



# Arkansas Department of Health

---

4815 West Markham Street • Little Rock, Arkansas 72205-3867 • Telephone (501) 661-2000

**Governor Asa Hutchinson**

**Nathaniel Smith, MD, MPH, Director and State Health Officer**

## 2015 Rabies Activity Year End Summary

**5/27/2016**

---

**Susan Weinstein, DVM, MPH,**  
State Public Health Veterinarian, Section Chief, Zoonotic Disease

**Richard Taffner, BS, RS**  
Zoonotic Disease Epidemiologist

**Max L Teehee, DVM, PhD, DACVPM**  
Zoonotic Disease Section

2015 Rabies Summary Report

<b>Table of Contents</b>	<b>Page</b>
Executive Summary.....	3
Data Limitations.....	3
National Information.....	4
Reporting and Analysis.....	4
Natural Reservoirs.....	5
Domestic Animals.....	5
Human Rabies in the United States.....	5
Arkansas Information and Rabies Activity 2015.....	6
Comparison to Previous Years.....	9
Geographic Distribution of Rabies.....	9
Positive Rabies Analysis, by Animal Type, AR 2015.....	12
Skunks.....	12
Bats.....	13
Dogs.....	14
Cats.....	15
Cattle.....	16
Foxes.....	17
Table 1. Animals Tested for Rabies, AR 2015.....	4
Table 2. Rabies Specimen Submission by State, AR 2015.....	7
Table 3. Positive Rabies Submissions by Public Health Region and County, AR 2015.....	11
Figure 1. Distribution of Major Rabies Virus Variants, U.S. and Puerto Rico.....	5
Figure 2. Rabies by Animal Type, AR 2015.....	6
Figure 3. Counties with Confirmed Rabies, AR 2015.....	8
Figure 4. Positive Rabies by Year, AR 2000-2015.....	9
Figure 5. Positive Rabies by Public Health Region, AR 2015.....	9
Figure 6. Counties without Historical Rabies, AR 2000-2015.....	10
Figure 7. Positive Rabies Numbers and Percentages by Month, AR 2015.....	10
Figure 8. Counties with Positive Rabies in Skunks, AR 2015.....	12
Figure 9. Positive Rabies in Skunks by Year, AR 2000-2015.....	12
Figure 10. Counties with Positive Rabies in Bats, AR 2015.....	13
Figure 11. Positive Rabies in Bats by Year, AR 2000-2015.....	13
Figure 12. Counties with Positive Rabies in Dogs, AR 2015.....	14
Figure 13. Positive Rabies in Dogs by Year, AR 2000-2015.....	14
Figure 14. Counties with Positive Rabies in Cats, AR 2015.....	15
Figure 15. Positive Rabies in Cats by Year, AR 2000-2015.....	15
Figure 16. Counties with Positive Rabies in Cattle, AR 2015.....	16
Figure 17. Positive Rabies in Cattle by Year, AR 2000-2015.....	16
Figure 18. Counties with Positive Rabies in Foxes, AR 2015.....	17
Figure 19. Positive Rabies in Foxes by Year, AR 2000-2015.....	17
Figure 20. Positive Rabies in Arkansas, 2015.....	18

## **Executive Summary**

The Arkansas Department of Health (ADH) received 1,021 specimens for rabies testing in 2015, of which 992 samples originated from animals in Arkansas, 19 were from animals in neighboring states, and 10 were proficiency samples. A total of 79 specimens tested positive for rabies, of which 73 originated in Arkansas (7.4% of the total Arkansas specimens submitted), three rabies positive specimens originated from neighboring states, and three positive samples were proficiency samples. The mean number of positive rabies cases originating in Arkansas from 1990-2015 was 59 (min. 29, max. 152). Wild animals accounted for 96% of positive Arkansas originating specimens in 2015, which is higher than the national average of 93% reported to CDC in 2014.

There were seven separate occasions that humans were exposed to known rabid animals in 2015. ADH recommended that 22 people receive rabies post exposure prophylaxis (PEP) because of those exposures. Seven additional people chose to take the PEP as a precaution, even though their interactions with rabid animals were not categorized as an exposure.

The positive results for Arkansas submissions included 16 bats, two cows, one dog, one fox, and 53 skunks (Table 1). Rabies specimens were submitted from 71 (of 75) counties, with positive results in 30 counties, which represent all five public health regions. The occurrence of rabies positive specimens was January through December, peaking in April and again in July/August.

Central Arkansas continued to see terrestrial rabies in areas that historically have not had documented cases. Pulaski County submitted the most specimens of any county in 2015 with 174 specimens submitted for testing. Of the specimens submitted from Pulaski County, 12 were positive (6.9% positive), including nine skunks and three bats. Pulaski County had not had positive specimens from terrestrial animals from approximately 1980 until 2013. Garland County, two counties southwest of Pulaski County, submitted 71 animals for testing, with nine positive specimens (12.7%), of which five were skunks and four were bats.

Animals testing positive for rabies in 2015 exposed 381 domestic animals, including 73 dogs, 7 cats, and 301 cattle. The State Public Health Veterinarian and the Zoonotic Epidemiologist coordinated positive rabies follow-up, including the quarantines for domestic animals and the risk assessment of people exposed to rabid animals. The State Public Health Veterinarian coordinated the recommendation for PEP. Twenty-seven ADH Environmental Health Specialists (EHS) conducted quarantine monitoring in 31 instances of animal exposures throughout the year.

## **Data Limitations**

The data collected on rabies is from a passive surveillance system. The data is dependent on informed veterinarians, animal control officers, and citizens submitting specimens of suspect animals. Surveillance is incomplete, and the incidence of rabies is underestimated. Increased awareness following public notification of positive results increases specimen submission, thereby increasing the sample size for testing.

**Table 1 Animals Tested for Rabies, AR 2015**

Animal type	Positive	Received*	% Positive	AR Positive Rabies/Year		
				Year	Positive	% Positive
Bat	16	156	10	2015	73	7
Skunk	53	127	42	2014	151	11
Cat	0	232	0	2013	152	12
Dog	1	335	< 1	2012	131	11
Fox	1	5	20	2011	60	7
Cow <sup>§</sup>	2	15	13	2010	34	4
Raccoon	0	73	0	2009	47	5
Other animals <sup>‡</sup>	0	49	0	2008	49	5
<b>Arkansas Total</b>	<b>73</b>	<b>992</b>	<b>7</b>	2007	33	4
Other States <sup>†</sup>	3	19	16	2006	34	4
Proficiency Tests	3	10	30	2005	36	4
<b>Total All Specimens</b>	<b>79</b>	<b>1021</b>	<b>8</b>			

\* Includes specimens determined unsatisfactory for testing.

§ Includes one cow residing in Arkansas, diagnosed positive in Oklahoma lab.

‡ Includes beaver (1), bobcat (1), chipmunk (1), coyote (3), donkey (2), goat (5), groundhog (1), horse (6), lion (1), mouse (2), muskrat (1), opossum (9), rabbit (2), rat (4), squirrel (8), sheep (1), swine (1).

† Includes two positives from Texas (1 cat, 1 skunk) and one positive from Oklahoma (1 skunk), among the submissions from Texas (9), Missouri (4) and Oklahoma (6)

## National Information

Over the last 100 years, rabies in the United States has changed dramatically. More than 90% of all animal cases reported annually to CDC now occur in wildlife; before 1960, the majority was in domestic animals. The principal rabies hosts today are wild carnivores and bats. All mammals are believed to be susceptible to infection, but major reservoirs are carnivores and bats. Although dogs are the main reservoir in developing countries, the epidemiology of the disease from one region or country to another differs enough to warrant the medical evaluation of all mammal bites. Bat bites anywhere in the world are a cause of concern and an indication for prophylaxis (JAVMA, 2014).

