

Port Arthur News.
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REPORT ON
EAST TEXAS RARE BAT SURVEY: 1997

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East Texas Rare Bat Survey: 1997
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The East Texas Rare Bat Survey began in the spring of 1994 to document the current distribution and roost locations for the southeastern myotis (*Myotis austroriparius*) and Rafinesque's big-eared bat (*Corynorhinus rafinesquii*) in the forests of east Texas. Prior to 1994, the southeastern myotis (SEM) was reported from nine counties (Bowie, Panola, Newton, Tyler, Hardin, Liberty, Orange, Harris, and Montgomery) and the Rafinesque's big-eared bat (BEB) was known from eight counties (Marion, Nacogdoches, Sabine, Polk, Newton, Hardin, Montgomery and Liberty (Schmidly et.al., 1977; Schmidly, 1983; Schmidly, 1991; Davis and Schmidly, 1994)). It has since been determined that the BEB record for Montgomery County is an error (see discussion). Most of these records were based on specimen collections and information on roosts was very limited.

During the first year's survey, nine sites in seven counties were mist netted from May to August, and 41 SEM and 2 BEB were captured in three counties (Horner, 1995). Jasper County was a new county record for both species, and Walker County was also added for the BEB by Dr. Monte Thies from Sam Houston State University (Thies, 1994).

A more intensive summer effort in 1995 covering 27 counties resulted in the capture of 43 SEM in 6 counties and 27 BEBs in 5 counties (Horner and Mirowsky, 1996). Cass, Shelby, and Polk County records were added for the SEM, and San Jacinto and Trinity County records were added for the BEB. Roost searches and radio telemetry were used to locate three SEM roosts in live hollow trees (two were maternity roosts) and four BEB roosts (three in manmade structures, one in a live hollow tree, one known maternity roost).

In 1996, a one-year roost characterization study was initiated (Mirowsky and Horner, 1997). Mist netting was again conducted during the summer months resulting in the capture of 38 SEM and 6 BEB. Six new counties were added for the SEM (Houston, Marion, Sabine, Smith, Walker, and Wood), and one county (Harris) for the BEB. Additional county records reported during this year included Leon and Freestone Counties for the SEM (Walker et al, 1996) and for the BEB, Shelby County (Yancey and Jones, 1997) and San Augustine County (Brian Keeley, pers. comm.) were added. More significantly, however, was the discovery of 8 new SEM roosts (two were maternity roosts in live hollow trees, 6 seasonal roosts in manmade structures) and 3 new BEB roosts (one was a maternity roost in a manmade structure). Occasionally, a roost was temporally or spatially occupied by both species.

The objective of the 1997 field season was to monitor the known roosts of these two bat species in east Texas. This report summarizes the monitoring efforts, describes five newly discovered roosts, and further summarizes the county occurrence records and the current status of the species.

Methods

Most roosts had a designated person or agency responsible for monitoring. Roosts were monitored opportunistically and a standardized form was completed to record date, observer, species presence (estimated number if possible), and weather within the last 24 hours. Observers were instructed to be as unobtrusive as possible by minimizing people, noise, and time spent in the roost, and using red filters over light sources when necessary to observe dark spaces. Roosts were to be visited no more than once per month.

There was no organized effort to search for new roosts this year. However, during the past 3 years, many biologists and natural resource managers have been alerted to the need to report locations of discovered roosts. When a roost was located on public land, the location and descriptive information was recorded as precisely as possible. Roost characterization information collected included date of discovery, exact location, distance from a permanent water source, type (structure, tree, etc.), condition and description of roost, location of bats within the roost, surrounding vegetation, and the potential for disturbance, detection, or destruction. If a roost was reported on private property, state law requires the landowner's written permission to observe and record information, and exact location was not required.

Results

In 1997, ten roosts were added to our list of known roosts. Roosts 14-18 were newly discovered and Roosts 19-23 were previously known but had not been part of our monitoring efforts.

