

# Tall Timbers eJournal

SUMMER 2020



AN INNOVATIVE USE OF TRAIL CAMERAS

SECRET OF THE STUMPS

MARCH MULES—MOVING BOBWHITE

GHOSTS OF AUCILLA

WHAT'S THAT BLOOMING ALONG THE ROAD?



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# FEATURE

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What's that blooming along the road?  
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BY ROSE RODRIGUEZ



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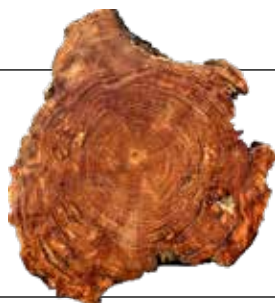
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# TALL TIMBERS eJournal

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## FROM THE EDITOR

I hope you are well and will enjoy the Summer 2020 issue of the *eJournal*. There are articles about current research at Tall Timbers. One of these is about the innovative use of trail cameras to document pollinators at a special host plant, the Sundial Lupine. The Sundial Lupine and one of its pollinators, the Frosted Elf butterfly, are the topics for our Flora & Fauna feature.

"Secret of the Stumps" discusses fire history, using longleaf pine tree stumps to reveal fire frequency and how this research will help with management decisions.

And, the success the Tall Timbers' Game Bird Program has had with quail translocation has brought the "bob-white" call back to places in the Southeast and mid-Atlantic states where it hasn't been heard in a long time. Read about it in "March Mules — Moving bobwhite for Population Recovery."

Our Conservation article, "Ghosts of the Aucilla," features the musings of a new member of the Tall Timbers team, Peter Kleinhenz. Thanks to grant funds, he will be working to conserve the Aucilla Watershed.

Finally, I have written a feature on tung trees, which were once planted in the Gulf South states known as the Tung Belt. I have always admired the blooms of the trees and wanted to know how this China native came to be planted in the U.S. It's a fascinating story. Tung production was once a thriving industry in Florida, south Georgia, Alabama, Mississippi and Louisiana; it all but disappeared in the late 1960s. But, it's making a comeback.

If you prefer to read a printed version, here is how to print one. There is a top arrow on every page that opens features that give you print options. Click on the print icon to print the entire publication or just the article(s) you want to read.

Because this is a digital publication, some articles include hyperlinks to websites that provide additional information. Click on text that is highlighted in color, [blue](#) this issue, which indicates a hyperlink. You can also click on the page number in the contents pages to go directly to the article on that page.

If you frequent social media, follow our pages/feeds: Facebook, Twitter, Instagram and YouTube. Click on the icons at left to take you there.

In every issue I ask for feedback. In this issue, I'm happy to include a beautiful letter I received about our Fall 2019 *eJournal* that featured an article, "Mule of the Red Hills," by Margaret McPherson. It's on the following page. I look forward to more feedback, so email me a note with your thoughts. I will include it in our next issue.

Rose Rodriguez  
[rose@talltimbers.org](mailto:rose@talltimbers.org)

# FEEDBACK

## LETTER TO THE EDITOR

Rose:

Thanks for sharing Peg McPherson's article with me about "The Mules of the Red Hills." My father was a quail hunter and therefore I became one as well. This was way back when there was wild quail in any direction out of town and several men in the small town kept and fed bird dogs. I am the last one left from that place and time. I still have two very old dogs but after they are gone, it ends here with me. Nothing left to show for it but a few guns and some old briar paints and boots and a lot of tears and joys from the memories I still recall.

While attending the 2018 class sessions down in Texas with Quail Masters (a joint effort of Texas A&M and Texas Wildlife Association), I became acquainted with Tall Timbers from a reading list provided by Dr. Dale Rollins. I must say that the efforts and philosophies of Palmer, et al down there are more familiar to me than Rollins, et al and the Rolling Plains down in Texas. I grew up in pine timber country in southern Arkansas but left there many years ago.

Perhaps I can come down at a later date for a visit before old age catches up with me. I do love the South and winters are too cold up here where I currently live. Oldest daughter is in Atlanta and Wifey's sister is in Durham.

Mules .... where have they gone? I grew up on 40 acres with bird dogs and horses. My grandfather had a mule. He never learned to drive because he was too poor to buy a truck. He made a corn crop each year to feed the mule, I asked him once why he kept the mule? His reply was "to make a corn crop." Makes sense, if you apply mule logic to it.