## Reporting and Analysis

Human and animal rabies are nationally notifiable conditions in the United States. Animal rabies surveillance is laboratory based, comprising 126 state health, agriculture, and university pathology laboratories performing the standard direct fluorescent antibody test for rabies diagnosis. During 2014, 53 reporting jurisdictions reported 6,034 rabid animals and one human rabies cases to the CDC, representing a 3.52% increase from the 5,398 rabid animals reported in 2013. (A 2.1% decrease from the 6,162 rabid animals and three human case reported in 2012). Ninety-three percent of reported rabid animals were wildlife. The CDC rabies program requests detailed information on animals submitted for rabies testing, as described. All states, with the exception of California, provided data on species, county, and date of testing or specimen collection for all animals submitted for rabies testing. Arkansas and eight other states (Idaho, Maryland, Massachusetts, Minnesota, New Jersey, South

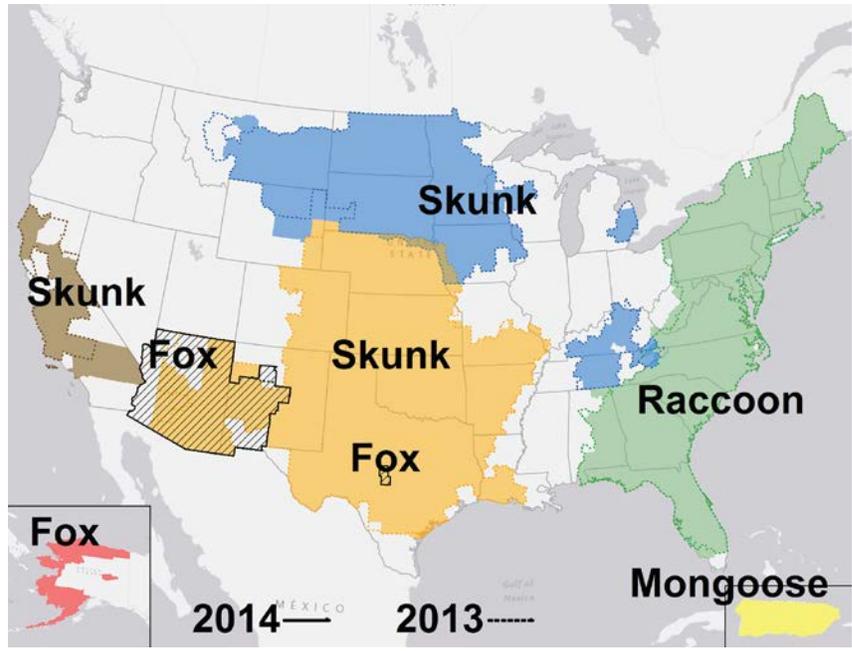
Dakota, Virginia, and West Virginia) transmitted electronic laboratory data for rabies diagnostic activity primarily through the Public Health Laboratory Information System.

### Natural Reservoirs

Wild animals account for approximately 93% of the rabid animals reported in 2014 in the United States. Figure 1 shows the distribution of major rabies virus variants

in the United States from 2008 to 2014. Nationally, there was an increase of 2.8% reported rabid wild animals from 2013. The wild animals reported (in order of decreasing frequency) with rabies were raccoons, bats, skunks, foxes, and other wild animals such as coyotes, bobcats, groundhogs and beaver. Seasonal trends for wild animals testing positive for rabies showed peaks in numbers in April, and again in September (JAVMA, 2016).

**Figure 1 Distribution of major rabies virus variants, U.S. and Puerto Rico, 2008-2014. Bat variants are widely distributed with their hosts.**



### Domestic Animals

Domestic animals accounted for approximately 7% of all rabid animals reported in 2014, a decrease from the 8% in 2013 (and 10% decrease from 2012). Cats accounted for 61% of rabid domestic animals in 2014 and have represented the majority of rabid domestic animals since 1992 (JAVMA, 2016). The domestic animals reported (in order of decreasing frequency) with rabies were cats, cattle, dogs, mules and horses, sheep and goats.

In 2007, the United States was declared free of the canine variant of rabies, which means there no longer is dog-to-dog transmission of rabies in our country. However, dogs can still get rabies from one of the reservoir species. This was achieved through implementation of dog vaccination and licensing, and stray dog control. This current canine-free status is fragile and highlights the need to continue rabies prevention, control and surveillance.

### Human Rabies in the United States

In 2014, 16 states submitted 19 human specimens for testing, with one human case of rabies diagnosed in the US. This one fatal human case occurred in Missouri, and had potential contact with two Arkansas residents. ADH interviewed the potential contacts and determined there was no risk of transmission. 37 human cases have been diagnosed since 2003 in the United States. Of those 37 cases, 10 were

infected outside of the US and 27 of the patients acquired rabies domestically. Of the domestically acquired cases, 67 percent (18/27) of those cases were infected with a bat variant, most likely after exposure to a bat (bite/contact), although four of these had no known history of bat exposure or any animal bites. Five of 27 human cases in the US resulted from two incidents of harvesting organs from infected donors (one donor had a bat variant, the other had raccoon variant). Two of the 27 cases were infected with raccoon variant rabies, neither with no known exposure. The other two cases, of the 27, was a mongoose variant in Puerto Rico, and one with unknown variant of rabies. Three patients of the 27 US human cases have survived a known rabies infection; two after contact or bite from a bat, and one survivor of an unknown exposure and unknown variant.

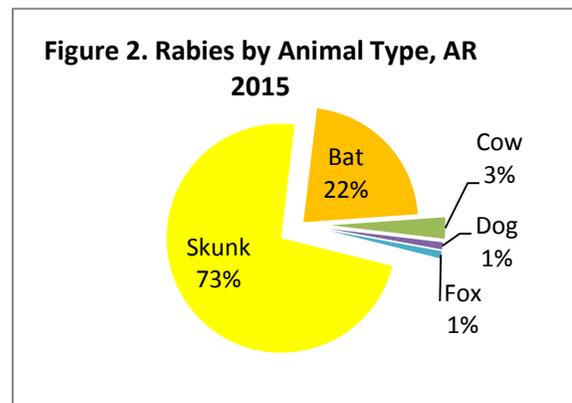
### Rabies in Canada and Mexico

Canada reported 92 laboratory-confirmed rabid animals during 2014. Wildlife was the most common rabid animals, representing 88 percent all rabid animals.

No human deaths associated with rabies were reported in Mexico during 2013 (first time since 1938), which is the latest year available for Mexico. Eleven rabid dogs were reported in 2013, representing an eight percent decrease from the 12 reported in 2012.

### Rabies Activity in Arkansas, 2015

The Arkansas Department of Health (ADH) received 1,021 specimens for rabies testing (992 originating in Arkansas) in 2015. Of these, 72 specimens tested positive for rabies from Arkansas submissions (7.4% of submitted specimens). Additionally, one cow, residing in Arkansas, was submitted and tested positive at an Oklahoma lab. This gives a total of 73 positive rabies cases from animals originating in Arkansas in 2015. The mean number of positive rabies from 1990-2015 is 47 (min. 29, max. 152). Wild animals accounted for 96% positive tested animals in 2015 in Arkansas, which is slightly higher than the national average of 93% reported to CDC in 2014 (JAVMA, 2016).