Roost 14 was reported from Village Creek State Park. An abandoned house just outside the Park property was donated to the Park, and when the house was inspected in February for possible relocation onto the Park, a small cluster of BEB was discovered roosting in the attic. One of the bats was previously banded from Roost 12, a summer maternity roost less than two miles away. A cluster with a banded bat was again observed in December. A solitary BEB was discovered in a new tree (Roost 15) at Martin Dies Jr. State Park in Jasper County in May while monitoring Roost 1. This is the second tree roost discovered in this park. A second tree roost (Roost 16) was also discovered on the Little Sandy Hunting and Fishing Club in October. The manager found the roost when the area was surveyed for oil exploration, and although positive identification of the bats using the roost has not yet been verified, the tree characteristics and number of bats in the roost indicate that it could be SEM. Since discovery, floods have precluded us from returning to make a positive identification. A solitary male SEM was netted from tree Roost 17 in July at Ratcliff Lake Recreation Area in Houston County. The specimen was not collected, but measurements and a photograph were taken. In November, a US Forest Service biologist reported observing several BEB roosting in a cement culvert (Roost 18) under a rural road in the Angelina National Forest. This location is less than 5 miles from maternity Roost 9. No bands were noted.

Roosts 19-22 were the SEM roosts previously discovered and reported by Walker et. al. (1996). These roosts were all cement box culverts along Interstate 45 in Leon and Freestone Counties. Roost 23 is in San Augustin County on private property, and although added to our list of known roosts, it was not monitored since permission was not granted. However, there

are photographs of BEB occupying the roost, and because it is a new county record, it has been added to our list.

Therefore, since the study began in 1994, 23 roosts have been discovered, documented, and characterized (Table 1, Figure 1). Of these, 11 roosts have contained only SEM, 10 have contained only BEBs, and 2 have had both species present.

Eleven roosts are in live hollow trees and 12 are in man-made structures. Of the tree roosts, 4 are in black gums (*Nyssa sylvatica*), 3 are water tupelos (*Nyssa aquatica*), 2 are in sweetgums (*Liquidambar styraciflua*), 1 is a willow or water oak (*Quercus phellos* or *Q. nigra*) and the last is a beech (*Fagus grandifolia*). Of the structures used, 3 are wooden structures and 9 are made from concrete, cement, or cinder blocks.

Sixty-one percent of the roosts used by SEM are tree roosts. To date, all maternity roosts for SEM have been in trees. When SEM have been found in man-made structures, it is usually in the fall or winter months and they are usually alone or in very small numbers compared to the other bat species present.

Sixty-seven percent of all the roosts and 100% of all the maternity roosts used by BEB are in man-made structures. BEB were found in trees during all seasons, but there were only one or two individuals present when visited.

The monitoring efforts for 1997 are summarized for SEM in Table 2 and for the BEB in Table 3. SEM were always present when Roost 7 was checked in Smith County, and usually present in Roost 8 in Wood County. It appears that these roosts are year-round roosts, but may not be occupied 100% of the time. One of the BEB roosts in Jasper County (Roost 9), which is often visited by hikers, was used as a maternity roost throughout the summer, but was vacant during the winter. Unfortunately, because most roosts were not monitored regularly, no other obvious patterns could be detected.

With a mist net capture of one SEM at Stephen F. Austin State University Experimental Forest in Nacogdoches, a new county record was added to the county occurrence map. No new county records were added for BEB. Figure 2 shows a map of all the county occurrences of SEM, and Figure 3 depicts the BEB county occurrences. County records prior to this study were taken from Schmidly, 1991 (see discussion below). Information concerning county records for SEM are listed in Table 4 and for BEB in Table 5.

Discussion

In 1997, we refocused our emphasis from occurrence and distribution surveys to monitoring known roosts. During this transition, we were unable to monitor all the roosts on a regular schedule, but roosts were monitored opportunistically.

In review of the data, it is apparent that not all roosts are equally important to the two species, nor are the two species using roosts in a similar manner. As summarized in our last report (Mirowsky and Horner, 1997) SEM prefer to congregate in large numbers (> 100 individuals)

in maternity roosts located in live, large, hollow, bottomland hardwood trees in close proximity to slow moving rivers, but will roost singly in smaller trees or manmade structures. Big-eared bats, however, tend to be found in maternity roosts in small numbers (<25 individuals) that are located in manmade structures in close proximity to slow moving rivers, but will roost singly in bottomland hardwood trees.

