DC | HEALTH
GOVERNMENT OF THE DISTRICT OF COLUMBIA

Annual Rabies Surveillance Report: Comparative Analysis of 2019 and 2020

The District of Columbia Department of Health (DC Health) has a robust animal bite and rabies surveillance system which is crucial to facilitate prevention and control of human and animal rabies. Using a One Health approach which recognizes that the health of animals, humans, and the environment are interconnected, strong collaboration exists among DC's animal shelter, animal control, veterinary and human healthcare workers, lab personnel and the health department.

All animal bites are reportable and are recorded in an online database which allows prompt reporting, investigations and rabies testing of animals as needed to determine risk of rabies transmission to DC residents from animal bite encounters. In 2019, 250 animal specimens were submitted to DC Public Health Laboratory (DC PHL) and in 2020, 186 animal specimens were submitted for rabies testing. All rabies sample testing is conducted using the Direct Fluorescent Antibody (DFA) test, the current gold standard test for rabies[1]. Figure 1 shows a comparison of DFA test results for surveillance years 2019 and 2020.

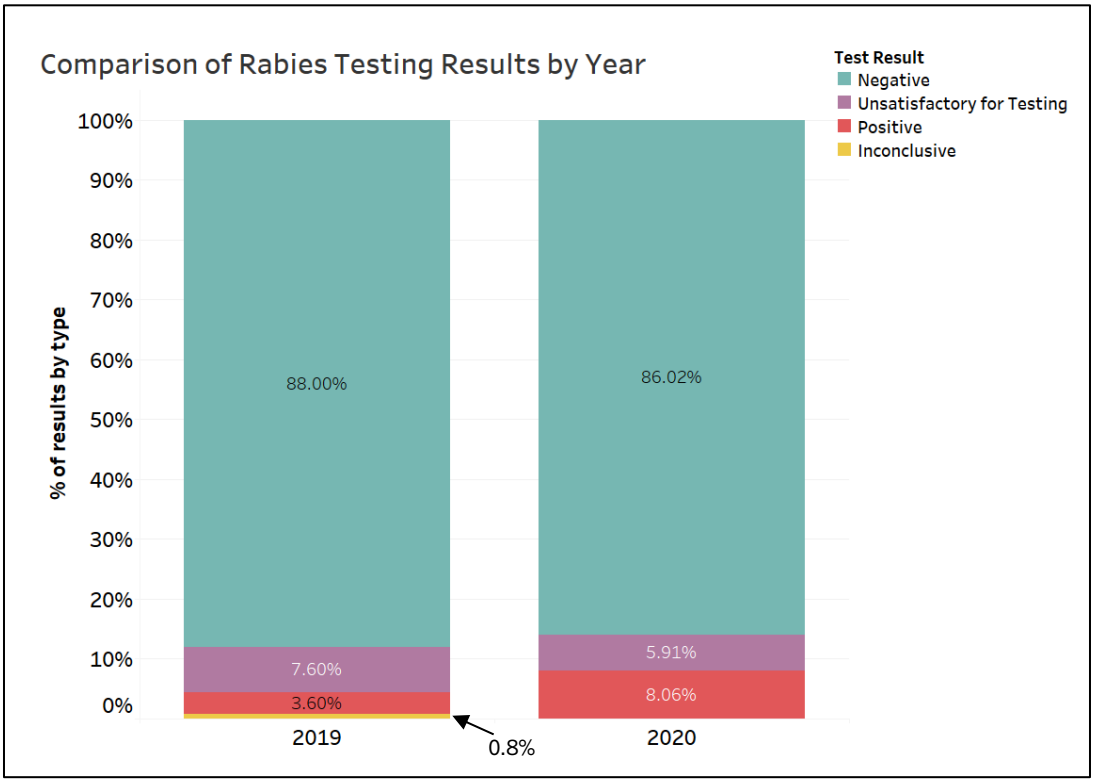

Figure 1. Comparative Rabies Testing Results in DC in 2019 and 2020.

In 2020, 8.0% (15 out of 186) of samples submitted tested positive for rabies. This was higher compared to findings in 2019 when 3.6% (9 out of 250) of samples submitted tested positive for the rabies virus (figure 1).

