TEXAS NATURE TRACKERS

Wildlife Diversity Program
3000 IH-35 South, Austin, Texas 78704
www.tpwd.state.tx.us/tracker

The Texas Nature Tracker

TEXAS PARKS & WILDLIFE

2006

Catching Up!

with

Marsha May Reimer, TNT Coordinator

What's new with Texas Nature Trackers?

Well, check out the new Texas Nature Tracker project – Texas Black-tailed Prairie Dog Watch. The prairie dogs are important keystone species of the grasslands providing food and shelter for as many as 170 other animals. The monitoring packet for this project won Outstanding Technical Publication at the Texas Chapter of the Wildlife Society Annual Meeting on South Padre Island, February 2006.

Another new project is the Texas Box Turtle Survey. When was the last time you saw a box turtle? Although many Texans can recall frequent encounters with box turtles in backyards, on ranches and along roadways in the past, many Texans report that they now are hard to find.

For more information on these and other Texas Nature Tracker projects, please go to our web site at: www.tpwd.state.tx.us/tracker

A Special Thanks to all of our Texas Nature Tracker Partners

for taking our Train the Trainer Texas Amphibian and Mussel Watch workshops and spreading this important information throughout their communities. TNT partners currently include eight Texas Master Naturalist Chapters and two Nature Preserves. We really appreciate all of the time and effort that the following groups

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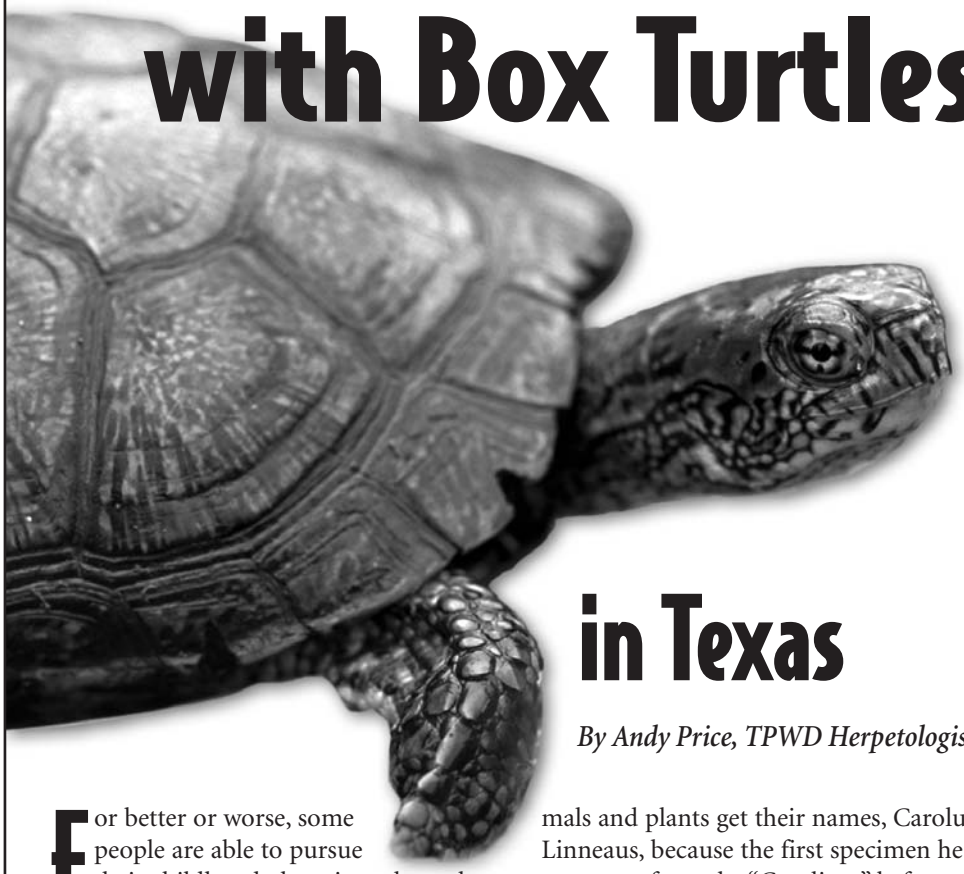
What's Happening with Box Turtles in Texas



By Andy Price, TPWD Herpetologist

For better or worse, some people are able to pursue their childhood obsessions throughout life. So I decided to become a herpetologist, someone who pursues the study of reptiles and amphibians for a living, not a very lucrative job and I'm sure not the idea my father had in mind when he advised me as a young man to "get a job doing something you like." And so here I am, and one of the reasons is my fascination with turtles. One of the first turtles I got to know was the Eastern Box Turtle, *Terrapene carolina carolina*, so named by the father of the modern science of the way in which animals and plants get their names, Carolus Linneaus, because the first specimen he saw came from the "Carolinas" before the united states became a country following the revolutionary war. Its common name is also very descriptive because it can close itself tightly into its shell (like a box) when disturbed. A land turtle, the several species in the genus occur from forests through deserts in North America, and there are several isolated species in Mexico, including one at the unique cuatro ciénegas which is aquatic!

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Catching up ...

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have put into this partnership. They are assets to their communities.

- Rolling Plains Master Naturalist Chapter – Wichita Falls
- Capital Area Master Naturalist Chapter – Austin
- Gulf Coast Master Naturalist Chapter – Houston
- Rio Grande Valley Master Naturalist Chapter – Brownsville
- Big Country Master Naturalist Chapter – Abilene
- North Texas Master Naturalist Chapter – Dallas
- Mineola Nature Preserve – Mineola
- Forest Glenn Springs Preserve – Rosebud
- Rio Brazos Master Naturalist Chapter – Granbury
- Heart of Texas Master Naturalist Chapter - Waco

There are over 30 Texas Master Naturalist Chapters and even more Nature Preserves in this wonderful state of ours. If every one of them became a TNT partner, the number of Texas citizens involved in these monitoring efforts would be absolutely amazing!

2005 Texas Amphibian Watch:

Dedication in the Drought

by Lee Ann Linam, TNT Biologist

When it rains it pours. And when it doesn't it doesn't… In 2005 Texas Amphibian Watchers saw the abundant rain of 2004 disappear. In the eastern and southern portion of the state rainfall was 50% below normal, and Central Texas received only about 2/3 of its normal rainfall. Despite the very slow breeding season for frogs and toads in much of the state, participation by our volunteers climbed again. In 2005:

- Data forms were submitted to TAW by 27 volunteers, for a total of 54 participants.
- Data were submitted from 37 counties, raising the total participation from 69 to 81.
- Data were analyzed from 44 TAW sites and five FrogWatch USA sites, raising the total number of sites monitored to 108.
- Data were collected at an additional 16 sites using automated frogloggers.
- Data were collected on 25 roadside transects, each representing 10 sampling points.
- Data were submitted from one monitoring site for Jollyville Plateau Salamanders (*Eurycea tonkawae*) and for three other salamander species.
- Texas Amphibian Watch has now collected data on 41 of the 42 extant frog species in the state.

The "big five" continue to dominate calling choruses in Texas, with no change in the most commonly reported amphibian species in the state over the last seven years:
Cricket frog (*Acris crepitans*) – 49 counties
Bullfrog (*Rana catesbeiana*) – 43 counties

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Texas Amphibian Watch — Brownsville.

Box turtles ...

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When I was about six years old we lived in (then rural) Arlington, Virginia, and I caught a couple of box turtles at the edge of some woods that were being cleared (of course, I didn't understand or even wonder why). They became my friends and we played together all over the neighborhood. I kept them in my backyard and fed them what you typically do; fruits, vegetables and meat. I came to realize growing up that my mother was a very tolerant woman, and encouraged my brothers and me to acquire first-hand knowledge about the natural world around us. For instance, I can remember her helping me raise tadpoles I brought home in my lunchbox, and staying up all night with me dropper-feeding a newborn litter of opossums whose mother had been hit by a car. Nevertheless, my parents' patience only went so far; they made me release my box turtles when they suffered injuries at my hands. Not knowing any better, I figured that my box turtle friends would enjoy the same things I did, including sliding down my backyard slide. I console myself now by realizing that box turtles routinely get cracked shells for one reason or another in the wild, and the shells typically heal with nothing worse than a scar.

My grandparents owned a truck farm in Arkansas on which they raised cotton, strawberries and chickens, and we would go to visit them almost every summer. I can still remember my brothers and I chasing chickens around the chicken coop, and my grandmother catching one to prepare for Sunday dinner (don't ask how, for that's another story). We used to roam around the fields, woods and swamps in the area, catching whatever amphibians or reptiles we could and them releasing them after awhile. Naturally one of our prizes was box turtles, which were quite common, even coming up into the yards of suburban houses like the one my cousin lived in. One day, we each took one of our prizes to a local community and entered them in a box turtle "race." The "racecourse" consisted of a circle chalked on the street with ever expanding concentric circles around it, much like an archery target. Everybody placed their box turtle in the center ring, and the first turtle to reach the outer circle won the race. My turtle won, and my prize was another turtle someone had abandoned and $5 – as far as I know, that $5 is still in a bank somewhere down there, probably making me rich …

Time passed and I aged, going to college in Florida and graduate school in New Mexico. I would always see box turtles along the edges of Interstate 20 between Texarkana and Little Rock on my way to visit my folks who had retired there. Don't see 'em any more. So, what's happened to our box turtles? There are many purported reasons, each with its own acolytes but precious little evidence to back them up. Commercial exploitation, habitat destruction, fire ants; you name it. The Texas Parks and Wildlife Department (TPWD) initiated a statewide survey last year, asking Department staff and citizens statewide to record and send in box turtle sightings along with ancillary data about sex, size, habitat associations, etc. The goal is to begin assessing box turtle populations in Texas by asking Texans to help by getting a first glimpse of what's out there now. Y'all sent in 574 sightings last year, 271 Eastern Box Turtles, 272 Ornate Box Turtles and 31 in which the species was unrecorded. Eastern Box Turtles were reported from 52 counties, Grayson County led with 40, followed by Cooke County with 14 and Anderson County with 13, while 15 counties reported a single observation each. Corresponding numbers for Ornate Box Turtles were 72 counties, Cottle County leading with 99 observations (thanks to TPWD biologist Chip Ruthven on the Matador WMA), followed by Briscoe County with 13, while 37 counties reported a single observation each. A single report from Caldwell County did not identify the species, otherwise the remainder of the unknowns came from counties in which one or both species were recorded. Interestingly, females of both species were encountered slightly more often than males. More Eastern Box Turtles were seen in May (132 observations) followed by June with 60, whereas Ornate Box Turtles were most commonly reported in June (83 sightings) followed by May with 68 and July with 61. The first Eastern Box Turtle was seen in March and the last one in December; corresponding dates for the Ornate were February and October. As is typical for most reptiles, box turtles were most often seen before 11 a.m. and a smaller peak of activity occurred in the late afternoon after 5 p.m.

A lot of interesting data remain to be analyzed, but as you can see your efforts have paid off in providing a first glimpse of the status of box turtles in Texas. TPWD is continuing this effort, so please continue to send in your sightings. You can find the sighting form at www.tpwd.state.tx.us/learning/texas_nature_trackers/box_turtle_survey/, or you can write or call us at: Texas Nature Trackers, Texas Parks and Wildlife Department, 3000 IH-35 South, Suite 100, Austin, Texas 78704, (800) 792-1112, ext. 7011 and we can send you hard copies. You can even send your sightings "freestyle" using the form as a guideline for the information we'd like to get.