The maternity season for the SEM is typically the end of April to the end of June (Horner and Mirowsky, 1996; Schmidly, 1991). One of the maternity roosts (Roost 1) used by SEM in previous years was not occupied during April or May 1997 but not checked in June. Since this is the period when non-volant young are usually present, we conclude that this tree was not used as a maternity roost in 1997. It is unlikely that our disturbance caused them to abandon the roost, because there were limited roost checks conducted previous to the maternity season. This provides an initial indication that SEM may not always be faithful to particular maternity roosts. This roost is in an extensive bottomland hardwood area, and undoubtedly they have multiple roosts from which to choose each year. Roost 2 was occupied in June, but not checked earlier, so it's use as a reoccupied maternity roost is inconclusive.

Two SEM maternity roosts (Roosts 7 and 8) were verified to be reoccupied from previous years. Roost 7 is a large hollow water tupelo standing in a clearcut less than 100 yds from the Sabine River. This roost was occupied year-round, and because it is the only live, large, hollow tree within several acres, the bats may not have alternative roosts. Roost 8, a black gum also occupied throughout the year, is within an extensive old growth bottomland hardwood forest.

Three BEB maternity roosts (Roosts 9, 11, 12) are known, but only one (Roost 9) was monitored. This roost, located in an abandoned concrete saw mill, was reoccupied as a maternity roost in 1997 despite heavy visitation by people. The historic mill is on an often-used hiking trail, but the bats continue to use the dark wall and ceiling about 40 feet above the entrance. We suspect that unknowing hikers never see the bats, so intentional disturbance is minimal.

The addition of the four SEM Roosts 19-22 (Walker et. al, 1996) to our monitoring list late in 1997 precluded monitoring efforts for this year. These roosts were reported as winter roosts from 1994-1996, and there may be evidence that some are occupied during other times of the year (Honeycutt, pers. comm.). Therefore, monthly monitoring will be initiated for 1998.

With the discovery of new roosts, the distribution maps are revised. The first record of SEM in Texas was a mummified individual found in an attic in Bowie County in 1962 (Packard, 1966). In 1991, Schmidly noted nine counties records. Now this species is known from 22 counties and the range line has been extended to the west by 100 miles (Walker et. al., 1995). Of the nine original counties, 7 counties have not been reconfirmed to have SEM since 1994. However, efforts to net these counties was low (total of five netting nights from 1994 to 1996).

In reviewing the revised map and catch per unit effort data (Mirowsky and Horner 1997), Jasper, Tyler, and Hardin counties in southeastern Texas may have the highest density of SEM. In the bottomland hardwood habitats in these counties, the SEM is the mostly commonly captured bat. It is possible that this distribution is a function of researcher effort since access to public lands in these counties is more available. However, we suspect that this distribution pattern is more likely correlated with the amount of large protected bottomland hardwood forests such as the Big Thicket National Preserve, Village Creek State Park, Martin Dies Jr. State Park, and The Nature Conservancy Sandylands Preserve. Most of the forested land in northeast Texas is privately owned and in smaller, fragmented parcels that were recently harvested. Such habitat reduces the number of large hollow trees suitable for roosting.

County occurrences for BEB have been inconsistent. In the book Texas Mammals East of the Balcones Fault Zone (Schmidly, 1983), seven county records were noted. The Bats of Texas (Schmidly 1991) also noted seven county records, but Marion and Harrison Counties were not included whereas Montgomery and Liberty Counties were included as Health Department specimens. Apparently there is no Harrison County specimen, so the 1983 record was published in error; similarly, omitting the Marion County record in the 1991 was also an error (D. Schmidly, pers. comm. and B. Burt, pers. comm). This specimen was indeed collected, but has since been lost. Thies (1994) reported a new county record for BEB in Walker County, but in summarizing the county distributions, the Health Department records were mistakenly noted in Harris and Jefferson Counties. We've reviewed the two Health Department records, and one specimen (male, 11 September 1984, #2527) was collected in Dayton (which is in Liberty County, not Chambers County as mistakenly catalogued). The second specimen (male, 13 September 1986, #2127) was collected in Beaumont in Jefferson County. Therefore, it appears the Montgomery County record (Schmidly 1991) and the Harris County record (Thies 1995) are incorrect; the correct locations of these records are Jefferson and Liberty Counties. Yancey and Jones (1997) report a third Health Department specimen from Shelby County which is a new county record and the northernmost documented occurrence of this species in Texas. However, they state that a total of four specimens have been recorded by the Health Department, which we believe is incorrect due to the previous mistakes which persist in the literature.

