

Master of Public Health
Integrative Learning Experience Report

RABIES INFECTION AND CONTROL IN THE EASTERN UNITED STATES

by

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MASTER OF PUBLIC HEALTH

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Summary

Anne Arundel County Animal Care & Control (AACACC) is a Maryland county department that works to maintain safe human-animal interactions and promotes the humane treatment of animals. The Bite Investigation Department, where I primarily worked, investigates domestic and wild animal bites, conducts rabies surveillance, and serves warning letters and citations to potentially dangerous and dangerous animals.

Rabies is a zoonotic virus from the genus *Lyssavirus* and poses a significant public health concern both worldwide and in the United States (1–3). While the United States has been canine-rabies free since 2007, there are multiple variants maintained in wild mammalian reservoirs, most importantly in raccoons (*Procyon lotor*) and eastern pipistrelle bats on the eastern coast of the United States (2, 4–10).

While working with the Bite Investigation Department at AACACC, my learning objectives were broadly to gain experience working in a county department. More specifically, my goals were to complete data entry and analysis of the major aspects of the Bite Investigation Department. Additionally, I was able to have a ride-along with an Animal Care & Control Officer (ACCO), go to animal abuse court hearings, and attend webinars.

I created many products that satisfy the six MPH foundational competencies and two MPH infectious diseases/zoonoses competencies. These products included spreadsheets containing data from rabies surveillance and warning letters, potentially dangerous orders, and dangerous orders, graphs that analysis these data, brochures, and templates for data collection.

Subject Keywords: Rabies, Anne Arundel County, Eastern United States, Animal Care & Control, ORV, Raccoons

Chapter 1- Literature Review

Anne Arundel County Animal Care & Control

Anne Arundel County Animal Care & Control (AACACC) is a Maryland county department and an agency of the Anne Arundel County Police Department. AACACC is “dedicated to promoting the humane treatment of animals and ensuring safe human-animal interactions” (11). AACACC has many roles in the community. Animal Care & Control Officers (ACCOs) enforce county and state laws pertaining to animals, they respond to animal-related complaints and public safety concerns pertaining to animals, and investigate animal cruelty cases. AACACC has a shelter to provide temporary housing for animals that are up for adoption, are quarantined for rabies detection, are lost, or have been relinquished by owners. AACACC also holds weekly low-cost rabies and microchip clinics for the public. Kristin Herbert was my preceptor. She has been an ACCO for seven years at AACACC and has a B.S. in Animal Science. She currently is working in the Bite Investigation Department.

Introduction

Rabies is a preventable, viral, zoonotic disease that poses a significant public health concern (1, 2). The rabies virus is the most important serotype (serotype 1) from the genus *Lyssavirus* globally because of its high burden of disease among humans, domestic animals, and wildlife (2, 3). The acute progressive encephalitis of rabies causes approximately 60,000 annual human fatalities worldwide (12). The incubation period of rabies can range anywhere from seven days to a year, but typically is two to three months (13). The length of the incubation period is dependent on factors such as the location, severity of the wound and the amount of virus inoculated in the wound (13). Rabies can present in two forms: furious (classical or encephalitic) form and the paralytic (dumb) form. Furious rabies is characterized by hyperactivity, hypersalivation, hydrophobia, and periods of agitation alternating with periods of lucidity (13). Paralytic rabies cases demonstrate flaccid muscle weakness, beginning from the site of infection, followed by gradually paralysis (13).

More than 99% of human rabies cases are transmitted by dog bites and occur primarily in Asia and Africa (12). The United States has been declared free of canine-rabies since 2007,

however, continued immunization of dogs and cats is critical to control rabies, especially as there are multiple variants of the rabies virus that are maintained in wild mammalian reservoirs (2, 4). **Figure 1.1** displays the rabies enzootic in foxes, skunks, racoons, and bats in each region of the United States (14). Raccoons (*Procyon lotor*) and eastern pipistrelle bats are of primary concern on the eastern coast of the United States (5–10).

This review will discuss the three major rabies threats, continued vaccination of dogs and cats, bat rabies, and raccoon rabies, on the eastern United States.

Dogs and Cats

Background

The incidence of rabies in domestic animals has decreased significantly since the 1950s in the United States, though the incidence of rabies in wildlife has increased (15). Only 7% of 7,437 total cases of rabies in the United States in 2001 were in domestic animal species and 4.8% of all reported cases of rabies were from dogs and cats (15). Despite this, approximately 86% of humans receiving post-exposure rabies prophylaxis do so because of exposure to rabid, or potentially rabid, dogs and cats (15). This may be because dogs and cats can present a higher risk to human beings than wildlife due to the close association humans have with their pets (16). Vaccination of dogs and cats is essential, especially in areas with endemic rabies in wildlife (15). From 1997-2001, West Virginia had the second highest percentage of rabid dogs among all dogs tested (13/980 [1.33%]) and Virginia (124/5211 [2.38%]) and Maine (18/1152 [1.56%]) had the highest percentages of rabid cats among all cats tested (15). A mean of 280 cats and 127 dogs were rabies-positive per year from 1994-1999 in the United States (16).

Almost all, 307/308, virus variants determined for dogs and cats in 1999 were the expected terrestrial rabies virus variant predicted by the geographic location of the dog or cat (16). The only virus variant that did not match was a cat with the bat-associated variant in Maryland (16). The raccoon-associated rabies virus variant was responsible for infection in 57% of animals (16). New York and Pennsylvania submitted the second and the third highest number of dogs and cats with 28 and 25, respectively, of rabies-positive during this time-frame (16). In 1999, 53% of rabies-positive dogs and cats were owned animals, but dogs were significantly more

likely than cats to be reported as owned (relative risk=1.72; 95% confidence interval 1.42-2.07; $p<0.0001$), though 94% of animals were reported as either unvaccinated or of unknown vaccination status (16). Rabies is uncommon in dogs and cats that have been vaccinated. From 1997-2001, 3.2% of dogs and cats with rabies had a history of rabies vaccinations, but only two dogs and three cats had vaccinations that were considered current (15). Rabies-positive dogs were significantly more likely than rabies-positive cats to have a known (versus unknown) exposure to a potentially rabid animals, potentially due to outdoor cats having unsupervised interactions with wildlife (16, 17).

2007 to Present

In September of 2007, the Centers for Disease Control (CDC) declared the United States canine-rabies free (4). This was achieved through public health campaigns that implemented dog vaccination, licensing, and stray dog control (4). Since that time, vaccination of pets has become no less important due to the presence of the wildlife rabies reservoirs and to potentially infected dogs adopted from other countries (4).

Despite the importance of rabies vaccination for all dogs, cats, and ferrets, a few state laws only require vaccinations for one species, and some states do not require rabies vaccinations for any pets (17). Maryland state laws require all dogs, cats, and ferrets four months or older to be rabies vaccinated (17). To encourage compliance, Maryland laws also require low-cost, self-financing, public animal rabies vaccination clinics in each of Maryland's 24 local health departments at least twice annually (17). In 2016, these 24 local health departments held an average of 8.75 clinics, with a range of two to 52 (17). Anne Arundel County conducts the most clinics, with weekly clinics, and 96% of departments conducted more than the statutorily required two clinics per year (17). These low-cost clinics serve approximately 20,000 animals per year in Maryland (17). A breakdown of animals served in Anne Arundel County, Maryland can be seen in **Table 1.1**. While this represents only 1% of the pet population of the state, 20,000 animals is a substantial number when it is considered that each unprotected pet poses a risk to any animals and humans exposed to it (17). The 1% of the pet population served is consistent with a 2015 survey from the AVMA which found that 1% of respondents used city- or county-sponsored public clinics for veterinary care (17). This indicates that this 1% may be a demographic that does not otherwise receive veterinary care (17). Three Maryland counties out

of the five counties with the highest population-adjusted average number of animals vaccinated per year also were among the counties with the largest percentage of rural populations, as seen in **Figure 1.2** (17). One explanation for this is that rural counties have residents that are largely of lower socioeconomic status and are unable to afford traditional veterinary services (17). Veterinary services may also be less available in rural counties. Low-cost clinics in each county provide services not otherwise available which can be especially important because pets in rural communities are more likely to spend unsupervised time outdoors where they could come into contact with wildlife species (17).

In 2017, rabies-positive cats accounted for 1.3% of cats tested, which is significantly higher than the mean percentage of rabies-positive cats in the previous five years (1.1%; 95% confidence interval, 1.1%-1.2%) (18). Rabies in cats is a particular issue in states along the east coast where raccoon rabies is enzootic (18). Pennsylvania accounted for 21.7% of rabid cats, Maryland 12%, New York 10.1%, and Virginia 9.1%. Most rabid cats (62.7%) were infected with raccoon rabies (18).

Methods to continue high pet vaccination compliance are critical to maintain the canine-rabies free status and to control rabies in cats. Low-cost rabies clinics, such as the ones offered in Maryland, are critical to achieve high vaccination compliance, but need to be combined with funding for the clinics and effective advertising to pet owners, especially owners in more rural areas (17). Other methods, such as providing animal control services and shelters to respond to sick or unwanted animals, and risk assessments and laboratory diagnostics of suspected animals are important for rabies control in pets (18).

Bats

Background

Since the 1950s, when the program for immunizing domestic dogs began, the most common cause of rabies in humans has become the bat-variant virus (14, 19–21). From 2003 to 2015, 81.1% of human rabies cases were epidemiologically or phylogenetically linked to exposure of bats rabies virus (RABV) (21). Rabies in bats has different clinical signs than in most terrestrial species. It is typically characterized by activity during the day (which is rare for nocturnal bat

species) or bats found on the ground (compared to usual resting locations in trees or other above-ground locations), though bat behavior is not always dramatically altered (14). Some infected bats may have erratic flying patterns, although healthy juvenile bats may demonstrate similar behavior (14). A clear sign of abnormality in bats is relentless attachment, especially to the hands or heads of humans (20).

Most human rabies cases (71% [17/24]) are caused by the bat RABV known as the Ln/Ps variant, that is linked to the silver-haired (*Lasionycteris noctivagans*) and eastern pipistrelle (*Pipistrellus subflavus*) bats (20). Eastern pipistrelles are distributed throughout the eastern United States (5). They are relatively sedentary and tend to have higher populations in regions with sheltered caves systems (5). Despite human cases of rabies associated with the eastern pipistrelles, state health department submission records suggest that these bats are rarely encountered (5). It is therefore possible that the prevalence of eastern pipistrelles has been underestimated (5). In 2003, most (74.3%) bats tested for rabies originated from the northeastern United States, however, the Northeast had the lowest percentage of rabies-positive bats (4.1%). The states located in the Northeast typically submit mostly terrestrial carnivores for rabies testing. Bats tested from states with predominantly bat submissions had more positive rabies tests (10%) than states testing for predominantly terrestrial carnivores for rabies (5.3%), despite most bats (81%) submitted for testing were from these states testing more terrestrial carnivores (20).

Challenges

The major challenge to prevention of human and animal rabies associated with bats is the potential minor evidence of contact with bats. Bat bites may be undetectable because their teeth are very fine and can leave pinpoint puncture marks that are less than one millimeter in diameter (14). Scratch marks can be smaller than one centimeter long (14). Virus-laden saliva may be present on bat's claws and wings from grooming, especially during the moribund stages of rabies infection when there is increased salivation (21). This saliva may then be transferred to humans by mechanisms other than bites, such as a superficial skin piercing, a scratch, or a prick when a bat lands on, or collides with, an individual (21). Among 56 human cases of bat rabies in a 2008 study, 42.9% of cases had no history of direct contact, and 34% reported no history of exposure (14). This information is summarized in **Table 1.2**. It is suspected that these

cases were caused by an unrecognized bite or from salivary contamination (14). In 1999, the rabies postexposure prophylaxis (RPEP) recommendations were expanded to include people who were in the same room as a bat, who might be unaware of a bite or direct contact (14). These recommendations now include cases such as, a sleeping person waking up to find a bat in the room, or an adult witnessing a bat in the room with a previously unattended child, a person with a mental disability, or an intoxicated person (14).

Raccoons

Background

Raccoon rabies is enzootic to the eastern coast of the United States and is associated with most human exposures and animal rabies cases in the United States (6–9, 22). Raccoon rabies was first reported in the United States in Florida in the 1950s (6). In the 1970s, a restocking program led to the translocation of rabid raccoons from the southern states to the Mid-Atlantic region of the United States (7–9). Raccoon rabies quickly spread throughout the Northeast, and, by the early 2000s was distributed from Alabama and Florida, to the Appalachian Mountains, Maine, and the southeastern parts of Canada (7). Historically, rabies has been controlled through eliminating or reducing the wildlife reservoir populations (3, 6). In the 1960s, a live attenuated oral rabies vaccine was developed in the United States, but it was not approved for use before raccoons rabies expanded throughout the Mid-Atlantic region (7). In the 1990s, an oral rabies vaccination (ORV) was developed for raccoons when the recombinant vaccinia-rabies glycoprotein (V-RG) vaccine became available (7). The Appalachian Mountains may have been a natural geographic barrier to deter westward movement of raccoon rabies, but the United States Department of Agriculture's National Rabies Management Program (NRMP) was established in 1997 to better prevent further westward expansion through coordinated ORV campaigns (9). The NRMP was developed to utilize the natural terrain features along the Appalachian Ridge with extensive ORV zones (baited 50-75 baits/km²) (10). Over the next ten years, the ORV zones were expanded to include eight states along the Appalachian Ridge (10).

Current Research

Current research on raccoon rabies control is primarily focused on increasing effectiveness of ORV programs. The goal is to immunize greater than 60% of the raccoon population against rabies.

Rabies virus neutralizing antibody (RVNA) titer levels that represent a valid marker of protection from ORV programs have not yet been established (7). There are many sources of variability that affect establishing an effective antibody titer level cut-off as a surrogate value for protection, including host immune response, environmental factors, and diagnostic test variability. High cutoffs have, therefore, historically been used to avoid false-positive serology results (7). Current research, however, has shown that approximately 45% of animals with low or medium level titers (0.05-0.5 IU/mL) after bait distribution were able to survive a rabies exposure challenge seven to ten months later. This suggests that the high antibody titer levels may actually be misclassifying many protected animals as not-protected (7). The most important factor to accurately use antibody titer levels as a surrogate value for protection is timeliness of antibody collection after bait distribution. If serologic monitoring is completed less than two months after bait distribution, it has been found that antibody titers of greater than 0.5 IU/mL (high antibody titers) are a strong predictor of protection. However, serologic monitoring completed greater than two months after ORV distribution should use lower RVNA cutoffs (7). Therefore, the current research suggests using a cutoff of greater than 0.11 IU/mL to have a high specificity and sensitivity test (7).

Current research also studies methods to increase RVNA seroprevalence of wild raccoons to the estimated 60% that has been determined necessary for prevention and control (9). One study researched the correlation between increasing baiting and RVNA response (9). High baiting areas, baited with 300 baits/km², had the highest RVNA response at 18.4% (95% confidence interval 10.0-31.4) and the target density of 150 baits/km² had an RVNA response of 14.8% (95% confidence interval 8.0-25.7) (9). While this is a pronounced effect, the increased RVNA response may not be enough to justify the increased cost associated with high baiting density because the RVNA seroprevalence is still well below the threshold value of greater than 60% for prevention and control (9). In addition to investigating the concentration and

disbursement of baits, baiting distribution strategies have been researched to determine if one method increases RVNA seroprevalence (8). The three main methods of bait distribution are by helicopter, hand distribution, or from bait stations that are a continuous, clustered source of ORV baits (8). Hand distribution of baits typically relies on roads or trails to access raccoon habitats, which may be a limiting factor in reaching certain home ranges of raccoons (8). Baiting using helicopters, either by cluster baiting, or individual baits, may overcome this lack of access but detailed knowledge of raccoon habitats in the landscape are typically unknown (8). There was not a statistically significant difference in seroprevalence based on the method of baiting (8). It was suggested that, while the two methods of hand baiting and helicopter baiting had no significant difference in percent seropositive, helicopters should be used in areas where hand baiting is inefficient and ineffective, and that depositing individual baits at regularly spaced intervals, instead of cluster baiting, may provide a more even distribution of ORV baits in the suburban raccoon habitat (8). However, neither method over two years achieved the desired 60% seroprevalence (helicopter baiting led to a 23.8% seroprevalence and hand baiting led to a 24.5% seroprevalence) (8).

Challenges

There have been concerns of potential residual vaccine virus pathogenicity, inefficacy, and high cost over the past 20 years of ORV use (3, 7, 8). Potential pathogenicity of the oral rabies vaccinations have not been widely discussed in the literature. A study conducted in 1990 found that one striped skunk, out of eight, succumbed to vaccine-induced rabies from a SAD-B₁₉ bait (23). Conventional modified live vaccines of the SAD strain, but not genetically engineered vaccines (SAG₁ and V-RG), were found to have residual pathogenicity in rodents, in a 1992 study (24). In 1999, an updated study to determine the pathogenicity of SAD-B₁₉ found no indications of pathogenicity in 16 species by different routes of administration (25). A more recent study conducted in Ontario, Canada, observed that, over the 16 year period that vaccine baits were distributed, a small number of ERA-variant rabies cases occurred in wildlife species, but ERA-derived SAD virus did not become established in the wildlife populations (26).

In the United States, the only licensed ORV is RABORAL V-RG. From 1997 to 2007, seroconversion in raccoons following ORV application was approximately 30%, with some spatiotemporal variability (7, 8). It is generally recommended for there to be a seroconversion

rate of 60-90%, though it has been suggested that a vaccination rate of 63% may be enough to sufficiently halt the spread of raccoon rabies via ORV distribution (8). The efficacy of V-RG has been shown to comply with regulatory standards when tested on captive animals, but there are many potential issues that may impact effectiveness when distributed in the field (7). Decreased vaccine performance in field situations, lack of access by target species to the vaccine-bait, non-target species bait competition, consumption by feral cats, design flaws of the bait, mis-timing of vaccine-bait distribution, and incomplete bait ingestion may all lead to lower field efficacy of the ORV (7, 8).

Cost has been an issue with the ORV programs in Maryland and New Jersey (27–29). From 2009 to 2012 in New Jersey, and during 2012 through 2013 in Maryland, the state ORV programs were discontinued due to budget cuts. Rabies-positive cases steadily increased from 2009 to 2014 in New Jersey, despite the ORV program reestablishment in 2012 (30). In Maryland, there was an increase in positive rabies tests in Anne Arundel County when the ORV program was stopped in 2012 (**Figure 1.3**). Even after the ORV program was restarted in 2014, it took until 2016 for the positive rabies tests to decrease. The number of positive raccoon rabies tests decreased in 2015 once the ORV program was reestablished (**Figure 1.4**). In 2009, the estimated cost of raccoon ORV programs for the Appalachian Ridge was \$108/km², or an average of \$5.2 million a year (10). However, a study from 2000 found an average net benefit of \$496 million with a 127.1 km/year baiting program and, in 2009, a net savings of \$100-500 million a year was calculated for a raccoon ORV program along the Appalachian Ridge area (10, 31).

Discussion

Rabies is a worldwide public health issue (2, 3). Most human rabies cases occur in Asia and Africa from dog bites, but on the eastern coast of the United States, continued vaccination of pets, and control of raccoons and eastern pipistrelle bats are the primary rabies concerns (5–10, 12).

The United States has been declared canine-rabies free since 2007, however, continued vaccination of pets is critical due to wildlife rabies reservoirs (4). Despite the importance, some state laws do not require rabies vaccinations for all cats, dogs, and ferrets (17). Some owners

have barriers to vaccination such as lack of veterinary access or high cost of veterinary care. Dogs and cats primarily kept outdoors may be less likely to be vaccinated, even though these animals are most at risk of coming into contact with wildlife. Implementing low-cost vaccination clinics throughout the country may help reach populations that would otherwise not vaccinate their pets.

Rabies in bats is difficult to control. Often, exposure to bats is unknown in human cases because the bites are undetectable or occur while sleeping (14, 21). To decrease human rabies from bats, the RPEP recommendations were expanded in 1999 to include any person in the same room as a bat. This ensures RPEP for any individual who may have been unaware of contact (14).

Raccoons are associated with most human exposures and animal rabies cases in the United States. Raccoon rabies is enzootic to the East Coast (6–9, 22). ORV programs are critical to prevent westward expansion of raccoon rabies (9). Perceived cost and the lower than ideal efficacy of the ORV pose significant challenges to control of raccoon rabies using ORV programs (3, 7, 8). A seroconversion rate of 60-90% is generally recommended, however, most research has shown seroconversion to be approximately 30% (7, 8). Challenges, such as lack of access, mis-timing of vaccine-bait distribution, and non-target species bait competition, lead to the low seroconversion rates (7, 8). More research is needed to develop baits and baiting strategies that will increase seroconversion to the ideal rate.

ORV programs for raccoon rabies have been cancelled in certain states due to budget cuts. Perceived costs of ORV programs led to Maryland and New Jersey discontinuing ORV programs (27–29). However, the cost of rabies positive animals and RPEP for exposed humans is greater than that of the ORV programs. Research has shown that there is an average net savings of \$100-500 million a year when ORV programs from raccoons are in place along the Appalachian Ridge area (10, 31).

Figures

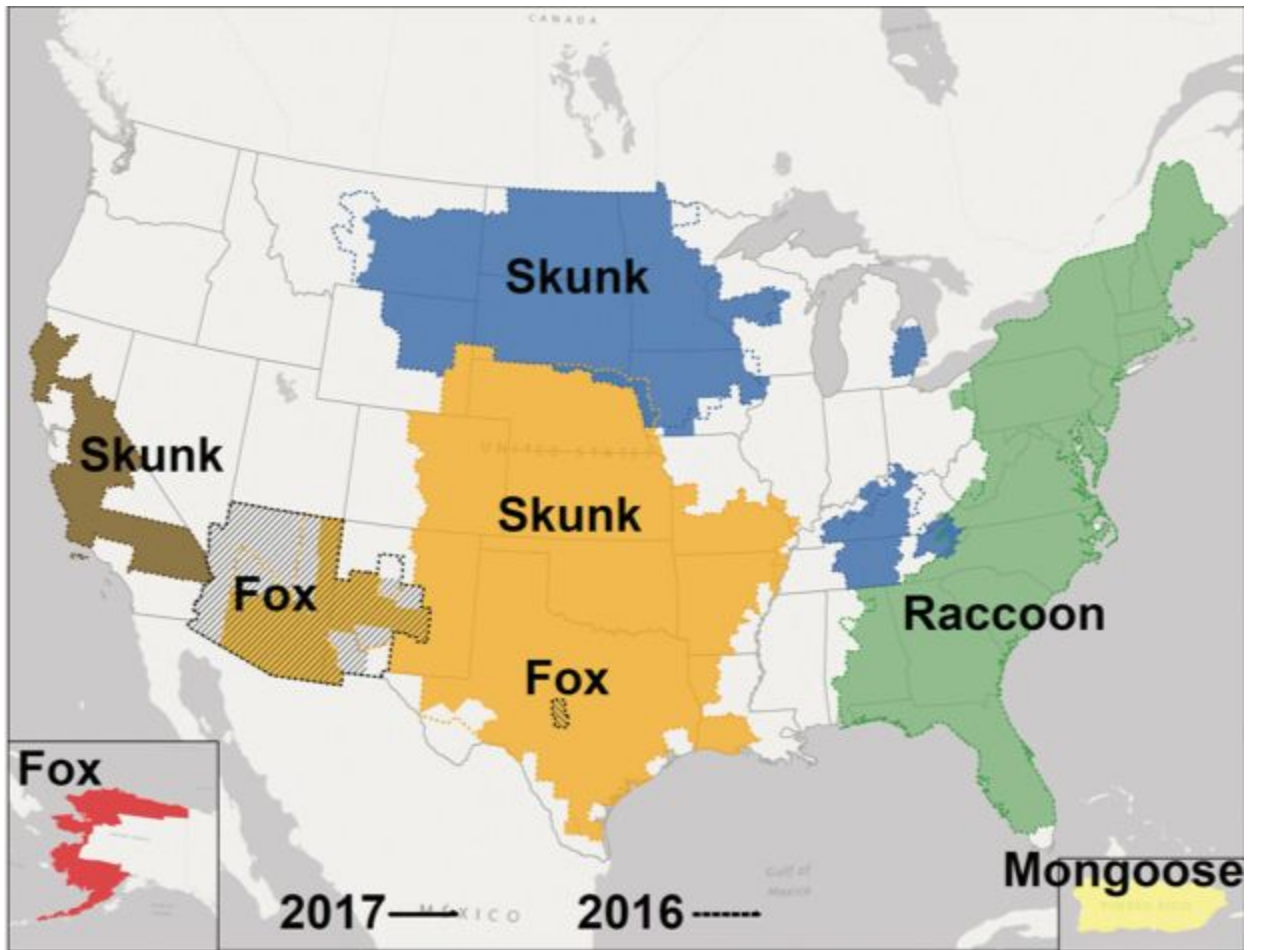


Figure 1.1: Distribution of major rabies virus variants in mesocarnivores in the United States and Puerto Rico

Solid borders represent rabies virus variant distribution from 2013 to 2017 and dashed borders represent the previous five year distributions from 2012 to 2016 (18).

