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# Baseline Survey for Street Dogs in Guam



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**HUMANE SOCIETY  
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## TABLE OF CONTENTS

Introduction and Purpose .....	3
Survey Design and Protocol.....	4
Data Analysis .....	5
Timeline and Key Personnel.....	7
Results .....	7
Discussion and Recommendations .....	10



## **INTRODUCTION AND PURPOSE**

Guam is an unincorporated territory of the United States, with a population of approximately 160,000 residents and a large U.S. military presence. It is also the largest island in the Micronesia region of the Pacific, and the Mariana Island chain. The island is administratively divided into nineteen municipalities, or “villages”, the largest of which is Dededo, with a population of approximately 45,000.

As is the case for many inhabited islands in Pacific region, dogs are common, including free-roaming street dogs that may be owned or unowned. Reproduction among dogs is largely unchecked, and many owned dogs do not receive adequate levels of basic care in the home or veterinary care when needed. For all of these reasons, Humane Society International (HSI) is exploring options for improving the management of street dog populations and promoting better treatment and care of all dogs on Guam and on the nearby islands of Rota and Saipan. One of the initial steps in this process was to plan and implement a baseline dog survey on Guam, which was accomplished in intermittent phases in February – May 2014. The results of this baseline survey are the focus of this report.

Baseline dog surveys serve several concurrent functions, which include:

- 1) Developing a dog population estimate for Guam. This estimate allows for a more realistic projection of the resources needed to accomplish particular management goals.
- 2) Determining the extent to which owned dogs contribute to the roaming street dog population, which in turn suggests the most effective type of management approach.
- 3) Characterizing the dog population in terms of sterilization rates, reproductive output, and general body condition.
- 4) Establishing quantitative benchmarks that can be used for comparing and evaluating future progress.
- 5) Exploring the animal care practices of dog owners, along with the attitudes and experiences of the broader population as they relate to dogs or dog care.

In this report, we define the term “street dog” as any unconfined outdoor dog, regardless of ownership status. Street dogs are typically comprised of a mix of owned dogs that are free to roam, unowned dogs that are intentionally fed by people, and unowned dogs that are not intentionally fed.

## SURVEY DESIGN AND PROTOCOL

The survey design for Guam was straightforward because of its relatively small size. First, the nineteen villages (which collectively comprise the entire surface area of the island) were categorized according to human population size, as shown in Table 1. Within each size category, approximately half of the villages present were selected for surveys, with the assumption that they would collectively be representative of the remaining unsurveyed villages.

**Table 1.** Villages of Guam, showing human population and whether the village was selected for baseline dog surveys.

Village	Human population (2010)	Category	Surveyed?
Dededo	45,000	Largest	Yes
Yigo	19,500	Large	Yes
Tamuning	18,000	Large	No
Mangilao	13,300	Large	Yes
Barrigada	8,600	Medium	Yes
Santa Rita	7,500	Medium	No
Yona	6,500	Medium	Yes
Chalan Pago	5,900	Medium	No
Mongmong	5,800	Medium	No
Agat	5,700	Medium	Yes
Agana Heights	3,900	Small	Yes
Talofofo	3,200	Small	No
Inarajan	3,000	Small	Yes
Sinajana	2,900	Small	Yes
Merizo	2,200	Small	Yes
Asan-Maina	2,100	Small	No
Piti	1,700	Small	No
Hagatna	1,100	Small	No
Umatac	900	Small	No

Within each of the selected villages, two types of survey were conducted. The first type of survey was a dog count conducted along village roads. Survey crews walked along roads in the selected village for 1 – 2 hours, counting every dog seen and recording its status with regard to:

- 1) Sex: Male or female.
- 2) Age: Adult or puppy.
- 3) Confinement status: Free-roaming, or confined in a house, yard, or on a tether.

- 4) Sterilization Status: This could usually be determined only for males, based on the presence or absence of a scrotum.
- 5) Condition: Various indicators of whether the dog appeared healthy or unhealthy; showed evidence of a skin condition, wound, or malnutrition; or showed visible evidence of pregnancy or lactation.