Therefore, prior to 1994, there were 8 county records (Marion, Nacogdoches, Sabine, Newton, Hardin, Jefferson, Liberty, and Polk) for BEBs, with the first specimens collected from a barn in Polk County in 1965 (Michael and Birch 1967). Now there are 15 county records. Of the 8 counties with known occurrences prior to 1994, six counties have not been reconfirmed to have BEBs since 1994. There has been some netting effort in these counties (17 netting nights since 1994), but this bat is difficult to net due to it's ability to detect the presence of nets.

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Table 1: Known roost sites for southeastern myotis (SEM) and Rafinesque's big-eared bat (BEB) in east Texas.

Roost #	1995 Roost ID	Location	Type	Species/Mat'l	County	Date first found	Status
1	MDJSP 1	Martin Dies Jr SP-Walnut Ridge Unit	Tree	Black Gum	Jasper	1-May-95	SEM 1995 maternity roost; BEB temporary roost
2	VCSP 1	Village Creek SP-Caney Slough	Tree	Water Tupelo	Hardin	26-May-95	SEM maternity roost
3	VCSP 2	Village Creek SP-Caney Slough	Tree	Black Gum	Hardin	4-Oct-95	SEM temporary or solitary roost?
4	VCSP 3	Village Creek SP-Water Oak Trail	Tree	Black Gum	Hardin	26-Oct-95	BEB temporary or solitary roost?
5	VCSP 4	Village Creek SP-Tupelo Swamp	Tree	Water Tupelo	Hardin	30-Jan-96	SEM temporary winter roost?
6		Village Creek SP - Water Oak Trail	Tree	Beech	Hardin	10-Sep-96	BEB temporary roost?
7		Byrd's property-Sabine River	Tree	Water Tupelo	Smith	6-Mar-96	SEM year-round roost
8		Little Sandy Hunting and Fishing Club - Trail 2	Tree	Black Gum	Wood	6-Mar-96	SEM year-round roost
9	SNF 1	Aldridge Saw Mill - Angelina NF	Structure	Concrete	Jasper	27-Jun-95	BEB maternity roost
10	BITH 1	Voth Mill - Big Thicket NP - Pine Island Bayou	Structure	Concrete	Hardin	15-Aug-95	BEB temporary roost
11		Private property - Trinity River	Structure	Wooden	San Jacinto	11-Jul-95	BEB maternity roost
12		Circle G Roost-Village Creek	Structure	Cinder Block	Hardin	16-Jul-96?	BEB year-round roost; SEM temporary roost
13		Lake Houston State Park-San Jacinto	Structure	Cinder Block	Harris	22-May-96	BEB temporary roost

Roost #	1995 Roost ID	Location	Type	Species/Mat'l	County	Date first found	Status
		River					
14		Murphy Roost - Entrance of VCSP	Structure	Wooden	Hardin	3-Feb-97	BEB winter roost
15		Martin Dies Jr. SP-Walnut Ridge campsite # 112	Tree	Willow Oak or Water Oak	Jasper	1-May-97	BEB temporary or solitary roost?
16		Little Sandy Fishing and Hunt Club-Trail 18	Tree	Sweetgum	Wood	Oct-97	SEM roost?
17		Ratcliff Lake Recreation Area	Tree	Sweetgum	Houston	19-Jul-97	SEM temporary roost?
18		Angelina National Forest; R255	Culvert	Cement	Jasper	1-Nov-97	BEB and SEM winter roost?
19		Under I-45 13.6 mi N of Huntsville	Culvert	Cement	Walker	27-Jan-95	SEM winter roost
20		Under I-45 2.4 mi S of Buffalo	Culvert	Cement	Leon	27-Jan-95	SEM winter roost
21		Under I-45 0.8 mi N of Buffalo	Culvert	Cement	Leon	27-Jan-95	SEM winter roost
22		Under I-45 3.2 mi N of Buffalo	Culvert	Cement	Freestone	27-Jan-95	SEM winter roost
23		Central San Augustine Co. on private land	Structure	Wooden	San Augustine	May-89	BEB maternity roost

Table 2: Estimated number of SEM in roosts. Blank cells indicate that the roost was not checked during that month.

