Houston Animal Welfare Study (Summary)

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Houston PetSet Executive Summary

Approximately 84,512 animals went through the Houston shelter system in 2016. This cost our five largest shelters a collective $36,323,500, and does not account for the millions of privately funded dollars raised by hundreds of smaller non-profit animal welfare organizations. In addition to the animals in-shelter, it is estimated that there are also hundreds of thousands of dogs and cats that remain on the streets. In some surveys, Houston residents have reported stray dogs and cats as the most common problem in their neighborhoods, ranking higher than crime, drinking water, pollution and dumping, and creating a quality of life issue for our community.[1]

The mapping of 311 City of Houston animal service calls reveals a significantly higher concentration of strays on the city's east side, correlating to a larger proportion of minority and low-income residents as well as a lack of animal shelters and services. The study identifies a disparity between demand and access to affordable services for pet owners in Houston, indicating a need for significant program expansion to address the public health and quality of life concerns.

At the City of Houston Bureau of Animal Regulation and Care (BARC), approximately 55% of animals were documented as "stray" upon intake in recent years, and more than 1,000 bite cases were investigated by city animal control per year since 2015. These statistics further testify to the reality of the stray animal population on our streets and its effects on public health.

The Rice University research study substantiates the problem of animal homelessness, defining the scope in Houston and analyzing our status relative to peer cities. It is evident that Houston has significant room for improvement citywide, in the forms of:

- Programs, such as high volume, low-cost spay/neuter and pet retention assistance;
- Policies, such as phasing in mandatory microchipping;
- Partnerships, across major organizations, potentially coordinated by a third party.

With alliances formed under the common goal of ending companion animal homelessness, peer city partners attest to the results observed from strategic divisions of labor and resources, and key stakeholders (including those in Houston) agree that community-wide partnerships are one of the most effective practices in animal welfare. Increased collaboration between organizations like city/county shelters, non-profit animal welfare organizations, and spay/neuter clinics have proven essential to success in Houston's peer cities.

[1] "Health of Houston Survey" Houston, TX: Institute for Health Policy, The University of Texas School of Public Health, 2010.

As a result, the study recommends that Houston has great potential to elevate its animal welfare status through a combination of identified programs, policies, and partnerships. Houston PetSet is strategically positioned to support this effort based on our organization's six impact areas of focus, including: spay and neuter, transport and rescue, community service and education, cruelty prevention, research and advocacy.

Note: Following the conclusion of the Rice study, additional research was conducted through Houston PetSet to aid the definition of the scope of the problem in Houston. Information was gathered regarding the Harris County Animal Shelter Call Center, Houston PetSet grantee organizations, and BARC animal outcome costs. An abridged version of the Rice study was prepared by a member of the research team through Houston PetSet.

Introduction

Houston PetSet charged our research team with conducting an independent study to investigate the state of animal welfare in the Houston metropolitan area. A key goal of this study is to identify practices that improve animal welfare by analyzing current programs, funding, and policies utilized by Houston animal welfare organizations and compare them to peer cities throughout the United States. In this study, when we use the term "animal welfare," we are referring to the well-being of domestic companion animals (i.e., pets). Although Houston shelters accommodate a number of different animal species, this study focuses on programs and practices associated with domestic dogs and cats. At Houston BARC, the city shelter investigated in this study, 98% of the animal intake is comprised of dogs and cats, suggesting that these animals are appropriate species to focus on in Houston (BARC). For the purposes of this report, the term "animals" refers to dogs and cats only.

The project began with a literature review to better understand key issues in animal welfare. Literature included academic journal articles concerning shelter medicine and animal welfare, policies and recommendations of the American Veterinary Medical Association, national surveys of shelters and pet owners, news articles, shelter and rescue websites, and reports published by Target Zero (an organization that assesses and provides recommendations to public and private open admissions shelters). For this study we interviewed key stakeholders both in Houston and in peer cities. Stakeholders included directors and personnel from public shelters, private shelters, local rescue organizations, spay/neuter clinics, and national shelter organizations. Animal shelters operated by either the city or county government were identified in every city and designated as "public." Similarly, other large, notable non-profit organizations that provided rescue services, vet care, and adoption placements were designated as "private shelters." Some of the shelter-specific data presented in this report was provided by shelter directors through personal interviews, or drawn from publicly available documents. Additional data were compiled throughout the initial literature review process.

A variety of metrics can be used to analyze the success of animal shelters, but this report primarily focuses on live release rate (LRR) to compare shelters across Houston and peer cities. Live release rate is a commonly used metric in animal welfare that is calculated by dividing live outcomes by total outcomes of all animals that are taken in by a given shelter. Live outcomes may refer to adoptions, transfers, or returns to owner (as opposed to euthanasia). We selected LRR as our metric because all shelters, on an annual basis, keep data that allows for calculating LRR, and because LRR is commonly used by shelter directors to track and report success. However, LRR is not a perfect metric of animal welfare, as it can

be manipulated[1] and does not necessarily reflect the quality of life for animals living in shelters, nor does it include those living on the streets. Moreover, the rule of thumb for a "no-kill" shelter is a 90% LRR--a number that was adopted because it was believed that 90% of animals entering shelters were not sick or aggressive (PAWS Chicago 2017). However, this variable can be discretionary, and with geographic variations in diseases such as heartworm, it is not clear if 90% should be a benchmark for all shelters (Dr. Roger Haston, personal communication, July 6, 2017). Despite the limitations of LRR, it provides a useful metric that allows us to compare overall shelter success.

Houston PetSet Position Statement: The live release rate (LRR) indicates the percentage of animals that leave the shelter alive, however the numbers strictly reflect the animals that actually go through shelter intake. Even if our shelters achieve a no-kill status through a 90% LRR, the animal homelessness problem cannot be considered "solved," as there are hundreds of thousands of animals that are still living on the streets. However, the homeless animal problem can be "solved" by leveraging resources such as spay and neuter, adoption and rescue/ transport, and education and community services, which will impact those street populations.

The report begins with a section describing the current state of animal welfare in Houston. We identify key stakeholders in Houston and Harris County, describing their role in improving animal welfare in the area. This section compares county, city, and private shelters in the Houston area through analyses of budget, shelter intake, and LRR. The Houston section concludes with the presentation of city animal control data and geo-mapping to identify high intake areas and examine the socio-economic demographics of areas most affected by animal overpopulation.

The report then defines Houston's peer cities, which were identified so that we could investigate their current practices and compare Houston to other cities. Public shelters in peer cities were also assessed based on budget, shelter intake, and LRR for comparison with Houston shelters. These assessments allowed us to measure each shelter's relative success and control for factors such as size and availability of resources when recommending programs and practices that might work in Houston. Data from shelters in peer cities is then incorporated into a section identifying their overall best practices for reducing shelter intake and euthanasia and improving live outcomes for animals. Finally, data collected from peer cities was used to provide recommendations for improving shelter practices and local policies in Houston.

[1] As LRR is simply a percentage of live outcomes over total outcomes, there are ways for this statistic to not accurately reflect what it intends. For example, if a shelter took in a large amount of animals and transferred them out within hours, though the shelter was responsible for them for only a brief period of time, all would be considered live outcome and LRR would increase.

Current Animal Welfare Status in Houston

Stray Animals & Houston

Like many cities, Houston has long faced problems with stray animals. A study by the University of Texas School of Public Health found that stray dogs and cats were the most frequently cited neighborhood problem by residents (Health of Houston Survey, 2010). Of residents surveyed, 37% reported that stray cats and dogs were the most common problem in their neighborhood, higher than crime (26%), air pollution/traffic (17%), and illegal dumping (17%) (Health of Houston Survey, 2010). News stories of stray dogs or packs of dogs harming citizens are not uncommon (*See* Newsfix 2017, Campinon 2017). For instance, in April of 2017, a stray dog wandered onto a schoolyard and bit five children during recess in southeast Houston.

Based on intake numbers from the five largest shelters in Houston, 84,512 homeless animals came through the Houston area shelters in 2016 (Table 1). BARC alone took in 27,638 animals, 7,480 of which were picked up by animal control agents in the field (BARC Performance At-A-Glance). Additionally, we plotted a breakdown of intake types using intake data from BARC from January to September, 2016 in Figure 1. The bar plot shows that about 55% of intake are strays. We cite these numbers to show that animal welfare is a public health and quality of life issue in Houston.

