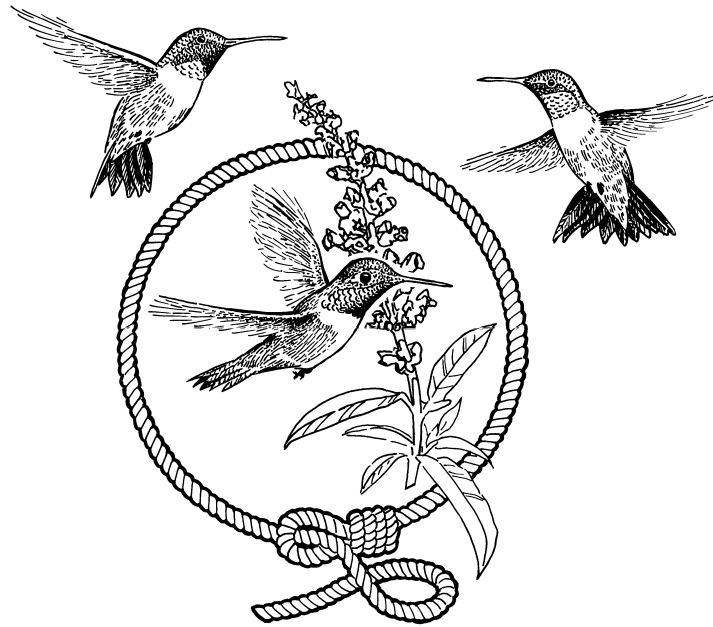


TEXAS HUMMINGBIRD ROUNDUP FINAL REPORT



INTRODUCTION

The Hummingbird Roundup is a citizen science project designed to gather distribution and behavioral data of hummingbirds in Texas. The program was launched in 1994 with an unprecedented level of participation of 1,220 volunteers the first year. Though conceived initially as a 5-year program, the Hummingbird Roundup continued for 20 years. In 2005, TPWD published The Hummingbirds of Texas (authors Cliff Shackelford, Madge M. Lindsay, and C. Mark Klym; TAMU Press) in 2005 with data from the first 10 years of the program. The Hummingbird Roundup was conceived to gain a better understanding of the distribution and behavior of Texas hummingbirds, the native plants that hummingbirds use, and to promote active public engagement with wildlife science through education and volunteer participation. The book was an important advancement in our understanding of hummingbirds. Hummingbird Roundup volunteers continued collecting data for another 10 years after its publication, so this report gives us an opportunity to present additional data, summarize our understanding of hummingbird distribution, and to close out this ground breaking citizen science program.

METHODS

Hummingbird Roundup volunteers were mailed a datasheet in the first few months of the calendar year. Volunteers typically had hummingbird feeders installed in a location where they could comfortably observe hummingbirds and their behavior. Active feeders were not a required component, and volunteers sometimes submitted observations from hummingbirds visiting their landscapes. Volunteers answered a short questionnaire as to their lot size, the number of hummingbird feeders they maintain, descriptors of their garden, plants most commonly used by hummingbirds, the date of first hummingbird observation, and behavioral questions such as whether they observed hummingbirds fighting. Volunteers then documented the species ID and number of individual hummingbirds they observed each week.

At the end of each calendar year, volunteers submitted their datasheets to TPWD. Since 1999, TPWD published an annual report in the spring detailing participation and notable observations from the previous year. Those reports are available at

http://tpwd.texas.gov/publications/newsletters/texas_hummer/

Annual reports, including this final report, summarized submitted datasheets, but also included sightings, observations, and information submitted to TPWD by Hummingbird Roundup volunteers via phone calls and emails. This submission method allowed TPWD biologists to confirm rare or atypical sightings, and to guide volunteers through the data collection process. Because these incidental reports were not entered into the official hummingbird roundup database, the map section of this report may not represent all counties in which a species was reported. However, the maps do demonstrate all data submitted through official datasheets since 1995.

RESULTS

Over the past 20 years, 5,166 people contributed data to the Hummingbird Roundup (Table 1). Those volunteers observed more than 608,750 hummingbirds, and reported those observations through 5,484 reports to TPWD. Volunteers graciously donated more than 5,400 hours in the pursuit of advancing our understanding of Texas hummingbirds.

Year	Number of Volunteers	Number of weekly surveys submitted	Hummingbirds reported	Number of hours spent observing
1995	409	6,812	58,703	722.20
1996	364	6,604	61,374	642.89
1997	405	7,241	55,782	638.20
1998	248	5,595	56,716	442.28
1999	67	1,352	8,644	119.07
2000	209	3,650	37,627	313.84
2001	144	3,097	21,289	305.45
2002	228	2,486	24,125	242.98
2003	154	2,044	21,314	132.01
2004	271	945	7,044	73.52
2005	377	2,910	27,620	201.32
2006	356	2,747	23,657	186.24
2007	283	2,324	19,702	141.24
2008	212	2,199	19,918	144.81
2009	357	3,575	35,012	213.44
2010	358	3,033	26,543	173.25
2011	212	2,592	24,766	168.56
2012	184	855	18,065	54.25
2013	251	820	19,925	41.27
2014	238	885	23,120	50.55
2015	157	453	17,804	29.19

Table 1. Participation in TPWD's Hummingbird Roundup citizen science program 1995-2015 as determined from Hummingbird Roundup Database.

The 2005 book Hummingbirds of Texas presented hummingbird records from several sources, but leaned heavily on Hummingbird Roundup sighting reports. Since then, Hummingbird Roundup volunteers have collected an additional 10 years of data, yielding better temporal and geographic distribution data and new sightings of Berylline and Amethyst-throated hummingbirds.

Prior to the Roundup, we had a poor understanding of the distribution and migration of hummingbirds in Texas. A popular bird field guide released in 1987 listed only 6 hummingbirds that predictably ranged in Texas. We now know that Texas regularly hosts as many as 18 species. The most common hummingbirds in Texas are the Ruby-throated and Black-chinned hummingbirds. In the Roundup, Ruby-throats were reported more than 39,000 times, and Black-chinned hummingbirds nearly 24,000 times (See Table 2).

Species	# of observation periods in which a species was reported	# individuals reported
Allen's	545	707
Amethyst-throated	1	1
Anna's	1,218	3,185
Berylline	5	5
Black-chinned	23,970	204,800
Blue-throated	173	766
Broad-billed	163	212
Broad-tailed	1,955	5,393
Buff-bellied	4,526	15,296
Calliope	718	1,206
Costa's	110	122
Green Violetear	106	107
Green-breasted Mango	58	58
Lucifer	676	2,231
Magnificent	81	256
Ruby-throated	39,708	313,709
Rufous	10,401	23,958
Violet-crowned	40	50
White-eared	77	201

Table 2. Numbers of Hummingbird Roundup observation periods in which hummingbirds were reported and number of individuals observed, by species; 1995-2015.

Buff-bellied, Broad-tailed, and Anna's hummingbirds were also reported frequently, though not nearly as commonly, with at least 1,000 observations each. It's important to note that these numbers do not reflect the number of individuals observed. During the 21 years from 1995 and 2015, volunteers observed 313,709 Ruby-throated hummingbirds in 39,708 detection periods. The 19th species on our list can only be considered a rare vagrant. The Amethyst-throated Hummingbird was reported only once: in 2006 in Hidalgo County in far South Texas. The Berryline Hummingbird, which is included in the 18, was reported by Roundup volunteers 1997-2000 and in 2007. Table 3 lists the hummingbird species reported in the Roundup and the years in which they were reported.

Allen's, Anna's, Black-chinned, Broad-tailed, Buff-bellied, Calliope, Lucifer, Ruby-throated, and Rufous hummingbirds were the most dependably sighted species in Texas, as they were recorded all 21 years of the Roundup. Broad-billed, Blue-throated, Magnificent, and Green Violetear were extremely common, and were only missed 1 or 2 years. The Berylline hummingbird was reported only 5 times, and was the least common of the "Texas 18." The Amethyst-throated hummingbird was recorded only once.