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Rabies is a zoonotic disease caused by RNA viruses in the genus *Lyssavirus*[3] that has many variants. All mammals are susceptible to rabies virus infection. With the elimination of the dog rabies virus variant (RVV) from the United States, terrestrial mesocarnivores (such as raccoons, skunks, foxes, and coyotes) and bats are now the only reservoirs of Rabies lyssavirus in this country, and these RVVs occur in geographically distinct regions [3] (figure 2). The raccoon rabies variant (RRV) is enzootic in eastern US including the District of Columbia (DC)[2].

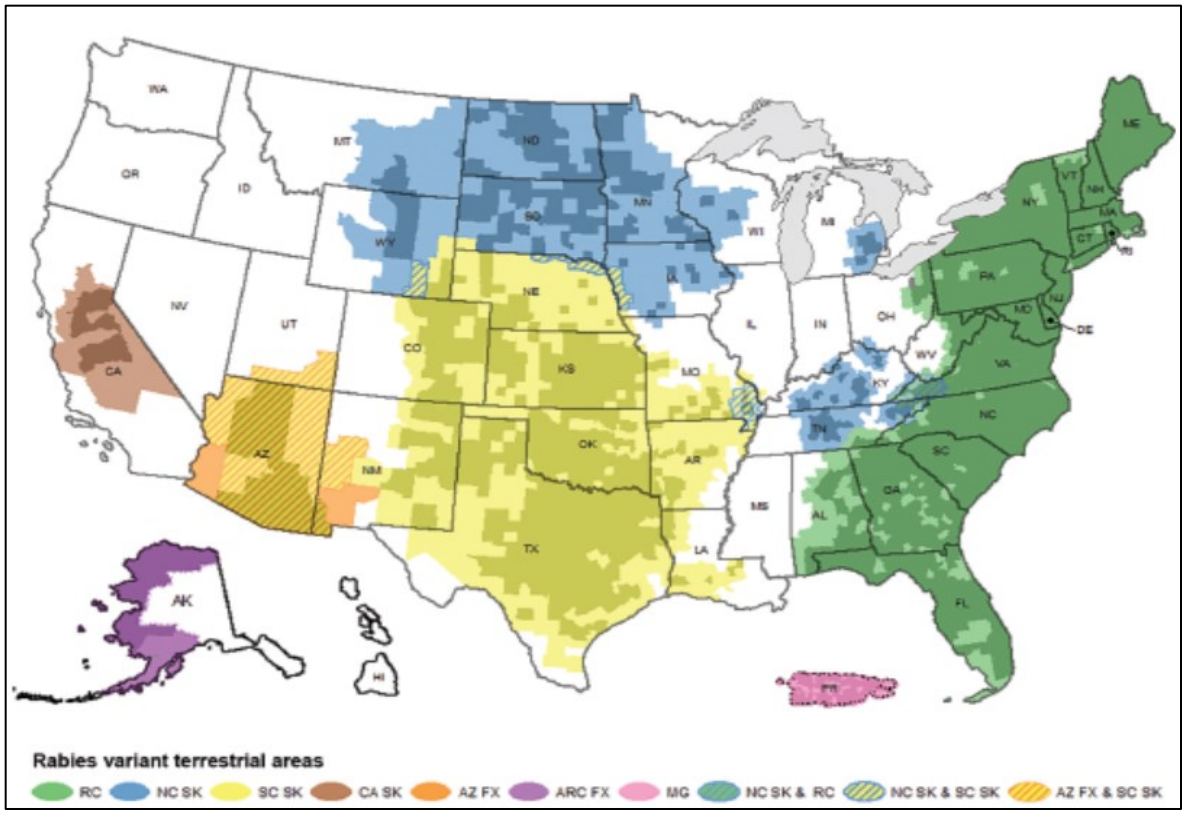

Figure 2. Distribution of major RVVs among mesocarnivores in the United States, including Puerto Rico, for 2015 through 2019[2]. Legend: ARC FX = Arctic fox RVV. AZ FX = Arizona fox RVV. CA SK = California skunk RVV. MG = Dog-mongoose RVV. NC SK = North central skunk RVV. RC = Eastern raccoon RVV. SC SK = South central skunk RVV

