challenges with drawing conclusions from the data for dog bites over this period including input errors, inconsistent data cleaning efforts, and changes in data collection systems. *See* E-mail from R. Picassari to Sloane Hawes, *supra* note 60. Beginning in 2005, a dedicated staff person was hired to manage all data; therefore, trends seen following 2005 are considered to be more reliable. *Id.* Additionally, in 2005, in order to streamline and standardize data collection, the definition of a bite was re-defined as a citation following a bite, not just a bite that went to the hospital. *See id.* (containing data on dangerous dog citations pulled directly from the animal control agency's records).

²⁰⁰ E-mail from R. Picassari to Sloane Hawes, *supra* note 60.

Figure 10. Section 8-51 (Dog Bite) Citations from 1990-2017



Note: DAP was only able to provide data on these citations from 2011 to 2017.²⁰¹ Data obtained prior to 2011 were obtained by *Westword* journalist Jared Maher via public records requests.²⁰²

While dog bite incidence in the City and County of Denver has decreased since 1989, it is unclear how other factors may have informed this trend. The literature suggests that the implementation of more comprehensive Dangerous Dog laws, such as routine monitoring of all dangerous dogs by animal protection officers, could positively impact rates of dog bites.²⁰³ The changes in the City and County of Denver's Dangerous Dog policies over the study period limit the ability to draw conclusions on the effectiveness of BSL, specifically in decreasing these rates. The variety of breeds, including German shepherds, Labrador retrievers, Chihuahuas, and PBTs, consistently reported in dog bite reports over the study period indicates that dog bites appear to be decreasing across all breeds in Denver. Without reliable estimates of the number of PBTs in Denver prior to BSL to compare to the current data, no firm conclusions can be drawn about the role of BSL in informing the downward trends in dog bites in Denver.

²⁰¹ *Id.*

²⁰² Maher, *supra* note 1.

²⁰³ Reese & Remer, *supra* note 12, at 7; see also Patronek & Bradley, *supra* note 149, at 75 (describing a study where animal behavior was evaluated in animal shelters); see generally Nanci Creedon & Paraic S. O' Súilleabháin, *Dog Bite Injuries to Humans and the Use of Breed-Specific Legislation: A Comparison of Bites from Legislated and Non-Legislated Dog Breeds*, 70 IRISH VETERINARY J. (2017), <https://irishvetjournal.biomedcentral.com/articles/10.1186/s13620-017-0101-1> [<https://perma.cc/4WYY-ACGD>] (accessed May 26, 2020) (regarding a study investigating the differences in dog bite characteristics that exist among legislated and non-legislated dog breeds in Ireland).

C. Impacts on Leash Law Violations

Within Section 8-16 of the Code of Ordinances for the City and County of Denver, Colorado, there is a description of the leash laws.²⁰⁴ It states that owners are responsible for preventing their pets from running at large.²⁰⁵ A dog is categorized as running at large when it is not on a leash, cord, or chain held by the dog owner or appropriately confined on the owner's premise.²⁰⁶ This would not include situations when a person over the age of eighteen is supervising his or her dog within a designated off-leash enclosure.²⁰⁷ When an officer encounters an individual with his or her dog off-leash, or receives reasonable information about a violation of the law, the officer must issue a summons and complaint.²⁰⁸ If a dog is found roaming off-leash by the police or an animal patrol officer, the dog can be placed in a municipal animal shelter.²⁰⁹

While the purpose of this law is to help keep the community safe, few studies have evaluated the practicality of the law. One study conducted in North Carolina showed that 76% of visitors to public land knew there was a leash law, "but 48% allowed their dogs to be unleashed."²¹⁰ Additionally, 15% of the visitors that had unleashed dogs agreed with the statement, "It is my choice how I walk my dog."²¹¹ Similarly, most visitors with dogs thought that having their dog unleashed had little to no consequences and believed that their dog's behavior in general could not have negative consequences.²¹²

Although people may feel it is safe to have their dog off-leash, the research justifies the need for leash laws as a means for protection. One study examining dog bites from 1979 to 1998 found that less than one half of 1% of the fatal dog bites came from leashed dogs not located on the dog's property, demonstrating that leashing dogs can prevent fatal dog attacks.²¹³ According to Colorado's Coalition for Living Safely with Dogs, 57% of dog attacks occurred off-leash at home and just over 15% of attacks occurred when a dog was off-leash at large in Denver.²¹⁴

²⁰⁴ DENV., COLO., CODE ORDINANCES § 8-16 (2018).

²⁰⁵ DENV., COLO., CODE ORDINANCES § 8-16(a).

²⁰⁶ DENV., COLO., CODE ORDINANCES § 8-2(v) (2018).

²⁰⁷ DENV., COLO., CODE ORDINANCES § 8-16(c).

²⁰⁸ DENV., COLO., CODE ORDINANCES § 8-3 (2018).

²⁰⁹ DENV., COLO., CODE ORDINANCES § 8-16(b).

²¹⁰ Joel G. Jorgensen & Mary B. Brown, *Evaluating Persuasive Messages to Influence Dog Leash Law Compliance at a Public Area in the Great Plains*, 27 GREAT PLAINS RES. 131, 134 (2017).

²¹¹ *Id.*

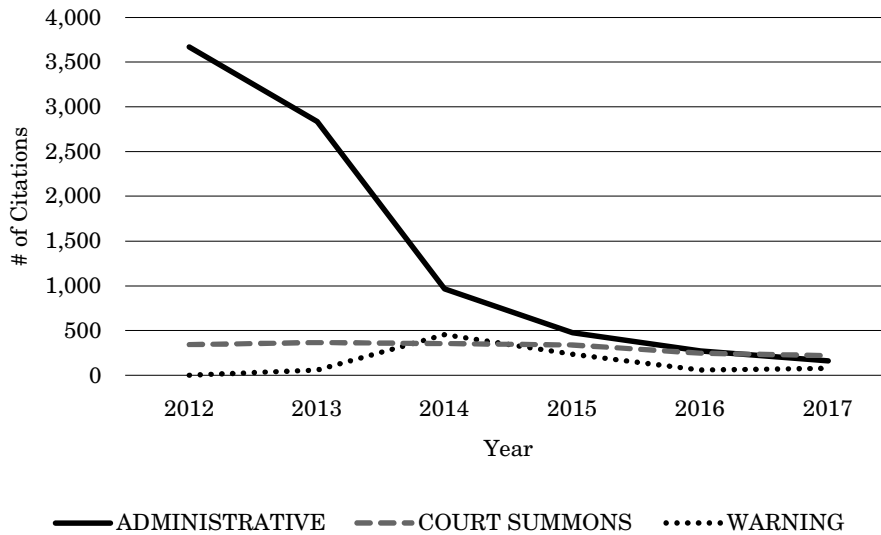
²¹² *Id.*

²¹³ Jeffery Sacks et al., *Breeds of Dogs Involved in Fatal Human Attacks in the United States Between 1979 and 1998*, 217 J. AM. VETERINARY MED. ASS'N 836, 836-38 (2000).

²¹⁴ COAL. FOR LIVING SAFELY WITH DOGS, *supra* note 186.

Increasing public education on the importance of leash laws is considered more effective than ticketing under most circumstances,²¹⁵ and DAP seems to have adjusted its practices to increase its outreach tactics accordingly.²¹⁶ This shift could be partially responsible for the decrease in violations of the leash law.²¹⁷ There has also been a decrease in the number of leash law violations in Denver because of the discontinuation of the bike patrol program in the parks.²¹⁸ Officers who formerly held this position patrolled parks and issued citations primarily for leash violations.²¹⁹ Because many people do not understand why they have to keep their dogs on a leash, providing educational programs supplemented with enforcement has the potential to be much more successful in attaining widespread compliance with the law. In summary, given that animal control ordinances like leash laws prevent dogs from running at large and require owners to have control over their animals, they are strategies that can be used as an effort to decrease dog bites from all breeds.

Figure 11. Section 8-16 (Leashing) Citations from 2012 to 2017.



²¹⁵ See generally Jorgensen & Brown, *supra* note 210, at 132, 134, 139, (discussing how leash law compliance can be modified through education campaigns and how studies suggest that education has the potential to improve leash law compliance rates).

²¹⁶ Interview with Alice Nightengale, *supra* note 70.

²¹⁷ See *infra* Figure 11. E-mail from R. Picassari, Data and Project Adm'r, Animal Prot., City & Cty. of Denv., Dep't of Pub. Health & Env't, to Sloane Hawes, Research Assoc., Inst. for Human-Animal Connection, Graduate Sch. of Soc. Work, Univ. of Denv. (April 9, 2018, 3:38 PM) (containing information about licensing procedures) (on file with the authors).

²¹⁸ Interview with Alice Nightengale, *supra* note 70.

²¹⁹ *Id.*

D. Social Impacts of BSL

Pet-keeping serves a variety of important functions in today's society. These functions include: maintaining individual physical and mental health, contributing to social capital, and facilitating social cohesion.²²⁰ PBTDS, like other dogs, have also played important community roles by serving as companions, therapy dogs, assistance dogs, search and rescue dogs, police dogs, and drug detection dogs.²²¹ By removing PBTDS from communities, BSL prevents these dogs from serving in some of these more beneficial community roles and may, therefore, hinder a community's ability to accrue these important benefits for its residents.

To begin assessing the social impacts of the breed ban ordinance in the City and County of Denver, the research team conducted an on-line survey using a random sample of Denver residents ($n = 252$). While a larger sample of Denver residents would help further define if the perspectives reported below are salient throughout the population, the responses of this smaller group of residents are provided to advance the discussion of the social impacts of BSL. In this survey, 86.1% ($n = 252$) of respondents stated that they were aware of the breed ban ordinance in Denver. After establishing the level of awareness of the policy in the community, the research team then assessed Denver residents' general sentiments regarding the policy. When asked whether BSL impacted the residents' opinion of the City and County of Denver, responses varied widely, with 46.4% stating the legislation does not change their opinion, 32.9% stating the legislation negatively changed their opinion, and 19.4% stating the legislation positively changed their opinion.²²² These responses indicate that very few Denver residents (19.4%) are strongly in favor of BSL.

Table 1. Impact of BSL on Denver Residents' General Opinion of the City and County of Denver

Does BSL Affect Your Opinion of Denver?	Number of Respondents ($n = 252$)	% of Total
No, it does not change my opinion	117	46.4%
Prefer not to answer	3	1.2%
Yes, negatively	83	32.9%
Yes, positively	49	19.4%

²²⁰ Phil Arkow, *The Impact of Companion Animals on Social Capital and Community Violence: Setting Research, Policy and Program Agendas*, 40 J. SOC. & SOC. WELFARE 33, 33-38 (2013).

²²¹ MacPherson, *supra* note 156.

²²² See *infra* Table 1.

E. Impacts on Community Cohesion

As previously articulated: “While animal control [ordinances] are written mainly to protect human lives and property, reasonable animal control law enforcement consists mainly of trying to improve human relations within a community, by removing reasons why neighbors fight.”²²³ While BSL aims to remove certain breeds of dogs from the community, it has been suggested that the increased presence of animals in a community has been connected to an overall increase in community cohesion and sense of safety.²²⁴ An emerging body of evidence points to the ways in which companion animals bring communities together by acting as a social bridge between people.²²⁵ One study describes six possible mechanisms through which dogs and dog walking can impact community health by influencing the social fabric of a community, which include: social interaction, formation of friendship, social support, civic engagement, visible community presence, and healthy and social urban design.²²⁶

Dogs often serve as a “social lubricant” by “transcending racial, cultural, geographic, age, and socioeconomic boundaries,” which can play a significant role in “building trust and sense of community at the neighborhood level.”²²⁷ A 1992 study found that being photographed with one’s dog made one appear more likeable as well as improved the dog’s social interactions.²²⁸ Additionally, individuals walking with a dog are far more likely to experience social contact and conversation with strangers, compared to solitary walkers.²²⁹ Dogs can normalize social interaction, provide a conversation starter or topic, and increase the likelihood of perceived friendliness.²³⁰ Another study found that 50% of dog owners report they get to know people in their neighborhood as a result of their dog, with about 84% of dog owners reporting they talked to other dog owners while walking their dog.²³¹ In the same study, pet-owners reported experiencing more favors performed for or by a neighbor than non-pet owners.²³² Such human interaction

²²³ Clifton, *supra* note 14.

²²⁴ Lisa Wood et al., *The Pet Connection: Pets as a Conduit for Social Capital?*, 61 SOC. SCI. & MED. 1159, 1169 (2005).

²²⁵ Lisa L. Wood & Hayley E. Christian, *Dog Walking as a Catalyst for Strengthening the Social Fabric of the Community*, in THE HEALTH BENEFITS OF DOG WALKING FOR PEOPLE AND PETS: EVIDENCE AND CASE STUDIES 51, 53 (Rebecca A. Johnson et al. eds., 2011).

²²⁶ *Id.*

²²⁷ Wood et al., *supra* note 224, at 1159, 1161, 1168.

²²⁸ Kelly Ann Rossbach & John P. Wilson, *Does a Dog’s Presence Make a Person Appear More Likable? Two Studies*, 5 ANTHROZOOS 40, 40 (1992).