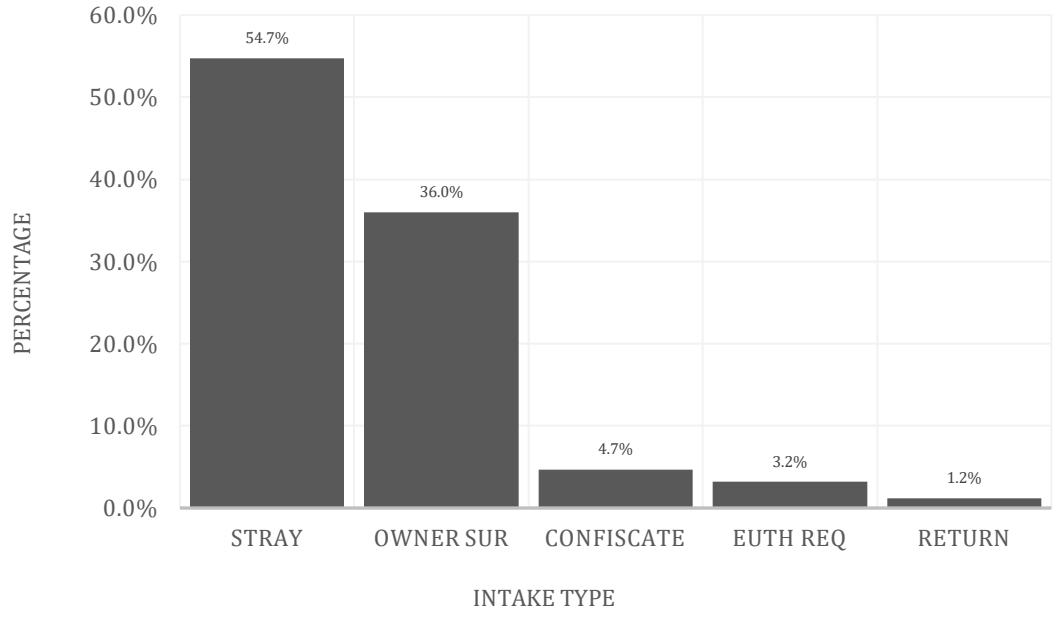

Figure 1. Shelter intake data from Houston BARC (Jan - Sep 2016).

Effects of Hurricane Harvey

We began this study by assessing the current state of animal welfare in Houston. The beginning of this investigation coincided with the occurrence of Hurricane Harvey, a natural disaster that highlighted the immense animal overpopulation problem in Houston. While the relief effort was largely focused on helping people, thousands of pets were also thought to be displaced or missing. Even before the storm hit, local and national rescues worked to clear space in the public shelters via transports, knowing that the storm would have harsh effects on the city's animal population. In the days following the storm, Best Friends Animal Society partnered with Houston PetSet, Harris County Animal Shelter (HCAS), and Houston/Austin Pets Alive to set up a disaster relief shelter, transforming the NRG Arena into the "Pet Reunion Pavilion," in order to help residents find their displaced pets. A total of 796 dogs and cats went through the shelter, yet only 36 animals were returned to their owners (Brent Toellner, Personal Communication, November 30, 2017). This suggests that many of the animals were possibly already on the street before the storm. The lack of mandatory microchipping in Houston makes it especially difficult to determine which animals were owned pets as opposed to strays. The effects of Hurricane Harvey amplified Houston's animal welfare problems and the need to tackle them.

Identifying Key Stakeholders

In the aftermath of Hurricane Harvey, we began identifying key stakeholders of animal welfare organizations serving the Houston area. The following shelters were identified as playing a prominent role in the welfare of animals in Houston:

- BARC Animal Shelter & Adoptions. The Bureau of Animal Regulation and Control, commonly referred to as BARC, runs a public, open-admissions shelter operated by the City of Houston. It is located in north Houston.
- Harris County Animal Shelter (HCAS). HCAS is a public, open-admissions shelter operated by the Veterinary Public Health division of Harris County and is located north of Houston city limits. HCAS is responsible for all of Harris County outside of the city of Houston.
- Houston SPCA. Houston SPCA is a private, non-profit shelter that is not affiliated with any other SPCA and is located in northwest Houston.
- Houston Humane Society. Houston Humane Society is a private, non-profit shelter that is not affiliated with any other Humane Society and is located in southwest Houston.
- Citizens for Animal Protection (CAP). CAP is a private, non-profit shelter located in west Houston.

Although the shelters listed above are among the largest and most established shelters in the Houston area, there are a number of other animal welfare groups serving this community. These include hundreds of rescue groups, such as Houston Pets Alive, K-9 Angels, and ADORE Houston. Rescue groups are an important part of the animal welfare landscape in Houston, however, they do not have as much publicly available data as shelters. Since many of the animals in rescues come from public shelters, we wanted to avoid double-counting animals. In addition, policy changes at a shelter will impact thousands of animals a year, while policy changes at any given rescue group will impact at most several hundred. Given the state of animal welfare in Houston at this point, we felt that focusing on organizations that serve the most animals would have the greatest impact. In addition to shelters and rescues, Houston is home to animal transport groups, such as Rescued Pets Movement and Lola's Lucky Day, that partner with shelters and rescue groups to transport animals to other cities. Low-cost veterinary clinics like Emancipet and the Spay-Neuter Assistance Program (SNAP) also serve as an important component of the Houston animal welfare landscape. Interviews with key stakeholders from many of these organizations are incorporated throughout this report, but in order to provide a broad overview of the scope of Houston's animal welfare situation, we began by looking at the five large shelters identified above.

Budget and Intake Analysis

To understand the size of these shelters, we compare the budget and intake numbers for each organization. These numbers give a sense of each stakeholder's relative impact on the problem. We then computed a budget per intake value to get a general idea of the amount of resources each shelter has to spend on an animal in their care. Table 1 provides budget and intake data for the identified shelters.

Public shelters are primarily funded by taxpayer dollars, while private shelters and rescues are supported solely by donations and grants. The combined budget of the two public shelters in Houston and Harris County is $19,326,604. The total budget of 55 of Houston PetSet's 2017 grantees, comprised primarily of rescue groups, and excluding private shelters accounted for in Table 1, is around $51 million. The extent of these resources further testifies to the scope of the problem in Houston.

Table 1. Total 2016 annual budget and intake of dogs and cats for five major Houston-area shelters.

Shelter	Budget	Intake	Budget per Intake
BARC	$14,826,604	27,529	$538.58
Houston SPCA	$8,691,484	15,594	$557.36
Houston Humane Society	$4,702,126	7,023	$669.53
Harris County Animal Shelter (HCAS)	$4,500,000	25,000	$232.00
Citizens for Animal Protection (CAP)	$3,603,288	4,525	$796.30
Total	$36,323,502	84,512*	$558.75 (Mean)

Note: Budgetary and intake information to be taken as estimates derived from the data/information available at the time of analysis. Some estimates are reflective of information reported in interviews. The budget for these 5 institutions include shelter operations and a variety of outreach programs that vary by organization.

*Due to transfers between shelters, a small number of animals may have been counted multiple times. However, due to minimal cooperation between shelters, we believe this number is negligible. For instance, only 26 animals out of 27,529 transferred from other shelters into BARC in 2016 (BARC).

When we compare budget to intake, we see a positive linear relationship between the number of animals being cared for and budget size. Shelters that have more resources tend to be responsible for more animals; Harris County Animal Shelter (HCAS) is a clear exception.