My grandfather's last mule was called "Old Roadie" and he was the only person that could touch him and or pick his feet up and thankfully the old mule went before Papaw did, because if he had gone first, Roadie would have been an outlaw and probably turned out to fend for himself. They are neat animals alright and my father would never have one, he was a horse guy. He said "a mule will wait twenty years to kick you." I had a cousin that was raised around them and kept a couple for most of his life just to look at and take care of. Today they are all gone as well. I still will stop and take the time to look at any mule that happens to come into my field of vision today but the chances are pretty remote for me now. Draft horses yes, but mules...not so much anymore. Why is that?

I usually do not take the time to write a letter to the editor but your staff does great work and your eJournal is top notch. I particularly enjoyed the pictures of the mules and Peg's piece as well. I spent over thirty years in the Army and realized on more than one occasion that I should have been born sooner and spent my time in The Green Machine, when they still had horses and mules. Unfortunately, I missed all of that fun. But I was fortunate to get in on the tail end of wild bird hunting, horses, and those special animals called mules.

Thanks for your time and keep up the good work down there.

—Dennis R. Payne





## ARCHIVES CORNER

### *Herbert Stoddard Had Tung Groves*

BY ROSE RODRIGUEZ

THIS SPRING WHEN THE TUNG TREES WERE IN BLOOM, I remembered a reference to Herbert Stoddard growing the trees at his Sherwood Plantation in Grady County, Georgia. The reference was in *Legacy of a Red Hills Plantation*, a history of Tall Timbers written by Robert L. Crawford and William R. Bruechheimer that was published in 2012. Crawford remembers seeing the grove when he visited Stoddard at Sherwood in April 1963.

Herbert Stoddard was a pioneer in the field of wildlife management whose Cooperative Quail Investigation led to publication of his classic, *The Bobwhite Quail*. Stoddard was a close friend of Henry Beadel, the owner of Tall Timbers Plantation. He was a forester whose method of managing longleaf pine forests in a sustainable way is called the Stoddard-Neel Approach. In Leon Neel's book, *The Art of Managing Longleaf*, he stated that on Sherwood, Stoddard grew quality timber, but also planted about 125 acres of tung trees as a cash crop.

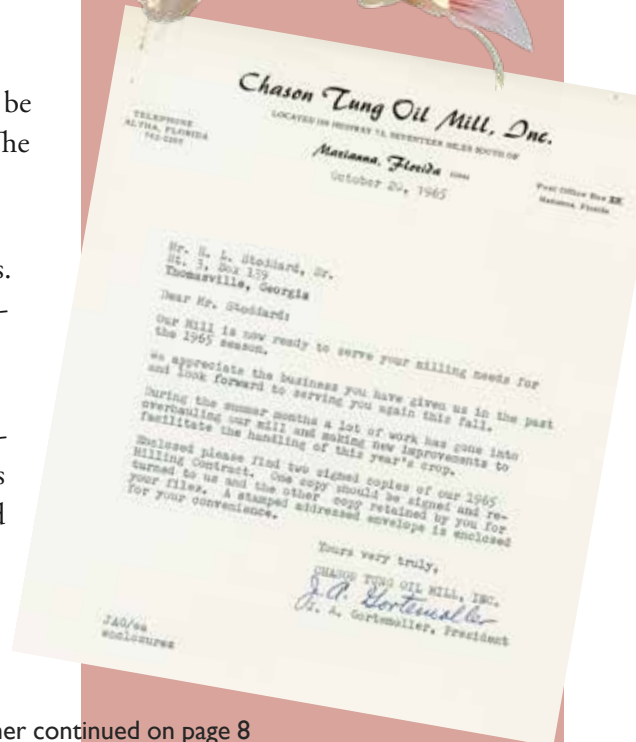
Tung trees produce a nut, which is an oilseed. The oil extracted is used in paints, varnishes and lacquers and as a waterproofing agent. A discussion of the Tung tree industry in the Gulf Coast states of the South can be read in the feature, "What's That Blooming?" on page 36 of this *eJournal* issue.