Below are a few references you may find interesting about turtle conservation worldwide and box turtles in particular. Thanks for participating in this effort!

Dodd, C.K., Jr. 2001. *North American Box Turtles: A Natural History*. Univ. Oklahoma Press, Norman.

Schwartz, C.W. and E.R. Schwartz. 1974. *The Three-toed Box Turtle in central Missouri: its population, home range, and movements*. Missouri Dept. Conserv. Terrestrial Ser. (5):1-28.

Schwartz, E.R., C.W. Schwartz, and A.R. Kiester. 1984. *The Three-toed Box Turtle in central Missouri, part II: a nineteen-year study of home range, movements and population*. Missouri Dept. Conserv. Terrestrial Ser. (12):1-29.

Van Dijk, P.P., B.L. Stuart, and A.G.J. Rhodin (eds.), 2000. *Asian Turtle Trade: Proceedings of a Workshop on Conservation and Trade of Freshwater Turtles and Tortoises in Asia*. Chelonian Res. Monogr. (2).

2005 Texas Amphibian Watch ...

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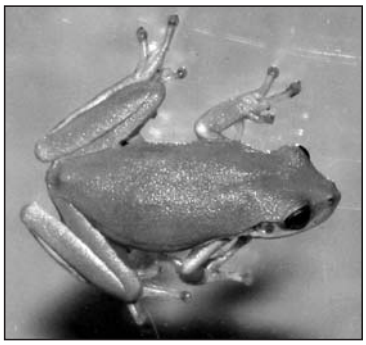
Green Treefrog (*Hyla cinerea*) – 43 counties
Southern Leopard Frog (*Rana sphenocephala*) – 40 counties
Gulf Coast Toad (*Bufo nebulifer*) – 32 counties

Anderson County in East Texas and Harris County in Coastal Texas have the highest frog and toad species totals for TAW, with 16 species each. They are followed by two other East Texas counties — Montgomery with 14 species and Trinity with 13 species. Cameron County in South Texas, Hays County in Central Texas, Fort Bend County in Coastal Texas and Houston County in East Texas have each reported 12 species.

Significant findings in 2005 included a report of Crawfish Frog calling in Anderson County in April and possibly in Wood County in September. This species is a secretive one about which more information is needed. Red-spotted Toads, which have not often appeared in our data, were reported calling in McLennan County in April. A volunteer in Grimes County provided photographs of a Cliff Chirping Frog (*Syrrhophus marnockii*) and a Rio Grande Chirping Frog (*S. cystignathoides*), both of which were not previously reported in that county. Significant data additions in 2005 included the addition of five permanent monitoring sites in South Texas, and submission of data from the five-year-long monitoring program at the Heard Natural Science Museum and Wildlife Sanctuary in North Texas. Thanks to Lisa Carrigan for soliciting those data for us.

Several partners joined Texas Amphibian Watch in 2005, including the Lower Rio Grande Valley, North Texas and Big Country Texas Master Naturalist Chapters and the Mineola Nature Preserve. TAW training workshops were also taught in 2005 in Austin by TNT staff, in Houston by Jaime Gonzalez and Scott Kiester in South Texas by the Lower Rio Grande Valley TMN, and in Dallas by the North Texas TMN. Our partners have already hosted several new workshops in 2006, and several new partners have come on board.



Green Tree Frog, photo by April Proudfit.

Finally, special individual recognition this year goes to **Betty Bouley, Scott Kiester and April Proudfit**. Betty collected data on ten different species at nine different locations in 2005. Scott, a member of the Gulf Coast Texas Master Naturalist Chapter, made 45 site visits and conducted one roadside route, collecting data on 13 species in the process. Scott also taught two workshops in 2005. April once again receives our diligence award, collecting data on 202 nights at her beautiful wetland location in Montgomery County. She heard a total of 12 species in 2005. Thanks to all three for their hard work!

It's never too late! … If you still have data from 2005 or previous years, you may still submit it. We are constantly updating our database in our attempt to monitor long-term trends.

Practice makes perfect! … Remember that you can practice call identification online at the North American Amphibian Monitoring program Web site: www.pwrc.usgs.gov/frogquiz/ (select "Public Quiz"). After some practice you may even decide you're ready to adopt one of the NAAMP roadside routes!

Texas Black-tailed Prairie Dog Watch:

by Marsha May Reimer, TNT Coordinator

Black-tailed prairie dogs (*Cynomys ludovicianus*) are an icon of the grasslands. These animals were once common in short and mixed grass prairies throughout the western mid-west, including Texas, Oklahoma, Arizona, Colorado, Kansas, Montana, Nebraska, New Mexico, South Dakota, North Dakota and Wyoming, as well as Canada and Mexico. Historically, millions of acres of Texas grassland were covered by prairie dog towns. Prairie dog towns in Texas now occupy less than 1% of their historic range.

Prairie dogs are an important part of the ecosystem. Their digging aerates and promotes soil formation, they clip back brush maintaining the short grass prairie and they are a keystone species providing food and shelter for as many as 170 different animals. A keystone species is a species that other species depend upon for survival.

Now, through participation in the Texas Black-tailed Prairie Dog Watch, you can help widen our understanding of prairie dogs and what is contributing to their decline. The Texas Parks and Wildlife Department (TPWD) needs your help to monitor prairie dog towns in your area by observing and collecting data. The data that is collected will help TPWD biologists to monitor population trends and develop more effective conservation and management methods.

For more information contact John Young at john.young@tpwd.state.tx.us or visit our Web site at: www.tpwd.state.tx.us/trackers

2004-2005 Texas Mussel Watch Notes

Marsha May Reimer, TNT Coordinator

"Who ever thought mussels would be so interesting or fun?" declared Rio Brazos Master Naturist, Elaine Bell. Elaine attended the April 2006 Texas Mussel Watch Train the Trainer workshop in Granbury. It is amazing how many Texas Mussel Watch volunteers are surprised when they realize that freshwater mussel monitoring is fun!

Freshwater mussels play an important role in aquatic ecosystems. Their filter feeding cleans the water of detritus and bacteria, and they are an important food source for many aquatic and terrestrial animals. There are about 53 species of freshwater mussels in Texas. About 38 percent of those 53 species are thought to be in danger of becoming extinct. These amazing creatures are very sensitive to changes in their environment which includes things like siltation from construction sites, pollutants, river flow alterations and salinity. Through Texas Mussel Watch (TMW), volunteers can help by monitoring populations of these incredibly beautiful and increasingly rare species, and help biologists map out their distributions. Our freshwater mussels truly are the canary in the mine!

During the 2004-2005 monitoring year, 20 TMW volunteers (Table 1.) collected mussel data from ten Texas drainage basins in 21 counties (see Figure 1.). This year volunteers amassed an astounding total of 191 volunteer hours. Volunteers observed 114 live unionid freshwater mussels, 196 shells and 313 valves (ranging from very-recently dead to subfossil). A total of 31 unionid species were found within ten drainage basins. Comparing the ten drainage basins examined in this study, the Sulphur River had the greatest number of unionid species, with a total of 17.

Table 1. Texas Mussel Watch Volunteers who collected and submitted mussel data during 2004-2005

Texas Mussel Watch Volunteers	
Alan Bartell and Students	Penny Miller
Dave Buzan	Jean Nance
Diane Cutler	April Proudfit
Edwin Dale	Will Reimer
Frances Fehribach	Ronald Rushing and Students
Leslie Fernandez	Cole Shankle
Laura Gillis	Jason Singhurst
Dian Hoehne	Brenna Toole
Mary Ligon	Michael Toole
Kathleen McCormack	Terry Young

Ten species on the Special Animal List by the Texas Biological and Conservation Data System (TPWD 2003) were recorded by TMW monitors.

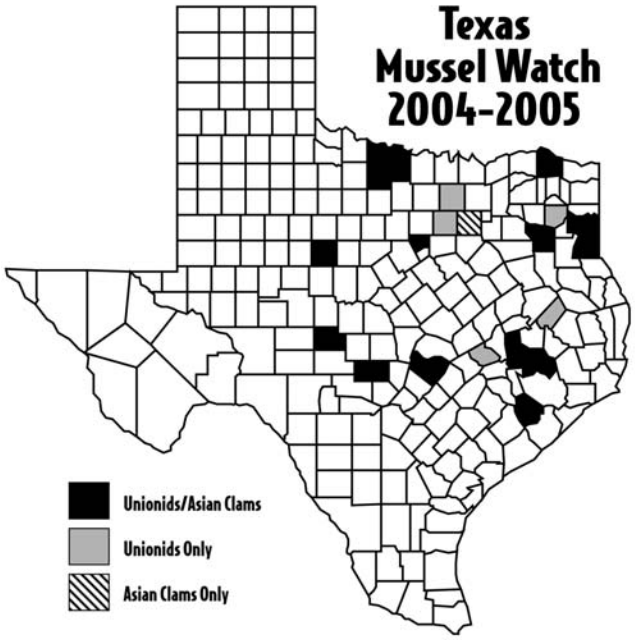


Figure 1. Counties where Texas Mussel Watch volunteers recorded unionid mussels and Asian clams (Corbicula fluminea).

Texas pigtoe (*Fusconaia askewi*)–Four live and two recently to relatively-recently dead shells were recorded in Harrison County in the Sabine River drainage basin; 1 shell and 1 valve, both long dead were recorded in Montgomery County in the San Jacinto drainage basin; 3 live and 3 recently to long dead shells were recorded in Panola County in the Sabine River drainage basin; and 2 very-long dead shells were recorded in Red River County in the Sulphur River drainage basin.

Wabash pigtoe (*Fusconaia flava*)–Three live and three recently to long dead shells were recorded in Panola County in the Sabine River drainage basin.

Sandbank pocketbook (*Lampsilis satura*) –One live, one shell and one valve, both relatively-recently to long dead were recorded in Red River County in the Sulphur River drainage basin.

Louisiana pigtoe (*Pleurobema riddellii*)–One long dead valve was recorded in Red River County in the Sulphur River drainage basin.

Smooth pimpleback (*Quadrula houstonensis*)–One relatively-recently dead shell was recorded in Burleson County in the Brazos River drainage basin; and five valves were recorded in Grimes County in the Navasota River drainage basin.

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2004-2005 Texas Mussel Watch ...

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Texas pimpleback (*Quadrula petrina*)–Twenty long to very-long dead valves were recorded in Menard County in the San Saba River drainage basin.

Creeper (*Strophitus undulatus*)–Three live and three very-recently dead to subfossil were recorded in Harrison County in the Sabine River drainage basin.

Pistolgrip (*Quadrula* (*Tritogonia*) *verrucosa*)–Three valves were recorded in Grimes County in the Navasota River drainage basin; six live and five recently to long dead shells were recorded in Harrison County in the Sabine River drainage basin; four live were recorded in Panola County in the Sabine River drainage basin; and four live, three shells and two valves that were relatively-recently to long dead were recorded in Red River County in the Sulphur River drainage.

Texas fawnsfoot (*Truncilla macrodon*)–One very-long dead shell was recorded in Hood County in the Brazos River drainage.

Texas Fawnsfoot.

Little spectaclecase (*Villosa lienosa*)–Three recently dead shells were recorded in Montgomery County in the San Jacinto drainage basin.

Asian clams (*Corbicula fluminea*) were recorded in 16 out of 21 counties. (Figure 1.)