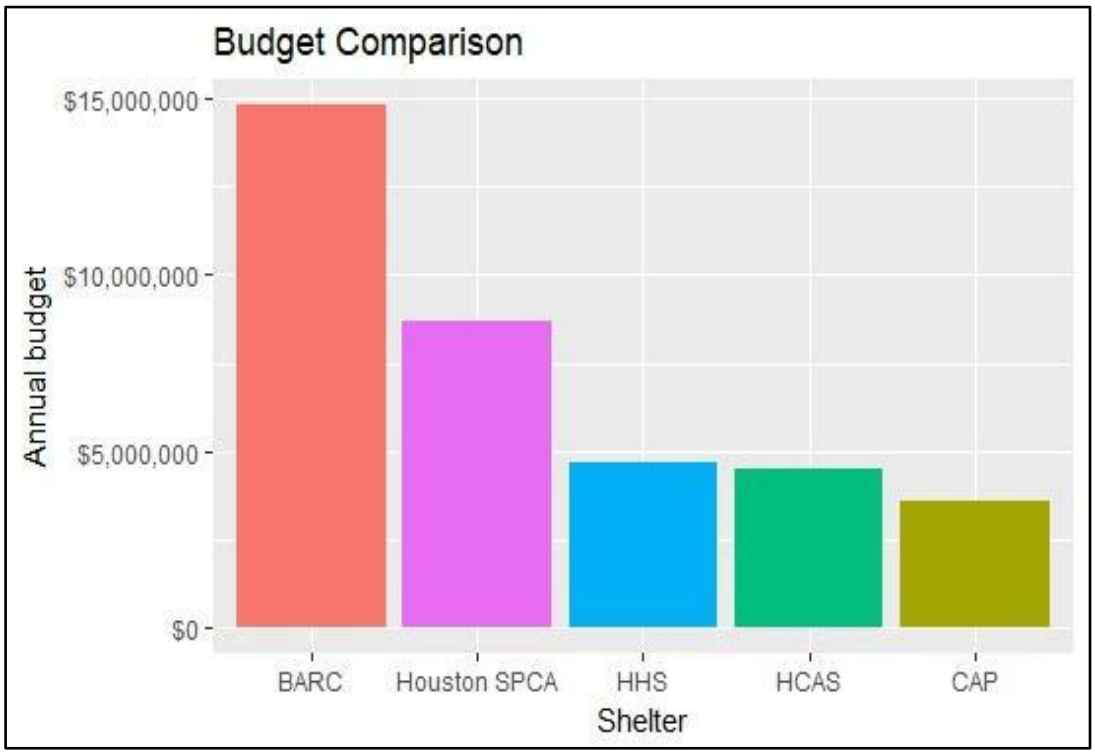

Figure 2. Comparison of 2016 budget data for major Houston-area shelters.

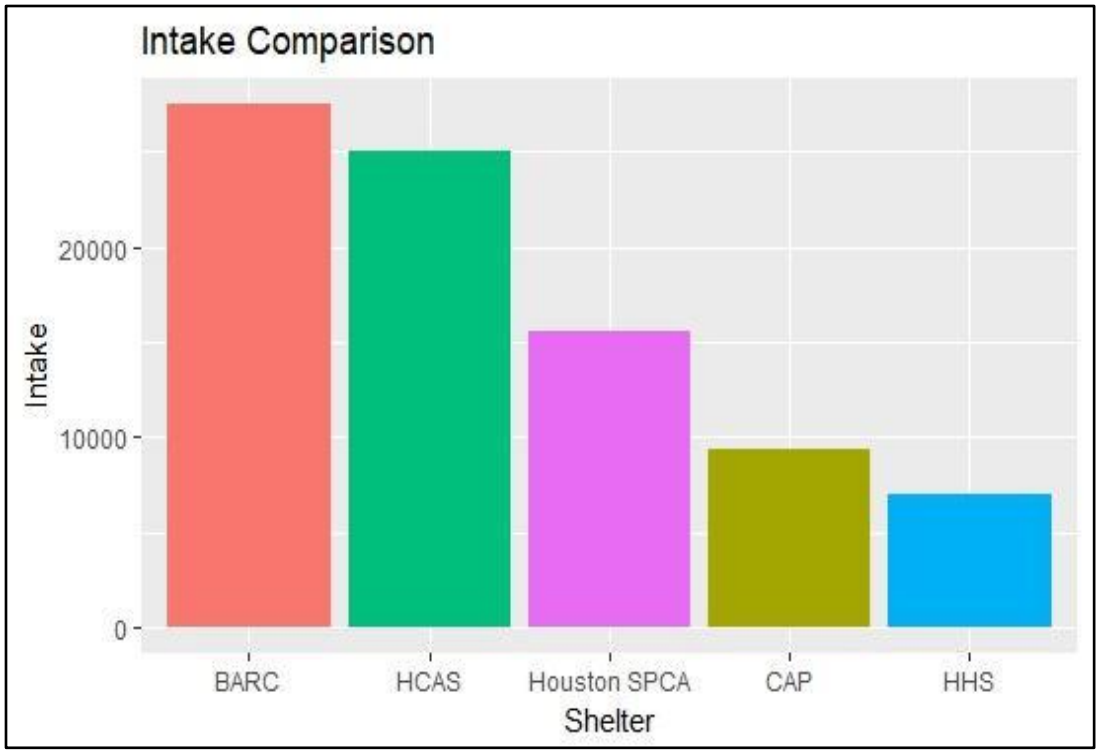

Figure 3. Comparison of 2016 total intake data for major Houston-area shelters.

HCAS takes in 29.6% of the stray animals in the Houston area, but its budget is only 12.3% of the total amount budgeted to animal shelters across the metropolitan area. This could potentially be impacting HCAS' ability to meet community's needs, preventing the shelter from fulfilling its mission of caring for animals and ensuring live release. While a possible conclusion of this graph is that the other Houston shelters are overfunded, later analysis comparing funding and LRR of peer city shelters shows that budget and LRR are positively correlated (see Figure 7). Moreover, many of the practices (listed later in this report) that increase LRR require start-up funds that HCAS is unable to access. Thus, we argue that HCAS is underfunded and unable to meet its goals, rather than the other shelters being overfunded.

Geo-Mapping Animal Control Data

In order to identify areas with high intake of stray animals and dead animals, we analyzed data from 311 calls in Houston. Residents can call the telephone number 311 or submit an online request and reach the city of Houston for service requests regarding animals. These calls are documented by BARC, as this shelter is run by the city of Houston. BARC receives over 50,000 service calls per year. In FY 2016-2017, BARC received 50,416 calls and answered 58.43% of those calls (BARC Performance At-A-Glance). Using open data from BARC and the City of Houston, we created several maps to visualize the distribution of 311 calls related to

animal welfare issues. These maps are intended to identify key high-intake areas (defined by zip code) that could benefit the most from targeted policy changes.

The Harris County Call Center, answering calls from outside the city 311 jurisdiction, received around 27,000 service requests in 2017. Around half of these were classified as "patrol calls," relating to loose or stray animals. More than 4,000 calls (16%) were bite case calls.

The following maps break the 311 calls into three categories relevant to animal welfare:

1. Stray animals (Figure 4)
2. Sick, injured and dead animals (Figure 5)
3. Animal bites (Figure 6)

While there are small differences between the graphs, overall they show that most calls are concentrated in the east side of Houston. These neighborhoods correspond to high minority populations marked by low socioeconomic status.

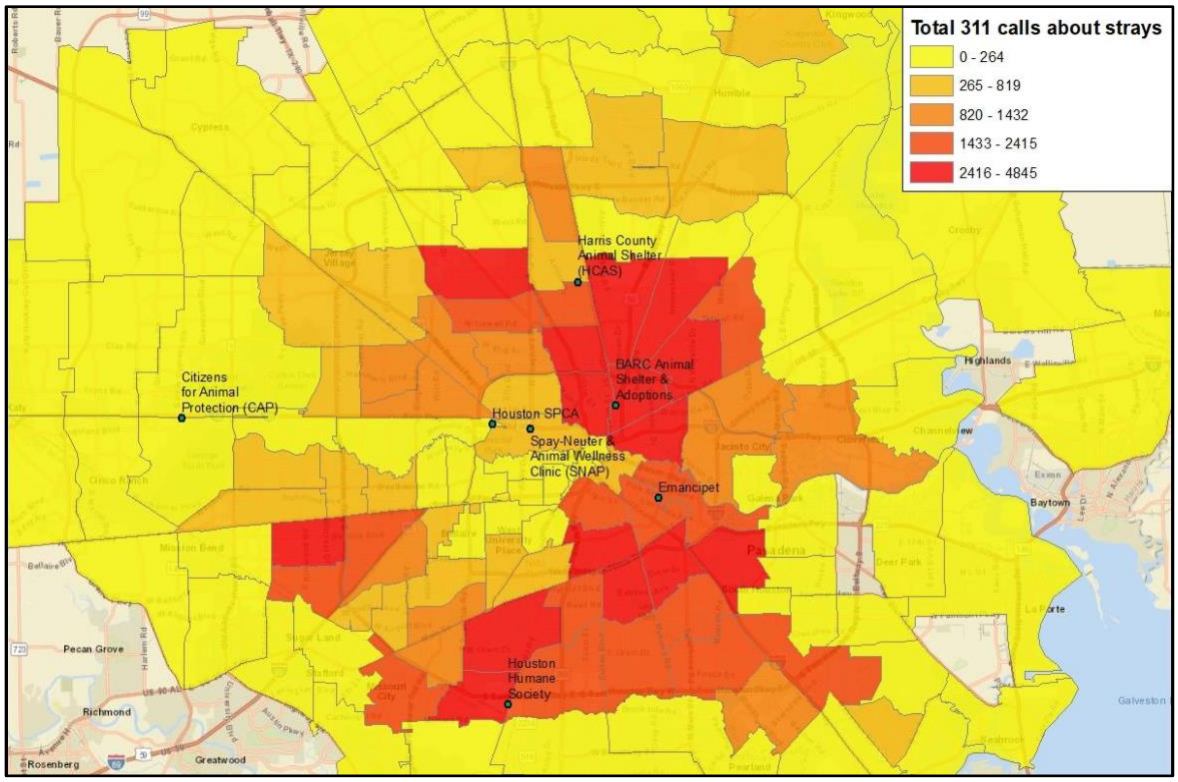

Figure 4. City of Houston 311 Calls about stray animals by zip code (2012-2016).

