



# Highland Lakes Steward

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**MISSION**

The Texas Master Naturalist program is a natural resource-based volunteer training and development program sponsored statewide by Texas AgriLife Extension and the Texas Parks and Wildlife Department.

The mission of the program is to develop a corps of well-informed volunteers who provide education, outreach, and service dedicated to the beneficial management of natural resources and natural areas within their communities for the state of Texas

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## CORK TREES

by Billy Hutson

Undoubtedly you are thinking of other more important things when you uncork a bottle of wine but have you ever wondered where corks come from? Well they come from the cork tree "Quercus Suber" which means slow growing. The cork trees I am talking about grow in SW Europe and NW Africa but in the Spain and Portugal area they are carefully cared for by the cork producing industry. I remember seeing one in the postage stamp backyard of a friends home in southern California where it took up



the entire space, so they evidently like that climate also. Maybe we could grow them in Texas!! There are other cork trees that grow in China and Australia but the wine cork industry is basically located in Spain and Portugal.

Some of you naturalists may have noticed that the Quercus Genus is the Oak genus and the cork tree is actually a species of Oak. The older the tree gets the larger it gets and therefore produces more cork because of its increased girth. The cork is formed of 14 sided cells in the bark where they are carefully removed in strips as pictured above and dried for 6 months, boiled and dried again in a lengthy process. The trees live long and some used for cork production are over 150 years old. The oldest known is a tree in the Alentejo region that has produced over a million corks since 1820 and is estimated at 212 years old. That's older than Phil.

are 25 years old and they are very carefully monitored. In fact they cannot be legally cut down in Portugal and the industry in Europe employs some 30,000 people.

Since the process is only 40% efficient there is a lot of waste and since the cork can only be taken from a specific tree at sustaining intervals (approximately every 9 to 12 years), the statement of a renewable resource is stretching it. So we come to the alternative corks which are made of ethylene vinyl acetate and are trademarked as Cellukork. There are even screw on caps now which seem to work quite well but the question of being able to age a good red wine in acetate or a screw cap has yet to be proven. Evidently enough people with not much else to do are concerned with this problem as they formed the Cork Quality Council (CQC) in 1992 with the mission of improving the quality of corks at the source through research and educational programs.

The trees can't be harvested until they

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**CORK**

Also interesting to us naturalists is the fact that the cork forests of NW Africa are home to the endangered Barbary Macaque and in Portugal and Spain they are home to the endangered Iberian Lynx, the most critically threatened feline in the world.

So, the next time you pop a cork you may want to take a minute to reflect on whether you are contributing to the economy of Europe or to the exploitation of *Quercus Suber* and the home of two endangered species while you're sipping a fine wine with a friend.

**BIRD COMMUNITIES**

By Sherry Bixler

A biological community consists of all the organisms, both plant and animal, that live in an area. Scientists rarely agree on why certain species are always found with other species but it is a common occurrence. Obvious co-dependents are the Monarch Butterfly and milkweed, or hummingbirds and tubular flowers. Less obvious might be the mixed flocks of birds which forage together but on different insect species, or certain flowers that rarely grow away from specific trees.

Bird guilds are a type of community that may include non-bird species. Desert sparrows, ants and rodents might constitute a seed-eating guild. Bird guilds may also be formed when mixed flocks forage together as above – different bill sizes mean that each species may focus on one or two specific insects and thus the birds are not in direct competition. Flocking together may help the birds locate good forage areas and may help protect them from predators. Scientists have learned that the arrival or departure of migrant species does not seem to impact the habits of resident guild members, but studying avian behavior without disturbing the birds is difficult and leaves much to be learned.

**MEETINGS**

At our August meeting, Jo Karr Kedder - President of the Central Texas Water Coalition, provided an insightful look at the issues involved with water in the Lower Colorado River watershed and the efforts to provide a strong voice from residential and city consumers of LCRA water.



The September meeting is at the Kingsland Library on the 7th from 1:00 to 3:00pm. Speaker to be announced.

# CONGRATULATIONS!

Photos by Jerry Stone



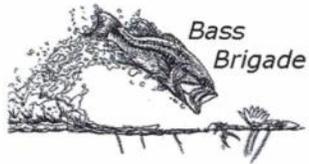
Elaine Barnhill (ctr) of the 2011 class received her initial certification, badge, and 2011 pin from Sue Kersey - awards chairperson (l) and V.P. Fredi Franki (r)



Kim Bacon received her 2011 pin from V.P. Fredi Franki



Ed and Sue Lilley received their 2010 pins from V.P. Fredi Franki



Lyle Schmidt  
c/o Bass Brigade  
2800 NE Loop 410, Suite 105  
San Antonio, TX 78218



Highland Lakes Chapter, Texas Master Naturalist  
1701 E Polk St, Suite 12  
Burnet, TX 78611

Dear Highland Lakes Chapter, Texas Master Naturalist:

Thank you so much for giving me a scholarship to attend the Bass Brigades. It is my first day at the Brigades and I'm already liking it.