Yet again, there were no observations of zebra mussels (*Dreissena polymorpha*) in Texas by any of our volunteers.

Texas Mussel Watch – Mineola.

We would like to thank every one of our Texas Mussel Watch volunteers for bestowing their precious time and energy by mucking around in the lakes, rivers and creeks collecting data on these wonderful creatures.

Data sheets for the 2005-2006 monitoring season are already flowing in. It looks like next year's report will be even better than this. Keep them coming!

For more information on Texas Mussel Watch, please go to our Web site at: www.tpwd.state.tx.us/mussels.

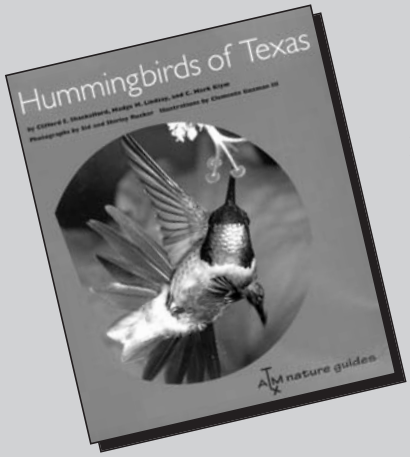
A Note from TPWD Ornithologist Cliff Shackelford

co-author of the book "Hummingbirds of Texas" (2005; Texas A&M University Press)

Some references state that the average hummingbird must visit 1,000-2,000 flowers per day to reach their necessary energy requirements. This would include sips from a backyard feeder. Insects are also important hummingbird food items, especially during the breeding season because they help build muscle in nestlings. Insectivory is about 10-12% of the diet of adults, too. Wildscaping your backyard can provide a healthy supply of gnats and other flying insects, since this is what they eat most from the insect world. Visit www.tpwd.state.tx.us/huntwild/wild/wildscapes/ for information on how to wildscape your yard for hummingbirds, butterflies and more. Hummingbird feeders are only part of the big picture. For part of each day, hummingbirds live the life of a tiny, hovering flycatcher. And they eat mosquitos, too!

Here are some hummingbird feeder tips:

- Keep feeders up year-round in Texas; we have very mild weather and some hardy hummingbirds
- Solution: 4 parts water boiled with 1 part white table sugar; never another type of sweetener
- Red dye is totally unnecessary and could be harmful since it's not part of the bird's natural diet; get a feeder with red plastic parts or hang red yarn or fabric to attract hummingbirds
- Clean the feeder every few days, especially during heat of the summer, and then replace it with fresh nectar; don't continue to serve them spoiled solution
- Don't fill up the feeder to the top if they don't drink it all in between cleanings

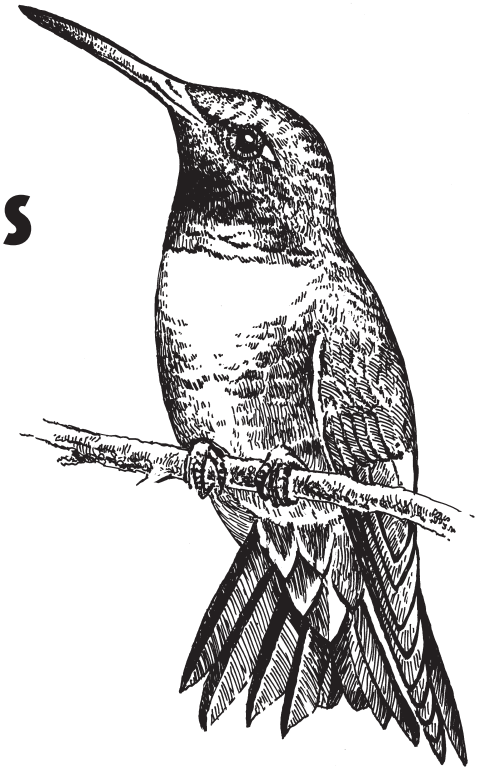


For more information on the book "Hummingbirds of Texas," please visit the Web site.

www.tamu.edu/upress/BOOKS/2005/shackelford.htm

Ruby-Throats and Black-Chins

By Jim Dillard, TPWD Wildlife Biologist in Mineral Wells



Something zipped past my head as I walked down a sandy pasture road the other day and disappeared into the lower limbs of an old post oak tree just ahead of me. As I approach the spot, a hummingbird suddenly appeared and hovered in mid air right in front of my face. We were nose to nose, eyeball to eyeball, neither one moving or batting an eye. She looked me over closely for a few seconds and then flew back into the leaves. Hoping that maybe, just maybe, I'd stumbled onto a nesting hummingbird, I parted the leaves for a closer look. Sure enough, dangling from the tip of a limb was her small thimble-size nest, made of spider webs and plant fibers, covered with lichens and leaf fragments. Inside were two tiny pea-size white eggs surrounded by a soft lining of down. I backed out of the brush, not wanting to disturb the hummer anymore than I already had. As I walked on down the road, she scolded and buzzed me with several strafing raids for intruding into her territory.

Early references to hummingbirds in North America were made by settlers in New England. On seeing one in 1634, colonist William Wood described "The Humbird is one of the wonders of the Countrey … no bigger than a Hornet … as glorious as the Rain-bowe." Audubon described hummingbirds he observed as a "glittering fragment of the rainbow … [a] lovely little creature moving on humming winglets through the air, suspended as if by magic in it, flittering from one flower to another." The French word for hummingbird is *oiseaumouche* which means fly-size bird, in Spanish, *colibrí* or *picaflor* (peck the flower) and in Portuguese, *beija-flor* (kiss the flower.) In Cuba, they just call them *zum-zums*.

Ruby-throated hummingbird

Two species of hummingbirds call the Cross Timbers home during spring and summer: the ruby-throated and black-chinned hummingbirds. Here in North Central Texas where their ranges overlap, this dynamic duo offers bird lovers a double-treat by their annual pilgrimage from south of the border. Timing of migration for both species coincides with the blooming of flowers and plants that provide nectar and increasing insect populations. Since they don't migrate in groups, it's unknown precisely what guidance they use to navigate north each year, particularly young that haven't been there before. Males migrate in advance of female.

From March to May, ruby-throats (*Archilochus colubris*) migrate from Mexico and Central America through Texas to points north and east and into southern Canada. Prior to migration, they increase their fat reserves and body weight by 50 percent to make the long trip. These birds fly nonstop over 500 miles across the Gulf of Mexico from Mexico's Yucatan Peninsula to the Texas and Louisiana coasts, leaving late one evening and arriving the next. They're the only hummingbird known to nest east of the Mississippi River. Many set up housekeeping in Central and East Texas and remain until September to December before heading south. And no! — they don't ride on the backs of geese; they're fully capable of making the trip all on their own. Ruby-throats that nest in Texas are thought to return overland to Mexico and points south.

Black-chins (*Archilochus alexandri*) also move through Texas during March to May but prefer the dryer country to the west from Central Texas across the semi-aired western United States and north to British Columbia. Some remain to nest in Central and West Texas and then return overland far south into Mexico during September to December.

Ruby-throat males tip the scales at 1/8 oz and females 1/7 oz. Both sexes are dark green above and white below, but males have iridescent ruby throats. Black-chins have black feathers on their throat with an iridescent purplish band at the bottom; otherwise they look similar to ruby-throats. Iridescent feathers on the throat of males, called the gorget, amplify certain wavelengths of light and reflect them directly in front of them. When viewed from the side, these feathers may appear black. The mechanism regulating iridescence involves the alignment of complex feather structures called barbules which contain layers of microscopic disc and tiny air bubbles. The color of iridescence is determined by minute differences in the thickness of the disc and the size of the air bubbles. Enough said.

Hummingbirds are specialized, to say the least. They can hover or fly backwards, sideways, up, down and even upside down for short distances. During cool weather or when food supplies are limited, their body functions slow and they go into a

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Ruby-throats ...

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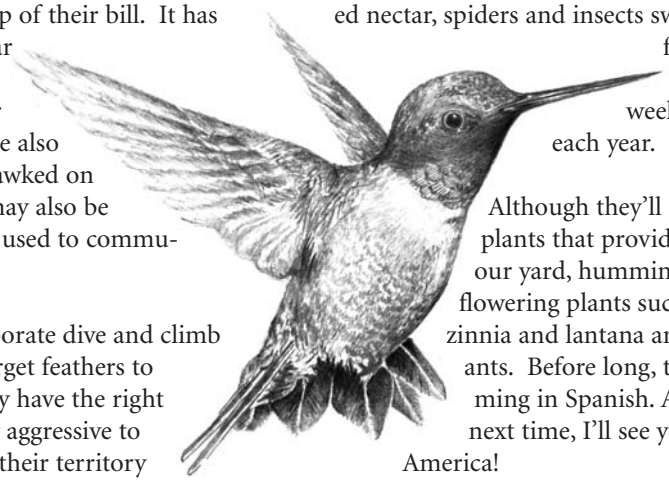
state of torpor. Normal heart rate is 650 beats per minute, but in flight increases to 1,250. Wing muscles make up 25-30 percent of their body weight. In hovering flight, their wings beat up to 80 times per second. Their tiny feet are used only for perching. They feed 50-60 times a day primarily on nectar using their tubular tongue which can extend well past the tip of their bill. It has grooves on the side through which nectar is carried by capillary action to the mouth. They lap rather than suck nectar from plants. Small insects and spiders are also plucked from flowers or flying insects hawked on the wing. Tree sap exuding from trees may also be consumed. Numerous vocalizations are used to communicate hummer to hummer.



Courtship by males usually involves elaborate dive and climb maneuvers and flashing of iridescent gorget feathers to impress prospective mates and show they have the right stuff. Males and females are territorially aggressive to interlopers and will take on anything in their territory they perceive to be a threat. After mating, males go their way and females raise the family all by themselves. She builds a nest on a tree branch using spider webs, plant fibers and down, lichens and small pieces of bark, leaves or flowers. Eggs of ruby-throats hatch in 11-16 days and 13-21 for black-chins. Young are fed regurgitated nectar, spiders and insects sword-swallower style with the female's long bill. Young grow quickly and leave the nest in 2-3 weeks. Multiple broods may be raised each year.

Although they'll use sugar water feeders, flowering plants that provide nectar are their first choice. In our yard, hummingbirds feast on some of my favorite flowering plants such as althea, honeysuckle, salvia, zinnia and lantana and leave the feeder to the bees and ants. Before long, they'll be zooming south and humming in Spanish. Adios colibri, hasta la vista. Until next time, I'll see you down the road and God Bless America!

Luling 4-H Safeguards Palmetto Pill Snail

by Lee Ann Linam, TNT Biologist

Luling 4-H members under the leadership of leader Melba Sexton are doing their part to help rare gastropods.

The 4-H youth, along with occasional volunteers from Austin Community College, have sampled riparian habitats at Palmetto State Park since 1999 in order to monitor the palmetto pill snail. The small snail, which is endemic to the park and may have once been widespread in its unique palmetto wetlands, now only can be found at one site — a wetland maintained by a hydraulic pump.

The youth and their assistants discovered that the snail is always found within four feet of the water's edge and thus have been able to refine their surveys to obtain better results. Surveys indicate that the snail population is stable, and even though heavy rains interrupted the 4-H club's monitoring efforts this year, volunteers Meredith, Kaitlin, Travis and Mickie were able to quickly locate two live snails and three additional shells.