While conducting the dog count, surveyors marked the roads along which they travelled on a map, allowing their count to be extrapolated to the remaining roads that were not surveyed due to time constraints or access issues. This dog count procedure has been developed by HSI and used in many dog management programs across the world. The protocol and data sheet used for the dog count surveys are available from HSI, along with maps indicating the specific survey routes that were followed for dog counts.

The second type of survey conducted in each selected village was a household survey. This involved surveyors asking the residents of selected houses a series of questions about how many pets they own and their practices, experiences and attitudes with regard to dogs. Some of the information gathered during household surveys included:

- 1) Number of humans, dogs and cats in each home.
- 2) Sterilization status and vaccination status of each animal in the home.
- 3) Reason for not sterilizing or vaccinating pets, where applicable.
- 4) Whether animals in the home receive veterinary care.
- 5) Attitudes towards streets dogs, and opinions on how to best address problems.

Surveyors attempted to obtain responses from at least 25 randomly selected houses within the larger villages, and 10-15 randomly selected houses in the small and medium sized villages. The protocol for household surveys and corresponding data sheets are available from HSI.

## **DATA ANALYSIS**

Most of the findings presented in this report are a product of simple data summarization. The exception involves the generation of population size estimates. Deriving these estimates is a multi-step process, as summarized below for counts of free-roaming dogs.

- 1) Raw survey results are corrected for “detectability”. Detectability is the average likelihood that a surveyor travelling along a particular route will see a given dog that is present along that route. Detectability can be directly estimated by various means in larger programs, but for Guam, we used a more general estimate of detectability (45%) for our dog counting protocol that was developed in other HSI program areas. It should

be understood that although this estimate of detectability is probably acceptably accurate for Guam, it has not been explicitly confirmed.

- 2) Raw survey results in a village are extrapolated to parts of the village that were not directly surveyed. For example, if surveyors walked along 50% of the roads within a village while performing the dog count, the direct dog count after correction for detectability is doubled in order to reach an estimate of dog population size for the entire village.
- 3) Within the surveyed villages, a mathematical relationship between the estimated dog population size and the known human population size is calculated. In areas where human settlements span a wide range of sizes, these relationships may change as human population size changes. In Guam, however, the range of human settlement size is fairly modest, and the dog/human ratio did not change systematically with human population. Therefore, a single overall dog/human ratio was calculated for all surveyed villages. The human population size of the unsurveyed villages was multiplied by this ratio to generate a dog population estimate for unsurveyed villages.
- 4) The dog population estimates for the surveyed and unsurveyed villages are summed to generate an overall dog population estimate.

In principle, dog counts should produce a good population size estimate for free-roaming dogs. However, it is unclear the extent to which dog surveys adequately estimate the real number of confined dogs. For this reason, the number of owned confined dogs (along with the number of owned free-roaming dogs) is estimated using data from the household surveys. This process is somewhat simpler, and involves the following steps:

- 1) In each surveyed village, the number of humans represented by the surveyed households is determined.
- 2) For the surveyed households, the number of owned confined dogs and owned free-roaming dogs is also determined.
- 3) A mathematical relationship is calculated for the number of owned confined dogs per person, and the number of owned free-roaming dogs per person.
- 4) These relationships are applied to the number of people living in each surveyed village to generate village-specific dog estimates.
- 5) The same relationships are applied to the human populations in unsurveyed villages.
- 6) Resulting dog estimates are summed over all villages to produce island-wide estimates for owned confined dogs and owned free-roaming dogs.

By comparing the results of dog counts and household surveys, we can develop some insight into the proportion of free-roaming street dogs that are owned versus stray, and generate an overall dog population estimate for Guam. However, it should be stressed that one cannot rigorously

compare results obtained from different survey protocols, and that results are therefore only approximate.

## **TIMELINE AND KEY PERSONNEL**

Orientation and training of volunteers assigned to conduct surveys was performed by Kelly Coladarci of HSI. Dog counts and household counts began on 1 February, 2014, and continued intermittently until May 25, 2014, when the last assigned survey was completed. Bambi Leone organized the volunteer effort and was directly involved in conducting most of the surveys, and we express our appreciation to her for her dedication and diligent effort in facilitating this survey.