The positive results from animals originating in Arkansas included 53 skunks, 16 bats, two cattle, one dog, and one fox (Table 1). Skunks accounted for 73% of all positive rabies specimens (Figure 2). Rabies specimens were submitted from 71 counties, with positive results in 30 counties, which represent all five public health regions (Figure 3). The occurrence of rabies positive specimens was January through December, with bimodal peaks in April and July/August (Figure 7).

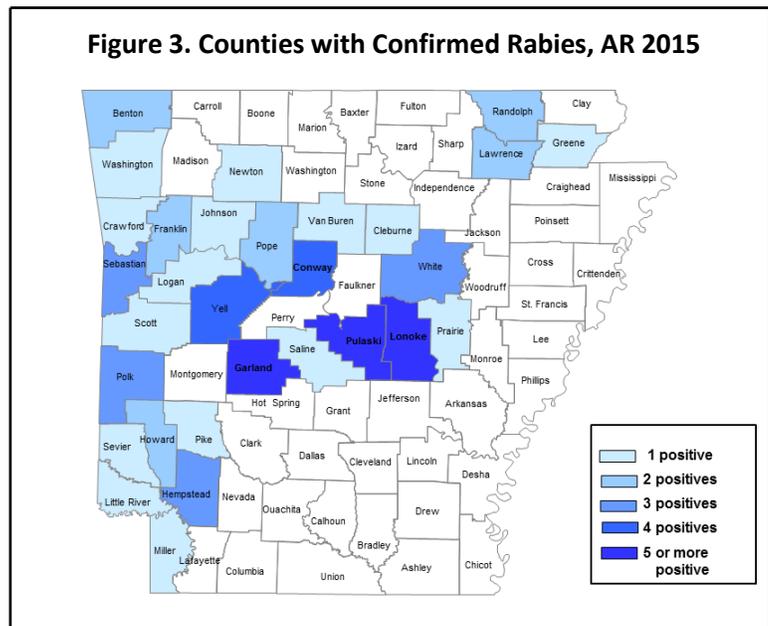
The Arkansas Department of Health Laboratory received specimens from four other states for rabies testing; Table 2 provides information on Rabies specimen submission by state in 2015.

**Table 2. Rabies Specimen Submission by State, AR 2015**

State	Animal	Positive	Negative	Not Tested	Total Submitted	Positive Rate %
Arkansas	Bat	16	127	13	156	10
	Beaver		1		1	0
	Bobcat		1		1	0
	Cat		232		232	0
	Chipmunk		1		1	0
	Cow	2	14		16	13
	Coyote		2	1	3	0
	Dog	1	329	5	335	<1
	Donkey		1		1	0
	Fox	1	4		5	20
	Goat		5		5	0
	Ground hog		1		1	0
	Horse		6		6	0
	Lion		1		1	0
	Mouse		1	1	2	0
	Muskrat		1		1	0
	Opossum		7	2	9	0
	Rabbit		2		2	0
	Raccoon		73		73	0
	Sheep		1		1	0
	Rat		3	1	4	0
	Skunk	53	70	4	127	42
	Squirrel		8		8	0
Swine		1		1	0	
<b>AR Total</b>		<b>73</b>	<b>892</b>	<b>27</b>	<b>992</b>	<b>7</b>
Missouri	Cat		2		2	0
	Dog		2		2	0
<b>MO Total</b>			<b>4</b>		<b>4</b>	<b>0</b>
Oklahoma	Cat		4		4	0
	Dog		1		1	0
	Skunk	1			1	100
<b>OK Total</b>		<b>1</b>	<b>5</b>		<b>6</b>	<b>17</b>
Texas	Bat		1		1	0
	Cat	1	2		3	33
	Cow		1		1	0
	Dog		1		1	0
	Horse		2		2	0
	Skunk	1			1	100
<b>TX Total</b>		<b>2</b>	<b>7</b>		<b>9</b>	<b>25</b>
<b>Grand Total</b>		<b>76</b>	<b>908</b>	<b>27</b>	<b>1011</b>	<b>8</b>

There were at least 381 domestic animals known to have been exposed to rabies in Arkansas in 2015. Of those animals exposed, 73 were dogs, 7 cats, and 301 cattle. More than 20 animals were known to be euthanized in 11 separate instances of exposure.

The State Public Health Veterinarian and the Zoonotic Epidemiologist coordinated all instances of positive rabies follow-up including the coordination of quarantines for domestic animals. The determination of risk of humans exposed to rabid animals and the recommendation for post exposure prophylaxis was coordinated by the State Public Health Veterinarian. ADH Environmental Health Specialists (EHS) conducted quarantine monitoring in 74 instances of exposure throughout the year. There were 27 quarantines in the Central public health region, 25 in the Northwest Public Health Region, nine in the Northeast Public Health Region, one in the Southeast Public Health Region, and 12 in the Southwest Public Health Region.



All known exposed domestic animals were categorized regarding their rabies vaccinations:

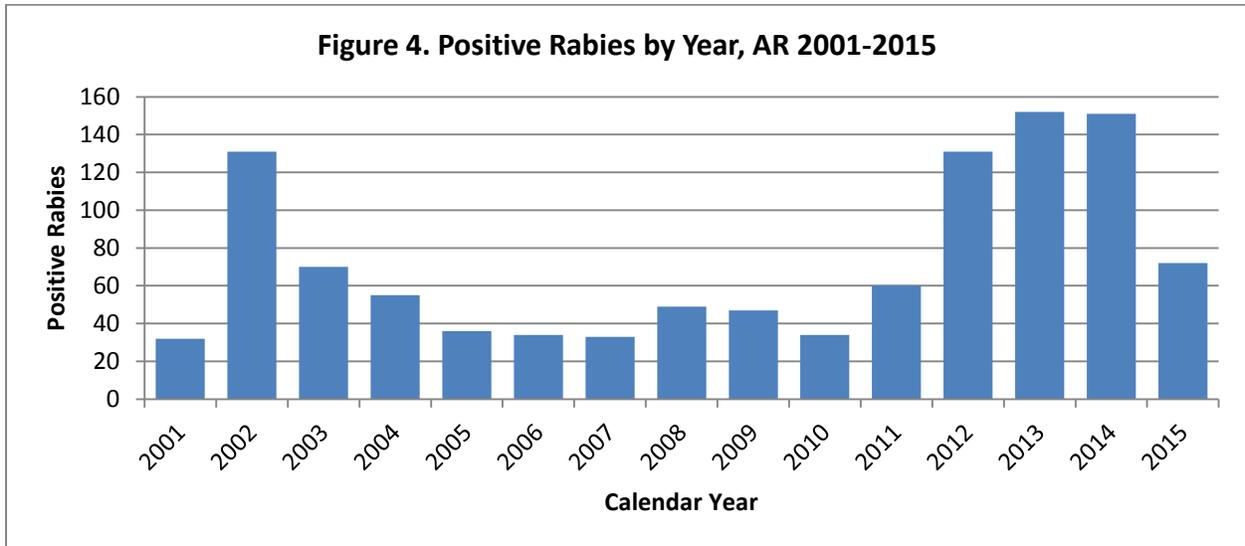
- Current, as documented by a licensed veterinarian for the dogs and cats (as required by state law)
- Out-of-date or vaccinated with an over-the-counter vaccine (OTC), i.e. having some previous rabies vaccine in the past
- Never vaccinated

The animals identified as potentially exposed to rabies included 73 dogs, of which 20 were current on vaccinations (27.4%), 23 were either out of date or had an OTC vaccine (31.5%), and 30 had never been vaccinated (46.1%). Of the dogs that were identified at risk, 19 (26.0%) were euthanized. Seven cats that were identified at risk, only three were current on vaccinations (42.9%), three had either out-of-date or OTC vaccines (42.9%), and one had never been vaccinated (14.3%). Of the cats that were identified at risk, one (14.3%) was euthanized. Three hundred and one cattle were identified at risk (which included 101 calves), none of which were previously vaccinated. All cattle were monitored under quarantine, and eventually released.