For more information about the snail, its habitat, and the student volunteers, see the Nov. 2005 issue of *Texas Parks & Wildlife* magazine.

Texas Hummingbird Roundup

By Mark Klym, Texas Hummingbird Roundup Coordinator, and co-author of the book "Hummingbirds of Texas" (2005; Texas A&M Univ Press)

Buff-bellied hummingbird

The 2006 hummingbird nesting season is well under way and already a few surprising, probably post nesting dispersals are beginning to show up around the state. Hays County has recorded not one, but two and possibly three Buff-bellied Hummingbirds this past month. In West Texas, Broad-billed Hummingbirds are again being seen in South Brewster County. Both Travis and Nueces Counties are reporting Green Violet-ears. This could be another year in which Texas records nearly a complete pallet of the hummingbirds known from the state. Last year, only two species were not reported in the Hummingbird Roundup – the Berylline Hummingbird and the Costa's Hummingbird. Of those, Costa's has already been recorded (Aransas County, 2/06) in 2006.

There have been some interesting changes made to the Hummingbird Roundup web site. It can be visited at www.tpwd.state.tx.us/hummingbirds, and offers both technical guidance and easy access to hummingbird roundup materials. The 2006 surveys can be accessed from the web site.

Monarchs rebound in 2005, improve further in 2006...

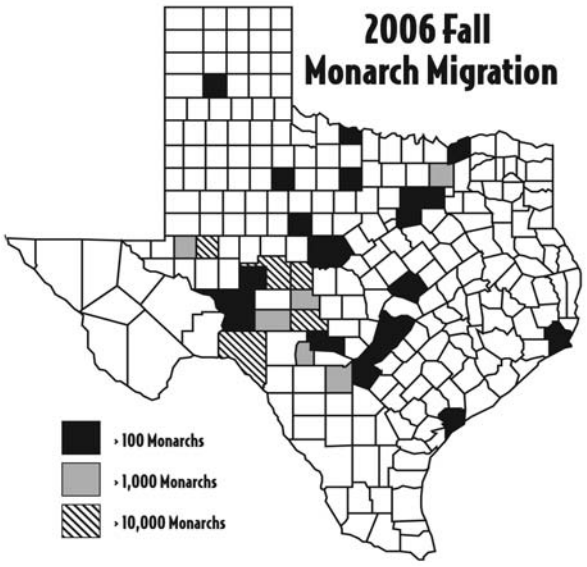
By Mike Quinn, TPWD Invertebrate Biologist

Good news! The annual measurement of the monarch overwintering colonies in Mexico showed that they *nearly tripled* in size, from a record low 2.19 hectares the previous winter to 5.92 hectares of occupied forest habitat last winter!

That it would be a good winter for the monarchs was predicted by numerous observations all along their fall migration route. Before they even left the northern reaches of their summer breeding grounds, they were already reported in the high hundreds. One observer in Minnesota recorded 900 monarchs on a single night in late August 2005!

By late September 2005, the monarchs were streaming across the Red River. In October, reports of hundreds of monarchs became the norm from the Dallas Metroplex west to Midland-Odessa. Texas Monarch Watch volunteers emailed, called or mailed in the following observations:

- One hundred or more monarchs were reported from 31 Texas counties.
- One thousand or more monarchs were reported from 11 Texas counties.
- Ten thousand or more monarchs were reported from Concho, Kimble, Midland, Tom Green, and Val Verde counties. (These last counties all lie in west-central Texas roughly between Junction and Midland.) see map.



By the end of October 2005, the vast majority of the migratory butterflies had crossed the Rio Grande into Mexico. However, not all monarchs migrate to Central Mexico. South Florida's overwintering population is well known, but that monarchs have recently taken up permanent residency along Texas' Upper Coast is less well

known. Milder winters and widely planted Tropical Milkweed (a preferred caterpillar food plant) may be inducing non-migratory behavior all along the Coast. Many monarchs found safe harbor last winter across the northern Gulf Coast and amazingly even up the Atlantic Seaboard as far north as Virginia!

Still, the majority of butterflies migrate to the Monarch Butterfly Biosphere Preserve in Michoacán, Mexico; their arrival coinciding with one of Mexico's most popular holidays, Día de los Muertos or the Day of the Dead celebrated each Nov. 2nd. The monarchs' arrival is woven into the local folklore by the belief that the butterflies represent the returning souls of the people's deceased relatives.

By mid-December 2005, the monarchs coalesced into fairly dense colonies. Late each December, Mexican biologists begin the arduous task of measuring the size of each colony, some of which are quite remote and most are above 10,000 feet. The surveying effort of the Mexican biologists yields the official annual monarch population benchmark. As mentioned above, last winter the monarchs occupied 5.92 hectares or 14.6 acres of forest habitat. The annual benchmark is represented by the size of the forest area occupied rather than the actual number of insects due to the widely disparate estimates of between 10 and 50 million monarchs per hectare.

As the monarchs in Michoacan overwinter at high elevations near 10,000 feet, they periodically experience hard freezes. Fortunately, last winter was relatively mild and the hibernating monarchs didn't experience significant weather events to cause their population to crash.

Come March, the monarchs begin streaming out of their winter refuges. By mid March 2006, the monarchs were rapidly moving north through Texas on the final leg of a sojourn begun half a continent and over a half a year ago. The spring monarch migration,

continued on the page 10

Monarchs rebound ...

continued from page 9

composed of worn individuals approaching the eighth month of their adult life, coincides with the insects' lowest annual population level, yet spring 2006 reports from Texas Monarch Watch volunteers of double digit monarchs per location were coming in from scattered locations across Texas! Usually spring monarch reports consist mostly of singletons.

As the monarchs were laying eggs and pushing ever northward, observers in Arkansas and Kansas noticed that the monarchs were ahead of their historical schedule. Even though above average numbers of monarchs were being seen, the fact that they were early caused some to be concerned. Chip Taylor, of the University of Kansas' Monarch Watch, speculated that the spring drought in Texas may have induced monarch females to retain eggs and to seek favorable conditions further north and that might have unduly stressed the butterflies…

Well, by the end of June 2006, the monarchs were still expanding to new locations in Canada with many observers reporting above average numbers of all stages of monarchs!!! All indications in terms of monarch observations and current weather conditions in the upper Midwest suggest that this might be a banner year for the mighty monarch butterfly!

In late September when the monarchs again pour south across the Red River, we'll be watching the skies and looking for your reports! Please send them to mike.quinn@tpwd.state.tx.us.

Mailing address is Texas Monarch Watch, 3000 S. IH-35, Ste. 100, Austin, TX 78704

Hunt for elusive snail lets students experience science

By: Jessica Sanders, Staff Writer, New Braunfels Herald-Zeitung

The Horseshoe Liptooth Snail is an elusive creature.

New Braunfels High School students dug through leaves on the hillsides of Landa Park one morning in May in search of the mysterious mollusk.

"We're looking for snails with small flat shells, shaped like a pill" said Lee Ann Linam, wildlife biologist for Texas Parks and Wildlife Department.

Under Linam's instruction, the environmental science class dug under the leaves in search of the Horseshoe Liptooth Snail.

"I didn't think there would be that many snails [of other types], but they're everywhere," said senior Andi Juarez.

Linam, who led Denise Ortiz's environmental science class on their snail hunt, said the Horsehoe Liptooth Snail may only live in Comal County.

"It's associated with the unique habitat of the springs. Landa Park has a lot of endangered, threatened and unique species, and this might be one more," she said. "I think Ms. Ortiz's classes have probably done more work on this snail than anyone else ever."

Ortiz said her environmental science students have been seeking the Horseshoe Liptooth Snail for more than five years. As part of the curriculum, they use real-world science, such as testing bodies of water for the state of Texas.

This year, with 46 students on the hunt for the Horseshoe Liptooth Snail, some groups were occupied with testing the Landa Springs water or completing a vocabulary scavenger hunt. Ortiz said that the

Horseshoe liptooth snail monitoring.

research from the snail project will be used by the U.S. Fish and Wildlife Service.

"I think because this is 'real science,' they know what they are learning in class has a meaning to it," she said. "Environmental science is so easy to relate to real life."

Senior Eric Gutierrez said environmental science class encompasses many issues including climate changes and the effects on animals such as the Horseshoe Liptooth Snail.

"Ms. Ortiz told us that they only found like three live [Horseshoe Liptooth] snails in the last five years," he said.

While picking snails out of the dirt, senior Amy Pohl said that getting messy was a small price to pay for hands-on learning. "It's great that this information is going to make a difference in research somehow," she said.

Editor's note: This year Ms. Ortiz's students sampled 50 quadrats but found only one shell from a dead horseshoe liptooth snail. Since 1997 nearly 1,000 quadrats have been sampled, but only five live snails have been found, with the last live snail found in 1999. This snail appears to be extremely rare and may be highly imperiled.

Uniquely Texas rare plants in care of volunteers

By Dana Price, TPWD Botanist

Volunteers assisted TPWD biologists in monitoring several rare plant species during the fall 2005 and spring 2006 seasons. The plants discussed here are found only in Texas and are vulnerable to extinction. Volunteers are making a valuable contribution to our understanding of these species by collecting data and observations and finding new populations.

Bracted twistflower (*Streptanthus bracteatus*)
Spring 2006 was not a favorable year for *Streptanthus*. There was very little rain in the Hill Country during the late fall through early spring period when this annual mustard's seeds need to germinate. Nevertheless, volunteers collaborating with TPWD botanist Dana Price and City of Austin biologist Mark Sanders visited the twistflower sites and found a few plants at many of them. Although no plants were found at Garner State Park or San Antonio's Eisenhower Park, we expect to see the populations recover in a more favorable year. In Medina County, despite very dry conditions, homeowners Barbara and Darryl Dankenbring and Carolyn and Wayne Shaw had several plants on their lots. The heavy rains around Austin in March led to some late-emerging plants being detected late in the growing season. We had some pleasant surprises, including the appearance of a single plant at Bright Leaf SNA, where plants had not been seen for the past three years. Nancy Woolley, Sara Moore and Ross Bee monitored sites in the Austin area. Bee monitored Garner State Park with biologist Frank Roberts. Longtime volunteer Mary Kennedy monitored sites in Medina County.

Texas A&M University plant geneticist Alan Pepper visited many sites along with this year's monitoring, collecting small samples of leaf tissue for a study of the genetic variation within and among *Streptanthus* populations. Knowing whether any populations have unique genetic characters or may have become inbred will help the *Streptanthus* conservation team make decisions about conservation and reintroducing new populations.

Big red sage (*Salvia pentstemonoides*)
Because of safety concerns, TxDOT has asked TPWD to discontinue using volunteers to monitor the Frederick Creek site at I-10 near Boerne. However, things may be looking up for this site, which has experienced a long-term decline in numbers of plants and absence of flowering plants in the past two years. After consulting with TPWD and Cibolo Nature Center staff, TxDOT removed much of the invading woody vegetation from the site, mowed the area, and treated the poison ivy with herbicide in summer 2005. Price visited the site with TxDOT biologists in late June 2005 and documented a total of 78 rosettes, none with flowers. We are very hopeful that 2006 will show an improvement in the big red sage plants' condition.

Meanwhile, the Cibolo Nature Center (CNC) has acquired a new *Salvia* site on Cibolo Creek. The new site, named Mock-orange Canyon, is very diverse and fragile; access to it will be limited to avoid trampling the *Salvia* and other plants growing on rock ledges above the creek. CNC Citizen-Science Research Advisor Bill Ward has started a small reintroduction project at the Center, also on Cibolo Creek. Plants transplanted into two test sites began flowering in mid-June 2006. CNC volunteers will monitor these plots as plants are added each year to build a viable population.