Roost	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1		0		0	0							0
2						< 50	10					
3						1	1					
5							0					
7	10-25	3	10-25		> 25	> 25			> 25		> 25	5-25
8	0	> 25	> 25	> 25	> 25	> 25		0		> 25	> 25	5-25
12		0										0
16										> 25		
17							1					
19												
20		0										
21												
22												

Table 3: Estimated number of BEBs in roosts. Blank cells indicate that the roost was not checked during that month.

Roost	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1		0		0	0							0
4						1			1			
6												
9	0	0		4-20	12-14	10-25						0
10		0										0
11		0										0
12		0										11
13						0	0	0	0	0	0	0
14		0-4										3
15					1							
18											6-8	
23												

Table 4: Information of county occurrences for SEM

County	Date	Location	Reference	Other
Bowie	Jul 62	New Boston	Packard 1966	Mummified bat from attic (skull only)
Cass	1 Jul 95	Atlanta SP	Horner and Mirowsky 1996	1 captured in mist net
Freestone	27 Jan 95	North of Buffalo	Walker et. al. 1996	Roost 20-21 discovered in culvert under Interstate Hwy 45
Hardin	18-20 Jul 94; 22 May-1 Jun 95; 1 May-18 Aug 96	Village Creek SP	Horner, 1995; Horner and Mirowsky 1996; Mirowsky and Horner 1997	Total of 56 captured in mist nets during 3 year period; Roosts 2,3,5 and 12 discovered
Hardin	11 Apr-29 Jul 96	Sandylands Nature Preserve	Mirowsky and Horner 1997	8 captured in mist nets
Hardin	31 May 95	Big Thicket NP, Turkey Creek Unit	Horner and Mirowsky 1996	1 adult male captured in mist net
Harris	29 Apr 84	Houston	Schmidly 1991	Department of Health Record #853
Houston	19 Jul 97	Ratcliff Lake Recreation Area	Horner and Maxey 1998	Roost 17 discovered
Houston	6 May 96	Davy Crockett Nat'l Forest	Mirowsky and Horner 1997	Adult Male captured in mist net
Jasper	28 Jun 94	Jasper State Fish Hatchery	Horner 1995	3 captured in mist nets
Jasper	19 May-15 Sep 94; 13 Mar-16 Jul 95; 2 Apr-9 Jul 96	Martin Dies Jr. SP	Horner 1995; Horner and Mirowsky 1996; Mirowsky and Horner 1997; Horner and Maxey 1998	66 total captured in mist nets over entire period; Roost 1 discovered
Leon	27 Jan 95	Buffalo and south of Buffalo	Walker et.al. 1996	Roost 22 discovered in culvert under I-45
Liberty	8 Mar 78	Big Thicket NP near Moss Hill	Schmidly 1983	1 specimen
Marion	29 Jul 96	Lake 'O the Pines/Big Cypress Crk	Mirowsky and Horner 1997	1 adult female post-lactating captured in mist net
Montgomery	15 Apr 84	Conroe	Schmidly 1991	Department of Health Record #743
Nacogdoches	26 Jun 97	Stephen F. Austin Univ. Exp. Forest	Horner and Maxey 1998	1 adult male, 1 adult lactating female captured in mist net
Newton	Feb-Jun 74	Mill and Indian Creek Bay	Ingilis, Clark, and Irby and Moehring, 1976	8 specimens, 1 lactating female
Orange	9 Jul 84	Vidor	Schmidly 1991	Department of Health Record #1665
Panola	10 Dec 69	8 mi. SW of Gary in sandstone cave	Michael et. al. 1970	1 adult male specimen
Polk	8 Jun 95; 24 Apr 96	Lake Livingston SP	Horner and Mirowsky 1996; Mirowsky and Horner 1997	1 adult female ('95) and 1 adult male ('96) captured in mist net
Sabine	18 Jun 96	Sabine Nat'l Forest	Mirowsky and Horner 1997	1 Juvenile male captured in mist net
Shelby	19 Jun 95	North Toledo Bend WMA	Horner and Mirowsky 1996	1 adult male captured in mist net
Smith	6 Mar 96	Sabine River - private property	Mirowsky and Horner 1997	Roost 7 discovered
Tyler	Jun-Oct 77 and Jun 78	Big Thicket NP near Town Bluff and Spurger	Schmidly, 1983	7 specimens
Tyler	4 May 95	Magnolia Park Ridge	Horner and Mirowsky 1996	5 adult males captured in mist nets
Walker	27 Jan 95	North of Huntsville	Walker et. al. 1996	Roost 19 discovered in culvert under I-45
Walker	17 Aug 96	Huntsville SP	Mirowsky and Horner 1997	1 adult male captured in mist net
Wood	6 Mar 96; Oct 97	Little Sandy NWR	Mirowsky and Horner 1997; Horner and Maxey 1998	Roost 8 and Roost 16 discovered