## **RESULTS**

Survey teams directly tallied 1,088 dogs during the course of the dog surveys and obtained household surveys from 371 households (containing 1,750 human residents) across the ten selected villages. Using the approaches described above, we estimated that there are approximately 61,000 dogs on Guam, or 38.9 dogs / 100 human residents. This figure includes all street dogs and all owned and confined dogs. The best estimate of the breakdown for this total dog population is given in Table 2.

**Table 2.** Breakdown of the dog population estimate for Guam.

Type of Dog	Population Estimate	Dogs / 100 People
Street Dogs, Unowned	5,500	3.51
Street Dogs, Owned	19,000	12.12
<b>TOTAL STREET DOGS</b>	<b>24,500</b>	<b>15.63</b>
Owned, Confined Dogs	36,500	23.28
<b>TOTAL DOGS</b>	<b>61,000</b>	<b>38.91</b>

As determined by dog count data, there is a small preponderance of male dogs with Guam's dog population. The frequency of puppies is relatively high, indicating active and uncontrolled reproductive activity, and the frequency of sterilized males (the only sex for which sterilization status could be visually determined) was very low among both free-roaming and confined dogs. Approximately one quarter of all observed dogs were unhealthy in some respect (undernourished, wounded, ill, or a combination), and just over 10% had visible evidence of mange or similar skin maladies. These findings from dog count data are summarized in Table 3.

**Table 3.** Attributes of dogs as determined in dog count surveys.

Sex Ratio:	56.3 % Male	43.7 % Female
Age:	88.6 % Adult (> 6 mo.)	11.4% Puppy (< 6 mo.)
Sterilization Status of Males:	97.6 % Not neutered	2.4% Neutered
Percent Females Visibly Lactating or Pregnant:	7.8 % Lactating or Pregnant	
Percent Visibly Undernourished, Wounded, or Ill:	24.1 %	
Percent with Visible Mange or Similar Skin Condition:	10.2%	

Household survey data indicated that 65.5% of households claim ownership of one or more dogs. A large majority of dog-owning households have 5 or fewer dogs, but a few own 10 or more dogs, usually because of the presence of a litter of puppies. Just over half (56%) of owned dogs are entirely confined, either tethered or kept within fences, and less frequently by being kept inside the house. A further 24% of owned dogs are left to roam free at all times or most of the time, and the remaining 20% are sometimes confined and sometimes allowed to roam. There is a small male bias in owned dogs, and the frequency of puppies is high. Only 15% of owned dogs sleep inside, and overall sterilization rate is below 15%, though somewhat higher for females than males. Most dogs are not vaccinated, and only a small proportion of dogs are registered. A summary of these findings is given in Table 4, and reasons given by respondents for failure to sterilize, vaccinate, or register their dogs are given in Table 5.

**Table 4.** Results of household surveys regarding owned dogs.

Household Dog Ownership Rate	65.5% Own dog(s)	34.5 % Do not
Confinement of Owned Dogs	55.6% Always confined	44.4% Always or sometimes free-roaming
Dog Sleeping Location	15.4% Inside	84.6% Outside
Sex Ratio:	57.8 % Male	42.2 % Female
Age:	83.7 % Adult (> 6 mo.)	16.3% Puppy (< 6 mo.)
Sterilization Status:	11.8 % Of males neutered	19.2 % of females spayed
Vaccination Status:	38.3 % Vaccinated	
Registration Status:	10.2 % Registered	

**Table 5.** Percent of respondents citing various reasons for failure to sterilize, vaccinate, and register dogs during household surveys. Because respondents could identify more than one response, percentages in a given column may not total 100%.