Species	Year																				
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Allen's	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Amethyst-throated												X									
Anna's	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Berylline			X	X	X	X							X								
Black-chinned	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Blue-throated	X	X	X	X		X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
Broad-billed	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Broad-tailed	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Buff-bellied	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Calliope	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Costa's	X					X	X	X	X	X		X	X	X	X		X	X	X		
Green Violetear	X		X	X	X	X		X	X	X	X	X	X	X	X		X	X	X	X	X
Green-breasted Mango	X		X	X			X	X		X	X	X	X		X						
Lucifer	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Magnificent	X	X	X	X		X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
Ruby-throated	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Rufous	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Violet-crowned		X	X		X	X	X	X			X		X		X		X	X			
White-eared	X	X				X		X	X	X	X		X	X	X		X	X	X	X	X
	16	14	15	15	13	17	15	17	13	16	16	16	18	15	17	12	16	16	15	14	14

Table 3. Reports of hummingbirds in Texas in TPWD's Hummingbird Roundup; 1995-2015. Data sources include official HR datasheets and annual HR newsletters published by TPWD.

HUMMINGBIRD PREFERENCE FOR NATIVE PLANTS

Roundup volunteers observed hummingbirds feeding, resting, or seeking cover in hundreds of species of native plants. Because we did not ask volunteers to report the species and the number of plants that were available to hummingbirds at their observation station, no inference can be made about selection preference, but volunteers did report which plants the hummingbirds use, so we can present the most commonly used plants at the observation stations:

1. Sage (*Salvia* spp.)
2. Hummingbird bush (*Hamelia patens*)
3. Turk's cap (*Malvaviscus arboreus*)
4. Cuphea (*Cuphea* spp.)
5. Coral Honeysuckle (*Lonicera sempervirens*)
6. Lantana (*Lantana* spp.)
7. Pentas (*Pentas lanceolata*)
8. Canna lily (*Canna* spp.)
9. Trumpetvine (*Campsis radicans*)
10. Flame acanthus (*Anisacanthus quadrifidus*)
11. Hibiscus (*Hibiscus* spp.)
12. Shrimp Plant (*Justicia brandegeana*)
13. Butterfly bush (*Buddleja* spp.)
14. Desert Willow (*Chilopsis linearis*)
15. Cross vine (*Bignonia capreolata*)
16. Mimosa (*Albizia julibrissin*)
17. Zinnias (*Zinna* spp.)
18. Four O'Clock (*Mirabilis* spp.)
19. Beardtongue (*Penstemon* spp.)
20. Esperanza (*Tecoma stans*)

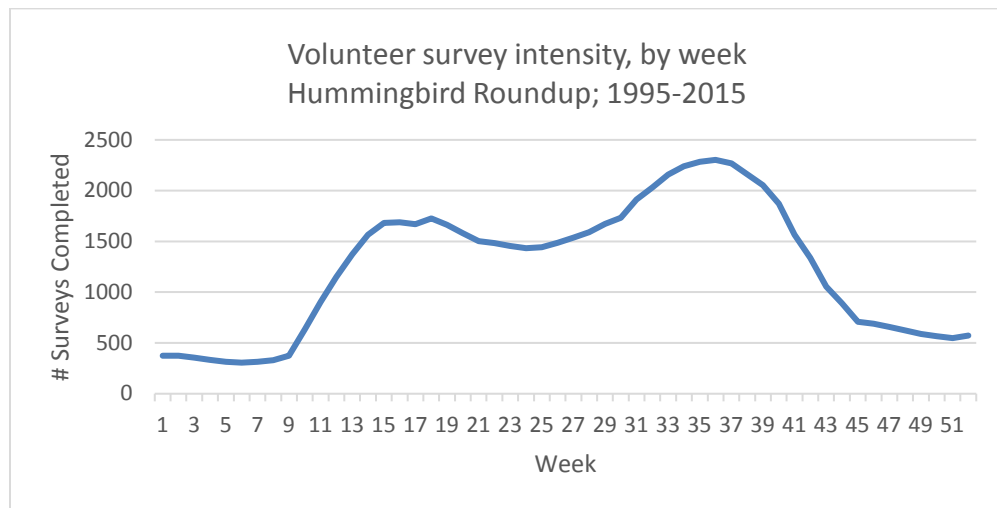
RANGE DOCUMENTATION

The following maps of the "Texas 18" were made to compare existing distribution maps to reports by Roundup volunteers. These maps only include sightings submitted to TPWD through official Roundup datasheets. Incidental reports submitted to TPWD by email or phone calls are not included. However, these maps provide additional information compared to what was available when Hummingbirds of Texas was printed in 2005.

TIMING

We present these data to demonstrate when volunteers were most likely to observe each of hummingbird species. The Amethyst-throated and Berylline hummingbirds were not analyzed due to low sample size.

Roundup volunteers could choose when they conducted surveys, so the first table illustrates survey intensity throughout the week, all years combined.

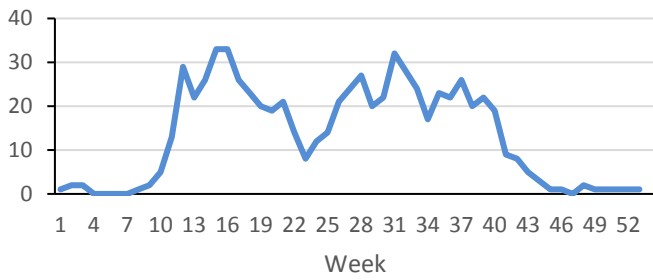


Week	Date
2	8-Jan
4	22-Jan
6	5-Feb
8	19-Feb
10	4-Mar
12	18-Mar
14	1-Apr
16	15-Apr
18	29-Apr
20	13-May
22	27-May
24	10-Jun
26	24-Jun
28	8-Jul

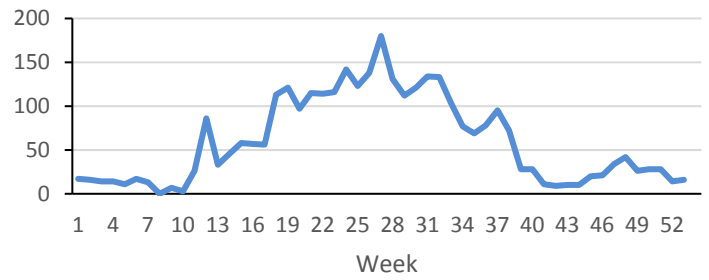
Week	Date
30	22-Jul
32	5-Aug
34	19-Aug
36	2-Sep
38	16-Sep
40	30-Sep
42	14-Oct
44	28-Oct
46	11-Nov
48	25-Nov
49	2-Dec
50	9-Dec
52	23-Dec

Figure 1. Intensity and timing of volunteer surveys, with key to approximate week-long windows; TPWD Hummingbird Roundup 1995-2015

