

Bite and Rabies Surveillance in Anne Arundel County, Maryland

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Anne Arundel County Animal Care & Control

- Maryland county department
- Agency of the Anne Arundel County Police Department
- “Dedicated to promoting the humane treatment of animals and ensuring safe human-animal interactions”
- Preceptor: Kristin Herbert, ACCO
 - B.S. in Animal Science

Anne Arundel County Animal Care & Control

- Enforce state and county animal laws
- Investigate animal cruelty cases
- Temporary animal housing
- Weekly low-cost rabies and microchip clinics for the public

Rabies

- Preventable, zoonotic, viral disease in the genus *Lyssavirus*
- 60,000 annual human fatalities world-wide
 - 99% in Asia and Africa
- Furious (Classical or Encephalitic) Form:
 - Hyperactivity
 - Hypersalivation
 - Hydrophobia
 - Periods of agitation alternating with periods of lucidity
- Paralytic (Dumb) Form:
 - Flaccid muscle weakness
 - Gradual paralysis

Rabies on the East Coast : Pets

Background

- In 2001, 4.8% of 7,437 rabies cases were in dogs and cats
 - 86% of humans receiving post-exposure rabies prophylaxis do so after exposure to a dog or a cat
- In 1991, 307/308 virus variants for dogs and cats were from the expected terrestrial rabies virus variant
- Raccoon-associated rabies virus variant responsible for 57% of animal rabies cases

Rabies on the East Coast : Pets

2007-Present

- September 2007: CDC declared United States canine-rabies free
- State laws differ in dog, cat, and ferret rabies vaccination requirements
- Maryland:
 - Requires all dogs, cats, and ferrets four months or older to be vaccinated
 - Requires low-cost, self-financing public rabies vaccination clinics
- Challenges:
 - Rural counties
 - Outdoor/Feral cats
 - Funding

Rabies on the East Coast : Bats

Background

- Most common cause of rabies in humans
 - 2003-2015: 81.1% human rabies cases
- Subtle signs in infected bats
- Eastern pipistrelles distributed throughout East Coast
 - 2003: 74.3% bats tested originate from northeastern United States
 - 4.1% rabies positive bats

Challenges

- Bat bites hard to detect
 - 2008: 42.9% human cases of bat rabies had no history of direct contact
 - 34% reported no history of any exposure

Rabies on the East Coast : Raccoons

Background

- *Procyon lotor*
- Endemic to East Coast
- Most human exposures and animal rabies cases
- Restocking program in 1970s spread infected raccoons throughout East Coast
- United States Department of Agriculture's Natural Rabies Management Program (NRMP) established in 1997
 - Prevention of westward expansion through ORV campaigns

Rabies on the East Coast : Raccoons

Current Research

- Determine accurate antibody titer level for surrogate value of protection
- Increase RVNA seroprevalence of raccoons to 60%
 - Increasing baiting
 - Baiting methods (helicopter, hand, bait stations)

Challenges

- Concerns of residual vaccine pathogenicity
 - No indications in 16 species by various routes of administration
- Low seroconversions of 30% due to field conditions
- Cost
 - Research shows that there is a net savings of \$100-500 million a year with ORV programs along Appalachian Ridge area

Learning Objectives

- Gain experience working at a county department
- Data entry and analysis in Bite Surveillance Department
 - Rabies Surveillance
 - Warning Letters, Potentially Dangerous Orders, Dangerous Orders
- Shadowed AACO Lisa Wolfe
 - Ride-along
 - Animal abuse court case
- Webinars
 - Dog fighting
 - Working with your veterinarian
 - Designation and regulation of dangerous/vicious dogs

Projects and Products

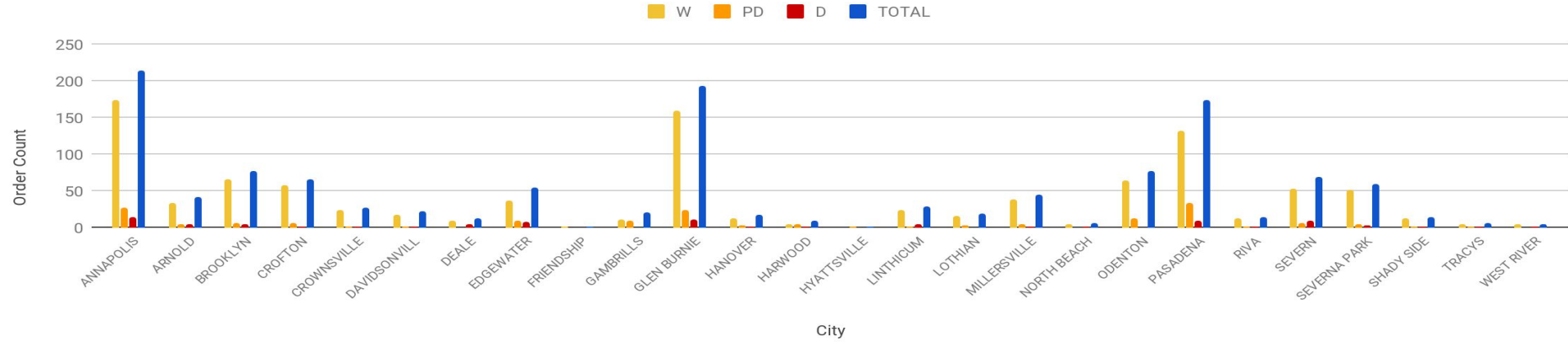
- Paperless organization of historical data
- Spreadsheets and data analysis
 - Bite Statistics
 - Rabies Examinations
 - Warning Letters, Potentially Dangerous Orders, Dangerous Orders
- Brochures
 - Rabies Information
 - Consequences of Animal Misbehaviors
 - Dogs in Parks
 - Severe Weather
 - Community Cats
 - Bringing Home Your New Dog
 - Bringing a New Dog Home to Live with an Existing Dog
 - Bringing Home Your New Cat
 - Bringing a New Cat Home to Live with an Existing Cat
- Templates

Warning Letters and Orders

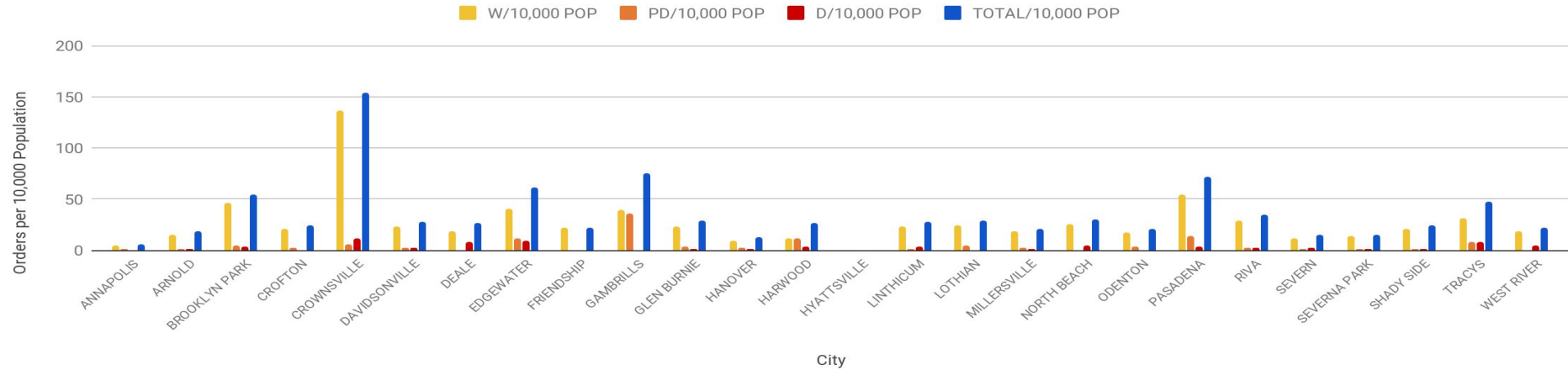


Orders by City (2014-2018)

Not Population Adjusted



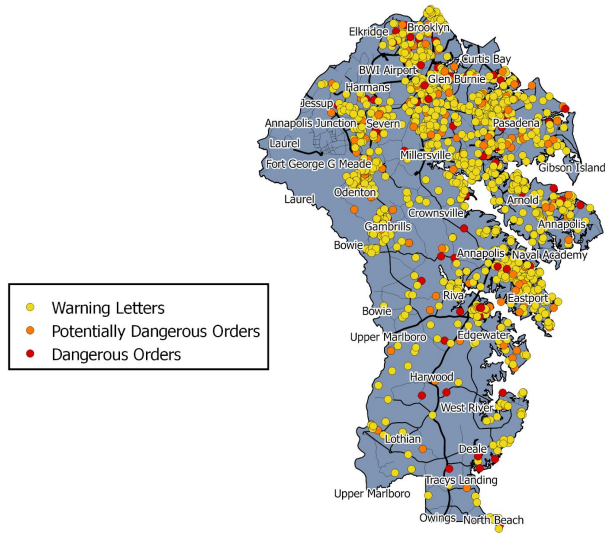
Population Adjusted Orders Per City (2014-2018)