	Reason for Not Sterilizing Dog	Reason for Not Vaccinating Dog	Reason for Not Registering Dog
Too Expensive	21.1%	30.7%	7.4%
Too Inconvenient	10.1%	13.6%	11.0%
Unhealthy for Dog	16.8%	6.6%	
Not Needed	17.2%	18.7%	17.5%
Didn't Know it Was Required			44.7%
Other / Don't Know	36.2%	31.6%	19.4%

In addition, household survey respondents were asked an array of questions related overall household practices, attitudes, and experiences as they relate to dogs. Just over half of dog owners report that they use the services of a veterinarian at least occasionally, or would use these services in principle. Although some respondents cited expense or inconvenience as a reason to avoid seeking veterinary care, most people who did not or would not use veterinary services had no specific reason, or simply felt no need to do so. About one-third of respondents feed dogs that they do not own, and nearly half of the households surveyed have experienced being bitten or threatened by a dog at some point. A large majority of respondents feel that there are too many free-roaming dogs on Guam for a range of different reasons, and the overwhelming majority support general efforts to control the dogs populations, though specific thoughts on how to best accomplish this vary. This information is summarized in Table 6.

**Table 6.** Additional results of household surveys. Some questions allowed multiple answers per household, so percentages may not always add up to 100%.

Use of Veterinary Care	50.4% of dog owners would or have sought veterinary services	<u>Of those who would not:</u> 32.7% Not needed 25.0% Too expensive 13.7% Too inconvenient 29.3% No reason / other
Dog Feeding	34.3% Feed dogs they don't own	65.7% do not
Experience of Dog Aggression	46.8% of households have experienced dog attacks or aggression	53.2% have not
Opinion About Free-Roaming Dogs	88.0% say there are too many free-roaming dogs	<u>Of these, reasons given:</u> 49.3% Aggression 48.7% Sanitation 11.5% Noise 9.2% Breeding 7.3% Traffic safety

Support for Management Efforts	97.2% Support management efforts	<u>Of these, favored approaches include:</u> 52.7% Removal (method unspecified) 29.0% Education 12.6% Sterilization 7.8% Subsidized services 23.7% Don't know / other
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## DISCUSSION AND RECOMMENDATIONS

Data gathered during this baseline survey indicate that Guam has a large population of free-roaming dogs, with few or no impediments to their breeding other than those imposed by resources and biology. It appears likely that most free-roaming street dogs are owned, and thus dog owners are both important targets and key partners in any comprehensive effort towards humane dog management. Animal welfare concerns are not limited to the free-roaming population however. According to numerous observations recorded during dog counts and household surveys, the standards of care for owned dogs are often poor, with dogs frequently being tethered without adequate access to water or shelter, or experiencing unalleviated discomfort, distress, injury or illness. A significant proportion of respondents to household surveys appeared to have low awareness or concern regarding basic animal care considerations, and it therefore seems likely that efforts to implement humane education will be needed in order to systematically improve the prospects for dogs on Guam. In addition, the frequency of real or perceived aggressive interactions directed from dogs towards people probably indicates some combination of inadequate dog socialization, widespread lack of “dog awareness”, and possibly some level of ongoing taunting or mistreatment of dogs.

In most respects, the dog situation on Guam parallels that on Saipan, where a baseline dog survey was also conducted. Differences include:

- 1) Guam’s dog population has a somewhat higher confinement rate, where Saipan’s is more free-roaming.
- 2) Breeding rates, though not explicitly measured, appeared to be slightly lower on Guam than Saipan.
- 3) Vaccination rates are somewhat higher on Guam, and registration rates are somewhat higher on Saipan.
- 4) Lack of knowledge or interest appears to be the largest impediment to sterilization and vaccination on Guam, whereas expense appears to be a larger impediment on Saipan.
- 5) Willingness or ability to use veterinary care is higher on Guam than on Saipan.

If a humane dog management effort is implemented on Guam, the dog count surveys described herein should be repeated at annual intervals, in a way that maintains full standardization with the original protocol with regard to location of survey routes, survey time, and approximate survey date. During these follow up surveys, number of dogs counted, overall sterilization rate (at least for males; for females also if sterilized females are visibly and consistently marked), frequency of puppies, and condition of dogs can be compared to original levels to determine if progress is occurring. If not, an evaluation of management activities should be conducted to determine the impediments to this progress and take remedial actions. It may also be beneficial to occasionally repeat household surveys, but a yearly interval is probably not necessary.