Figure 3 shows the comparative histogram of DFA tests by test result, species, and year. In 2020, the most tested animal species were bats (n=105), followed by racoons (n=50), cats (n=14), and dogs (n=9). Similarly, in 2019 the most tested animal species were bats (n=98), followed by dogs (n=75), raccoons (n=34), and cats (n=33). The number of dogs and cat specimens tested decreased while raccoon specimen increased in 2020 compared to 2019. Other species that were submitted in for rabies testing in 2019 included opossums (n=3), groundhogs (n=2), squirrels (n=2), foxes (n=2), and one coyote. Other species that were submitted for rabies testing in 2020 included opossums (n=3), groundhogs (n=2), foxes (n=2), and one beaver.

No domestic animals that were submitted tested positive for rabies in either surveillance year. Only wild animals tested positive for rabies. For surveillance purposes, a representative sample of positive samples is sent to CDC for variant typing yearly. One of 3 positive bats was sent to CDC for a confirmatory Polymerase Chain Reactive (PCR) test which confirmed its positive status and infection with the *Eptesicus fuscus* II (insectivorous bat) rabies virus variant. In 2020, five raccoon specimens were submitted to CDC for variant typing and the results were consistent with the raccoon rabies virus variant seen in Eastern USA.

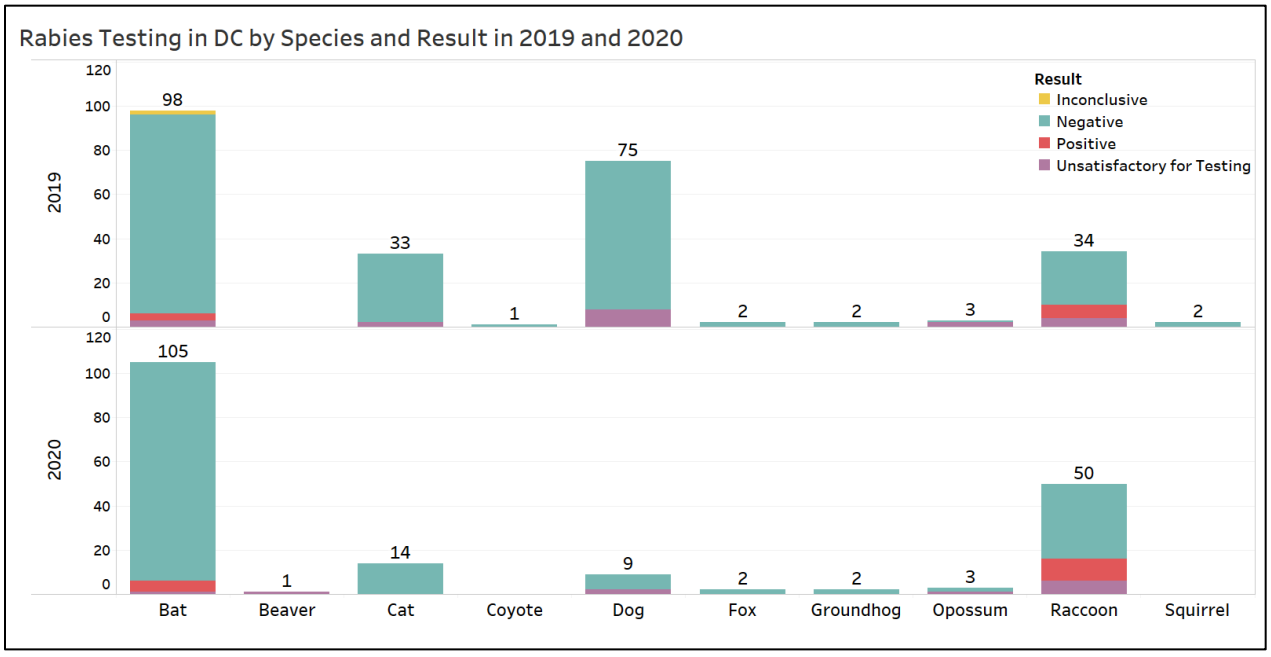

Figure 3. Wild and Domestic Animals tested for Rabies in DC, 2019 and 2020.