Anne Arundel County

Warning Letters and Orders Cited

2014-2018



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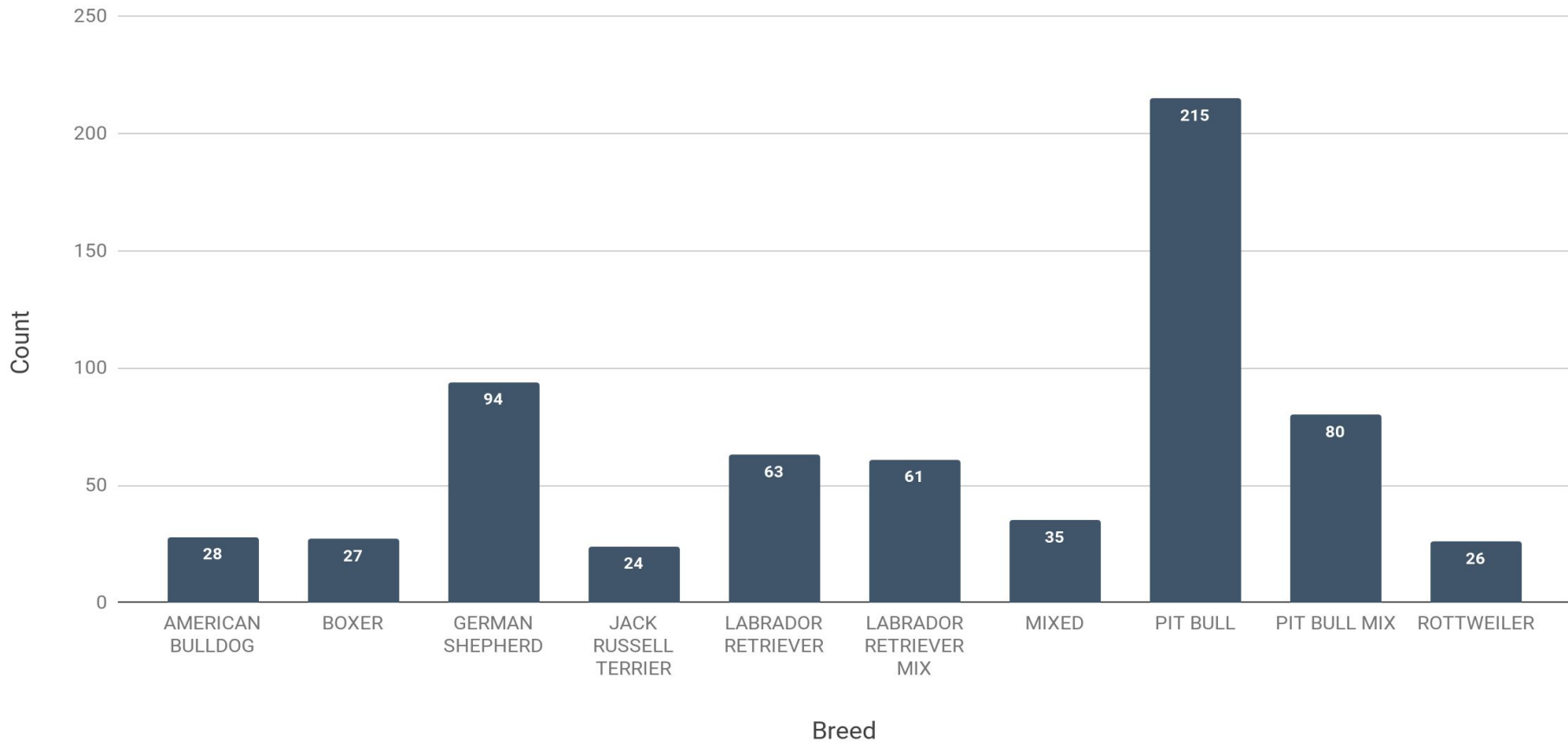


10 0 10 20 km



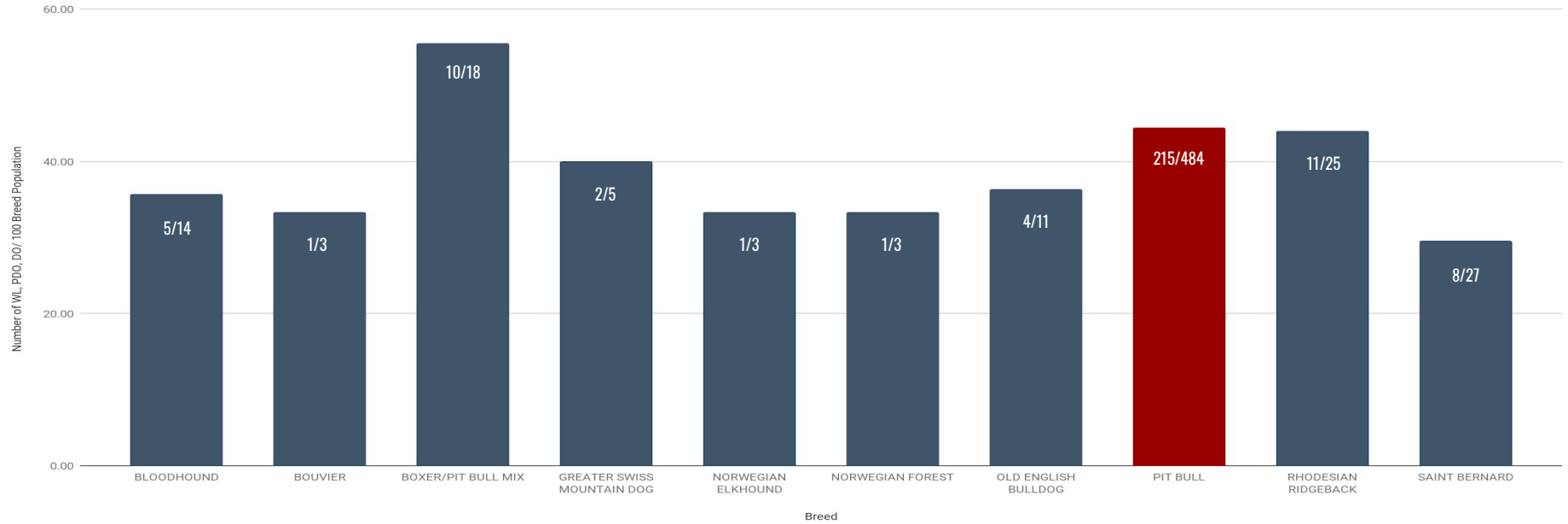
Top 10 Unadjusted "Dangerous" Breeds

2014-2018



Adjusted* "Most Dangerous Dog Breeds"

5 year Trend (2014-2018)



*Population adjusted by taking total count of all warning letters, potentially dangerous orders, and dangerous orders for each breed, and dividing that by the population of each breed in our license database, then multiplying by 100 to get per 100 Breed Population

106 breeds in the original data were not registered in the licenses database

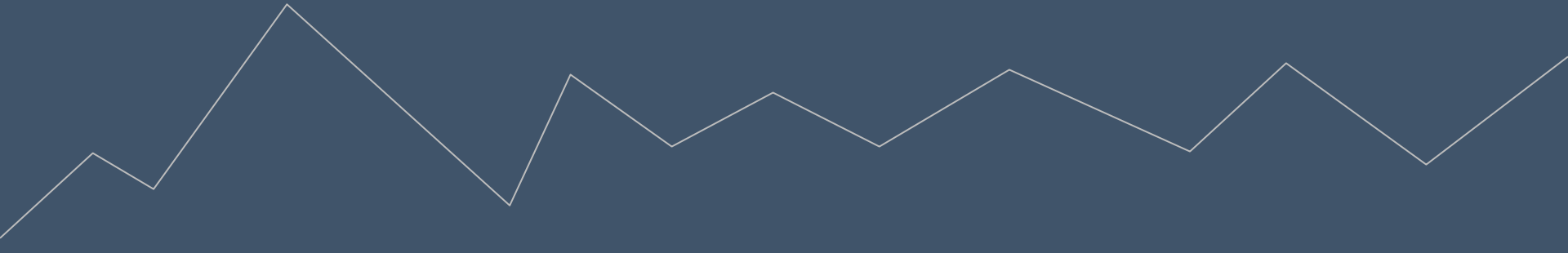
8 breeds were 100% "dangerous", but each only had 1-2 letters/orders, so were omitted from adjusted chart

(Alapaha Blue Blood Bulldog, Bernese Mountain Dog/Border Collie, Clumber Spaniel, Dogue De Bordeaux, Golden Retriever/Hound, Nova Scotia Duck Tolling Retriever, Red Heeler, Tibetan Mastiff)

9 breeds were 50% "dangerous", but each were 1 out of 2, so were omitted from adjusted chart