### Comparison to Previous Years

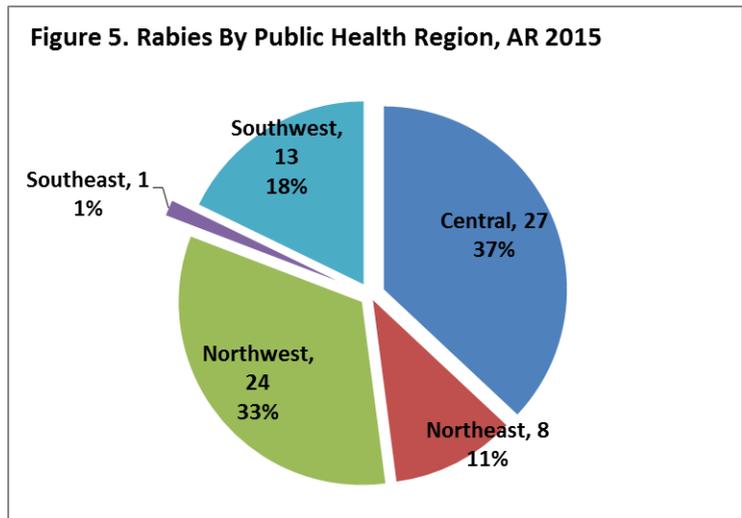
Wild animals accounted for 96% positive tested animals in Arkansas, which is slightly higher than the national average of 93%. Skunks accounted for 73% of all animals positive for rabies 2015 (Figure 2) and 76% of all positive wild animals.

The 73 positive rabies cases in 2015 were closer to the 15 year average of 59 cases/year after three consecutive years of significantly increased incidence. (Figure 4). Positive results for rabies occurred throughout the calendar year, peaking in April and again in July/August (Figure 7).



### Geographic Distribution of Rabies

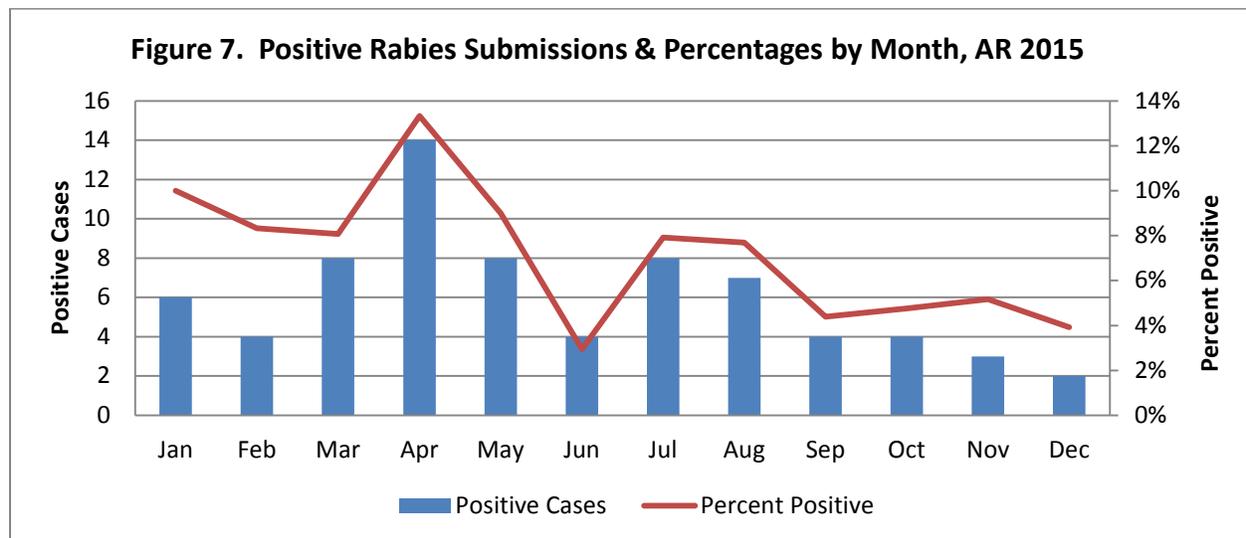
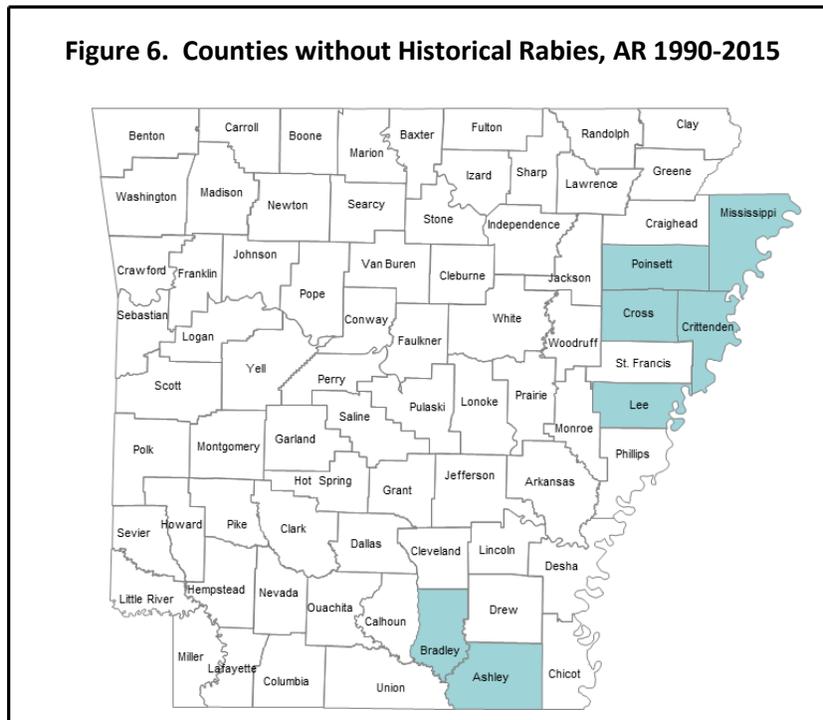
The occurrence of rabies in Arkansas has not been equally distributed across the state. Historically, the majority of rabies cases in Arkansas were located in the northwest portion of the state, until 2014, when 44 percent all positive rabies cases were located in the Central Health Region, compared to 33 percent in the Northwest Region. This surge in rabies cases in the Central Health Region appears to be the tied to the appearance of rabies in terrestrial animals in 2013. Since 1980, Pulaski County had not had a positive specimen from a terrestrial animal. Then in 2013, there were seven positive skunks, and in 2014, 21 positive skunks in Pulaski County. In 2015 the Central Public Health Region continued to see a slight majority of the positive rabies cases over the Northwest region (Figure 5).



Pulaski County submitted the most specimens of any county in 2015 with 174 specimens submitted for testing. Of the specimens submitted from Pulaski County, 12 were positive (6.9% positive), including nine skunks and three bats.

Historically, seven counties in Arkansas (Ashley, Bradley, Crittenden, Cross, Lee, Mississippi, and Poinsett) have not had any positive rabies since at least 1990 (Figure 6). Those counties, located on the eastern and southeastern portion of the state, traditionally also have very low submission rates as well. Lincoln County previously had not reported any cases of rabies but in 2014 recorded their first positive rabies, a bat.