At camp we are responsible for memorizing and reciting a "Gold Hook". These are included in our daily journal and are a famous quote. For instance, mine was, "Success comes in cans and failure in can'ts.". This meant to me that if you believe you can do something then you can but if you say you can't do something, you will fail at it.

Thank you once again for your generous scholarship that enabled me to enjoy the Bass Brigade.

Sincerely,

*Lyle Schmidt*

Lyle Schmidt



Lyle made a great presentation to the chapter about the Bass Brigade and what he learned from it.

Photo by Jerry Stone

## THREE EXQUISITE LOOKS AT THE BIG BEND - BOOK REVIEWS



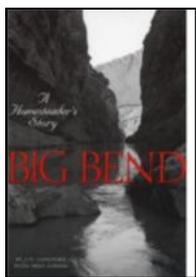
*Wildflowers of the Big Bend Country, Texas*, Barton Warnock, (1970) [photos by Peter Koch], Sul Ross University Press  
reviewed by Margy Butler

Barton Warnock headed up the Botany Department at Sul Ross University for 30 some years, and spent years studying and cataloging flora in the rugged Big Bend back country. He discovered dozens of heretofore unknown plants. Twelve plant species now carry his name, the naming honor given to him by fellow botanists. This book is one of several that Dr. Warnock wrote about the vegetation and wildflowers of the Trans-Pecos area, and is specific to the area of the HLMN fall field trip. The photos are clear and excellent and the book is not only a terrific field guide, but it is just the right size to fit into a pack. Dr. Warnock's plant specimen collection was given to the Warnock Center, which he had designed for Walter Mischer, the Houstonian who developed Lajitas. When the property was sold to Texas Parks and Wildlife, the museum was named the Barton Warnock Environmental Education Center and it will be one of our stops along the way into Big Bend Ranch State Park in the fall. This book has been out of print for some time, but will be available at the bookstore in Alpine, a scheduled stop on our fall trip. Although Dr. Warnock's taxonomy is somewhat dated, his book stands strong as an excellent field guide, and is a must have for in the field identification in the Big Bend.



*Little Big Bend: Common, Uncommon, and Rare Plants of Big Bend National Park*, Roy Morey (2008) Texas Tech University Press  
reviewed by Margy Butler

Roy Morey's beautiful book is full of stunning photographic plates. It's intended (and accomplished) goal is to illustrate the amazing plant diversity in the Big Bend area, main area of concentration being Big Bend National Park. The "little" in the name is a clue about plant size of some of the species featured. This book is probably bigger than you'd want to take out in the field, but is one you'll want to have in your collection due not only to the photographs, which are really outstanding and make for easy identification, but also because of the text. Each species is described in readable, enjoyable specific detail, and there's the unexpected addition of ancillary information that one rarely sees in a plant guide. The prose of the book is worth the purchase price alone, if there were nothing else. Beautifully written text, superb photographs, striking subject. Who could ask for more?



J. O. Langford (author), Fred Gipson (Contributor) (1981) *Big Bend: A Homesteaders Story*, University of Texas Press  
reviewed by Kim Bacon

When Bessie Langford was pregnant with her second child, her husband, J. O. Langford, loaded her and their 18 month old daughter onto a wagon and headed out to spend three years homesteading three sections of land he had bought without ever laying eyes on it. J. O. was a traveling salesman. Bessie was a city girl.

It was 1909 and the land was located at the mouth of Tornillo Creek on the Rio Grande. The Big Bend.

*Big Bend: A Homesteader's Story* tells the story of this young couple --who seemed least likely to succeed at homesteading--as they established a home, a business (spas!), and raised two toddler-aged children in the most remote area of Texas.

And what a story. If you are going on the trip to Big Bend Ranch, spend an evening and read through the 154 pages of this little book. Ever catch and eat a 60 # catfish? Know how to escape from quicksand? How to fix a crooked election? Collect honey from a wild hive? Ever witness a meteorite impact? Made an adobe brick? Gone quail hunting? Run from a panther? J. O. and Bessie did. And after reading this little book, I think you will appreciate all the Big Bend had to offer a young couple in 1909.

All of these books highly recommended!

## HILL COUNTRY WRENS

By Sherry Bixler

There are ten species of wrens in North America and only the Pacific Wren is not found in the hill country. Common species here are the Cactus Wren, Canyon Wren, Carolina Wren, Bewick's Wren and House Wren. Wrens seen less frequently are the Rock Wren, Winter Wren, Sedge Wren and Marsh Wren. The Canyon Wren is at the eastern edge of its range while the Sedge Wren and Winter Wren are at the western edge of their range.



House Wren

Of the five common species here, all but the House Wren are found year-round. The House Wren winters here and migrates north to breed. Both Carolina and Bewick's Wrens are frequent residents of suburban yards and prefer tree



Cactus Wren

Photo by Mason and Hayes

cavities for nesting but will take advantage of bird houses as well as old hats, stove pipes and similar objects.

Observers can tell the Carolina Wren by its chubby appearance and buffy orange color while the



Carolina Wren

Bewick's Wren is grayer, slimmer and usually cocks its tail. Within the Bewick's Wren species are polymorphic individuals which may be redder or grayer in color.



