

Each year the Texas Department of State Health Services (DSHS), in conjunction with Texas AgriLife Extension/Wildlife Services and occasionally other agencies, collects samples from wildlife for plague (the bacterium *Yersinia pestis*) testing. Samples are collected primarily from carnivores using Nobuto blood filter strips in the course of predator-control actions or as part of targeted surveillance efforts for plague and other zoonotic diseases. Although most carnivores are resistant to plague, they develop antibodies when exposed to *Y. pestis*, thereby making them good indicators of plague activity within their territories. Animal and arthropod surveillance results indicate that there are natural reservoirs for the plague organism in much of the state.

Plague, which occurs naturally in Texas, can cause severe human disease and death. Clinical- or laboratory-confirmed cases in animals or humans are reportable to DSHS. Surveillance for plague enables DSHS to alert physicians and veterinarians to be vigilant for signs of the disease in their patients when increased plague activity is detected in wildlife. *Y. pestis* can be used as a bioterrorism weapon and unusual plague activity related to its use as a weapon can be recognized more easily if natural disease occurrence is well characterized.

Plague in Humans

There were no reported human cases of plague in Texas during 2016.

Plague in Animals

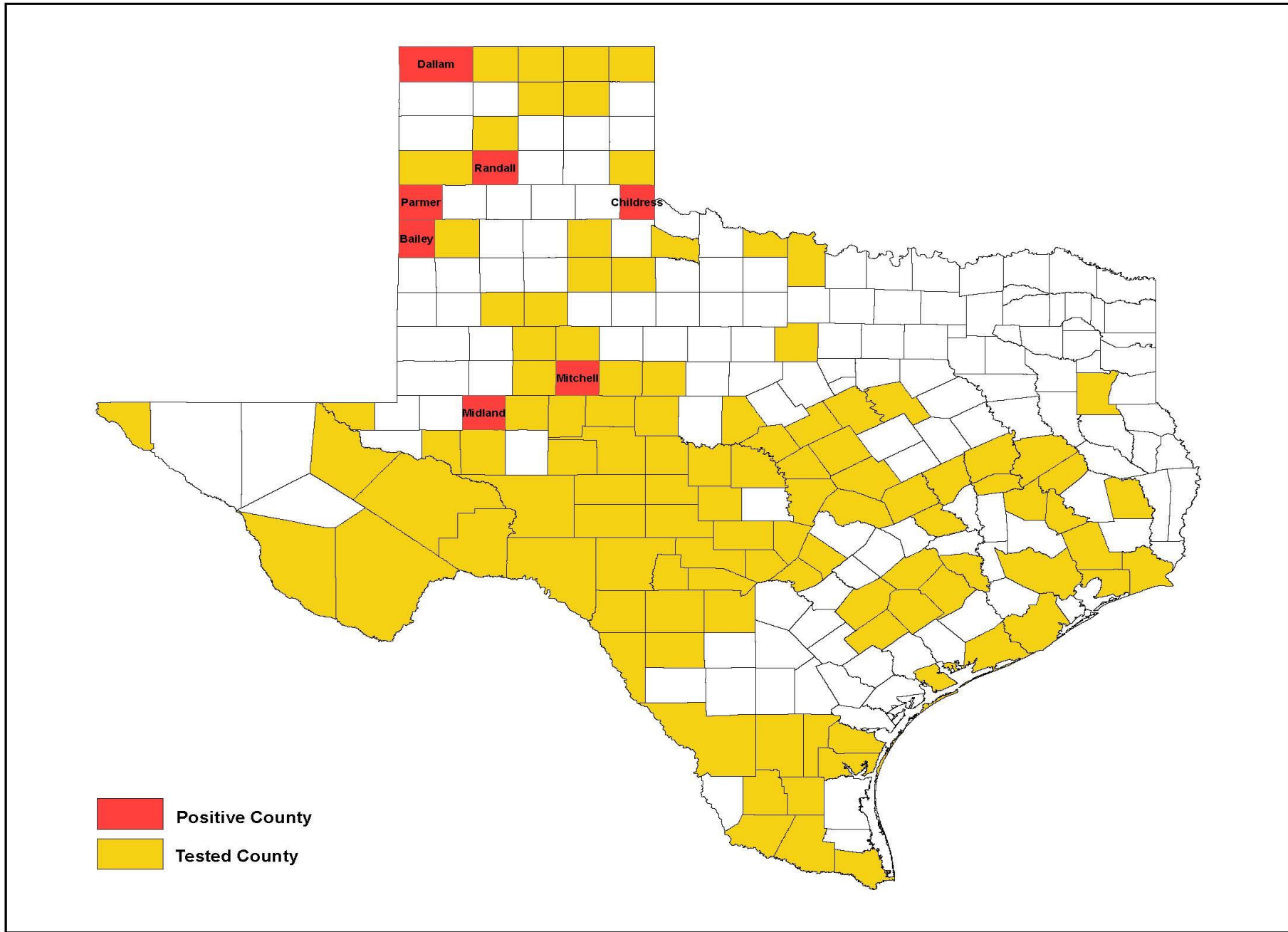
Statewide, 1,115 animals collected from 114 counties (45% of Texas' 254 counties) during calendar year 2016 were submitted to various laboratories for plague testing. The DSHS Laboratory Services Section received Nobuto strip samples from 1,111 of these animals for serologic testing, of which 1,028 samples (92.5%) from 113 counties were tested; 83 of the samples (7.5%) were not tested due to specimen damage, insufficient specimen quantity, missing specimen, or limited supplies of laboratory reagents. Plague antibodies at a titer of $\geq 1:32$, which indicates probable exposure to *Y. pestis*, were reported for 19 Nobuto samples (1.8% of those tested) collected from 5 counties; 3 fleas from a single county were tested by the U.S. Geological Survey National Wildlife Health Center laboratory in Madison, Wisconsin, and were positive for plague by polymerase chain reaction (PCR); and a single rodent was tested by the El Paso City LRN Laboratory and was positive for plague by both culture and PCR (Table 1). Out of the 1,028 samples tested at DSHS, 1,009 samples (98.2%) were negative at a titer of $<1:32$ (Table 2).