Submission of specimens is a passive surveillance system and a possible complicating factor could be low submissions from these counties. Table 3 provides a summary of positive rabies by public health region and county in Arkansas in 2015. Figure 7 represents positive rabies by month.

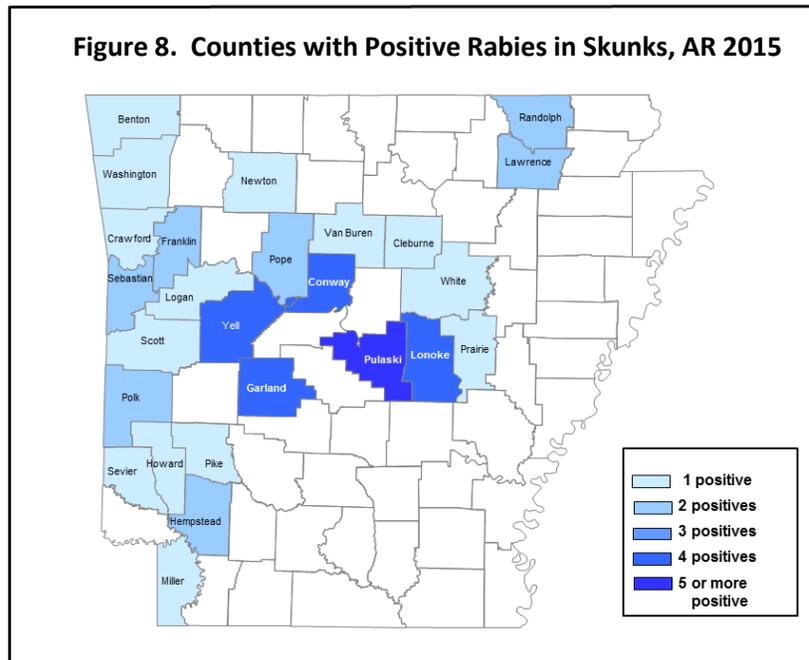


**Table 3. Positive Rabies Submissions by Public Health Region and County, Arkansas 2015**

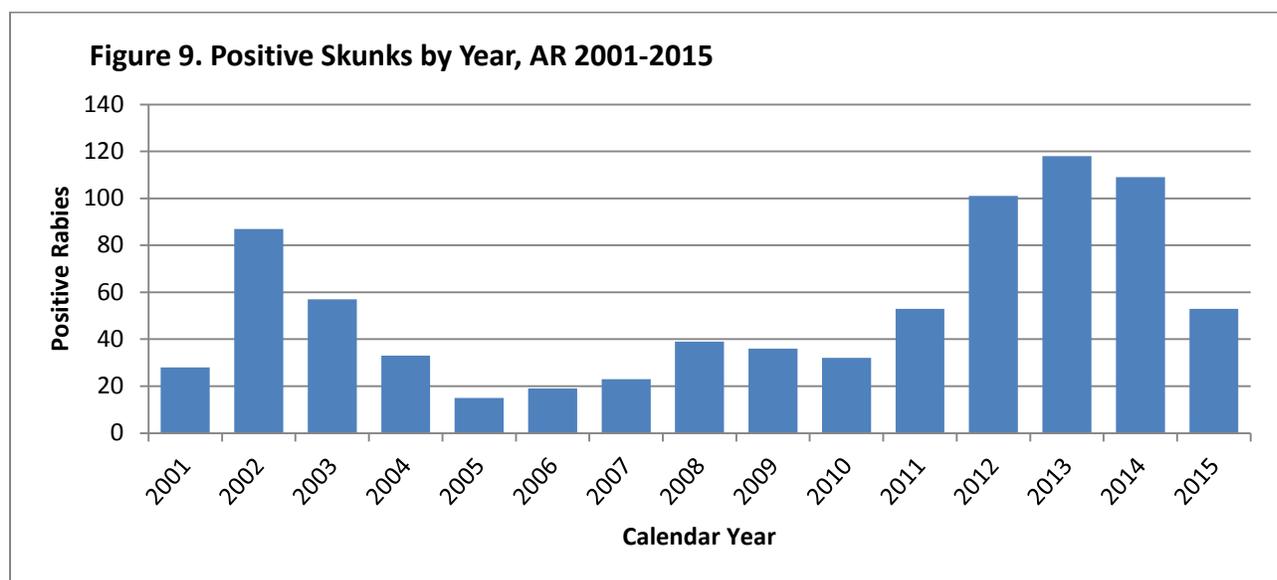
Public Health Region	County	Bat	Cat	Cow	Dog	Fox	Skunk	Total
Central Public Health Region	Garland	5					4	9
	Lonoke	1					4	5
	Pulaski	3					9	12
	Saline	1						1
Northeast Public Health Region	Cleburne						1	1
	Greene	1						1
	Lawrence						2	2
	Randolph						2	2
	White	1			1		1	3
Northwest Public Health Region	Benton			1			1	2
	Conway						4	4
	Crawford						1	1
	Franklin						2	2
	Johnson	1						1
	Logan						1	1
	Newton						1	1
	Pope						2	2
	Scott						1	1
	Sebastian	1					2	3
	Van Buren						1	1
	Washington						1	1
	Yell						4	4
Southeast Public Health Region	Prairie						1	1
Southwest Public Health Region	Hempstead			1			2	3
	Howard	1					1	2
	Little River	1						1
	Miller						1	1
	Pike						1	1
	Polk					1	2	3
	Sevier						1	1
<b>Statewide Total</b>		16	0	2	1	1	53	73

### Positive Rabies Analysis by Animal Type: Skunks

There were 53 rabies positive skunks reported by the Arkansas Department of Health in 2015. One hundred and twenty-seven skunks were submitted for testing for a positivity rate of 42%. The highest concentration of positive skunks were found in the central part of the state, including Pulaski County, an area that before 2013 had not had a positive case since at least 1990 (Figure 8). The mean number of positive skunk cases from 2000-2015 is 54 (range 15 to 118), so 2015 is near average, a significant decrease from 2013 and 2014 which saw the highest and second highest number of positive skunks in recent history (Figure 9). The geographical range of reported positive skunks also has decreased from 30 counties in 2014 to 26 counties in 2015.