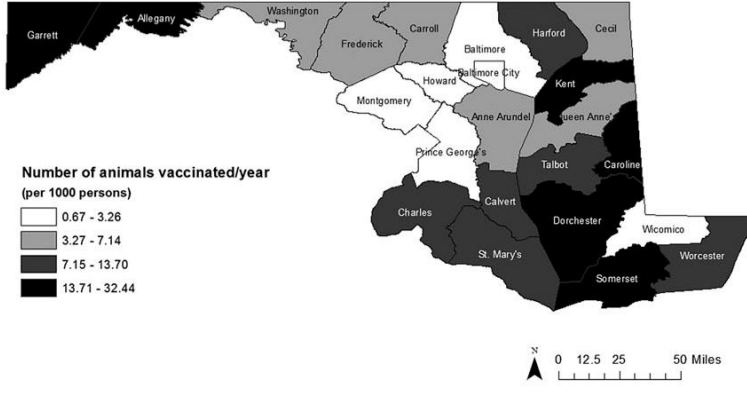
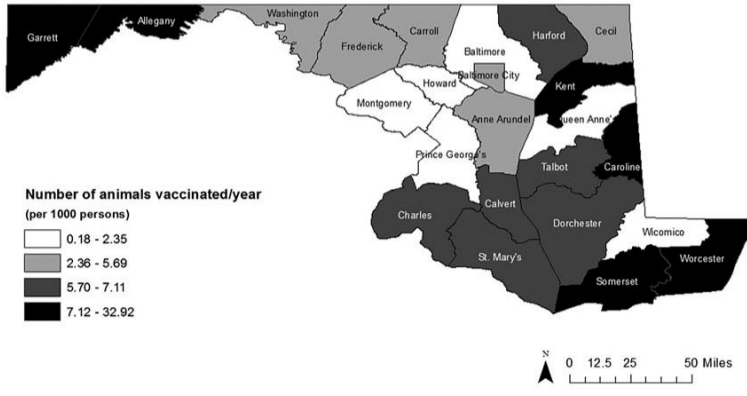
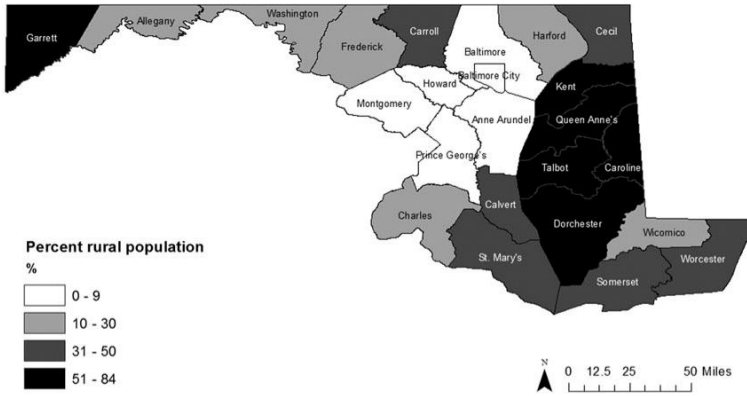


Figure 1.2: Maps of rural population and population-adjusted animals by jurisdiction

Top: Percent rural population by jurisdiction (2012). Middle: Population-adjusted animals vaccinated each year by jurisdiction (2006-2008). Bottom: Population-adjusted animals vaccinated each year by jurisdiction (2015-2016) (17).

Figure 1.3: Positive rabies tests in Anne Arundel County, Maryland from 2009-2018

Annotated to include the years in which oral rabies vaccination programs were suspended (2012 and 2013) and restarted (2014) (32).

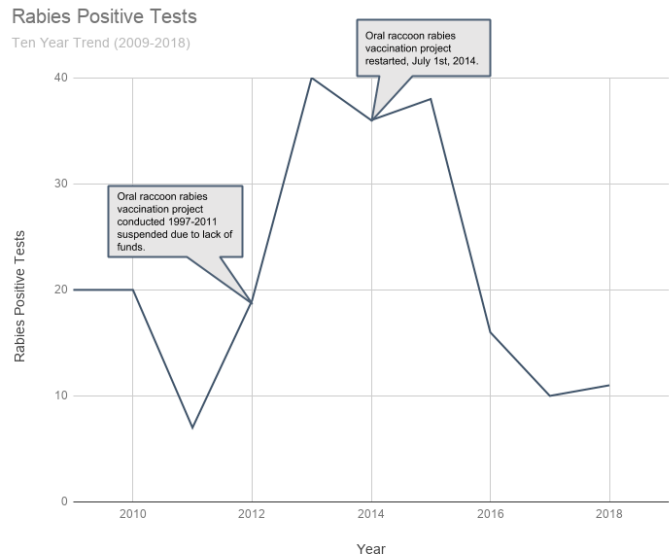
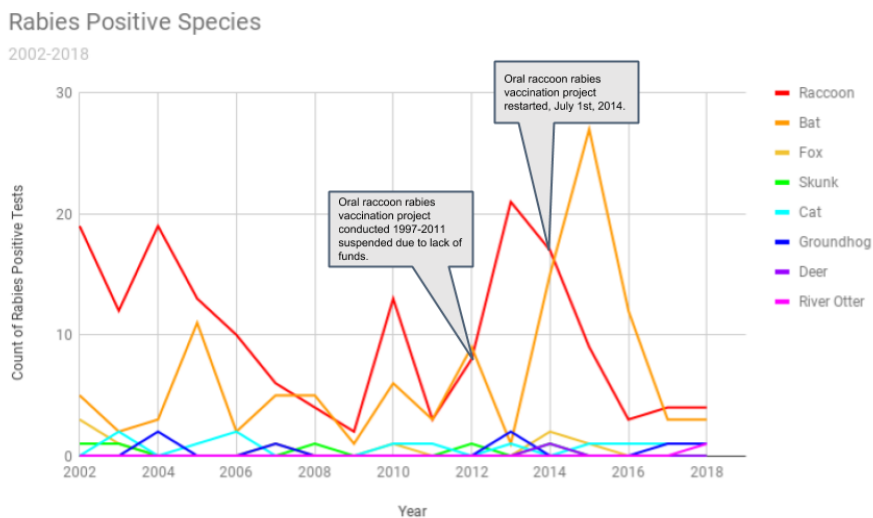


Figure 1.4: Positive rabies tests for each species in Anne Arundel County, Maryland from 2002-2018.

Annotated to include the years in which oral rabies vaccination programs were suspended (2012 and 2013) and restarted (2014) (32).



Tables

Table 1.1: Number of dogs, cats, and ferrets vaccinated per year by jurisdiction (2006-2008, 2015-2016) (17).

No. vaccinated per year species, period	Jurisdiction																				p				
	Allegheny	Anne Arundel	Baltimore	Baltimore City	Calvert	Caroline	Carrroll	Cecil	Charles	Dorchester	Frederick	Garrett	Harford	Howard	Kent	Montgomery	Prince George's	Queen Anne's	Saint Mary's	Somerset		Talbot	Washington	Wicomico	Worcester
Dogs, 2006-2008	782	2550	1260	608	428	531	678	312	1384	346	539	674	1324	216	263	722	436	185	602	332	220	—	186	—	0.05
Dogs, 2015-2016	775	1981	1058	1000	468	324	465	390	838	127	743	715	1261	—	232	499	133	66	577	309	189	—	151	373	
Cats, 2006-2008	353	1055	358	187	237	246	482	147	526	149	293	285	635	119	126	384	113	85	245	176	161	—	117	—	0.43
Cats, 2015-2016	275	788	371	1000	173	121	236	192	232	79	347	265	440	—	111	334	32	47	210	178	67	—	68	307	
Ferrets, 2006-2008	6	40	14	2	6	7	16	6	8	5	22	3	28	12	1	11	5	2	3	1	1	—	1	—	<0.01
Ferrets, 2015-2016	1	3	7	0	4	4	2	1	1	0	2	2	5	—	0	0	2	1	1	0	0	—	0	1	

p Values from two-sided t-test, 2006-2008 vs. 2015-2016, paired by jurisdiction.

Table 1.2: Number of human cases and incidence rates of bat rabies in the United States and Canada, by decade and type of contact.

Excludes any cases involving organ transplantation (14).

Period	Population	Cases per billion person-years (no. of cases)						Total
		Bat-variant rabies				Unknown source and rabies variant	Total	
		Direct contact		No direct contact				
		With bite	No bite	House exposure	No history of exposure			
1950-1959	1,802,584,987	2.2 (4)	0 (0)	0 (0)	1.7 (3)	3.9 (7)	11.6 (21)	15.5 (28)
1960-1969	2,119,911,320	0 (0)	0 (0)	0 (0)	0.5 (1)	0.5 (1)	0 (0)	0.5 (1)
1970-1979	2,379,524,923	2.5 (6)	0 (0)	0 (0)	1.3 (3)	3.8 (9)	0.8 (2)	4.6 (11)
1980-1989	2,627,534,011	0.8 (2)	0 (0)	0 (0)	0.4 (1)	1.1 (3)	0 (0)	1.1 (3)
1990-1999	2,904,437,968	1.0 (3)	1.7 (5)	1.0 (3)	3.1 (9)	6.9 (20)	0 (0)	6.9 (20)
2000-2007	2,507,594,847	2.8 (7)	1.6 (4)	1.2 (3)	0.8 (2)	6.4 (16)	0 (0)	6.4 (16)
Total	14,341,588,056	1.5 (22)	0.6 (9)	0.4 (6)	1.3 (19)	3.9 (56)	1.6 (23)	5.5 (79)

Chapter 2-Learning Objectives and Project Description

The learning objectives while at Anne Arundel County Animal Care & Control were to gain experience working in a county department and to learn how county departments overcome challenges. More specific learning objectives included data entry and analysis of the major aspects of the Bite Surveillance Department of AACACC. The Bite Surveillance Department has the two primary goals of bite and rabies surveillance and addressing animals that receive warning letters, potentially dangerous orders, or dangerous orders.

While working at AACACC, in addition to my data entry and analysis projects, I shadowed officers doing several different daily tasks. I spent a day with ACCO Lisa Wolfe on a ride-along. Each ACCO is assigned a region of the county in which they patrol daily and respond to calls from residents or police officers. The day of my ride-along was a cold Friday in January, so was particularly slow in terms of complaint calls. We checked on some of Officer Wolfe's ongoing cases and I learned that many of these cases were ongoing due to citizens' avoidance of communication attempts by ACCOs. We patrolled parks to observe for anyone breaking Animal Care & Control laws, especially leash laws, and neighborhoods to ensure compliance of the Severe Weather Animal Alerts due to the weather being below freezing. I also accompanied Officer Wolfe when she was disposed in two related court cases held on the same day. The cases were to address a father and a daughter who had separately been charged with, and ultimately convicted of, seven counts of animal abuse. This experience gave me a valuable learning opportunity to see how the court system and Animal Care & Control intersect.

I attended several webinars during the course of my experience on topics including dog fighting, working with your veterinarian to better document animal maltreatment, and the designation and regulation of dangerous/vicious dogs.

I was primarily responsible for creating a paperless organization of various types of historical data and for manipulating the data. This is a task that the department has wanted to do, but, due to staff and time restrictions, has not been able to be completed. AACACC has been moving to become paperless over the last few years and primarily uses Google Drive to accomplish this task. However, the Bite Surveillance Department still deals mostly with paper

records of bites and rabies examination results. The department keeps paper reports from the previous five years but has storage for older records at an off-site document storage facility.

My main projects were creating spreadsheets and manipulating data for the monthly bite statistics (2002-2018), the warning letters, potentially dangerous orders, and dangerous orders (2014-2018), and rabies examination results (2014-2018). From the monthly bite statistics, I was able to create trends for rabies test results and exposures over time (months and years). I graphed exposures and rabies-positive tests over months to see seasonal trends, and yearly to see yearly trends. I graphed different species to see seasonal and yearly trends of rabies-positives among different species. These graphs were especially important to compare the years in which the ORV programs were in place (1997-2011, 2014-2018) and the years (2012-2013) in which funding was cut and there were no ORV distributed. I created a standardized form to be used by ACCOs in the Bite Surveillance Department for the monthly bite statistics because there were discrepancies in how species were described (e.g. rodents could be described as rodents, or separately as mice, rats, moles, etc.). This form also contains protected formulas to ensure that all total calculations would be correct. I completed a 2019 sheet that is ready to be filled in with 2019 data and is linked so it will automatically populate all graphs and tables with the 2019 data.

There was a registry and map of all animals with potentially dangerous orders and dangerous orders on the AACACC website, however, there was not a database that included warning letters. I created a spreadsheet with all of the data from the registry and included any warning letters issued from 2014 to 2018. These data were then mapped and graphed. I graphed the warning letters, potentially dangerous orders, and dangerous orders by city, both population adjusted and not population adjusted. I created two graphs of the most “dangerous” dog breeds. In the past, AACACC has listed the breeds using just the number of each breed that received a warning letter, potentially dangerous order, or dangerous order. However, it is critical when making these lists, because many apartment complexes and homeowners associations will cite these lists when restricting dog breeds for residents, to consider the total population of each breed in the calculation. Therefore, I created one graph with just the count for each breed, and one graph that was adjusted by the total number of each breed using the animal license database from the county.

I created a spreadsheet to organize the rabies examination results from 2014 to 2018.

Previously, the data were only available in monthly summary statistics or in paper form. From the data, I was able to create several different maps and graphs. I mapped rabies test results for each year, all rabies test results for the five years, total positive tests results for the five years (maps of positive test results from each year are already created every year), rabies tests of bats (2014-2018), rabies tests of raccoons (2014-2018), rabies tests of stray cats (2014-2018), and rabies tests of species immunized by the ORV (2014-2018). I graphed the test results over time, by species, by type of exposure, and by type of exposed.

I created nine brochures for the department. I updated six brochures that were previously being distributed that were outdated and not particularly visually pleasing. AACACC's name recently changed from Anne Arundel County Animal Control to Anne Arundel County Animal Care & Control, so most of these brochures needed the updated name. I created three brochures that did not have previous brochures. While creating the brochures, I designed them all to have a standardized format so that it is clear that they were all produced by the same department.

Chapter 3- Results

Warning Letters, Potentially Dangerous Orders, Dangerous Orders

There were approximately 1,300 warning letters, potentially dangerous orders, and dangerous orders issued in Anne Arundel County between 2014 and 2018. When graphing the data by city, Annapolis, Glen Burnie, and Pasadena had the highest number of warning letters and orders issued (**Appendix 1.1**). However, when adjusted by population, Crownsville, Gambrills, and Pasadena had the highest number of warning letters and orders issued (**Appendix 1.2**). When mapped, the majority of warning letters and orders issued are located in the northeastern part of the county (**Appendix 1.3**).

The top ten unadjusted most “dangerous” dog breeds were calculated by adding all warning letters, potentially dangerous orders, and dangerous orders for each dog breed (**Appendix 1.4**). These breeds were Pit Bulls (215), German Shepherds (94), Pit Bull Mixes (80), Labrador Retrievers (63), Labrador Retriever Mixes (61), Mixed Breeds (35), American Bulldogs (28), Boxers (27), Rottweilers (26), and Jack Russell Terriers (24) (**Appendix 1.4**). Adjusted for population of each breed, using breed information from the license database, yielded a different most “dangerous” dog breeds list (**Appendix 1.5**). Eight breeds that were 100% “dangerous” (each only had 1-2 letters/orders) were omitted from the adjusted list. These breeds included: Alapaha Blue Blood Bulldog, Bernese Mountain Dog/Border Collie Mix, Clumber Spaniel, Dogue De Bordeaux, Golden Retriever/Hound Mix, Nova Scotia Duck Tolling Retriever, Red Heeler, and Tibetan Mastiff. Nine breeds were 50% “dangerous” (each were one out of two) were omitted, and these breeds included: Beauceron, Carolina, Chow/Shepherd/Collie Mix, English Shepherd Mix, Entlebucher, Gordon Setter, Maremma Sheepdog, Otterhound Mix, and Pharaoh Hound Mix. After adjustments, the most “dangerous” dog breed list was: Boxer/Pit Bull Mixes (10/18), Pit Bulls (215/484), Rhodesian Ridgebacks (11/25), Greater Swiss Mountain Dogs (2/5), Old English Bulldogs (4/11), Bloodhounds (5/14), Bouviers (1/3), Norwegian Elkhounds (1/3), Norwegian Forests (1/3), and Saint Bernards (8/27).

Bite Statistics

Total exposure and rabies-positive tests fairly reliably increased starting in March each year and peaked between June-August before decreasing in September (**Appendix 2.1-2**).

Rabies-positive tests increased from seven cases in 2011 to 40 cases in 2013 (**Appendix 2.3**).

A decrease in positive cases did not occur until 2016. Total exposure rose from 2009 to 2014, stayed relatively constant, and then decreased until 2018 (**Appendix 2.4**). Total exposure remained between approximately 3000 to a little over 4000 exposures per year over the ten year period between 2009 to 2018.

Raccoon rabies cases were fairly sporadic from 2002 to 2012, with peaks in 2002, 2004, and 2010 (**Appendix 2.5**). Raccoon rabies increased in 2012, peaked in 2013, and then fell from 2014 to 2016 before plateauing to 2018. Bat rabies peaked approximately every two years from 2002 to 2013, before an increase of bat rabies in 2014 and 2015 preceding a similar decrease from 2016 to 2018. All other positive species in Anne Arundel County between 2002 to 2018 (foxes, skunks, cats, groundhogs, deer, and river otters) remained fairly constant of approximately one or two every few years. Raccoons and bats were the species with the highest positive rabies counts.

Rabies Examination Results

All maps of the rabies examination results fairly consistently showed an increased number of tests from the northeastern parts of Anne Arundel County. There is a higher number of negative test results than positive results each year (**Appendix 3.1-8**). When examining rabies test results trends over the years 2014 to 2018, a seasonal pattern of total tests performed can be seen (**Appendix 3.8**). More tests are performed from May to August of every year. Positive rabies tests results show a less consistent seasonal trend though most years have an increase in positive rabies test results between May and August (**Appendix 3.9**). The total number of tests have decreased each year between 2014 and 2018, but the number of rabies-positive tests do not have as clear of a pattern (**Appendix 3.10-11**). Rabies-positive test results

decrease from 2015 to 2017, but increase slightly from 2017 to 2018 (**Appendix 3.11**). Bats are sent for rabies examinations more than any other species that is tested, though there are fewer bats tested than all species immunized by ORV combined (**Appendix 3.12-3.13**). Stray cats are mostly tested in the northern areas of Anne Arundel County (**Appendix 3.15**).

Bats and cats are sent for rabies testing more than other species, though the number of tests each year of bats has been decreasing since 2014 (**Appendix 3.16**). Raccoons are tested in far fewer numbers than bats or cats, but have the highest number of positive rabies tests, second only to bats (**Appendix 3.18**). Dogs are tested the third most frequently, but have had no positive rabies tests from 2014 to 2018 (**Appendix 3.16**).

Humans are most likely to have been exposed to bats, cats, and dogs that are then sent in to be rabies tested, but animals (often dogs) are more often exposed to wildlife such as foxes, opossums, groundhogs, and raccoons (**Appendix 3.19**). In total, animals sent for rabies testing most likely exposed a human (**Appendix 3.20**). Bites are the primary exposure type for humans, though other exposure types (such as a bat being in the house, or trapping a stray cat) are also a commonly reported type of exposure (**Appendix 3.21**).

Chapter 4- Discussion

Warning Letters, Potentially Dangerous Orders, Dangerous Orders

Two of the largest cities in Anne Arundel County are Annapolis, 2017 population of 393,241 and Glen Burnie, 2010 population of 67639. These cities had correspondingly high numbers of warning letters and orders cited. However, adjusting for population size changes the ranking of the cities fairly dramatically. Crownsville, with a 2010 population of 1,757, is the third smallest city in Anne Arundel County. When adjusting for population, Crownsville becomes the city with the largest number of warning letters and orders (approximately 78 letters and orders/10,000 population). Crownsville is a rural area, with a large income gap of residents. The population-adjusted results could be a result of farm dogs that may be allowed to roam and may come into contact with other animals or humans. It would be interesting to study further why there are an increased number of warning letters and orders in rural areas like Crownsville.

Lists of top dangerous dog breeds are used by apartment complexes, homeowner associations, and jurisdictions to prevent residents from owning certain dog breeds. However, in the past, lists of dangerous dogs have been created using the raw data of breeds with the highest counts of warning letters and orders. The problem with creating lists on the raw data is that it does not take into account the number of each breed in the sample size. It can, however, be a challenge to find an accurate number of each breed in a sample. Anne Arundel County requires all dog and cat owners to have their pets licensed within 30 days of moving into the county and all animals that interact with animal control (due to a citation, responding to a citizen complaint, etc.) will have an officer follow-up with them until they are licensed. Unfortunately, license compliance is still suspected to be low, but an accurate picture of how low is unable to be determined. This greatly affects the accuracy of the adjusted list of “dangerous” dog breeds. While adjusting the data, 106 dog breeds that have warning letters or orders, were not in the license database. This is most likely due to differences in how owners described a mixed breed dog on one document to another. Breeds that were 100% “dangerous” or 50% “dangerous” were omitted from the adjusted list. These breeds had only one or two total animals in the breed and either both animals had received a warning letter or dangerous order, or one out of the two

did. These animals were omitted as outliers. These omissions may have greatly skewed the list, and, therefore, lists of dangerous dogs breeds do not seem particularly accurate or useful to determine which breeds are most likely to have a conflict with a human or another animal.

Bite Statistics

Statistical significance tests cannot be completed because the data were from case studies and there was no control group, however, the data could show trends that could be useful for certain policy decisions and as a guide for potential future research.

The exposure and the rabies-positive graphs showed a fairly distinct seasonal trend. The yearly trends indicated both exposure and rabies positive tests increased typically in April or May, peaked during June to August and decreased by September (**Appendix 2.1-2**). These seasonal trends are logical because both animals and humans are more likely to be outside during the warmer months, and are therefore more likely to interact. Knowing the trends in exposure and rabies-positive tests can help organizations like AACACC to determine when it is most important to increase distribution of rabies awareness materials.