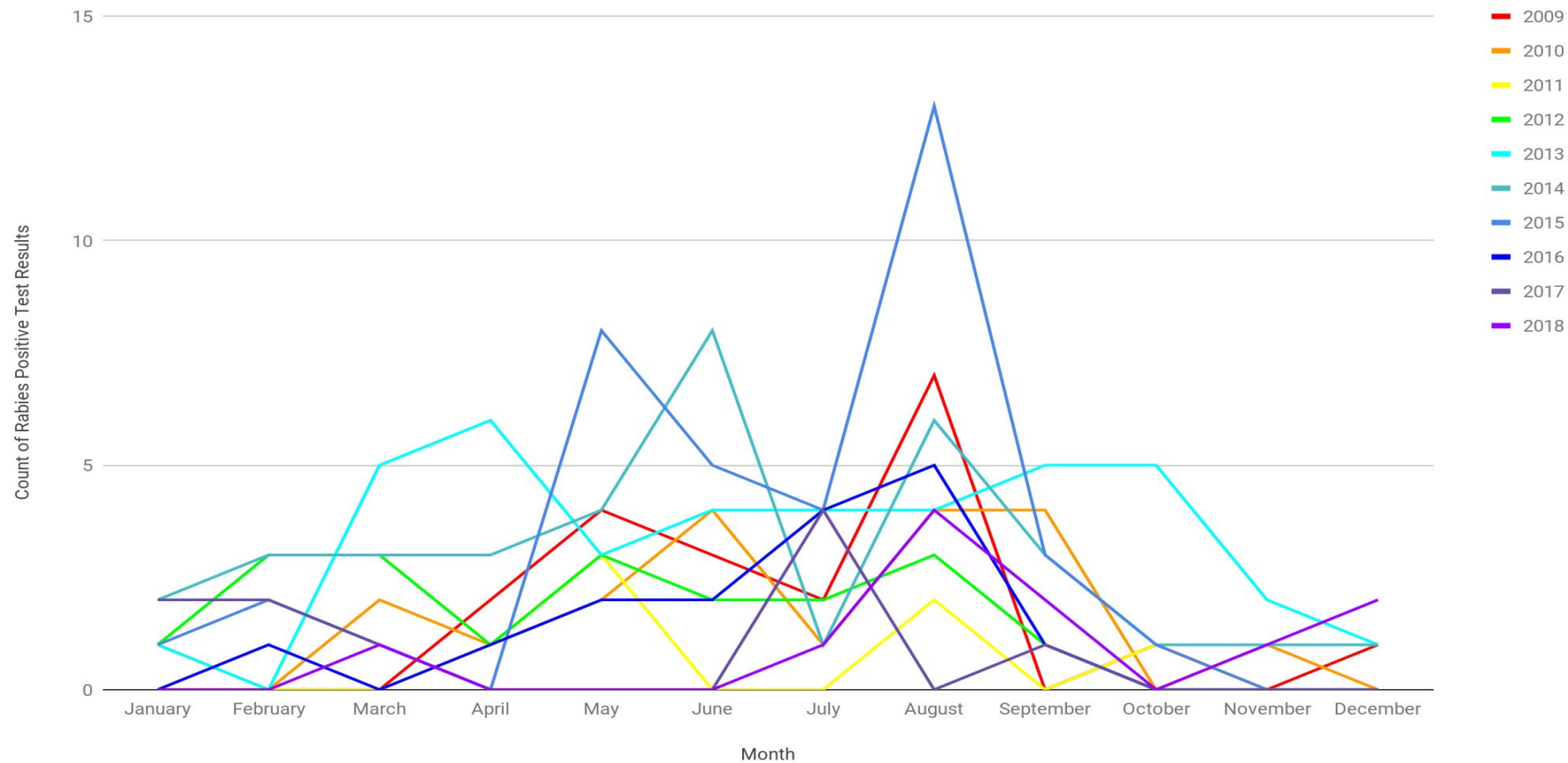
(Beauceron, Carolina, Chow/Shepherd/Collie, English Shepherd Mix, Entlebucher, Gordon Setter, Maremma Sheepdog, Otterhound Mix, Pharaoh Hound Mix)

Bite Statistics



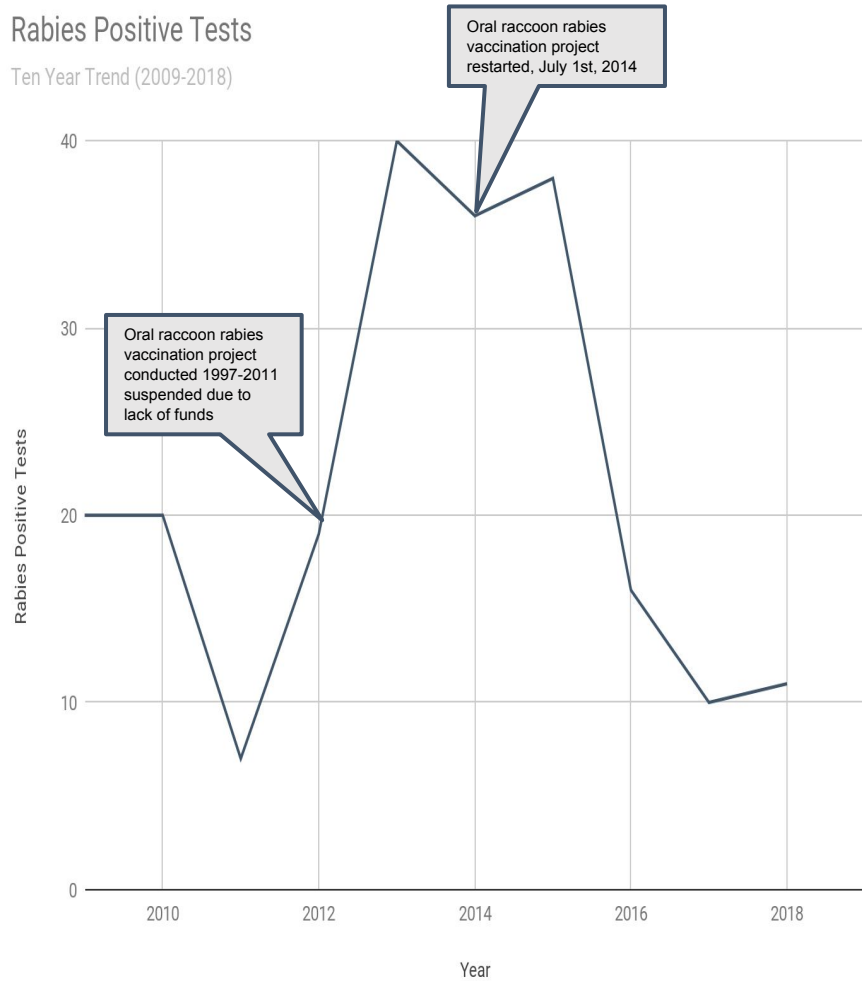
Rabies Positive Tests

Ten Year Trend (2009-2018)



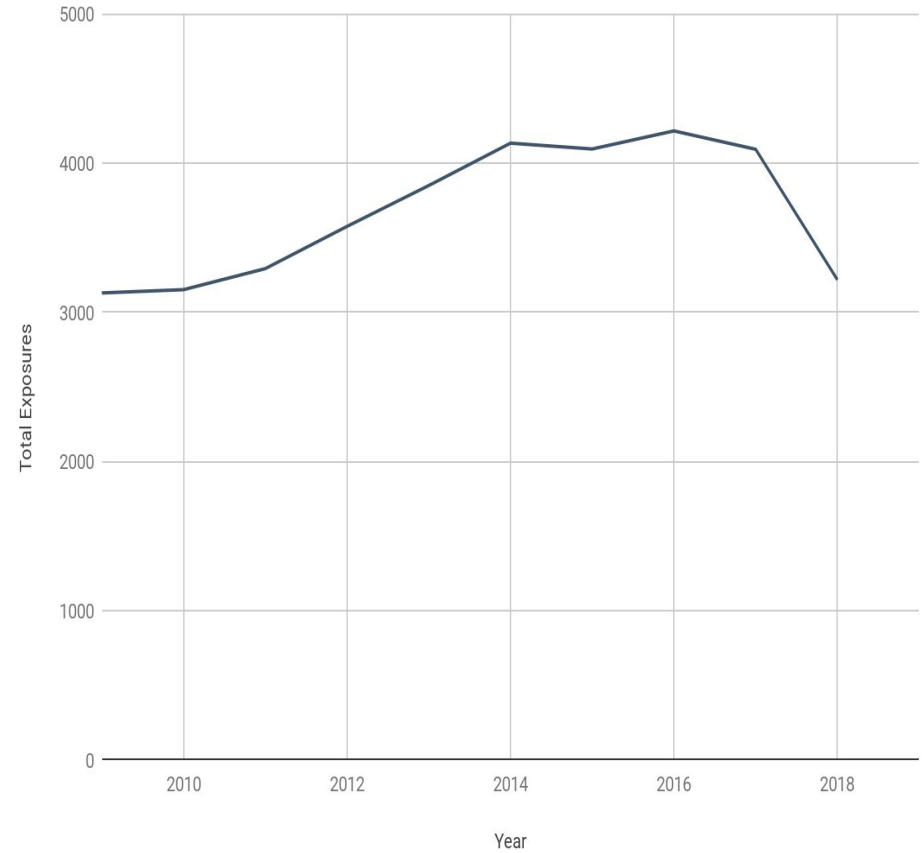
Rabies Positive Tests

Ten Year Trend (2009-2018)