Although tung trees had been introduced from China at the turn of the twentieth century, it was until the late 1930s in the Red Hills region that it became commercially significant. The earliest reference I found of Herbert Stoddard and his tung grove is 1940, in *Birds of Grady County, Georgia*. (See page 144, his species account for Grasshopper Sparrows.) Since it takes five years for tung trees to mature, Stoddard probably planted his grove in the mid-1930s.

A letter he wrote to the Cooperative Quail Association members with secretary Henry Beadel, on April 15, 1943, states that the Association would be disbanded on May 1 of that year. Several reasons for this action were given. The third reason states:

We, who are carrying on the work of the Association feel impelled to devote our time and energies to essential work during these trouble times. Stoddard has planned to devote his time during the War to assisting nearby preserve owners in their timbering programs, and to attending to his Tung oil groves and farm...

When doing research for this article, I checked with Juanita Whiddon, the archivist at Tall Timbers, to see what she could find out about Stoddard and his Tung grove. She looked in the Stoddard Collection for any records and found a manila folder titled "Tung" in Stoddard's handwriting. Inside the folder Stoddard had placed correspondence with tung oil mills, receipts for tung nut processing, brochures from the American Tung Oil Association, a 1957 farmer's bulletin on tung production from the U.S. Department of Agriculture and other memorabilia. What a find! ■



—Archives Corner continued on page 8

# *Birds of Grady County and Herbert Stoddard's Tung Groves*

In *Birds of Grady County, Georgia*, Herbert Stoddard makes several references in his bird observations to his tung groves. The manuscript was found among Stoddard's papers after his death in 1970, and was published by Tall Timbers as Bulletin No. 21 in July 1978. It was edited by Roy Komarek and Robert L. Crawford, who state in the Editors' Introduction that Stoddard's manuscript was written in longhand, with no introduction or bibliography. They included other notes and annotations by Stoddard they found in his papers for the book's publication.

Here are excerpts from Stoddard's species accounts in *Birds of Grady County, Georgia*, with references to his tung groves.

**Blue Grosbeak.** ... the Blue Grosbeaks have almost deserted the brushy spots in the open pine woods on Sherwood and now concentrate their breeding activities in the tung oil groves. Here the lightly constructed, rather deep nests are built and lined with grasses and rootlets, usually being placed from 5 to 15 feet up in the tung trees. A pair of Grosbeaks per about 3 acres of grove approximates the breeding density in this type of habitat. These birds have increased manyfold [sic] since tung groves have been expanded to a size that makes them attractive for nesting. ... A typical nest with 3 eggs, located about 6 feet up in a tung tree, was found 9 June 1947. Young grosbeaks just out of the next but still dependent on their parents for food were common in the tung groves during mid-August. I observed a female feeding full developed young on 20 August 1942 and 2 others carrying worms into dense tung trees where young were undoubtedly concealed by the foliage. Blue Grosbeaks find an abundance of insects on the leguminous cover crops grown for soil improvement in the tung groves....



*"Blue Grosbeaks lived in scattered pairs in thicket-dotted openings in the forest. I found one nest low among the outer branches of a tung tree...." – George M. Sutton*

**Eastern Wood Pewee.** ... As noted elsewhere pewees sometimes found it profitable to follow me up one row and down another in the tung groves, catching insects I disturbed as I worked. This behavior, which occurred during the summer months, was similar to that of the phoebe during the winter. As I worked in a tung grove in late afternoon of 15 May 1958, yellow-green deer flies began annoying me. Only one or two were buzzing around my head at first, but they were quick as a flash and seldom were caught by my slapping hand. Suddenly a wood pewee darted within inches of my eyes 2 or 2 times before I realized what was happening. He was following my slow forward progress, and soon I noticed that at every dart he made toward my head there was one less deer fly. He never seemed to miss! ...

**Eastern Phoebe.** ... An interesting behavior of the phoebe is quoted from my notes of 13 December 1955:

The week of 6-13 December was a bitter cold one for south-west Georgia, with temperatures near or below freezing during the night and cold 15-30 m.p.h. northwest winds blowing during daylight hours, sometimes into the night. I worked afternoons pruning limbs in one of Sherwood's tung groves in the winter territory of a phoebe who was having a hard time making a living — few insects were flying. Early afternoons as I started my work, the phoebe joined me, perch to perch only a few feet distant as I worked down the rows. He would sally forth and catch insects disturbed by my chopping. Occasionally, as the wind lulled, I would note a few dancing swarms of tiny insect in the air. At such time the bird left me and fed on them. But when the wind blew hardest with lowered temperatures because of clouds, he followed me faithfully and caught the few insects disturbed by my activity. I have frequently noted this habit of the phoebe when pruning my tung groves in severe winter weather, but never has one accompanied me so long and closely. ...