Table 1. Animals Positive for Plague by County and Titer, 2016

| County | Result | Coyote | Flea | Woodrat | Number Positive | Number Tested (County, All Species) | Percent Positive (County, All Species) |
|-------------------------------------|---------------|---------------|---------------|----------------|------------------------|--|---|
| Bailey | 1:128 | 1 | | | 6 | 10 | 60.0% |
| | 1:256 | 1 | | | | | |
| | 1:512 | 2 | | | | | |
| | 1:1024 | 1 | | | | | |
| | 1:2048 | 1 | | | | | |
| Childress | 1:1024 | 1 | | | 1 | 7 | 14.3% |
| Dallam | PCR+ | | 3 | | 3 | 3 | 100.0% |
| Midland | PCR+ | | | 1 | 1 | 8 | 12.5% |
| Mitchell | 1:128 | 1 | | | 1 | 5 | 20.0% |
| Parmer | 1:256 | 1 | | | 2 | 3 | 66.7% |
| | 1:512 | 1 | | | | | |
| Randall | 1:128 | 1 | | | 9 | 61 | 14.8% |
| | 1:256 | 3 | | | | | |
| | 1:512 | 3 | | | | | |
| | 1:2048 | 2 | | | | | |
| Number Positive (Statewide) | | 19 | 3 | 1 | 23 | | |
| Number Tested (Statewide) | | 748 | 3 | 1 | 1032 | | |
| Percent Positive (Statewide) | | 2.5% | 100.0% | 100.0% | 2.2% | | |