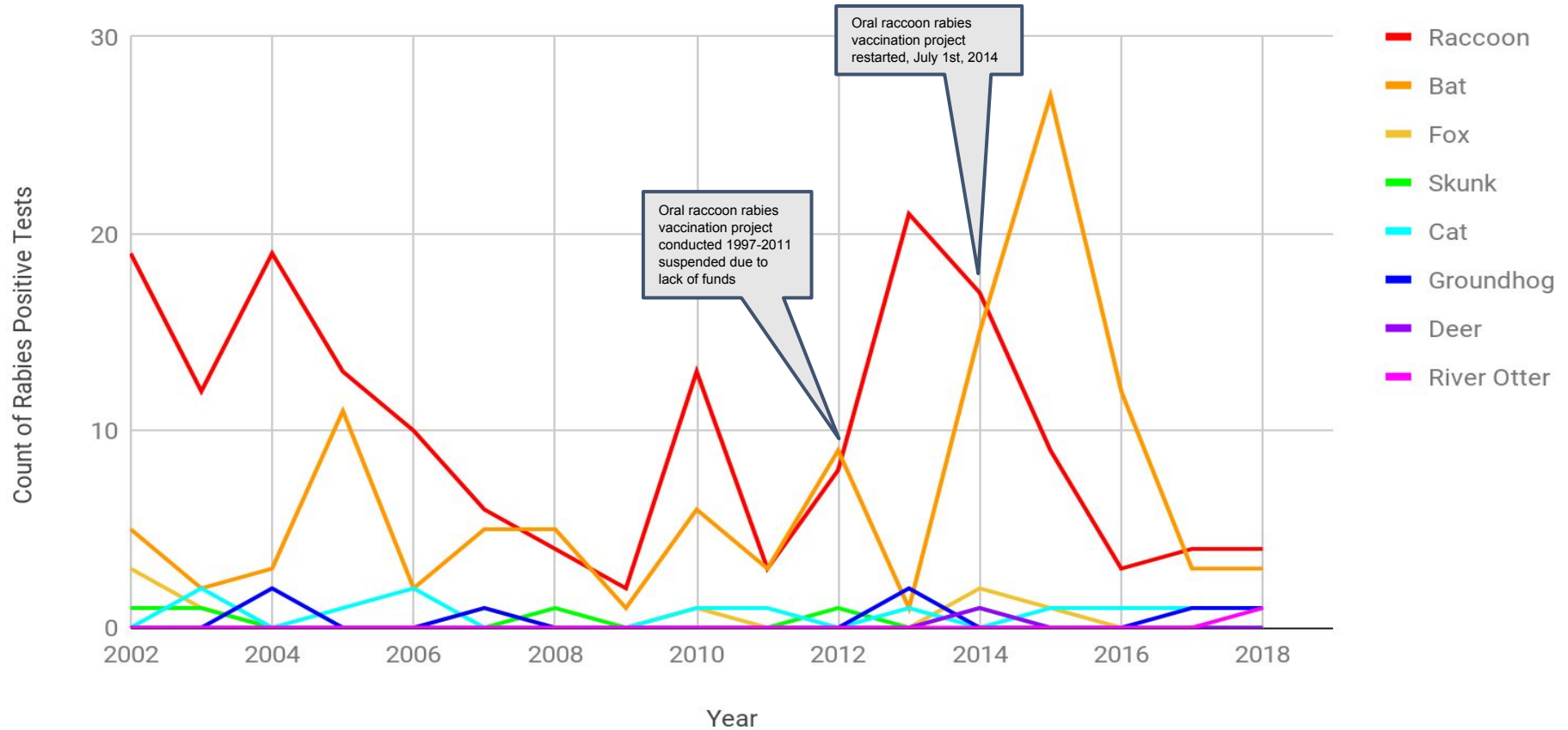
Total Exposures

Ten Year Trend (2009-2018)

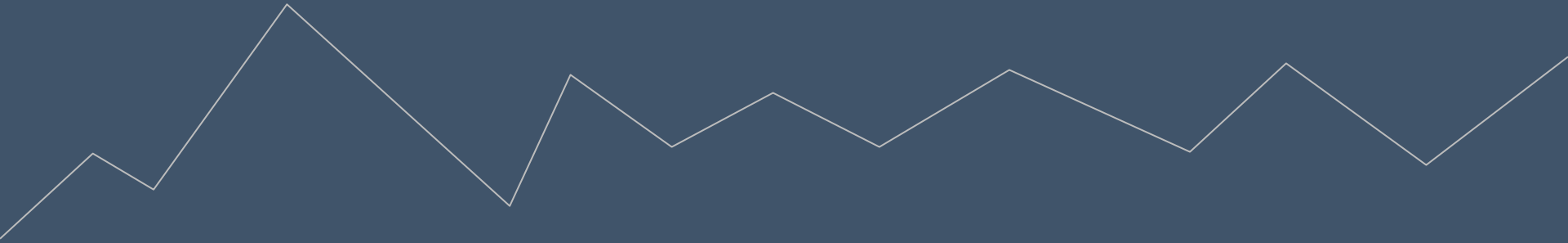


Rabies Positive Species

2002-2018

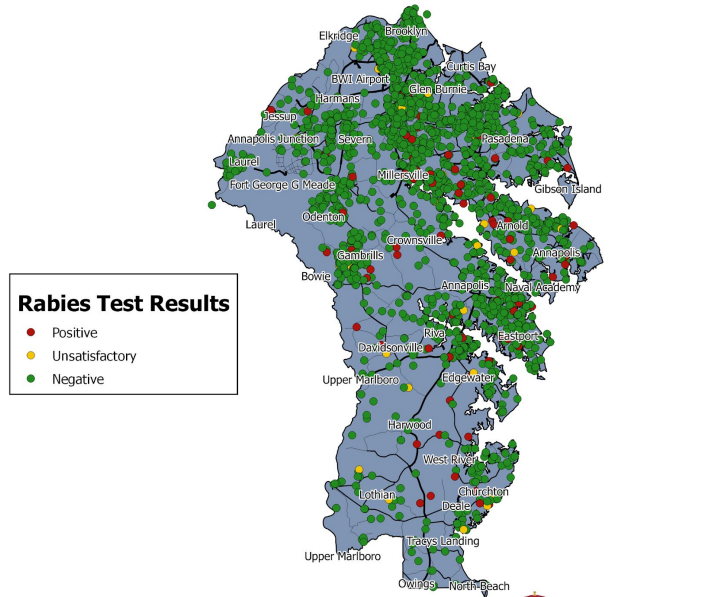


Rabies Examination Results



Anne Arundel County Rabies Test Results

2014-2018



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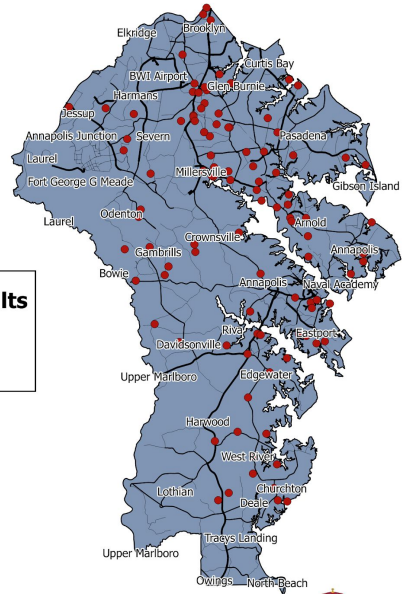