Bewick's Wren

Canyon Wrens prefer rocky slopes but will also visit yards in search of insects; all wrens are insectivores. The large Cactus Wren prefers open scrubland and



Canyon Wren Photo by Michael Bruce

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## CURRENT RESPONSES TO “THE MOST PRECIPITOUS DECLINE OF NORTH AMERICAN WILDLIFE IN LIVING MEMORY”

By Ray Buchanan with research assistance by Mike Harris

The quotes signal the intensity of the story: “it threatens some of the continent’s most abundant ... species with extinction;” “the total ... population of New York and other impacted states has been decimated;” “surprising resiliency to WNS – a modest ray of hope.”

More than 1 million have died over the past 4 years in the Northeast and Canada. In any given hibernacula the expectation is that 90-100 % will die. It has spread over 19 states and 4 provinces in Canada (see map). The loss is calculated as 700 tons of insects NOT eaten, which threatens an existing \$3.7 billion in pest control services to US agriculture every year.

The story is one of disaster for bats, particularly those 25 species out of a total of 41, who hibernate and develop the White Nose Syndrome from close proximity in caves during the winter season (see bat photos). It is a white fungus (*Geomyces destructans*) that develops on the muzzle and on other parts of the body and that also causes wing tissue to deteriorate and tear. But the fatal consequence for bats stems from the disruption of the biological clocks in their hibernation cycle, which causes them to leave their shelter seeking food during the deepest cold months of winter. There is no food to be had at that time and bats starve or freeze in those extreme temperatures. What causes the fungus? where did it come from? and



how can we stop its spread? are urgent questions that remain unanswered.



Discovered in late 2007 when New York state biologists explored numerous caves and found thousands of dead bats, the fungus itself, new to North America, was not identified until a year later. Nine bat species, including the endangered Indiana and gray bats, dominate the list of fatalities. The prediction that the little brown myotis bat, common in the northeastern US, will be extinct by 2015 highlights the urgency of a concerted response aimed at stemming the tide of costly deaths among our bat population.

Much is being done in the northeast US area most drastically infected. According to a recent newsletter of the Bat Conservation International, Fort Drum Military

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installation's Fish and Wildlife biologists, Chris Dubony and LeRay Mansion, are monitoring on a month by month schedule some 300 sites on the reservation where bats are known to roost. Hibernation sites are being checked during the winter months. Some survival and recovery examples have provided "a modest ray of hope" that some of the little brown myotis might prove to have developed resistance to the fungus (like most European bats). (see [www.drum.army.mil](http://www.drum.army.mil))

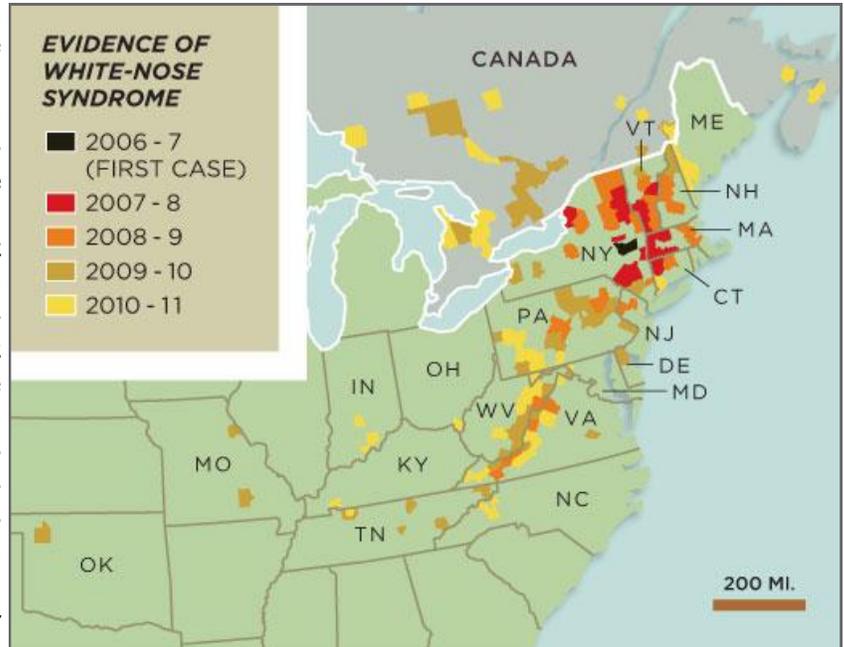
Also, DeeAnn Reeder at Bucknell University in central Pennsylvania has developed climate controlled chambers designed to mimic natural cave conditions so that she can study bat hibernation patterns. She gathers bats with WNS in her lab to facilitate the application of microbiological strategies to finding a way to stop the spread of the fungus.

As well, studies on the frontiers of the spreading disease are probing ways to stop the deadly march of the fungus. An article in the recent issue of the *Smithsonian Magazine* discussed how Brooke Slack, a bat person biologist for the Kentucky Department of Fish and Wildlife, has teamed up with cave person, Hazel Barton; from Northern Kentucky University to collect local bats for study. They are also collecting data on the microbiological community that exists in caves. So far no WNS bats have been sited in Kentucky.