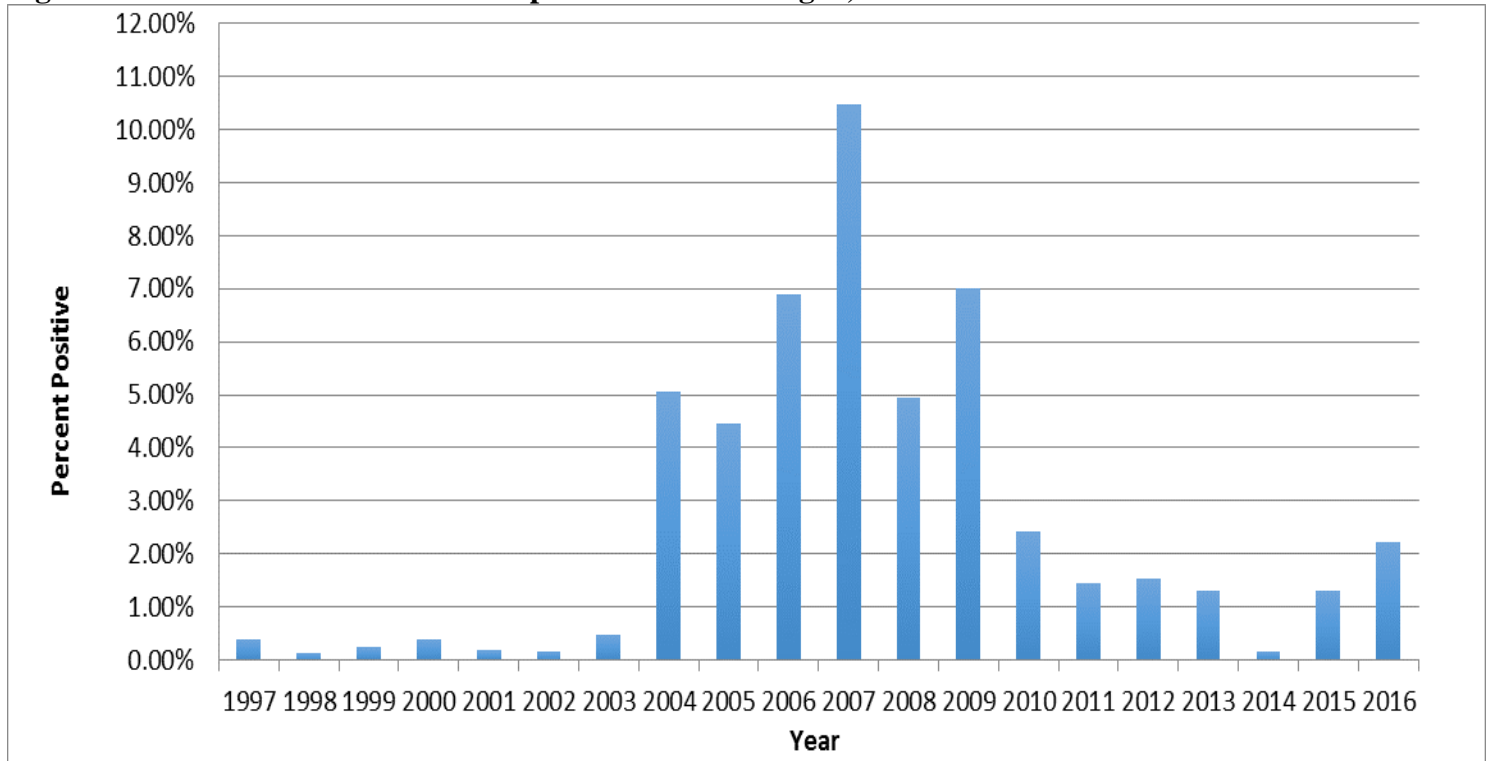
The geographic distribution by county of specimens tested and specimens testing positive for *Yersinia pestis* in 2016 is illustrated in Figure 1.