Houston daisy (*Rayjacksonia aurea*) and Texas windmillgrass (*Chloris texensis*)
Mercer Arboretum and Botanical Gardens botanist Anita Tiller and volunteers Bob Harris and Dennis Samoska joined Texas Master Naturalist Terri Ficker and TPWD botanist Dana Price to monitor the Houston daisy sites in Addicks Reservoir. Although still extensive, populations continue to show declines. Two small sub-populations had no plants and the sites are increasingly overgrown by woody plants and taller grasses. One new site was located, and we hope that further surveys of known Texas prairie dawn (*Hymenoxys texana*) sites within Addicks will yield others. The rare plant threeflower broomweed (*Thurovia triflora*) is also found extensively within Addicks and was noted by the volunteers at numerous sites.

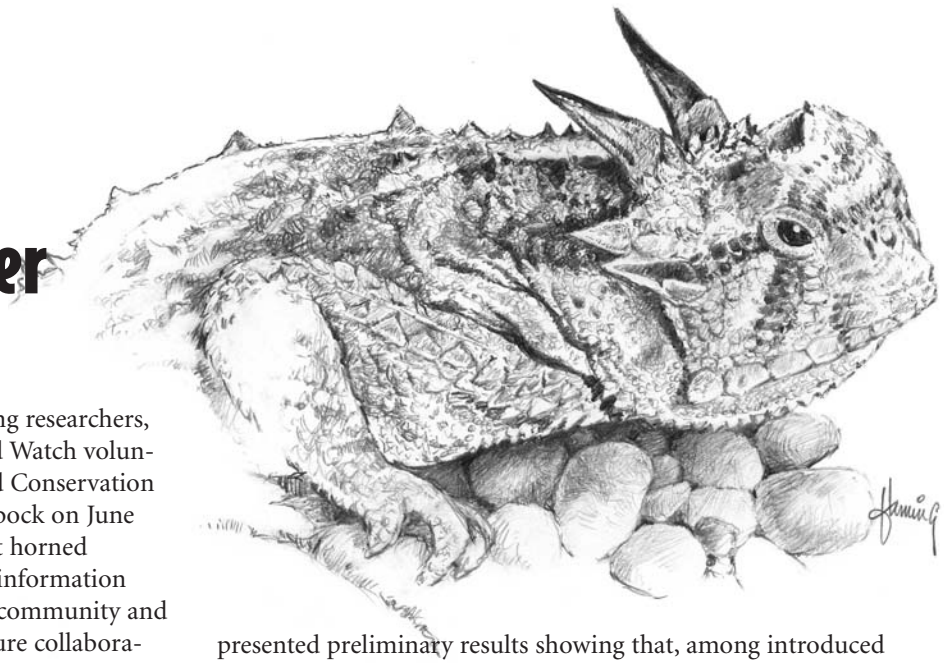
Texas Master Naturalist Lisa Yelenick joined Price to monitor Houston daisy and Texas windmillgrass sites on roadsides in the Cypress area. Although some roadside sites have been lost, many benefit from occasional mowing and persist as long as they are left in native vegetation. At one intersection that receives regular mowing, both species are holding their own. Future improvements are planned to the intersection, so volunteers may be needed to rescue plants — stay tuned!

At North Harris College, Janis Hartgrove and three student volunteers joined TPWD biologist Lee Ann Linam to monitor the Houston daisy. The area occupied by the daisy was slightly less than in recent years due to a recent mowing of one side of the site. The other side, which had been mowed very little, contained the majority of the daisy and an abundance of native prairie species up to 1.5 meters in height.

The Katy Prairie Conservancy (KPC) offers volunteers opportunities to monitor rare plants in fall and spring. In 2004, land manager Wesley Newman identified Texas windmillgrass on one of KPC's tracts. Volunteers have helped delineate the extensive populations of threeflower broomweed (fall) and Texas prairie dawn (spring) on KPC's Jack Road South tract. Bob Harris, Anita Tiller and Hillary Loring assisted with monitoring at this important site. Although Houston daisy does not occur on this tract, the habitat appears suitable for a reintroduction project.

Many thanks to the volunteers and partners who are helping assure the continued viability of some of our rarest Texas plants!

Lubbock Workshop Pulls Horned Lizard Aficionados Together



By Lee Ann Linan, TNT Biologist

More than 40 fans of horned lizards, representing researchers, students, field biologists, Texas Horned Lizard Watch volunteers, Texas Master Naturalists, Horned Lizard Conservation Society members and landowners, gathered in Lubbock on June 4-5, 2005 to share information and questions about horned lizards. The purpose of the workshop was to offer information about horned lizards to interested members of the community and to allow researchers to meet together to discuss future collaborations and coordination regarding techniques, goals, etc.

Saturday's meeting on the campus of Texas Tech University included a varied assortment of papers on horned lizard biology, research methods, survey efforts, propagation, reintroduction and landowner incentives. During a morning session Chip Ruthven of Texas Parks and Wildlife Department (TPWD) presented an overview of Texas horned lizard biology, comparing some life history attributes of South Texas populations with other preliminary findings in the state. His presentation noted that body size, clutch size, and length of active season were greatest in South Texas and declined with increasing latitude. Chris Mostyn (TPWD) and Beth Moeller (Fort Worth Zoo) presented the results of burning and grazing studies on the Chaparral Wildlife Management Area. Chris noted that moderately grazing and prescribed burning seemed to produce quality horned lizard habitat as measured by home range sizes. Beth noted that highest survival occurred in habitats that had received winter burns as part of their management treatment. Eric Hellgren (Oklahoma State University) presented data from Tinker Air Force Base showing that this very urban population of horned lizards is experiencing good survival on a habitat that does not have red harvester ants.

The afternoon session addressed a variety of topics. Lee Ann Linam (TPWD) presented data from Texas Horned Lizard Watch that supports the idea that horned lizards are faring best in the western two-thirds of the state, but also offered hopeful results from the Post Oak Savannah ecoregion. Jim Mueller (Sul Ross State University) discussed efforts to use line transects to estimate horned lizard abundance, indicating that openness of the habitat and ground temperatures were important considerations in the accuracy of this method. Bart Drees (Texas Cooperative Extension Service) provided an interesting discussion of options available to control imported red fire ants while maintaining native ant populations. Size of the property, density of fire ant populations and method of pesticide application are important considerations in selecting treatment methods. Gad Perry (Texas Tech University) presented preliminary results showing that, among introduced pasture grasses, WW-B.Dahl seems to allow a lower density of fire ants than other nonnative grasses.

Wendy Hodges (UT-Permian Basin) presented results of a horned lizard reintroduction experiment in Central Texas. Although habitat at the site was apparently suitable, survival of the released lizards was extremely low, with no population establishment. Aaron Dickey (Fort Worth Zoo) discussed some of the challenges of hibernating horned lizards in captivity and described the zoo's success with an artificially-chilled system. Mike Miller and Shelly Plante (TPWD) then offered a list of suggestions and resources for private landowners who might be interested in habitat improvement and nature tourism for horned lizards on their property.

Following the paper session, a business meeting for the Texas Chapter of the Horned Lizard Conservation Society was held and researchers convened to discuss communication, standardizations and future collaborations.

On Sunday participants enjoyed a field trip to the scenic Beach Ranch in Garza County near Post. This ranch (8,000 acres) is working with TPWD, the Lubbock Audubon Society, Texas Tech University and others to restore the Rolling Plains ecosystem. They have successfully reestablished prairie dog and Burrowing Owl populations using releases from the South Plains Wildlife Rehabilitation Center. Horned lizard research is ongoing at the site, and Tech student Jacob Goldfarb located a radio-transmittered horned lizard during the group's visit. Field trip participants also found four more horned lizards, three ornate box turtles and two diamondback rattlesnakes in addition to the many prairie dogs, Burrowing Owls and jackrabbits.

Sponsors of the workshop were the Horned Lizard Conservation Society, TPWD, UT-Permian Basin and Texas Tech University. Abstracts of the presentations offered at the meeting can be found at the Horned Lizard Conservation Society Web site www.hornedlizards.org.

Horned Lizard Watchers Help Fill in the Gaps

By Lee Ann Linan, TNT Biologist

Texas Horned Lizard Watch participation dropped in 2005, but participants are still helping to "fill in the gaps" in our knowledge of the status of horned lizards around the state.

Seven new counties added data to Texas Horned Lizard Watch in 2005, bringing the total number of counties participating to 164. In 2005 a total of 14 volunteers submitted data sheets, while an additional 26 informal reports were received. THLW now has had 175 people formally participate.

Congratulations to **Karen Crisman** for submitting her fifth year of data in 2005! Some other notable contributions in 2005 included **Jeff Bonner**, who submitted sightings from four counties; **Beverly Kitzman**, who collected data on 16 different dates, and the **Palo Alto Battlefield National Historic Site**, whose staff reported 29 sightings. We appreciate the efforts of all of our watchers!

Texas Horned Lizard Watch findings in 2005 were similar to results over the previous six years; however, results indicate a more optimistic ranking for some counties. Positive findings in Potter County in the Texas Panhandle and in Brown and Tom Green counties in the Rolling Plains indicate that over 80% of our watchers still find horned lizards in those counties. Positive reports were received for the first time from Blanco and Gillespie counties in the Hill Country and Denton County in the Blackland Prairie of North Texas, indicating hope for the species in those areas (Figure 1). For the second year sightings of a horned lizard laying eggs was reported from Tarrant County.

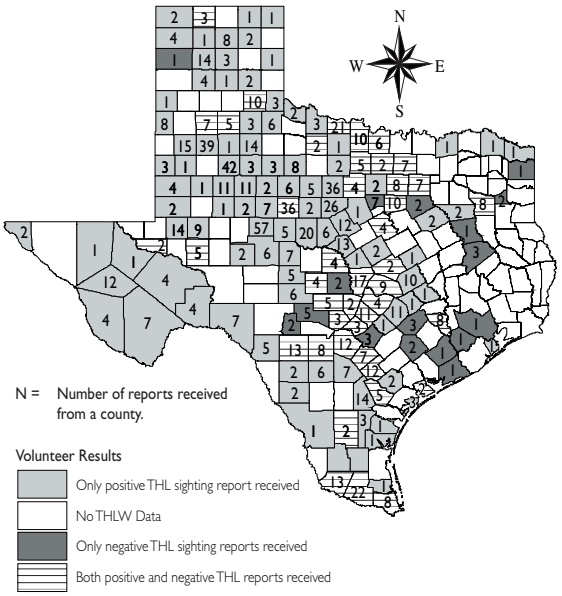


Figure 1. Texas Horned Lizard Prevalence — based on 1997-2005 Texas Horned Lizard Watch results.

2005 Texas Horned Lizard Watch sightings were combined with results from the 2002-06 Hometown Horned Toads essay contests, interviews of TPWD biologists, and attendees at 2004-2005 Texas Parks & Wildlife Expo to produce a map depicting dates of recent sightings across the state. Results indicate that, while horned lizards may be more rare now than in the past, they still have been seen recently in many parts of the state. That's good news! See Figure 2 for dates of sightings in your county.