And government entities at the national, state, and local level have organized researchers and response teams. The US Fish and Wildlife Service has a National Coordinator for WNS, an Assistant National Coordinator, a National WNS Communications Leader, a National Wildlife Refuge System Coordinator, and 8 regional coordinators. Paul Barrett is the Southwest WNS Coordinator, which covers Texas: Paul\_Barrett @fws.gov 505-248-6281. (see [www.fws.gov/whitenosesyndrome/index.html](http://www.fws.gov/whitenosesyndrome/index.html)) The US Geological Survey, the US Forest Service, and the Department of Defense, among many others, have taken on the challenge of white nose syndrome. State organizations like the New York State Department of Environmental Conservation have state-wide and local WNS programs. Although there have been no reported sightings in Texas, the Texas Speleological Association has provided cavers with special instructions

#### EVIDENCE OF WHITE-NOSE SYNDROME

- 2006 - 7 (FIRST CASE)
- 2007 - 8
- 2008 - 9
- 2009 - 10
- 2010 - 11



about spotting WNS. The State Parks Division of the Texas Parks and Wildlife Department has initiated monitoring schedules and cave closing criteria.

See also these additional sources for information about WNS and go out and monitor the bats where you live.

Additional Sources:

"Economic Importance of Bats in Agriculture," Justin G. Boyles et al., *Science*, April 1, 2011

"An Emerging Disease Causes Regional Population Collapse of a Common North American Bat Species," Winifred F. Frick et al., *Science*, August 6, 2010

"Bat White-Nose Syndrome: An Emerging Fungal Pathogen?" David S. Blehert et al., *Science*, October 30, 2008

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## WRENS

usually builds its nest in prickly pear or cholla cacti. Look for the House Wren in cooler weather; its lack of eyestripe and drab color are good identifying marks.

Except for the Sedge Wren, all wren species have from three to thirteen subspecies, usually with only minor differences in appearance. Most wrens raise two broods annually and lay five to eight eggs. Cactus wrens lay fewer eggs and need slightly longer to fledge their young.

## BLUE WEED ERADICATION PROJECT

By Sammye Childers

We continue to monitor the property with the blueweed (*Echum Vulgare*) invasion. New plants are routinely removed but they are few and scattered. When rains return there is always the possibility of another surge of growth but hopefully we have begun to have the upper hand in this situation. Bill Carr has estimated that the seed bank will remain viable for at least another five years and continued monitoring will be necessary.



Mature Plant with Flower Stalks



Example of the Flower Stalk



Rosette

## MILKWEED

by Kim Bacon

Just in case you stumble across any blooming Milkweeds during the drought, here are photos of the three species we have in Burnet County according to the USDA Plants Database (<http://plants.usda.gov/java/nameSearch>).

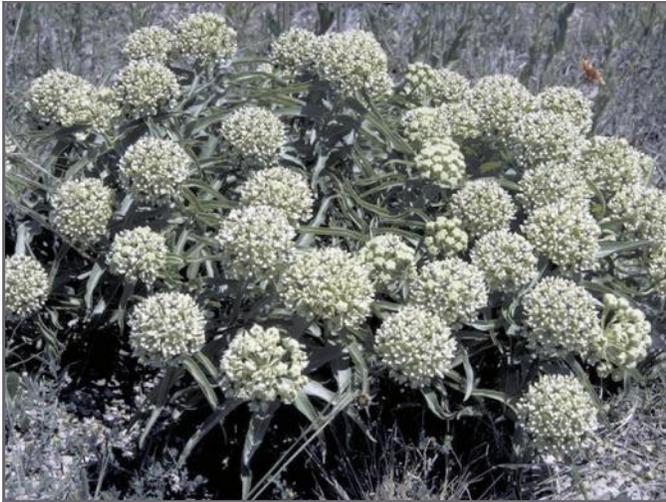


Photo: Mrs. W.D. Bransford,  
Lady Bird Johnson Wildflower Center

**Spider Milkweed, Antelope Horns, or Green-flowered Milkweed (*Asclepias asperula*)** can be 1' to 2' tall and can be either an upright or sprawling plant. Interesting fact: The stems have lots of minute hairs. Blooms March through October.



Photo: Joseph A. Marcus,  
Lady Bird Johnson Wildflower Center

**Swamp Milkweed or Pink Milkweed (*Asclepias incarnata*)** can be 2' to over 4' tall. Interesting fact: Most likely found in moist areas. Blooms June through October.



Photo: Thomas L. Muller,  
Lady Bird Johnson Wildflower Center

**Butterfly Milkweed or Orange Milkweed (*Asclepias tuberosa*)** can be 1' - 2' tall. Interesting fact: This species has no milky sap! Blooms May through September.