²²⁹ June McNicholas & Glyn M. Collis, *Dogs as Catalysts for Social Interactions: Robustness of the Effect*, 91 BRIT. J. PSYCHOL. 61, 61–63 (2000).

²³⁰ See Wood et al., *supra* note 224, at 1162 (“Dogs also have the greatest capacity to facilitate social interaction and contact, as they are the type of pet most likely to venture with their owners into the broader community.”).

²³¹ *Id.* at 1166.

²³² *Id.*

may contribute to a greater “sense of community,” which suggests that the presence of dogs may serve as a protective factor for community cohesion and may influence individuals’ attitudes towards their local community members and the community itself.

Furthermore, the presence of dogs in a community is believed to influence the perception of safety in a community. In one study, the visible presence of people “out and about,” including dog walking, was identified as a positive marker of community safety.²³³ On the other hand, “deserted streets and parks conveyed negative impressions about safety, crime, and [a] general sense of community.”²³⁴ Another study concluded that “the visible presence of dogs being walked, the accompanying social exchanges, and the impetus dogs provide for people to be out walking” in the streets and parks, all contribute to increased “feelings of collective safety and perceptions of a sense of community.”²³⁵ It is important to note that none of the research tying the presence of dogs to a sense of community cohesion and safety includes an assessment of the relevance of breed.

Sense of safety appears to be a primary driver behind BSL in the City and County of Denver.²³⁶ Results from a 2013 Gallup Poll indicate that 78% of Denver residents ($n = 3,506$) report feeling safe walking alone at night, ranking second in the country.²³⁷ In the research team’s survey of Denver residents, 24.6% of respondents ($n = 252$) said the City and County of Denver’s breed ban makes them feel safer.²³⁸ While in the minority of opinions, this perceived sense of safety that comes from the removal of PBTDs from communities demonstrates the negative association with PBTDs and contradicts research that supports the idea that dogs in communities have positive impacts on the community and an individual’s sense of safety.

²³³ Lisa J. Wood et al., *More than a Furry Companion: The Ripple Effect of Companion Animals on Neighborhood Interactions and Sense of Community*, 15 *SOC. & ANIMALS* 43, 50 (2007).

²³⁴ *Id.* at 51.

²³⁵ See Wood et al., *supra* note 224, at 1169 (“While not explored in our study, it is plausible that, for some, the visible presence of dogs being walked, the accompanying social exchanges, and the impetus dogs provide for people to be out walking contributes to increased feelings of collective safety and perceptions of sense of community.”).

²³⁶ See Maher, *supra* note 35 (discussing how proponents of breed bans in Denver argue that breeds like pit bulls are more dangerous because when they bite the injuries they inflict are more serious).

²³⁷ Jeffrey M. Jones, *Minneapolis–St. Paul Area Residents Most Likely to Feel Safe*, GALLUP (Apr. 5, 2013), <https://news.gallup.com/poll/161648/minneapolis-paul-area-residents-likely-feel-safe.aspx?version=print> [<https://perma.cc/6VA5-9M96>] (accessed May 26, 2020).

²³⁸ See *infra* Table 2.

Table 2. Impact of BSL on Denver Residents' Sense of Safety

Does BSL Make You Feel Safer?	Number of Respondents (<i>n</i> = 252)	% of Total
I am neutral	55	21.8%
No, it does not make me feel safer	134	53.2%
Prefer not to answer	1	0.4%
Yes, it does make me feel safer	62	24.6%

While BSL makes some residents of the community feel safer, the removal of PBTDs from homes in the City and County of Denver presents tremendous implications for individuals who choose to keep PBTDs as companions. Some of the protective factors for these individuals— including their sense of community, social cohesion, and social capital— may be inherently at risk upon the impoundment of any dog due to BSL.²³⁹ In one study, PBTD owners reported that when they were with their dogs, community members appeared frightened or nervous.²⁴⁰ Owners frequently experienced situations in which people actively avoided coming near the PBTD by walking around the PBTD or crossing the street and, in some cases, individuals refused to visit a home where a PBTD resided.²⁴¹ These actions and remarks, recalled by owners, reflected the theme that people expected PBTDs to be dangerous, untrustworthy, and erratic.²⁴² More research in this area is needed to assess the negative social impacts of BSL on the individuals who keep PBTDs.

F. Impacts on Underserved Communities

In a survey of Denver residents, conducted by the IHAC research team for this study, 19.0% of Denver residents randomly surveyed (*n* = 252) said they had been impacted (either directly or indirectly) by the City and County of Denver's breed ban.²⁴³ These results indicate that, as of 2017, only a minority of individuals in Denver continue to experience the impacts of the City and County of Denver's BSL.

²³⁹ Ulrike (Uli) Zimolag & Terry Krupa, *Pet Ownership as a Meaningful Community Occupation for People With Serious Mental Illness*, 63 AM. J. OCCUPATIONAL THERAPY 126, 127 (2009).

²⁴⁰ Twining et al., *supra* note 50, at 35.

²⁴¹ *Id.* at 5.

²⁴² *Id.* at 9.

²⁴³ See *infra* Table 3.

Table 3. Denver Residents' Report of Being Impacted by the City and County of Denver's BSL

Have you been personally impacted by BSL?	Number of Respondents (<i>n</i> = 252)	% of Total
Not Impacted	204	81.0%
Impacted	48	19.0%

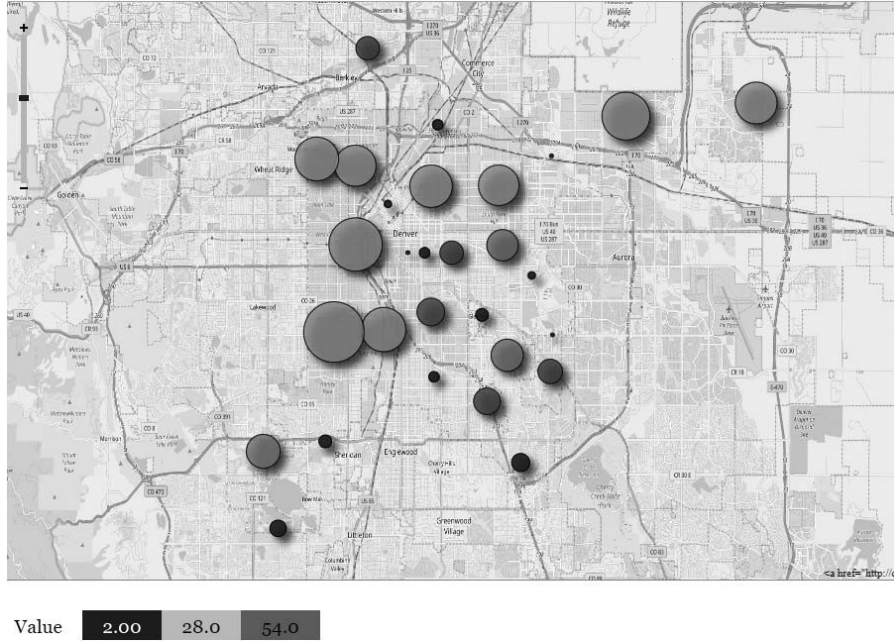
Enforcement of BSL in the City and County of Denver as of 2017 appears to be focused in specific areas of the community. The research team's analysis of the locations of complaints received regarding the presence of PBTDs in Denver in 2017 identified that they were most likely to occur where racially diverse communities intersect with predominantly white neighborhoods.²⁴⁴ In 2017, the top five zip codes with complaint calls related to PBTDs included: 80219, 80204, 80239, 80223, and 80212.²⁴⁵ Furthermore, the communities in Denver experiencing the highest BSL-related call volume and enforcement have been identified by DAP as communities also experiencing challenges accessing pet supportive services such as veterinary care, pet supply stores, and spay or neuter services.²⁴⁶

²⁴⁴ *Race/Ethnicity Along Colorado's Front Range: Block-By-Block*, MAPBRIEF (Aug. 2011), <http://mapbrief.com/co-census/> [<https://perma.cc/2M9W-NEMT>] (accessed May 26, 2020); see *infra* Figure 12.

²⁴⁵ See *infra* Appendix C.

²⁴⁶ *Pets for Life*, CITY & COUNTY OF DENVER: DENVER ANIMAL SHELTER, <https://www.denvergov.org/content/denvergov/en/denver-animal-shelter/programs.html> [<https://perma.cc/ZR J7-2Q27>] (accessed May 26, 2020).

Figure 12. 2017 Section 8-55 Complaint Calls by Zip Code



The locations of the BSL enforcement indicate that animal welfare issues such as the presence of dangerous dogs may be driven by similar challenges to social cohesion and other social issues, including gentrification.²⁴⁷ For example, Arluke argues that BSL is an example of how racial profiling by the police can become normalized and justified so that it develops into standard enforcement policy and practice.²⁴⁸ A recent study of NYPD-referred 3-1-1 calls highlights the ways in which gentrification, an influx of white residents into lower income, majority persons-of-color neighborhoods, coincides with an increased volume of “quality of life” calls such as noise complaints.²⁴⁹ It is important for policymakers to identify factors that may be negatively impacting relationships in their communities and adjust policies accordingly.

While there are a number of factors that could inform the location of BSL enforcement, it is important to acknowledge the ways in which over-policing, particularly in communities with limited access to re-

²⁴⁷ Erin C. Tarver, *The Dangerous Individual(s) Dog: Race, Criminality and the ‘Pit Bull’*, 55 *CULTURE, THEORY & CRITIQUE*, 273, 273-85 (2014) (explaining the relationship between race and the pit bull); see also Franklin D. Gilliam Jr. et al., *Where You Live and What You Watch: The Impact of Racial Proximity and Local Television News on Attitudes About Race and Crime*, 55 *POL. RES. Q.* 756, 756-71 (2002) (explaining the relationship between race and gentrification).

²⁴⁸ Arluke, *supra* note 47, at 35, 37.

²⁴⁹ Press Release, Cmty Serv. Soc’y, *New Neighbors and the Over-Policing of Communities of Color—A CSS Report* (Jan. 6, 2019), <https://www.cssny.org/news/entry/press-release-on-311-report> [<https://perma.cc/5R9T-JGWY>] (accessed May 26, 2020).

sources, can exacerbate existing health challenges for both humans and animals. Diminished access to resources has resulted in negative consequences, such as individuals being accused of animal cruelty, abuse and neglect, or served with fines or criminal charges.²⁵⁰ As a response to the negative association with PBTDs that is fostered by BSL, many homeowners' insurance companies refuse to provide coverage to households with dogs that fall within the list of restricted breeds.²⁵¹ One study found that PBTD owners are more likely to maintain a low profile in their community to avoid authorities, while others may choose to relinquish their dog.²⁵² Finally, lack of access to veterinary care in underserved communities can result in a PBTD's prolonged illness and recovery, an increased likelihood of being relinquished to an animal shelter, and an increased risk for euthanasia.²⁵³ While BSL is primarily an intervention for the presence of dangerous dogs in communities, policy makers may wish to consider the additional implications of enforcing BSL in underserved communities.

VII. ECONOMIC IMPACTS

Breed-Specific Legislation (BSL) has been in place in the City and County of Denver for over three decades, making measuring the economic impacts of this policy challenging due to incomplete or unavailable data, changes in data collection practices, variable definitions, and other mitigating factors. To begin assessing the economic impacts of BSL in the City and County of Denver, the research team asked a random sample of Denver residents to share what they believed the cost of BSL to be. A majority (64.8%) of respondents indicated they believed BSL costs less than \$250,000 per year.²⁵⁴ These data demonstrate the limited awareness of a typical resident around the true costs of enforcing such a policy and the need for a more detailed assessment.

²⁵⁰ Amanda Arrington & Michael Markarian, *Serving Pets in Poverty: A New Frontier for the Animal Welfare Movement*, 18 SUSTAINABLE DEV. L. & POL'Y 40, 40 (2017).

²⁵¹ Stanley Coren, *Psychological Characteristics Owners of Aggressive Dog Breeds*, PSYCHOL. TODAY (Mar. 16, 2009), <https://www.psychologytoday.com/us/blog/canine-corner/200903/psychological-characteristics-owners-aggressivedog-breeds> [https://perma.cc/5SC5-WC7D] (accessed May 26, 2020); see also Larry Cunningham, *The Case Against Dog Breed Discrimination by Homeowners' Insurance Companies*, 11 CONN. INS. L.J. 1, 3-4, 6 (2004) (analyzing "dog breed discrimination by insurers").

²⁵² Cunningham, *supra* note 251, at 42.

²⁵³ Sara C. White et al., *Characteristics of Clients and Animals Served by High-Volume, Stationary, Nonprofit Spay-Neuter Clinics*, 253 J. AM. MED. ASS'N. 737, 737-45 (2018).

²⁵⁴ See *infra* Table 4.

Table 4. Responses from Denver Residents on the Perceived Cost of BSL

How Much Do Respondents Believe BSL Costs Annually? (<i>n</i> = 252)		
Less than 100K	85	33.6%
100K to 250K	79	31.2%
250K to 500K	50	19.8%
500K to 1M	25	9.9%
> 1M	14	5.5%
*One respondent checked both [100–250] and [250–500] options.		