Table 1 summarizes rabies test results, including percent positive, by species and year. In 2019 and 2020, bats and raccoons comprised all rabid specimens identified from testing. In 2020, raccoons most tested positive, with 20% (n=10/50) of submitted samples and this was like 2019 when 17.6% (n=6/34) of submitted raccoons tested positive. In both years, the proportion of bats (33.3%) and raccoons (66.7%) found positive remained the same in 2020 as compared to 2019.

Table 1. Final Test Results of Rabies in animals by species, DC, 2019 and 2020.

Species	Year	Negative	Inconclusive	Unsatisfactory for Testing	Positive	Total	% Positive
Bat	2019	90	2	3	3	98	3.1
	2020	99	0	1	5	105	4.8
Beaver	2020	0	0	1	0	1	0.0
Cat	2019	31	0	2	0	33	0.0
	2020	14	0	0	0	14	0.0
Coyote	2019	1	0	0	0	1	0.0
Dog	2019	67	0	8	0	75	0.0
	2020	7	0	2	0	9	0.0
Fox	2019	2	0	0	0	2	0.0
	2020	2	0	0	0	2	0.0
Groundhog	2019	2	0	0	0	2	0.0
	2020	2	0	0	0	2	0.0
Opossum	2019	1	0	2	0	3	0.0
	2020	2	0	1	0	3	0.0
Raccoon	2019	24	0	4	6	34	17.6
	2020	34	0	6	10	50	20.0
Squirrel	2019	2	0	0	0	2	0.0

Figure 4 shows the seasonality of rabies testing of raccoons and bats by year. Testing trends reflect a seasonal increase in the summer months when people tend to spend more time outdoors and are more likely to encounter a raccoon. Our data suggests that bat encounters see an increase in the summer when more bats tend to seek shelter in homes in cool and dark areas.

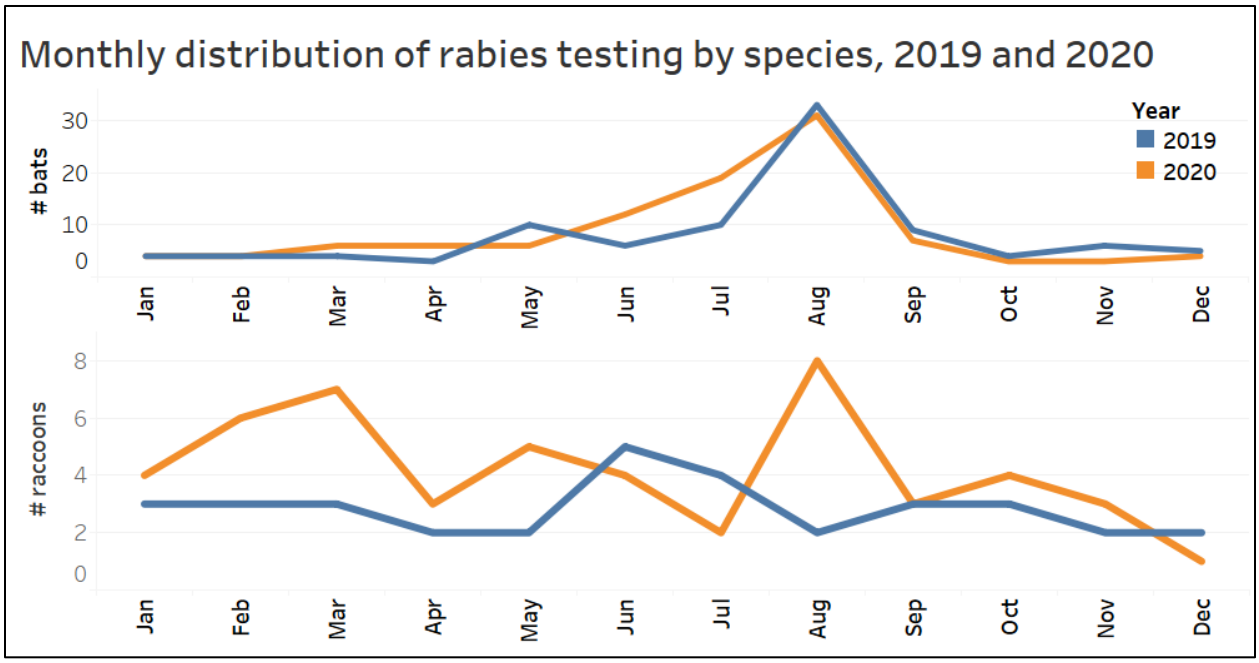

Figure 4. Comparative monthly rabies testing trends in raccoons and bats, 2019 and 2020.