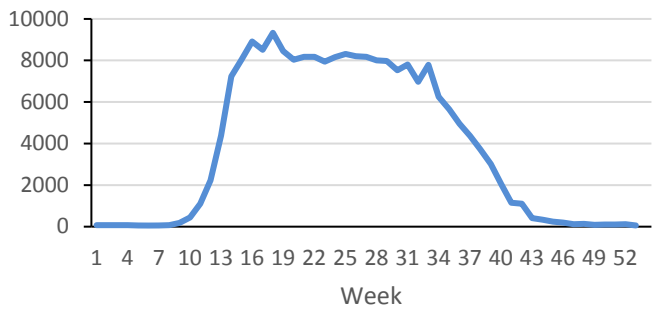
Allen's Hummingbird Reports
1995-2015



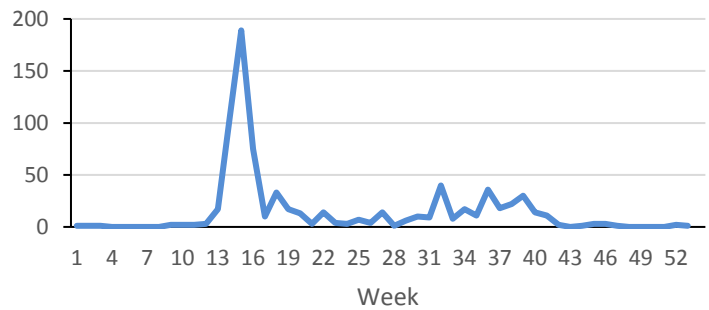
Anna's Hummingbird Reports
1995-2015



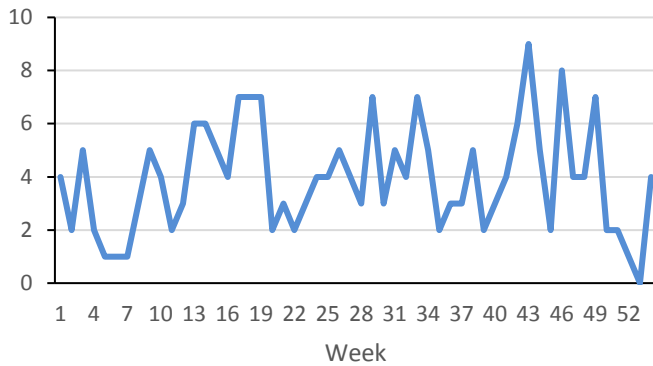
Black-chinned Hummingbird Reports
1995-2015



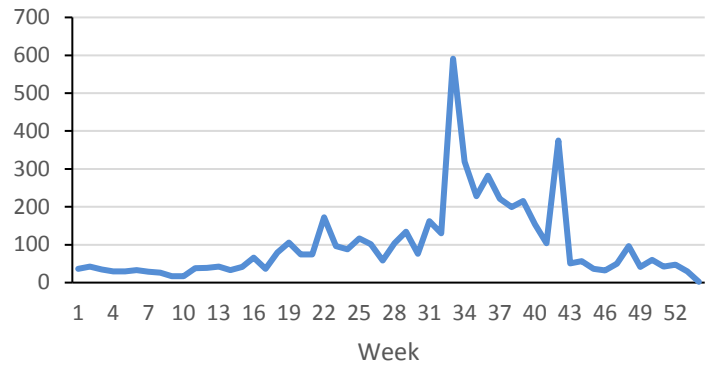
Blue-throated Hummingbird Reports
1995-2015



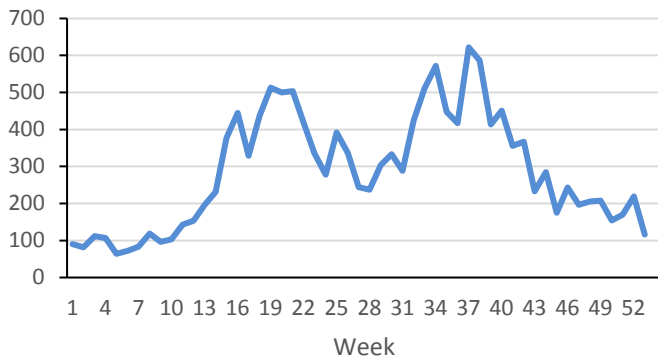
Broad-billed Hummingbird Reports
1995-2015



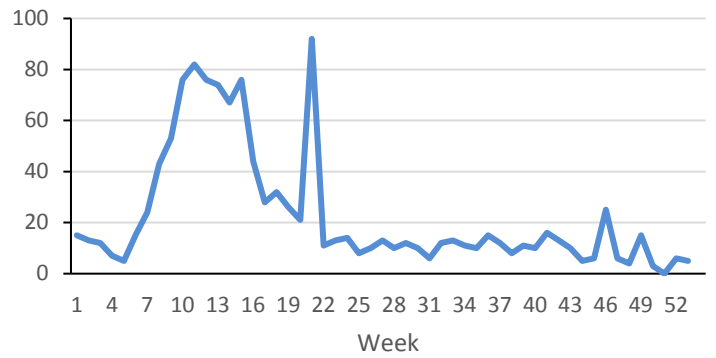
Broad-tailed Hummingbird Reports
1995-2015



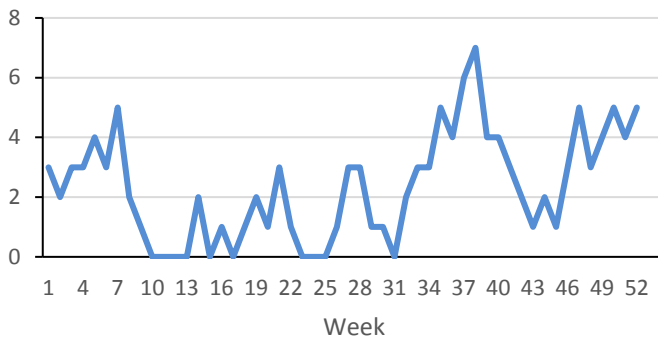
Buff-bellied Hummingbird Reports
1995-2015