Figure 1. Counties Tested and Counties Positive for Plague, 2016



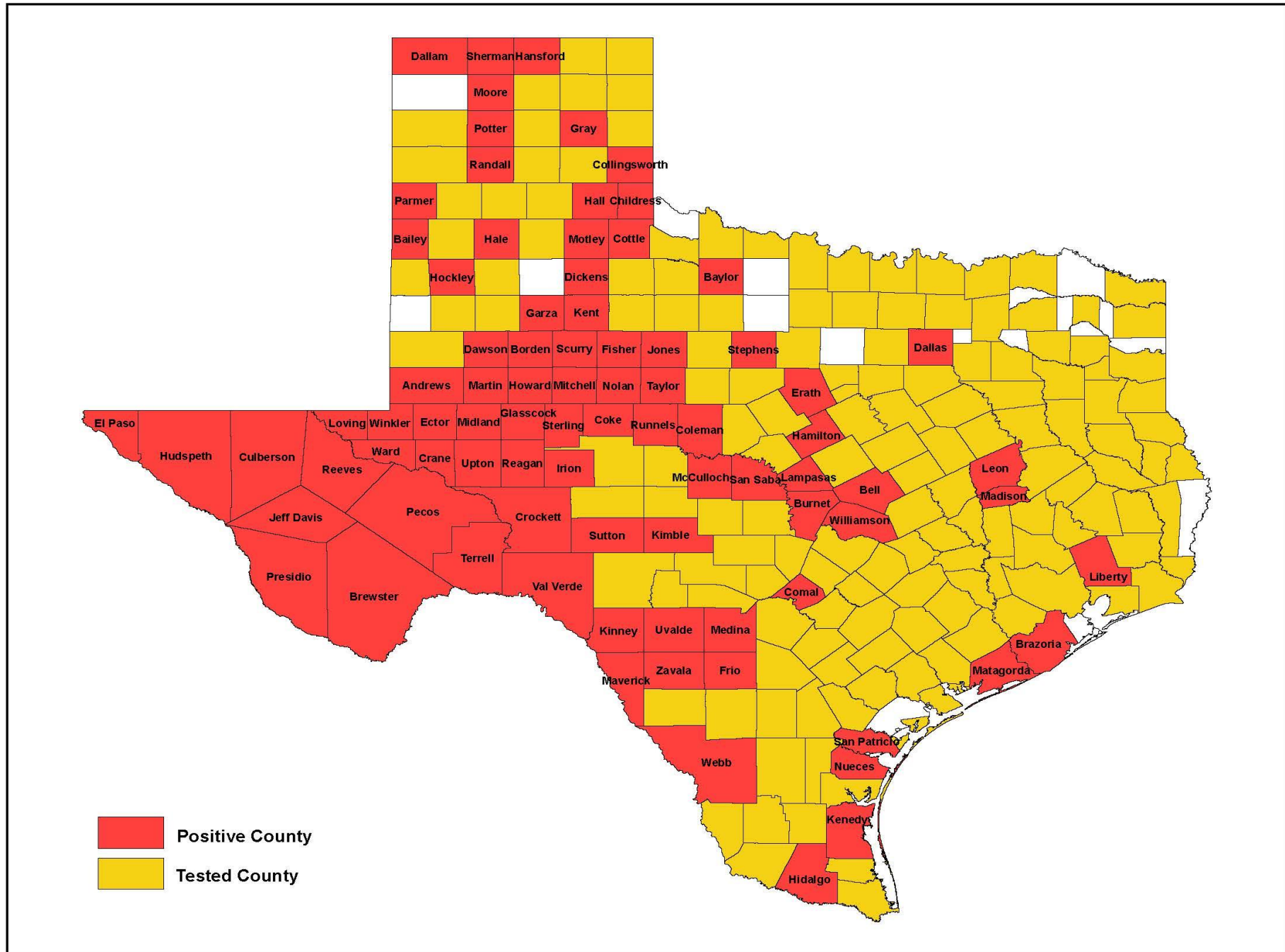
Comparing the percent of surveillance samples positive for plague during 2016 to the percent positive in the previous 19 years indicates a continuing overall lower level of detected plague activity from 2010-2016, as compared to 2004-2009 (Figure 2). Factors such as climate, changing ecosystems, predator activity, and host and flea population size and dynamics may affect the extent of plague transmission within wildlife populations. Differences in sampling rates and the species and locations sampled may also affect the detection of plague activity within wildlife populations.