To determine the economic impacts of BSL in the City and County of Denver, the research team needed to assess the total number of dogs impacted by the policy since 1989. Therefore, the total pet-keeping population of Denver and the proportion of those pet-keeping households with pit bull-type dogs (PBTs) were estimated. These estimates were then used to measure the pet care-related revenue that would be lost to Denver's local economy due to BSL restrictions on PBTs in the City and County of Denver. Additional costs related to the enforcement of BSL were considered, including additional staffing needs, such as additional animal protection officers or shelter personnel; kenneling of PBTs at Denver Animal Shelter (DAS); euthanasia of PBTs determined to be unsuitable for placement back in the community; and the legal costs of citations under the City and County of Denver's Section 8-55 ordinance that resulted in criminal litigation, civil litigation, or both. Finally, the impact of BSL on surrounding communities was considered. Throughout the study, conservative assumptions on missing data and estimation approaches were used. Therefore, the findings represent very conservative estimates, given the available data.

A. *Estimating the City and County of Denver's Rate of Pet-Keeping*

To estimate the economic impact of BSL in the City and County of Denver, there were two variables of interest for this section of the study: (1) an estimation of the dog ownership rates in Colorado and, more specifically, in the City and County of Denver; and (2) an estimated percentage of PBTs in Denver. Both of these variables were then used as part of the cost estimation procedure, which is described in further detail below.

1. *United States and Colorado Dog Ownership Estimation 1989 to 2017*

The original data set on rates of dog ownership in the United States is nationally available from two sources: the American Pet Products Association (APPA) and the American Veterinary Medical

Association (AVMA).²⁵⁵ APPA conducts ownership studies every two years, while the AVMA conducts ownership studies every five years.²⁵⁶ These organizations use different methods for estimating dog ownership rates at the household level, as evident from the differences in observed rates for years where both data sets were available. To maintain consistency and keep the estimation conservative, AVMA's method was adopted (yielding lower dog ownership percentages than APPA data).²⁵⁷ The missing years for AVMA data were estimated using year-to-year percent changes in the APPA data and applying those percentages to the AVMA data.

Even after scaling and merging APPA data with the AVMA data, data for certain years were still unavailable since neither source covered all years. For the remaining missing years, estimated ownership rates were computed using the linear interpolation method,²⁵⁸ which provided annual United States dog ownership rate estimates from 1986 to 2017.²⁵⁹

Next, Colorado-specific dog ownership data for the years 1996, 2001, 2006, and 2011 were collected from the 2012 AVMA sourcebook. For those four years, Colorado dog ownership rates were 19% above the national averages.²⁶⁰ Therefore, assuming the 19% difference was stable throughout the entire time period, the Colorado dog ownership rates were estimated using the national dog ownership rates from 1986 to 2017 by scaling national numbers up by 19%.²⁶¹

2. *City of Denver Dog Ownership Estimation*

Since BSL does not exist statewide, to calculate the economic impacts of BSL in the City and County of Denver, the Denver dog owner population was estimated. While there are no publicly available sources that estimate dog ownership rates in Denver over time, a 2017 Realtor.com survey reported a 42.5% dog ownership rate in Denver.²⁶²

²⁵⁵ ANDREW N. ROWAN, HUMANE SOC'Y U.S., COMPANION ANIMAL STATISTICS IN THE USA (2018).

²⁵⁶ *Market Research*, AM. PET PRODUCTS ASS'N, https://www.americanpetproducts.org/pubs_overview.asp [<https://perma.cc/WW35-PNKQ>] (accessed May 26, 2020); Katie Burns, *Pet Ownership Stable, Veterinary Care Variable*, AM. VETERINARY MED. ASS'N (Jan. 15, 2019), <https://www.avma.org/News/JAVMANews/Pages/190115a.aspx> [<https://perma.cc/9XRF-MCPV>] (accessed May 26, 2020). AVMA, PET OWNERSHIP & DEMOGRAPHICS SOURCEBOOK (2012) [hereinafter 2012 AVMA].

²⁵⁷ AVMA, PET OWNERSHIP & DEMOGRAPHICS SOURCEBOOK (2017) [hereinafter 2017 AVMA].

²⁵⁸ Assuming equal year-to-year increments over a certain number of missing years.

²⁵⁹ For 2015 to 2017, the research team extrapolated dog ownership rates using the previous five-year averages.

²⁶⁰ 2012 AVMA, *supra* note 256.

²⁶¹ See *infra* Appendix D.

²⁶² Lance Lambert, *Let the Fur Fly: What Are the Best Cities for Dog Lovers and for Cat Lovers?*, REALTOR.COM (Oct. 9, 2017), <https://www.realtor.com/news/trends/best-cities-cat-dog-lovers/> [<https://perma.cc/79FH-JA35>] (accessed May 26, 2020).

Given the underlying survey data were not available,²⁶³ a conservative adjustment was made by taking the Colorado dog ownership rate downwards by a factor of 0.96 (44.5 divided by 42.5) for each year to estimate the dog ownership rate in Denver.²⁶⁴

3. *Pit Bull-Type Dogs Estimation*

Since BSL specifically targets PBTDS, the associated costs of BSL were estimated as a function of the number of PBTDS in Denver. As part of the effort to understand the percentage of PBTDS in the City and County of Denver, multiple estimates of PBTDS as a percentage of total dogs owned were found from various sources.²⁶⁵ These estimates ranged from 5% to 20% of total dogs, but none of the sources describe its respective methodology for collecting data. Therefore, none of the located resources were assessed to be more reliable than others.

Given the lack of reliable third-party data on the percentage of PBTD ownership in the City and County of Denver, the research team utilized the rate of PBTD intake at DAS in order to accurately estimate the PBTD ownership rates in Denver. The average number of PBTD intakes to percentage of total intakes for all breeds from 2007 to 2017 at DAS was calculated to be 4.4% for the City and County of Denver. It is important to note that DAS intake data is subject to two potential biases. One is the fact that BSL has been in effect for three decades in Denver, and the observed PBTD rates are potentially lower than they would be in the absence of BSL. In other words, 4.4% is a lower estimate for what the PBTD ownership rates would be in a BSL-free Denver area. The second potential bias is that it is possible that observed PBTD intake numbers overrepresent the true percentage of PBTDS in the city, since Denver Animal Protection (DAP) dog intakes are more likely targeted towards PBTDS. Therefore, the two bias factors for the DAS intake data move in opposite directions, indicating that the 4.4% DAS intake rate is the most reliable estimator for PBTD ownership rates for calculating lost revenues to the city.

As the last step for estimating the number of PBTDS in the City and County of Denver, the United States Census data were used to determine the annual number of Denver households, then that number was multiplied by the estimated dog ownership rate in Denver.

²⁶³ The research team requested this data (using <https://www.realtor.com/research/data/> [<https://perma.cc/VHN9-GXD8>]) but no response was received from Realtor.com.

²⁶⁴ The AVMA's estimated 2017 household dog ownership rate for Colorado is 44.5. See *infra* Appendix E.

²⁶⁵ Merritt Clifton, *2016 Survey: List of Top 5 U.S. Dog Breed Types Ousts Pit Bulls*, (July 29, 2016), <https://www.animals24-7.org/2016/07/29/2016-survey-list-of-top-5-u-s-dog-breed-types-ousts-pit-bulls/> [<https://perma.cc/58ZL-XURG>] (accessed May 26, 2020); see also JOHN DUNHAM & ASSOCIATES, INC., BEST FRIENDS ANIMAL SOC'Y, THE FISCAL IMPACT OF BREED DISCRIMINATORY LEGISLATION IN THE U.S. (Apr. 17, 2012), <https://resources.bestfriends.org/article/dog-breed-discrimination-prevention> [<https://perma.cc/QU6K-QJMF>] (accessed Apr. 18, 2020) (estimating that pit bulls make up an average of 6.9 percent of the entire population, or about 5 million dogs).

The AVMA survey data led to the conclusion that an average dog-owning household owned 1.6 dogs.²⁶⁶ Therefore, 1.6 was applied to the estimated number of dog-owning households in Denver. Finally, the estimated number of dogs in Denver was multiplied by 4.4% to obtain the estimated number of PBTDS in the City and County of Denver for purposes of the lost revenue calculations.

B. Impact on Pet Care Revenue

The city of Denver has most likely lost business revenues on pet care services as a result of BSL. Specifically, existing owners of PBTDS in Denver may be less likely to utilize local resources for their veterinary, grooming, and boarding services to avoid the risk of their dogs being reported to DAP, though none of these groups are mandatory reporters. Denver residents with PBTDS may pay for such services in the surrounding communities where PBTDS are legal and owners feel safe, resulting in lost revenues for the Denver economy. This same argument follows for the PBTDS that would have lived in Denver but for the BSL. Since data were not available to determine the true number of PBTDS that would have existed in Denver but for the BSL—and could not account for the number of individuals who may have chosen to keep a PBTDS but for the BSL—the 4.4% PBTDS ownership rate used was a very conservative figure for the lost revenue estimation.

Two separate approaches were used to estimate the BSL-related forgone revenues for the City and County of Denver. For the first approach, estimated numbers of PBTDS were multiplied with the average per dog spending that could have remained within Denver in the absence of BSL. For the second approach, total size of the veterinary and pet care-related industries was used as the starting point, which was then apportioned by the percentage of PBTDS in Denver.

For the first approach, the 2014 APPA pet industry expenditure data were used to determine which per dog expenditures were most likely spent outside of Denver by PBTDS owners. In-person costs such as grooming, boarding and pet sitting, and medical care were included. For example, if PBTDS owners utilized non-Denver businesses in the year 2014 (the most recent APPA pet industry expenditure report year), Denver's local economy could be expected to have lost the following revenues: \$61 per dog on grooming, \$327 per dog on boarding and pet sitting, and \$239 per dog on medical care. Other expenditures that would not necessarily have been impacted by the BSL in Denver, because they would not require the individual to present his or her PBTDS in-person for services, include licensing at \$7 per dog, food at \$231 per dog, treats at \$65 per dog, and toys at \$41 per dog.

The estimated number of PBTDS in Denver was used to calculate the total forgone pet-related expenditures in Denver's economy since the implementation of BSL in 1989 around the previously mentioned

²⁶⁶ 2012 AVMA, *supra* note 256.

services. Since these AVMA reported annual spending estimates were in 2014 dollars, the lost revenue was then deflated by Consumer Price Index (CPI) indices germane to pet services and medical costs.²⁶⁷

The estimation method described above yields \$4.9 million per year in forgone spending related to the PBTDS in Denver, as measured in 2017 dollars. To check the reasonableness of these figures, a second approach was employed using data collected from the Census' County Business Patterns (CBP) database for the County of Denver on the two relevant industries of veterinary services and pet care services. Once the estimated sales for the entire industry were calculated using CBP data,²⁶⁸ the data were apportioned from total expenditures to only dog-related expenditures using AVMA statistics of a 68% dog ownership rate and the estimated Denver PBTDS population of 4.38%. These calculations resulted in \$2.55 million in estimated sales lost from PBTDS owners.²⁶⁹

The \$2.55 million estimate for lost sales using CBP data is expected to be less than the lost expenditures estimate of \$4.90 million calculated using APPA data.²⁷⁰ The discrepancy between the two approaches indicates that there is likely a reporting problem of informal economy (e.g., some college students boarding or pet sitting dogs but are not registered as businesses), or some existing PBTDS owners already used services that are located outside of the City and County of Denver to avoid being reported.²⁷¹ For such reasons, true lost revenues to the City and County of Denver should lie somewhere in between the estimated value of lost sales, \$2.6 million, and lost expenditures, \$4.9 million. Therefore, the mid-point of the two estimates was taken for the final calculation of \$3.7 million in average annual lost revenues. This estimate yields a total calculated lost revenue of \$108 million over the twenty-nine years that BSL has been in effect in the City and County of Denver.²⁷²

²⁶⁷ See *infra* Appendix F.

²⁶⁸ *All Sectors: Geographic Area Series: Economy-Wide Key Statistics: 2012*, U.S. CENSUS BUREAU (Apr. 19, 2018), <https://data.census.gov/cedsci/table?q=economic-wide%20key%20statistics%202012&hidePreview=false&tid=ECNBASIC2012.EC1200A1&y=2012&vintage=2012> [https://perma.cc/JU5A-ZVKQ] (accessed May 26, 2020) (estimating of sales is conducted using 2012 annual payroll to annual sales information for each industry). The same ratio was then applied to the 2016 CBP payroll data to estimate 2016 sales.

²⁶⁹ 2017 AVMA, *supra* note 257; see *infra* Appendix G.

²⁷⁰ In an ideal economic environment, the theory would have suggested that the two approaches must yield identical figures.

²⁷¹ Economic theory suggests that under ideal circumstances, e.g. if all the expenditures are recorded officially by registered businesses, the expenditure approach should yield identical figures to the sales approach.

²⁷² See *infra* Table 5.