Table 5: Information of county occurrences of BEB.

County	Date	Location	Reference	Other
Hardin	17 May 75	7 mi SE Silsbee	Schmidly 1983	Specimen collected
Hardin	27 Oct 95; 16 Jul 96; 10 Sep 96; 3 Feb 97	Village Creek SP and adjacent area	Horner and Mirowsky 1996; Mirowsky and Horner 1997; Horner and Maxey 1998	Roost 4, 6, 12, 14 discovery
Harris	22 May 96	Lake Houston SP	Mirowsky and Horner 1997	Roost 13 discovery
Jasper	28 Jun 94	Jasper Fish Hatchery	Horner 1995	Mist net capture
Jasper	27 Jun 95	Angelina National Forest	Horner and Mirowsky 1996	Roost 9 discovered in abandoned concrete structure
Jasper	13 May 96; 1 May 97	Martin Dies Jr. SP	Mirowsky and Horner 1997	Roost 1 discovered to be used by single Corynorhinus; Roost 15 discovered
Jasper	1 Nov 97	Culvert under Road 255	Horner and Maxey 1998	Roost 18 discovered
Jefferson	13 Sep 86	Beaumont	Schmidly 1991; Thies 1994	Texas Dept. of Health record
Jefferson	15 Aug 95	Big Thicket NP	Horner and Mirowsky 1996	Roost 10 discovered
Liberty	11 Sep 84	Dayton	Schmidly 1991	Texas Dept. of Health record
Liberty	21 Jul 94	Davis Hill SP	Horner 1995	1 adult female captured in mist net
Marion	7 Oct 73	27 mi. W of Jefferson	Schultz, et.al. 1975	Specimen collected from an abandoned dwelling
Nacogdoches	28 Oct-15 Nov 68, 1 Apr 69; 22-27 Nov 74	within 15 mile radius of Nacogdoches	Shultz, et. al. 1975; Schmidly, 1983	22 specimens captured in wells, 1 flying along Angelina River
Newton	Nov-Dec ; June	within 10 mi radius of Burkeville	Schmidly, 1983	Specimens collected in cisterns in late fall and mist netted in June
Polk	31 Oct-4 Nov 66	1 mi. S Neches River, 3 mi. E. Hwy 59	Michael and Birch, 1967; Shultz, et. al. 1975; Schmidly, 1983	First record on this species in Texas. 7 Specimens captured in a barn
Sabine	20-27 Jul 72, 15 Sep 72	3 mi. NE Milan	Shultz, et. al. 1975; Schmidly, 1983	Specimens collected from an abandoned dwelling
San Augustine	summer 1989-1994	central San Augustine County on private land	Mirowsky and Horner, 1997	Maternity Roost 23 discovered in abandoned dwelling monitored annually; about 30 adults and pups present; a few seen in nearby well in fall/winter; photograph taken
San Jacinto	11 Jul 95; May 96	near Shepherd on private land	Horner and Mirowsky 1996; Mirowsky and Horner 1997	Roost 11 discovered and monitored
Shelby	6 Jun 96	Center, Texas	Yancey and Jones, 1997	Texas Dept. of Health record
Trinity	18 July 95	Alabama Creek WMA	Horner and Mirowsky 1996	1 adult female captured in mist net
Walker	7 Sep 93	Huntsville Fish Hatchery	Thies 1994	1 adult male captured in mist net as it emerged from concrete culvert