Figures 5 and 6 show the geographical distribution is a map displaying cases of rabid species that identified through testing in DC in 2019 and 2020.

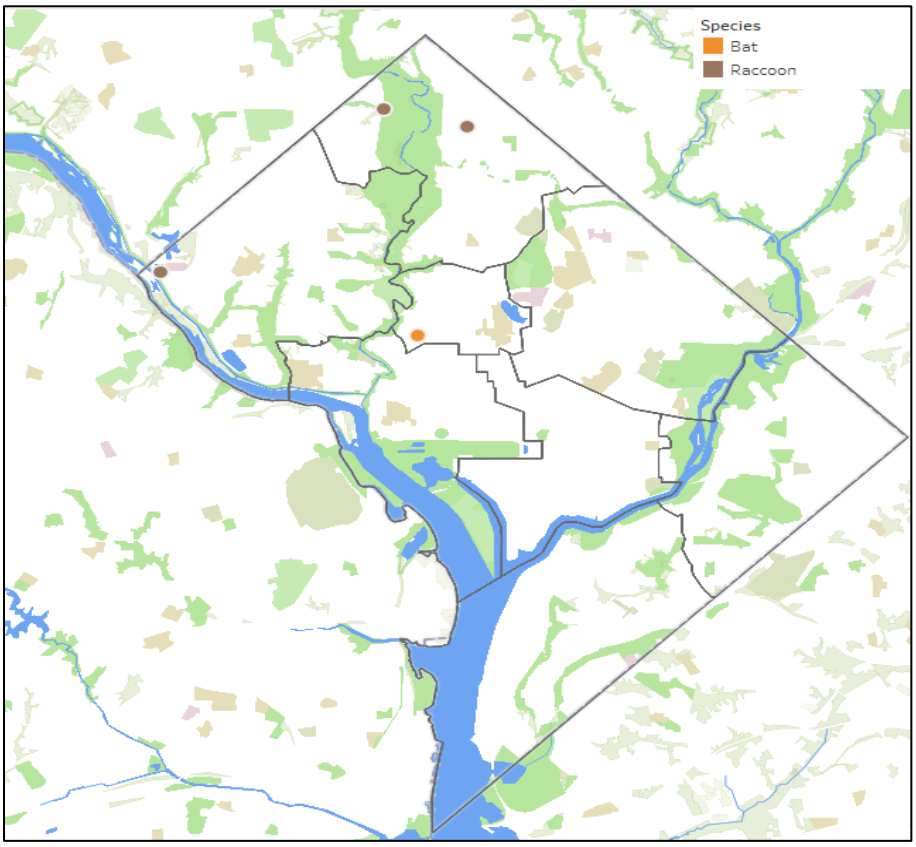

Figure 5. Geographical distribution of rabid animals that were detected in DC, 2019