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Some interesting facts about milkweed:

1. The flowers of the milkweed plant are arranged like an umbrella (umbel) with five “vessels” of nectar. Bees will land on the umbel and while sucking up the nectar, a foot will slip between the anthers wings and then get wedged into a slit in the pollinium. Bees are usually strong enough to dislodge their foot (which pulls the pollinium out of the plant). The bee flies on with the pollinia stuck to its leg. When the bee lands on another flower, its leg will slip into another space between the anthers and the pollinium sac will break lose exactly where it needs to be in the plant. The pollinia can actually get stuck to any hairy or barbed surface on the bee. If you observe, you will see bees with many pollinia on *Asclepias*. Sometimes the bee gets stuck for a while in the flower. Watch the videos below and it will become clear! Trust me!

Photo of a bee with pollinia attached

<http://bugguide.net/node/view/13049>

Honeybee stuck to a milkweed flower

<http://www.youtube.com/watch?v=K0-4FrV8DAo>

Honeybee snagged by a Milkweed Flower

<http://www.youtube.com/watch?v=6gyO-tVlrlk&NR=1>

Bumblebee snags a pollinia with its back leg

<http://www.youtube.com/watch?v=EjgoyDoAblo&NR=1>

2. During WWII, Kapok fluff was used to fill military life vests, but Japan cut off the supply. Milkweed floss (which is very waterproof and buoyant) from inside the pods was used as a substitute. About 150,000 pounds was gathered in 1944 for use in military life vests. [Click on this link](#) to see how it was collected (with a cute photo!)

3. Want to buy a pillow stuffed with milkweed floss? [Click here to see an odd little video from the maker of these pillows/comforters.](#)

### A Little Nature Trivia

John & Rosalie Taylor, submitted by Lyn Davis

There are as many molecules in a teaspoon of water as there are teaspoons of water in the Atlantic Ocean.

When cormorants dive to catch fish, they flatten their eyeballs to reduce visual distortion.

There are no electric eels. HUH? That's right. The so called electric eel is a carp. But, like the carp, eels are fish too.

More people are killed by poisonous fish each year than by sharks.

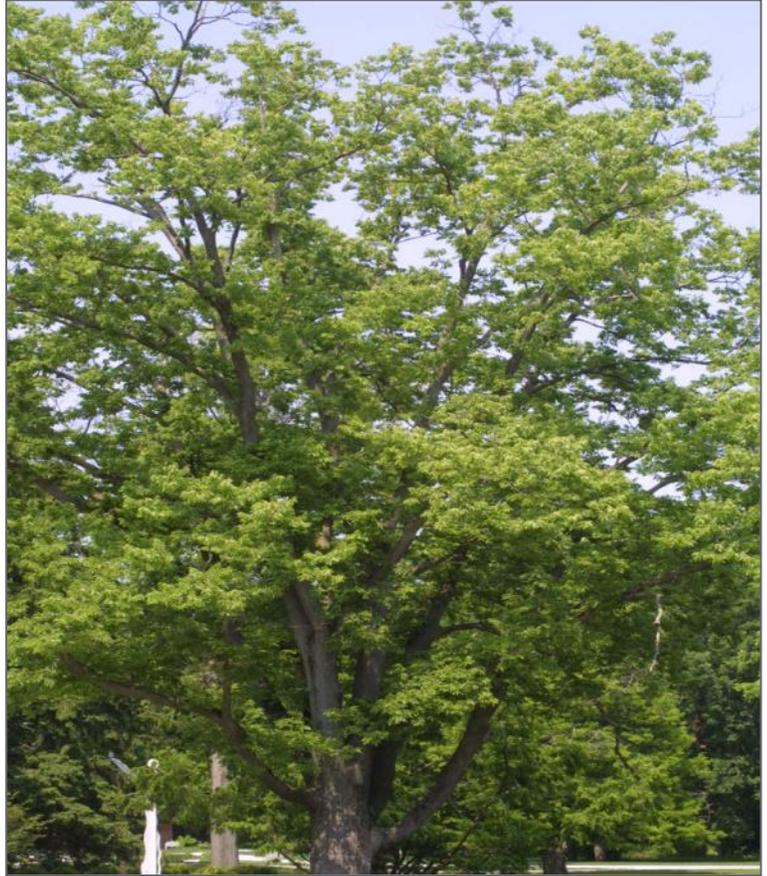
Whales weighing 150 tons, and mice weighing three ounces develop from the same size eggs.

## HACKBERRY TREES (*CELTIS LAEVIGATA* OR *RETICULATA*)

By Phil Wyde

The hackberry is a very common tree in Texas – and apparently one of the most unpopular since I have seldom heard a kind word about this species. Quite to the contrary, I have heard many negative comments about Hackberry trees including that they are too short-lived, too ugly, too dirty, too fragile and too knobby and woody. This has puzzled me since we have several hackberries on our property, and we like them. They have provided us with shade, are usually occupied by birds and are always the first trees to leaf out in the spring and among the last to shed their leaves in the fall. Moreover, we have a relatively large wooden bowl made from hackberry wood, and it is beautiful. I decided to see what I could find out about them and lo and behold, I found a chapter on Hackberries in a favorite book of mine, Remarkable Plants of Texas, Uncommon Accounts of our Common Natives, (Turner, M.W. 2009. Hackberry *Celtis* spp., pp. 17-19, Univ. of Texas Press, Austin, TX.