Table 5. Denver's PBTD-Related Lost Revenues and Spending Estimation

Approach	Annual Estimate	Total Lost Revenues to Denver (1989 – 2017)
<u>Approach 1</u> : Lost Local Expenditures Medical, Boarding and Pet Sitting, for all PBTDs	\$4,906,352	\$142,284,207
<u>Approach 2</u> : Lost Veterinary and Pet Care Services in Denver – Apportioned by % of PBTD	\$2,559,662	\$85,940,851
Mid-Point Estimate	\$3,733,007	\$108,257,203

C. Impact on DAP's Enforcement Costs

The implementation of BSL accrues extra expenses for DAP in the evaluation and intake of dogs who have a Section 8-55 (restricted breed) hold. For instance, DAP provided data indicating that it takes about five minutes for an Animal Care Attendant, or about ten minutes for an Animal Protection Officer, to conduct a general evaluation of physical health, which must be completed for every dog that enters the care of DAS.²⁷³ Additionally, each dog costs about \$30 per day to care for, including the cost of food, toys and enrichment, kennel, and staff time.²⁷⁴ As a result of BSL, DAS's Animal Care Attendants performed an average of thirty banned breed intakes per year—a total cost of \$35 per year if an Animal Care Attendant is paid \$14 per hour—and DAP's Animal Protection Officers performed an average of 130 banned breed intakes per year—a total cost of \$528 per year if an Animal Protection Officer is paid \$24 per hour.²⁷⁵ DAS conducts an average of six breed evaluations per week to screen for banned breeds for a total of \$22,464 per year.²⁷⁶ Additionally, DAS conducts an average of two voluntary breed evaluations per week for a total of \$7,488 per year.²⁷⁷

To estimate BSL enforcement costs incurred since 1989, DAP provided data on PBTD impounds and euthanasians for the 2007 to 2017 time period. Moreover, DAP impound and euthanasia data were acquired from 1992 to 2009 from a former *Westword* journalist, Jared Maher, who obtained this data from DAP via Colorado Open Records

²⁷³ E-mail from R. Picassari to Sloane Hawes, *supra* note 60 (containing a narrative on intake processes from Officer Daniel Ettinger and Officer Jenna Humphreys).

²⁷⁴ *Id.* (containing data on the cost of care pulled directly from the municipal shelter's budget).

²⁷⁵ *Id.*

²⁷⁶ *Id.*

²⁷⁷ *Id.*

Act (CORA) requests for a series of articles published in *Westword* in 2009.²⁷⁸

As the first step for estimating enforcement costs related to BSL, the overlapping portions of the two data sets (direct vs. indirect) were compared. The indirect source of data reported DAP PBTD impounds in 2007 were 459, in 2008 were 354, and in 2009 were 162. The direct source of DAP data reported DAP PBTD impounds in 2007 were 443, in 2008 were 361, and in 2009 were 225.²⁷⁹ After comparing the data from 2007 to 2009 that were available from both sources, it was concluded that, for impounds from 1992 to 2017, a 105.54% direct to indirect adjustment ratio would be necessary.

Because data were obtained from two sources, and the data obtained directly from DAP are considered to be of greater validity, the 1992 to 2009 data were adjusted to address any definitional mismatch issues. The past indirect segment of the data was adjusted by the 105.5% adjustment factor from 1992 to 2006. Moreover, the indirect data were missing the years 1989 to 1991 and the year 2004. These numbers were estimated in 2004 by averaging the years before and after, and it was assumed that years 1989 to 1991 were equal to the 1992 levels.

1. *Costs Proportional to PBTD Impounds*

As reported in Table 7, in-house and walk-in evaluation costs were calculated as a per impounded PBTD level.²⁸⁰ Similarly, costs related to Section 8-55 calls were calculated at per impound level, under the assumption that the higher number of calls would be correlated with the higher number of impounds.²⁸¹ Using the per PBTD impound costs described above, the relevant cost items were calculated for each year from 1989 to 2017 using the number of PBTD impounds estimated for each year.

2. *Kenneling Costs*

To estimate the kenneling costs for Section 8-55 impounds, first the length of stay (LOS) per PBTD in the shelter was estimated. LOS data were provided from DAP from 2007 to 2017, but not prior to 2007. The average LOS per PBTD from 2007 to 2017 was calculated as 13.7 days. Since no better estimate was available, the 13.7 days was used as a proxy for the LOS for all previous years. Kenneling costs were then

²⁷⁸ Maher, *supra* note 1. E-mail from Jared Maher, Journalist, *Westword*, to Sloane Hawes, Research Assoc., Institute for Human-Animal Connection, Graduate School of Social Work, University of Denver (Nov. 1, 2017).

²⁷⁹ Maher, *supra* note 35.

²⁸⁰ DAP provided consistent data on PBTD impounds, but could not provide an estimate of any changes in actual costs year-to-year.

²⁸¹ Data was not available on the number of calls received throughout the study period. The Section 8-55-related call volume was calculated based on a yearly average of 535 calls in the 2015 to 2017 data.

estimated by multiplying the average LOS at each year by the number of impounded PBTDs. DAP indicated that the average kenneling cost per day per PBTD was \$30.

3. *Case Preparation and Court Costs*

DAP also directly reported the number of PBTD-related citations for the years 2016 and 2017. The number of citations from 1992 to 2000 were estimated indirectly. Using the available data for overlapping time periods, the ratio of PBTD citations to PBTD impounds for four years was calculated.²⁸² It is important to note that these ratios are significantly different from each other and can be interpreted as a signal for enforcement changes in DAP.²⁸³

According to DAP, there are a variety of costs related to impoundment due to BSL.²⁸⁴ (Table 6). Because some of the DAP cost items were reported at the annual aggregate level, as opposed to per impounded PBTD level, some figures provided by DAP were converted to per impounded PBTD.

²⁸² Indirect DAP impound data were available from 1999 to 2009. Indirect DAP citations data were available from 1992 to 2000. There were only two years (1999 to 2000) overlapping across the two variables, hence the impounds-to-citations ratio was calculated for those two years only. Similarly, 2016 and 2017 are the only years for which PBTD citations data were available, thus the only overlapping years for direct DAP citations and impounds data are 2016 and 2017.

²⁸³ Note that the estimation in this section excludes defense costs in court cases involving DAP.

²⁸⁴ See *infra* Table 6.

Table 6. Summary of Costs Related to PBTD Impoundment
as of 2017

DAP Costs	Estimated Cost	Frequency²⁸⁵
Cost Per Intake ²⁸⁶	\$6	Per Impound
Kenneling Costs	\$30	Per Impound, Per Day
In-House Breed Evaluations	\$22,464	Annual
Euthanasia Costs	\$19.43	Per Dog
Section 8-55 Call-Related Costs	\$12,480	Annual
Walk-in Evaluation Costs	\$7,488	Annual
Case Preparation Costs	\$24	Per Citation
Defense Costs in Court	\$3,072	Per Court Case
Average # of PBTD Impounds	136	Annual
Average In-House Breed Evaluation Cost	\$166	Per PBTD Impound
Average Section 8-55 Call Cost	\$92	Per PBTD Impound
Average Walk-In Evaluation Cost	\$55	Per PBTD Impound

The ratio of PBTDs impounded to cited was calculated to be 29.5% and was then used to estimate the post-2007 years of missing PBTD citation data. The 1999 to 2000 PBTD impounds-to-citations ratio was estimated at 82.6% and was then applied to the estimations for the pre-2007 years. This procedure was used because impound data were available throughout the study period; however, the citations data series was incomplete. Because citations were positively correlated with impounds, the number of impounds was used to estimate citations for missing years. It should also be mentioned that proactive measures (i.e., walk-in evaluations) have significantly decreased the number of impounds over the years.²⁸⁷ Once the number of citations was estimated, the case preparation costs were calculated for each year by multiplying the number of citations with the average case preparation cost reported by DAP.

Based on data from 2016 to 2017, DAP annually incurs an average of \$3,072 for defense expenses in court.²⁸⁸ Reports from the Denver City Attorney's office on criminal enforcement cases from 2011 to 2017

²⁸⁵ Annual costs are assumed to be proportional to the number of impounded PBTDs.

²⁸⁶ DAP reported fifteen minutes per animal intake (ten minutes per field officer, five minutes per care attendant) multiplied by DAP's reported hourly wage rate of \$24.

²⁸⁷ Interview with Alice Nightengale, *supra* note 70.

²⁸⁸ E-mail from R. Picassari to Sloane Hawes, *supra* note 60.

support the estimation of one trial per year.²⁸⁹ There were exactly eight cases reported for Section 8-55 violations that reached the trial stage from 2011 to 2017.²⁹⁰ Based on this data, estimated trial defense costs for DAP since 1989 amount to nearly \$90,000.

4. *Euthanasia Costs*

Direct DAP data were obtained for the number of PBTDS euthanized each year from 2007 to 2017, and indirect DAP data were obtained for 2002 to 2003 and 2005 to 2006. The year 2004 was estimated by averaging 2003 and 2005 data and then calculating the sample average ratio of the number of PBTDS euthanized to the number of PBTDS impounded from 2002 to 2017. The weighted average of PBTDS euthanized within those years is 58.9%, while the simple average is 48.7% (standard deviation = 15.2%). The number of euthanized PBTDS from 1989 to 2001 was estimated by applying the weighted average of 58.9% to the number of impounds each year. Euthanasia costs were then calculated by multiplying the number of euthanized PBTDS by the DAP-reported euthanasia costs per dog.

D. *Summary of DAP's Costs to Enforce BSL*

The cost parameters for implementing BSL that DAP provided were used to generate an estimation of total costs over the full study period from 1989 to 2017.²⁹¹ The Consumer Price Index was then applied to each year of data included in the estimation to account for changes in price over time. The total cost of BSL was estimated to be \$4.7 million in actual dollars and \$5.8 million in 2017 dollars.²⁹² This amounts to \$750 per PBTDS impounded (in 2017 dollars).

²⁸⁹ *Id.*

²⁹⁰ *Id.*

²⁹¹ See *infra* Appendix H; see also E-mail from R. Picassari to Sloane Hawes, *supra* note 60 (containing data on cost of care pulled directly from the municipal shelter's budget).

²⁹² See *infra* Table 7.

Table 7. Summary of DAP's Costs to Enforce BSL from 1989 to 2017

Variables	1989 to 2017
Estimated PBTD Impounds	7,784
Estimated PBTD Euthanasia	4588
Intake Costs	\$46,705
Kennel Costs	\$3,143,998
In-House Breed Evaluation Cost	\$1,290,519
Section 8-55 Call-Related Costs	\$716,955
Walk-in Evaluation Costs	\$430,173
Euthanasia Cost	\$89,154
Case Preparation Costs	\$96,806
Defense Costs in Court	\$89,088
Total Annual Costs – in 2017 Dollars	\$5,814,311
Total Annual Costs – in Constant Dollars (CPI adjusted)	\$4,687,757

1. Prince George's County Task Force Estimation

BSL-related economic impact estimation is a very new area of research. To check the reasonableness of the cost figure for enforcement of BSL in the City and County of Denver, additional cost figures from other cities were sought. The only study identified that includes costs for enforcement of BSL was a task force study conducted in Prince George's County, Maryland.²⁹³ A summary of the findings for Prince George's County is presented in Table 8.

Table 8. Prince George's County Task Force Estimation, 2001 to 2002

Parameter	Cost
Estimated Variable Costs of BSL Enforcement	\$559,570
Estimated Fixed Costs of BSL Enforcement	\$122,100
Number of PBTDs Impounded	2,031
Variable Costs Per PBTD Impounded	\$215
Total Costs Per PBTD Impounded (in 2002 Dollars)	\$276
Revenues Collected (Permits, County Licenses, and Bonds)	\$35,061
Euthanized-to-Impounds Ratio	84.9%
PCG Task Force Estimated Cost Per PBTD Impound (in 2017 Dollars)	\$378

²⁹³ VICIOUS ANIMAL LEGISLATION TASK FORCE, REPORT OF THE VICIOUS ANIMAL LEGISLATION TASK FORCE 4, 7 (2003).

BSL in the City and County of Denver is estimated to cost \$750 per dog, while BSL in Prince George's County is estimated to cost \$378 per dog. In this case, however, it is not statistically accurate to compare the Prince George's County cost estimation to the Denver cost estimation since there is only limited information regarding the methods used—such as data availability, time frame of data collection, sources of data, and assumptions made with the analyses—in the Prince George's County task force study. Therefore, the Prince George's County figures are presented here merely to illustrate that one way of evaluating the effectiveness of BSL is to compare the economic impacts of the policy from jurisdiction to jurisdiction. More detailed studies on the costs of BSL in other cities are needed to draw conclusions regarding whether the costs for enforcement of BSL in the City and County of Denver are higher—or lower—than the average.

E. Impact on Surrounding Communities

BSL requires PBTDS to be removed from Denver city limits, which typically means the impounded PBTDS are either euthanized or transferred to neighboring counties.²⁹⁴ To minimize the euthanasia of healthy PBTDS, DAS may transfer PBTDS to animal shelters in surrounding communities that do not have BSL.²⁹⁵ Since PBTDS have a statistically longer stay in shelters than other breeds of dogs,²⁹⁶ the shelters in the surrounding communities who accept these PBTDS must allocate space and reserve resources to care for them. From a purely economic perspective, one could argue that the cost of transferring PBTDS from DAS to surrounding communities are 'financial savings' to Denver's local economy, as DAS avoids shelter personnel, kenneling, and potential euthanasia costs for all PBTDS transferred out of the city. However, these transfers constitute a financial burden on the City and County of Denver's neighbors that should be considered a negative externality of the City and County of Denver's BSL.