Figure 2. Percent of Surveillance Samples Positive for Plague, 1997-2016



While plague is considered endemic in far west Texas and the Panhandle region, statewide surveillance demonstrates that there may be naturally occurring risk in all but the extreme eastern part of the state (Figure 3).

Figure 3. Counties Tested and Counties Positive for Plague, 1976-2016



By using educational materials, news releases, a public-access website, and conference presentations, DSHS personnel keep veterinarians, physicians, and the general public aware of the plague risk in Texas. Even in areas with historically low plague activity, infections may occur in hunters or campers who visit plague-endemic areas or in pets and wildlife transported from those areas. There is also a risk that new areas of infection may be established by moving animals across the state.

Table 2 shows the complete listing, by county and species, of samples that tested negative for plague in 2016.

Table 2. Animals Negative for Plague by County, 2016

| County | Bobcat | Coyote | Feral Hog | Gray Fox | Raccoon | Red Fox | Striped Skunk | Total |
|---------------|---------------|---------------|------------------|-----------------|----------------|----------------|----------------------|--------------|
| Austin | | 1 | | | | | | 1 |
| Bailey | | 4 | | | | | | 4 |
| Bell | | 10 | | | | | | 10 |
| Blanco | | | | 20 | | | | 20 |
| Borden | | 4 | | | | | | 4 |
| Bosque | 1 | 6 | | 1 | 1 | | | 9 |
| Brazoria | | 5 | | | | | | 5 |
| Brewster | | 10 | | 4 | | | | 14 |
| Brooks | | 3 | | | | | | 3 |
| Brown | | | | 1 | | | | 1 |
| Burleson | 1 | 4 | | | | | | 5 |
| Burnet | | 2 | | 1 | | | | 3 |
| Calhoun | 1 | 3 | | | | | | 4 |
| Cameron | | 4 | | | | | | 4 |
| Chambers | | 32 | | | | | | 32 |
| Childress | | 6 | | | | | | 6 |
| Clay | | 2 | | | | | | 2 |
| Coke | | | | 6 | | | | 6 |
| Collingsworth | | 1 | | | | | | 1 |
| Colorado | | 2 | | | | | | 2 |
| Comal | | 19 | | 2 | | | | 21 |
| Concho | | | | 4 | | | | 4 |
| Coryell | | 13 | 3 | | | | | 16 |
| Crane | | 2 | | | | | | 2 |
| Crockett | | 7 | | 4 | | | | 11 |
| Deaf Smith | | 5 | | | | | | 5 |
| DeWitt | | 5 | | | | | | 5 |
| Dickens | | 2 | | | | | | 2 |
| Duval | | 3 | | | | | | 3 |
| Edwards | 2 | 6 | | 1 | | | | 9 |
| El Paso | | 2 | | 4 | | | | 6 |
| Fayette | | 2 | | | | | | 2 |
| Foard | 1 | 3 | | | | | | 4 |
| Garza | | 2 | | | | | | 2 |
| Gillespie | | | | 1 | | | | 1 |