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Rabies Test Results

Positive Tests

2014-2018

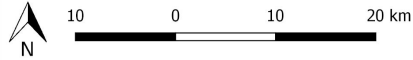


Rabies Test Results

- Positive
- Unsatisfactory
- Negative

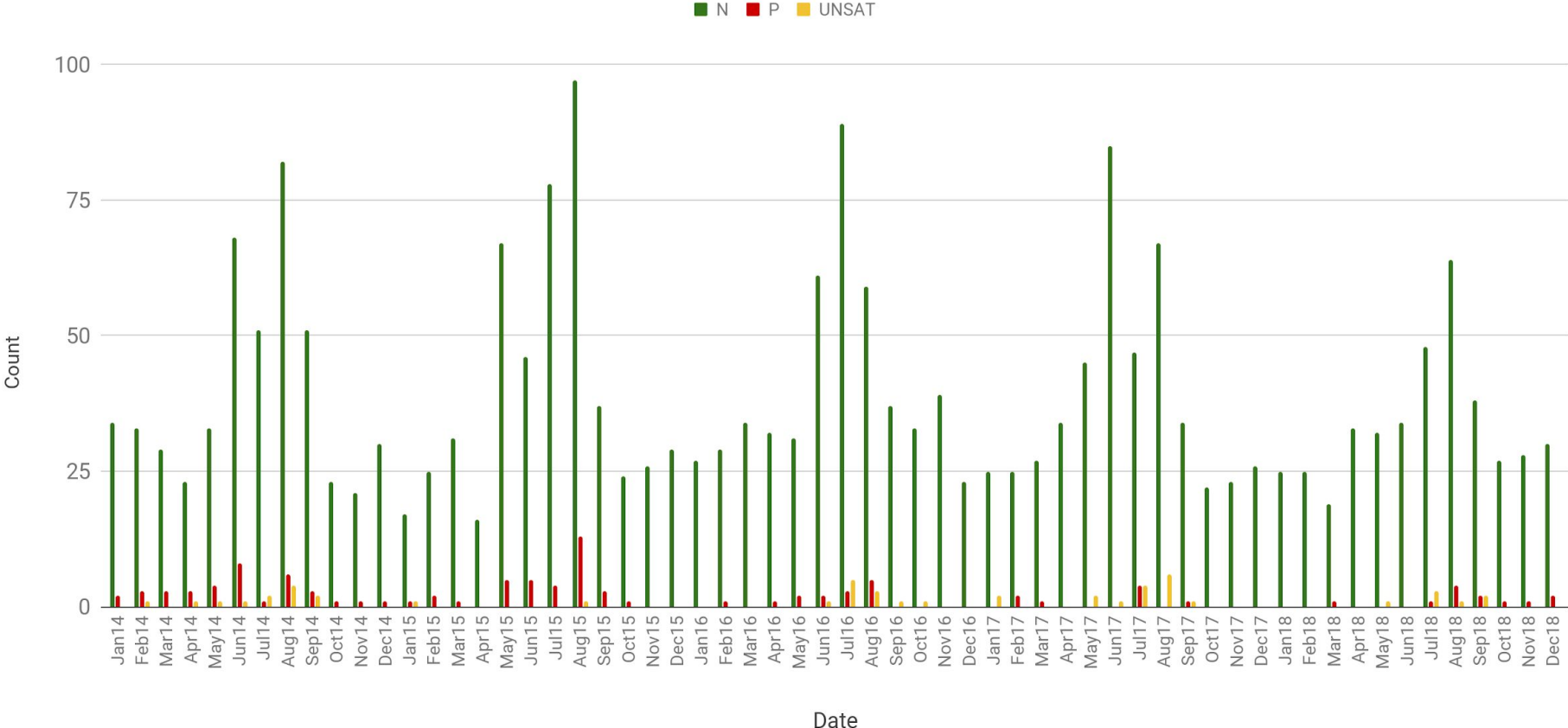


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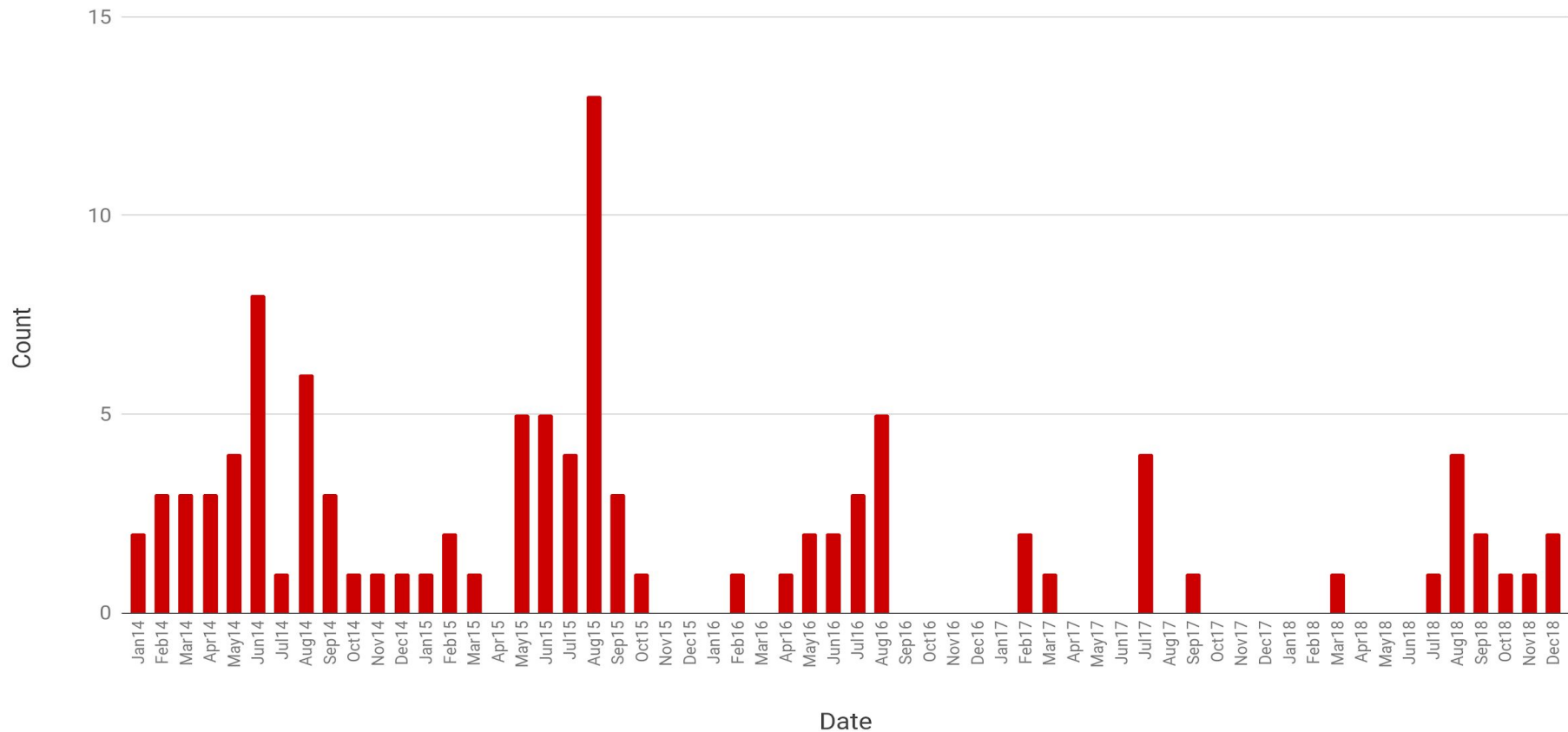
Rabies Examination Test Results