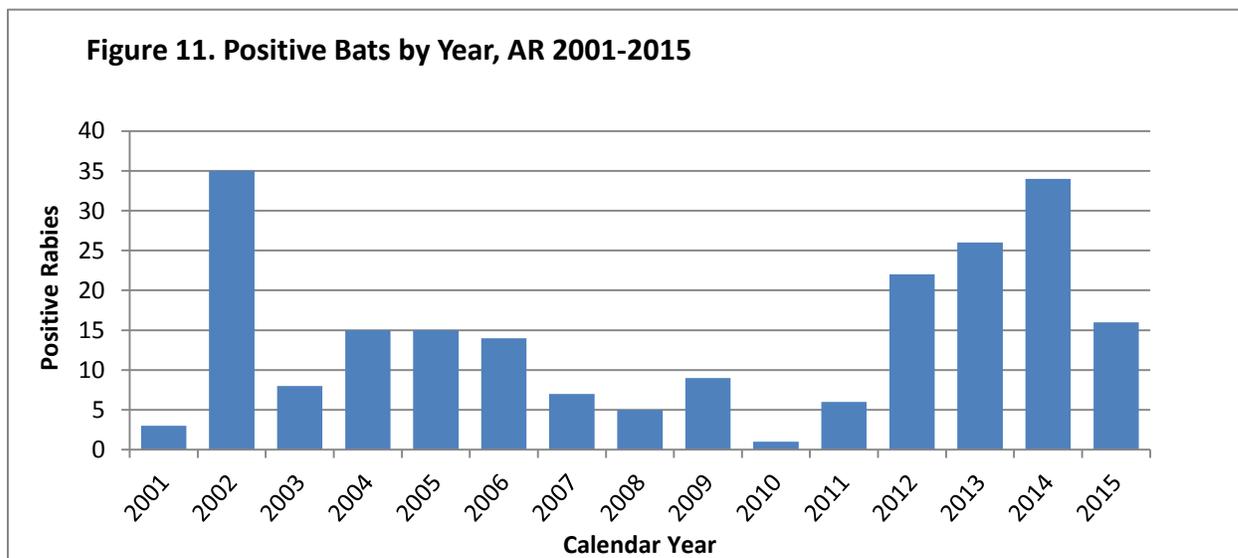
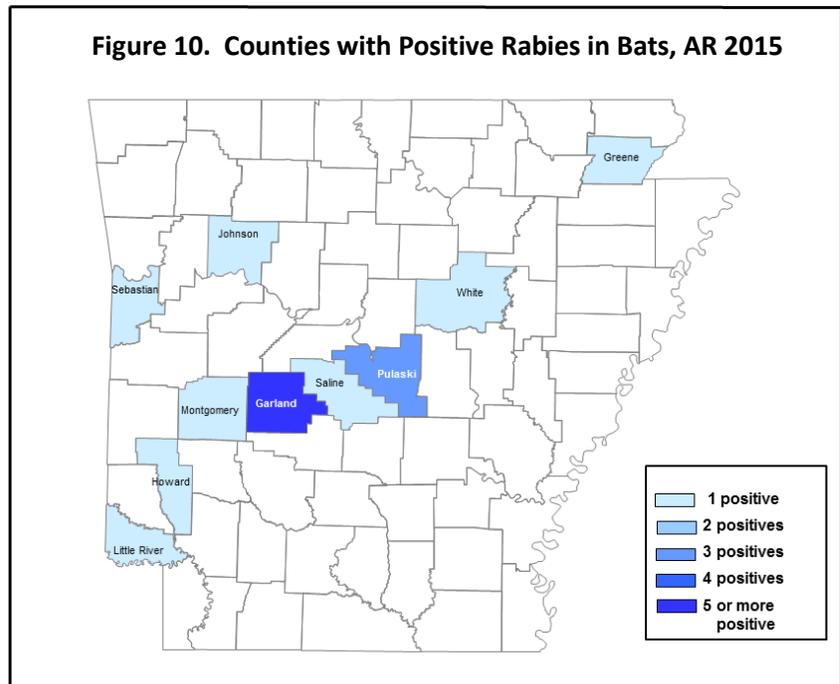


Four people were identified as having a potential exposure to rabid skunks in 2015. All four individuals received rabies Post Exposure Prophylaxis (PEP), following recommendations of the State Public Health Veterinarian.



### Positive Rabies Analysis by Animal Type: Bats

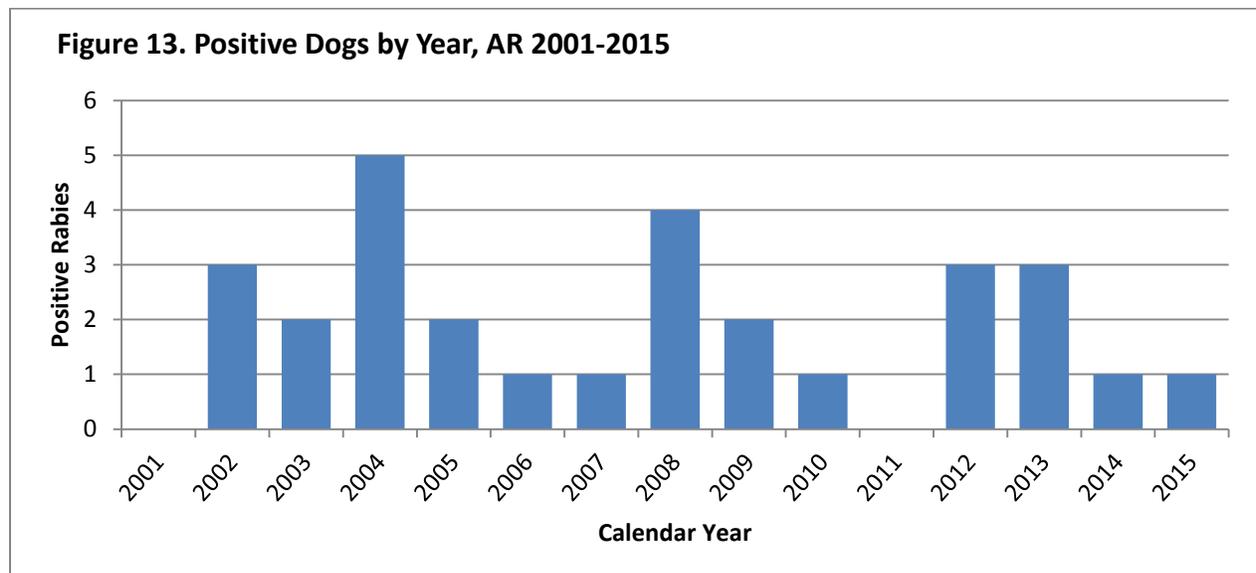
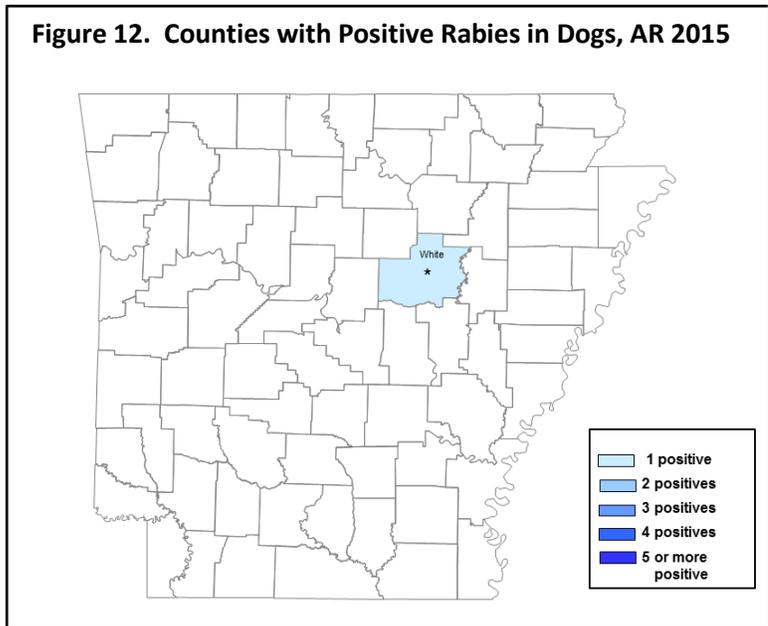
The 16 rabies positive bats reported to the Arkansas Department of Health in 2015 was a decrease from the 34 positives in 2014. The 16 confirmed cases were spread over 10 counties with the majority coming from the central health region (Figure 10). One hundred and fifty-six were submitted for testing in 2015, with a positivity rate (positive/submitted) of 10% compared to 13% in 2014. The mean number of cases reported from 2001 to 2015 is 14 (range 1 to 350). (Figure 11).