To estimate the 'bad neighbor' cost of BSL, Longmont Humane Society's (LHS) transfer intake data were analyzed with consideration for the average length of stay and cost to kennel PBTDS in its care.²⁹⁷ LHS provided the average cost per animal's stay²⁹⁸ and the average

²⁹⁴ E-mail from R. Picassari to Sloane Hawes, *supra* note 60.

²⁹⁵ *Id.*

²⁹⁶ Lisa M. Gunter et al., *What's in a Name? Effect of Breed Perceptions & Labeling on Attractiveness, Adoptions & Length of Stay for Pit-Bull-Type Dogs*, 11 PLOS ONE 7 (2016).

²⁹⁷ There are a number of other organizations in surrounding counties that DAS transfers dogs to (and from), however LHS has been used as a single example for illustrative purposes. LHS confirmed that no dogs were sent to DAS in return for accepting PBTDS, thus costs are not offset by counter transfers. E-mail from R. Moriarty, Dir. of Shelter & Clinic Operations, Longmont Humane Soc'y, to Katy Loughney, Consultant, Inst. for Human-Animal Connection (Mar. 2, 2018) (on file with authors).

²⁹⁸ LHS' cost per animal included the average cost of care for both cats and dogs. Although we understand that the cost to kennel dogs in shelters is typically greater

number of days a PBTB is available compared to an average dog for the years 2012 to 2017.²⁹⁹ Next, the DAS PBTB transfer data for the years 2007 to 2017³⁰⁰ were collected and analyzed.³⁰¹

Table 9. Length of Stay and Cost Per Stay for Dogs in the Care of Longmont Humane Society

Variables	2010	2011	2012	2013	2014	2015	2016	2017
Length of Stay for non-PBTBs (# of days)	18	18	17	15	14	13	12	11
Length of Stay for PBTBs (# of days)	N/A	50	28	N/A	39	31	N/A	N/A
Cost Per Animal Per Stay	N/A	N/A	\$312	\$337	\$381	\$402	\$447	\$447

To calculate the cost of all the PBTBs transferred to neighboring communities by DAS, the PBTB transfer data for the years 2007 to 2017 were analyzed, and the numbers of PBTBs transferred from 1989 to 2017 were estimated.³⁰² The estimated costs of these transferred PBTBs are calculated to be over \$1 million since the enactment of BSL in Denver.³⁰³

than cats, the research team elected to conservatively use the cost per animal data LHS could provide to complete the estimation.

²⁹⁹ The PBTB cost per stay was adjusted proportional to the dog's length of stay. When the length of stay data were missing for a year, the research team assumed that the LOS was equal to the sample average of 2011 to 2017. For the years with missing cost of stay data, the research team discounted the available annual costs according to the CPI medical and pet services price index on a year-to-year basis.

³⁰⁰ This data set contains transfer of PBTBs to all surrounding counties. Because DAP transfer data was only available after 2007, the 1989 to 2006 transfers were estimated.

³⁰¹ See *infra* Table 9.

³⁰² This data set contains transfer of PBTBs to all surrounding counties. The research team applied the transfer rates to the impound figures to reach the annual number of PBTB transfers from DAS to neighboring counties. Because DAS's transfer data were only available after 2007, we estimated the 1989 to 2006 transfers.

³⁰³ See *infra* Table 10.

Table 10. Estimated Costs Associated with the Transfer of PBTDs out of the City and County of Denver to Surrounding Community's Shelters

Estimated Statistics	1989 - 2017 Total
Estimated # of PBTDs Transfers to Neighboring Counties	1281
Cost of Transferred PBTDs to Neighboring Counties (in Constant Dollars)	\$728,375
Cost of Transferred PBTDs to Neighboring Counties (in 2017 Dollars)	\$1,078,816

VIII. LEGAL IMPACTS OF BSL

The American legal system is comprised of two different types of cases, civil and criminal. Criminal cases are generally considered offenses against the state and are accordingly prosecuted by the state.³⁰⁴ Civil cases, on the other hand, are typically disputes between individuals or entities regarding the legal duties and responsibilities each owes the other.³⁰⁵ These cases are adjudicated through civil lawsuits.³⁰⁶ This section attempts to represent the amount of resources that have been deployed on criminal cases in Denver due to Breed-Specific Legislation (BSL). Since 1989, there have also been thirteen BSL-related civil cases where the City and County of Denver was either a plaintiff or a defendant (including *City and County of Denver v. State of Colorado*, *Colorado Dog Fanciers, Inc. v. City and County of Denver*, and *Dias v. City and County of Denver*).³⁰⁷ While the economic impact of both the civil and criminal cases is beyond the scope of this study and will be covered in a subsequent study, a conservative estimate of the cost of these cases, given the currently known data, is in the multiple millions of dollars.

A. Impacts of Criminal Cases

Denver Municipal Code Section 1-13 provides that any violation of the pit bull ban, Section 8-55, shall be deemed a “criminal violation” and provides that any “person who shall be convicted . . . [shall] be

³⁰⁴ *Criminal Law*, LEGAL INFO. INST., https://www.law.cornell.edu/wex/criminal_law [<https://perma.cc/8DUK-G2HT>] (accessed May 26, 2020) (“Criminal law . . . is a system of laws concerned with punishment of individuals who commit crimes Each state decides what conduct to designate a crime. Thus, each state has its own criminal code.”).

³⁰⁵ *Civil Cases*, U.S. CTS., <https://www.uscourts.gov/about-federal-courts/types-cases/civil-cases> [<https://perma.cc/5P4W-5FG7>] (accessed May 26, 2020) (“A federal civil case involves a legal dispute between two or more parties. A civil action begins when a party to a dispute files a complaint, and pays a filing fee required by statute.”).

³⁰⁶ *Id.*

³⁰⁷ Letter from Melissa Poole-Knight, Dir. of Admin., Denv. City Att’y’s Office, to authors (Feb. 14, 2018) (on file with authors).

fined in a sum not more than nine hundred ninety-nine dollars (\$999.00) or jailed not to exceed three hundred (300) days, or both so fined and jailed.”³⁰⁸ So, in addition to risking the loss of one’s dog, the City and County of Denver’s BSL imposes municipal criminal liability on persons possessing a pit bull in violation of the city code.

In assessing the impact of the criminal cases related to the City and County of Denver’s BSL (which are prosecuted by the City Attorney), the research team considered 157 criminal enforcement cases that occurred from 2011 to 2018.³⁰⁹ Each criminal case was divided into one of three subgroups: (1) cases in which a defendant pleaded guilty at his or her arraignment; (2) cases in which the defendant had at least one hearing; and (3) cases in which the defendant took the case to trial. As mentioned above, cases brought in state and federal court, which are typically civil cases challenging the validity of the statute itself, were considered separately.

Most of the criminal cases identified for this report fell into the first subgroup, which would have required a minimal amount of time in court and are thus relatively low-cost cases. In these cases, defendants pleaded guilty at their arraignments; the court contemporaneously imposed a sentence; and the case’s time in court was complete. In the cases examined, just over 80% of the defendants in criminal cases pled guilty to their crimes when they first appeared before the judge, and nearly 66% of their cases required no additional hearings or court time.

The second subgroup accounted for just over 18% of criminal cases related to BSL that took place from 2011 to 2018. In twenty-nine cases, the court conducted only one hearing.³¹⁰ In only three cases, less than

³⁰⁸ DENV., COLO., MUN. CODE § 1-13 (1982); DENV., COLO., CODE ORDINANCES, § 8-55.

³⁰⁹ The city attorney reported that there were 170 criminal cases on file regarding the City and County of Denver’s BSL from 2011 to 2018. The court did not have records for two of these 170 cases. In eleven of the 170 cases, the defendant failed to appear for court. Thus, there was no data to consider for those cases.

³¹⁰ *People v. Morales*, No. 17GV702451 (Denv. Cty. Ct. Sept. 12, 2017); *People v. Lutz*, No. 17GV702343 (Denv. Cty. Ct. Aug. 18, 2017); *People v. Douglas*, No. 17GV702087 (Denv. Cty. Ct. Aug. 3, 2017); *People v. Garcia*, No. 17GV701935 (Denv. Cty. Ct. May 15, 2017); *People v. Russell*, No. 16GV701976 (Denv. Cty. Ct. Oct. 28, 2016); *People v. Stakes*, No. 16GV701952 (Denv. Cty. Ct. Aug. 17, 2016); *People v. Sanchez*, No. 16GV701337 (Denv. Cty. Ct. June 3, 2016); *People v. Aguilar*, No. 16GV701395 (Denv. Cty. Ct. May 9, 2016); *People v. Aguilar*, No. 16GV701394 (Denv. Cty. Ct. May 9, 2016); *People v. Baez*, No. 16GV701367 (Denv. Cty. Ct. Jan. 8, 2016); *People v. Arreola*, No. 15GV622788 (Denv. Cty. Ct. Nov. 12, 2015); *People v. Desmond*, No. 15GV622783 (Denv. Cty. Ct. Oct. 6, 2015); *People v. Lewis*, No. 15GV553517 (Denv. Cty. Ct. Aug. 3, 2015); *People v. Mendoza*, No. 15GV554040 (Denv. Cty. Ct. June 12, 2015); *People v. Malaya*, No. 15GV553510 (Denv. Cty. Ct. June 2, 2015); *People v. Calzada*, No. 15GV554030 (Denv. Cty. Ct. Mar. 16, 2015); *People v. Padilla*, No. 15GV553814 (Denv. Cty. Ct. Mar. 5, 2015); *People v. Valdez-Esquivel*, No. 15GV553883 (Denv. Cty. Ct. Feb. 13, 2015); *People v. McGhee*, No. 15GV554026 (Denv. Cty. Ct. Feb. 5, 2015); *People v. Perez-Echieverria*, No. 14GV551311 (Denv. Cty. Ct. Sept. 29, 2014); *People v. Guerrero-Garcia*, No. 14GV553706 (Denv. Cty. Ct. Aug. 29, 2014); *People v. Morataya*, No. 14GV553477 (Denv. Cty. Ct. May 27, 2014); *People v. Rodarte-Ramirez*, No. 14GV552543 (Denv. Cty. Ct. May 9, 2014); *People v. Percoco*, No. 14GV552504

2% of the cases overall, the court conducted two hearings.³¹¹ By definition, these cases are more costly because, regardless of whether the defendant is represented, the prosecution must prepare for the hearing. But the resulting increase in cost is likely not substantial. There are three types of hearings in these cases: (1) bond hearings resulting from an arrest because a defendant failed to appear; (2) motion hearings to address any motions the prosecution or defense filed relating to the case; and (3) restitution hearings to determine the amount of restitution a defendant owed as a result of his or her crime.

Bond hearings do not require an immense amount of preparation because there are predetermined considerations which determine whether a defendant presents a flight risk or is a danger to the community such that he or she should not be released on bail.³¹² In BSL cases, these considerations include, but are not limited to: whether the defendant has failed to appear before; whether the defendant has a criminal history; whether the defendant has ties to the community; and whether the defendant has any other outstanding warrants.³¹³ To prepare for such a hearing, the prosecution can typically obtain all the information it needs from a defendant's pretrial services report.

Motion hearings can require more preparation than bond hearings. A motion hearing, though uncommon in BSL-related cases, would address any motion the prosecution or the defense filed in relation to the case.³¹⁴ For example, if necessary, the prosecution will prepare any witnesses, respond to any motions filed, write and file motions, and be

(Denv. Cty. Ct. Apr. 22, 2014); *People v. Aguirre*, No. 14GV553216 (Denv. Cty. Ct. Mar. 25, 2014); *People v. Nevarez*, No. 14GV552528 (Denv. Cty. Ct. Mar. 7, 2014); *People v. Oliphant*, No. 14GV552457 (Denv. Cty. Ct. Jan. 15, 2014); *People v. Gallegos*, No. 13GV552394 (Denv. Cty. Ct. Dec. 31, 2013); *People v. Dale*, No. 13GV552314 (Denv. Cty. Ct. Oct. 16, 2013).

³¹¹ *People v. Chacon*, No. 17GV702476 (Denv. Cty. Ct. Oct. 16, 2017); *People v. Hilt*, No. 15GV554038 (Denv. Cty. Ct. June 3, 2015); *People v. Lichter*, No. 14GV553654 (Denv. Cty. Ct. July 8, 2014).

³¹² *Bail Hearing Procedures*, FINDLAW, <https://criminal.findlaw.com/criminal-procedure/bail-hearing-procedures.html> [https://perma.cc/7HL5-7L6X] (accessed May 26, 2020) ("The court will review the history and character of a defendant during the bail hearing procedure, including the following considerations: Physical and mental condition; Financial resources; Family ties; History relating to drug and alcohol abuse; Criminal history; Record concerning appearance at court proceedings; and Length of residence in the community . . . Where a defendant poses a threat to the safety of the community, they may be held without bail.").

³¹³ See, e.g., COLO. ASSOC. OF PRETRIAL SERVS., THE COLO. PRETRIAL ASSESSMENT TOOL (CPAT) ADMINISTRATION, SCORING, AND REPORTING MANUAL, VERSION 2 (2015) (providing "an empirically developed pretrial risk assessment tool").