5 Year Trend (2014-2018)

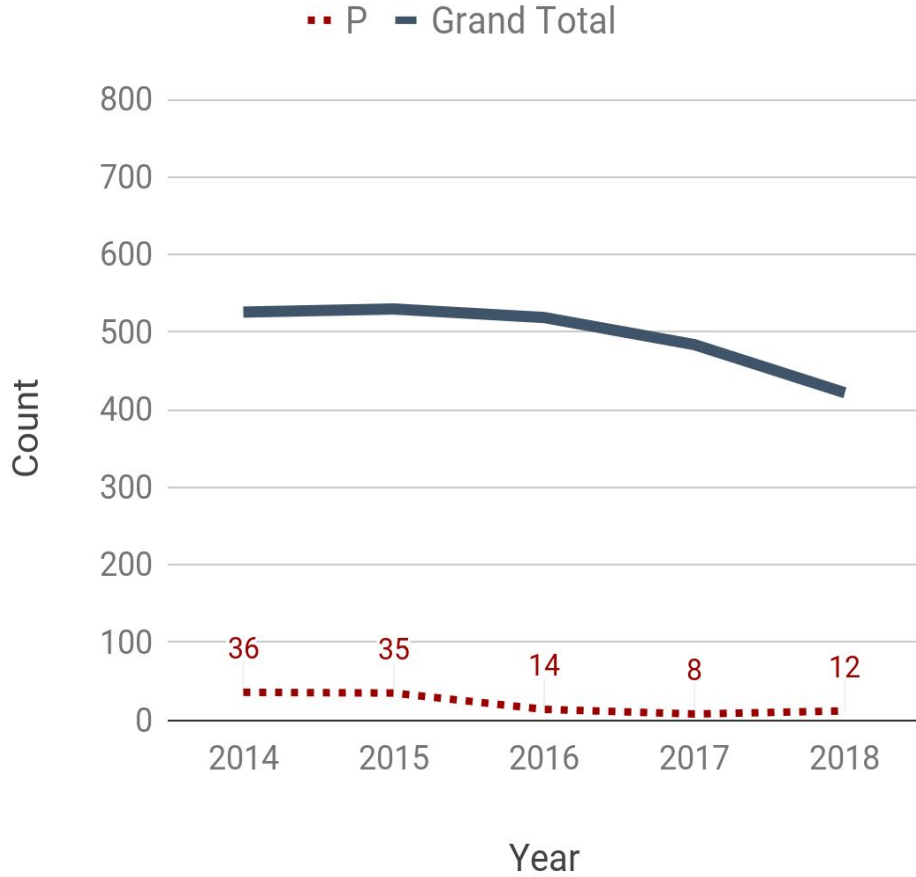


Positive Rabies Test Results

5 Year Trend

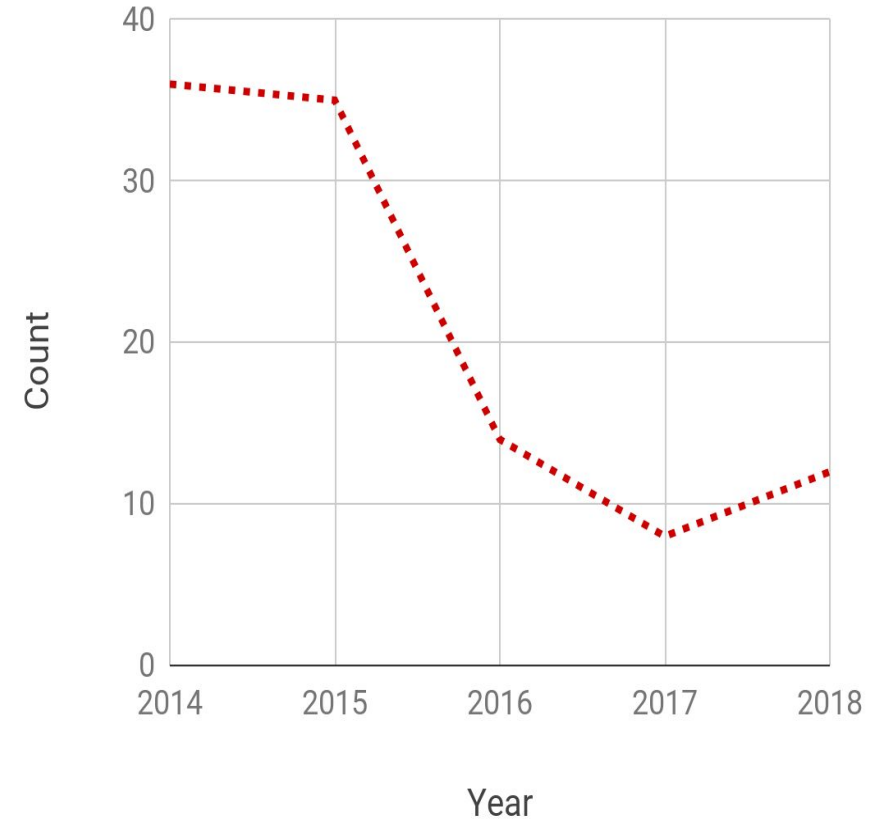


Total Tests Per Year

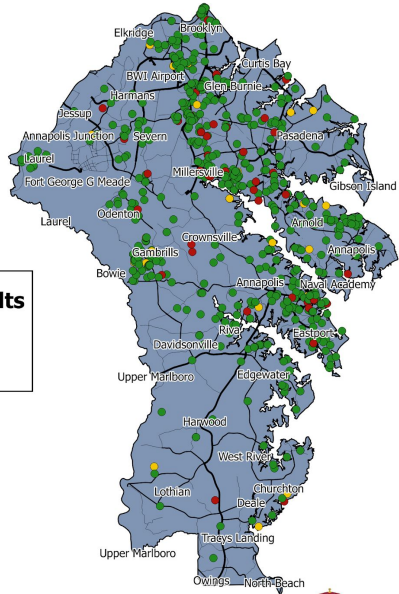


Total Positive Rabies Tests Per Year

5 Year Trend



Anne Arundel County
Rabies Test Results
Bats
2014-2018

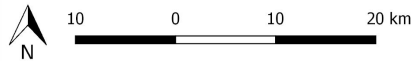


Rabies Test Results

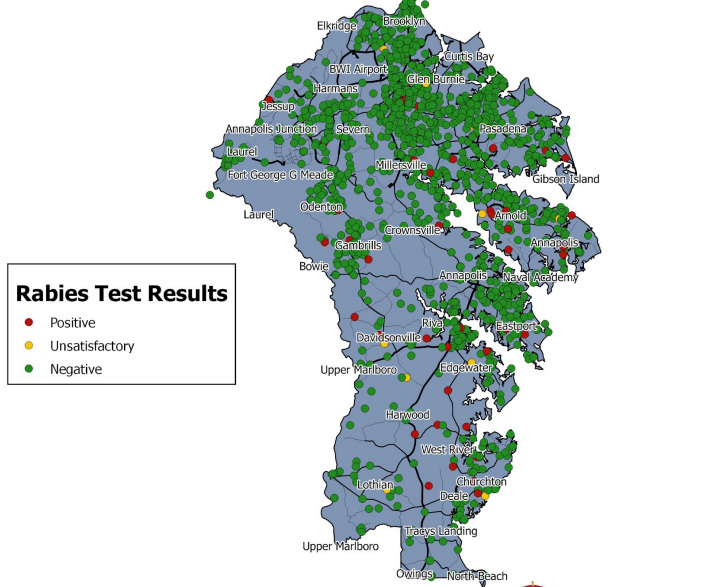
- Positive
- Unsatisfactory
- Negative



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Anne Arundel County
Rabies Test Results
Species Immunized By Oral Rabies Vaccine
2014-2018

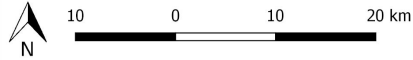


Rabies Test Results

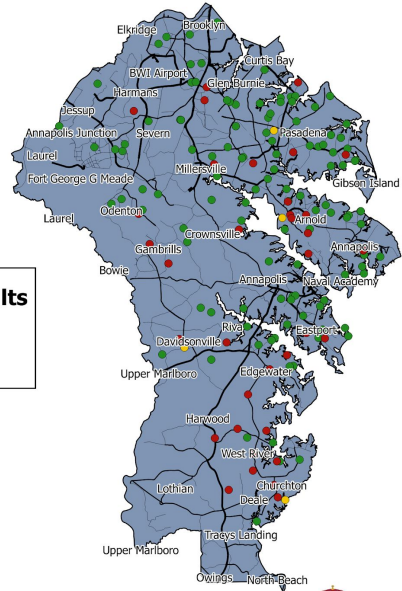
- Positive
- Unsatisfactory
- Negative



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Anne Arundel County
Rabies Test Results
Raccoons
2014-2018

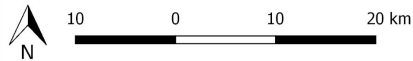


Rabies Test Results

- Positive
- Unsatisfactory
- Negative



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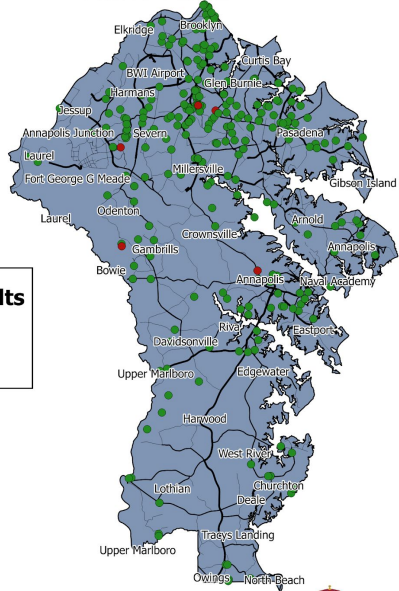