The chapter started out by stating that Hackberry trees are “ragged in appearance with crooked branches and warty trunks,” are short lived (ca. 30 years) and prone to twig dieback, broken limbs, root fungus, wood borers, and leaf galls. It went on to say that Hackberry wood is relatively soft, coarse grained and weak and for these reasons, Hackberry has not been used much for lumber. Whoa! This book is about REMARKABLE TREES?!



Well it turns out that Hackberry trees have a number of good traits. First the tree is very hardy and will grow in almost any soil type. (Those of you in Burnet County should not take too much hope in this. They do need soil.) In addition Hackberry trees are very drought tolerant and can be used as a windbreak, a fencerow or in barren areas where little else will grow. Indeed, according to the author, if given good soil and water, this tree can make an attractive, fast growing shade tree (see photo above or come over and visit the Wydes). Moreover, the wood from Hackberry trees has been used for fencing, flooring, crating, making sporting goods (?) and for manufacturing furniture. Interestingly, when talking about the last point, Turner states that Noah Smithwick, a Texas pioneer, wrote that the inhabitants of a mid nineteenth century Mormon settlement near Marble Falls (Burnet County) manufactured chairs, tables and bedsteads from Hackberry wood (for more information see Smithwick, 1983 reference below). [Now we know how Mormon Hill in Marble Falls got its name, and maybe how the Smithwick area just east of Marble Falls got its ap-

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pellation.] Just as interesting, according to Turner, the Lipan Apache used Hackberry wood to make their saddles in the mid 1800s, and Hackberry is still used for this purpose by present day Kickapoo Indians. Hackberry twigs are used by modern day Caddo Indians in their basket making.

Here is a fact for Debbie McClintock: The shallow, spreading roots of Hackberries were used by Indians and early settlers for making a yellow dye. They also used these roots as cord. The bark of Hackberry trees was also utilized, for tanning. Here is one for Billy. Texas folk tradition holds that Hackberry wood makes a good toothbrush (Turner 2009). Another one for Billy, and for Cynthia Castleberry. Kiowa Indians apparently ground hackberries into a paste which was molded on a stick and baked on an open fire. The Comanche Indians did better. They added fat to the paste before cooking it (see Canonge, 1958 reference below). Turner does not say what these concoctions tasted like. However, given what I will tell you next, they were probably quite sweet.

That brings us to the fruit of the Hackberry. The tree produces small, inconspicuous berries (only millimeters in diameter) that range in color from orange to red (see photo). The berries contain a hard pit and the skin of the berry is very thin and evidently very sweet. (They are probably the reason that an alternate name for a Hackberry tree is "sugarberry" tree.) **THESE BERRIES ARE AN IMPORTANT SOURCE OF FOOD FOR A NUMBER OF ANIMALS, ESPECIALLY BIRDS.** The berries persist long after the leaves fall off the Hackberry trees, and thus are an important source of food in the winter for both resident and migrating birds including bluebirds, cardinals, mockingbirds, cedar waxwings, doves, flycatchers, jays, orioles, robins, sapsuckers, sparrows, thrashers, warblers and woodpeckers. White-tail deer, raccoons and other small animals eat the berries also. Hackberries also provide larval food for a number of butterfly species (i.e., caterpillars).

Three small towns and more than a dozen creeks in Texas have been named for the Hackberry.



By the way, there are two species common to Texas, (*Celtis laevigata* and *Celtis reticulata*). They are difficult to differentiate (one main difference being size) and hybridization is known to occur.

I think from what I have just written, the common Hackberry ought to get more respect than it has given. Moreover when we take our next interpretive hike and spot a Hackberry along the trail, I think that instead of saying, "Oh it's a Hackberry," we should say, "That is a Hackberry. It is a remarkable tree. It helped to sustain Indian populations as well as early Texas pioneers. They used parts of the tree to tan hides and to make furniture, cord, fences, saddles and a yellow dye. It is still an important tree since it is a hardy, tough, drought tolerant native tree that can act as a windbreak, form a fence line, used to fill barren areas and to provide shade, food and shelter for many birds and animals."

Canonge, Elliott. 1958. Comanche Texts. Norman: Summer Institute of Linguistics of the Univ. of Oklahoma

Smithwick, Noah, 1983. The Evolution of a State or Recollections of Old Texas Days. Comp. Nanna Smithwick Donaldson, Barker Texas History Center Series, no. 5, Austin: Univ. of Texas Press.