³¹⁴ *Motion Hearing*, BLANCHARD L., <https://blanchard.law/criminal-defense-process/motion-hearing/> [https://perma.cc/ABQ9-AMMR] (accessed May 26, 2020) ("A motion hearing is a hearing that is held in front of the judge after one of the lawyers in the case has filed a written request for the judge to do something. At the hearing, the lawyers will orally argue for or against the request, and in some cases, testimony will be taken regarding the issue. Motion hearings can cover anything from requesting that the judge modify your bond, inclusion or exclusion of evidence at trial, demanding that particular evidence be turned over, or to dismiss the entire case based on a legal issue.").

present in court for the hearing itself. These cases, in and of themselves, are not complex. They usually involve a minimal number of parties and witnesses, and the evidentiary investigation for the crime is limited to the single incident and the dog itself.³¹⁵ Because of the relative simplicity of these cases, it is unlikely that preparing for a motion hearing takes a substantial amount of time.

Restitution is a mechanism by which a court orders a defendant to compensate persons or entities for the costs or damages incurred as a result of the defendant's crime.³¹⁶ In a restitution hearing, the persons or entities requesting restitution put forth the evidence required to substantiate their respective claims, and the judge weighs the statutorily-required considerations for restitution to decide the fair amount of restitution to impose upon the defendant.³¹⁷ Restitution hearings require only minimal preparation because a prosecutor need only consider the victim impact statement, which outlines the costs a victim allegedly incurred as a result of the crime, to prepare for the hearing.³¹⁸ A restitution award permits a victim to recover pecuniary losses³¹⁹ resulting from the commission of a crime.³²⁰ Pecuniary losses are monetary expenses a person suffers because of a crime.³²¹ In the cases collected from the last seven years in Denver, the court awarded restitution in less than 5% of all cases. Restitution is typically awarded to cover medical expenses or veterinarian costs associated with dog at-

³¹⁵ See, e.g., *Chacon*, No. 17GV702476 (showing that the parties involved with the hearing in a BSL case include the dog's owner and animal control); *Douglas*, No. 17GV702087 (noting that trial required four witnesses).

³¹⁶ See *Restitution*, MERRIAM-WEBSTER, <https://www.merriam-webster.com/dictionary/restitution> [<https://perma.cc/ZL73-M38N>] (accessed May 26, 2020) (defining restitution as "a legal action serving to cause restoration to a previous state").

³¹⁷ *Restitution Hearing Law and Legal Definition*, US LEGAL, <https://definitions.uslegal.com/r/restitution-hearing/> [<https://perma.cc/KTR9-SL7C>] (accessed May 26, 2020).

³¹⁸ *Restitution*, DENV. DISTRICT ATT'Y, <https://www.denverda.org/restitution/> [<https://perma.cc/P6D9-3Q9N>] (accessed May 26, 2020) ("The judge presiding over the criminal case can only consider losses directly caused by the crime and for which documentation has been provided to the District Attorney through a victim's Victim Impact Statement The District Attorney is responsible for providing the court with the amount of restitution owed to the victim, based upon the documentation provided by the victim to the District Attorney. A Victim Impact Statement (VIS) . . . describes and identifies the emotional and financial impact and losses suffered as a result of the crime.").

³¹⁹ A pecuniary loss is a loss suffered by a victim and "includes but is not limited to all out-of-pocket expenses, interest, loss of use of money, anticipated future expenses, rewards paid by victims, money advanced by law enforcement agencies, money advanced by a governmental agency for a service animal, adjustment expenses, and other losses or injuries proximately caused by an offender's conduct and that can be reasonably calculated and recompensed in money." But this does "not include damages for physical or mental pain and suffering, loss of consortium, loss of enjoyment of life, loss of future earnings, or punitive damages." COLO. REV. STAT. § 18-1.3-602(3)(a)(2017).

³²⁰ COLO. REV. STAT. § 18-1.3-602(3)(a)-18-1.3-603(1).

³²¹ See *Pecuniary loss*, BLACK'S LAW DICTIONARY, (11th ed. 2019) ("A loss of money or of something having monetary value.").

tacks or bites.³²² To receive restitution, victims need to present the bill associated with their injuries.³²³ Despite only being awarded in seven cases, restitution amounted to nearly \$18,000 in costs paid to victims.³²⁴ Restitution was available in at least seven additional cases, but it was either not sought by the victim or not awarded by the court. However, this means that in nearly 9% of cases, a private individual is bearing the up-front costs associated with a violation of the BSL. Then, in half of those cases, the court compensated the individual for his or her respective pecuniary losses.

The third subgroup only covers cases that were set to go to trial. This group includes eight cases, which is approximately 5% of all cases. Interestingly, none of the cases set for trial actually proceeded to trial. In every case where the defendant appeared for trial, the defendant pled guilty at, or just prior to, trial.³²⁵ The court files did not provide any information regarding why these defendants pled guilty rather than proceeding to trial. Despite the fact that these cases did not actually proceed to trial, there are costs associated with setting a case for trial. When a case is set for trial, the court summons jurors to sit for that trial. If the defendant pleads guilty just before trial, the jurors have been summoned to court to be impaneled for that trial.³²⁶ The cost to the public, however, is limited to the cost of summoning and organizing the jurors, which is usually done by a single clerk.³²⁷ Under Colorado law, a person's employer is responsible for compensating its employee when he or she is called for jury duty.³²⁸ Thus, the time the jurors are serving is not a direct cost to the public, but jury duty—even for cases that do not go to trial—removes those individuals from the workforce for that day.

Considering the criminal enforcement cases as a whole, the majority of these defendants did not have representation. In fact, only thir-

³²² *Restitution*, *supra* note 318 (“Restitution can be sought for medical expenses, replacement or repair of damaged property, loss of wages, insurance deductibles, and other expenses directly related to the crime.”).

³²³ *Id.* (“Restitution can only be requested for those out-of-pocket costs that can be documented.”).

³²⁴ See *Lutz*, No. 17GV702343 at 1 (showing restitution was ordered in the amount of \$2,617); *People v. Maestas*, No. 16GV702607 at 1 (Denv. Cty. Ct. Sept. 23, 2016) (showing restitution was ordered in the amount of \$6,806.59); *Sanchez*, No. 16GV701337 at 1 (showing restitution was ordered in the amount of \$7,131); *Mendoza*, No. 15GV554040 at 2 (showing restitution was ordered in the amount of \$638); *People v. Harris*, No. 14GV553779 at 1 (Denver Cty. Ct. Oct. 29, 2014) (showing restitution was ordered in the amount of \$233.17); *Percoco*, No. 14GV552504 at 1 (showing restitution was ordered in the amount of \$188.79); *Oliphant*, No. 14GV552457 at 1 (showing restitution was ordered in the amount of \$114).

³²⁵ One defendant failed to appear at trial, so he never entered a plea.

³²⁶ See COLO. R. CRIM. P. 24(a) (outlining procedures for jurors in criminal trials).

³²⁷ COLO. R. CRIM. P. 24(a).

³²⁸ See COLO. REV. STAT. § 13-71-126 (2019) (outlining the requirements and limitations for employers paying an employee when he or she is called for jury duty in Colorado).

teen of the 152 defendants retained or requested representation.³²⁹ This means nearly 86% of the defendants waived their right to request representation. Five of the thirteen defendants—over 38% of defendants who retained or requested counsel—failed to appear in court, were subsequently arrested on a warrant, then retained or were appointed counsel for their in-custody hearing. When a defendant is represented, it is far more likely that the case will be set for trial. In nearly 85% of the cases that were set for trial, the defendant retained or was appointed representation. But, as indicated in the previous paragraph, the phrase “set for trial” does not indicate that the cases were actually tried. When a case is tried, both sides present their respective evidence, and the judge or jury renders a decision based on the evidence. None of the defendants who retained representation actually had their case tried—they all pled guilty at trial.³³⁰ Retaining representation did not lead to a higher number of objectively more favorable outcomes for defendants. Nine of the thirteen defendants—over 69% of the defendants with representation—pled guilty to charges against them.³³¹ The difference between these defendants and the defendants in ‘group one’ (who pled guilty at their first appearance in front of the judge) is that represented defendants typically pled guilty much later in the case. For example, three of the defendants pled guilty just before their respective jury trial, and two of them pled guilty at their fourth appearance before the judge.³³² Only three of the thirteen defendants—just over 23%—had the charges against them dismissed.³³³ One was the result of a plea deal on another case, and one charge was dismissed by the prosecution prior to trial.³³⁴ One defendant obtained a ‘deferred judgment,’ which meant that his case could be dismissed if he satisfied the conditions of receiving a deferred sentence.³³⁵

³²⁹ Within the 157 cases, five defendants had two cases against them. Thus, though there are 157 cases, there are only 152 defendants.

³³⁰ See *Morales*, No. 17GV702451; *Douglas*, No. 17GV702087; *People v. Franklin*, No. 17GV701590 (Denv. Cty. Ct. June 1, 2017); *Garcia*, No. 17GV701935; *People v. Broadus*, No. 17GV702245 (Denv. Cty. Ct. May 4, 2017); *People v. Troncosa*, No. 17GV701921 (Denv. Cty. Ct. Feb. 23, 2017); *Maestas*, No. 16GV702607; *Baez*, No. 16GV701367; *People v. Ramirez*, No. 15GV622774 (Denv. Cty. Ct. Oct. 28, 2015); *Mendoza*, No. 15GV554040; *Calzada*, No. 15GV554030; *People v. Robles*, No. 15GV553989 (Denv. Cty. Ct. Jan. 21, 2015); *Guerrero-Garcia*, No. 14GV553706.

³³¹ *Morales*, No. 17GV702451; *Douglas*, No. 17GV702087; *Franklin*, No. 17GV701590; *Broadus*, No. 17GV702245; *People v. Baez*, No. 16GV701367; *Ramirez*, No. 15GV622774; *Mendoza*, No. 15GV554040; *Calzada*, No. 15GV554030; *Guerrero-Garcia*, No. 14GV553706.

³³² *Douglas*, No. 17GV702087; *Broadus*, No. 17GV702245; *Robles*, No. 15GV553989; *Franklin*, No. 17GV701590; *Ramirez*, No. 15GV622774.

³³³ *Robles*, No. 15GV553989 at 1; *Troncosa*, No. 17GV701921 at 1; *Maestas*, No. 16GV702607 at 1.

³³⁴ *Robles*, No. 15GV553989; *Troncosa*, No. 17GV701921.

³³⁵ *Maestas*, No. 16GV702607 at 1.

When a public defender represents a defendant, it is an additional cost to the public.³³⁶ Only five of the 157 cases filed—3% of the cases considered—indicate a public defender was involved in the case. The Denver Office of the Municipal Public Defender, a publicly-funded organization, represents indigent defendants who face jail time for violating municipal ordinances in Denver County Court.³³⁷ Individuals are indigent when: (1) their annual income is equal to or less than \$15,175, and they have liquid assets of \$1,500 or less; or (2) their annual income is less than \$18,906.25; their assets total \$1,500 or less; and their expenses are equal to or exceed their annual income.³³⁸ In these cases, the public is funding both the prosecution and defense.

The 2011 to 2017 criminal case data (collected via record requests) were used to estimate the number of pit bull-type dog (PBSD) citations that led to more costly formal legal procedures. From 2011 to 2017, 166 of the 285 PBSD citations (58%) proceeded to legal procedures. To get an estimate of the legal impacts of BSL over the full study period, this rate of 58% was then applied to the 5,042 PBSD citations identified over the full study period of 1989 to 2017. Of the 5,042 PBSD citations from 1989 to 2017, 2,935 would be expected to have resulted in legal procedures. This represents a significant investment of legal resources to manage the criminal cases resulting from BSL.

B. Impact of Civil Cases

Based on an open records request, the Denver City Attorney's office produced records regarding six civil cases since 1989 related to the BSL.³³⁹ Four of these cases were filed in state court, and two were filed in federal court.³⁴⁰ Two of the four state cases proceeded to the Colorado Supreme Court, the state's highest court; one case was appealed to the Colorado Court of Appeals, the state's intermediate appellate

³³⁶ An indigent defendant has a constitutional right to appointed counsel when, if he or she is convicted of a crime, it could result in imprisonment. *See Lassiter v. Department of Soc. Servs.*, 452 U.S. 18, 26–27 (1981) (“[A]n indigent defendant has a right to appointed counsel only when, if he loses, he may be deprived of his physical liberty.”); *see also Stern v. Cty. Court in and for the Cty. of Grand*, 773 P.2d 1074, 1076 (Colo. 1989) (holding that an attorney must be provided for an indigent defendant when the proceeding could result in imprisonment). However, a defendant must qualify as indigent to obtain representation through the public defender's office.

³³⁷ *Office of the Municipal Public Defender*, DENVER.GOV, <https://www.denvergov.org/content/denvergov/en/office-of-the-municipal-public-defender.html> [https://perma.cc/5UAY-CBVQ] (accessed May 26, 2020) (The “primary focus” of the Denver Office of the Municipal Public Defender “is to provide comprehensive legal representation to defendants who face jail time for violating municipal ordinances in the Denver County Court System”).

³³⁸ The Colorado Supreme Court issues guidelines to determine when an individual is “indigent.” SUPREME COURT OF COLO., CHIEF JUSTICE DIRECTIVE 98-01, COSTS FOR INDIGENT PERSONS IN CIVIL MATTERS (Aug. 2011). The income levels listed are based on an unmarried individual with no dependents, and the qualifying income level is dependent on the number of people in the household. *Id.*

³³⁹ Letter from Melissa Poole-Knight to authors, *supra* note 306.