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Rabies Test Results

Stray Cats

2014-2018

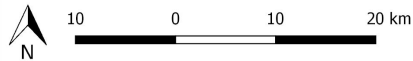


Rabies Test Results

- Positive
- Unsatisfactory
- Negative

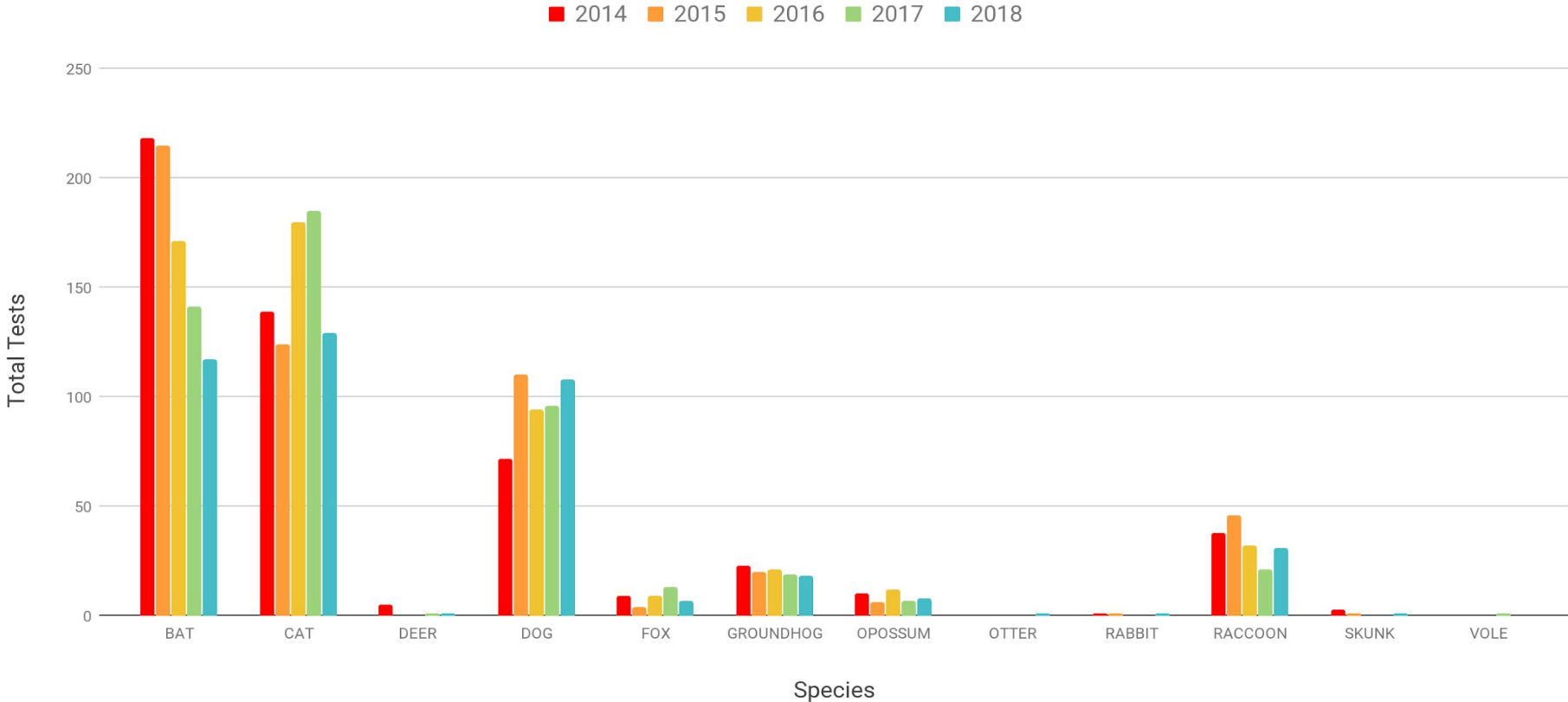


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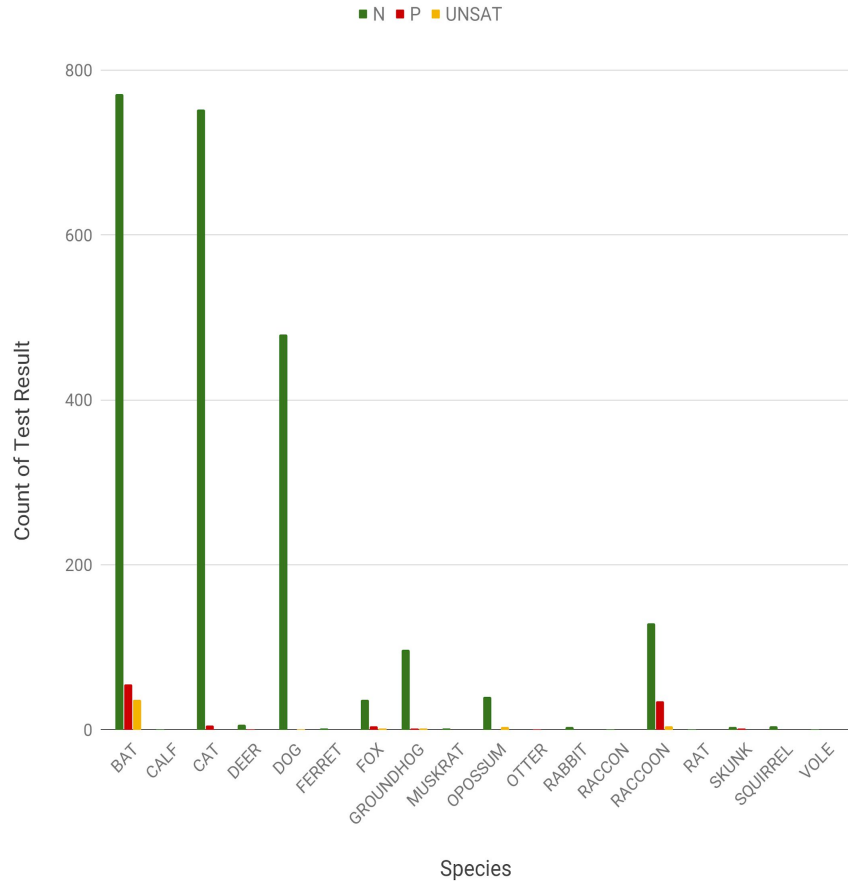
Total Tests Per Species Each Year