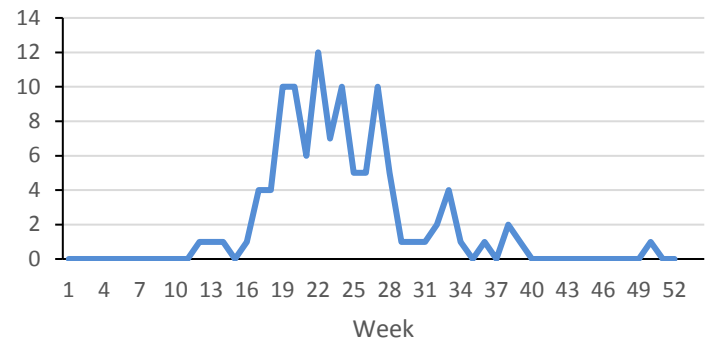
Calliope Hummingbird Reports
1995-2015



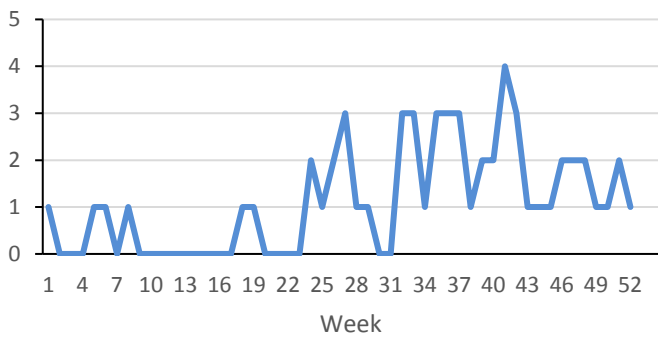
Costa's Hummingbird Reports
1995-2015



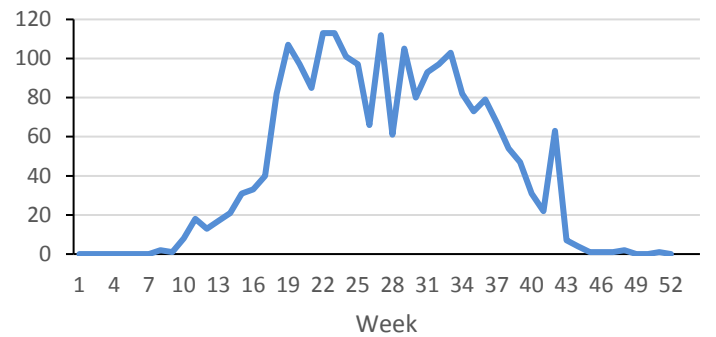
Green Violetear Reports
1995-2015



Green-breasted Mango Reports
1995-2015



Lucifer Hummingbird Reports
1995-2015



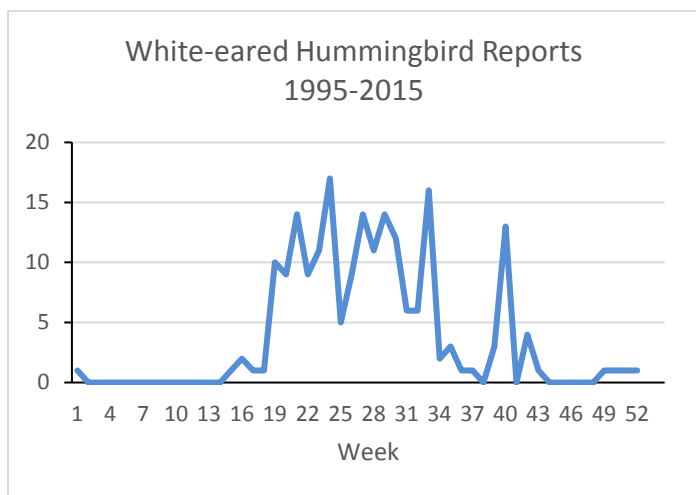
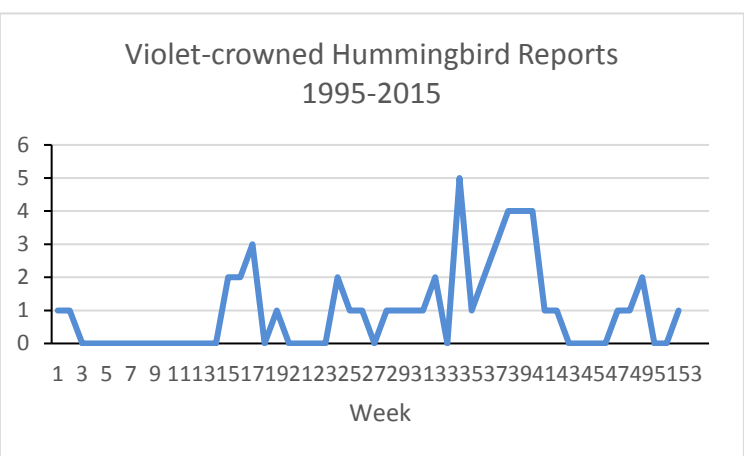
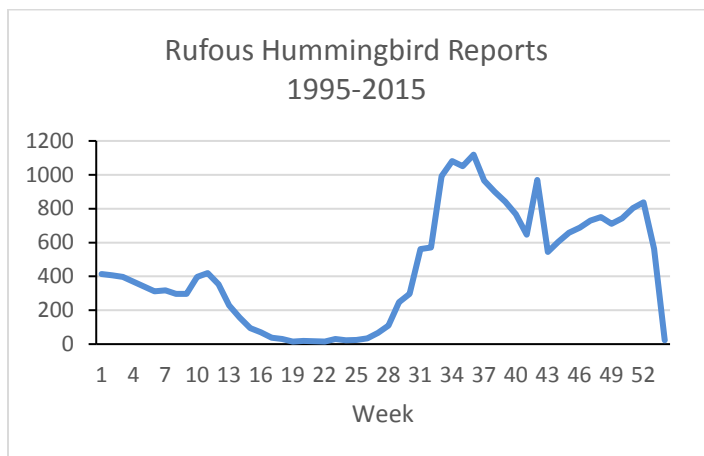
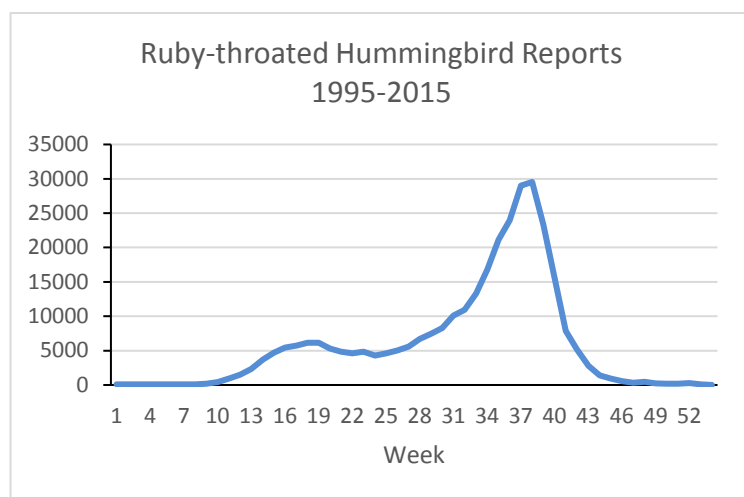
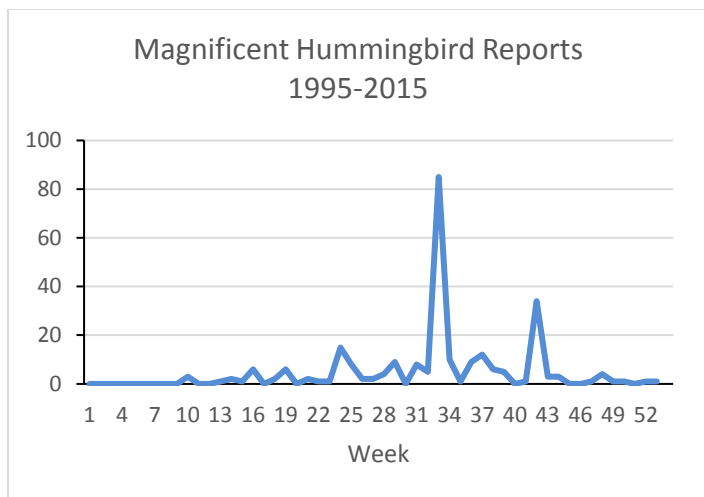


Figure 2. Timing of reports of hummingbirds by species by week; TPWD Hummingbird Roundup (1995-2015)

CONCLUSIONS

Observing hummingbirds is an enjoyable pastime and valuable source of information to wildlife managers.

Texans are dedicated to conserving hummingbirds and their citizen science data are critical to enhancing our understanding of hummingbird distribution, abundance, and behavior. Hummingbirds face a number of threats to their survival, including anthropogenic effects of habitat loss and pesticides as well as feral cats and non-native plants that occur in their environments. With educational outreach, awareness was raised towards hummingbird conservation which encouraged people to support hummingbirds by volunteering in Hummingbird Roundup. Volunteers helped to demonstrate how people could properly manage their own yards to attract hummingbirds and create a natural habitat for them. The Hummingbird Roundup was able to reach out to communities through (# of workshops) educational outreach workshops throughout the state of Texas.

Identifying the desired plants that hummingbirds use to feed on was another goal for the Hummingbird Roundup project. Although hummingbirds can feed on all nectar-producing plants, we strongly recommend planting native plant species. Non-native plant species can become invasive and out-compete the native species that are better for hummingbirds. Gardening with native nectar-producing plants is the best way to help hummingbirds. Energy sources for hummingbirds derive from nectar from plants, sugar water from feeders, and protein from insect and spider communities are all beneficial to hummingbird populations. Rich nectar sources from a diverse range of native plants that bloom throughout the year can offer overlapping and reliable blooms as early as January. Consequently, native plants also allow insect-spider communities to thrive and remain a sufficient protein source for hummingbirds. Lastly, feeders should be considered only a supplementary food source in addition to the natural food sources because plants may experience periods of stress and low blooms. An ideal hummingbird garden will have an open area for the birds to fly in, surrounded by a 5-15 ft range of trees and brush to provide shelter. The open area should include nectar-producing plants such as those listed above in this report.

Nineteen species of hummingbirds have been documented within Texas, making it the highest number of species found within a single state in the U.S. Within those eighteen species, a notable discovery is the established distribution of the Berylline Hummingbird species of Texas. The first recorded sighting in Texas was in August 1997. Hummingbird Roundup contributed to the observations of the Berylline hummingbird species with sightings in 1998, 1999, 2000, and again in 2007 in Jeff Davis County. Another notable discovery was the Amethyst-throated hummingbird. Although the Amethyst-throated hummingbird primarily occurs in Mexico and Central America, Roundup volunteers reported one in 2006 in Hidalgo County in the Rio Grande Valley. These data have dramatically changed our understanding of hummingbird distribution in Texas.