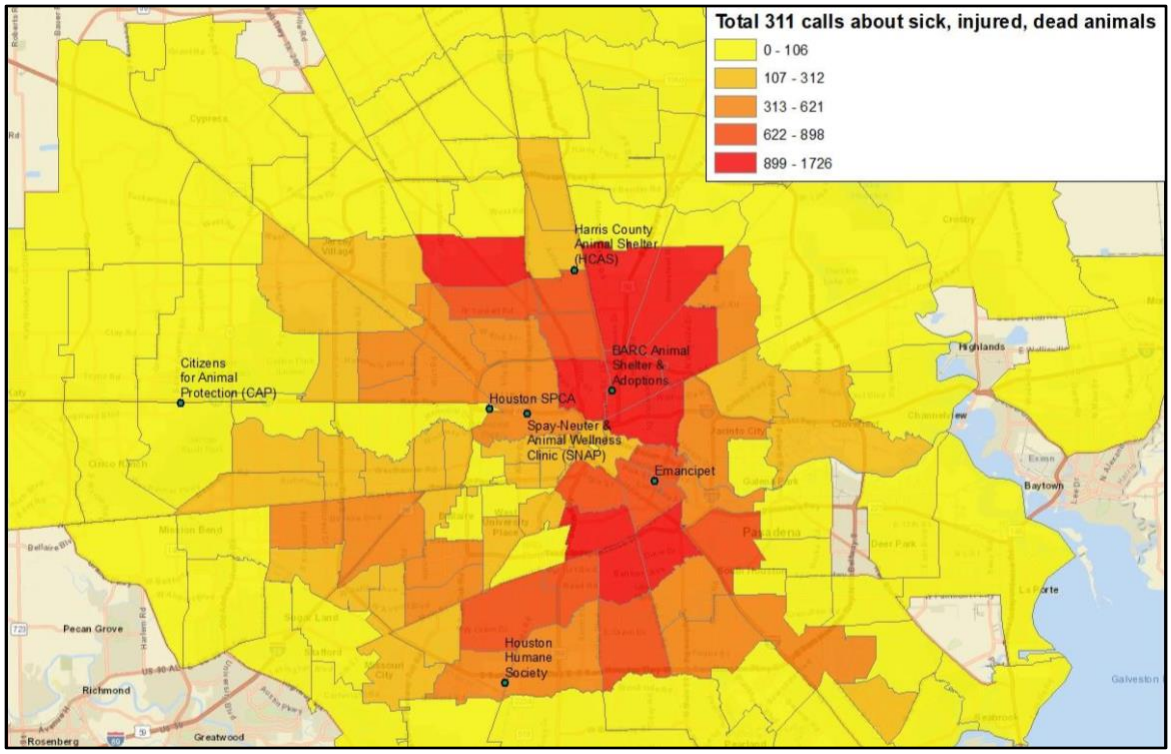

Figure 5. City of Houston 311 calls about sick, injured and dead animals by zip code (2012-2016).

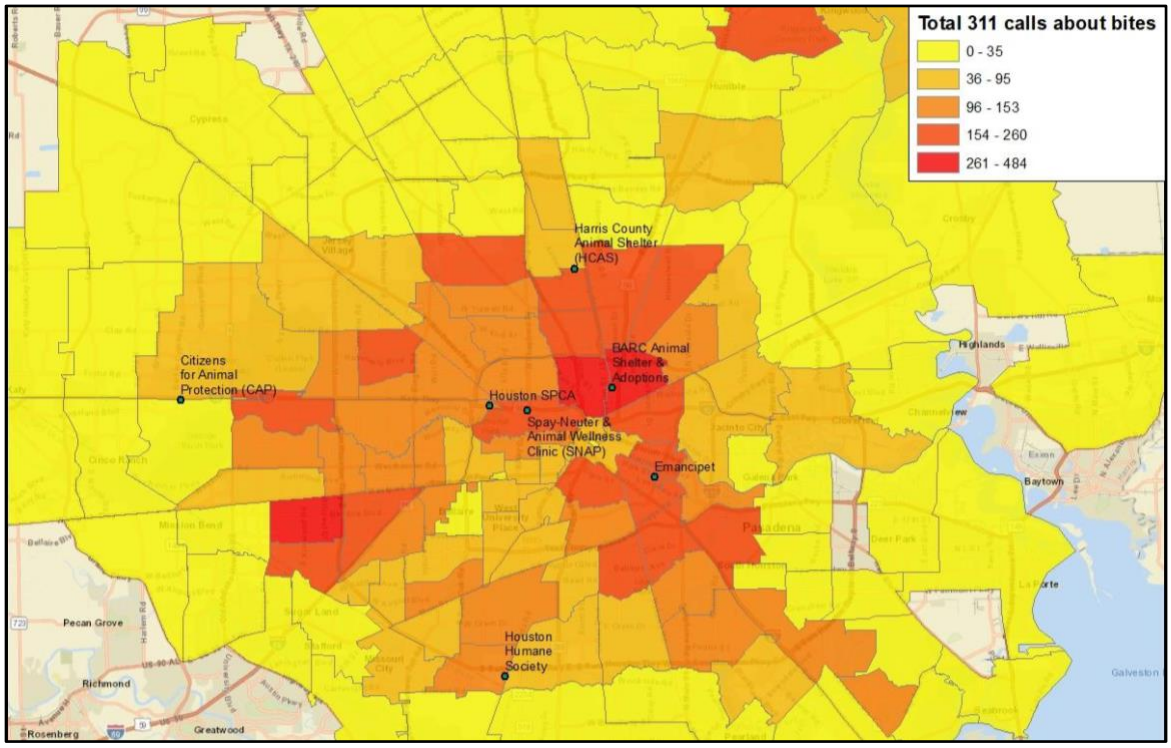

Figure 6. City of Houston 311 calls about animal bites (2012-2016).

Tables 2, 3, and 4 list the areas with the highest number of 311 complaints. Table 5 ranks the areas by the average percentage across categories. For each category, we calculate each zip code area's total complaints divided by the total number of complaints in Houston, as a percentage. These areas, shown also in Figures 4, 5 and 6, would be ripe for targeted animal welfare projects due to the high number of uncontrolled animals (stray animals and bites) and animals needing vet care (sick and injured animals), which are two of the most pressing animal welfare issues. Based on this data, the five zip codes with the highest average concentration of animal welfare complaints are: 77033, 77016, 77026, 77088, and 77045.

Table 2. Top 10 areas by zip code with high call volumes about stray animals.

Zip Code	77033	77016	77026	77088	77045	77021	77053	77087	77020	77093
Percent	4.38%	3.96%	3.38%	3.08%	3.05%	2.97%	2.88%	2.78%	2.72%	2.71%

Table 3. Top 10 areas by zip code with high call volumes about sick, injured and dead animals.

Zip Code	77026	77033	77009	77016	77088	77087	77028	77021	77093	77020
Percent	4.64%	3.69%	3.68%	3.60%	3.36%	3.11%	3.09%	2.99%	2.96%	2.86%

Table 4. Top 10 areas by zip code with high call volumes about animal bites.

Zip Code	77026	77009	77072	77022	77093	77099	77339	77017	77016	77036
Percent	4.80%	3.13%	2.98%	2.58%	2.28%	2.08%	2.02%	1.97%	1.96%	1.94%

Table 5. Top 10 areas by zip code with high call volumes, 3 categories combined.

Zip Code	77033	77016	77026	77088	77045	77021	77053	77087	77020	77093
Percent	4.38%	3.96%	3.38%	3.08%	3.05%	2.97%	2.88%	2.78%	2.72%	2.71%

Animal Welfare in Peer Cities

In order to gain a better understanding of the relative scope of Houston's animal welfare problems, we also analyzed the status of animal welfare in peer cities. Examining budgets, shelter practices, local policies, and animal outcomes, such as LRR in other cities, can provide insight into what factors lead to better animal welfare outcomes, with the goal of applying these insights to Houston. We identified peer cities for this study using characteristics that define Houston as a city, and have practical implications for animal welfare.