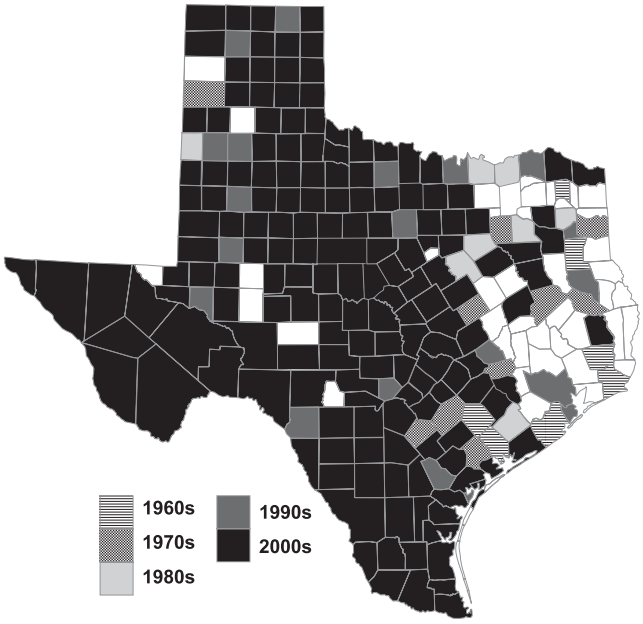
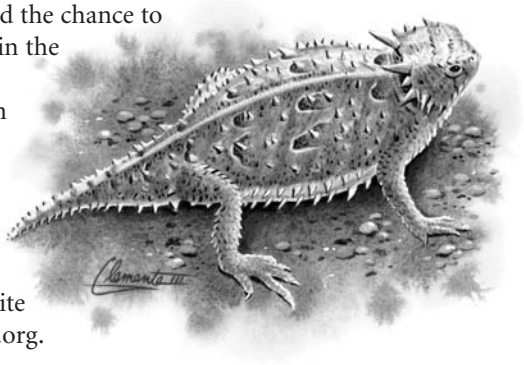


Figure 2. Most recent decade in which horned lizards were reported sighted. Source data: 2004 interviews with TPWD biologists, 2004/2005 visitors to Texas Parks & Wildlife Expo, Texas Horned Lizard Watch (1997-2004 data). Hometown Horned Toads essay contest (2003-2006 interviews).

For more information on Texas Horned Lizard Watch visit www.tpwd.state.tx.us/hornytoads/.

Still wishing you had the chance to see a horned lizard in the wild? The Horned Lizard Conservation Society offers regular field trips and volunteer opportunities each year. Find out more at their Web site www.hornedlizards.org.



Horned Lizards in my Hometown? Where!?!

By Heather Cardella, TPWD Intern

This is the very question that Kimberly Robinson and K.J. Parker, along with other curious and creative students have been investigating for the Texas Parks and Wildlife Department (TPWD) Hometown Horned Toads Essay Contest. Across the state, students have been interviewing family, friends and other local residents and digging deep into local records to find stories, memories and facts about horned lizards in their hometowns.

Kimberly Robinson from Krum, Texas, had seen horned lizards during a family vacation in Oklahoma. After reading the story in her local paper about the Hometown Horned Toad Essay Contest, she decided to enter and investigate what had happened to the horned lizards in Krum. After interviewing local residents in person, she put out survey boxes and a survey in the newspaper to gather more stories and information. Replies poured in as people responded with answers and horned lizard stories from their youth.

Since Kimberly won the essay contest, her interest in horned lizards has continued to grow. When asked what she planned on doing next, she said she was going to look for more horned lizards. She also plans to send her essay to the governor so that more things can be done to help save these unique reptiles.

Hundreds of essays have been turned in over the past four years from across the state, each one holding different possible reasons for the Texas horned lizard's reduction in numbers. The majority of the essays suggest that the official state reptile began declining in the 1970s and 1980s, with red imported fire ants, urbanization and pesticide use suggested as the major causes of decline.

Texas residents hold valuable information that can aide in helping the species to recover. People's memories are in some cases the only record of horned lizards in the area. This essay contest captures this information and helps TPWD biologists to better understand the population decline trends and changes in the lizard's habitat and may help to create better conservation methods.

The essays were judged according to age group and thoroughness of investigation, number of interviews, number of written sources and quality of presentation, including historical perspective, scientific analysis, neatness and creativity. Submitted essays were judged by volunteers from TPWD's Wildlife Diversity Branch and County Historical Commissions. Individual winners received prize packs that will help them with further reptile and amphibian field studies including items such as digital cameras, field guides, binoculars and walkie-talkies, while team winners received a field trip to a TPWD Wildlife Management Area.

The complete list of 2005 winners included:

Grades 3-5 Individual:
- 1st place-Kimberly Robinson – Blanch Dodd Intermediate, Krum
- 2nd place-Zachary Roberts – homeschool, San Antonio
- 3rd place-Logan Glenn – McCamey Primary, McCamey

Grades 3-5 Team:
- Erika, Jordan, Graham, Clayton, Alan and David–Ambleside School, Fredericksburg

Grades 6-8 Individual:
- 1st place-K.J. Parker – homeschool, Waco

Grades 6-8 Team
- Sally Platt, Annabeth Mohon, and Sara Pennington – Ambleside School, Fredericksburg

Grades 9-12 Team
- Advanced Wildlife Class Childress High School

The idea behind the essay contest is to get young minds interested in science and exploring the world around them while also helping to raise awareness about horned toads. Clint Groom, a fourth grade teacher at Hidden Lakes Elementary, used the essay contest as a writing lesson. He said, "This lesson is much more exciting than a regular writing lesson. Although every one of my kids didn't meet enough requirements to send in their essay, they all did one. They really loved learning about these "little dinosaurs." They were able to speak to their parents, or relatives about them. To this day, I get at least one comment a day about Horned Frogs." The Hometown Horned Toads Essay contest is an extension of Texas Nature Tracker's Texas Horned Lizard Watch. First place contest winner's essays are included in this newsletter.

2005 Hometown Horned Toads Essay Contest Winners

Grades 3-5 – Individual Essay

Let's Help The Horned Toads!

Last summer I went to Oklahoma and climbed Black Mesa, Oklahoma's state highpoint summit. During our climb to the top, my family and I saw several horned lizards. It surprised us how easily my little brother could pick up the horned lizards. They were harmless and gentle. When I got back to my hometown of Krum I discovered that the Texas Horned Lizards seemed to have disappeared. I decided to write about the Texas Horned Lizards because I read about the essay contest in our local paper, the Krum Star.

Texas Horned Lizards are small reptiles. They have almost circular bodies and are covered in flake-like, pointy, small scales. They measure up to five inches long and have short legs and tails. The biggest Texas Horned Lizard ever found was 7 1/8 inches long. These lizards eat spiders, insects, and especially harvester ants, but high temperatures are required to stimulate their appetites and that makes them difficult to raise in captivity. Horned lizards also shoot blood out of the corners of their eyes when they are alarmed. The Texas Horned Lizards have two long spikes on top of their heads to protect them from predators. The lizards dig holes to keep them from the sun and in the winter they dig their holes deeper. Today, Texas Horned Lizards are rare in many areas of the Texas and are protected by law. It is illegal to keep them as pets.

The town of Krum is in the heart of the Blackland Prairie Region of North Texas. Krum is in Denton County and is located on Farm Road 1173 seven miles northwest of Denton. In 1886, Krum was "born" when the construction of the railway line for Gulf, Colorado and Santa Fe was built. The railway line went through northwest Denton County when it was finished. In 1886, the railroad company purchased two hundred acres of land to build a town that would be named after one of its Vice-Presidents, A. R. Krum. Krum became the largest inland grain market in the world in 1900 and remained so for many years. The population then was around 300. When Interstate Highway 35 was built near Krum in the 1970s the population grew from 605 in 1978, to 917 by 1982, to 1,542 by 1990, to more than 2,000 people today.

I interviewed six people on the phone and let me tell you they had a lot of things to say about horned toads. Most of these were older people who have lived their whole lives in Krum and they have seen lots of horned toads. They said they played with horned toads and put them in their pockets and took them to school. Sometimes the boys chased the girls with horned toads to make the girls scream! It must have been fun! They told me Krum was much smaller than it is today but in the 1960s and 1970s horned lizards were everywhere in Krum. What changed? More houses and roads were being built and fire ants were moving into the area. Most of the people interviewed think population growth and pesticides used to kill fire ants killed the horned lizards and their food sources including harvester ants. In Krum, harvester ants were disappearing as fast as the horned lizards in the 1970s.

During one of my interviews one person told me he knew someone who had seen a horned toad on his property last summer. I called that person and interviewed him and he told me that he had one horned toad on his property. Another person I interviewed said he had several on his property every summer for the last several years. They both said they had harvester ants and fire ants but they were not spraying pesticides anymore. After I finished my interviews with these two men, I thought, "Maybe the Texas Horned Lizards were making a comeback in Krum!"

Once I found out Krum had horned toads I thought about it and I decided to do a survey where people would fill out a form and participate. I also put that same survey in an ad in The *Krum Star* to allow people to do the same and mail it to me. Then I made three survey boxes that would get people's attention. I put the survey boxes in a popular Mexican restaurant called Miguelito's, Krum's Hardware Store, and Krum's Public Library. In one week I got 36 surveys! I was really excited. From the responses I got it seems like there are still horned toads in Krum and that the people of Krum care about these lizards. Six people have seen horned toads in the last five years! I asked if they thought horned toads were making a comeback in Krum, but almost everyone said no. Today, they are hard to find in Krum. One person said that if the horned toads were to make a comeback it would take the care and concern of my generation to make it happen.

I think Texas Horned Lizards were at their peak population in the 1960s and 1970s in Krum. In my opinion it's sad to say that some pesticides used to kill fire ants may have made the lizards rare. I think that all Texas elementary and middle schools should have a "Texas Horned Lizard Day" on a specific day every year. It could be a fun day of learning about horned lizards and the importance of saving them for future generations to enjoy. There could be science activities, field trips to look for horned toads, arts and crafts — whatever teachers could do to help students learn and love these wonderful lizards. Once we become adults we would do the right things to protect the horned toads and their environment.

I just want to say, let's help the horned toads!

Grades 3-5 – Team Essay

Memories of Gillespie County's Texas Horned Lizards

Horny toads have been in Gillespie County for many years. Why are they disappearing?

The Texas Horned Lizard ranges from Kansas to Mexico and Arizona to Louisiana. Although widely spread, The Texas Horned Lizard is on the verge of extinction. At one time it was the pet of many fond boys, but this creature can hardly be seen anymore.

Fredericksburg is an old German town in Central Texas. In many places the soil is rocky, however, on the river bottoms the soil is rather sandy. Fredericksburg is in Gillespie County, and is the county seat. It is in the hill country between San Antonio and Austin. It is a large tourist attraction.

The Texas Horned Lizard has a flat body, because of its short legs and its strange body shape. Some people consider them part of the

2005 HOMETOWN HORNED TOADS ESSAY CONTEST WINNERS

amphibian family, this is how they got the name "horny toads," but this is not their true name.

The diet of this unusual reptile is mostly harvester ants. But it will also prey upon grasshoppers, isopods, beetles and beetle larvae.

The habitat of the Texas Horned Lizard is in mostly hot, dry areas with very few plants. Its daily routine is based on the schedule of harvester ants and other prey.