³⁴⁰ *Id.*

court; and one case was heard only at the Denver District Court, the state's trial court.³⁴¹ Both federal cases were appealed to the U.S. Court of Appeals for the Tenth Circuit.³⁴² The cost of these civil cases is far more variable than the criminal cases examined in the prior section. These civil cases spanned over months or years, and some likely cost hundreds of thousands of dollars. To determine how much these cases cost the public, the amount of time the attorneys and the judiciary spent on them would have to be evaluated. These calculations were beyond the scope of this study. While a portion of these costs could be estimated using the available court records, the majority of the time spent in litigation strategy and discovery is either undocumented or missing and, therefore, cannot be estimated reliably given the lack of data. The research team plans to conduct a subsequent study that focuses on the economic costs of these civil cases.

IX. CONCLUSIONS AND PROPOSED ALTERNATIVES

There have been substantial economic impacts of Breed-Specific Legislation (BSL) on the City and County of Denver. The city has lost an estimated \$3.7 million per year in grooming, boarding, and medical care-related services, for a total of \$107 million since the legislation was enacted in 1989. Enforcement of BSL has cost the city's animal protection agency, Denver Animal Protection (DAP), an additional estimated \$5.8 million throughout the study period. Furthermore, it is estimated that the transfer of pit bull-type dogs (PBTDS) to surrounding communities has resulted in a cost of \$1 million since 1989 for shelters operated by the City and County of Denver's neighboring cities. While a specific estimation of costs related to the legal proceedings under BSL was beyond the scope of this study, 2,935 (58%) of the 5,042 PBTDS citations from 1989 to 2017 would be expected to have resulted in criminal legal procedures, which represents a substantial additional cost to the Denver community beyond what was already calculated.

For these costs, the City and County of Denver has accrued questionable improvements in public safety across a number of relevant metrics. A minority (24.6%) of Denver residents say BSL makes them feel safer. These individuals' perception that PBTDS are dangerous is likely the primary driving force behind continuing the enforcement of BSL. Meanwhile, the overall trend in dog bites in Denver has decreased since 1989. This decrease has been driven by reductions in bites by all breeds. Therefore, improved breed-specific data collection on dog bites and other measures of animal-driven public safety concerns are needed to objectively assess how removing PBTDS from communities is impacting the actual safety of residents.

BSL appears to disproportionately affect individuals in underserved communities. Only 19.0% of Denver residents stated that they

³⁴¹ *Id.*

³⁴² *See infra* Appendix A.

had been impacted by BSL. BSL has negative implications for individuals in the United States who keep PBTDS and, therefore, the impacts should be well-documented and weighed against the potential benefits of the policy. If BSL is disproportionately impacting only specific individuals in a community, policymakers should consider alternative solutions such as increasing the accessibility of pet supportive services for that population, rather than targeting them with punitive action. By measuring the impacts of enforcement of BSL in these communities, this report provides an opportunity to critically evaluate the effectiveness of the policy in achieving its intended outcomes, such as improving the health and safety of all the human and nonhuman animals of a community.

Other cities have concluded that BSL may not be worth the investment. A number of communities have overturned their BSL following a review of the impacts of the policy. Two of Denver's neighboring cities, Castle Rock and Fort Lupton, overturned their BSL in May of 2018 and February of 2019, respectively, following a thorough assessment and community discussion.³⁴³ A package of integrated dangerous dog legislation that focuses on owner responsibility, as opposed to breed, was enacted as a replacement for Castle Rock's BSL.³⁴⁴

After twenty-five years, the Dutch government removed a ban on PBTDS because it was ineffective at reducing the number of dog bites in its country.³⁴⁵ A study in Belgium found that the breeds restricted under its BSL were not responsible for a majority of the reported dog bites.³⁴⁶ Another study performed over a thirteen-year period in Odense, Denmark found that there continued to be dog bites reported to emergency rooms despite the presence of BSL provisions requiring restricted breeds to wear muzzles in public.³⁴⁷ More rigorous research is needed to see exactly what types of dogs are biting in Colorado to determine if BSL has contributed to a reduction in the rate of dog bites.

BSL is only one of the potential interventions that exist to reduce dog bite incidents. Education regarding dog bites is viewed by some as a more effective preventive platform for community safety.³⁴⁸ One study showed that by incorporating community-specific strategies in addition to prevention at the family level, efforts to address dog bites were more effective.³⁴⁹ Other studies have shown that educating the

³⁴³ *BSL Continues to Crumble*, PIT BULL INFO (Nov. 8, 2019), <https://www.pitbullinfo.org/bsl-continues-to-crumble.html> [<https://perma.cc/TT63-RTV6>] (accessed May 26, 2020).

³⁴⁴ See *infra* Appendix A.

³⁴⁵ Kaspersson, *supra* note 155, at 220.

³⁴⁶ Tiny De Keuster et al., *Epidemiology of Dog Bites: A Belgian Experience of Canine Behaviour and Public Health Concerns*, 172 VETERINARY J. 482, 484 (2006).

³⁴⁷ Finn Nilson et al., *The Effect of Breed Specific Dog Legislation on Hospital Treated Dog Bites in Odense, Denmark*, PLOS ONE, 1, 2-4 (2018).

³⁴⁸ *Why Breed-Specific Legislation Is Not the Answer*, *supra* note 179.

³⁴⁹ Barbara A. Morrongiello et al., *Examining Parents' Behaviors and Supervision of Their Children in the Presence of an Unfamiliar Dog: Does The Blue Dog Intervention*

public on dog bite prevention, and acknowledging that many breeds can exhibit dangerous behavior if not properly socialized and cared for, “can help reduce shelter overpopulation,” redirect tax dollars” to more effective public safety programs, “and can help fund spay and neuter programs” for underserved communities.³⁵⁰ Joel Ray suggests integrating age-appropriate humane education materials related to animal bites and zoonotic diseases into schools.³⁵¹ More evidence is needed to understand how targeted, community-based policies can reduce dog bite injuries.

A number of professional organizations have taken a stance on BSL and proposed alternative solutions to the presence of dangerous dogs in a community. For example, the American Veterinary Society of Animal Behavior states: “BSL is ineffective, and can lead to a false sense of community safety as well as welfare concerns for dogs identified (often incorrectly) as belonging to specific breeds.”³⁵² The American Society for the Prevention of Cruelty to Animals’ (ASPCA) official position statement advocates against regulation on the basis of breed, and instead recommends:

[A] community-based approach to resolving the reckless guardian/dangerous dog question whereby all stakeholders—animal control, animal shelters, medical and veterinary professionals, civic groups, teachers, public officials—collectively identify an appropriate dog bite prevention strategy. Central to this model is an “advisory council or task force representing a wide spectrum of community concerns and perspectives” whose members review available dog bite data, current laws, and “sources of ineffectiveness,” and recommend realistic and enforceable policy, coupled with outreach to the media and educational efforts directed at those in regular contact with “dog owners and potential victims” (e.g., medical and veterinary professionals, animal control/shelters, teachers).³⁵³

The City of Calgary’s Responsible Pet Ownership bylaw may be considered as a “model ordinance” that could serve as an alternative to BSL in municipalities.³⁵⁴

Colorado consistently receives a high rating on lists of dog-friendly states.³⁵⁵ Denver is home to some of the nation’s most innovative

Improve Parent Practices?, 54 ACCIDENT ANALYSIS PREVENTION 108, 108–13 (2013); see generally AVMA, *A Community Approach to Dog Bite Prevention*, 218 J. AM. VETERINARY MED. ASS’N 1732, 1739, 1741 (2001) (discussing the importance of targeting parent behavior in addition to child behavior in preventing dog bites).

³⁵⁰ Franklin, *supra* note 158, at 54–55.

³⁵¹ Joel Dillard Ray, Jr., *Pet Awareness with Students (P.A.W.S.): The Development of Age Appropriate Materials for Teaching Public Health Education to Children* (Apr. 2011) (unpublished M.S. thesis, Mississippi State University) (on file with author).

³⁵² *Position Statement on Breed-Specific Legislation*, AM. VETERINARY SOC’Y ANIMAL BEHAVIOR, https://avsab.org/wp-content/uploads/2018/03/Breed-Specific_Legislation-download_8-18-14.pdf. [https://perma.cc/73BA-SKDY] (accessed May 26, 2020).

³⁵³ ASPCA, *supra* note 136.

³⁵⁴ City of Calgary, By-law No. 23M2006, Responsible Pet Ownership Bylaw (2016).

³⁵⁵ John Wenzel, *Just How Dog-Friendly Is Colorado? A Brief Survey for National Dog Day*, DENV. POST (updated Aug. 26, 2016 at 3:24 PM), <https://www.denverpost.com/>

animal welfare organizations that have helped the state achieve one of the highest animal shelter live-release rates in the United States.³⁵⁶ Therefore, the existence of BSL—a breed ban that costs the city millions of dollars to implement and to defend with inconclusive public safety outcomes—is inconsistent with Denver’s image as a leading animal welfare innovator. The recognition of more effective alternatives further highlights this inconsistency. While the quality of the dog bite, animal sheltering, and economic data across the entirety of the Denver legislation’s existence make definite conclusions difficult, the overall findings support thorough reassessment of the legislation with an emphasis on identifying more successful and cost-effective alternatives. This would continue Denver’s progress toward becoming a truly humane community.

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XI. CONFLICTS OF INTEREST

The authors declare no conflict of interest. The funding sponsors and sources of data (e.g., Denver Animal Protection and Longmont Humane Society) had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

2016/08/25/national-dog-day-colorado/ [https://perma.cc/R4D8-45DN] (accessed May 26, 2020).

³⁵⁶ Hawes et al., *supra* note 20.

APPENDIX A: CASTLE ROCK, COLORADO BSL –
SUMMARY OF REPEAL

In May 2018, the city council of Castle Rock, Colorado, a city thirty miles south of Denver, voted 5–0 to repeal its 26-year-old Breed-Specific Legislation (BSL).³⁵⁷ Castle Rock has transitioned to a system of regulating dogs on the basis of “behavior, not breed, by classifying them as ‘dangerous’ or ‘potentially dangerous.’”³⁵⁸ At the time of repeal it was reported there had been 600 dog bites in Castle Rock over the last ten years, with only twenty bites involving a pit bull-type dog (PBTD).³⁵⁹ Twenty-one of the 600 dog bites were classified as severe, but none of the severe bites involved a PBTD.³⁶⁰ In its repeal of BSL, Castle Rock cited the following reasons for more comprehensive dangerous dog policies:

- Considerable growth in human and pet population;
- Difficulties in enforcement, including time, costs, and resources devoted to impounding; and prosecuting dogs who have not committed any harm;
- Challenges attendant to BSL such as reliable breed identification;
- Concern that BSL will lead residents to not license their dogs or seek appropriate; veterinary care.³⁶¹

The revised ordinance, which went into effect June 1, 2018, reads:

No dogs are restricted based on their appearance. Restrictions are now based on dog behavior and are identified in a two-tiered system defining potentially dangerous dogs, and dangerous dogs. A dog need not bite to be determined as potentially dangerous. A potentially dangerous dog may be allowed to remain in the Town under court ordered restrictions. A dog determined to be a dangerous dog is not allowed in the Town.³⁶²

Under the new system, dogs determined to be dangerous would be placed under the first tier.³⁶³ Animals with this designation would be removed from town limits or euthanized.³⁶⁴ The second tier would be

³⁵⁷ Jessica Gibbs, *Castle Rock Repeals Pit Bull Ban*, CASTLE ROCK NEWS-PRESS 2 (May 10, 2018), <https://issuu.com/coloradocommunitymedia/docs/cr0510> [<https://perma.cc/DQ7V-FJVA>] (accessed May 26, 2020).

³⁵⁸ *Id.*

³⁵⁹ E-mail from J. Dudley, Organizer, End Castle Rock BSL, to Sloane Hawes, Research Assoc., Inst. for Human-Animal Connection (January 30, 2018) (containing Castle Rock bite data obtained from Castle Rock Police Department by the citizen group End Castle Rock BSL) (on file with authors).

³⁶⁰ *Id.*

³⁶¹ *Id.*

³⁶² *Animal Ordinance Updates*, TOWN OF CASTLE ROCK COLO., <https://www.crgov.com/2977/Animal-Ordinance-Updates> [<https://perma.cc/BVZ4-CALV>] (accessed May 26, 2020).

³⁶³ E-mail from J. Dudley to Sloane Hawes, *supra* note 359.