The yearly trends of exposure and rabies positive tests are enlightening in terms of the ORV program in Anne Arundel County, Maryland (**Appendix 2.3-5**). The oral raccoon rabies vaccination project began in 1997 and continued to 2011. Due to a suspension of funds, the ORV program was discontinued in 2012 and 2013. During these years, the total number of rabies-positive tests increased from seven cases in 2011 to 40 in 2013. Rabies in raccoons increased from three cases in 2011 to 21 cases in 2013. However, reported exposure remained relatively steady between 3,200 and 4,200 cases between the years 2011 and 2014. The ORV program was reinstated in 2014. Total rabies-positive tests decreased to 36 in 2014, 38 in 2015, and down to 16 cases in 2016. Raccoon rabies decreased to 17 cases in 2014, nine cases in 2015, and three cases in 2016. These results indicate the importance of ORV programs in Anne Arundel County.

Rabies Examination Results

For many years, AACACC has produced maps each year of the test-positive species. I created maps that include positive, negative, and unsatisfactory test results for a variety of variables (**Appendix 3.1-7**). These maps can be added to the website as images or can be interactive, in that more information can be displayed about the test when the point is clicked.

The test results broken down by month and year show the same seasonal trend that was shown from the graphs of the bite statistics and has the same importance to AACACC (**Appendix 3.8-9**). The total number of specimens sent for testing has decreased since 2014, but the trend in total positive rabies tests from 2014-2018 is not as consistent. Total rabies-positive tests decreased from 2014-2017, but increased from 2017 to 2018. It is important for AACACC to understand that the frequency of positive rabies test results has increased because it might be important to subsequently increase efforts to prevent rabies exposure.

The maps displaying individual species are important because they display the areas that are most at risk for exposure for each species (**Appendix 3.12-15**). Raccoons tested for rabies were fairly evenly distributed throughout most of the county, but tested bats primarily originated from the northeastern areas of the county where populations are higher and living conditions are more crowded. The stray cat map could be very useful if compared with a map of stray cat colony locations. Unfortunately, there is no formal data available currently of these colonies, but if these data become available, they should be compared to the rabies examination map.

The most common species tested are bats and cats, though bats and raccoons have the highest number of positive test results (**Appendix 3.16-18**). Further research to determine why bats are tested more frequently than any other species would be interesting. It may be that bats are more likely to be caught in multiples, especially in bigger buildings like schools or offices, or that raccoons in Anne Arundel County are

less likely to live in populous areas. The true reason cannot be known without further research.

Examining the exposed populations and the routes of exposure is important for AACACC to know where to target rabies prevention materials (**Appendix 3.19-21**). Humans primarily were exposed to bats, cats, and dogs. Humans are more likely to be exposed than other animals to bats because bats were primarily collected from buildings where humans were also located. Animals, typically dogs, interact with wildlife like foxes, groundhogs, and opossums, due to dogs' natural interest in chasing and catching wildlife. Humans typically know to avoid wildlife and are less often exposed to them. Animals that are tested for rabies are most likely to have exposed a human. This often occurs because dogs or cats of unknown vaccination status that bite humans are almost always sent to be rabies tested as a precaution.

General Limitations

There were certain limitations that pervaded every product created at AACACC. Due to limited storage space and the desire to move to a paperless system, there has been the potential for some records to be incomplete or lost over time. Individual records and forms had variability in the amount of information they contained depending on the day and officer. Records also did not use standardized forms leading to ambiguity in the data. For instance, on some records, rodents would be used to describe the species and on others, more specific species, such as rats or mice, would be used to describe the species. Without standardized forms, there is a large potential for misclassification of data.

As with most local governmental departments, funding and staff shortages were challenges faced by AACACC. AACACC does not often receive the amount of funding needed to be able to complete important projects. I was valued as an unpaid employee because I was able to complete many projects that the staff at AACACC have not been able to because of the lack of time and lack of staff. AACACC manages to accomplish more than most animal control departments despite funding shortages, but it could greatly improve rabies prevention and

surveillance if there was funding that would allow for research to be conducted and more staff to be hired.

Chapter 5- Competencies

Student Attainment of MPH Foundational Competencies

Competency #1: Apply epidemiologic methods to the breadth of settings and situations in public health practice

Epidemiologic methods were applied to public health settings in both the spreadsheets and graphs of Rabies Examination Results and the Warning Letters, Potentially Dangerous Orders, and Dangerous Orders. Descriptive epidemiology provides a method to organize and analyze data to understand the variations in disease/health events geographically over time, and how the disease/health event varies among person, places, and time (33). All epidemiologic techniques were limited to descriptive epidemiology because the data were from case reports of animal/human exposures. This information was still important because it could be used to describe the public health problem in graphical displays that were easy for the public understand and it could describe the extent of the public health issue (34).

Rabies is an infectious disease that is endemic in Maryland, and wildlife, particularly raccoons, serve as a reservoir. This is important epidemiologic information to know when approaching rabies surveillance and control. After analyzing the data using descriptive statistics, a strong seasonal pattern could be seen in both exposure and positive rabies tests. Total rabies positive tests, rabies positive tests per species, and exposure over time were also graphed. The data were mapped in order to see the geographic distribution of various attributes. Graphs were created to describe who the exposed individuals were (humans or animals) and what type of exposure each of the exposed type were likely to have.

The data collected for the Warning Letters, Potentially Dangerous Orders and Dangerous Orders were not disease data, but they were still a public health concern and could have epidemiologic methods applied. The data were also described in terms of the descriptive epidemiology of person (animal breed), place (city), and time (yearly, 2014-2018). The data were graphed by breed to view adjusted and unadjusted most “dangerous” dog breeds, though

the data were determined to have large caveats that made these lists unreliable. The data were both mapped and graphed to determine where these animals were located in the county. Finally, the data were collected over the five-year period of 2014-2018.

Competency #3: Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate

The Bite Investigation Statistics spreadsheets, Rabies Examination spreadsheets, and Warning Letters, Potentially Dangerous Orders, and Dangerous Orders spreadsheets all used similar computer-based software for analysis. All spreadsheets were completed in Google Sheets because AACACC had shifted to using Google Drive to share all documents created within the department. Google Sheets is similar to Microsoft Excel in respect to formulas and processes that can be completed. These skills are summarized in the **Table 5.1**. Google Fusion Tables were used to map the data originally, but the open source software QGIS was ultimately used for professional mapping.

Table 5.1 Summary of Google Sheets Skills

Skill	Description	Example
Conditional Formatting	Used to mark values, using a color, to easily see values outside of the intended range	Mark longitudes and latitudes in mapped spreadsheets that were outside the Anne Arundel County, Maryland values
Pivot Table Creation and Manipulation, Including Graph Creation	Used to easily view selected variables out of raw data and then graph these values	Creating a table containing the count of each warning letter, potentially dangerous order, and dangerous order for each city
Filters	Allows for only specific values from one column of data to be viewed, without creating an entirely new table	Used to view the ten breeds that had the highest count of warning letters, potentially dangerous orders, and dangerous orders to see which breeds would be considered most “dangerous”

Sorting	Sorts entire dataset by one or more columns while keeping each record intact	Sorting data by alphabetical city to view data easier
Capitalize all letters in a cell	Formula=UPPER(), then copy all cells, insert into a new column using paste special, values only	Initially did not input data in all caps which led to many non-standardized data entries and had to change to the uniform, all capitalizations
Protecting data sheets/cells	Protect data sheets/cells to accidental disruption; particularly important for cells with formulas	Use on templates to avoid accidental alterations to cells that contain formulas
Array formula	Formula=ArrayFormula(right(, len()-n)) Removes characters from selected cells	Used to remove the first two digits from parcel boundaries (location identifiers) for mapping
Lookup formula	Formula=LOOKUP (A1, {""},{""}) Looks up value from cell and, if stated value, it returns the value that is assigned	Used to put population values into the spreadsheet for each city
Concatenate formula	Formula=CONCATENATE(A1&"",",",B1&"",") Combines columns, while keeping the data, and adds a delineator	Addresses were inputted in raw data as separate columns for street address, city, state, zip code and country, but needed to be in one column to calculate Longitude and Latitude. Formula combined all address columns into one column, separated by spaces and commas
IF formula	Formula=IF(A1="A",0, IF(A1="B",1)) Tests a value in a cell and outputs the value specified if the value is true or false	Google Fusion Tables required all variables to be numeric data. IF formula used to change categorical data to numeric

Competency #4: Interpret results of data analysis for public health research, policy or practice

All data were analysed and presented in the form of graphs and maps. These graphs and maps were designed to be easy to read by the general public and to be published on the AACACC website. It is possible that the data analysis could be used as a reference to research, however, it is unlikely due to the funding challenges for the department that much research could be conducted. The data from the rabies examinations could be potentially used for policy decisions if funding is cut for ORV programs in Anne Arundel County, because the analysis of the data showed a relatively significant correlation between cessation of the ORV program and increased raccoon rabies in Anne Arundel County.

Competency #18: Select communication strategies for different audiences and sectors

Brochures for a county department, like AACACC, need to be able to communicate information easily to many different types of people. The information needs to be clear and concise, without using jargon. Each brochure was designed with the specific intended audience in mind for the subject, but also with the idea that they will also be displayed on the website for any member of the public to see.

Competency #19: Communicate audience-appropriate public health content, both in writing and through oral presentation

This competency was spread over a presentation of the data analysis (graphs and maps) from the Rabies Examination Results spreadsheet, Bite Investigation spreadsheet, and the Warning Letters, Potentially Dangerous Orders, and Dangerous Orders spreadsheet, and writing public health information in the brochures. I gave a presentation to the employees of AACACC during a luncheon. I presented all of the graphs, maps, and brochures I had created to the employees. This presentation was designed so that the employees could see a collection of all of the rabies information and warning letters and orders cited information that had been gathered from their

surveillance work in the last five years. As stated with Competency #18, the brochures were designed to communicate to a large variety of audiences.

Competency #21: Perform effectively on interpersonal teams

I worked with Thomas Burja, the Zoonotic Disease Specialist at the Anne Arundel County Department of Health to create all of the maps. Mr. Burja regularly creates the positive rabies maps for each year and has a good working relationship with AACACC. He was a GIS major in college and helped me to find and develop maps with QGIS. Mr. Burja gave me valuable information for creating professional maps, as I had never done it, and I was able to show him some interesting features of the QGIS software and Google Fusion Maps, as he normally works with ArcGIS.

Table 5.2 Summary of MPH Foundational Competencies

Number and Competency		Description
1.	Apply epidemiological methods to the breadth of settings and situations in public health practice	Descriptive epidemiology was used to describe health events in the Rabies Examination Results and the Warning Letters, Potentially Dangerous Orders, and Dangerous Orders spreadsheets.
3.	Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate	Google Sheets software, Google Fusion Tables, and QGIS mapping software were used to analyze the data from the Bite Investigation Statistics spreadsheets, Rabies Examination spreadsheets, and Warning Letters, Potentially Dangerous Orders, and Dangerous Orders spreadsheets.
4.	Interpret results of data analysis for public health research, policy or practice	All data were analyzed and presented in the form of graphs and maps that were designed to be published on the AACACC website.
18.	Select communication strategies for different audiences and sectors	Brochures were designed for any member of the public to read and understand.
19.	Communicate audience-appropriate public health content, both in writing and through oral presentation	All data analyzed and brochures created were presented to the employees of AACACC.

21.	Perform effectively on interprofessional teams	Maps were created by working with the Zoonotic Disease Specialist at the Anne Arundel County Department of Health.
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Table 5.3 MPH Foundational Competencies and Course Taught In

22 Public Health Foundational Competencies Course Mapping	MP H 701	MPH 720	MP H 754	MP H 802	MP H 818
Evidence-based Approaches to Public Health					
1. Apply epidemiological methods to the breadth of settings and situations in public health practice	x		x		
2. Select quantitative and qualitative data collection methods appropriate for a given public health context	x	x	x		
3. Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate	x	x	x		
4. Interpret results of data analysis for public health research, policy or practice	x		x		
Public Health and Health Care Systems					
5. Compare the organization, structure and function of health care, public health and regulatory systems across national and international settings		x			
6. Discuss the means by which structural bias, social inequities and racism undermine health and create challenges to achieving health equity at organizational, community and societal levels					x
Planning and Management to Promote Health					
7. Assess population needs, assets and capacities that affect communities' health		x		x	
8. Apply awareness of cultural values and practices to the design or implementation of public health policies or programs					x
9. Design a population-based policy, program, project or intervention			x		
10. Explain basic principles and tools of budget and resource management		x	x		
11. Select methods to evaluate public health programs	x	x	x		
Policy in Public Health					
12. Discuss multiple dimensions of the policy-making process, including the roles of ethics and evidence		x	x	x	
13. Propose strategies to identify stakeholders and build coalitions and partnerships for influencing public health outcomes		x		x	
14. Advocate for political, social or economic policies and programs that will improve health in diverse populations		x			x
15. Evaluate policies for their impact on public health and health equity		x		x	

Leadership					
16. Apply principles of leadership, governance and management, which include creating a vision, empowering others, fostering collaboration and guiding decision making		x			x
17. Apply negotiation and mediation skills to address organizational or community challenges		x			
Communication					
18. Select communication strategies for different audiences and sectors	DMP 815, FNDH 880 or KIN 796				
19. Communicate audience-appropriate public health content, both in writing and through oral presentation	DMP 815, FNDH 880 or KIN 796				
20. Describe the importance of cultural competence in communicating public health content		x			x
Interprofessional Practice					
21. Perform effectively on interprofessional teams		x			x
Systems Thinking					
22. Apply systems thinking tools to a public health issue			x	x	

Student Attainment of MPH Emphasis Area Competencies

Table 5.3 Summary of MPH Emphasis Area Competencies

MPH Emphasis Area: Infectious Diseases/Zoonoses		
Number and Competency		Description
1	Pathogens/pathogenic mechanisms	Evaluate modes of disease causation of infectious agents.
2	Host response to pathogens/immunology	Investigate the host immune response to infection.
3	Environmental/ecological influences	Examine the influence of environmental forces on infectious diseases.
4	Disease surveillance	Analyze disease risk factors and select appropriate surveillance.
5	Disease vectors	Investigate the role of vectors, toxic plants, and other toxins in infectious diseases.

AACACC is not an organization designed for research, rather it is designed for passive surveillance and control methods for rabies. Therefore, many of the MPH emphasis area competencies were not researched or evaluated, but were stated as common knowledge. The main two competencies that were utilized during this experience were: #3

Environmental/ecological influences, and #4 Disease surveillance. The environmental forces were mainly involved with the location. Anne Arundel County, Maryland has diverse environments that range from rural to city, which leads to challenges in wildlife and rabies control. By mapping the location of different species that were positive for rabies, it could be possible to see which environments are of particular risk for specific species. It would be especially interesting to compare the location of stray cats that were sent in for rabies testing and the locations of known community cat colonies.

AACACC conducts passive surveillance. Animals are sent to be tested for rabies only after a known exposure. Active surveillance would be preferable, with rabies tests on wildlife before human or animal exposure occurs, but is cost prohibitive. I did look into exposure risk factors. Humans were more likely to be exposed to an animal that was then sent for rabies testing than an animal (such as a dog or cat), and humans were also more likely to be bitten as their route of exposure.

References

1. 2018. CDC - Rabies.
2. Brown CM, Slavinski S, Ettestad P, Sidwa TJ, Sorhage FE. 2016. Compendium of Animal Rabies Prevention and Control, 2016. *Journal of the American Veterinary Medical Association* 248:505–517.
3. Oral vaccination of wildlife using a vaccinia–rabies-glycoprotein recombinant virus vaccine (RABORAL V-RG®): a global review | *Veterinary Research* | Full Text.
4. CDC Online Newsroom - Press Release - US Declared Canine-Rabies Free.
5. Messenger SL, Smith JS, Rupprecht CE. 2002. Emerging Epidemiology of Bat-Associated Cryptic Cases of Rabies in Humans in the United States. *Clin Infect Dis* 35:738–747.
6. Roscoe DE, Holste WC, Sorhage FE, Campbell C, Niezgoda M, Buchannan R, Diehl D, Niu HS, Rupprecht CE. 1998. EFFICACY OF AN ORAL VACCINIA-RABIES GLYCOPROTEIN RECOMBINANT VACCINE IN CONTROLLING EPIDEMIC RACCOON RABIES IN NEW JERSEY. *Journal of Wildlife Diseases* 34:752–763.
7. Blanton JD, Niezgoda M, Hanlon CA, Swope CB, Suckow J, Saily B, Nelson K, Chipman RB, Slate D. 2018. EVALUATION OF ORAL RABIES VACCINATION: PROTECTION AGAINST RABIES IN WILD CAUGHT RACCOONS (PROCYON LOTOR). *jwidi* 54:520–527.
8. Berentsen AR, Patrick EM, Blass C, Wehner K, Dunlap B, Hicks B, Hale R, Chipman RB, Vercauteren KC. 2018. Seroconversion of raccoons following two oral rabies vaccination baiting strategies. *The Journal of Wildlife Management* 82:226–231.
9. Pedersen K, Schmit BS, DeLiberto TJ, Suckow JR, Davis AJ, Slate D, Chipman RB, Hale RL, Gilbert AT. 2018. Raccoon (*Procyon lotor*) biomarker and rabies antibody response to varying oral rabies vaccine bait densities in northwestern Pennsylvania. *Heliyon* 4.
10. Sterner RT, Meltzer MI, Shwiff SA, Slate D. 2009. Tactics and Economics of Wildlife Oral Rabies Vaccination, Canada and the United States. *Emerg Infect Dis* 15:1176–1184.
11. Animal Care & Control | Anne Arundel County, MD.
12. Cliquet F, Guiot A-L, Aubert M, Robardet E, Rupprecht CE, Meslin F-X. 2018. Oral vaccination of dogs: a well-studied and undervalued tool for achieving human and dog rabies elimination. *Veterinary Research* 49:61.
13. WHO | Symptoms. WHO.
14. De Serres G, Dallaire F, Côte M, Skowronski DM. 2008. Bat Rabies in the United States and Canada from 1950 through 2007: Human Cases With and Without Bat Contact. *Clin Infect Dis* 46:1329–1337.
15. Murray KO, Holmes KC, Hanlon CA. 2009. Rabies in vaccinated dogs and cats in the United States, 1997–2001. *Journal of the American Veterinary Medical Association* 235:691–695.
16. McQuiston JH, Yager PA, Smith JS, Rupprecht CE. 2001. Epidemiologic characteristics of rabies virus variants in dogs and cats in the United States, 1999. *Journal of the American Veterinary Medical Association* 218:1939–1942.
17. Radhika Gharpure, Kimberly C. Mitchell, Samantha Dolan, Sally Ann Iverson, Katherine A.

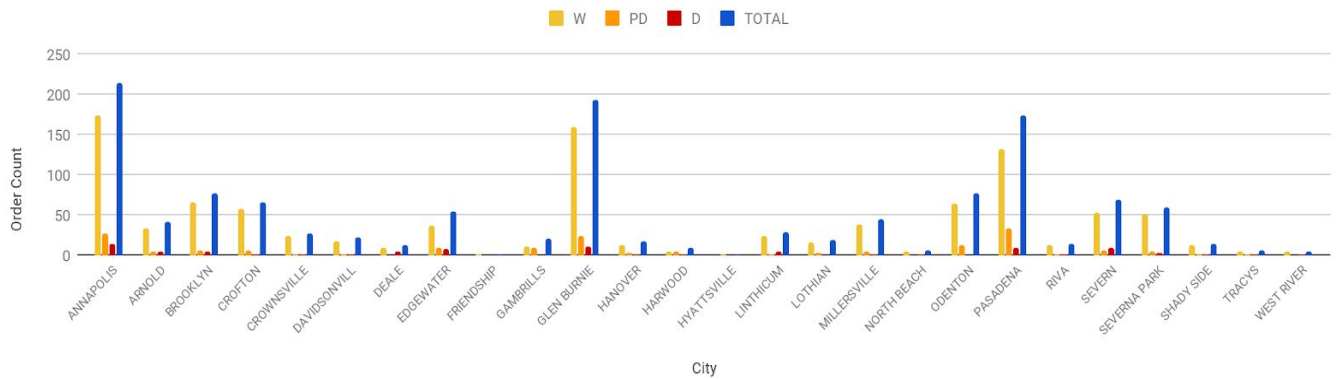
- Feldman. 2018. Low-Cost Animal Rabies Vaccination Clinics in Maryland Facilitate Access to Rabies Vaccination for Pets. *Vector-Borne and Zoonotic Diseases*.
18. Ma X, Monroe BP, Cleaton JM, Orciari LA, Li Y, Kirby JD, Chipman RB, Petersen BW, Wallace RM, Blanton JD. 2018. Rabies surveillance in the United States during 2017. *Journal of the American Veterinary Medical Association* 253:1555–1568.
 19. Lu H, McComas KA, Buttke DE, Roh S, Wild MA. 2016. A One Health Message about Bats Increases Intentions to Follow Public Health Guidance on Bat Rabies. *PLOS ONE* 11:e0156205.
 20. Mondul AM, Krebs JW, Childs JE. 2003. Trends in national surveillance for rabies among bats in the United States (1993–2000). *Journal of the American Veterinary Medical Association* 222:633–639.
 21. Dato VM, Campagnolo ER, Long J, Rupprecht CE. 2016. A Systematic Review of Human Bat Rabies Virus Variant Cases: Evaluating Unprotected Physical Contact with Claws and Teeth in Support of Accurate Risk Assessments. *PLOS ONE* 11:e0159443.
 22. Ben T. Hirsch, Jennifer J.H. Reynolds, Stanley D. Gehrt, Meggan E. Craft. 2016. Which mechanisms drive seasonal rabies outbreaks in raccoons? A test using dynamic social network models. *Journal of Applied Ecology* 53:804–813.
 23. Rupprecht CE, Charlton KM, Artois M, Casey GA, Webster WA, Campbell JB, Lawson KF, Schneider LG. 1990. Ineffectiveness and Comparative Pathogenicity of Attenuated Rabies Virus Vaccines for the Striped Skunk (*Mephitis mephitis*). *Journal of Wildlife Diseases* 26:99–102.
 24. Artois M, Guittre C, Thomas I, Leblois H, Brochier B, Barrat J. 1992. Potential pathogenicity for rodents of vaccines intended for oral vaccination against rabies: a comparison. *Vaccine* 10:524–528.
 25. Vos A, Neubert A, Aylan O, Schuster P, Pommerening E, Müller T, Chivatsi DC. 1999. An update on safety studies of SAD B19 rabies virus vaccine in target and non-target species. *Epidemiology & Infection* 123:165–175.
 26. Fehlner-Gardiner C, Nadin-Davis S, Armstrong J, Muldoon F, Bachmann P, Wandeler A. 2008. ERA VACCINE-DERIVED CASES OF RABIES IN WILDLIFE AND DOMESTIC ANIMALS IN ONTARIO, CANADA, 1989–2004. *Journal of Wildlife Diseases* 44:71–85.
 27. Slate D. 2009. WRITTEN BY: Kathy Nelson 9.
 28. Pratt T. Anne Arundel rabies vaccination project will distribute 85,000 baits. capitalgazette.com.
 29. No raccoon rabies vaccine baiting in Anne Arundel this year - Baltimore Sun.
 30. Department of Health | Communicable Disease Service | Animal Rabies Statistics.
 31. Economic analysis of a large scale oral vaccination program to control raccoon rabies. ResearchGate.
 32. Hannah Lux. Data from “Bite statistics 2002-2018.” Unpublished, Anne Arundel County Animal Care & Control.
 33. Descriptive Epidemiology.
 34. Principles of Epidemiology | Lesson 1 - Section 6.