City size is important because a larger human population correlates to a larger animal population. We can assume that more populated cities have bigger shelters with higher intake numbers than smaller cities. As the 4th largest city in the country, Houston's peers should be marked by large populations. Therefore, we decided peer cities for comparison should have a population of at least 250,000 or higher. Population was defined within the city limits using the most recent 2016 Census estimates.

Additionally, Houston is a sprawling city with many adjacent suburbs, so cities with a similar span should be selected as peers. Urban sprawl is relevant because it addresses the geographic scope of animal welfare problems including animal control, and shelter/resource locations and accessibility. Sprawl was controlled by choosing cities comprised of more than 100 square miles within city limits.

Finally, we included climate as a criterion because warmer climates allow for year-round breeding seasons, which can exacerbate the size of the stray animal population, and animal survival is more difficult in colder climates. Heartworm can also be spread more easily in warm climates (McCall et al. 2008), which increases the costs of caring for homeless animals.

Houston's identified peer cities:

- Dallas, TX
- Austin, TX
- San Antonio, TX
- Phoenix, AZ
- Jacksonville, FL
- Los Angeles, CA
- Orlando, FL
- Atlanta, GA
- St. Louis, MO

Within these cities, we compared public shelters' intake, budget, and live release rates with those of BARC and HCAS. These publicly accessible metrics provided a preliminary assessment of the animal welfare status in these cities, and can be seen in Table 6 below.

Table 6. Budget and LRR of large public shelters in Houston and peer cities.

City Public Shelter	Annual Budget (USD)	Budget/Intake (USD)	Budget Per Capita (USD)	LRR (%)	2017 LRR (%)**
Austin Animal Center	AY 2015: $10,700,000	629.41	11.29	96.14	97.00
Jacksonville Animal Care & Protective Services	AY 2016: $3,446,889	285.13	3.94	90.00	90.00
Atlanta LifeLine Animal Project	AY 2016: $8,196,322	522.19	4.69	88.45	87.00
San Antonio Animal Care Services	AY 2016: $12,500,000	416.67	8.37	88.00	91.00
LA Animal Services	FY 2016: $43,950,107	950.64	11.05	87.16	85.00
Houston BARC	**AY 2016: $14,826,604**	**538.58**	**6.44**	**82.40**	**85.4**
Maricopa County Shelter	FY 2017: $16,793,043	465.87	4.03	77.00	94.00
Dallas Animal Services	AY 2017: $13,042,036	999.92	9.44	72.90	80.00
Orange County Animal Services	FY 2016: $7,479,931	386.50	5.81	68.50	73.00
Harris County Animal Shelter	**AY 2016: $4,500,000**	**232.69**	**2.25**	**50.10**	**78.80**
St. Louis Animal Care and Control	FY 2016: $1,336,151	NA*	NA*	NA*	NA*
Mean	**$12,433,734.82**	**542.76**	**$6.73**	**79.13**	**86.12**

Note: LRR and budget estimates were obtained from public records readily available or from interviews with shelter directors ranging from 2015 to the 2016-2017 fiscal year.
*Intake data was unavailable for St. Louis Animal Care and Control. For cities without a city-run shelter, the corresponding county shelter was selected for data analysis: Phoenix (Maricopa County), Atlanta (Fulton/DeKalb Counties), and Orlando (Orange County).
**2017 LRR was obtained by Houston PetSet. Dr. White of Harris County attributed the increase in LRR to "lots of free and reduced fee adoptions, increased positive exposure and media coverage, the Community Cat Program, their partnership with Best Friends, increase in foster base, and transport helps."

Starting with annual budgets, it is apparent that Harris County's budget is significantly lower than that of almost every peer city. Peer city shelters had budgets ranging from $1.3 million (St. Louis) to $43.9 million (Los Angeles), with a mean of $12.4 million. Because the cities have different human population sizes and animal intake, we also calculated budget per animal intake at the shelter and budget per human capita. Budget per intake reveals the amount of spending per animal that comes through the shelter. To calculate per intake figures, the annual budget was divided by the number of total intakes for the year for each shelter. We include budget per human capita in our report because animal populations generally increase in tandem with human populations, and this measure would adjust for the size of the animal population in each city/county. Budget per human capita was calculated by

dividing the city's listed budget for animal services by their population (based on U.S. Census 2015 estimates).

Comparing these metrics to outcomes in terms of LRR, we can see which shelters are efficient with their funds while maintaining successful outcomes. Among large public shelters in peer cities, shelters spend from $232.69/intake (HCAS) to $999.92/intake (Dallas). Shelters spend from $2.25 (HCAS) to $11.29 (Austin Animal Center) per person in the appropriate geographic region, with a mean of $6.73. HCAS spends much less than any other shelter in terms of budget per capita ($2.25) and in terms of budget per intake ($232.69/intake), while also reporting the lowest LRR in 2016 (50.10%).

Budget may be an important factor in determining LRR because greater funding could allow shelters to dedicate more resources to animal survival and care. To test this theory, we examined how budget per intake and per human capita were individually related to shelter LRR. Plotting budget per human capita by live release rate reveals a persistent positive correlation ($R^2 = 0.54$) between per capita investment in public animal welfare and the LRR for that shelter, as seen in Figure 7. Similarly, budget per intake capita and live release rate (Figure 8) has a weaker but still positive correlation ($R^2 = 0.28$).

Figure 7 shows that Dallas Animal Services is a notable outlier, with a $9.44 budget per capita but only a 72.9% live release rate (which, compared to the others, seems to be a low LRR for such a high budget per capita number). However, Dallas has recently restructured its approach to animal welfare, going so far as to rebrand its animal care and control department. As a result, Dallas has been investing significantly more money in animal welfare over the past five years, and may not yet see full returns on their investment. This shelter's budget was $7,979,512 in FY 2013-2014 and $13,042,036 in FY 2016-2017. The increased resources appear to be paying off; Dallas had a live release rate of 45% in FY 2013-2014, which increased to 72.9% in FY 2016-2017. Similarly, Jacksonville has had a sustained, historical commitment to animal welfare, and the shelter now boasts a low budget per capita of $3.94 but a high LRR of 90%.

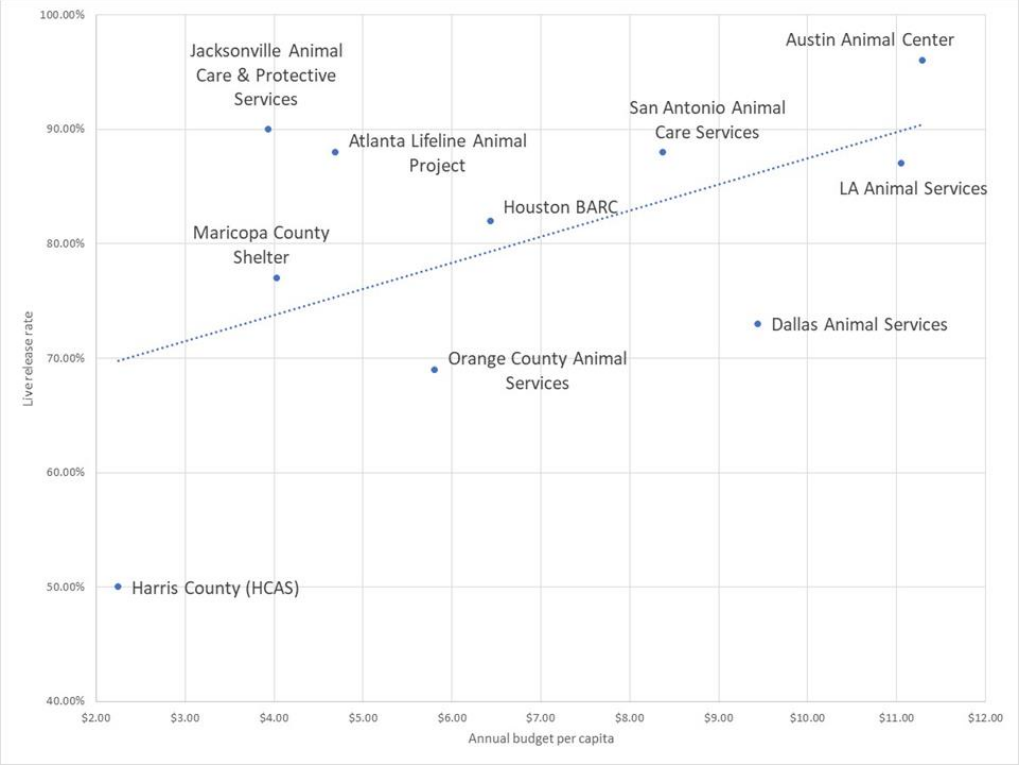

Figure 7. LRR graphed against annual budget per capita for public shelters in Houston and peer cities (data from Table 6).