### Positive Rabies Analysis by Animal Type: Dogs

One rabies positive dog was reported to the Arkansas Department of Health in 2015. The previous year also had one rabies positive dog. The mean number of cases reported from 2001 to 2015 was 2 (range 0 to 5) Figure 13. The 2015 case originated in White county. (Figure 12)

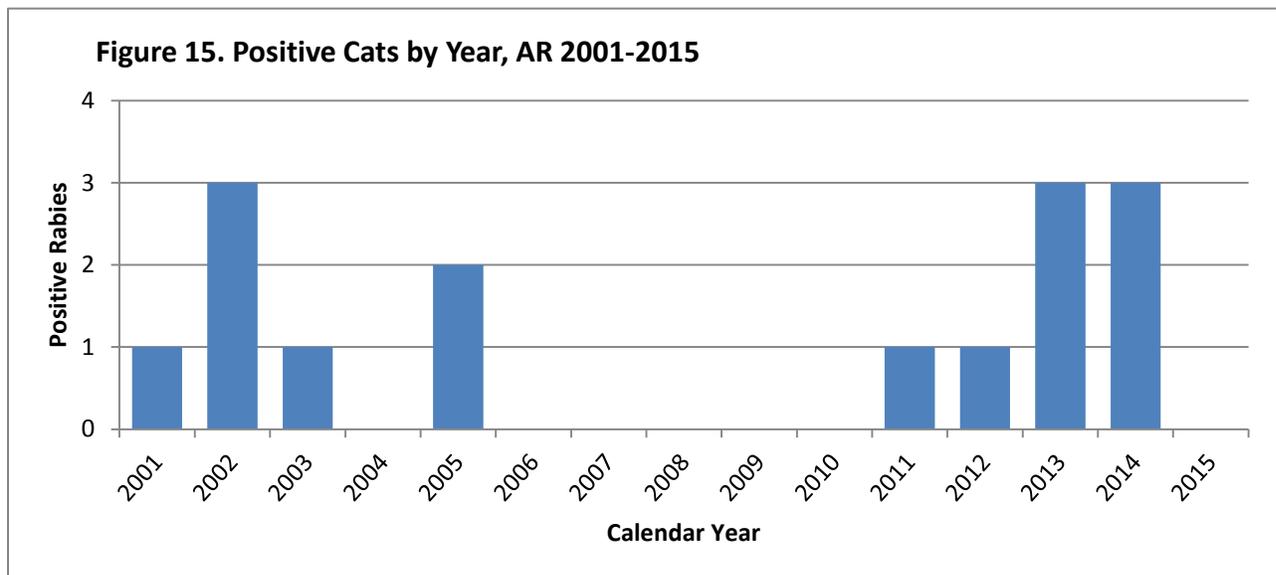
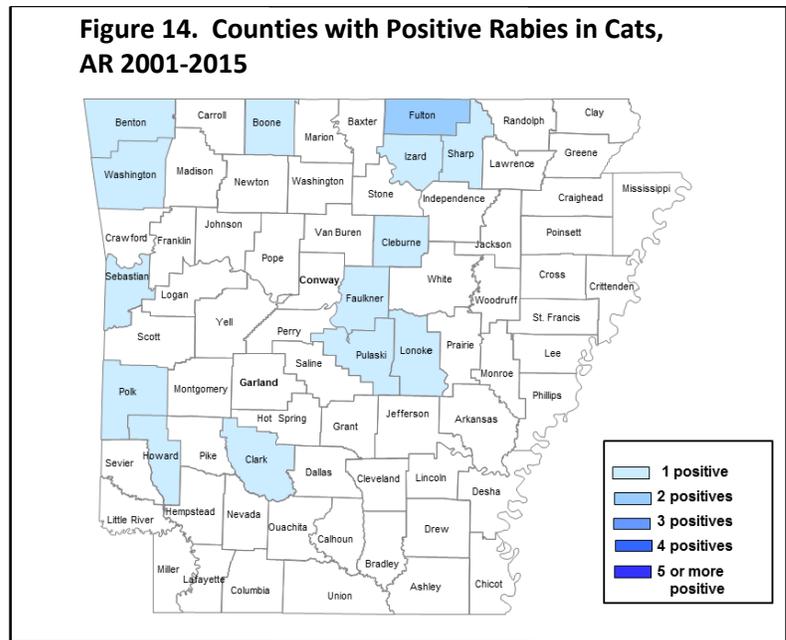
- Three hundred and thirty-five dogs were submitted for testing in 2015, with one positive (positivity rate of <1%).
- Seventy-three domestic dogs were known to be exposed to rabies by other animals, 20 of which were current on rabies vaccination. The rabies vaccination rate of exposed dogs was approximately 27 percent, a slight decrease from the 33% of 2014.
- Thirteen people were potentially exposed to the rabid dog in 2015, of which nine completed rabies PEP, following recommendations of the State Public Health Veterinarian.
- *It is important to note that domestic animals with rabies historically expose a much larger human population than rabid wild animals.*



### Positive Rabies Analysis by Animal Type: Cats

There were no positive rabies in cats reported to the Arkansas Department of Health in 2015. The mean number of cases reported from 2001 to 2015 is one (range 0 to 3) (Figure 15).

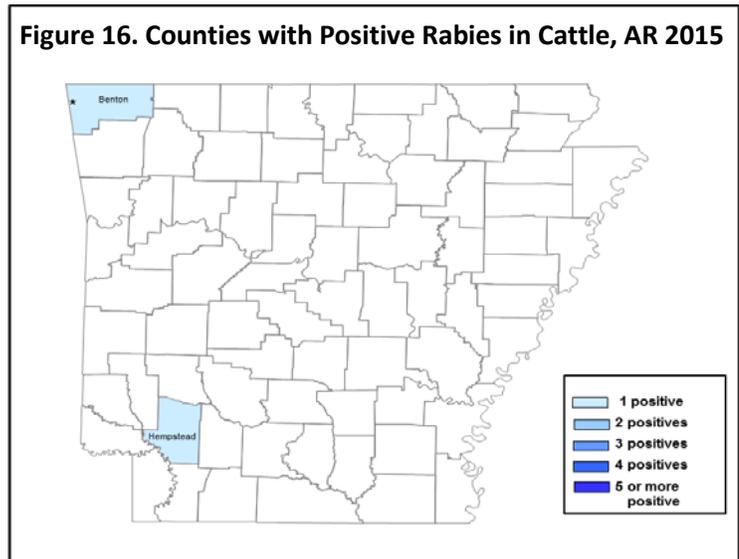
- Two hundred and thirty-two cats were submitted for testing in 2015, with no positives.
- Seven domestic cats were known to be exposed to rabies by other animals. Three of the exposed seven were current on rabies vaccine (43%), three were out-of-date or had received OTC vaccines (43%), and one had never been vaccinated for rabies (14%). The one cat never vaccinated was euthanized.
- No people were exposed to positive rabies cats for 2015.
- *It is important to note that domestic animals with rabies historically expose a much larger human population than rabid wild animals.*