Appendix 1: Warning Letters, Potentially Dangerous Orders, Dangerous Orders

Appendix 1.1: Warning Letters (W), Potentially Dangerous Orders (PD), Dangerous Orders (D), by City (2014-2018)

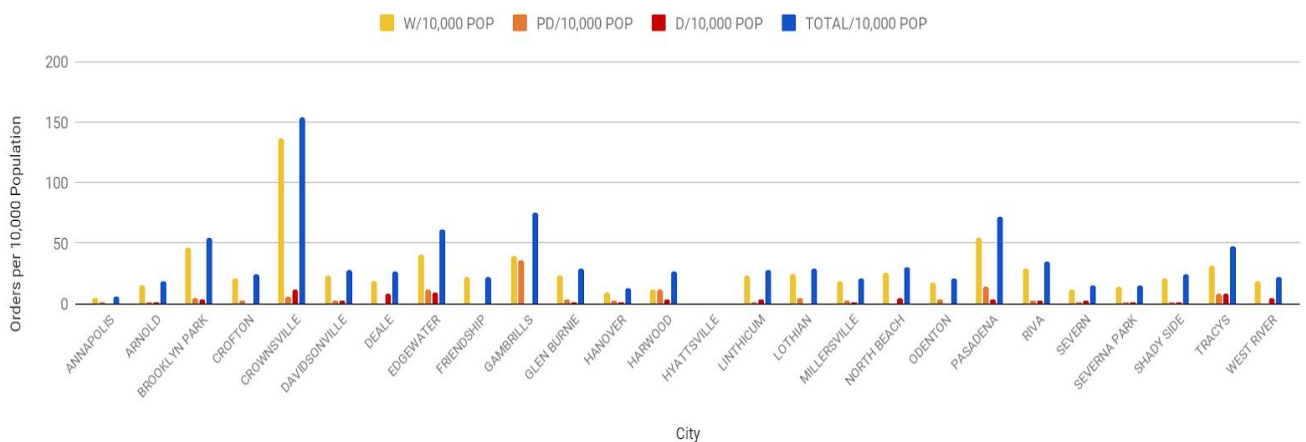
Orders by City (2014-2018)

Not Population Adjusted



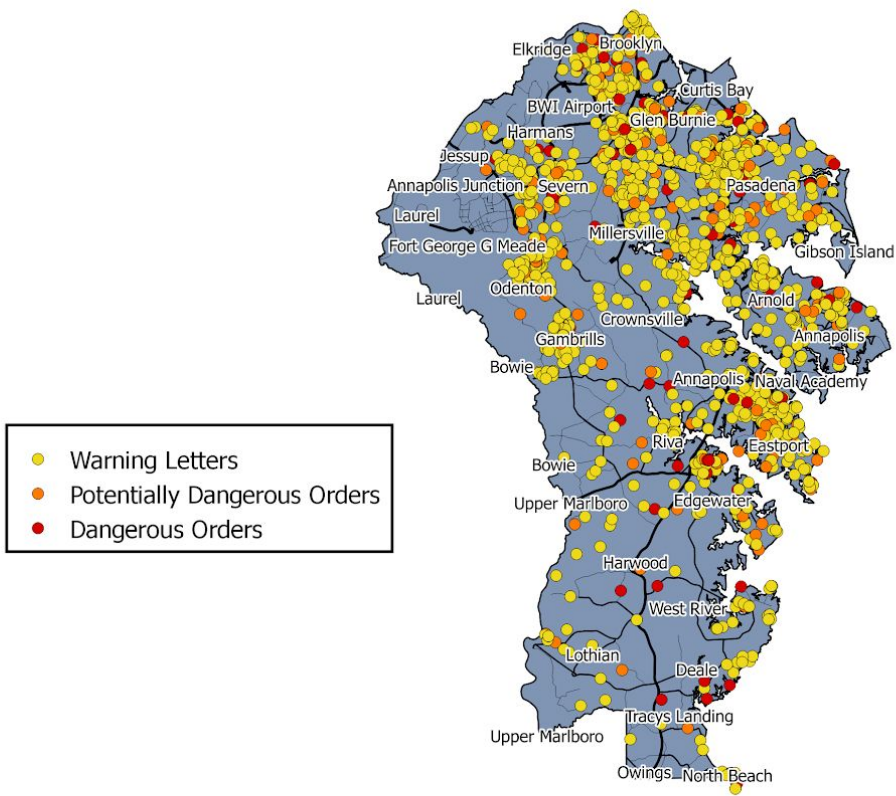
Appendix 1.2: Population Adjusted Warning Letters (W), Potentially Dangerous Orders (PD), Dangerous Orders (D), by City (2014-2018)

Population Adjusted Orders Per City (2014-2018)



Appendix 1.3: Warning Letters and Orders Cited (2014-2018) Map

Anne Arundel County Warning Letters and Orders Cited 2014-2018



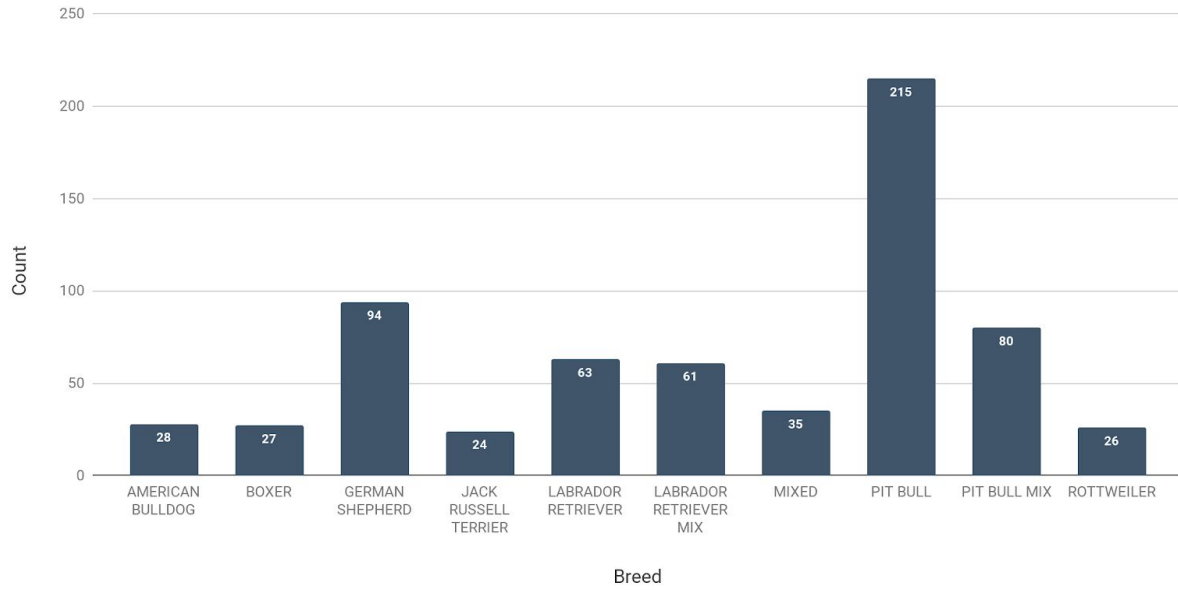
Animal Care & Control

Hannah Lux
February 2019



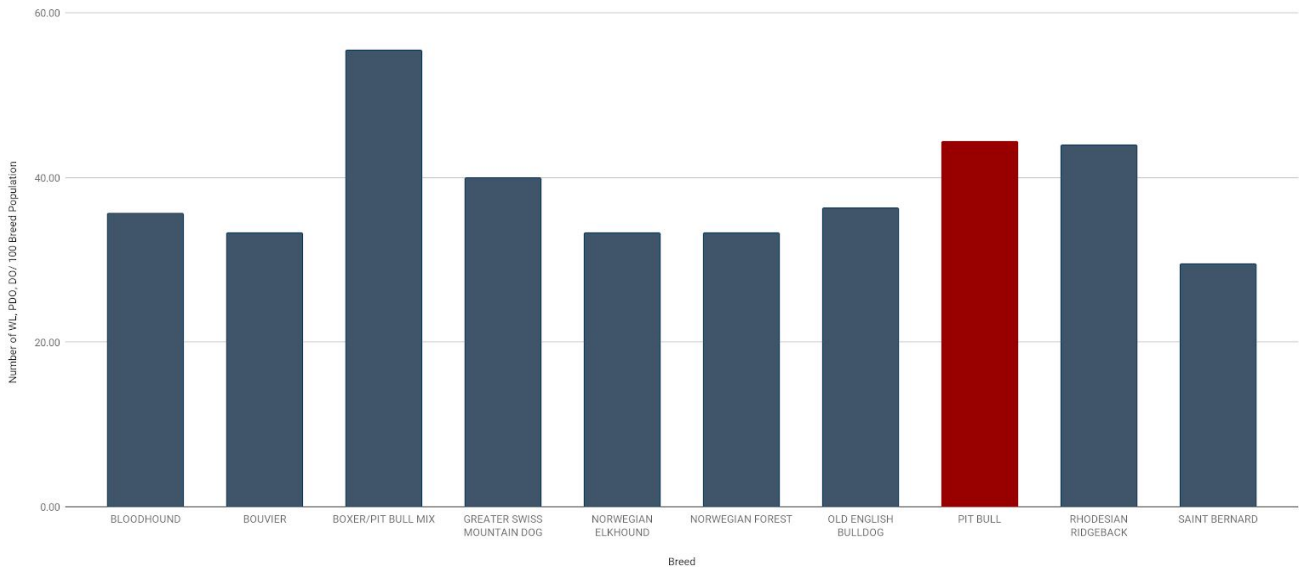
Appendix 1.4: Top 10 Unadjusted “Dangerous” Dog Breeds (2014-2018)

Top 10 Unadjusted "Dangerous" Breeds
2014-2018



Appendix 1.5: Top 10 Adjusted “Dangerous” Dog Breeds (2014-2018)

Adjusted* "Most Dangerous Dog Breeds"
5 year Trend (2014-2018)

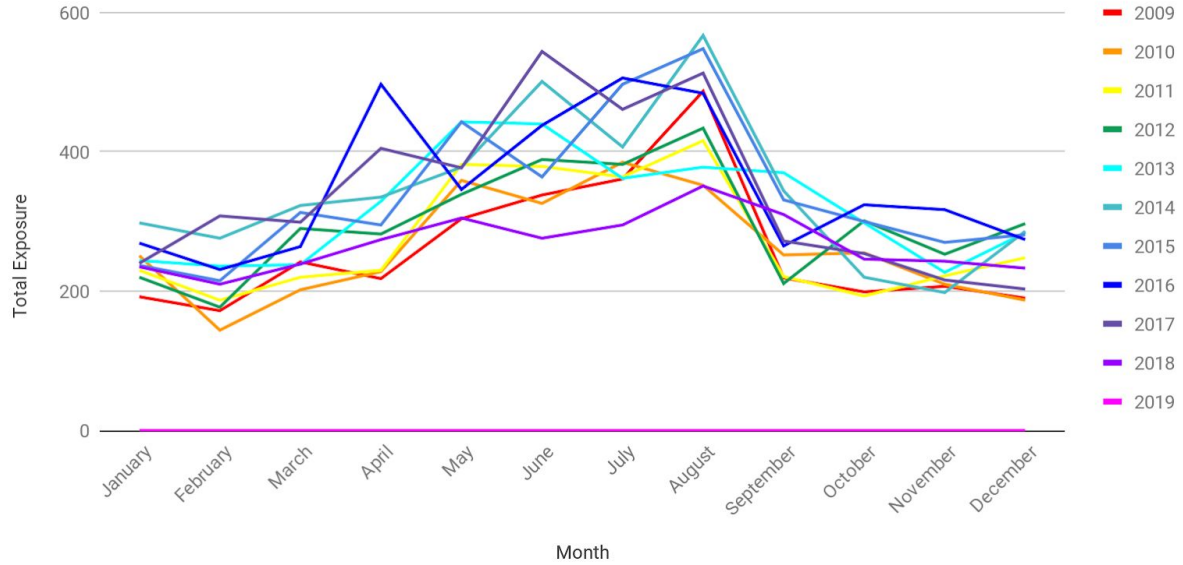


Appendix 2: Bite Statistics

Appendix 2.1: Total Exposure Trends (2009-2014)

Total Exposure Trends

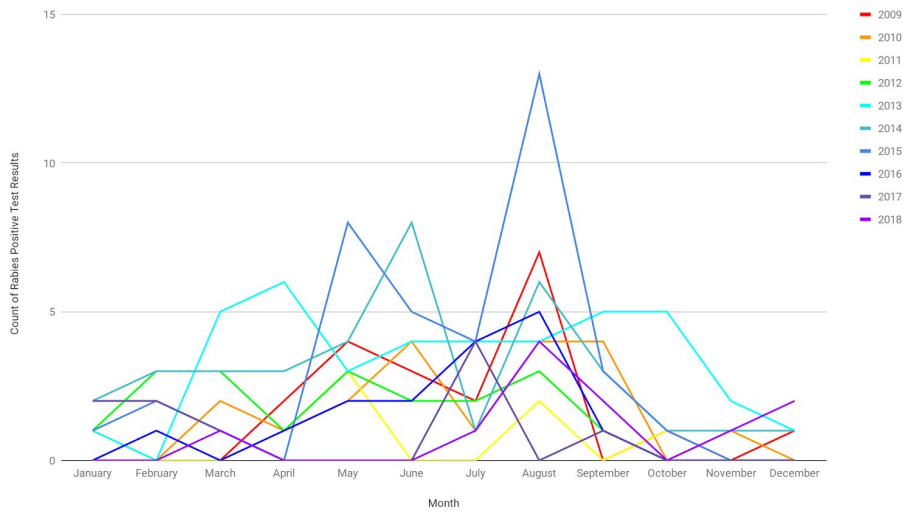
Ten Year Trend (2009-2018)



Appendix 2.2: Rabies Positive Test Trends (2009-2014)

Rabies Positive Tests

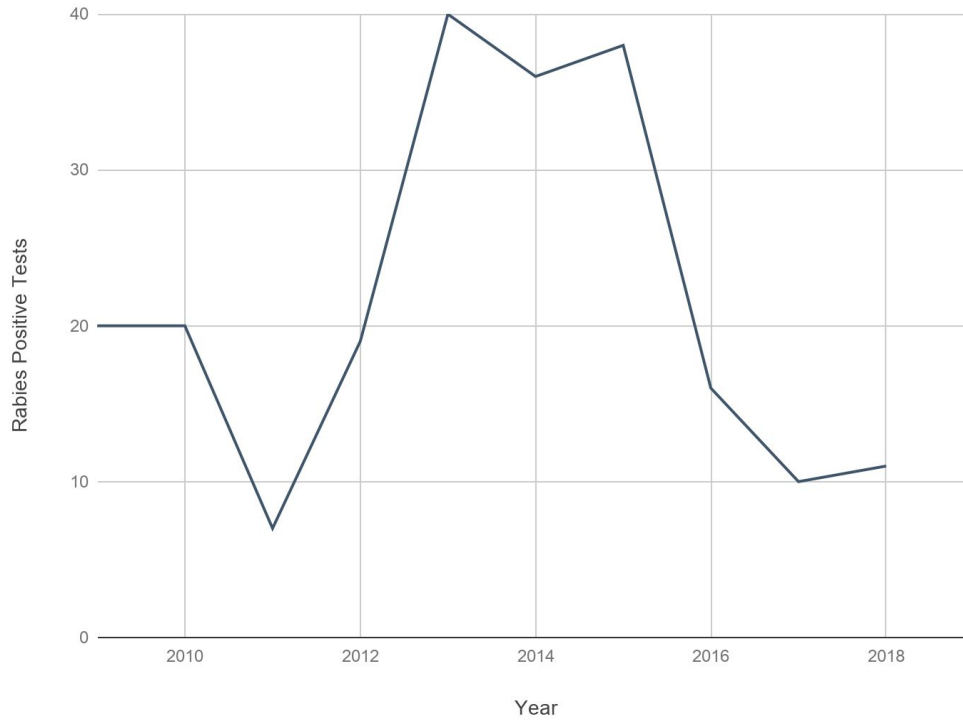
Ten Year Trend (2009-2018)



Appendix 2.3: Rabies Positive Tests (2009-2018)

Rabies Positive Tests

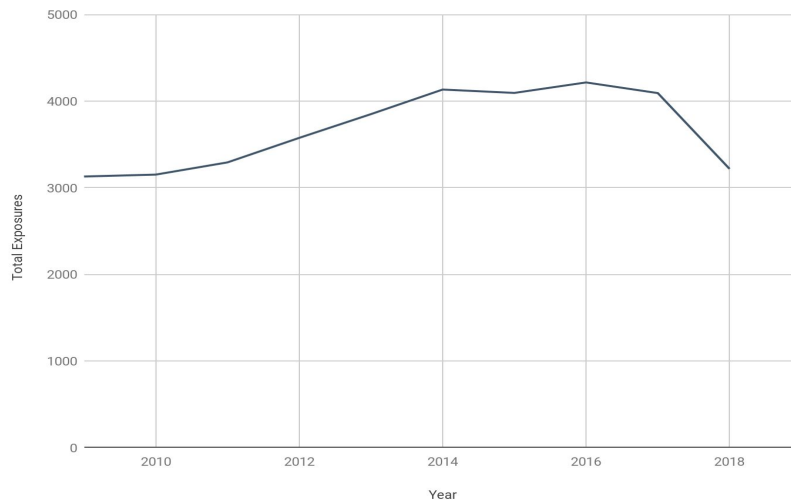
Ten Year Trend (2009-2018)



Appendix 2.4: Total Exposure (2009-2018)

Total Exposures

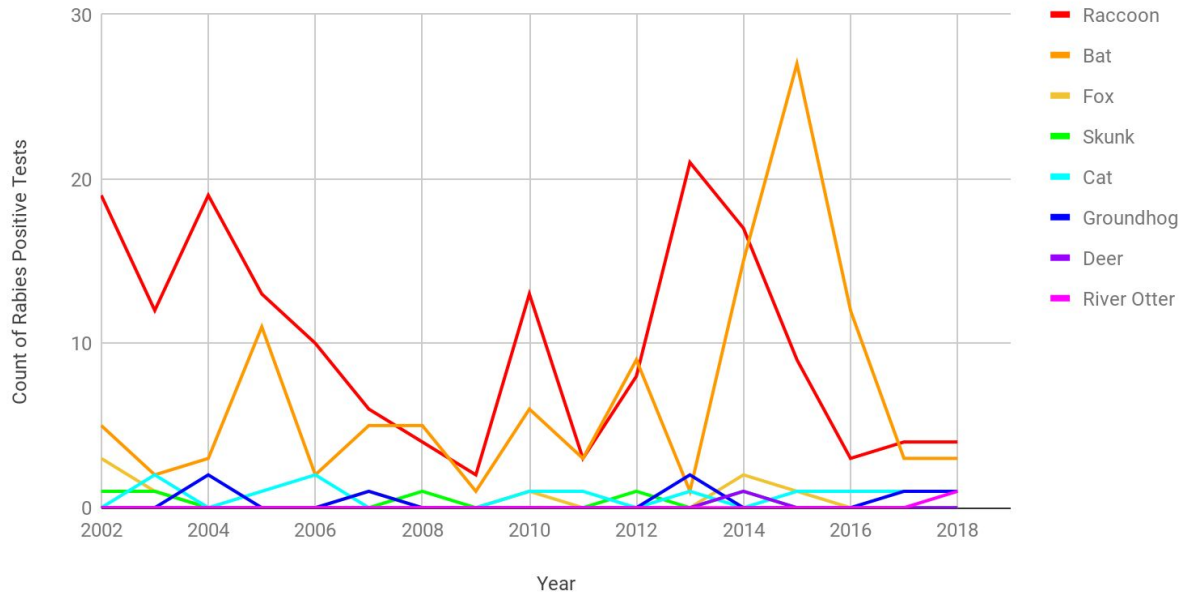
Ten Year Trend (2009-2018)



Appendix 2.5: Rabies Positive Species (2002-2018)