³⁶⁴ *Id.*

for potentially dangerous dogs.³⁶⁵ These are dogs that injured a person or domestic animal, but the injury was not serious.³⁶⁶ These potentially dangerous dogs would need to be registered with the city, and the owners would need to obtain a permit for them.³⁶⁷ The revised ordinance is designed to “[hold] the owners responsible for the actions of their dogs”, allowing for “court-mandated preventive measures to make sure the dog’s behavior doesn’t escalate.”³⁶⁸ It also provides an opportunity for rehabilitation, allowing the court to mandate education, retraining classes, and improved fencing or enclosures.³⁶⁹

APPENDIX B: DENVER ANIMAL PROTECTION INTAKE AND OUTCOME DATA

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
RETURNED ADOPTION	0	0	0	0	0	11	0	1	82	89	87
CONFISCATED	549	533	466	409	374	413	448	437	456	438	413
OWNER SURRENDER	927	952	850	625	735	748	779	477	392	394	456
STRAY	2,945	2,817	2,609	2,695	2,923	3,246	3,937	3,846	3,877	3,843	3,476
TRANSFER IN	0	0	0	10	30	13	26	196	64	20	77
Total Intake	4,421	4,302	3,925	3,739	4,062	4,431	5,190	4,957	4,871	4,784	4,509
ADOPTION	1,000	1,151	1,034	966	1,048	1,193	1,657	1,653	1,323	1,092	1,121
RETURNED TO OWNER	1,420	1,518	1,427	1,272	1,402	1,635	1,870	1,909	2,043	2,199	2,125
TRANSFER	486	475	613	729	951	957	1,173	926	674	517	565
EUTHANASIA	1,448	1,124	831	737	631	614	458	482	793	919	681
MISSING	8	3	8	5	2	2	4	3	1	0	0
DIED	24	22	10	16	8	11	11	20	14	10	13
Total Outcomes	4,386	4,293	3,923	3,725	4,042	4,412	5,173	4,993	4,848	4,737	4,505
Asilomar LRR (%)	66.26	73.24	78.36	79.65	84.14	85.79	90.86	89.89	83.33	80.39	84.59
ASPCA LRR (%)	65.73	73.08	78.32	79.35	83.73	85.42	90.56	90.54	82.94	79.60	84.52

³⁶⁵ *Id.*

³⁶⁶ *Id.*

³⁶⁷ *Id.*

³⁶⁸ Michael Roberts, *Pit Bull Advocates Hope Ban’s End in Castle Rock Will Help Stop the Slaughter*, WESTWORD (May 2, 2018, 7:11 AM), <https://www.westword.com/news/castle-rock-pit-bull-ban-ends-advocates-want-to-stop-slaughter-in-denver-10268960> [<https://perma.cc/D3HH-QNKS>] (accessed May 26, 2020).

³⁶⁹ *Id.*

APPENDIX C: SECTION 8-55 COMPLAINT CALLS BY ZIP CODE

Zip Code	# of Complaint Calls
80219	69
80204	54
80239	44
80223	38
80212	37
80205	35
80249	34
80211	33
80207	32
80235	23
80224	21
80220	20
80209	16
80222	15
80231	13
80206	12
80221	12
80237	8
80123	7
80236	5
80246	5
80210	4
80216	4
80218	4
80202	3
80230	3
80203	2
80247	2
80238	1

APPENDIX D: PET-KEEPING RATE ESTIMATIONS

Year	United States Rate Estimation	Colorado Rate Estimation	Denver Rate Estimation
1986	38.2	45.3	43.3
1987	37.9	44.9	42.9
1988	37.5	44.5	42.5
1989	37.2	44.1	42.1
1990	36.8	43.7	41.7
1991	36.5	43.3	41.3
1992	30.7	36.4	34.8
1993	30.1	35.7	34.1
1994	29.4	34.9	33.3
1995	30.5	36.2	34.6
1996	31.6	38.1	36.4
1997	32.8	38.8	37.1
1998	33.9	40.2	38.4
1999	34.3	40.7	38.9
2000	34.7	41.2	39.3
2001	36.1	43.7	41.7
2002	33.7	40.0	38.2
2003	34.9	41.4	39.5
2004	36.1	42.8	40.9
2005	36.7	43.5	41.5
2006	37.2	43.3	41.4
2007	37.5	44.5	42.5
2008	37.9	44.9	42.9
2009	38.2	45.2	43.2
2010	38.4	45.6	43.5
2011	36.5	42.5	40.6
2012	38.8	46.0	43.9
2013	37.7	44.6	42.6
2014	36.5	43.3	41.4
2015	37.6	44.4	42.4
2016	37.4	44.2	42.2
2017	37.6	44.5	42.5

APPENDIX E: COMPARISON OF COLORADO VERSUS
UNITED STATES DOG OWNERSHIP RATES
(AT THE HOUSEHOLD LEVEL)

Colorado vs. United States Dog Ownership Rates			
Year	Colorado	United States	Colorado-to-United States Ratio
1986 (est.)	45.3	38.2	1.19
1991 (est.)	43.3	36.5	1.19
1996	38.1	31.6	1.21
2001	43.7	36.1	1.21
2006	43.3	37.2	1.16
2011	42.5	36.5	1.16
Average 1986 to 2011	42.7	36.0	1.19

APPENDIX F: APPROACH ONE – LOST EXPENDITURES
DUE TO BSL

Lost Expenditures	Total 1989 to 2017	Annual Average
Number of Households in Denver	7,146,669	247,270
Percentage of Colorado Households with Dogs	n/a	42.0%
Number of Dogs in Denver		166,967
Number of PBTDs in Denver		7,311
Lost Local Spending - Medical (in 2017 Dollars)	\$55,411,754	\$1,910,750
Lost Local Spending - Other Pet Services (in 2017 Dollars)	\$86,872,453	\$2,995,602
CPI Growth % (Pet Services + Medical)	n/a	4.23%
CPI Growth % (Pet Services)		3.02%
CPI Adjusted Lost Local Spending - Medical (in Constant \$)	\$38,671,630	\$1,333,504
CPI Adjusted Lost Local Spending - Other Pet Services (in Constant Dollars)	\$65,310,056	\$2,252,071
Total Lost Local Expenditures Medical, Boarding and Pet Sitting (in 2017 Dollars)	\$142,284,207	\$4,906,352
Total Lost Local Expenditures Medical, Boarding and Pet Sitting (in Constant Dollars)	\$103,981,686	\$3,585,575

**APPENDIX G: APPROACH TWO – DENVER PBTD-RELATED
LOST SALES ESTIMATION (USING CBP DATA)**

Location	2012 NAICS code	Year	Number of Establishments	Annual Payroll (\$1,000)	Estimated Sales Total	PBTD-Related Total Estimated Sales
Denver County, Colorado	Veterinary services	2016	42	23,635	\$61,310,739	\$1,826,079
Denver County, Colorado	Pet Care (except veterinary) services	2016	65	10,707	\$24,630,111	\$733,583
Denver County, Colorado	All Relevant Sectors	2016	107	34,342	\$85,940,850	\$2,559,662

**APPENDIX H: FULL DATASET FOR ESTIMATION OF DAP'S
COSTS TO ENFORCE BSL**

Variables	1989 to 2006	2007 to 2017	1989 to 2017
Estimated PBTD Impounds	5,630	2,154	7,784
Estimated PBTD Euthanasia	3,575	1,013	4,588
Intake Costs	\$33,781	\$12,924	\$46,705
Kennel Costs	\$2,310,748	\$833,250	\$3,143,998
In-House Breed Evaluation Costs	\$933,416	\$357,103	\$1,290,519
Section 8-55 Call-Related Costs	\$518,564	\$198,391	\$716,955
Walk-in Evaluation Costs	\$311,139	\$119,034	\$430,173
Euthanasia Costs	\$69,471	\$19,683	\$89,154
Case Preparation Costs	\$84,598	\$86,590	\$96,806
Defense Costs in Court	\$55,296	\$33,792	\$89,088
Total Annual Costs - in 2017 Dollars	\$4,317,013	\$1,586,385	\$5,903,399
Total Annual Costs - in Constant Dollars (CPI adjusted)	\$3,241,866	\$1,445,891	\$4,687,757

APPENDIX I: DETAILS OF BSL-RELATED CIVIL CASES

In *Dias v. City & County of Denver*, three women, presumably residents of the City & County of Denver (the City), challenged the constitutionality of the Breed-Specific Legislation (BSL) and sought prospective injunctive relief against the enforcement of the law against them.³⁷⁰ Plaintiffs claimed that the BSL violated the Fourteenth Amendment in two ways. First, Plaintiffs made a facial challenge to the law by claiming it to be unconstitutionally vague on its face.³⁷¹ Under the void-for-vagueness doctrine, there are two ways in which a law can be impermissibly vague: the law can fail “to provide people of ordinary intelligence a reasonable opportunity to understand” what conduct it prohibits; or it can “authorize, or encourag[e] arbitrary and discriminatory enforcement”³⁷² Here, Plaintiffs claimed the BSL’s “ban on dogs that have ‘the majority of physical traits’ of one of the enumerated prohibited dogs fails to . . . provide dog owners with fair warning of which dogs are covered by the ban.”³⁷³ Second, Plaintiffs made an as-applied challenge that the BSL deprived them of procedural due process.³⁷⁴ The Fourteenth Amendment prohibits states from depriving a person of property “without due process of law.”³⁷⁵ To determine the amount of due process that a particular situation requires, a court engages in a balancing test that considers the private interests of the affected individual, the interests of the government, and the risk of the erroneous deprivation of property under the current procedures.³⁷⁶ Plaintiffs claimed that the fact that BSL permitted seizure of the dogs without a prior hearing violated their procedural due process right.³⁷⁷ They also claimed the City’s “unwritten polic[y] of summarily executing dogs whose owners have previously been cited under the [BSL], coercing waivers of due process protections and the privilege against self-incrimination, and using the coerced, self-incriminating statements to encourage guilty pleas [or] discourage jury trials” violated procedural due process.³⁷⁸

Procedurally, this case moved between the U.S. District Court for the District of Colorado and the U.S. Court of Appeals for the Tenth Circuit. The case started when Plaintiffs filed their complaint in the trial court: the U.S. District Court for the District of Colorado.³⁷⁹ De-

³⁷⁰ *Dias v. City & Cty. of Denv., Colo.*, No. 07-cv-00722-WDM-MJW, 2008 WL 791939, at *1, *6 (D. Colo. Mar. 20, 2008), *affirmed in part, reversed in part, dismissed in part*, 567 F.3d 1169 (10th Cir. 2009).

³⁷¹ *Id.* at *1.

³⁷² *Hill v. Colorado*, 530 U.S. 703, 732 (2000).

³⁷³ *Dias*, 2008 WL 791939, at *7.

³⁷⁴ *Id.* at *1.

³⁷⁵ U.S. CONST. amend. XIV, §1.

³⁷⁶ *Mathews v. Eldridge*, 424 U.S. 319, 334–35 (1976).

³⁷⁷ *Dias*, 2008 WL 791939, at *1.

³⁷⁸ *Id.* at *1.

³⁷⁹ *Dias*, 2008 WL 791939.

defendants responded by filing a motion to dismiss.³⁸⁰ While waiting on the judge to rule on the motion to dismiss, Plaintiffs proceeded to file a motion to certify class.³⁸¹ The motion is not dispositive, but it indicates the Plaintiffs' intent to expand the case to include all persons similarly affected by the BSL. A class action lawsuit can have wide-reaching and costly effects on a city if successful. The district court granted defendant's motion to dismiss, and Plaintiffs appealed the ruling to the Tenth Circuit.³⁸²

The filings required to present a case to an appellate court are generally far simpler than the filings required for a trial court. In a federal appellate court, the appellant (the party appealing the case) files an opening brief; the appellee files an answer brief; and the appellant may, but is not required to, file a reply brief to answer the claims in the appellee's brief.³⁸³ The court may, at its discretion, schedule the case for oral argument.³⁸⁴ The preparation required for oral argument is comparable to researching and filing a dispositive motion, and it is reflected as such in the case analysis. The parties in this case filed all three briefs and argued the case before the Tenth Circuit.³⁸⁵ The Tenth Circuit affirmed the dismissal in part, reversed in part, and dismissed in part.³⁸⁶ As a result, the case was remanded back to the district court for further proceedings consistent with the Tenth Circuit's ruling.³⁸⁷ Once back at the trial court, the defendants again filed a dispositive motion for summary judgment.³⁸⁸

³⁸⁰ Defendants' Motion to Dismiss, *Dias v. City & County of Denv.*, No. 07-cv-00722-WDM-MJW (D. Colo. June 18, 2007), 2007 WL 6962201. A motion to dismiss is a dispositive motion. If a defendant's motion to dismiss is successful, the entire case is dismissed.

³⁸¹ Plaintiffs' Motion for Class Certification, *Dias v. City & County of Denv.*, No. 07-cv-00722-WDM-MJW (D. Colo. Oct. 1, 2007) 2007 WL 6962202.

³⁸² *Dias*, 567 F.3d at 1173.

³⁸³ FED. R. APP. P. 31(a).

³⁸⁴ FED. R. APP. P. 34(a).

³⁸⁵ Appellant Opening Brief, *Dias*, 567 F.3d 1169 (No. 08-1132), 2008 WL 3285433; Appellee Brief, *Dias*, 567 F.3d 1169 (No. 08-1132), 2008 WL 4735353; Appellant's Reply Brief, *Dias*, 567 F.3d 1169 (No. 08-1132), 2008 WL 6058868; Case Argued, *Dias*, 567 F.3d 1169 (No. 08-1132).

³⁸⁶ *Dias*, 567 F.3d at 1184.

³⁸⁷ *Id.*

³⁸⁸ Defendant's Motion for Summary Judgment, *Dias*, 567 F.3d 1169 (No. 1:07-cv-00722), 2010 WL 4313529.