The Texas Horned Lizard is rather frightening, when its appearance first meets the eye, but its appearance is quite the opposite of its gentle nature. Of course, when feeling threatened it spits blood at you. Another reaction to being threatened is to flatten out and remain perfectly still, or camouflaged, and sometimes it looks dead.

According to the four interviews we conducted, the lizards were most common in the 1930s through the late 1970s.

"Fredericksburg was a small community. There were more people in the country than in the city," said interviewee Lydia Fishel.

"It was a rural area, made up of farms," quotes Tom Syfan.

Our interviewees had either played with "horny toads" as children, or their children had. Everyone seemed to have noticed that the "horny toads" were declining in every direction.

At the time of the "horny toad" decline, changes began to take place. Fredericksburg grew larger; it became a tourist town. More people came: Main Street became busier. Farmers planted different crops, such as wheat, flax, cotton, peanuts, and corn. Three of our interviewees believe the decline to be "directly related to newly released outdoor chemicals and insecticides for the control of insects," which could be very harmful to the Horned Lizard species.

"I can remember," states Tom Syfan. "When we would catch them, put them in a box, and make pets out of them."

Mr. Syfan does not remember one ever dying, but he does remember when they would set them free in nests of Harvester Ants.

"I remember, the boys used to tease the girls by trying to put them down their dresses," said Lydia Fishel.

"We used to play with them. My son would put them in his pocket. They were kind of like pets," says interviewee Mr. Heineman.

"All of my youth I played with horny toads," said Tom Syfan. "Through my younger years, horny toads were easy to find."

Three of our interviewees believe that the Texas Horned Lizard still exists in Fredericksburg, but is very rare. We have many different reptiles in this area, but we can hardly find "horny toads" in Gillespie County anymore, perhaps because of our rapidly growing population, and maybe land developments are pushing them out of their homes.

This fascinating creature has found its way into the concerns of our hearts. We hope that they are not lost forever.

We would like to express our thanks to: **Lydia Fishel** and **Clinton Stork**, **Tom Syfon**, **Mrs. Grauke** and **Mr. Heinemann**.

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Grades 6-9 – Individual Essay

Whatever Happened to the Horned Lizard?

Most people over the age of 30 remember playing with horned lizards, usually called horny toads, when they were young. Now however, many children have never even heard of a horned lizard much less seen one. That brings up the question, "Whatever happened to the horned lizard?" Though there are 13 species of horned lizard, this paper will focus on the Texas horned lizard, *Phrynosoma cornutum* (Manaster 1997).

The Texas horned lizard's color varies from dark grayish-green to light gray depending on the environment in which it lives. It has spiky scales on its back and two rows of spikes on each side. The horned lizard likes to bask in the sun during the day and dig a hole to sleep in at night. While it will eat certain moving insects, its favorite meal is the red harvester ant. After mating, a female Texas horned lizard will dig a hole for a nest and lay up to 37 eggs. She then leaves and never returns. Only an average of two horned lizards from each nest will survive until adulthood (Manaster 1997). When a horned lizard is threatened, its first defense is to try and blend in with its surroundings. If that does not work, the horned lizard tries to escape. If it cannot escape, then it will face the enemy and inflate its belly while hissing. As a last resort, the horned lizard will squirt blood from its eyelids (Manaster 1997). The Texas horned lizard is certainly one of a kind.

I have lived in Waco, Texas for four and a half years. Waco is a medium-size city located in McLennan County with a population of 113,726 (http://en.wikipedia.org/Waco,_Texas). There are also nine smaller communities surrounding Waco. Waco is home to the Lake Waco Wetlands, the Brazos and Bosque Rivers, and 400-acre Cameron Park (http://www.waco-texas.com). This means that there are many different kinds of habitats in Waco. We have urban areas, woods, rocky cliffs, wetlands and lots of farmland.

For this project, I interviewed five people. Charles Clark, Bud Clark, and Paul Derrick have lived in Waco for many years. Wes Penney is a Cameron Park Ranger and has lived in Waco his entire life. James Johnson is a herpetologist with the Cameron Park Zoo and has lived in Waco for eight years. Only three of these people have seen a horned lizard in Waco. In 1979, Bud Clark saw one in the rural area where he lives. Wes Penney remembers playing with horned lizards as a child in the late 1980s. He says that they were easy to catch and he liked to watch the horned lizards spit at their food. James Johnson has seen horned lizards as recently as 2004. Sometimes when people find a horned lizard, they bring it to Mr. Johnson at the zoo. He tells them to return the horned lizard to where they found it, because it means that there is a colony there. Mr. Johnson said that there are two known colonies of horned lizards in the Beverly Hills area of Waco. Most of the people I interviewed felt that the horned lizard was most common from 1940-1970. Horned lizards may have been around much earlier though. Paul Derrick remembers seeing a picture of early starving settlers eating a horned lizard in a history book he had as a child. Also Baylor University was a popular place for horned lizards to live in the early 1900s (Manaster 1997) (www.inhs.uiuc.edu/~ksc/Malacologists/StreckerJ.K.html).

All of the people I interviewed believe that the horned lizard has become more rare in Waco. Paul Derrick has seen horned lizards at Galveston Bay as a child and in Big Bend as an adult, but none at all in Waco. Neither Bud Clark nor Wes Penney have seen any within the last 15 years. Charles Clark has never seen a horned lizard in person, but said that Clint Eastwood used to carry one in his front pocket for luck when he filmed movies. Everyone has different opinions as to why the horned lizards have declined. Some of the opinions are lack of habitat, pesticides and fertilizers in the water table, fire ants eating the red harvester ants that the horned lizards eat, DDT, and more red-tailed hawks which eat horned lizards.

After my research I believe the horned lizard was most common before 1970. The horned lizard population seemed to be going down through the 70s, 80s, and 90s. That time period is also when the fire ants arrived and caused the red harvester ants to leave. Pesticides and fertilizers were also frequently used during this time. Now that people are using more organic and natural ways to fertilize and control pests, maybe the horned lizards will come back to this area someday. At this time, the fire

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ants are still a problem. If we can find a way to control the fire ants, maybe the red harvester ants will return. Hopefully in the future, horned lizards will once again be a common sight for children everywhere!

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Grades 6-9 – Team Essay

A Horny Toad. What Is a Horny Toad?
A Search for the Disappearing Horny Toads in Fredericksburg

Horny toads? What are horny toads? That's what most Texas kids would say when asked about the amazing but rarely seen Texas horned lizard. There are just so few left, as we learned from some long time Texas residents. Why? We don't know exactly why, but that is what we are trying to find out. We want to help save an important emblem of Texas, the Texas Horned Lizard!

In our investigation we first found out a little bit about our hometown, Fredericksburg. Fredericksburg is a middle-sized town set in the heart of the hill country. It was settled by German immigrant farmers and today there are still German speakers and many festivals here. The climate is typical of Texas, a hot summer, mild winter, and snow is a rarity. Around Fredericksburg there are green rolling hills, limestone caverns, lakes and many oak trees. Among the hills there are grassy fields, often spotted with cattle and willowy mesquite trees. Gillespie County and more especially Fredericksburg is a popular tourist hot spot because of its German heritage, excellent bakeries and other German stores such as Der Kuchen Lauden, Freidhelms, Der Lindenbaum and the Old German Bakery. Perhaps the flocks of tourists to Fredericksburg contributed to the horny toad's decline.

Throughout Texas history horny toads have often appeared in books and Native American legends. The Navahos honored the horny toad so much that whenever they saw one they would pick him up and place him gently over their heart and say "Ya ateech shi che," which translated into English means "Hello my grandfather." They believed this gave them strength in their heart and mind.

It is no wonder that horny toads are so popular in Texas. They are easy to play with because of their gentle, docile nature. Some neighbors in our town, Mr. Henk and Mr. Puryear said that when they were kids they would play with horny toads in funny ways, such as putting them down girls dresses and having them pull little wagons! One time they even had a horny toad puff on a cigarette!

In appearance horny toads are small creatures with tiny brown scales on their back and legs. There is a small white stripe going down their back and this makes him especially unique because no other type of horny toad has it! They have two large spikes on their head and smaller spikes around these. They look prehistoric! Because of their brownish color and bumpy skin, horny toads blend in well with the often desert-like surroundings of Texas. Sometimes he blends in so well that he almost disappears!

Horny toads like to live in places where there is little vegetation except for maybe a few bushes here and there in the long grass. They also like to live in loose, often sandy soil because it makes it easier to dig their burrows.

The horny toad life cycle is much like that of any reptile. A Texas horny toad starts out life in an egg which he breaks open with an egg tooth that later falls out. The little horny toad has to fend for himself right away because his mother left right after she laid her eggs. The little lizard will grow rapidly until he is ready to hibernate in the fall. In the spring he will come out and begin looking for a mate. After mating the female will carry the developing eggs until she is ready to lay them. She will then dig a slanted tunnel, lay her eggs in it and pack them between several layers of soil. She will sit on the tunnel for about one day and then leave. In about 5 to 9 weeks the eggs will be cracked open by the baby horny toad and the cycle starts all over again!

Horny toads eat the large, red harvester ants as the main food in their diet. They spend a lot of time basking in the sun to regulate their body heat but in the extreme heat of the day they will seek cover in the shade. One place they often like to do this is on roads [according to the TPWD Web site] and so many horny toads get killed because they just don't move when a car comes.

Another example of a Texas horny toad story is in Old Yeller by Fred Gipson. The narrator of the story says "One time he [Arliss] brought in a horned toad that got so mad he swelled out round and flat as a Mexican tortilla and bled at the eyes." In reality, horny toads don't get that flat although they do bleed at the eyes. Probably, the most popular legend of the horny toad is of the courthouse cornerstone in Eastland County. As legend has it, in 1897 as the courthouse was being built, a horny toad was placed in a cornerstone and 31 years later it was found alive. It then went on to tour the country and meet President Calvin Coolidge. The toad was named "Old Rip." Scientifically, this is impossible, although it is true that horny toads, being reptiles, can go for surprisingly long periods with no food.

Of all of our interviewees, which numbered seven, most thought that horny toads were most common in the 1940s, 50s and 60s. Many of them thought that in the 70s the horny toad population went drastically down and continued to do so in the next decades.

Mr. Puryear [one of our interviewees] said that in the height of the horny toad population, Fredericksburg was a close-knit community of German farmers. And it was also sandy and hot as Mr. Henk added. Mr. Taylor also noted that there was a lot of limestone, as there is now. But then things started to change. There were more people, more imported fire ants, and more pesticides were being used to keep bugs off trees and crops. Why would these things hurt horny toads? I asked our interviewees, so they explained. The fire ants eat the baby horny toads was Mrs. Whatleys theory and Mrs. Lindig thought that the pesticide covered fruits would fall from the trees and horny toads would come in contact with it. [She should know, she was a peach farmer.] The other interviewees attributed the decline of horny toads to these changes. Some Texans think that horny toads have disappeared because of too much handling. None of our interviewees thought that this has had any affect on them, because after all they played with them when they were kids and there were plenty of them then. They even tied them to leashes and took them for walks! Overall, the people that we spoke to thought that the habitat for horny toads was being compromised and continues to decline today. But there is still hope because Mr. Puryear and his friend think that there are fewer fire ants than before!

Mr. Puryear said that you would usually see them in harvester ant beds, just sitting there eating the ants while they crawled over him. He even said that you could hardly walk outside without seeing one, but now you hardly ever see them.

Most thought that horny toads still live in Fredericksburg, [but only a few], although they had not seen one in a while except for Mrs. Pennington who saw one last summer.