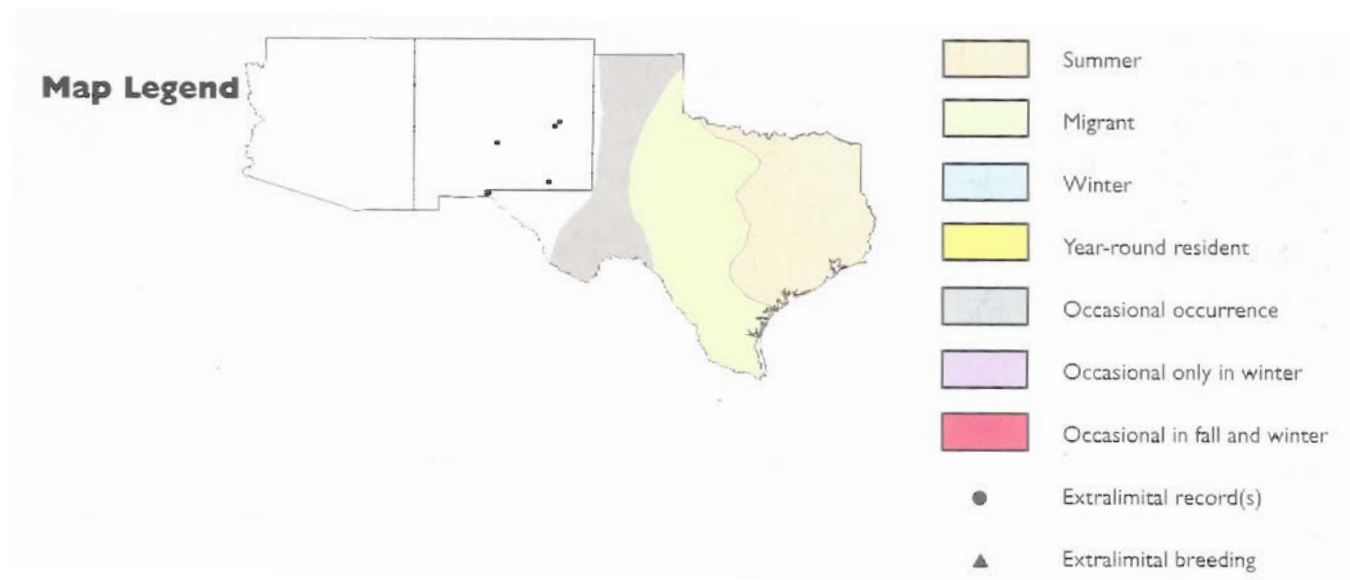
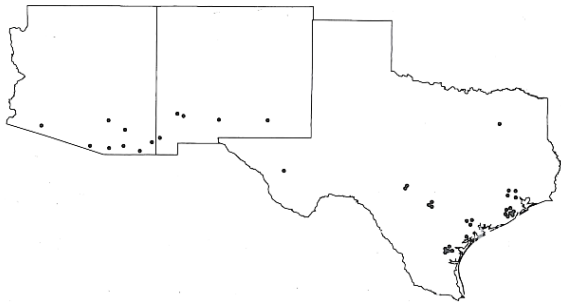
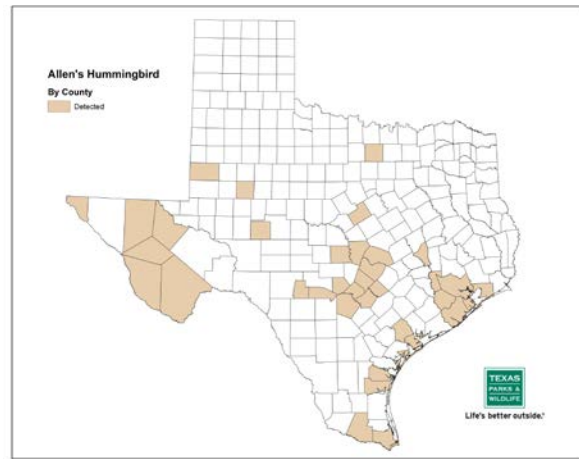


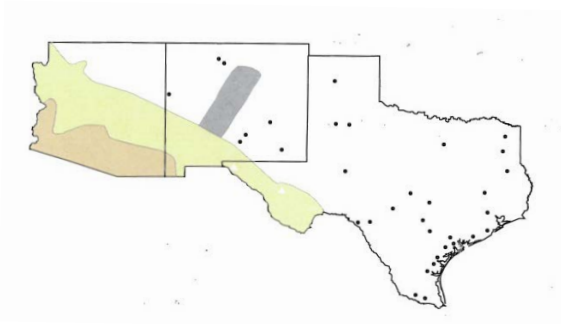
Figure 3. Map legend of the distribution maps from *Hummingbirds of Texas*.



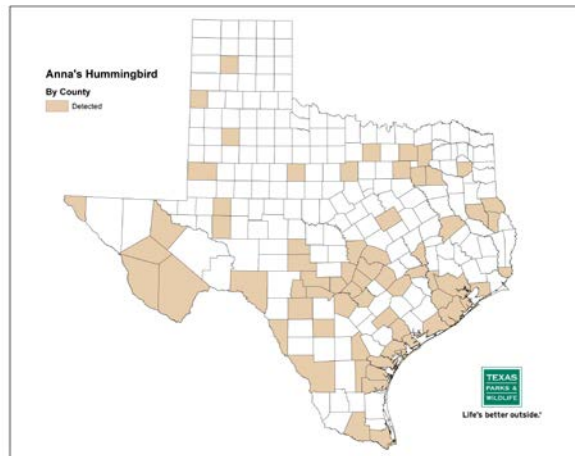
Map 1a. Allen's Hummingbird distribution.
(*Hummingbirds of Texas* 2005)



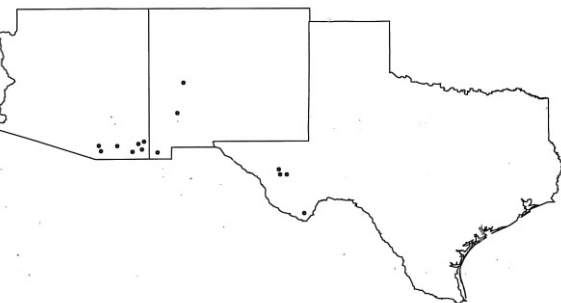
Map 1b. Allen's Hummingbird reports from
Hummingbird Roundup (1994- 2015)



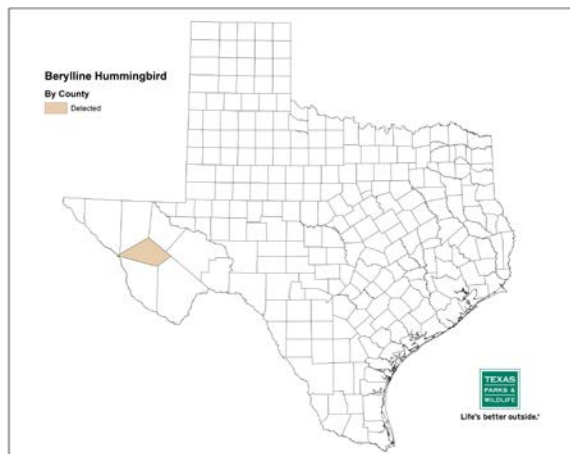
Map 2a. Anna's Hummingbird distribution.
(*Hummingbirds of Texas* 2005)



Map 2b. Anna's Hummingbird reports from
Hummingbird Roundup (1995- 2015)



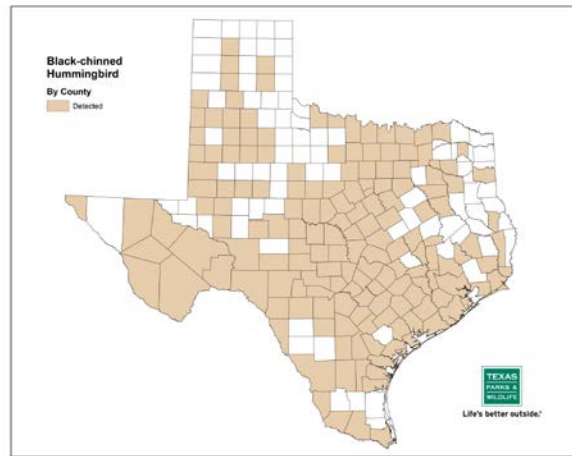
Map 3a. Berylline Hummingbird distribution.
(*Hummingbirds of Texas* 2005)