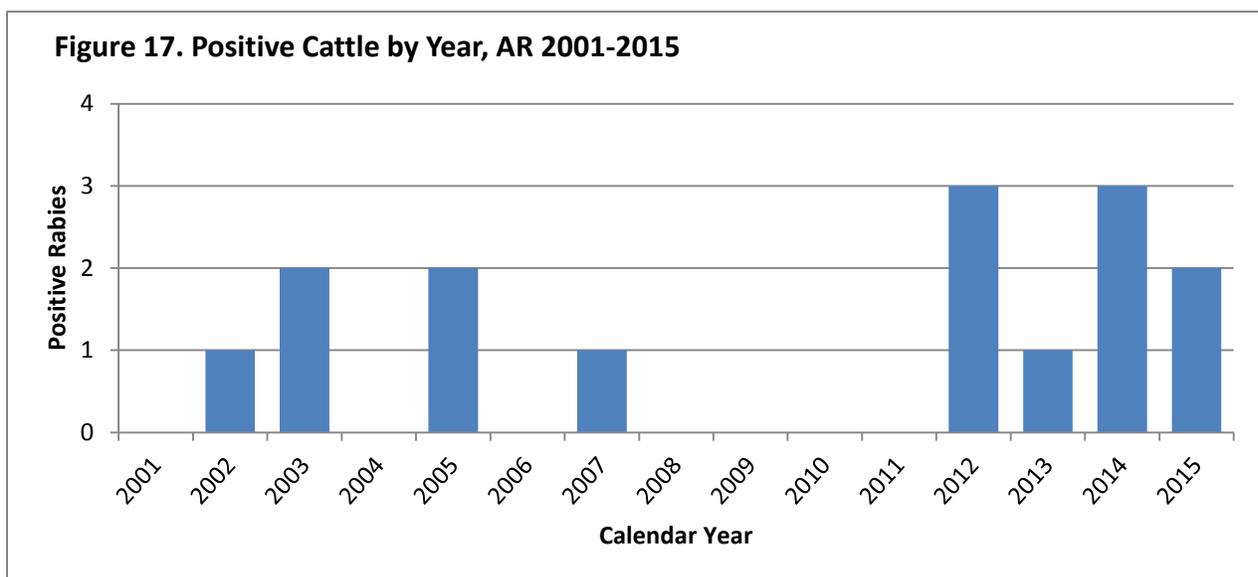
## Positive Rabies Analysis by Animal Type: Cattle

There were two cases of positive rabies in cattle reported to the Arkansas Department of Health in 2015. One cow resided in Benton County Arkansas, but rabies was tested, and confirmed, in an Oklahoma lab and reported to the ADH. The other cow was from Hempstead County (Figure 16). The mean number of cases reported from 2000 to 2015 is one (range 0 to 3) (Figure 17).

- Sixteen cattle were submitted for testing in 2015, with two positives (positivity rate of 13%). Three hundred and one additional cattle were potentially exposed to rabies by other animals in Benton and Hempstead counties (which includes 101 calves). None of the exposed cattle had been previously vaccinated for rabies. All potentially exposed cattle were monitored and released after the quarantine period.



- Six people were exposed to the rabid cattle. Two of those six were pre-vaccinated veterinarians. Of the remaining four human exposures, all elected to undergo rabies PEP, following recommendations of the State Public Health Veterinarian. Two additional people sought PEP as a precaution.
- *It is important to note that domestic animals with rabies historically expose a much larger human population than rabid wild animals.*



### Positive Rabies Analysis by Animal Type: Foxes

The number of positive rabies in foxes reported to the Arkansas Department of Health in 2015 was one, the same as 2014. (Figure 18). Prior to 2014, the most recent positive fox with rabies was in 2007. The mean number of cases reported from 2000 to 2014 is less than one (range 0 to 2) (Figure 19).

- Five foxes were submitted for testing in 2015, with one positive (positivity rate of 20%).
- Two dogs were identified as being potentially exposed to the rabid fox, both were current on rabies vaccines.

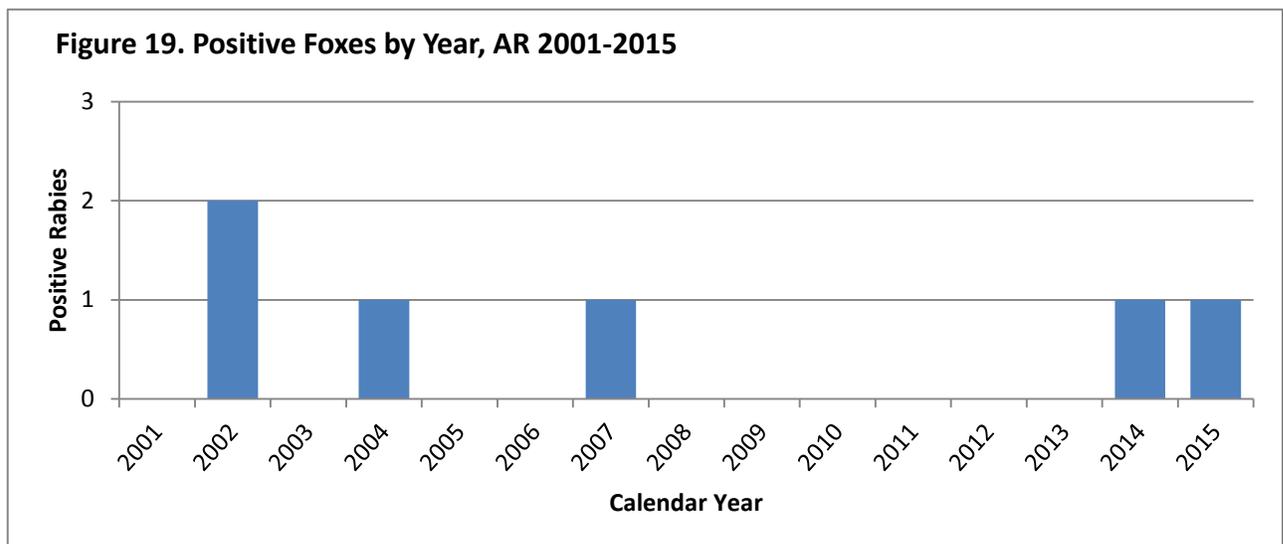
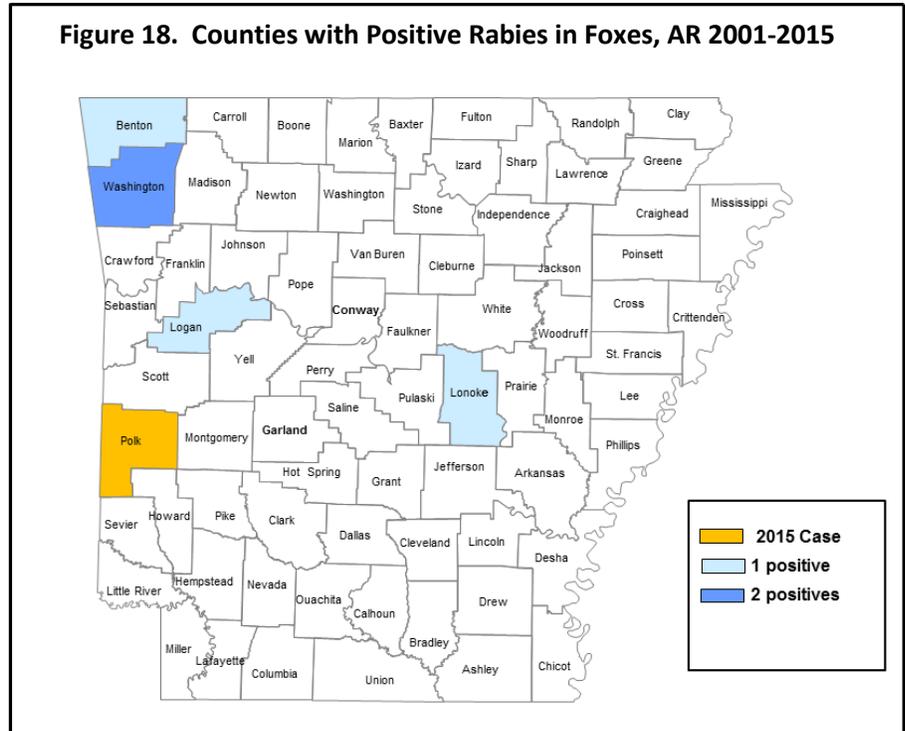


Figure 20. Positive Rabies in Arkansas, 2015