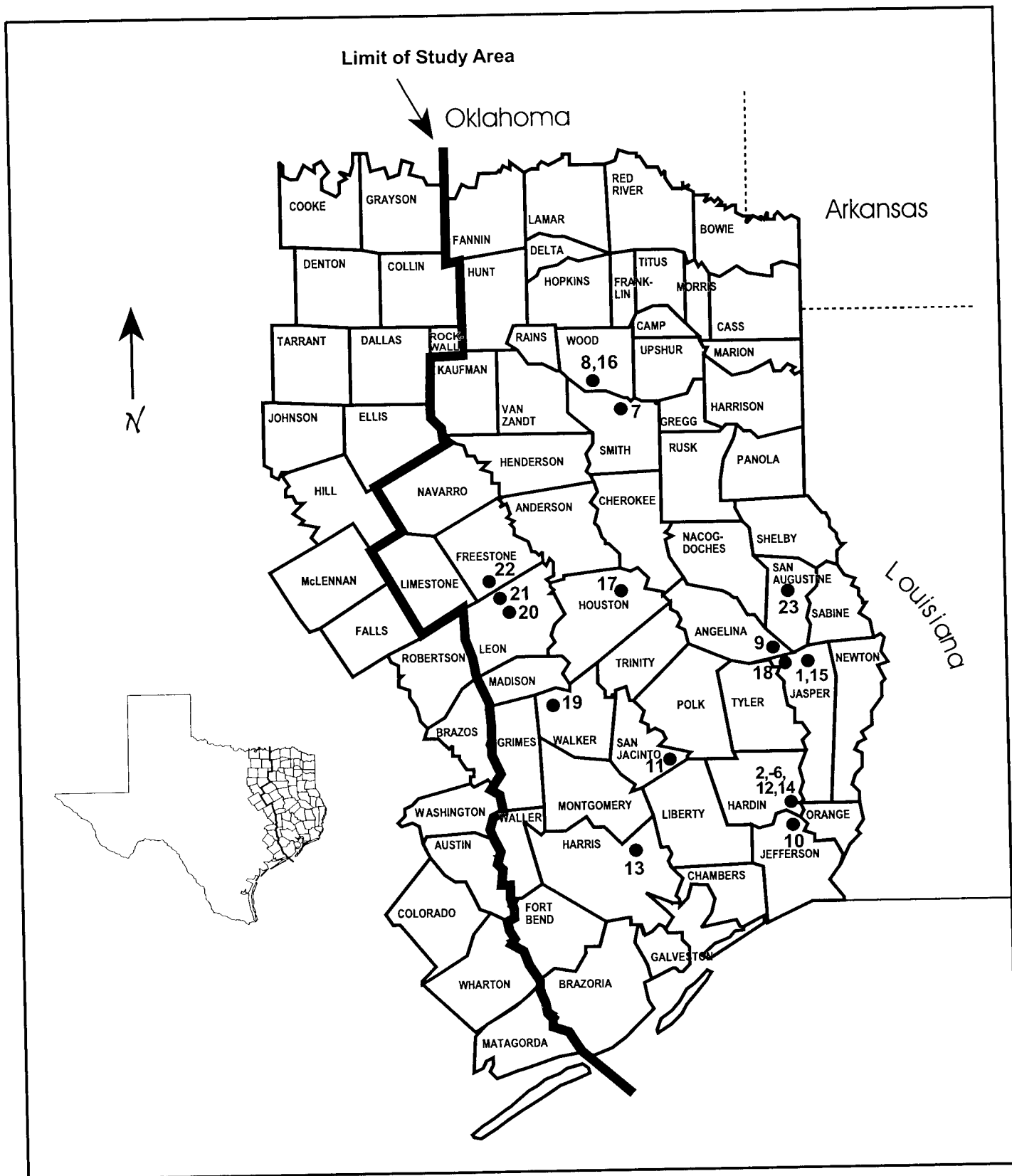


Figure 1: Location of all the known roost sites for SEM and BEB in east Texas (note: Roost 23 is approximate).