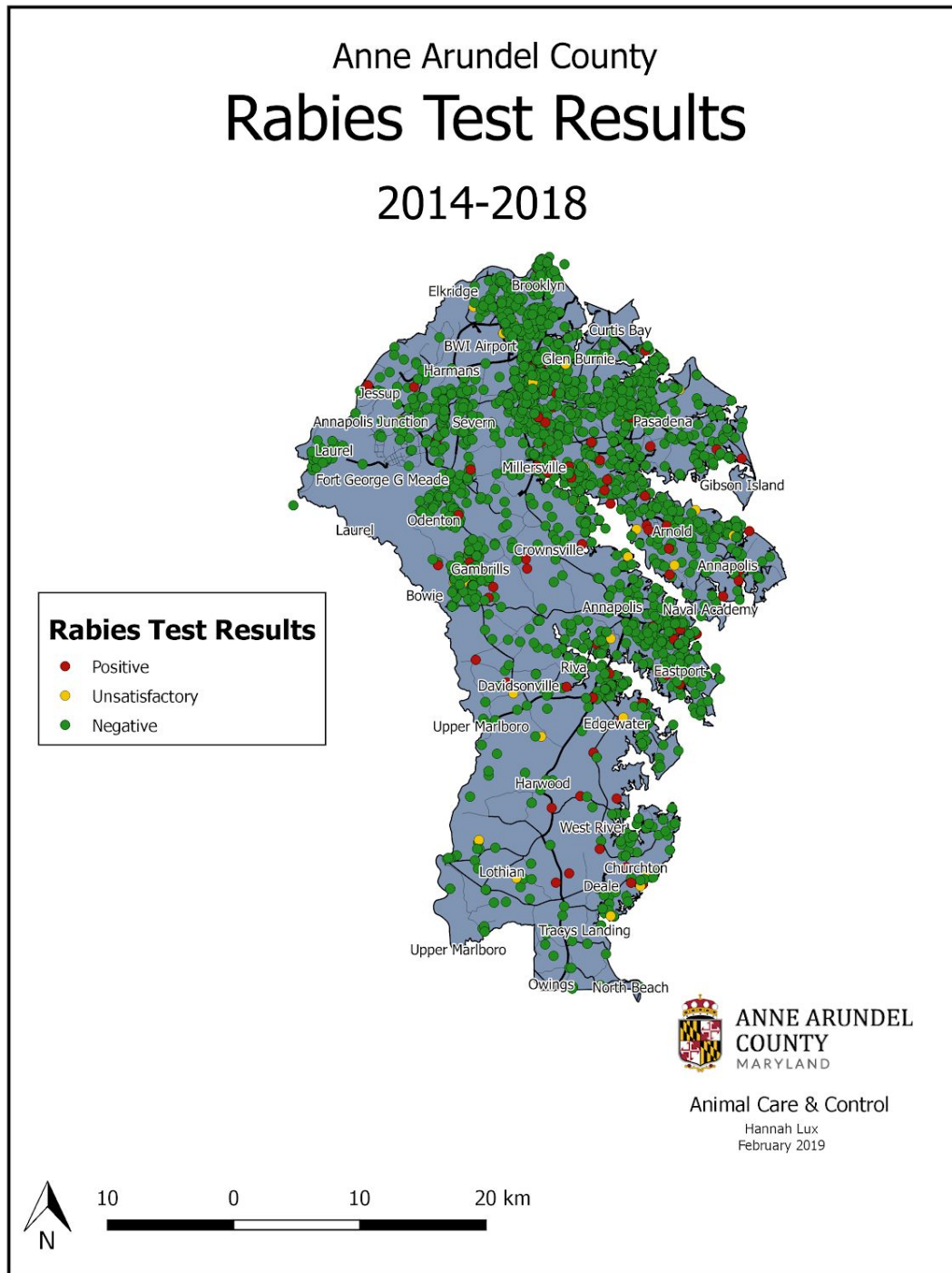
Rabies Positive Species

2002-2018

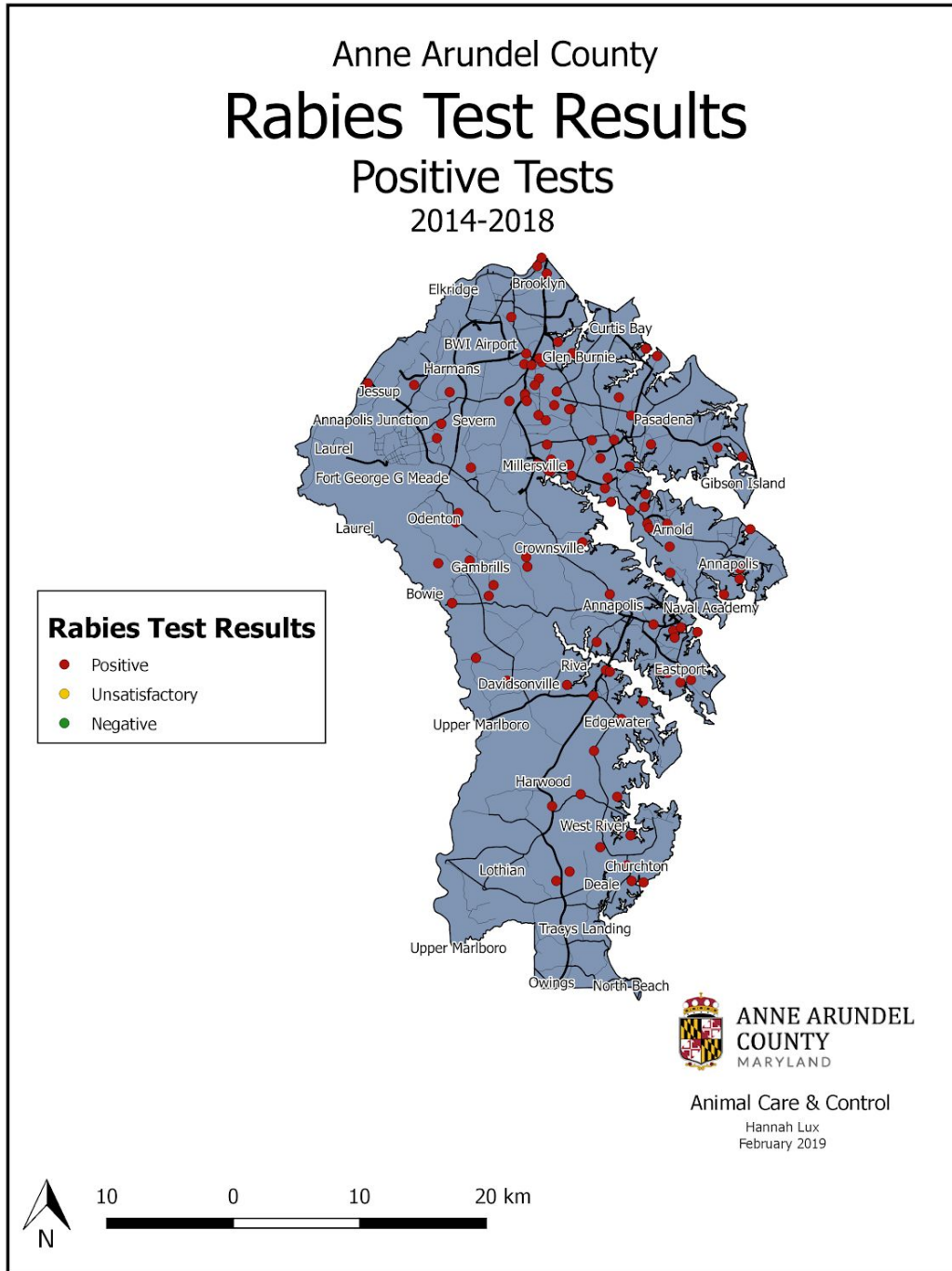


Appendix 3: Rabies Examination Results

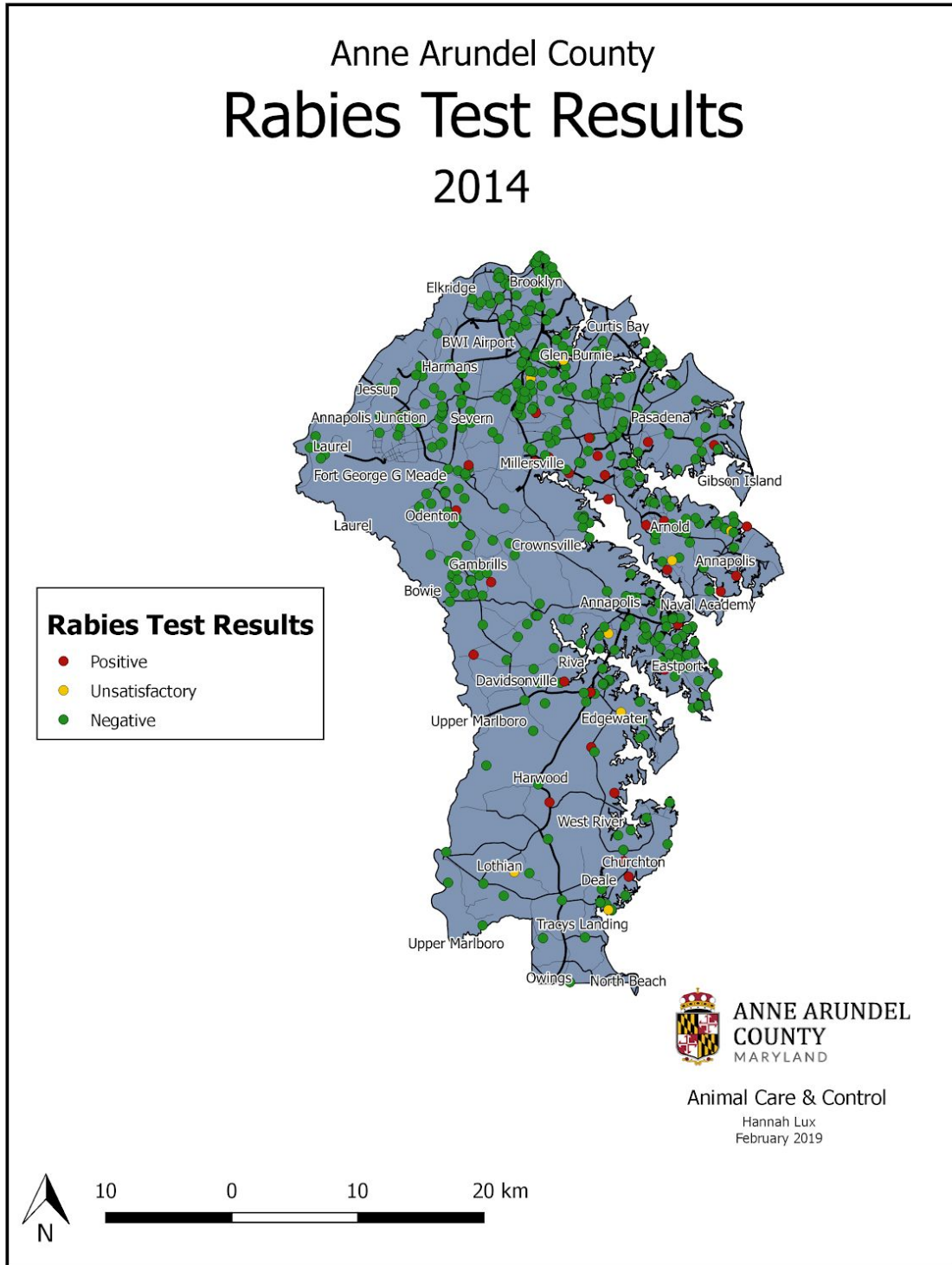
Appendix 3.1: Rabies Test Results (2014-2018) Map



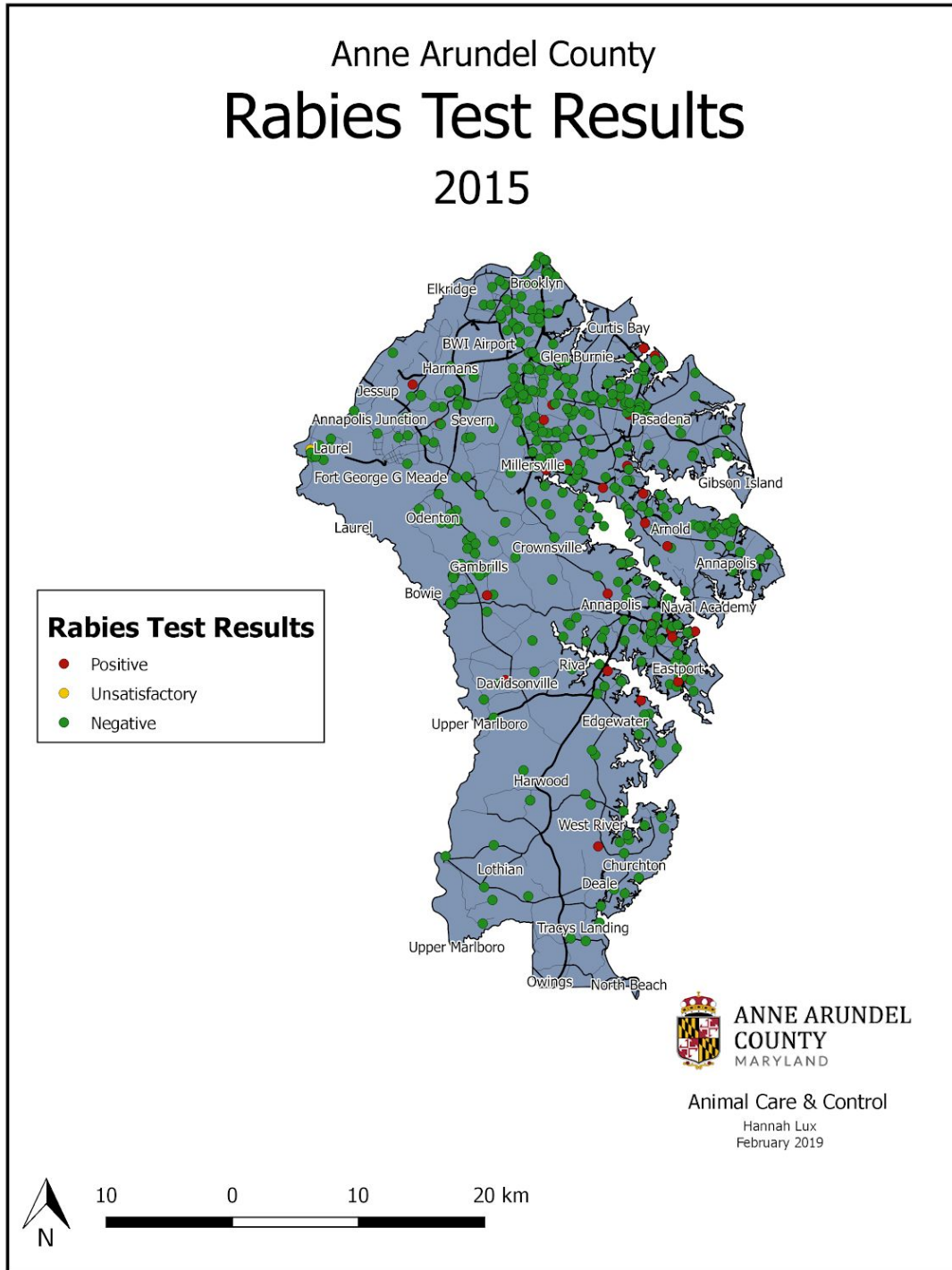
Appendix 3.2: Rabies Positive Test Results (2014-2018) Map



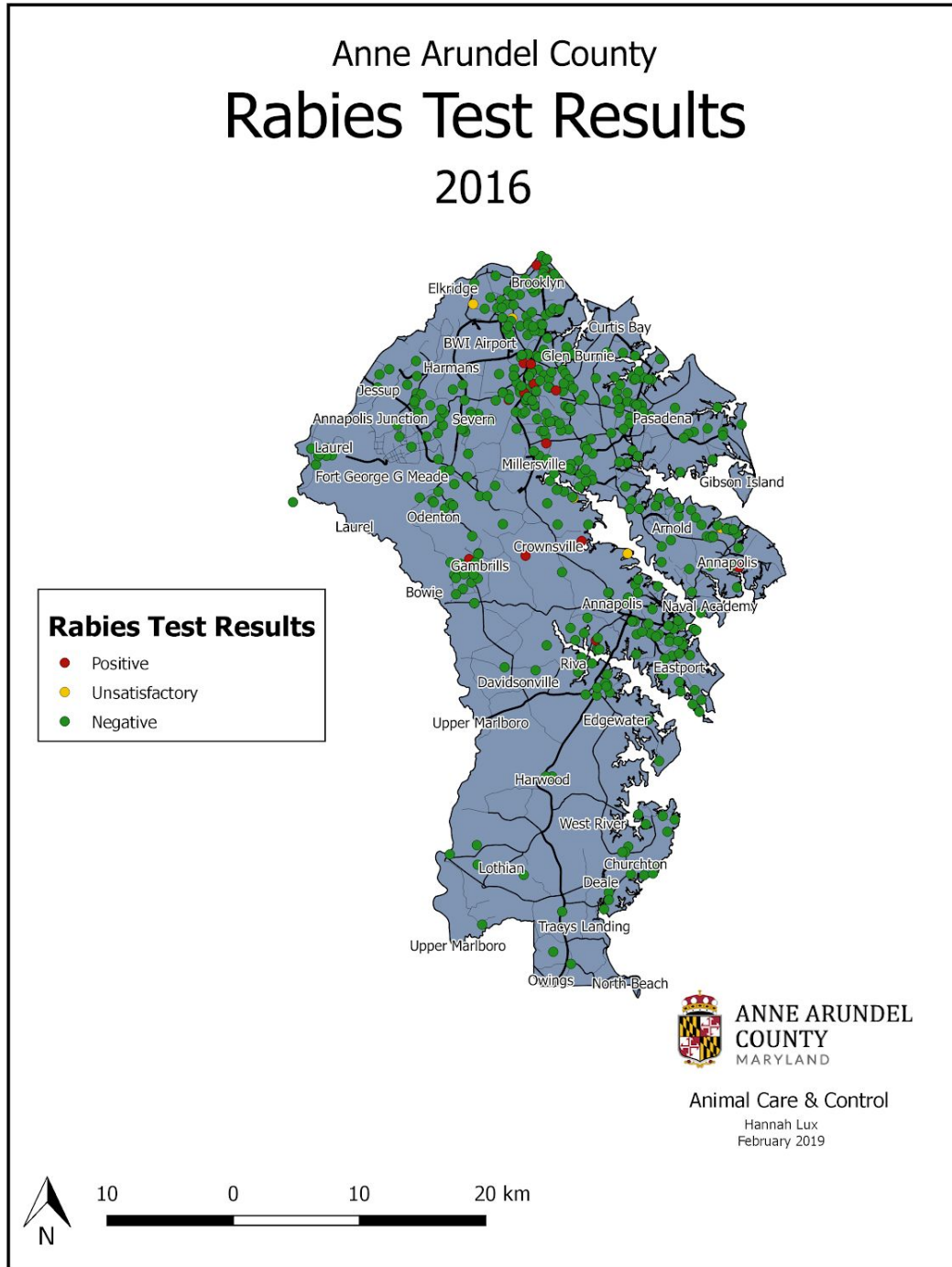
Appendix 3.3: Rabies Test Results 2014 Map



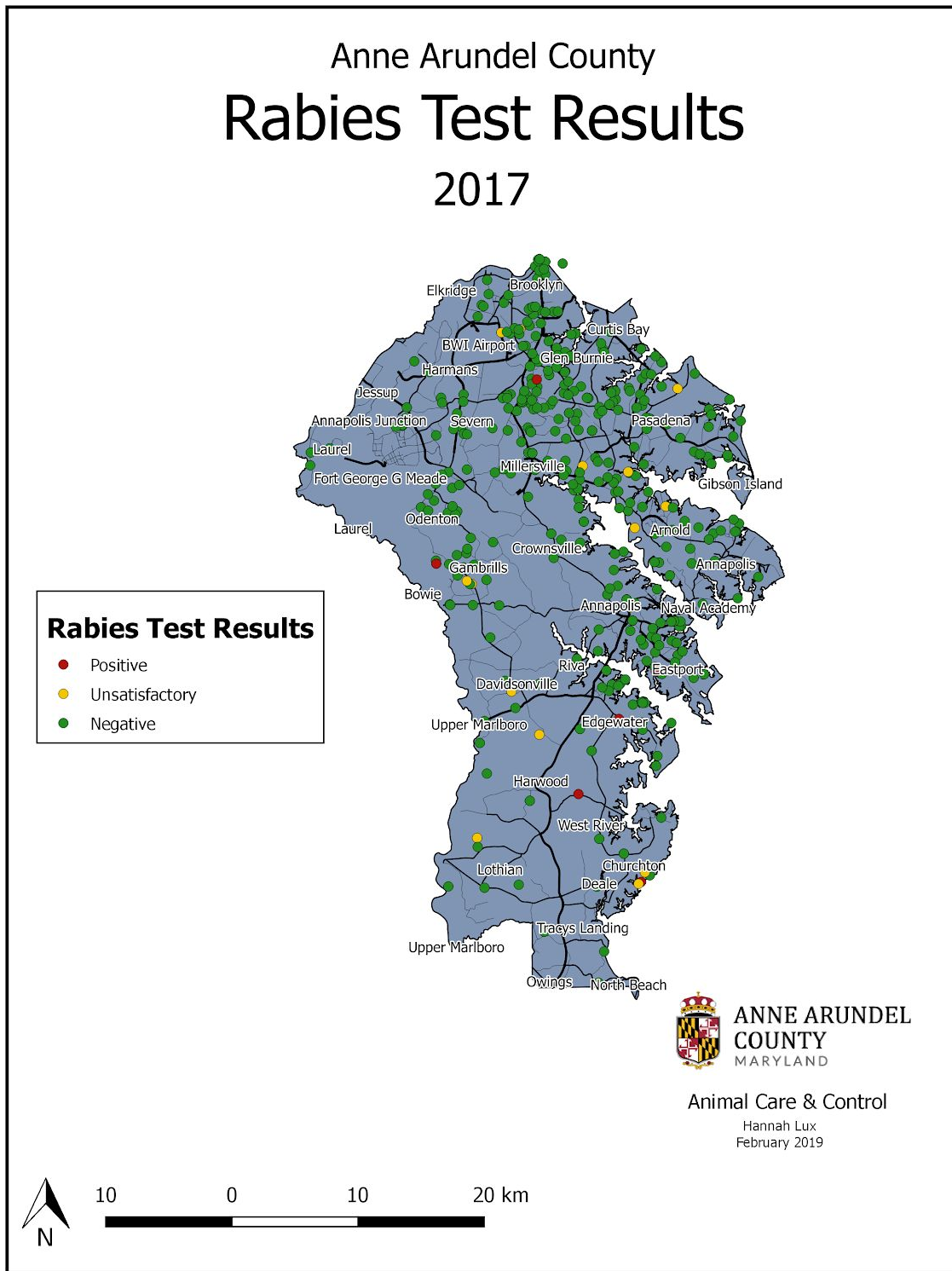
Appendix 3.4: Rabies Test Results 2015 Map



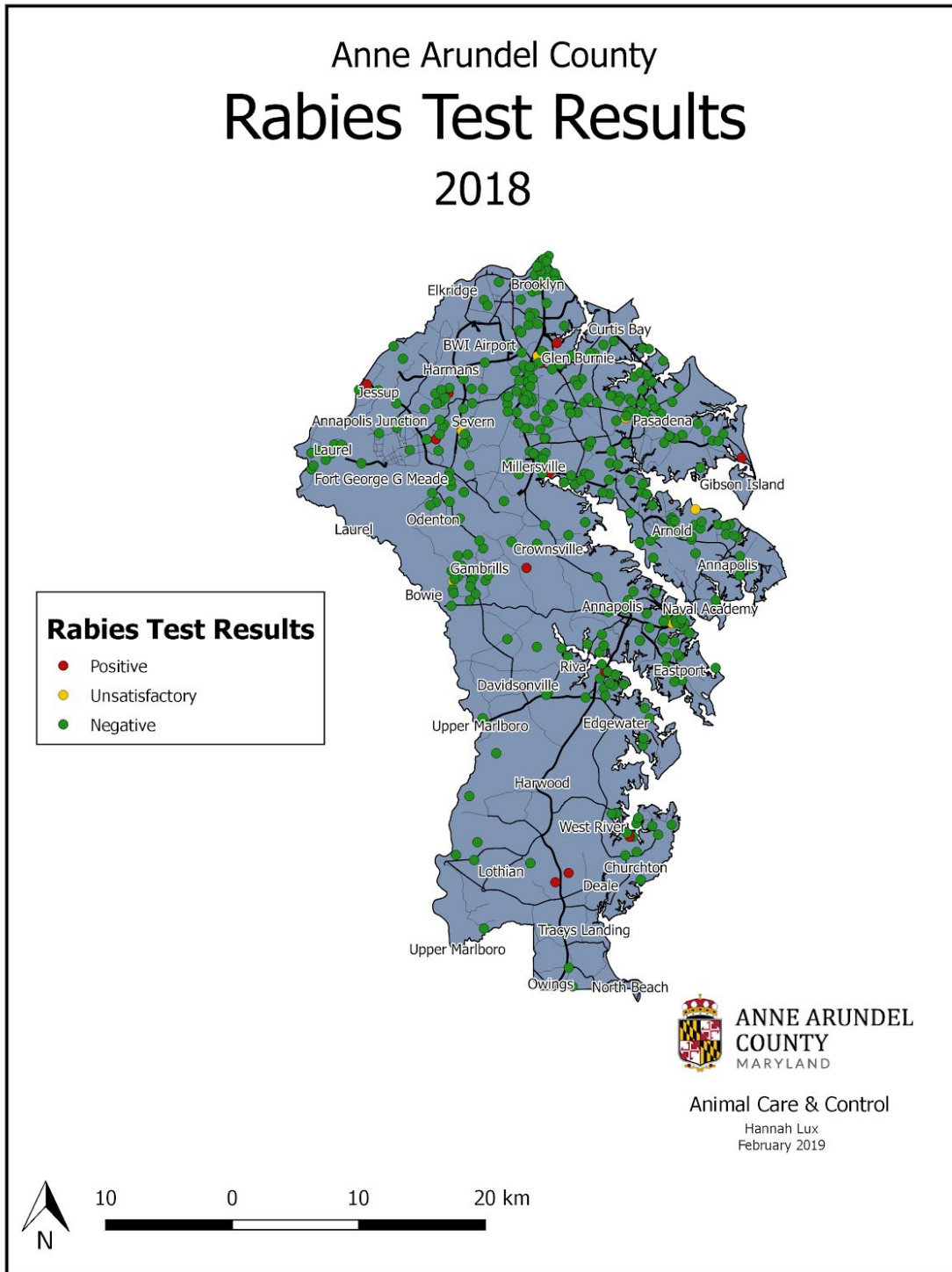
Appendix 3.5: Rabies Test Results 2016 Map