Above, center, is a watercolor of Blue Grosbeaks painted at Sherwood Plantation in 1952, by George M. Sutton for the book *Georgia Birds* by Thomas Burleigh, published in 1958. Herbert Stoddard hosted Sutton at Sherwood while he drew and painted birds. Sutton was a renowned bird artist and ornithologist. In his essay on the color plates for the book, Sutton mentions being driven all over Sherwood and shown the tung orchards.



**Indigo Bunting.** ... This species has during recent years "taken over" the tung groves on Sherwood for breeding (although the "natural" location is shrubby growth on field edges and in the open piney woods). When the leaves drop in the fall, we find 2 or 3 to half a dozen of the characteristic nest in each grove. This, coupled with observations on the singing males, is the basis of our estimate of a maximum nesting population of one breeding pair to each 2 or 3 acres of grove. As there are 13 of the groves totaling some 125 acres, a considerable breeding population is indicated. Very few pairs, however, continue to nest in the open piney woods on the place to which they were largely confined as breeders before the tung groves were planted. On 20 July 1940, a nest with 3 eggs was noted near the end of a tung branch not over 18 inches above the ground. The more usual situation in tung trees is from 5 to 15 feet up....

**Grasshopper Sparrow.** ... Winter records include 2 seen while disking tung groves on Sherwood, 6 December 1941, and a specimen collected in another tung grove on 4 February 1940. Many others have been observed in the groves at this season.... In Grady County, Grasshopper Sparrows may be found in largely open areas – fields grown up to rank broomsedge, grassy pastures, and the scant grassy spots between trees in tung and pecan groves. ...

## *Why Tung Groves on Sherwood?*

According to a brochure produced by the American Tung Oil Association, growing tung trees for oil was undertaken to provide an agricultural industry for the cut-over pine area of the lower Gulf States, an area then underdeveloped and much better suited to tung production than to growing cotton.

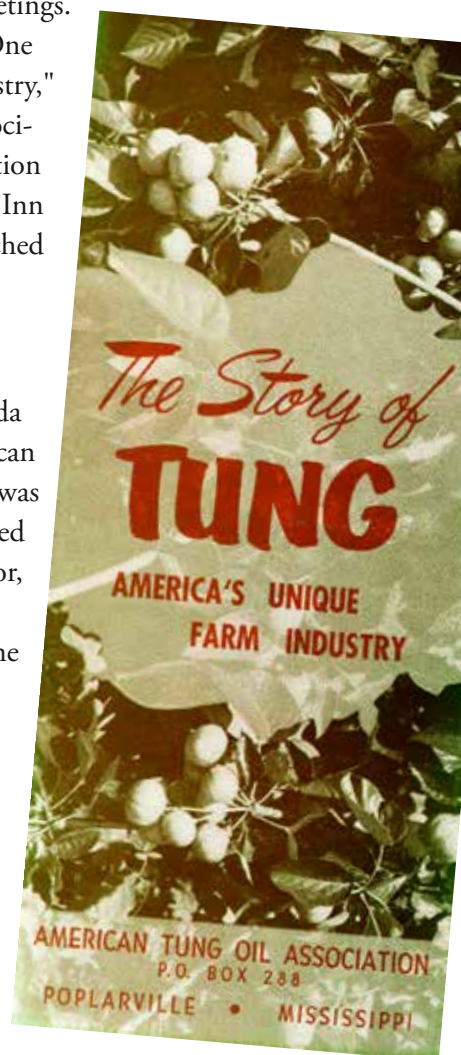
During the Great Depression, the tung industry provided much needed work and there was a demand for the oil by the paint and varnish manufacturers, which was becoming hard to import from China thanks to Japanese aggression prior to World War II.

Enthusiasm was high for the tung industry in north Florida and south Georgia, as well as the rest of the Tung Belt states during these years. Herbert Stoddard jumped on the "tung tree band wagon" and planted tung groves at this time. Stoddard also grazed cattle on his Sherwood Plantation. Cattle grazing in tung groves was common as tung and livestock proved to be compatible. As previously noted, Stoddard tended to his tung groves during the war years and continued until the mid-1960s.