5 Year Trend (2014-2018)



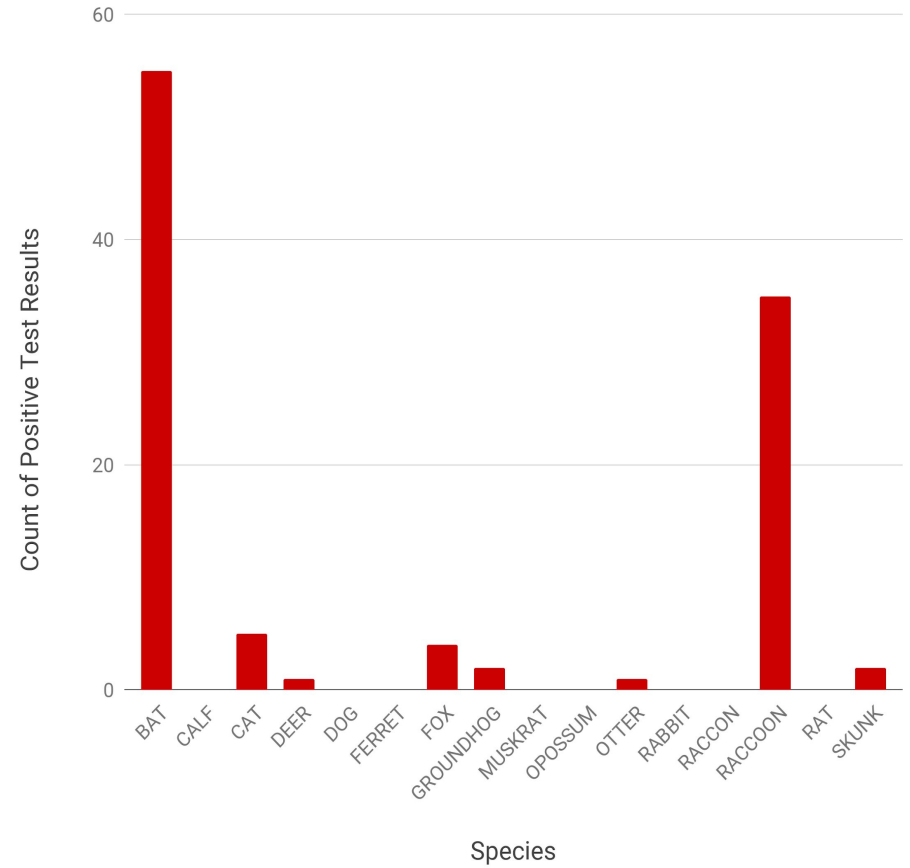
Test Results Per Species

5 Year Trend (2014-2018)

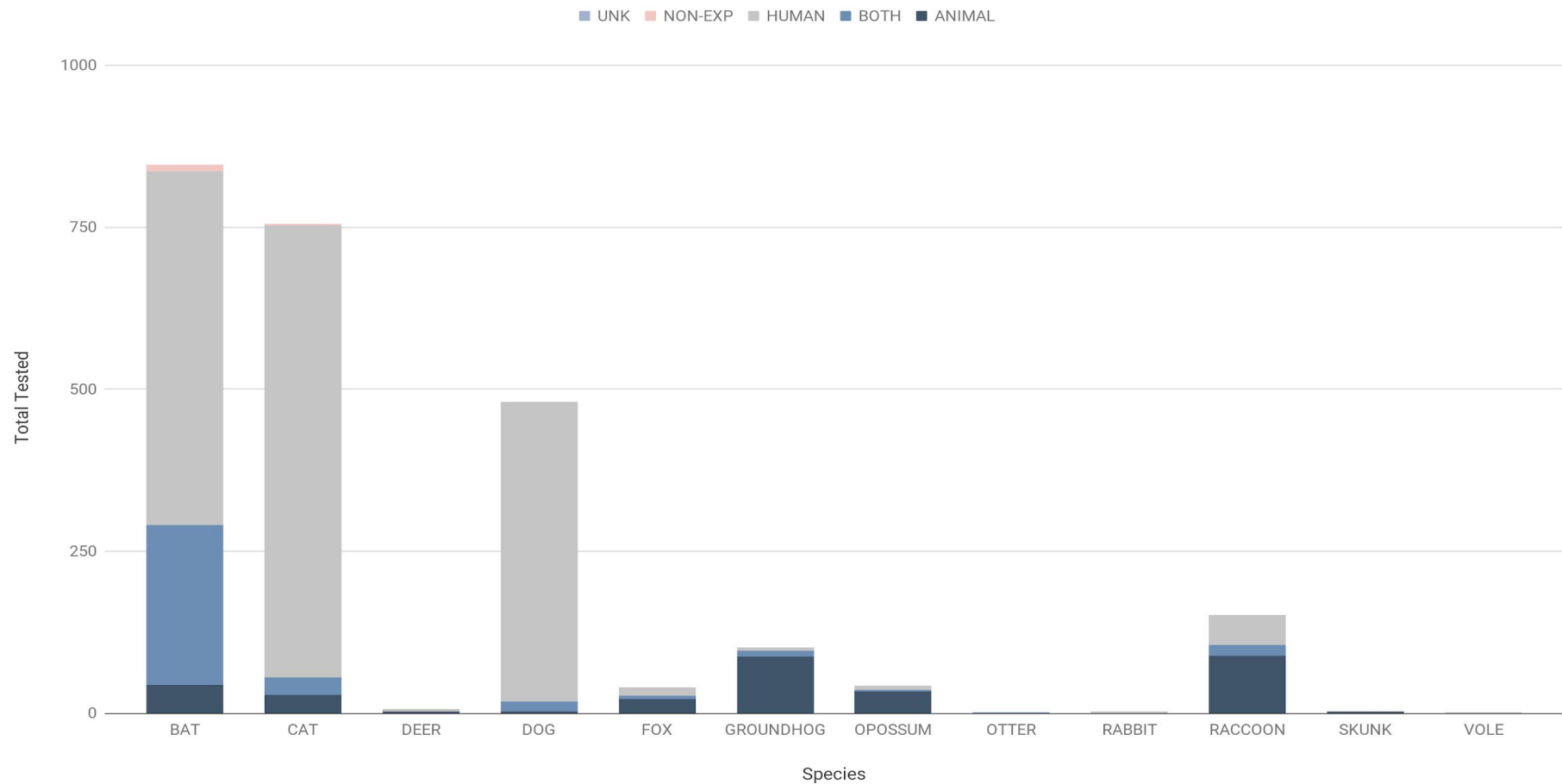


Positive Results Per Species

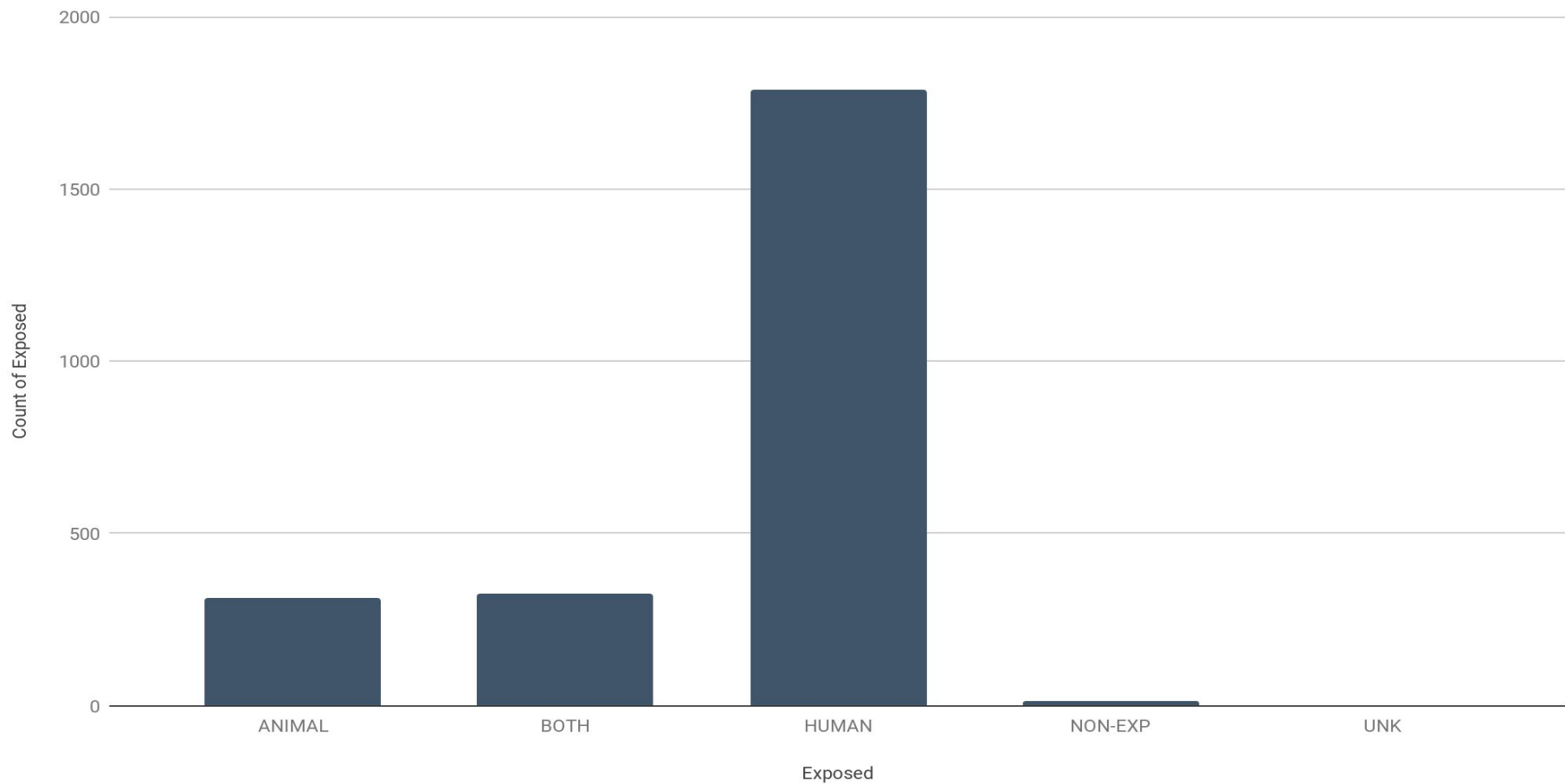
5 Year Trend (2014-2018)



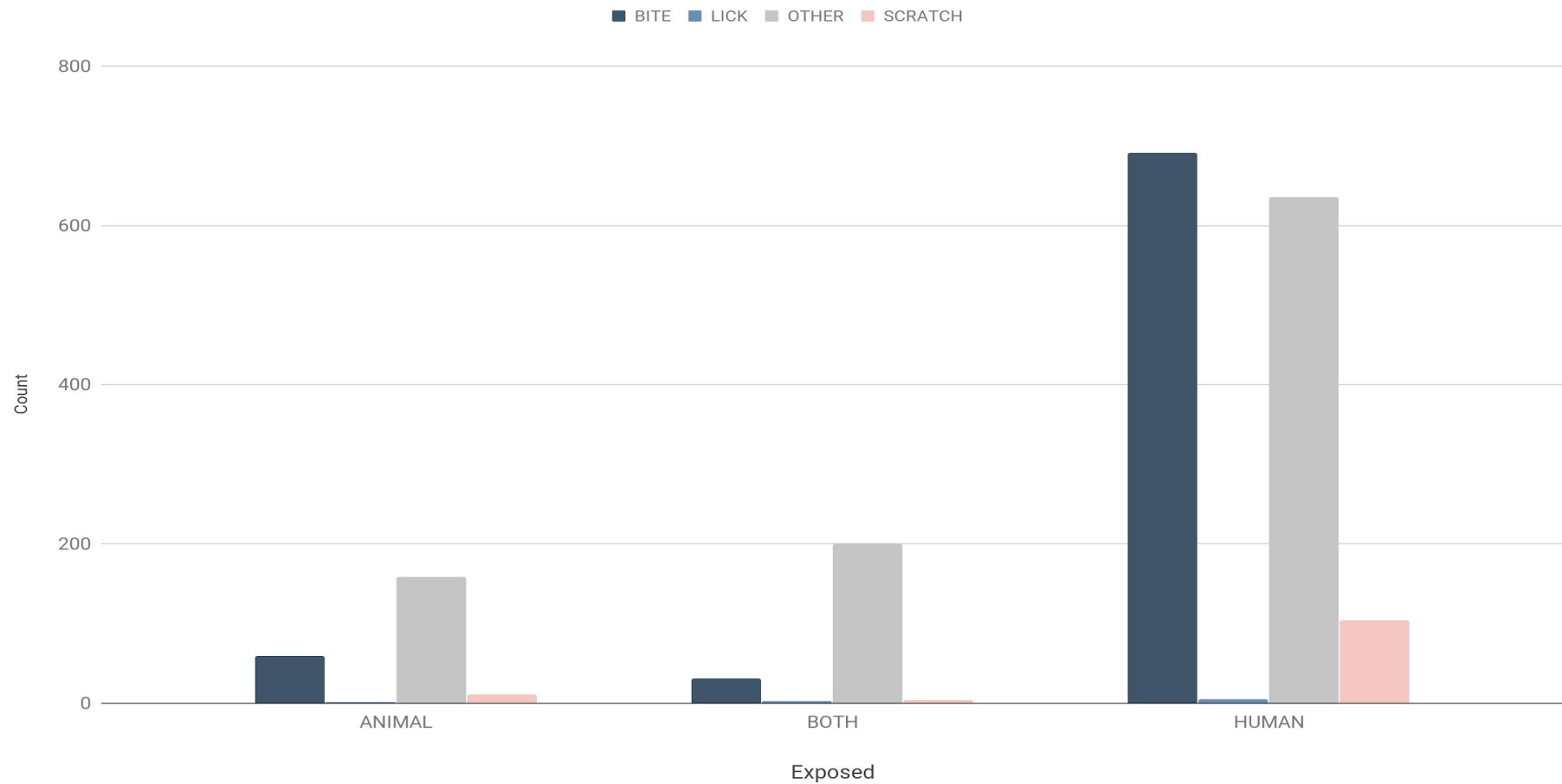
Total Tested of Each Exposed Type By Species



Total Count for Each Type of Exposed



Types of Exposure vs Exposed Species



General Limitations

- Limited Storage Space
 - Lost or damaged documents
- Inconsistent Records
 - Lack of standardized forms
 - Various recording styles
- Lack of Funding
 - Staff and time limitations
 - Limits on “extra” projects
 - Little to no research funding

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 was 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 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.

Competency #1: Apply Epidemiologic Methods to the Breadth of Settings and Situations in Public Health Practice

- Descriptive epidemiology
 - Person, place, and time
- Rabies Examination Results Spreadsheets/Data Analysis
 - Person: Humans/Animals
 - Place: City in Anne Arundel County
 - Time: Monthly, Yearly, 2014-2018
- Warning Letters, Potentially Dangerous Orders, Dangerous Orders Spreadsheets/Data Analysis
 - Person: Dog Breed
 - Place: City in Anne Arundel County
 - Time: Yearly, 2014-2018

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

- Google Fusion Tables
- QGIS
- Google Sheets
 - Conditional Formatting
 - Pivot Tables
 - Graph Creation
 - Filters
 - Sorting
 - Protecting sheets/cells
 - Array Formula
 - Lookup Formula
 - Concatenate Formula
 - IF Formula

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

Public Health Practice:

- Graphs and maps for website

Potential Public Health Policy

- Rabies Examination Results for ORV programs

Public Health Research

- Funding is greatest limiting factor

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

- Wide range of income and education levels
- Brochures designed for general public

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

- Graphs and maps for website
- Brochures
- Presentation to AACACC staff

Competency #21: Perform effectively on interpersonal teams

- Thomas Burja, Zoonotic Disease Specialist at Anne Arundel County Department of Health
- Created maps using QGIS

Infectious Diseases/Zoonoses Competencies

Competency #3: Environmental/ecological Influences

- Diverse environments
- Challenges to wildlife/rabies control
- Maps of rabies

Competency #4: Disease Surveillance

- Passive surveillance
- Active would be preferable, but not economically feasible
- Risk factors:
 - Humans most likely to be exposed via bites

Questions?