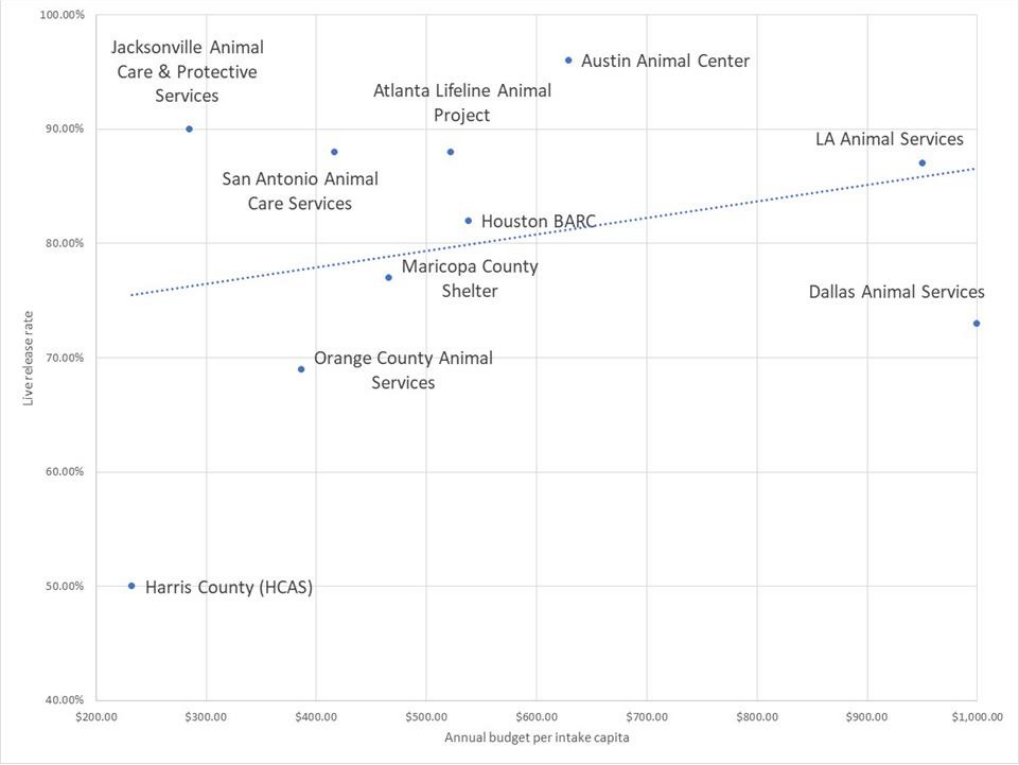

Figure 8. LRR graphed against annual budget per intake capita for Houston and peer cities (data from Table 6).

Best Practices in Peer Cities

Based on data from interviews with stakeholders from both Houston and the peer cities identified above, we compiled a list of shelter practices that increase LRR by decreasing both shelter intake and euthanasia. The following practices have been implemented in shelters in Houston or its peer cities and have effectively improved live outcomes for shelter animals: low-cost vet care (including targeted spay/neuter surgeries), pet retention programs, pet licensing/microchipping, community-wide partnerships, targeted programs for vulnerable pet populations, community cat programs, and open adoption.[2]

Low-Cost Vet Care

As many animals entering shelters come from low-income areas, many shelters implement programs to provide free or reduced cost vet care to the public as a way to reduce shelter intake (Pizano 2017). The cost of vet care is one of the top reasons people give up their animals, so developing targeted programs to provide the public with access to low-cost vet care is an important practice for shelters (Dolan et al. 2015). Most Houston area shelters provide some form of low-cost vet care, including: BARC, HCAS, Houston Humane Society, and CAP. However, the prices of low-cost vet care and the services covered can vary greatly between shelters. It is common for shelters to offer standard wellness care, including vaccinations and flea/tick preventatives. BARC offers a number of low-cost services, but the public is often required to wait several hours for these services because of first-come, first-serve policies. This demonstrates demand for low-cost vet care in Houston, suggesting that there are animals who would benefit from increased access to low-cost vet care.

One of the main areas of focus for low-cost vet care is targeted spay/neuter surgeries. According to a study completed by PetSmart charities in 2014, 54% of respondents (pet owners) were unaware that low-cost options were available to them, and many respondents cite price as the primary reason for keeping their pets intact (PetSmart Charities, 2014 U.S. Shelter Pet Report). Though the cost of spay/neuter procedures fluctuates greatly based on the clinic, current grant funding, type of animal, and the animal's condition, unsubsidized spay/neuter procedures can be a financial burden. Based on the pricing for Banfield Pet Hospital, a large veterinary hospital associated with PetSmart, the price for a dog spay is $309.95 and the price for a dog neuter is $289.95. To be affordable for lower income pet owners, low-cost spay/neuter surgeries should cost less than $20. This definition is based on a study of pet owners in New Hampshire which showed that indigent caretakers did not follow through with sterilizations that cost more than $20 (Marsh 2012).

[2] *Targeted programs for vulnerable populations, community cat programs, and open adoption/managed intake* were omitted from the summary. Houston PetSet believes there is a philosophical concern with open adoption policies that can lead to unqualified adoptions, as well with the livelihood of cats in community cat programs.

Implementation of low-cost programs in targeted, low-income areas can be an effective method of population management, thereby decreasing shelter intake. The following cities were identified by Target Zero as having experienced decreased shelter intake/euthanasia following targeted spay/neuter programs: Jacksonville, Florida, Waco, Texas, Huntsville, Alabama, and Indianapolis, Indiana. From 2002 to 2016, Jacksonville was able to decrease intake from nearly 35,000 to less than 25,000 and lower total euthanasia from over 20,000 to fewer than 5,000, after implementing targeted spay/neuter programs. This inverse relationship between the number of spay/neuter surgeries and intake/euthanasia is evident in all of the cities using these programs (Pizano 2017).

Although the inverse relationship between spay/neuter rates and shelter intake has only been demonstrated anecdotally, low-cost spay/neuter surgeries are effective in increasing the total number of spay/neuter procedures, rather than acting as a substitute for regular cost programs (Frank and Carlisle-Frank 2007). In order for a targeted spay/neuter program to effectively decrease intake, an estimated five subsidized surgeries are required per 1,000 low-income residents (Marsh 2012). Running an assistance program that reaches this volume would require about $500 per year for every 1,000 low-income residents, assuming total surgery costs equal about $100 (Marsh 2012). Extrapolating this ratio to HCAS (including the population of Houston), Target Zero estimates that at least 22,500 low-cost surgeries are required for targeted spay/neuter to significantly affect intake. Table 7 shows the typical pricing at the shelters/clinics in Houston that provide reduced rate spay/neuter services to the public. Other shelters that offer low-cost vet care (like HCAS) do not offer subsidized surgeries to the public. All prices listed are for dogs, as these surgeries are more expensive and more common, based on data from Emancipet.

Table 7. Costs of Spay/Neuter in Houston.

Shelter/Clinic	Cost of Spay	Cost of Neuter	Total Reduced Rate Sterilizations (2016)
BARC (Fixin' Houston Clinic)	$75	$70	3,621
Emancipet*	$69	$69	4,715
Houston Humane Society	$75	$60	N/A
Spay-Neuter Assistance Program (SNAP)**	$81 (under 30 lbs.)	$66 (under 30 lbs.)	9,802
Total	-	-	18,138+

*Emancipet offered free spay/neuter surgeries to those affected by Hurricane Harvey through December 9, 2017. However, due to the high volume of calls regarding free surgery, this offer was booked through December within the first few days.
**SNAP also offers free surgeries on mobile clinics for animals living in qualifying low-income households.

Based on a maximum cost of $20, none of these publicly available surgery options in Houston qualify as "low-cost." Although many of the options listed above are affordable, they may not be truly accessible to low income pet owners (Marsh 2012). Upon further investigating the programs in the four cities showing a significant decrease in shelter intake and euthanasia, we found that all of these cities have established a high-volume spay/neuter clinic that offers free or truly low-cost surgery to income qualifying residents. These programs are independent of the shelters in these cities; in order for residents to qualify for spay/neuter assistance, they are required to provide proof of household income below federal poverty guidelines or qualification for certain needs-based public assistance programs (i.e. Medicaid, Food Stamps, Public School Free Lunch Program, etc).