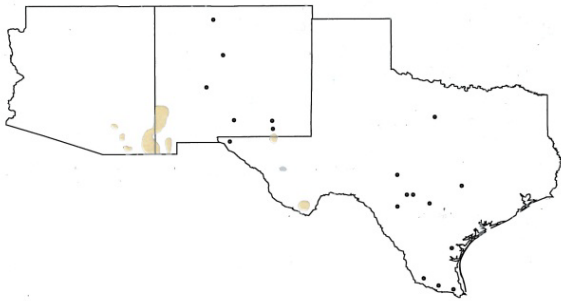
Map 3b. Berylline Hummingbird reports from
Hummingbird Roundup (1995- 2015)



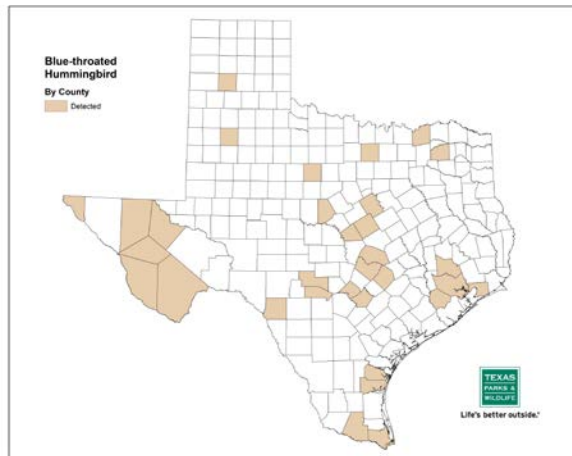
Map 4a. Black-chinned Hummingbird distribution.
(*Hummingbirds of Texas* 2005)



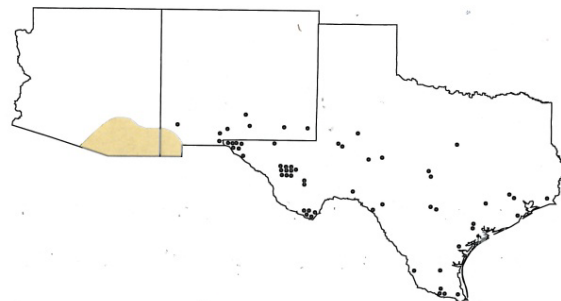
Map 4b. Black-chinned Hummingbird reports
from Hummingbird Roundup (1995-2015)



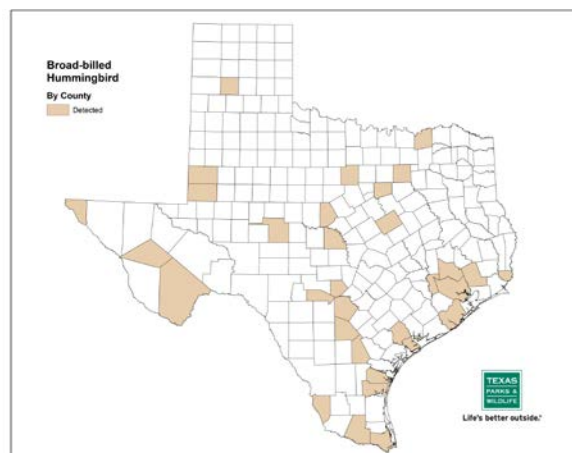
Map 5a. Blue-throated Hummingbird distribution.
(*Hummingbirds of Texas* 2005)



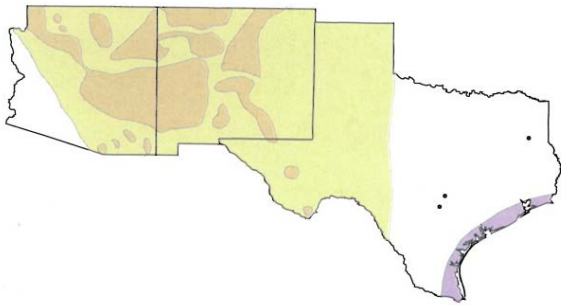
Map 5b. Blue-throated Hummingbird reports
from Hummingbird Roundup (1995-2015)



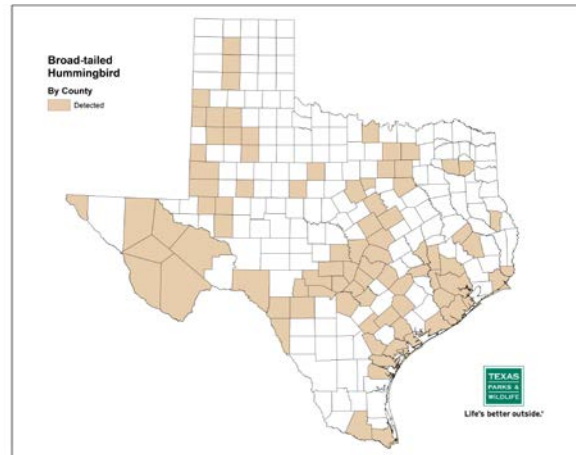
Map 6a. Broad-billed Hummingbird distribution.
(*Hummingbirds of Texas* 2005)



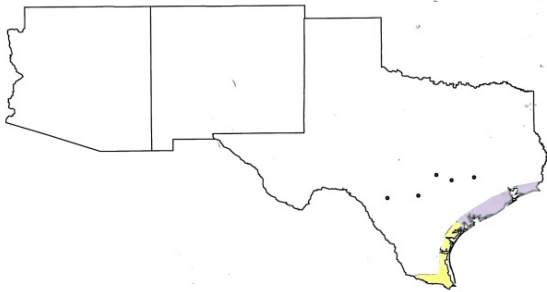
Map 6b. Broad-billed Hummingbird reports from
Hummingbird Roundup (1995-2015)



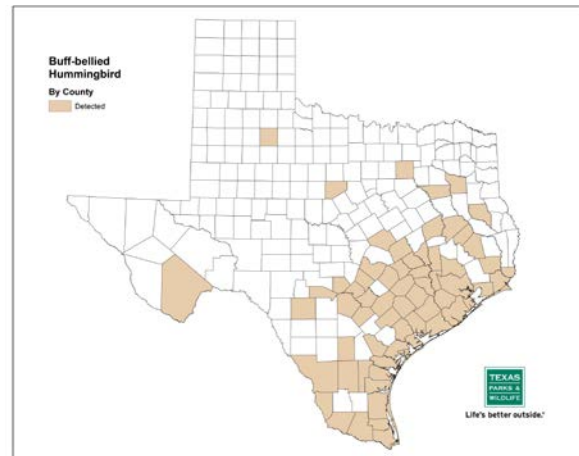
Map 7a. Broad-tailed Hummingbird distribution.
(*Hummingbirds of Texas* 2005)



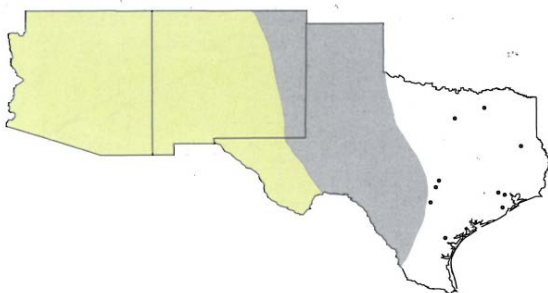
Map 7b. Broad-tailed Hummingbird reports from
Hummingbird Roundup (1994- 2015)