| County | Bobcat | Coyote | Feral Hog | Gray Fox | Raccoon | Red Fox | Striped Skunk | Total |
|---------------|---------------|---------------|------------------|-----------------|----------------|----------------|----------------------|--------------|
| Glasscock | | 7 | | | | | | 7 |
| Gonzales | | 3 | | | | | | 3 |
| Hamilton | | 7 | | | | | | 7 |
| Hansford | | 9 | | | | | | 9 |
| Harris | | 5 | | | | | | 5 |
| Hays | | 11 | | | | | | 11 |
| Hidalgo | | 14 | | | | | | 14 |
| Hill | | | 3 | | | | | 3 |
| Houston | | 9 | | | | | | 9 |
| Howard | | 2 | | | | | | 2 |
| Hutchinson | | 1 | | | | | | 1 |
| Irion | | | | 3 | | | | 3 |
| Jefferson | | 22 | | | | | | 22 |
| Jim Hogg | | 18 | | 2 | | | | 20 |
| Jim Wells | | 18 | | | | | | 18 |
| Kendall | | 1 | | 16 | | | | 17 |
| Kerr | | | | 3 | | | | 3 |
| Kimble | 3 | 13 | | 8 | 3 | | | 27 |
| King | | 1 | | | | | | 1 |
| Kinney | 6 | 6 | | 7 | 1 | | | 20 |
| Kleberg | | 1 | | | | | | 1 |
| Lamb | | 2 | | | | | | 2 |
| Lampasas | 2 | 21 | | 8 | 8 | 2 | 1 | 42 |
| Lavaca | | 3 | | | | | | 3 |
| Leon | | 33 | | | 1 | | | 34 |
| Liberty | 1 | | | | 3 | | | 4 |
| Lipscomb | | 14 | | | | | | 14 |
| Loving | | 3 | | | | | | 3 |
| Lynn | | 3 | | | | | | 3 |
| Madison | | 6 | | | | | | 6 |
| Mason | | 1 | | 1 | | | | 2 |
| Matagorda | | 8 | | | | | | 8 |
| Maverick | | 19 | | | | | | 19 |
| McCulloch | | | | 16 | | | | 16 |
| Medina | | 1 | | | | | | 1 |
| Menard | | 3 | | 1 | 1 | | | 5 |
| Midland | 1 | 5 | | 1 | | | | 7 |
| Milam | 1 | 3 | | | | | | 4 |
| Mills | | 1 | | 1 | | | | 2 |
| Mitchell | | 2 | | 2 | | | | 4 |
| Motley | | 16 | | | | | | 16 |
| Nolan | | 5 | | | | | | 5 |
| Nueces | | 2 | | | | | | 2 |

| County | Bobcat | Coyote | Feral Hog | Gray Fox | Raccoon | Red Fox | Striped Skunk | Total |
|---------------|---------------|---------------|------------------|-----------------|----------------|----------------|----------------------|--------------|
| Ochiltree | | 2 | | | | | | 2 |
| Palo Pinto | | 2 | 1 | | | | | 3 |
| Parmer | | 1 | | | | | | 1 |
| Pecos | | 20 | | 3 | | | | 23 |
| Potter | | 1 | | | | | | 1 |
| Presidio | | 9 | | 2 | | | | 11 |
| Randall | | 51 | | | | 1 | | 52 |
| Real | | 10 | | | | | | 10 |
| Reeves | | 1 | | | | | | 1 |
| Roberts | | 2 | | | | | | 2 |
| Robertson | | 3 | | | | | | 3 |
| Runnels | | 2 | | | | | | 2 |
| Rusk | | 3 | | | | | | 3 |
| San Jacinto | | 2 | | | | | | 2 |
| San Saba | | 7 | | 10 | | | | 17 |
| Schleicher | | | | 2 | | | | 2 |
| Scurry | | 4 | | | | | | 4 |
| Sherman | | 19 | | | | | | 19 |
| Starr | | 3 | | | | | | 3 |
| Sterling | | 18 | | 4 | | 4 | | 26 |
| Sutton | 2 | 5 | | 2 | 1 | | | 10 |
| Taylor | | 2 | | | | | | 2 |
| Terrell | | 2 | | 59 | | | | 61 |
| Tom Green | | 3 | | 3 | | | | 6 |
| Trinity | | 1 | | | | | | 1 |
| Tyler | | 8 | | | | | | 8 |
| Upton | | 30 | | 10 | | | | 40 |
| Uvalde | | 11 | | | | | | 11 |
| Val Verde | 1 | 2 | | 9 | | | | 12 |
| Walker | | 1 | | | | | | 1 |
| Webb | | 20 | | | | | | 20 |
| Wichita | | 1 | | | | | | 1 |
| Williamson | | 9 | | 1 | | | | 10 |
| Zavala | | 5 | | | | | | 5 |
| Total | 23 | 729 | 7 | 223 | 19 | 7 | 1 | 1,009 |