Emancipet and SNAP are two large high-volume spay/neuter clinics that currently exist in Houston, but neither of these clinics offers a formal application for qualifying pet owners to request free or low-cost surgeries. According to the website for Houston SNAP, qualifying low-income households can receive free surgeries from their mobile clinics, but only the $81/$66 surgeries listed above are available at their stationary clinics. Currently, Emancipet is expanding its services in Houston and has established itself as one of the primary providers of low-cost vet care services. However, based on an interview with Kelly McCann of Emancipet, the clinic is limited to a maximum of 30 surgeries per day and only operates four days a week, performing approximately 10,000 surgeries annually (Kelly McCann, personal communication, July 27, 2017). Residents are not turned away from the clinic if they are unable to pay the $69 fee; about 10% of clients need reduced-cost services, but none of these surgeries cost less than $20.

BARC also works with Emancipet, SNAP, Houston Humane Society, and Friends for Life to provide free spay/neuter surgeries each month through their Healthy Pets Healthy Streets program. This strategic approach to pet overpopulation targets high intake areas and provides approximately 300 free surgeries over the course of three days (Greg Damianoff, personal communication, November 14, 2017). While Healthy Pets Healthy Streets helps provide surgeries in the five council districts BARC sees as being in greatest need, there are many Houston neighborhoods that lack access to veterinary care. In addition to helping with this BARC initiative, Emancipet hopes to continue to build clinics in low-income neighborhoods (at least two more in Houston) to provide much needed access to veterinary care (Amy Mills, personal communication, July 27, 2017).

BARC reports that within the shelter, the average total cost to euthanize an animal is $141.79, the average total cost to adopt an animal is $197.95, and the average total cost to transfer an animal is $272.95.

Table 8 summarizes the total number of surgeries that BARC Healthy Pets Healthy Streets, Emancipet, and SNAP offered in 2016 that are free or cost less than $20 through mobile spay/neuter clinics stationed in high intake areas. However, these programs are not sufficient to complete the 22,500 surgeries required to effectively reduce shelter intake and euthanasia.

Table 8**.** Summary of spay/neuter programs providing surgeries for less than $20 in 2016.

Spay/Neuter Program	Total Number of Surgeries in 2016 (completed for less than $20)
BARC Healthy Pets Healthy Streets	1,152
Emancipet Houston Clinic	0
SNAP	2,440
Total	3,592+

Pet Retention Programs

Some shelters in our study also provide pet retention programs to limit the number of animals surrendered by their owners. These include Austin Pets Alive, Dallas Animal Services, and Jacksonville Humane Society. In a survey by Maddie's Fund of 750 shelters spanning all 50 states, when asked "To what extent does your organization empower the owner to find a home for their pet themselves, as an alternative to surrender to a shelter or rescue?" 20% responded to a very great extent, 29% responded to a great extent, and 30% responded to a moderate extent. (Maddie's Fund 2016). This shows that pet retention programs are a prevalent practice in animal welfare.

While these programs vary across shelters, all of them aim to reduce the number of owner surrenders that a shelter intakes. Resource-based pet retention programs exist across the country, providing temporary financial or material resource assistance to pet owners. For example, if someone says they may have to surrender their dog due to cost of food, then the shelter may offer them free or discounted food. Or, if a person expresses that they cannot keep their puppy because the animal is destroying their property while they are at work, the shelter may offer them a free or discounted crate and advice on crate-training dogs.

An example of a successful resource-based program is Austin Pets Alive's program Possible Alternative to Shelter Surrender (PASS). This program is run as a separate non-profit with the sole mission of pet retention. PASS has partnered with over 42 shelters (as of 2014) (Austin Pets Alive), and prevented 536 pets from entering the Austin shelter system in 2015 (Austin Pets Alive). PASS's main goals are fundraising to pay for medical care/housing deposits, distributing donated pet food to those who need it, encouraging and supporting community re-homing (that is, networking with family and friends to find the animal a new home before it enters a shelter), and connecting people in a short-term crisis with emergency boarding for their animal. Marketing for PASS is done solely through social media and the program is run by two dedicated volunteers, making it a relatively inexpensive solution (Austin Pets Alive).

Jacksonville Humane Society is another example of a resource-based pet retention program. Jacksonville Humane Society offers to pay housing deposits (or subsidize up to $250) for those who would give up their pet due to not being able to afford the deposit, and also offers temporary housing for an animal, through partnership with a local private boarding facility, if the owner is surrendering due to a personal emergency. They reported that 30% of those who intended to surrender their pet did not do so as a result of the Jacksonville Humane Society's assistance. Jacksonville Humane Society also cited financial savings as a motivation to start such a program (Denise Deisler, personal communication, October 26, 2017).

A concern of pet retention programs is that they might increase animal abandonment. However, Jacksonville Animal Care and Protective Services reports a decrease in the number of 311 calls since they have implemented this program, with their response time to stray animal 311 calls decreasing from 2-3 weeks in 2014 to 2-3 days in 2017 (Jennifer Walter, personal communication, 19 October 2017). This leads us to believe the number of abandoned or stray animals does not increase with pet retention programs. Another concern is that encouraging community re-homing could put animals in bad situations. In the same Maddie's Fund survey, the highest cited concern among shelters who had little or no pet retention or community rehoming program was "fear of not being placed in a good home/ cruelty" (Maddie's Fund 2017).

Pet Licensing and Microchipping

The majority of municipalities have pet licensing programs, mandating that pet owners register their dogs and cats with the city or county at an annual fee (Petchamp 2017). Such programs serve to mandate vaccinations, provide a platform to reunite lost pets with their

proper owners, and/or track the number of pets in the region's system. Price per license varies across peer cities, along with requirements on which pets (usually dogs and cats or just dogs) are mandatory. In the majority of cases, including Houston's, the cost of a license is much higher for pets who are not spayed/neutered (S/N) ($60) vs. those who are ($20). This practice demonstrates a recognition of the importance of S/N incentives as a tool to reduce an area's stray population and therefore reduce area shelters' intake.

Licensing programs can often be a significant source of revenue for a given animal services department. Such is the case in Jacksonville, Florida, where $5 out of every $20 license fee goes directly into the fund for low cost S/N (Conner 2011). However, in some cases, licensing programs result in more costs than benefits when public compliance is especially low. San Antonio and Dallas abolished licensing programs in 2015 and 2017, respectively. As a replacement, both cities now mandate microchipping as their new form of pet registration. Dallas specifically employed this switch as part of an ongoing city-wide revamping of their animal welfare system, supporting a crackdown on the city's large stray population.

Table 12. Licensing and microchipping costs/requirements in Houston and peer cities.

City	Mandatory Licensing	License Cost	Mandatory Microchip
Houston/Harris County	Y	$60 intact $20 S/N	N
Phoenix (Maricopa County)	Y (dog only)	$42 intact $17 S/N	N
Los Angeles	Y	$20 S/N	N
Jacksonville	Y	$20	N
Atlanta (Fulton County)	Y	$25 intact $10 S/N	N
St. Louis	Y	$50 intact $4 S/N	N
Orlando (Orange County)	N	N/A	N
Austin	N	N/A	N
Dallas	N	N/A	Y
San Antonio	N	N/A	Y

Microchip registration programs are generally associated with high return to owner rates, due to the microchip's permanent nature and the radio frequency identification technology's ability to retrieve owner information with a quick scan (American Veterinary Medical

Association). Dallas is already seeing the effects of widespread microchipping on their return to owner rates, with the total pets returned to owners increasing from 2,362 in 2016 to 4,571 YTD in 2017 (Ed Jamison, personal communication, November 15, 2017). Dallas shelter director Ed Jamison attributes this increase to return to widespread microchipping. In San Antonio, the microchip program is associated with higher compliance than the licensing program, likely because San Antonio Animal Care Services offers free microchips to residents. When microchipping is not free, it can still be cheaper in the long run. Unlike pet licensing, which requires pet owners to pay to renew their license every year, microchipping a pet is a one-time fee. This makes enforcement easier as pets are tracked down one time only instead of once every year. Further, if animal control officers have universal microchip scanners in their cars, they can return animals immediately rather than entering lost animals into the shelter system, reducing the burden on shelters. In Dallas, even the Sanitation Department carries microchip scanners in the field to assist with returning pets to their owners.

In Houston, the city and county licensing programs are significant sources of revenue for both shelters, so totally abolishing them without compensating for revenue could have harmful consequences. However, the administrations of both BARC and HCAS believe a microchip program would be very useful and effective at increasing return to owner rates. Dr. White of HCAS would like to see mandatory microchipping coincide with the annual licensing fees (Dr. Michael White, personal communication, November 10, 2017). He believes the goal of a licensing program should be to help return pets to their owners, but with such low compliance for licensing in the county, the return to owner rate for cats is currently less than 1%. Greg Damianoff of BARC already foresees microchipping as the future of Houston pet welfare (Greg Damianoff, personal communication, November 14, 2017). Mandatory microchipping would help get lost pets home, without having to take them into the public shelter system. The city and county would benefit from working together on licensing/microchipping, to avoid further jurisdictional confusion for owners.