## Stewardship

An ethic that embodies cooperative planning and management of environmental resources with organizations, communities and others to actively engage in the prevention of loss of habitat and facilitate its recovery in the interest of long-term sustainability

# PHOTO GALLERY



Painted Bunting by Jerry Stone



Cooper's Hawk by Mike Childers



Northern Cardinal by Jerry Stone



Grackle by Jerry Stone

## NOT ALL SWEETNESS AND LIGHT

submitted by Mike Harris

by Jack Conner, from *Living Bird Magazine*

"Every birder knows that hummingbirds have a symbiotic relationship with certain wildflowers. Browse through any textbook about bird biology, and you will almost surely find a section detailing the connection—complete with photographs of the birds nectaring and diagrams of bills, tongues, stamens, pistils, and corollas. Because they are tubular and showy, and often red, the plants gain pollinators with long memories, who return to the same flowers again and again. And because their bills are long and their tongues flexible and grooved, the birds have access to energy sources not readily available to other animals. The birds probe the flowers to collect the nectar at the bottom of the corollas and come away dusted with pollen, which they carry from flower to flower. The birds are fueled; the plants are fertilized.

This article was posted January this year by the Cornell Laboratory of Ornithology.

Hummingbirds and "hummingbird" plants make such an eye-catching ecology lesson that textbook authors repeat it in book after book, and birders often fail to see that it's not the whole story.

What's easy to forget is the proviso that most texts generally mention in a sentence or two but rarely illustrate: "Hummingbirds supplement their sugar diets by feeding on small arthropods." Most of us know this truth, but my sense is that too many of us consider it a trivial point. How many birders have made a determined effort to watch how hummingbirds feed themselves away from flowers? And how important is that supplement, anyway?

One problem may be that we don't know what to look for. In a fairly lengthy library and Internet search, I found few illustrations of arthropod-hunting by hummingbirds (although it's easy to find photographs and drawings of the much rarer activity of hummingbirds being killed by praying mantises). The oldest explanatory images I could find dated to 1946 and appear in an article by German ornithologist Helmuth O. Wagner titled, "Food and Feeding Habits of Mexican Hummingbirds," published in *The Wilson Bulletin*.

Wagner studied the foraging behaviors of more than a dozen species in Mexico during the 1940s. He illustrates the techniques used by starthroats, sabrewings, violet-ears, and other hummingbirds to capture flying insects from the treetops, over cornfields, and



above forest streams. Several hummers are drawn in silhouette flying up from tree branches to snatch insects from the sky, kingbird-style—a foraging technique that today would be called sally-hawking. He also describes hummingbirds gleaning prey from bark, leaves, and even water surfaces.

Based on his field observations, his work with captive hummingbirds, and the stomach contents of collected specimens, Wagner concluded that insects and spiders were far more important in hummingbird diets than is generally understood and that nectar was not as essential as many authorities believed. Hummingbirds adapt their foraging to whichever sources are available, and arthropod prey often replaces nectar. "The food of hummingbirds is determined primarily by habitat and season," he wrote. "A given species may feed mainly on nectar or mainly on insects, depending on the time of year. The majority of the hummingbirds in Mexico are not dependent on flowers."

Although few researchers have claimed that hummingbirds can go without nectar indefinitely, a number of them have argued that arthropods are more important in the birds' diets than is generally supposed. A 1980 study published in *The Condor* involved just a single individual hummingbird, but it is frequently cited. Robert D. Montgomerie and Catherine A. Redsell tracked the foraging activities of a female Broad-tailed Hummingbird for two weeks in May in and around her nest in Rose Canyon in Arizona's Santa Catalina Mountains. The researchers surveyed for nectar plants in the nearby landscape (in a one-kilometer-diameter circle around the nest) and found none in bloom that were appropriate for hummingbirds. Over several sub-

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sequent days, they recorded time budgets for the female's activity for 10-minute intervals during each daylight hour (6:00 A.M. to 8:00 P.M.) and followed all her movements away from the nest as best they could. "During the 19 foraging bouts...that we observed," they reported, "the hummingbird spent all her time either flycatching, gleaning from leaves, probing among lichens on tree trunks, or flying between foraging sites." Their conclusion: "[T]he bird must have subsisted only on arthropods for at least two weeks."

A much larger study by J. V. Remsen, F. G. Stiles, and P. E. Scott published in 1986 in *The Auk* examined the stomach contents of more than 1,600 individuals of 140 species of tropical hummingbirds and found that 79 percent held arthropod remains. "The data indicate that most hummingbirds, at any given moment during the day, are digesting arthropods [and suggest that] most hummingbirds feed on arthropods on a daily basis and probably at regular intervals throughout the day."

Why don't we notice hummingbirds hunting more often? Could it be that they spoil us—chasing each other through our yards, preening in the open on leafless perches, or, best of all, zooming right up under our noses to nectar at our feeders and garden plants? In those situations they make themselves hard to miss. Hunting for insects, however, they seem to keep a lower profile, noted often only by those who are most alert.

In a report published in *The Condor* in 1995, summarizing his 18 years of hummingbird observations in the lowland forest in La Selva, Costa Rica, F. G. Stiles describes and illustrates four primary methods tropical hummingbirds use to capture arthropods. Do temperate-zone hummers use the same?