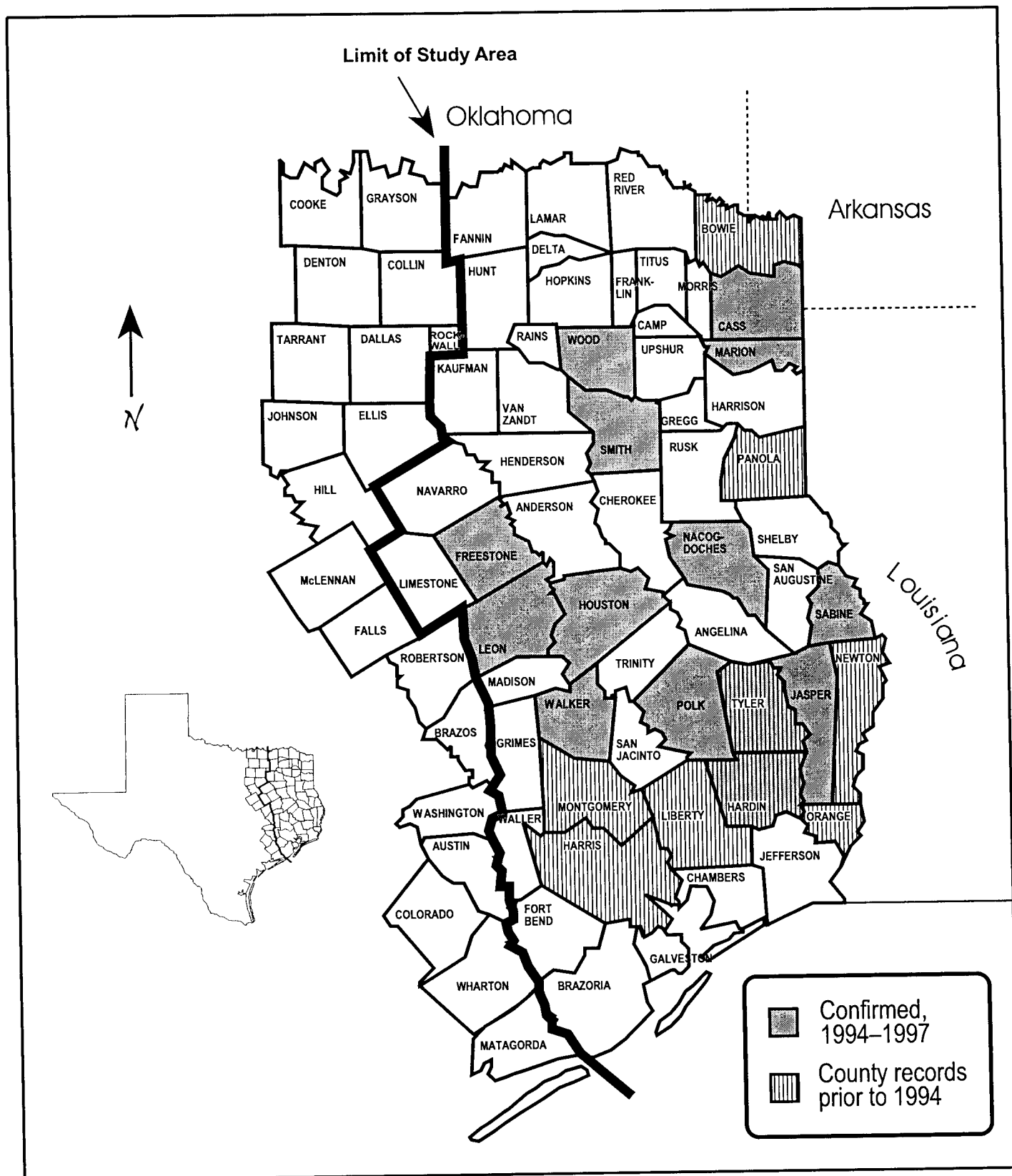


Figure 2: Distribution of SEM by county.