In Stoddard's Tung folder, I found correspondence beginning in 1952. It was a letter from John Watts the editor and publisher of *Tung World*, a monthly review of the tung oil industry thanking Stoddard for renewing his subscription. Stoddard replied thanking Mr. Watts for the TUNGOLIN that he was trying out on various minor skin troubles, and enclosed a check in the amount of \$1.25 for payment.

There were many letters between Stoddard and the American Tung Association regarding his membership dues, proxy voting and association meetings. A 1954 letter enclosed two brochures that were attached. One is titled, "The Story of Tung, America's Unique Farm Industry," the other was used as an advertising solicitation for the associations publication, *American Tung News*. There is an invitation to attend a meeting of Florida tung growers at the Holiday Inn in Tallahassee, Florida on July 25, 1963. A program is attached with notes by Stoddard (that I can't decipher) on the back.

Most of the other correspondence is from tung mills. Herbert Stoddard had contracts with American Tung Mills out of Florala, Alabama who also had a mill in Altha, Florida south of Marianna, where his nuts were milled. The American Tung Mills correspondence was from Michael Lisanti who was later found guilty of knowingly selling tung oil that belonged to the federal government. In November 1958, a competitor, Alabama Tung Mills, who was trying to get Stoddard's business, sent Stoddard a copy of an article about it from the *Mobile Register* along with a contract, which wasn't signed. A 1961 copy of the *American Tung News* had an article about a new mill being readied for operation. This was the Chason Tung Oil Mill on Highway 73 near Altha. It was a resurrection of the American Tung Mills, and was the tung mill Stoddard did business with, at least until May 1966. There is a letter, a signed contract (witnessed by Leon and Julie Neel) and a tung nut analysis for moisture and oil. These are the last documents in Stoddard's file folder. ■



# FLORA & FAUNA

## Sundial Lupine

BY ROSE RODRIGUEZ

Sundial lupine or wild lupine (*Lupinus perennis* L.) is a native perennial herb that is a member of the pea family. Its southeast range is shown on the USDA map here, although it can be found in eastern North America as far north as Canada and as far west as Texas. According to the US Forest Service website's wildflowers section, the plant was once quite common prior to fire suppression (resulting in overgrown woods that were once open), urban sprawl, and livestock pens, which have "invaded their strongholds."

The sundial lupine grows in dry sandy soils and clearings of open woods. In sun or part shade, it blooms from April to July. The Ladybird Johnson Wildflower Center plant database describes it as having "blue [or purple], pea-like flowers ... in an upright, elongated, terminal cluster on an erect stem with palmately compound leaves. ... divided into 7-11 leaflets. Occasionally flowers range from pink to white." [https://www.wildflower.org/plants/result.php?id\\_plant=lupe3](https://www.wildflower.org/plants/result.php?id_plant=lupe3)

The sundial lupine is important for two butterfly species. The federally endangered Karner blue butterfly, (*Lycaeides melissa samuelis*), relies on *Lupinus perennis* as a larval host plant, as does the Frosted Elfin butterfly (*Callophrys irus*), a species of conservation concern across its range. For this reason there is considerable interest in reestablishing colonies of sundial lupine.