Appendix 3.6: Rabies Test Results 2017 Map

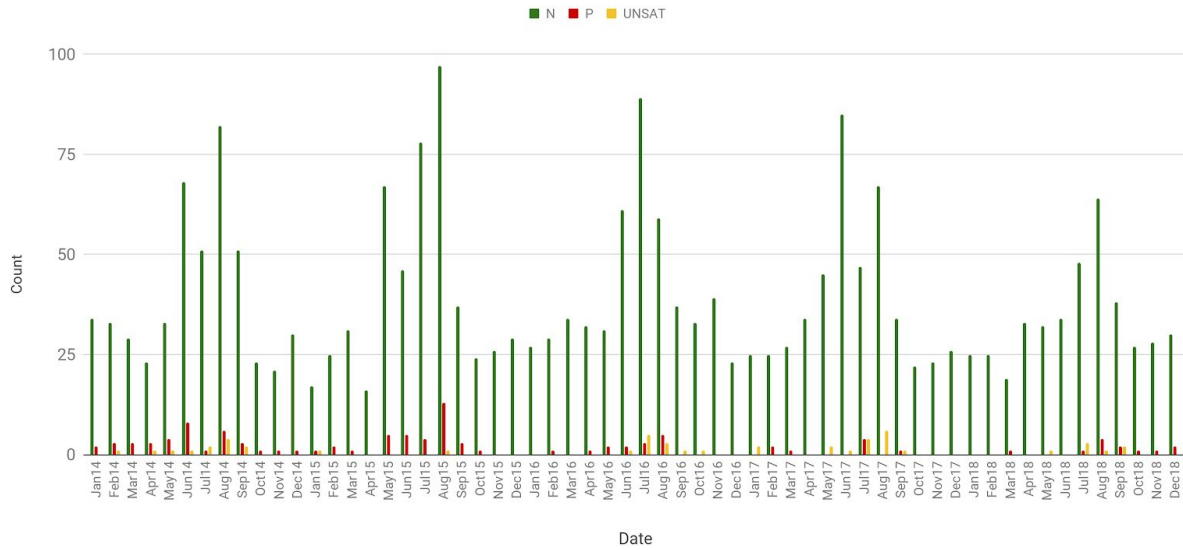


Appendix 3.7: Rabies Test Results 2018 Map



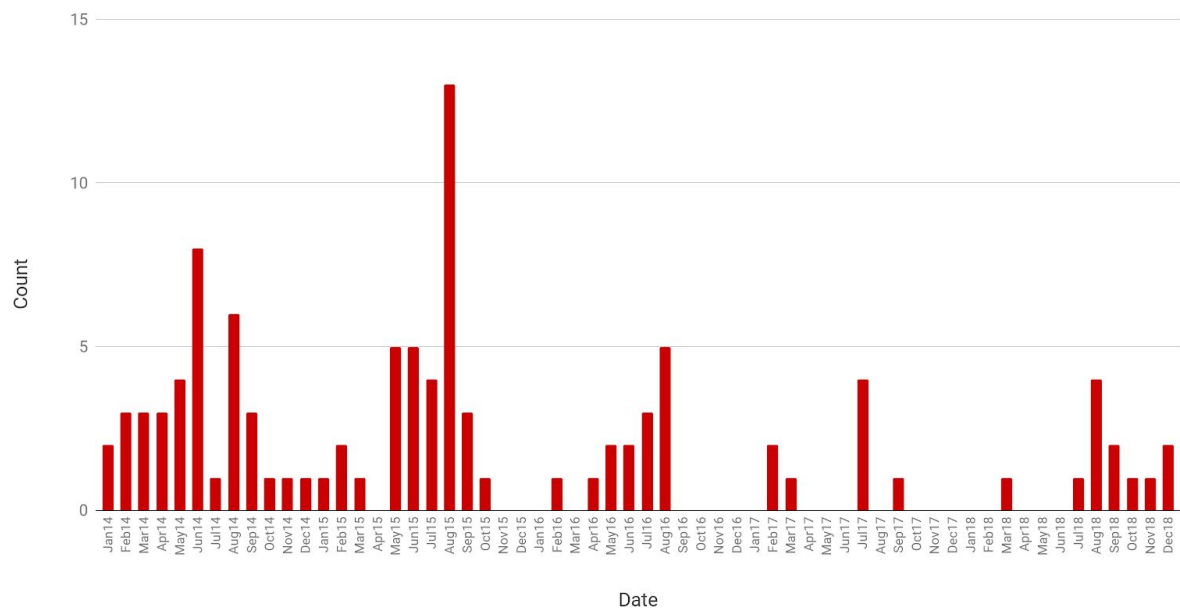
Appendix 3.8: Rabies Examination Results (2014-2018)

Rabies Examination Test Results
5 Year Trend (2014-2018)



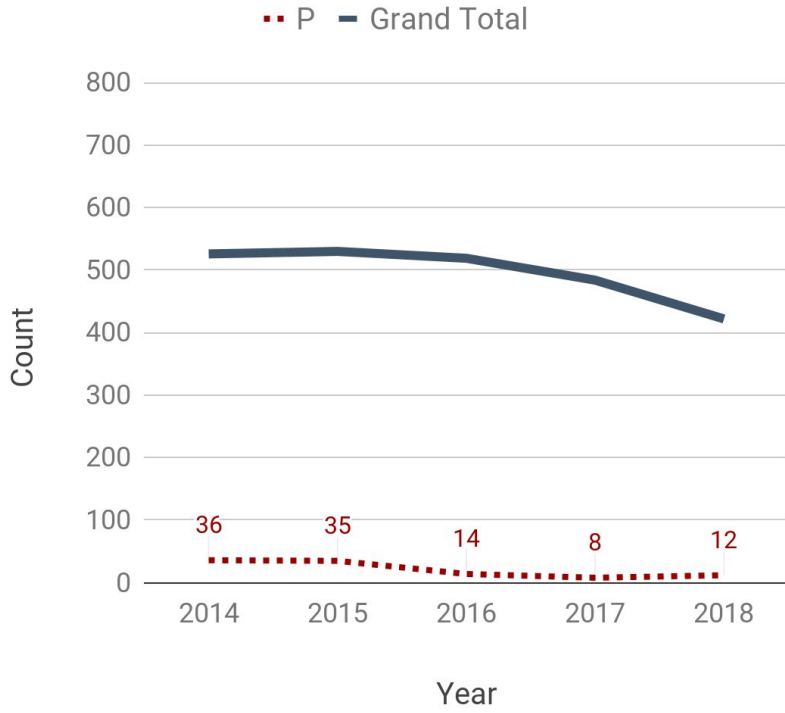
Appendix 3.9: Positive Rabies Test Results (2014-2018)

Positive Rabies Test Results
5 Year Trend



Appendix 3.10: Total Rabies Examinations and Positive Tests (2014-2018)

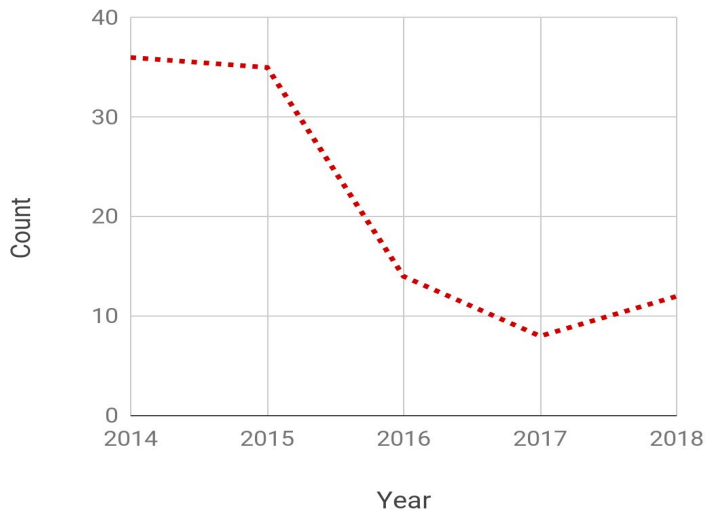
Total Tests Per Year



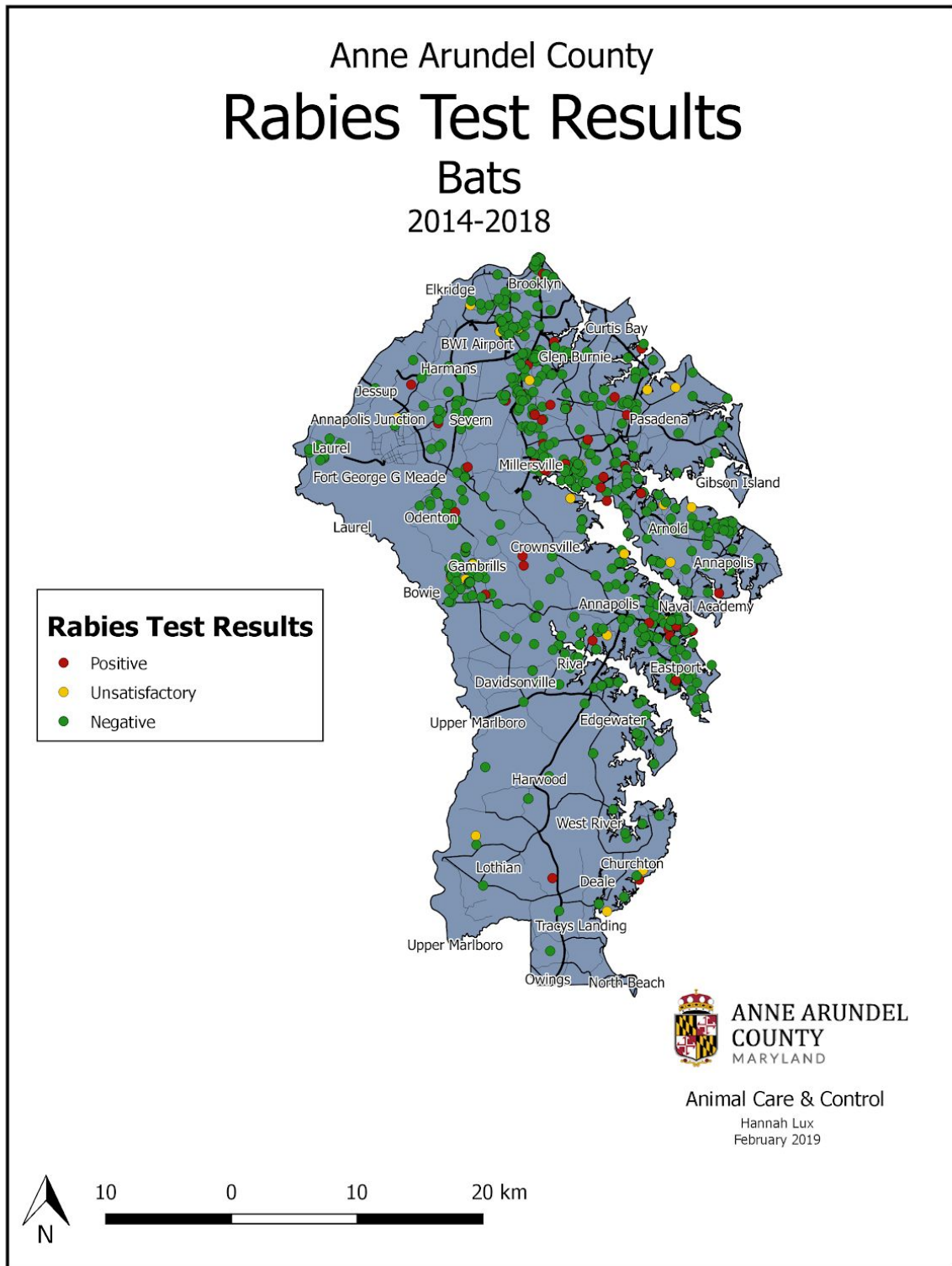
Appendix 3.11: Total Rabies Positive Tests (2014-2018)

Total Positive Rabies Tests Per Year

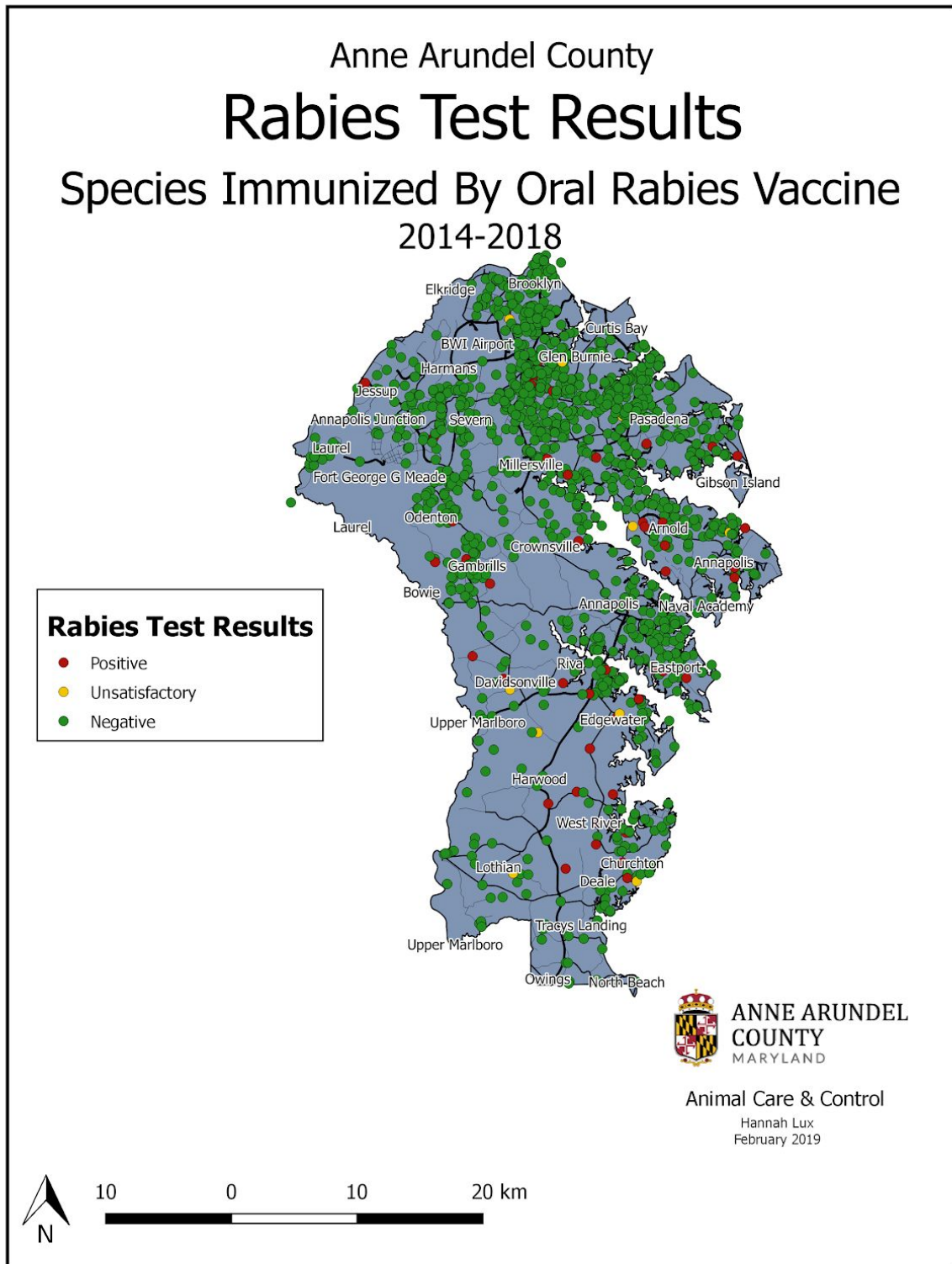
5 Year Trend



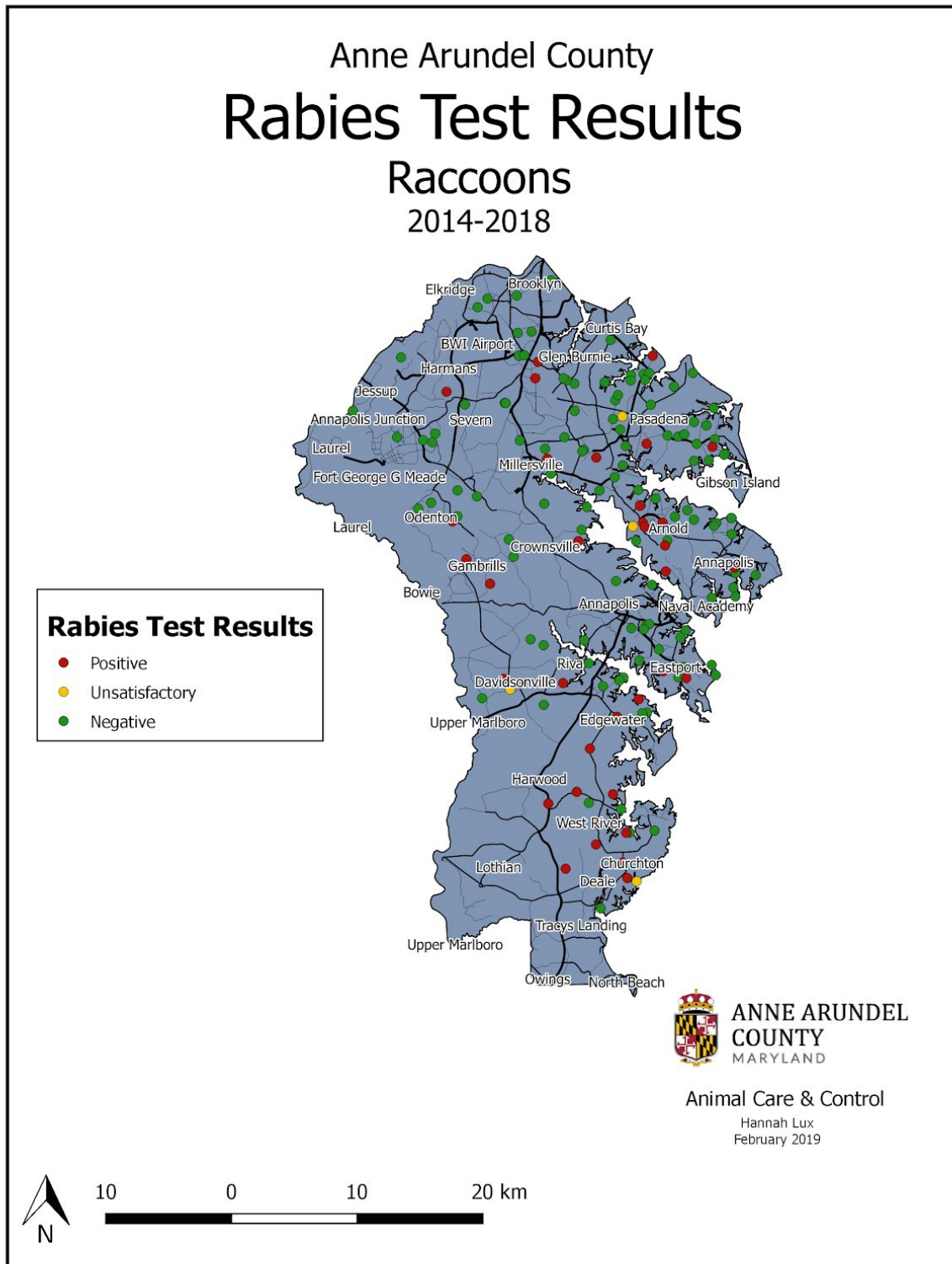
Appendix 3.12: Bat Rabies Test Results Map (2014-2018)



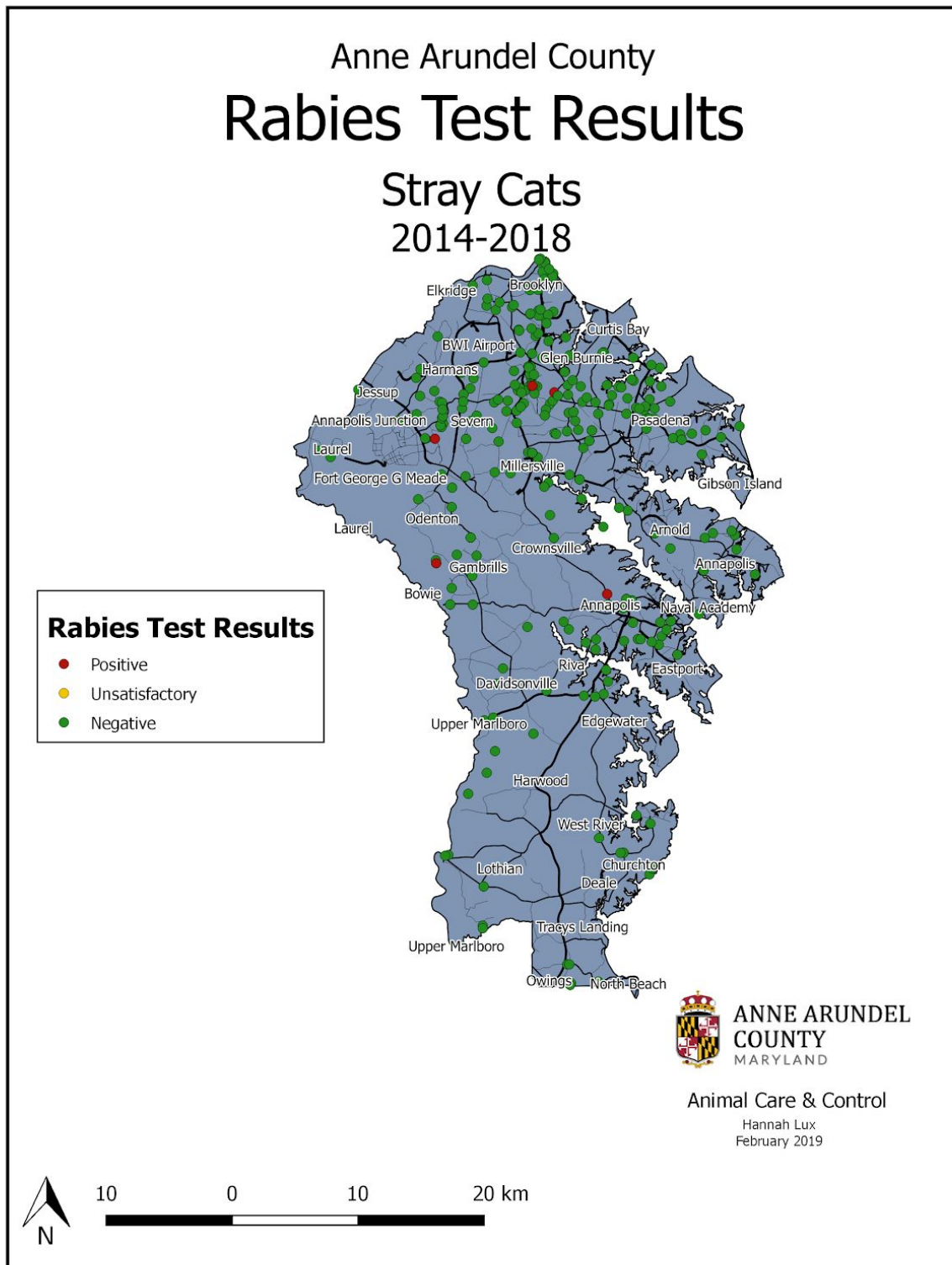
Appendix 3.13: Species Immunized by ORV Map (2014-2018)



Appendix 3.14: Raccoon Rabies Test Results (2014-2018)