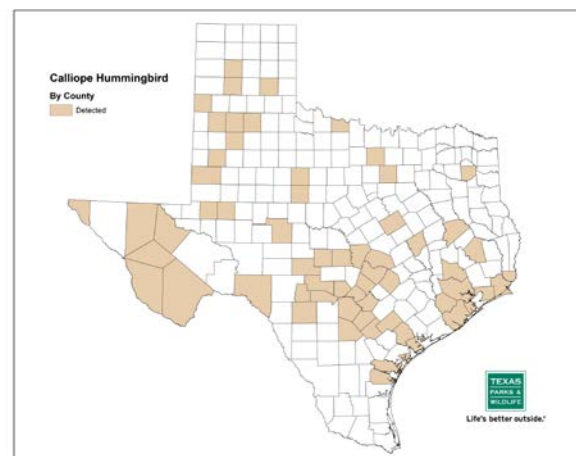
Map 8a. Buff-bellied hummingbird distribution.
(*Hummingbirds of Texas* 2005)



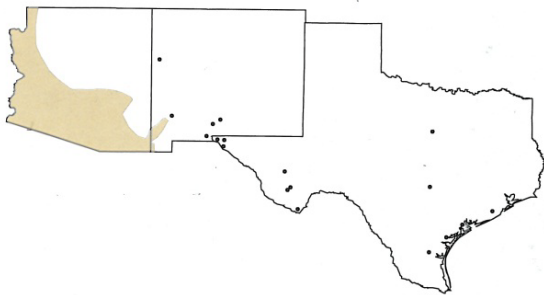
Map 8b. Buff-bellied hummingbird reports
from Hummingbird Roundup (1994- 2015)



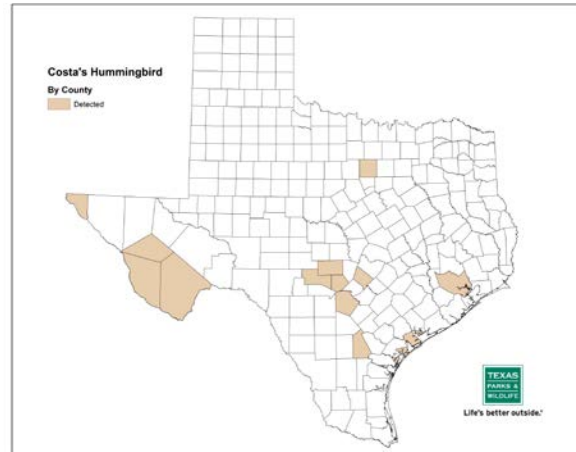
Map 9a. Calliope hummingbird distribution.
(*Hummingbirds of Texas* 2005)



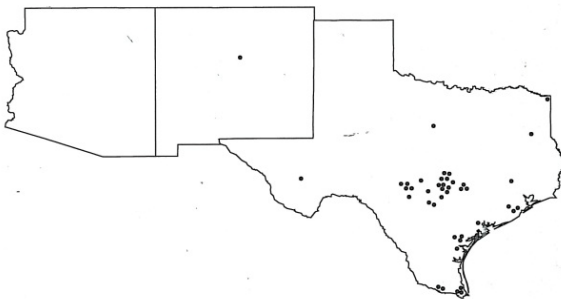
Map 9b. Calliope hummingbird reports from
Hummingbird Roundup (1995-2015)



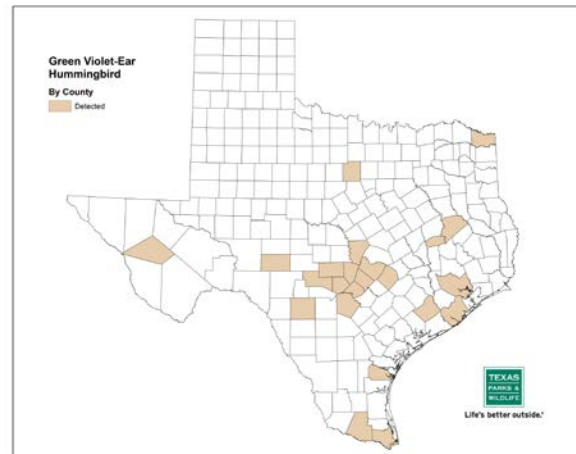
Map 10a. Costa's hummingbird distribution.
(*Hummingbirds of Texas* 2005)



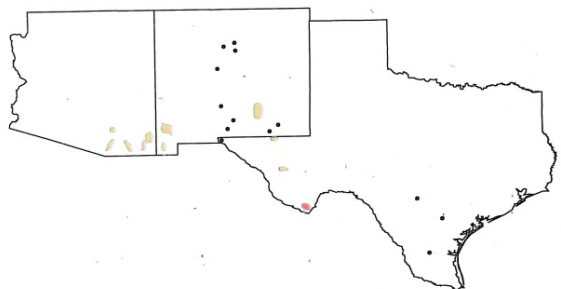
Map 10b. Costa's hummingbird reports from
Hummingbird Roundup (1995-2015)



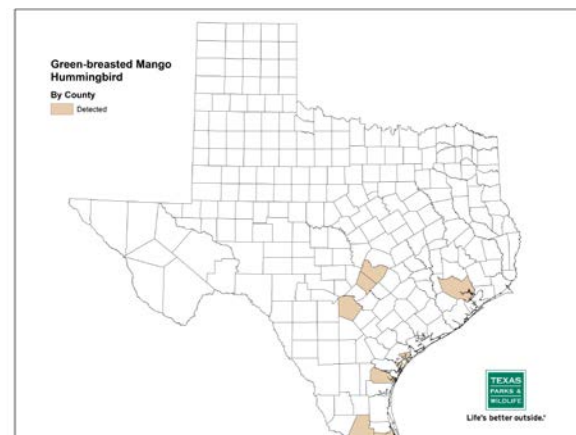
Map 11a. Green Violet-ear hummingbird distribution.
(*Hummingbirds of Texas* 2005)



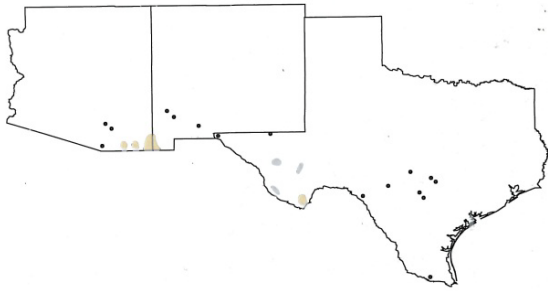
Map 11b. Green Violet-ear hummingbird reports
from Hummingbird Roundup (1995-2015)



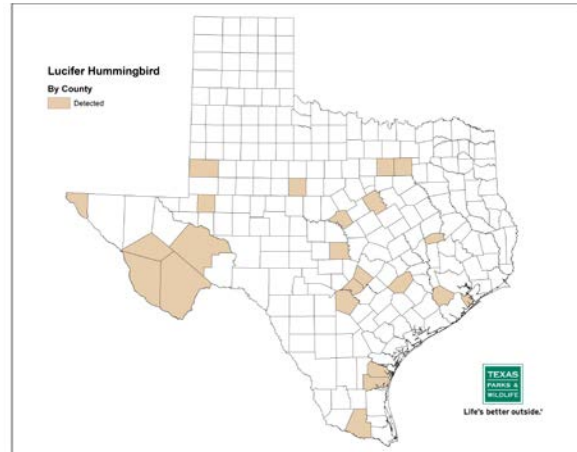
Map 12a. Green-breasted Mango hummingbird distribution.
(*Hummingbirds of Texas* 2005)



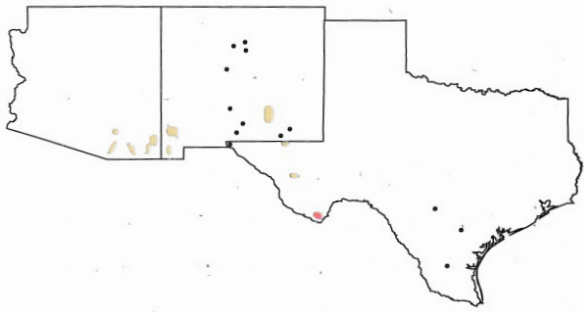
Map 12b. Green-breasted Mango reports from
Hummingbird Roundup (1995-2015)