The first method, hover-gleaning, looks like nectaring: the bird holds itself in the air a few inches from a spider web or a leaf and reaches for the prey with bill and tongue. This may be the most easily observed of the four methods. If you witness this behavior, you might try to determine the bird's target—sometimes it's the spider, but hummers also parasitize from the webs, taking insects the spider has already captured. (And, of course, female hummers often steal the threads from webs as adhesive building material for their nests.) A second method, hover-hawking, also involves hovering, but here the bird zigzags through swarms of insects, picking them off one by one, almost as a swallow might. The final two methods are probably the hardest to notice because both involve the bird

sitting quietly and mostly motionless, scanning for prey. In sally-hawking, the bird flies up to snatch a single flying insect and then returns to its perch. In sally-gleaning, the hummer flies up to pick an insect off a leaf and returns to perch.

Stiles' superb and lengthy article cannot be summarized adequately in the space available, but here are a few highlights:

More than half of all foraging efforts Stiles recorded (both nectaring and predation) involved hunting for arthropods. Nectaring is actually the less-frequent activity.

Hawking is more frequent higher in the vegetation; sally-gleaning and hover-gleaning are more common at lower heights. Foraging activity of all types is most intense early in the morning, when the birds are at their hungriest.

Spiders are a favored prey among many species; some tropical hummers feed almost exclusively on them. Stiles even noticed some spiders retreating from their webs when the birds hovered near, and he suggests this might point to a competitive advantage for hummingbirds with longer bills, which can still probe and grab without alerting their prey by the whir of their wings.

During the nesting season (at La Selva at least), females spend three to four times more time searching for arthropods than males do. In fact, the importance of arthropod foraging may be one reason why female hummers in many species—including several North American species—have longer bills than their mates. In all hummingbirds, females are the sole caretakers of their nests and young, obligated to gather all the food for their nestlings, which need protein for growth.

Can observers equipped only with binoculars study these phenomena? The answer is an unqualified yes. Stiles depended extensively on his visual observations of birds in action in compiling his data, as did Wagner in the 1940s, when binoculars were much weaker instruments than they are today.

Searching them out away from our feeders is one key, of course. That involves a little extra legwork. As is the case in many other birding challenges, however, the real challenge is mental: to learn how these birds truly live their lives, we must make the effort to look past their flash and dazzle to the grittier reality just beyond".

**VOLUNTEER OPPORTUNITIES AND AT/EVENTS CALENDAR**

Mike Childers

**AUGUST EVENTS & VOLUNTEER OPPORTUNITIES**

Texas Parks and Wildlife Commission Annual Public Hearing TPWD, Commission Hearing Room, 4200 Smith School Rd., Austin	24th 2pm
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**FUTURE EVENTS & VOLUNTEER OPPORTUNITIES**

HLMN Monthly Meeting Kingsland Library	Sept 7 1-3pm
Burnet Kids Day Out - HLMN Tree Give-Away Burnet County Fairgrounds	Sep 10 7:30am-3pm
Burnet Kids Day Out - Kids Kayaking Inks Lake State Park	Sep 10 9am-3pm
NPSOT Wildscapes Workshop - Native Grasses Not Just for Mowing Fredericksburg United Methodist Church	Sep 10 7:30am-3pm
NPSOT Highland Lakes Chapter Meeting Marble Falls Library	Sep 17 1-3pm
Texas Wildlife Association - Women of the Land Warren Ranch, Santa Anna, TX	Sep 23-25
Tex-Mex Border Ecology - Ro Wauer Highland Lakes Bird and Wildflower Society - Marble Falls, Library	Oct 6 10am
Nueces River Authority - Remarkable Riparian Summit San Antonio, TX	Oct 6 9am-4pm
Refuge Week Festival Balcones Canyonlands National Wildlife Refuge	Oct 8 8:30am-4pm
Native Plant Society of Texas Symposium Houston, TX	Oct 14-16
Native Plant Garden Tour Burnet County	Oct 15 9am-4pm
Texas Master Naturalist State Conference Mo Ranch, Hunt TX	Oct 21-23
Big Bend Ranch State Park Field Trip Big Bend Ranch State Park	Oct 30-Nov 4
Fall Outing at the Lilly's Ed and Sue Lilly's Ranch, Lampasas	Oct 27 or 30

For volunteer opportunities and events scheduled at Inks Lake State Park, Blanco State Park, and Balcones Canyonlands, check these websites for information:

[http://beta-www.tpwd.state.tx.us/state-parks/parks/find-a-park/inks-lake-state-park/park\\_events/](http://beta-www.tpwd.state.tx.us/state-parks/parks/find-a-park/inks-lake-state-park/park_events/)

[http://beta-www.tpwd.state.tx.us/state-parks/parks/find-a-park/blanco-state-park/park\\_events/](http://beta-www.tpwd.state.tx.us/state-parks/parks/find-a-park/blanco-state-park/park_events/)

<http://friendsofbalcones.org/>

Please submit pictures, articles, reports, stories, calendar and event entries, etc. to [chili865@gmail.com](mailto:chili865@gmail.com). Photos should have captions and appropriate credits. The deadline for submissions to each month's newsletter is the 10th of the month and publication will be by the 15th.