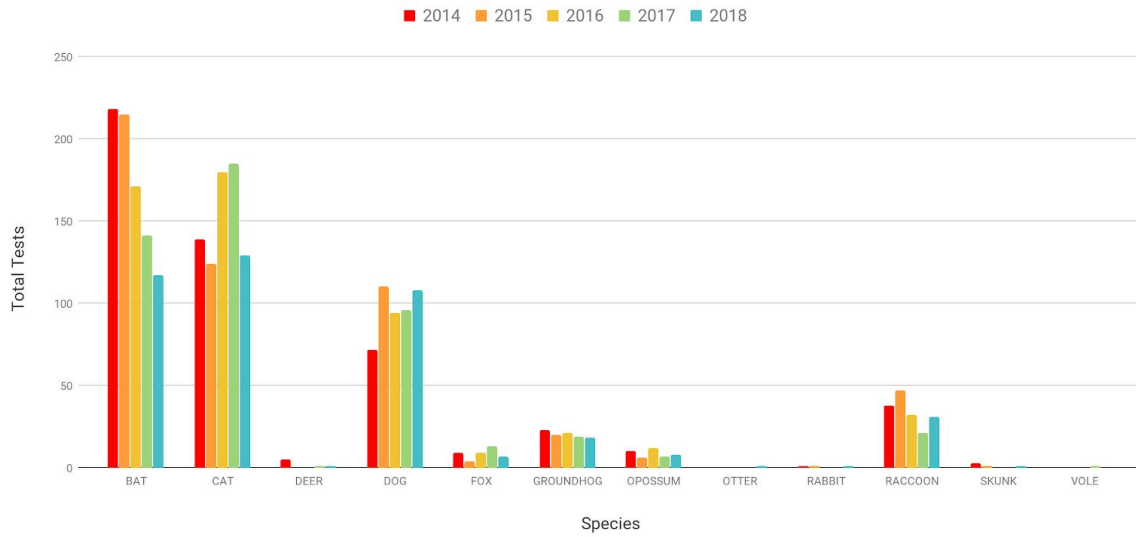
Appendix 3.15: Stray Cat Rabies Test Results (2014-2018)



Appendix 3.16: Rabies Examination Test Results by Species (2014-2018)

Total Tests Per Species Each Year

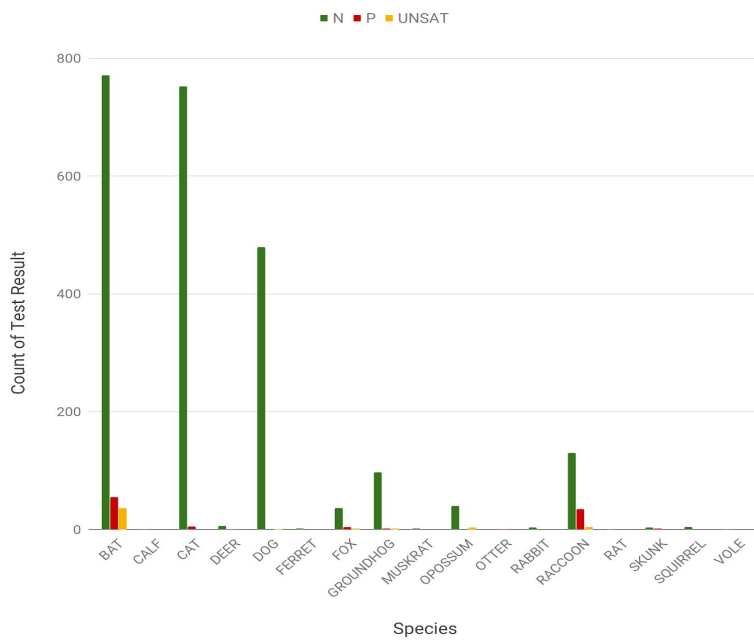
5 Year Trend (2014-2018)



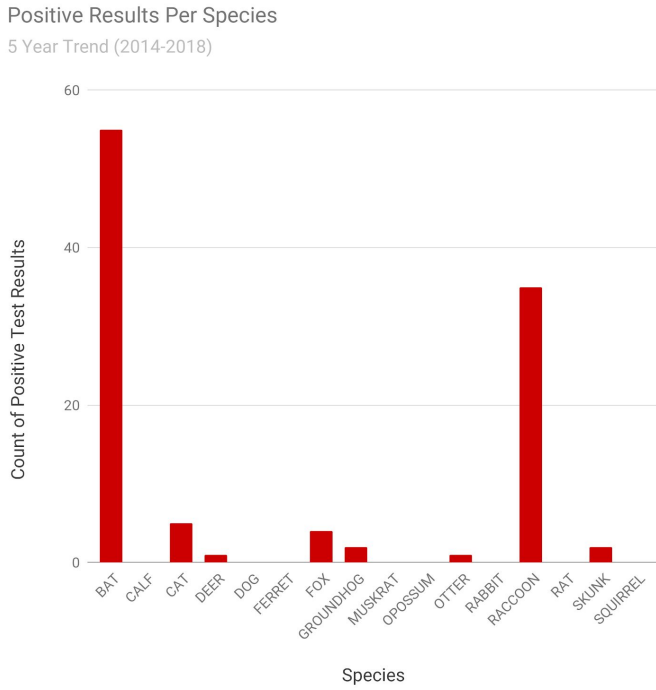
Appendix 3.17: Total Rabies Examinations by Species (2014-2018)

Test Results Per Species

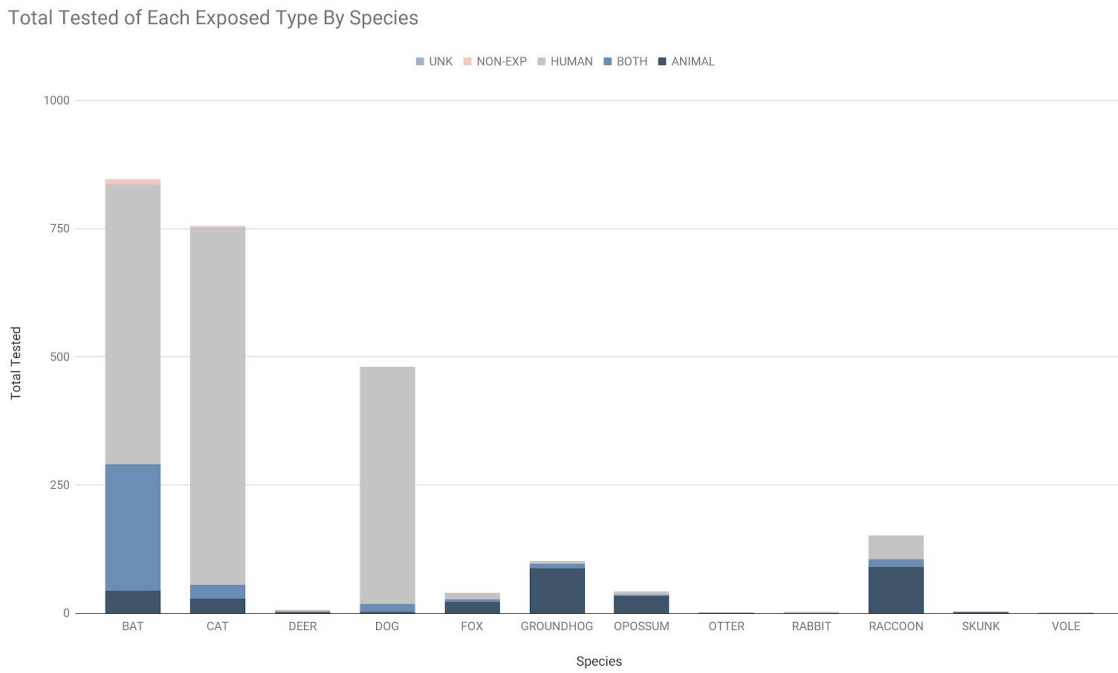
5 Year Trend (2014-2018)



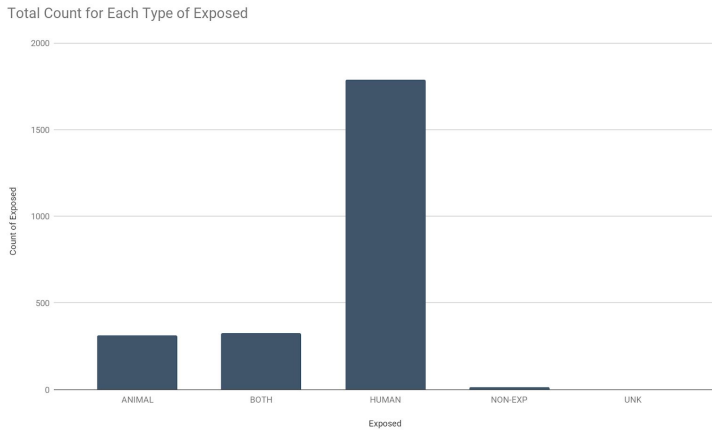
Appendix 3.18: Positive Rabies Examination Test Results by Species (2014-2018)



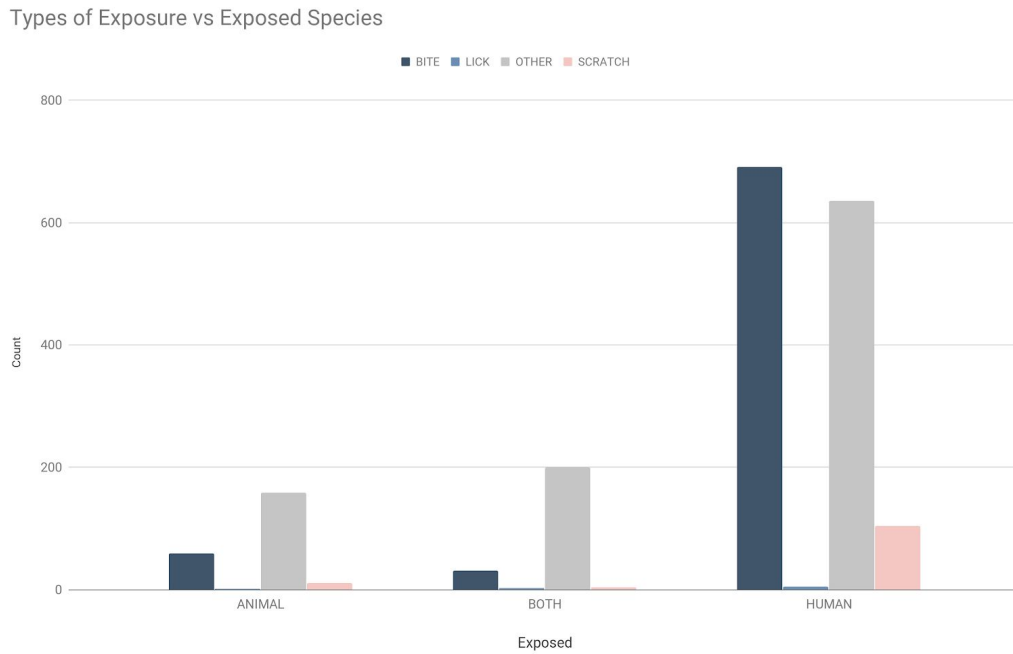
Appendix 3.19: Total Tested of Each Exposed Type By Species (2014-2018)



Appendix 3.20: Total Count of Each Type of Exposed (2014-2018)



Appendix 3.21: Types of Exposure and Exposed Species



Appendix 4: Brochures

Appendix 4.1: Rabies Informational Brochure

REPORT ALL BITES

All animal bites are to be reported to Anne Arundel County Police at 410-222-8610 or Annapolis City Police at 410-268-9000. All reports are turned over to Animal Care & Control for investigation. If the owner is known, the officer will contact them for rabies vaccination verification and to give instructions.

If the owner is unknown, the officer will ask for certain information to assist in her/his investigation. This information may include breed, description, where the animal was last seen, and the direction that the animal was going. It is important to prevent further contact, bites, or injury. Remember, educate your family on rabies prevention, vaccinate your pets, and contact Animal Care & Control with any questions or concerns about rabies in your community.

WEEKLY RABIES CLINIC

EVERY THURSDAY

(Weather Permitting, No Holidays)

SUMMER HOURS (July-September):

9am-12pm

WINTER HOURS (January-June):

12-3pm

Four times per year clinics are 12-7pm, see website for details

VACCINATION COST : \$5.00

MICROCHIP IMPLANTATION: \$20

ALL DOGS MUST BE ON LEASH AND ALL CATS MUST BE IN A CARRIER

Maryland State law requires all dogs, cats, and ferrets four months of age and older to be vaccinated against rabies. The length of vaccine effectiveness varies depending on the vaccine used, the species, and the age of the animal. Proof in the form of an up-to-date rabies certificate is a prerequisite for the purchase of an Anne Arundel County Pet License.

Anne Arundel County Animal Care & Control is doing its part to help protect all Anne Arundel County pets from the deadly rabies virus. Animal Care & Control holds weekly low cost rabies vaccination clinics.

Pets under three (3) months of age, pregnant or nursing mothers, pets currently under quarantine, and those sick/injured should be seen by a veterinarian before being vaccinated.

PLEASE DO YOUR PART AND VACCINATE YOUR PET!

411 Maxwell Frye Road
Millersville, MD 21108
410-222-8900
www.aacounty.org/pets
Facebook: @AACAnimalCareControl
Twitter: @AACAnimalCareCtrl

2019

Rabies Informational Brochure

Anne Arundel County
Animal Care & Control

411 Maxwell Frye Road
Millersville, MD 21108
410-222-8900
www.aacounty.org/pets
Facebook: @AACAnimalCareControl
Twitter: @AACAnimalCareCtrl

RABIES

Rabies is caused by a virus that attacks the nervous system of mammals. Pets, livestock, wildlife, and humans may contract the disease. The rabies virus lives in the saliva of the rabid animal. Rabies is most commonly spread through bites from infected animals. The virus can also pass through open wounds, scratches, and membranes of the eyes, nose, and mouth, to cause disease.

The rabies virus travels via the nerves from the site of infection to the spinal cord and the brain. The disease can cause convulsions, paralysis, and death. Treatment is effective if given soon after the bite or exposure to a rabid animal.

Once the symptoms of rabies appear, death is almost certain. It usually requires several weeks to several months before signs of the disease appear, after an animal is infected. Near the end of this incubation period, the virus may be present in saliva, and the animal can spread the disease.

A marked change in normal behavior is the most consistent sign of rabies. The two forms of rabies are dumb rabies and furious rabies. In dumb rabies, the animal may appear unusually shy, timid, calm, and approachable. In furious rabies, the animal is excitable, irritable, and aggressive. These animals tend to attack and bite other animals or people, and have no fear of natural enemies.

Other signs to look for include:

- Nocturnal animals active and visible during the day
- Animals have difficulty walking or seemingly disoriented
- Weakness or paralysis
- Inability to eat or drink
- Drooling and foaming at the mouth
- Convulsions

In this area, rabies is most often seen in raccoons, bats, foxes, and skunks. Unvaccinated domestic animals, such as dogs, cats, ferrets, and farm animals, are particularly at risk if they are allowed to roam where they could come into contact with wild or stray animals.

PROTECT YOUR FAMILY AND YOUR PETS

IMMUNIZE PETS

Maryland State Law and Anne Arundel County Law requires all cats, dogs, and ferrets, four (4) months of age or older to be vaccinated.

In Maryland, the first rabies vaccination is good for one (1) year. Subsequent vaccinations may last for three (3) years depending on the vaccination administered.

OBSERVE ANIMAL AT LARGE LAWS

DO NOT ALLOW YOUR PETS TO ROAM OFF OF YOUR PROPERTY. All owned cats and dogs in Anne Arundel County must be on leash and under the control of a responsible person when not on the owner's property. Not only is this law, but it will help to reduce the possibility of rabies exposure.

AVOID CONTACT WITH WILD ANIMALS

- If your animal has come into contact with a wild or stray animal, avoid direct contact with your pet. Protect yourself by wearing gloves and long sleeves.
- Never approach a wild animal even if it appears friendly.
- If a wild animal is sick or injured, contact Nuisance Wildlife at 1-877-463-6497.
- Never attempt to make a wild animal a pet. This is against the law and exposes humans and pets to rabies.
- To deter wild animals from coming into your yard:
 - ▶ Do not feed wild or stray animals
 - ▶ Do not leave pet food outside unless secured
 - ▶ Secure trash and garbage in cans with lids
 - ▶ Keep doors, windows, chimneys, attics, and other entry points to your home secured against access by animals
 - ▶ Teach your children to never approach a wild or stray animal

ANIMAL BITES

PET EXPOSURE

If your pet has come in contact with a wild or unknown animal, contact your veterinarian and Animal Care & Control. Use gloves while handling your pet after the contact. Your pet may need a rabies booster vaccination.

HUMAN EXPOSURE

If you or a family member are bitten or come in contact with a wild or stray animal:

- **CLEAN THE WOUND IMMEDIATELY AND THOROUGHLY and SEEK MEDICAL ATTENTION AS SOON AS POSSIBLE**
- Contact Anne Arundel County Police at 410-222-8610 or, if you are within Annapolis City, Annapolis City Police at 410-268-9000

It is critical to seek prompt medical attention, either from your physician or the Emergency Department at your local hospital. The physician may consult with Animal Care & Control or the Department of Health to determine any treatment that may be necessary.

CAPTURE OR OBSERVE THE ANIMALS UNTIL HELP ARRIVES

If it is safe to do so, attempt to confine any animal (wild or stray) that you or your pet may have come in contact with. If you are unable to confine the animal, if possible and safe, have someone observe the animal until help arrives. If the animal is deceased, do not touch it or allow any other humans/animals to touch it.

ANIMALS WITH OWNERS

If the animal is a pet and you can find the owner, get their name, address, phone number, and rabies vaccination information in writing. If you are unable to get proof of a current rabies vaccination, try to obtain information on where and when the animal last received a vaccination, so that verification can be made through a veterinarian. If the owner is unknown, follow the animal from a safe distance and see if the animal returns home and the owner can be located. Call Animal Care & Control for immediate assistance.

BAT EXPOSURE

Bat bites or exposures should be reported to Animal Care & Control immediately. If you or your family have been exposed to a bat within your home, if possible, attempt to confine the bat and contact Animal Care & Control. Do not let it out of the house. Animal Care & Control will transport the animal for rabies testing.

Appendix 4.2: Community Cats Brochure

Ear Tipping

Ear tipping is the deliberate removal of no more than one-quarter of an inch from the tip of a Community Cat's left ear. This is performed by a licensed veterinarian while the cat is under anesthesia.

Ear tips are used to identify a Community Cat as being sterilized and vaccinated for rabies at least once, but does not serve as proof of a current rabies vaccination.



Trap-Neuter-Return Program

Anne Arundel County Animal Care & Control does not manage community cat Trap-Neuter-Return Programs.

Please contact the organization below to provide guidance and assistance to citizens, business owners and community groups interested in managing Community Cats and Community Cat colonies.

SAVECats Program

A program of Rude Ranch Animal Rescue and Spay Spa & Neuter Nook

www.aacsavocats.org
info@aacsavocats.org
443-607-2290

411 Maxwell Frye Road
Millersville, MD 21108
410-222-8900
www.aacounty.org/pets
Facebook: @AACAnimalCareControl
Twitter: @AACAnimalCareCtrl

2019

Community Cats



Anne Arundel County Animal Care & Control

411 Maxwell Frye Road
Millersville, MD 21108
410-222-8900
www.aacounty.org/pets
Facebook: @AACAnimalCareControl
Twitter: @AACAnimalCareCtrl

Community Cats

Community Cats are unowned, free-roaming cats, 12 weeks of age or older, who are cared for by one or more known or unknown persons residing or working in the immediate area.

Community Cat Caregivers are a person or group that, in accordance with good faith effort to conduct Trap-Neuter-Return, provide food, shelter, and medical care to a community cat. They are **not** the owners of a community cat.

Trap-Neuter-Return (TNR) is the process of humanely trapping, sterilizing, vaccinating for rabies, and returning a community cat to their original location. It includes a plan for revaccination of the community cat. This is an acceptable option to reduce the number of community cats humanely euthanized, to control the community cat population, and to provide community safety.

Recent Changes to County Code

In February 2018, Anne Arundel County laws were updated due to the Community Cat Bill (96-17). This bill changed the interactions between Animal Care & Control, Community Cat Caregivers, neighbors, and Community Cats. The changes are addressed below:

- ▶ Community Cat Caregivers are specifically excluded in the definition of an "owner". Therefore, they cannot be cited for perceived violations as applied to a community cat
- ▶ Anne Arundel County Animal Care & Control does not have the authority to impound an ear tipped Community Cat unless the cat:
 - Has a health issue that constitutes an immediate and substantial danger to person or property or poses a public safety threat
 - Is determined to be dangerous or vicious
 - Is sick or injured
 - Is the subject of repeated complaints to Animal Care & Control from residents or businesses that remain unresolved

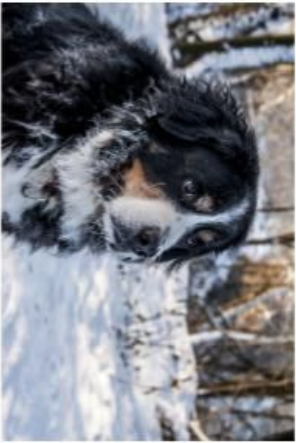
- ▶ An ear tipped Community Cat can be reclaimed by a Community Cat Caregiver from the Animal Care & Control facility without proof of ownership and is exempt from shelter fees and impoundment charges
- ▶ An impounded Community Cat that has not been sterilized, vaccinated for rabies, or ear tipped can only be released to a Community Cat Caregiver after receiving a rabies vaccination administered by Animal Care & Control. The Community Cat Caregiver must agree, in writing, to provide documentation of the sterilization and ear tipping of the Community Cat to Animal Care & Control within 60 days



Appendix 4.3: Animal Laws During Severe Weather Brochure

Severe Weather Animal Alert

A Severe Weather Animal Alert is declared by the County Executive when the weather conditions prompt the Anne Arundel County Office of Emergency Management to activate the Warming or Cooling Center Plan.



Find Us On

Website:
aacounty.org/pets
aacounty.org/oem

Facebook:
Anne Arundel County Animal Care & Control

Anne Arundel County Office of
Emergency Management

Twitter:
[@AACAnmlCareCtrl](https://twitter.com/AACAnmlCareCtrl)

[@AACO_OEM](https://twitter.com/AACO_OEM)

Instagram:
[@annearundel_oem](https://www.instagram.com/annearundel_oem)

Nextdoor:
Anne Arundel County Office of
Emergency Management

411 Maxwell Frye Road
Millersville, MD 21108
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410-222-8900
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Animal Laws During Severe Weather



Anne Arundel County
Animal Care & Control

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www.aacounty.org/pets

Any dogs left unattended outside during a Severe Weather Animal Alert

MUST HAVE*:

- ▶ Fresh, clean, non-frozen, drinkable water at **all times** in a non-tip bowl
- ▶ A dog house, with no interior metal surfaces, that is raised **at least two (2) inches** off of the ground, that protects the animal against wind, snow, rain, and cold
- ▶ From December 1st-March 15th, the dog house must have an accessible covered entry or an off-set door to act as a windbreaker
- ▶ Dry bedding or a resting board must be inside the dog house
- ▶ Separate shade other than the dog house
- ▶ If the dog is in an enclosure, it must meet County minimum sizes:
 - 100 square feet for dogs under 80 pounds
 - 150 square feet for dogs over 80 pounds
 - An additional 50 square feet for each dog under 80 pounds in the same enclosure
 - An additional 75 square feet for each dog over 80 pounds in the same enclosure

Further Recommendations

- ▶ Entrances of dogs houses should be oriented away from prevailing winds
- ▶ Abundant dry bedding should be placed inside the dog house
- ▶ A heated or insulated water bowl (please read/follow instructions carefully to avoid fires)



DOGS CANNOT BE TETHERED OUTDOORS IF THE TEMPERATURE IS BELOW 33° F OR ABOVE 89° F, EVEN UNDER SUPERVISION

It is recommended that if the temperature or wind chills are expected to be at or below 32° F, all dogs should be brought indoors

Failure to comply with these laws during a Severe Weather Animal Alert is a Class D Civil Offense

Fines for a First Violation: \$125
Second Violation: \$500
Third and Subsequent Violations: \$1,000

*These items are required independent of the weather. Fines for non-compliance are increased during Severe Weather Animal Alerts.