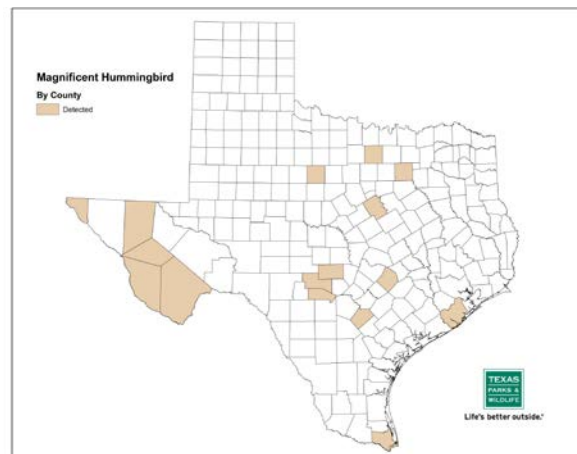
Map 13a. Lucifer hummingbird distribution.
(*Hummingbirds of Texas* 2005)



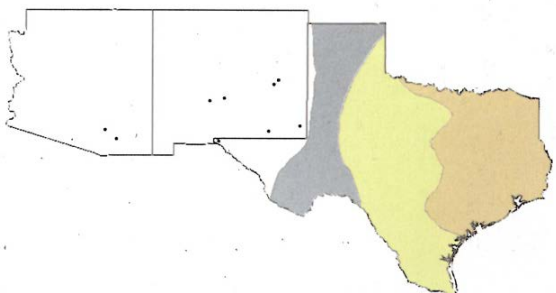
Map 13b. Lucifer hummingbird reports from
Hummingbird Roundup (1995- 2015)



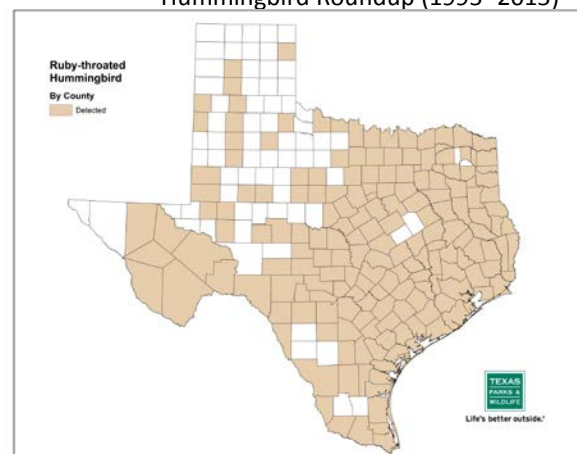
Map 14a. Magnificent hummingbird distribution.
(*Hummingbirds of Texas* 2005)



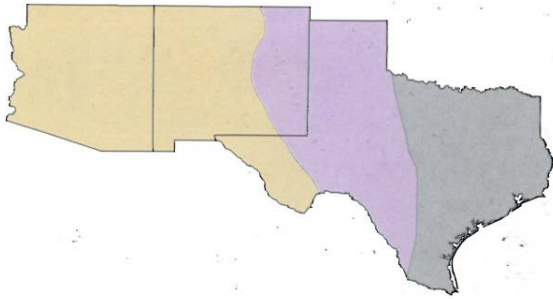
Map 14b. Magnificent hummingbird reports from
Hummingbird Roundup (1995- 2015)



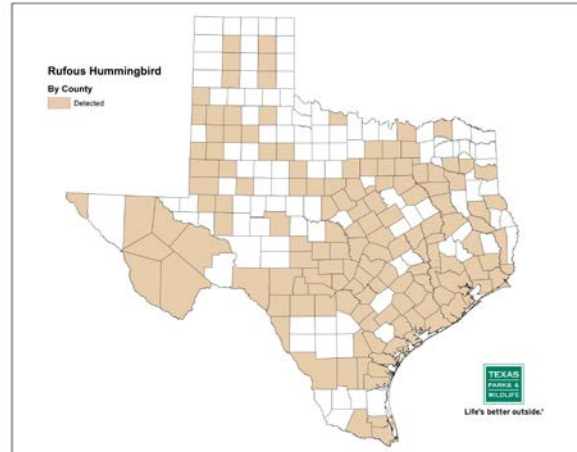
Map 15a. Ruby-throated hummingbird distribution.
(*Hummingbirds of Texas* 2005)



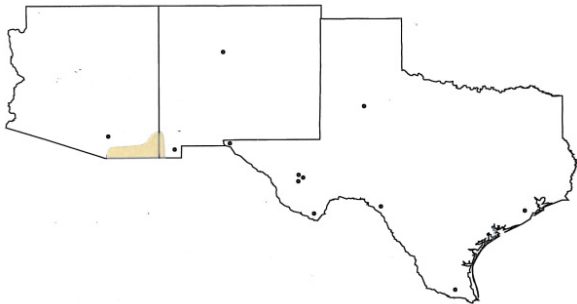
Map 15b. Ruby-throated hummingbird reports from
Hummingbird Roundup (1995-2015)



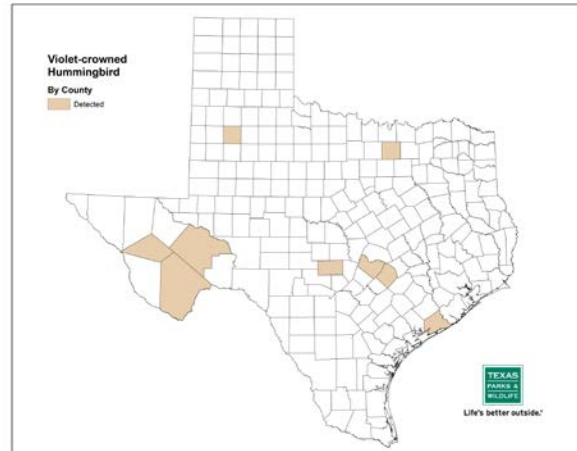
Map 16a. Rufous hummingbird distribution.
(*Hummingbirds of Texas* 2005)



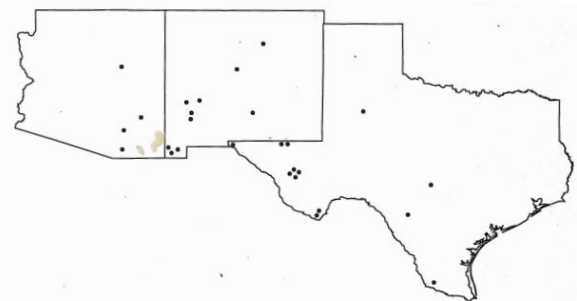
Map 16b. Rufous hummingbird reports from
Hummingbird Roundup (1995- 2015)



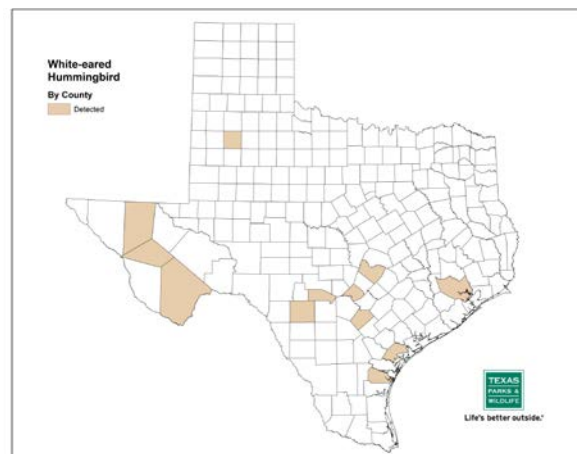
Map 17a. Violet-crowned hummingbird distribution.
(*Hummingbirds of Texas* 2005)



Map 17b. Violet-crowned hummingbird reports from
Hummingbird Roundup (1995-2015)



Map 18a. White-eared hummingbird distribution.
(*Hummingbirds of Texas* 2005)



Map 18b. White-eared hummingbird reports from
Hummingbird Roundup (1995- 2015)