From the results of our interviews and research we conclude that horny toads are almost gone because of fire ants, pesticides and change in habitat.

But we can help get them back by reducing fire ant population

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[without using poison], never harming harvester ants and using fewer pesticides.

We hope that everyone will aid the rescue of these cute, playful Texas horned lizards from extinction! Help this unique Texas creature live on!

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Grades 9-12 – Team Essay

An Explanation of the Alleged Texas Horned Lizard's Decline in Childress, Texas

Introduction

If Texans couldn't adopt a Texas-sized reptile they could simply adopt a reptile with a Texas-size reputation and that's what the state did when they made the Texas Horned Lizard their state reptile in the early 1990s. In Childress County the Horned Lizard, has been a source of curiosity for folks all over the county. The horny toad grew abundantly over the years in Texas and many hold fond memories of playing with them as kids growing up. But, over the past 40 years, there has been a perceived sharp decline in this species county-wide. Due to the fact there are fewer "Horned Toads" in Texas, we have interviewed Childress residents over the age of 50 to determine their opinion of the decline of the Horned Lizard. It is the goal of the Advanced Wildlife class of Childress High School in Childress, Texas to answer this question.

About the Texas Horned Lizard

Phrynosoma cornutum, also known as the Texas Horned Lizard, Horny Toad, and Horned Frog, is listed as an endangered species in Texas. The horned lizard has a flat body and a fierce-looking appearance. It is about 2.5 to 4.25 inches long. The head has numerous horns, all of which are prominent, with two central head spines being much longer than any of the others. The ventral surface of the lizard is either gray or tan. The dorsal side is covered with a pattern of spots, which corresponds with the location of the spines.

The Texas Horned Lizard spends its days eating, sunbathing, and avoiding predators. Its intimidating exterior is contrary from its docile and friendly nature. The Horny Toad hibernates during September or October, and begins mating right after hibernation usually in April or May. They will emerge from their burrows a little before sunrise and relax with their backs toward the sun in order to bring a fast rise in body temperature. After they have been appropriately warmed, they remain vigorous until the time comes to return to shaded areas to avoid the most extreme heat of the day.

The Texas Horned Lizard has many different and bizarre styles of defense. Their first reaction when threatened is to flatten out and freeze in place. This helps to reduce the casting of a body shadow and enables them to blend in with the ground. Regrettably, many Horned Lizards are killed because they lie around on roadways and do not move when a car approaches. They can also create the illusion of disappearing by running briefly then abruptly stopping. One of its most strange defense reactions is when it is extremely agitated, it is capable of inflating its body, hissing and even squirting blood from its eyes.

Harvester (red) ants are the horned lizards main source of food, but they will also eat grasshoppers, beetles and beetle larvae. In order to obtain enough energy, adult Texas Horned Lizards must forage from several ant colonies.

About Childress County

Childress County is located at the southeastern edge of the Texas Panhandle, at the intersection of U.S. Highways 287 and 83. The county seat, Childress, is located 120 miles southeast of Amarillo and 110 miles west of Wichita Falls. Childress County is bordered on the east by the state of Oklahoma, to the north by Collingsworth County, to the south by Cottle County and to the west by Hall County. Childress County is about 710 square miles in size and is at an elevation of approximately 1,600 to 1,900 feet above sea level. Childress County is located in the Rolling Plains ecological region of Texas. The average minimum temperature is 26 degrees Fahrenheit in January, and the average maximum temperature ranges in the high 90s during July. Childress County receives an average of 20.67 inches of rainfall annually.

Wildlife and vegetation in Childress County are very diverse. Wildlife includes white-tailed and mule deer, feral hogs, bobwhite quail, mourning doves, assorted ducks and other wildlife species. Brushy vegetation includes shin oak, salt cedar, hackberry and mesquite while grasses include little and big bluestems, gramas and buffalo grass.

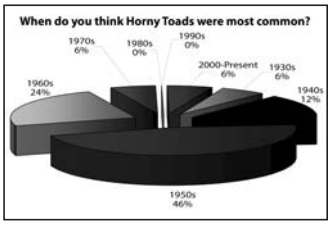
Interviewee Results

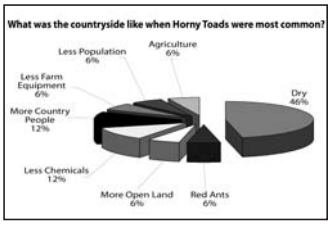
The interviews we conducted were in December 2004, and the results were compiled in early January 2005. Each class member was asked to interview two people that have lived in Childress County most of their lives. We compiled 21 interviews total.

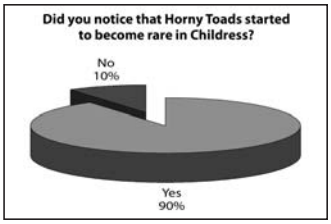
Interviewee Profile

When we averaged all of the responses together, here is the average profile of those interviewed:

- The average person has lived in Childress for 55 years;
- 100% of the interviewed people remember seeing Horned Lizards in this hometown;
- Most said that the countryside was drier than it is now;
- 90% said they noticed that horned lizards becoming rarer;
- 62% thought the horned lizard became rarer in the 70s and 80s;
- 33% of the people thought more chemicals were being used in the hometown at this time;
- 62% thought Horned Lizards became rarer because of chemicals;
- 71% said the last time they saw one was the summer of 2004;
- 100% of the interviewed people said they thought horned lizards still live in this hometown.







Although answers vary, 70% of those interviewed thought Horned Lizards were most common in the 1950s and 1960s as illustrated in the first chart.

The next chart illustrates that the answers to the questions vary, but almost half of the interviewees thought the weather was dryer when Texas Horned Lizards were most common.

In the last pie chart, a significant majority of people believed that the Texas Horned Lizard population has decreased and the reptile is becoming rarer.

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As is typical of all of the research conducted in Childress County over the past four years, many of those interviewed believed that the use of chemicals and farm land held a direct connection to the population of Texas Horned Lizards. In fact, the numbers who say that chemicals had an adverse affect on horny toad populations has remained relatively the same in the four years that the same research questions have been asked.

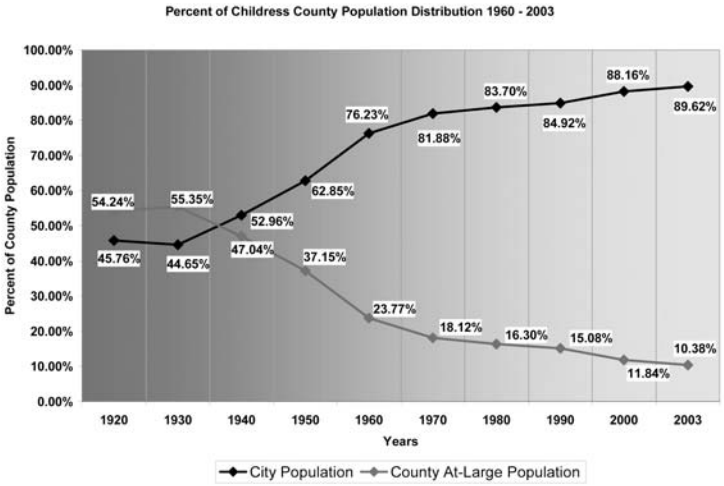
What does this all mean?

What all this means is a bit confusing. While all interviewees agree that the Texas Horned Lizard population has declined, 71% report that they saw one of the reptiles last summer while 100% say that they believe that Texas Horned Lizards still exist in Childress County. Looking back at the research done in Childress County in 2001 and 2003, we find that the perceived decline of Texas Horned Lizards in Childress County seems to be due to habitat changes and their decline is not chemically related. This thesis is backed up by the fact that less and safer chemicals are applied to area crops now compared to a quarter century or more ago, but, supposedly, the Texas Horned Lizard population has failed to rebound. Therefore, with that evidence in mind, we rule out chemical and pesticide use as being a culprit to their supposed decline. The Childress, Texas horned lizard research conducted since 2001 does show that Childress County has undergone fundamental changes since 1960 including:

- A 15.5% increase in the county population;
- A 56% decrease in farmland county-wide;
- The introduction to Conservation Reserve Program land in the places where farmland once existed.

Although other Childress High School classes reported differently in the past, we feel that the human population increase has had a negligible effect on the Texas Horned Lizard population since the increase has occurred in the only town in the county – Childress. However, while the size of the town increased, the number of people living on farmsteads throughout the county has decreased by 86.76% from the 1920s until today.

It seems, then, that the reports of the demise of Texas Horned Lizard populations may be largely anecdotal. When more people lived out in the country, the small farmsteads created open ground areas around their premises that was conducive to red ant colonization (red ants are a staple of the Texas Horned Lizard). The cotton land that was farmed also created open ground areas along the edges of the farm fields and where they intersected the surrounding brush land. Again, these open ground areas are very desirable as areas that red ants colonize and forage.



As the farms and farmland decreased, the number of red ants probably decreased which resulted in a loss of Texas Horned Lizards in the Childress County area. But is the loss as substantial as some claim? We don't think so.

Because less people live in the country and 89% of all the residents in Childress County live within the limits of the county seat of Childress, their likelihood of incidental contact with the reptile is greatly reduced. From 1950, the in-town percent of the county-wide population has grown from 62.85% percent to 89.62% today while the county-at-large population has shrunk from 37.15% to 10.38% of the total (see chart below). These time and population trends coincide with the ages of the people interviewed in this and every year's research.

Since the likelihood of incidental contact is diminished, people may perceive that there are fewer Texas Horned Lizards based solely on their personal observations.

So are there less Texas Horned Lizards in Childress County? It's hard to say since the overall decline in Childress County may be due to people perceiving there are fewer horned lizards because of media reports and the fact that their busy lives in town keeps them from having incidental contact with the reptile. As we look back at the Texas Horned Lizard research conducted by two previous classes, we find that their interviews reveal that most people's perception of when Texas Horned Lizards started to decline coincide with the time they are growing older and moving away.

What we do know, however, is that on land that belongs to the Childress Independent School District, horned lizards are seemingly plentiful as sightings of the reptile are very common. On parcels of the land surveyed, bare ground makes up 57% of the surveyed land while ground covered in grass at least two inches tall and prickly pear makes up 43% of the surveyed land. These bare ground areas are ideal for red ants to colonize and forage and where you find red ants in the Texas Rolling Plains, you typically find Texas Horned Lizards.

Conclusion

Has the horned lizard population in Childress County really decreased or has perceptions of its demise been exaggerated by media reports and people not having as much day to day contact with the reptile? The average age of the persons interviewed is 55. This means they grew up in the 50's and 60's, and probably most spent their time outdoors and closer to the horned lizards natural habitat. So it was a bigger possibility that they would come across a horned lizard as they played outside. But now that most of those people have moved into town and have a job and a family they don't spend as much time outdoors and they are less likely to see the reptile. Ultimately, how do we find out if the horned lizard has, in fact, declined? Our class proposes four ways to solve this problem:

- Develop methods of accurately estimating the current population;
- Research historic Texas Horned Lizard numbers;
- Monitor populations for at least five years, preferably longer;
- Monitor the same location and note how the habitat changes effects the horned lizards numbers.

If we can establish a base number of the horned toads in Childress County then we can monitor their numbers and determine if, in fact, they are declining. If it turns out they are declining we can determine the true reason for their decline.

TEXAS PARKS & WILDLIFE

The Texas Nature Tracker

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