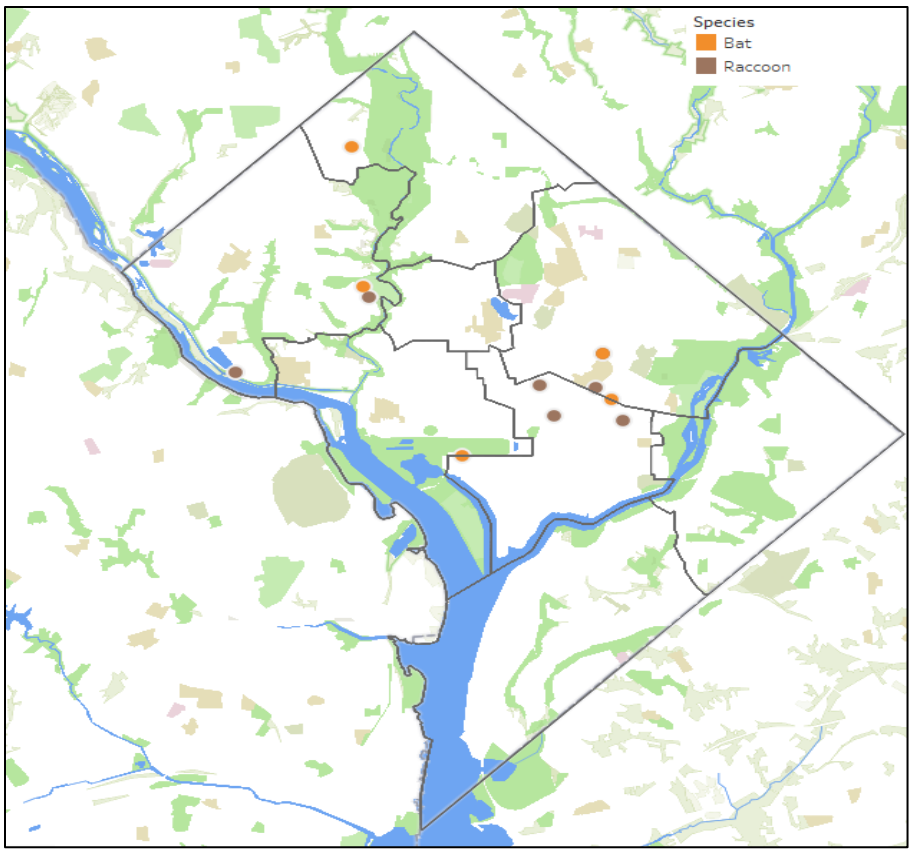

Figure 6. Geographical distribution of rabid animals that were detected in DC, 2020

Rabies is almost 100% fatal once symptoms develop; it is also 100% preventable with appropriate vaccination. Canine rabies was successfully controlled during the late 1970s and the number of human rabies cases have dramatically reduced as a result[2]. The provision of human post-exposure prophylaxis (PEP) and pre-exposure vaccinations for those at-risk, such as veterinarians, prevents rabies infection even when someone has been exposed. For healthy people who have never been vaccinated against rabies, PEP consists of immediate wound washing, and administration of human rabies immune globulin along with 4 doses of rabies vaccine on days 0, 3, 7, and 14[2].

In cases of a potential rabies virus exposure to a person from a domestic animal such as a cat or dog, a 10-day animal observation period is recommended. While most domestic animals in DC are appropriately vaccinated as mandated, a quarantine is still required to make sure the animal is not at risk for having passed on rabies to a person. Appropriate reporting and monitoring of the biting animal can prevent someone from receiving unnecessary PEP. In cases of a person exposed to wildlife, risk of rabies transmission is determined by rabies testing if the animal is available[2]. In either case, if an animal is not available, there remains a risk for rabies exposure, and PEP is recommended.

DC Health continues to work to prevent human rabies cases through the promotion of rabies vaccination of all dogs and cats residing in DC, animal control programs, appropriate rabies PEP recommendations, and education of healthcare professionals and the public. For more information, please visit https://dchealth.dc.gov/service/rabies-and-animal-exposures.

1. Cdc.gov. (2018). New Rapid Rabies Test Could Revolutionize Testing and Treatment | CDC Online Newsroom | CDC. [online] Available at: https://www.cdc.gov/media/releases/2018/p0516-rapid-rabies-test.html [Accessed 26 Aug. 2019].
2. Ma X, Monroe BP, Wallace RM, Orciari LA, Gigante CM, Kirby JD, Chipman RB, Fehlner-Gardiner C, Cedillo VG, Petersen BW, Olson V, Bonwitt J. Rabies surveillance in the United States during 2019. J Am Vet Med Assoc. 2021 Jun 1;258(11):1205-1220. doi: 10.2460/javma.258.11.1205. PMID: 33978439.
3. Ma, X., Monroe, B., Cleaton, J., Orciari, L., Li, Y., Kirby, J., Chipman, R., Petersen, B., Wallace, R. and Blanton, J. (2018). Rabies surveillance in the United States during 2017. Journal of the American Veterinary Medical Association, 253(12), pp.1555-1568.