Appendix 4.4: Consequences of Animal Misbehaviors

Seeking Medical Care

It is Maryland State Law for health care providers to contact Animal Care & Control when any patient presents with an animal bite or scratch, no matter how minor. Animal Care & Control will follow-up with the health care facility to determine the severity of the injuries. All patients will receive a follow-up call from Animal Care & Control to address any patient concerns, determine circumstances of the exposure, and to ensure the animal has undergone a 10-day observation period for rabies, if applicable. This is precautionary for most minor cases. The health department will send a letter to all patients, which is an additional precaution and is not indicative that there will be consequences for the animal.

Animal Care & Control's utmost goal is to protect you and your animals.



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Consequences of Animal Misbehaviors



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Public Nuisance

Acts by an animal that interfere with the rights of citizens to enjoy life or property, or that unreasonably annoys humans, endangers the life or health of other animals or human beings, or offends human senses.

- ▶ **May Include:**
 - Assault of pedestrians
 - Chasing vehicles
 - Damaging property of someone other than the owner
 - Continual or repeated howling, barking, whining or other noise

Possible Consequences:

- ▶ Warning letter that declares the owner/animal is in violation
- ▶ Citations

Public Safety Threat

An animal poses a threat to public safety if the animal:

- ▶ Inflicts severe injury to a person
- ▶ Bites a person
- ▶ Kills or inflicts injury to a domesticated animal
- ▶ Attacks a person
- ▶ Chases or approaches a person or a fully restrained domesticated animal in an aggressive manner while at large
- ▶ Engages in or shows evidence of having been engaged in encourage dogfighting activity

Possible Consequences:

- ▶ Warning letter that declares the owner/animal is in violation
- ▶ Citations
- ▶ Administrative Order

Potentially Dangerous & Dangerous Animals

An animal may be designated by Animal Care & Control to be dangerous if the animal poses a threat to public safety, has been determined to be dangerous by another jurisdiction, or has engaged in documented behavior that is a public safety threat in another jurisdiction

Possible Consequences:

- ▶ Owner will be issued an order that contains the reasons for the Agency's determination and directs the owner to comply with conditions for maintaining the animal on the owner's property
 - Failure to comply with these conditions may result in temporary or permanent impoundment of the animal
- ▶ Citations

Possible Conditions:

- ▶ Manage the animal and its environment in a manner that will abate the animal's problem
- ▶ Spay or neuter the animal
- ▶ Implant the animal with a microchip
- ▶ Obtain an insurance policy providing for protection for bite victims in a minimum amount of \$300,000
- ▶ Remove the animal from the custody of an individual less than 21 years old
- ▶ For a rental property, obtain the written permission of the landlord to maintain the animal on the property
- ▶ Confine the animal to a structure of a size and type specified by Animal Care & Control
- ▶ Maintain the animal exclusively on the owner's property except for medical treatment or examination
- ▶ Muzzle and leash the animal
- ▶ Post on the premises where the animal is maintained a clearly visible warning sign that there is a dangerous animal on the property
- ▶ Submit the name of the animal, picture, sex, age, weight, primary breed, secondary breed, color and markings, whether spayed or neutered, the address or map where the animal is maintained, name of owner and address of the owner to be included on the Dangerous Animal Registry that is available to the public on the Anne Arundel County Animal Care & Control website

Vicious Animals

An animal may be designated as vicious if:

- ▶ the animal kills or inflicts severe injury to a person or domesticated animal
- ▶ if the animal has been determined to be dangerous and engages in a second incident determined to be a threat to public safety by Animal Care & Control
- ▶ The animal has been determined to be vicious by another jurisdiction

No person may keep an animal designated as vicious by Animal Care & Control

Appeals

All owners of animals that have been deemed Dangerous, Potentially Dangerous, or have a Vicious Order have the right to appeal within a timely manner.

The first step is to appeal to the Animal Control Commission. This step is free and must be filed within 10 days. If the owner is unhappy with the recommendations of the Animal Control Commission or Chief of Police, they may appeal to the Board of Appeals for a \$250 fee within 30 days.

Animal Care & Control can cite and/or fine owners upon receipt of a properly completed affidavit of complaint from a citizen.

Appendix 4.5: Dogs in Parks Brochure

THE BIG THREE

1. SCOOP YOUR POOP

For the health and safety of other park visitors, please bring bags with you to the park to clean up and dispose of any waste created by your dog. **IT'S THE LAW!**

2. ALL DOGS MUST REMAIN ON A LEASH

For the health and safety of other park visitors, you must keep your dog under control AND on a leash at all times while in the park. **IT'S THE LAW!**

The only exception to this law is at one of the off-leash dog parks or beaches.

3. DO NOT LEAVE YOUR DOG UNATTENDED IN YOUR VEHICLE

For the health and safety of your dog, do not leave your dog unattended in your vehicle, especially during hot weather. This is both cruel and **IT'S THE LAW!**

Off-Leash Dog Parks & Dog Beaches

Belt Branch Park

1150 Barbara Swamp Way
Garnertills, MD 21054
410-222-7317
Hours: Dawn-Dusk

Broadneck Park

613 College Pkwy
Annapolis, MD 21409
410-222-7317
Hours: Dawn-Dusk

Loch Haven Park

3424 Pochahontas Dr
Edgewater, MD 21037
410-222-7317

Maryland City Park

565 Brock Bridge Rd
Laurel, MD 20724
410-222-7317
Hours: Dawn-Dusk

Quiet Waters Park

600 Quiet Waters Park Rd
Annapolis, MD 21403
410-222-7317
Park Entry Fee

Towers Branch Park

1405 Jackson Rd
Odenton, MD 21113
410-222-7317
Hours: Dawn-Dusk

Downs Park

8311 John Downs Loop
Pasadena, MD 21122
410-222-6230
Hours: 7am-Dusk
Park Entry Fees

Rules & Regulations:

- All dogs must be vaccinated
- Puppies under 3 months of age are not permitted
- Enter at own risk, not all dogs get along

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Dogs in Parks Owner Responsibilities



Anne Arundel County Animal Care & Control

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www.aacounty.org/pets

Anne Arundel County Department of Recreation and Parks

1 Harry S Truman Parkway
Annapolis, MD 21401
410-222-7317
www.aacounty.org/recparks

DOGS IN PARKS

Dogs are welcomed and encouraged in county parks as long as they abide by the laws set forth governing their behavior.

The County will take appropriate actions, including fines and park suspensions if necessary, against individuals who do not heed the laws.

Bark Ranger Volunteer Program

Bark Rangers help protect the rights of dog owners and non-dog owners. If you would like to support the Recreation and Parks Department in overseeing the dog parks and dog beaches by educating dog park users, enforcing rules, and assisting in the maintenance of the grounds, please call 410-222-7317.

LEASHES

PROTECT FROM UNWANTED PUPPIES by preventing random matings.

PREVENT INJURIES by restraining your pet from darting into traffic, and eliminating pain and veterinary bills.

MAKE GOOD NEIGHBORS by keeping your pet from trespassing or destructive behavior on your neighbor's lands or public sidewalks. They keep your pet from jumping up on children or adults which may inflict injuries or frighten them.

PROTECT WILDLIFE AND THE ENVIRONMENT by keeping your pet from harassing wild animals.



RELATED ANIMAL CONTROL LAWS

Article 12 Section 4-402 Public Safety

An animal poses a threat to public safety if the animal:

- Inflicts injury to a person
- Bites a person
- Kills or inflicts injury to a domestic animal
- Attacks a person
- Chases or approaches a person in an aggressive manner
- Chases or approaches a lawfully restrained animal in an aggressive manner
- Engages in encouraged dogfighting activity or shows evidence of having been engaged in encouraged dogfighting activity

Article 12 Section 4-903 Public Nuisance

The owner of an animal may not permit the animal to be a public nuisance or to cause a public nuisance condition. Public Nuisance includes, but is not limited to, chasing vehicles, molesting pedestrians, or damaging the property of someone other than its owner

Article 12 Section 4-904 Animal Disturbance Prohibited

Anyone who owns, keeps, or has possession of an animal shall not permit the animal to disturb the quiet of a person or neighborhood

Article 12 Section 4-905 Animals Running at Large Prohibited

"At Large" means off the property of an animal's owner and not leashed and not under the control of a responsible person. This includes all animals owned by a person, domestic (cats and dogs), livestock, and exotics

Article 12 Section 4-909 Removal of Animal Excreta

The owner of an animal shall be responsible for the removal of any excreta (feces) deposited by his or her animal on public walks, recreation areas, or private property other than his own

Penalty for Violation

Anyone violating sections of Article 12 may be subject to fines not less than \$50.00 and up to \$1,000.00

Appendix 4.6: Bringing Home Your New Dog Brochure

Be Patient!

Your new dog is experiencing many changes all at once and we cannot be certain how your new pet was treated before it arrived at our shelter. To set your new dog and your family up for success, you must **slowly** help him/her acclimate to his/her new surroundings. A scared dog's options are "fight or flight". Wait and allow your new dog to interact with you and your family when s/he is ready. We recommend that you spend at least two weeks focusing strictly on getting your new dog familiar with your house, your family, and his/her position in his/her new "pack".

Avoid Overwhelming Situations

For at least two weeks DO NOT:

- ▶ Try to integrate your new dog with existing household pets (see *Bringing a New Dog Home to Live With an Existing Dog* brochure)
- ▶ Take your new dog on walks
- ▶ Visit other family members
- ▶ Take your new dog to the pet store
- ▶ Take your new dog for unnecessary car rides

**Anne Arundel County Animal Care & Control requires you to take your new dog to see your veterinarian within 5 days of adoption for a well veterinary visit*



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Bringing Home Your New Dog



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Crate Training

A crate, just large enough for your dog to stand up and turn around in, with bedding, should be set up in a quiet place. This will become your dog's personal den, where s/he can find comfort, solitude, and feel safe and secure. His/her space in the crate should be respected. Do not allow anyone to go into the crate while your dog is inside.

For the first two weeks, your new dog should be confined to the crate except for exercise, bathroom trips outside and 20-30 minute leashed interactions with your family inside of your home. Your new dog should be fed meals in the crate.

The crate should **never** be used as a punishment and your dog should not be crated for more than 3-4 hours at a time without a break.

Only approach your new dog if s/he is being quiet. If you approach while your dog is barking or whining in the crate, it will reinforce those behaviors.

Use a Leash

For at least two weeks your dog should be leashed whenever outside of his/her crate, including inside of the home. The leash will allow you to maintain control of your new dog, help you monitor your new dog's activities and help your dog learn his/her position in the "pack".

It is the law in Anne Arundel County that your dog must always be on a leash when outside, unless inside of your securely fenced yard.

House Training

Be patient! Change and stressful situations can sometimes cause previously house trained dogs to have accidents.

While your new dog adjusts, it is critical to:

- ▶ Maintain a consistent schedule so that your new dog can learn when s/he will have opportunities to eliminate
- ▶ Use plenty of praise when s/he eliminates in the appropriate area
- ▶ **Not** punish your new dog for accidents
- ▶ **Be patient** while your new dog adjusts

Exercise

A tired dog is a happy dog!

During the first two weeks, exercise your new pet either with toys inside or on a lunge line (a very long leash) outside, even if you have a fenced in yard. After the initial two weeks, find additional ways to get your dog the exercise s/he needs. Always keep exercise fun and positive!



Meeting New People

Your first goal as your dog's new owner is to get your dog comfortable with you and his/her place in your immediate family.

After a few weeks with your family, you can slowly start to introduce your dog to other new people, one person at a time.

To encourage success:

- ▶ All introductions should be done with your dog on a leash
- ▶ Always let your dog approach a new person; never allow the person to approach the dog, as this may make him/her feel cornered
- ▶ Closely watch your dog's behavior and remove him/her from any situation where s/he exhibits signs of stress, particularly signs of "fight" (growling, hackles raised, showing teeth) or "flight" (attempting to dart or pull away from something/someone)
- ▶ Show both children and adults how to be respectful of your new dog and teach your new dog to respect all people

Children should never be left unattended with an animal.

Seek Professional Advice

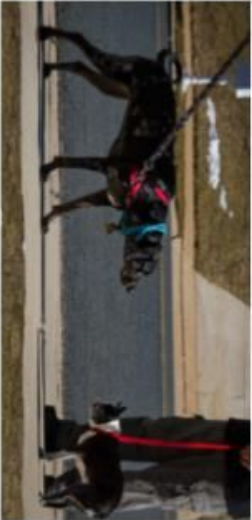
Anne Arundel County Animal Care & Control recommends that you look for an experienced dog trainer who can show you how to teach your dog, help you strengthen the human/animal bond, and set your new pet up for success.

Watch your new dog closely around its food, treats, or toys. If s/he exhibits any signs of possession aggression, seek advice from an experienced dog trainer or your veterinarian.

Appendix 4.7: Bringing a New Dog Home to Live With an Existing

Preparations for Introducing a New Dog

- ▶ Introduce your dogs **before** you bring your new dog home
- ▶ Be patient! Everyone will need time to adjust. Keep things positive and upbeat
- ▶ Each dog should have their own food bowl, water bowl, bed, and toys
- ▶ Get your new dog an ID name tag as soon as possible
- ▶ It usually takes 2-4 weeks to know if your dogs will be friends, but it can also take more or less time
- ▶ It is important to spend time alone with both dogs. If you only interact with the dogs when they are together, you will miss opportunities to bond with your new dog and may create jealousy from your existing dog. The first few weeks of your relationship with your new dog can set the stage for the rest of your dog's life



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Bringing a New Dog Home to Live With an Existing Dog



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Step One:

Introduce On Neutral Territory

Use the largest, safe space available. Animal Care & Control has a space available for this meeting. The more your dogs can move around, the better they can observe each other's body language and get to know each other.

Step Two:

Introduce At Home

Both dogs should be leashed when meeting at home for the first time. Keep the leashes loose because a tight leash can cause frustration in the dogs that may be redirected as aggression.

If you have more than one dog, introduce them separately.

Watch the dogs' body language. Hard stares, low growls, raised hackles, and stiffening of the body are all warning signs. If you see these signs, step in with a loud noise, and then separate the animals.

Toys, bones, and balls could be a fight trigger for dogs. Pick up anything they could become possessive over before allowing dogs in the same area.

Step Three:

Build Comfort

During the first weeks together, the only time the your dogs should be around each other is while supervised. Your new dog should be crated or confined when you are not there to supervise.

After introducing outside, once calm, bring your dogs inside, keeping the leashes on. Allow brief (10-15 minute) interactions inside, ending them on a positive note.

Slowly increase their time together. As they begin to get more comfortable, you can leave leashes attached but drop them while in an enclosed area. This way you can separate them safely, if necessary.

You will know your dogs are beginning to accept one another when they start to ignore each other. The goal is to show the existing dog(s) that the new dog is now a part of the pack.



Troubleshooting

Common fight triggers include:

- ▶ Chasing a squirrel or a ball in the yard
- ▶ Rushing to the door when the doorbell rings
- ▶ Receiving your attention
- ▶ Play sessions between the dogs that get too exciting
- ▶ Tug of war games

If your dogs get overexcited, take action using a loud noise and immediately separate them to different areas until they have settled down.

Remember to **always** separate your dogs when you are not home or not able to supervise.

If you have any questions or concerns while integrating your new dog into your home, please contact Anne Arundel County Animal Care & Control for advice.

Appendix 4.8: Bringing Home Your New Cat Brochure

Be Patient!

Your new cat is experiencing many changes all at once and we cannot be certain how your new pet was treated before it arrived at our shelter. To set your new cat and your family up for success, you must **slowly** help him/her acclimate to his/her new surroundings. A scared cat's options are "fight or flight". Wait and allow your new cat to interact with you and your family when s/he is ready. Cats tend to hide when scared; remember to respect their space. If your cat has chosen to hide in a spot that feels safe, s/he will come when ready. You can try to encourage your new pet to come out by providing a different hiding spot, such as a covered bed, in an area that is more accessible to you, or by offering treats.

Avoid Overwhelming Situations

For at least two weeks DO NOT:

- ▶ Try to integrate your new cat with existing household pets (see *Bringing a New Cat Home to Live With an Existing Cat* brochure)
- ▶ Bring your new cat to visit other family members/friends or invite many people over to meet him/her
- ▶ Take your new cat to the pet store or other public places
- ▶ Take your new cat for unnecessary car rides

* Anne Arundel County Animal Care & Control does require you to take your pet to see your veterinarian within 5 days of adoption for a well veterinary visit



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Confine Your Cat

Your first goal as your cat's new owner is getting him/her comfortable with you and your immediate family.

First Two Weeks:

Your cat should spend the first two weeks in a quiet, small room such as a bathroom or spare bedroom. Cats tend to get overwhelmed and stressed easily when their environment changes.

Provide:

- ▶ Soft, Comfortable Bedding
- ▶ Food
- ▶ Water
- ▶ Litterbox
- ▶ Toys

Family members should take turns going in to visit your new cat either individually or in pairs.

Children should always be supervised.

After Two Weeks:

If, after the initial two weeks, your cat is comfortable in the small room, you can consider letting him/her explore other areas of the home for short periods of time and under close supervision.

Confine any other pets away from your new cat while s/he explores.



Litter Box

Change and stressful situations, as well as medical issues, can sometimes cause previously trained cats to eliminate outside of the litter box. If the cat you have adopted is not using the litter box properly, **be patient**, there are a few things that could be causing the issue:

- ▶ A shortage of litter boxes: If you have more than one cat you should have one litter box per cat plus one
- ▶ Litter box cleanliness, size or type of litter
- ▶ Litter box is not in a comfortable location for your cat or is not easily accessible

Always make sure your veterinarian is aware of issues with the litter box as it can also be a sign of medical conditions

Keep Your Cat Indoors

The safest place for your cat is inside your home. Cats face a variety of dangers if allowed outdoors. They may get severely/deadly injured or lost.

If you would like, at some point, to allow your cat to go on **supervised** trips outdoors (after s/he is fully acclimated to your home/family), remember the leash law in Anne Arundel County applies to cats as well as dogs.

Meeting New People

After a few weeks with your family, you can slowly start to introduce your cat to new people, one person at a time. All introductions should be done in a calm, quiet, and safe setting.

Always let the cat approach a new person; never allow the person to approach the cat. This may make the cat feel cornered.

Closely watch your cat's behavior and allow him/her to retreat from any situation where s/he exhibits signs of stress, particularly signs of either "fight" (hissing, ears pinned back, swatting) or "flight" (attempting to dart or hide from something/someone). Do not attempt to pick up or move the cat when s/he is trying to escape from an overwhelming situation.

Show **both** children and adults how to be respectful of your new cat, and teach your cat how to respect people.

Children should never be left unattended with an animal.

Appendix 4.9: Bringing a New Cat Home to Live with an Existing Cat

Preparations for Introducing a New Cat

Prepare a small, quiet room with a litter box, bedding, food, water, and toys as explained in the *Bringing Your New Cat Home* brochure.

Allow your new cat ample time to adjust to this space before introducing him/her to your existing cat.

Introducing cats slowly will help to prevent aggressive or fearful behaviors before they can begin.



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Bringing a New Cat Home to Live With an Existing Cat



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Step One: Introduce By Smell

Approximately two weeks after adoption

- Keep the door to the room closed so that the cats can smell and hear each other, but cannot touch or see each other
- Spend time with the new cat in the room, sitting and playing with him/her
- Gradually move food bowls close to the door until they are eating next to it
- Give both cats treats near the door trying to get them as close to the door, and each other, as possible
- Switch the cats occasionally, putting the new cat in the house, and the other cat in the new cat's room with the new cat's belongings
 - Only introduce the new cat to one or two rooms in the house at a time, limiting the new cat's exposure to short periods of time
- Rub one cat with a towel and then rub the other cat with the same towel to get them used to each other's scent
- Switch their bedding after each cat has slept on it

Step Two: Introduce by Sight

Method One:

Use two doorstops, one of each side of the door, to allow the cat to see each other, but not squeeze through the opening.

Method Two:

Place two baby gates, one above the other, to block the doorway.

During this period, you can tie the two cat toys together, placing one on either side of the door and letting them play together from opposite sides.

If you see any negative reactions, such as hissing, growling, or swatting, close the door and try again another day.



Step Three: Bringing the Cats Together

Bring the cats together when they are calm. A good time for introductions may be after a meal or a strenuous play session.

Watch for aggressive behavior like growling, spitting, crouching, or ears pinned back against the head.

If you see this behavior:

- Try throwing a pillow near the cats (do not hit the cats with the pillow)
- Use a loud noise, such as clapping your hands or yelling, to startle them
- Squirt the cats with a spray bottle of water

Separate the cats if necessary by gently herding them into separate parts of the house. Do not use your body; cookie sheets work well to separate fighting animals.

The goal is to intervene before they have a negative interaction.

If unsuccessful, try the same tactics another day.

Note: Similar methods should be used when introducing your new cats to your pre-existing dog. However, always keep your dog on a leash.

Appendix 5: Templates

Appendix 5.1: Monthly Bite Investigation Statistics

Animal Control
Monthly Bite Investigation Statistics

	Bites	Tested	Positive	Negative	Unsatisfactory	Non-Bite	Juveniles
Dog							
Cat							
Bat							
Beaver							
Calf							
Chicken							
Chipmunk							
Coatis							
Deer							
Donkey							
Ferret							
Flying Squirrel							
Fox							
Gerbil							
Goat							
Goose							
Groundhog							
Guinea Pig							
Hamster							
Horse							
Kinkajou							
Moles							
Monkey							
Mouse							
Muskrat							
Opossum							
Otter							
Pig							
Pony							
Rabbit							
Raccoon							
Rat							
Shrew							
Skunk							
Squirrel							
Sugar Glinder							
Unknown							
Vole							
TOTALS	0	0	0	0	0	0	0

POSITIVES

Date Address Species

ENFORCEMENT ACTION

- Warning Letter
- PDO
- DO
- Retain of Custody
- Attacks/Public Safety
- Addendums
- Orders Lowered
- Annual Inspections
- 14 Day Quarantine
- 45 Day Quarantine
- 4 Month Quarantine
- 6 Month Quarantine

Appendix 5.2: Shelter Statistics

Shelter Statistics 2015-2019

	2019		2018		2017		2016		2015	
	Jan-Mar	Apr-Jun	Jul-Sept	Oct-Dec	TOTAL	Jan-Mar	Apr-Jun	Jul-Sept	Oct-Dec	TOTAL
Live Animal Count at Beginning of Qtr										
LIVE INTAKE DURING QTR										
Stray/At Large										
Relinquished by Owner										
Owner Requested Euthanasia										
Transferred in from Another Agency										
Other Live Intakes (Impounds, births, animals placed in foster care, brought in for TNR, etc.)										
TOTAL LIVE INTAKE DURING QTR	0	0	0	0	0	0	0	0	0	0
DISPOSITION DURING QTR:										
Adoption										
Returned to Owner										
Transferred to Another Agency										
Other Live Outcome (Includes TNRs released)										
Died/Lost in Care										
Euthanasia--at Owner's Request										
Euthanasia--All Other Than Owner Request										
TOTAL DISPOSITION DURING QTR	0	0	0	0	0	0	0	0	0	0
Live Animal Count at End of QTR (includes Fosters)	0	0	0	0	0	0	0	0	0	0
% Cat Intake: Unowned										
# Unowned Euthanized Cats										0

2019