Community-wide Partnerships

Across all peer cities including Houston, all key stakeholders in animal welfare agree that some form of collaboration is key to significantly improving animal welfare in a community. Even in cities with little to no collaboration, the desire or need for collaboration is strongly identified. In interviews with peer cities, we saw that collaboration often took one of several forms.

In Phoenix (Maricopa County), organization leaders meet regularly with one common goal - to save as many homeless pets as possible. This resulted in the formation of the Alliance for

Companion Animals in 2004, a community-wide partnership consisting of the county shelter (MCACC), the Arizona Humane Society, the Arizona Welfare League, HALO Animal Rescue, Animal Defense League of Arizona, Altered Tails Barnhart Clinic, and the Phoenix Animal Care Coalition 911 (representing rescues). While the coalition has taken many different forms since its inception, their success is marked by the "Fix.Adopt.Save." campaign that has past executed in the past few years. PetSmart Charities worked with the coalition in 2012 to establish this comprehensive three year plan to improve Phoenix's animal welfare by increasing the amount of free/low-cost S/N surgeries, and ultimately reducing intake and euthanasia rates. As of 2016, the euthanasia rate decreased by 79% across all shelters, saving the equivalent of over 30,000 animals. Heather Allen of HALO Rescue attributes the coalition's success to their determination to enumerate Phoenix's problems and organize those in the community who are best equipped to meet the various needs (personal communication, October 25, 2017). For example, HALO focuses on animals already in the shelter system, taking thousands of animals off the county's hands each year, while the Humane Society has the strong medical team and emergency hospital resources to most effectively deal with animal health. This community-wide partnership has allowed Maricopa County to leverage its resources, gain immense support from national organizations such as PetSmart Charities, and improve its reputation as one of the worst cities in terms of animal overpopulation crises.

In other cities, this type of divide-and-conquer collaboration is not as formalized and occurs more naturally. In St. Louis, each shelter also has its own niche and tries not to duplicate resources. For instance, the county, city, and Humane Society all share a website for lost and found animals, and all collected strays are automatically added to the platform (Sarah Javier, personal communication, October 18, 2017). In Austin, Jacksonville, and San Antonio, collaboration consists of large private shelters taking a significant number of animals from public shelters, helping to lessen the burden. In Austin, Austin Pets Alive was founded with the mission of saving animals on Austin Animal Center's euthanasia list (Austin Pets Alive). Since beginning a partnership with San Antonio Animal Care Services, the Animal Defense League of Texas has almost exclusively taken in animals from the public shelter's euthanasia list, rather than from the community.

County shelters in the Atlanta metropolitan area have adopted a different, and rather unique, partnership model of privatizing management of public, open-admissions shelters. Fulton and DeKalb Counties have contracts for shelter management with LifeLine Animal Project, a private, non-profit animal welfare organization in Atlanta. Prior to privatization, the LRR of Fulton and DeKalb County Animal Services were 39% and 61%, respectively. The current LRR for both shelters is reported at 89%. According to Rebecca Guinn, the founder of the LifeLine

Animal Project, this change was possible through an investment in life-saving programs at the county shelters, and investing in more staff was the first step in improving outcomes (Rebecca Guinn, personal communication, November 22, 2017). LifeLine Animal Project aims to make Atlanta a no-kill city in the future through its contracts with the two county shelters. This type of community partnership is unique among the peer cities identified in this study and has been shown to improve live outcomes.

Dallas and Houston seem to be lacking community-wide partnerships. Dallas is in the process of making sweeping changes city-wide, and the city's shelter director believes there is great potential for better collaboration in the near future. In Houston, specifically, although collaboration is currently limited, BARC and HCAS agree that there needs to be more of it. HCAS attributes their lack of collaboration to underfunding and a subsequently poor reputation, while BARC argues that openness and transparency is needed between shelters before collaboration should exist. However, it is not clear why the lack of funding and transparency should not by themselves be reasons for no collaboration to take place. Clearly collaboration has not come about naturally for the Houston community as it has in other places, like Austin, Jacksonville, or San Antonio. However, Houston's animal welfare groups share common goals of saving animals, and would most likely benefit from formalizing a partnership. As seen in peer cities across the country, shelters and other animal groups working together yields higher live release rates for the entire city, and a higher percentage of the pet population being spayed/neutered.

Community cat/TNR initiatives, open adoption and managed intake practices, targeted programs for vulnerable populations, and behavioral programs were practices omitted in the abridged version of the report for summarization purposes. Original information on these topics is available upon request.

Conclusion

Based on data from Houston-area shelters as well as peer cities, Houston has a significant problem with animal welfare, with over 84,000 animals entering the shelters every year, in addition to 50,000 311 service requests in Houston city limits alone. Stray cats and dogs are a major concern to residents of Houston and impact quality of life and public safety. Peer cities that are similar to Houston in terms of city size, sprawl, and climate have made vast improvements and overcome similar animal welfare crises through city-wide cooperation and targeted programs.

We believe that Houston has the potential to improve outcomes for animals city-wide. Houston has the benefit of looking to other peer cities who have successfully improved their states of animal welfare in recent years. However, sustained, long term change will require the cooperation of local governments, shelters, animal welfare organizations, and the public to adjust the way that Houston approaches key issues in animal welfare. We recommend a combination of changes to programs, partnerships, and policies that together can help improve the state of animal welfare in Houston.

References are available upon request.

Houston PetSet Conclusion

Houston and Harris County's municipal shelters, compared to those of other major U.S. cities and metro areas with similar populations, are severely underfunded. This lack of funding has negative consequences for public safety, public health and quality of life of the region.

With current levels of staffing and resources, City of Houston Animal Control Officers are unable to respond to many 311 calls that the City receives regarding stray animals. In addition, it has been noted that residents will falsely report an animal bite in order to get the attention of Animal Control. The current lack of resources for Animal Control puts both community residents and stray animals at risk.

Budget and Live Release Rate of Large Public Shelters of Houston/Harris County and Peer Cities

City Public Shelter	Annual Budget (USD)	Budget/Intake (USD)	Budget Per Capita (USD)	LRR (%)	2017 LRR (%)**
Austin Animal Center	AY 2015: $10,700,000	629.41	11.29	96.14	97.00
Jacksonville Animal Care & Protective Services	AY 2016: $3,446,889	285.13	3.94	90.00	90.00
Atlanta LifeLine Animal Project	AY 2016: $8,196,322	522.19	4.69	88.45	87.00
San Antonio Animal Care Services	AY 2016: $12,500,000	416.67	8.37	88.00	91.00
LA Animal Services	FY 2016: $43,950,107	950.64	11.05	87.16	85.00
Houston BARC	**AY 2016: $14,826,604**	**538.58**	**6.44**	**82.40**	**85.4**
Maricopa County Shelter	FY 2017: $16,793,043	465.87	4.03	77.00	94.00
Dallas Animal Services	AY 2017: $13,042,036	999.92	9.44	72.90	80.00
Orange County Animal Services	FY 2016: $7,479,931	386.50	5.81	68.50	73.00
Harris County Animal Shelter	**AY 2016: $4,500,000**	**232.69**	**2.25**	**50.10**	**78.80**
St. Louis Animal Care and Control	FY 2016: $1,336,151	NA*	NA*	NA*	NA*
Mean	**$12,433,734.82**	**542.76**	**$6.73**	**79.13**	**86.12**

Note – the "live release rate" of the Harris County Animal Shelter (HCAS) has increased in the past year due to additional funding for transport by Houston PetSet and the Lance McCullers Jr. Foundation, with the transports being organized by Houston PetSet. In addition, the cost of these transports and employees working at HCAS, funded by other not for profits, are not accounted for in the HCAS budget as outlined above. BARC has a contract to transport approximately 7,000 animals a year with Rescued Pets Movement and the cost of transport is included in the BARC budget.

Even with the working budgets of the five largest Houston area regional shelters, it is estimated that Houston/Harris County serves only 13% of our homeless animal population. In terms of measuring our efforts, live release rates should not be seen as the only measure of success of animal control efforts, as these rates do not reflect animals that do not move through the shelter system (i.e. animals that live their entire lives on the streets). In order to address these key quality of life issues, Houston PetSet advises public actors and local governments to collaborate to provide additional funding for shelters, targeted spay/neuter projects, rescue and transport, and education and community services.