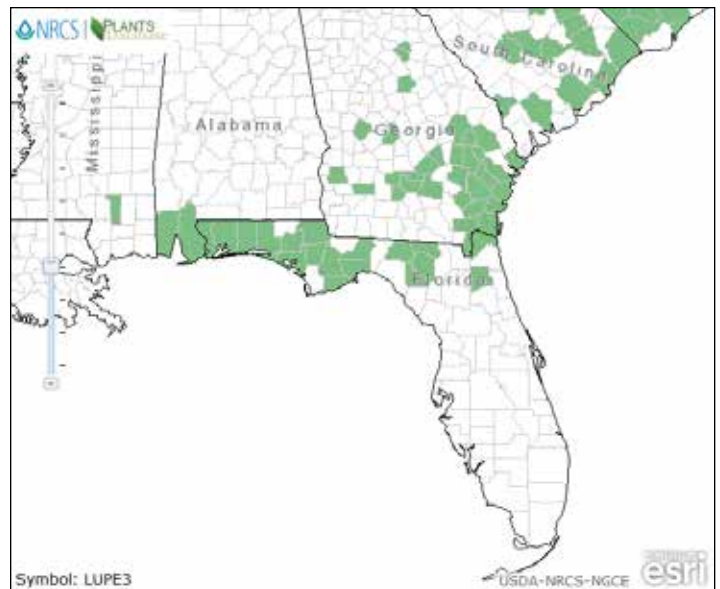


Frosted Elfin butterfly - male.  
Photo by Dave McElveen

The Wildflower Center notes that the plant has benefits for other wildlife. Deer browse its foliage, and birds and small mammals eat the seeds. The plant is recognized by pollination ecologists as attractive to a large number of native bees, especially bumble bees. The origin of the plants name, *Lupinus*, is from the Latin word lupus meaning "wolf." It was thought that these plants robbed the soil, which is not true. Lupines actually help to increase soil nitrogen. According to the Center's information about sundial lupine, the use of this plant for medicinal purposes



This photo (detail) of sundial lupines was taken from a trail camera for a study monitoring flower-visiting pollinators. Read about this study in the article on page 10, "An Innovative Use of Trail Cameras."



Southeast range of the sundial lupine (by state and county), is shown on the map in green. Map from the USDA-NRCS Plants database. <https://plants.usda.gov/core/profile?symbol=LUPE3>, shows the full range.

is not recommended as it is quite toxic and potentially fatal, especially the seeds.

Native Americans, however, brewed a tea from its leaves, which they would drink cold to treat nausea and internal bleeding. "They also used it as a fodder for horses to fatten them and make them 'spirited and full of fire'." ■

For more about a study being conducted on sundial lupine pollinators, see page 12.



# Frosted Elfin Butterfly

BY DAVE MCELVEEN

The Frosted Elfin (*Callophrys irus*) is a small (about 1 inch tall) butterfly of our longleaf pine sandhills. Its shades of tan, auburn and chestnut combine like puzzle pieces and mimic pine bark. In north Florida, it uses sundial lupine (*Lupinus perennis*) as their sole host plant, i.e., the plant females lay eggs on and that the caterpillars feed on. Adults fly from late February to mid-April. Females lay eggs that hatch in 5-7 days. The caterpillars go through 4 instars, or phases of development, over a period of 20-30 days. In each instar they shed their old skin, which allows them to grow larger each time. At the end of their 4th instar, they travel down to the ground and wander off a few feet. Here they choose a safe spot at or below the soil surface and change one more time into chrysalis. They remain there for 10 months, then emerge the following spring as adults to start the cycle over.

Photos here were captured by the author using a Canon D7200 digital camera with a 150mm macro lens on a tripod.

*Clockwise starting from upper left:*



Female frosted elfin ovipositing on sundial lupine flower bud. Eggs are often nestled in between the young flowers where, upon hatching, the young caterpillars have ready access to nutritious new growth.



1st instar frosted elfin caterpillar (~1/16th inch long) newly emerged from its egg case. Caterpillars chew their way out of the egg.



2nd instar (about 1/8" long) with ball of shed skin from its 1st instar. They often eat this shed skin to start their new phase in life.



Large 4th instar (~3/4" long) feeding on lupine leaflets. It's almost ready to wander off and form a chrysalis.



A newly emerging 3rd instar shedding its old skin. 3rd instars are deeper green in color to blend in with lupine leaves. At this stage they move from eating hidden in flower buds to being exposed on the green leaflets of lupine.



4th instar (~1/2" long) feeding on mature lupine flowers.



# An Innovative Use of Trail Cameras

## MONITORING FLOWER-VISITING POLLINATORS

BY ROBERT T. MEYER AND DAVE MCELVEEN

**T**rail cameras began as a way for hunters to monitor their quarry at food plots and game feeders. Early versions were bulky and had poor picture quality. Wildlife researchers, including Tall Timbers staff, began using trailcams in the 1990s to monitor the presence of quail predators such as bobcat, fox and racoons. Now, Dave McElveen and I, researchers at Tall Timbers, have developed an innovative use of trailcams to monitor flower-visiting pollinators. This is the first time this approach has been used in the US.

Traditional monitoring of almost any species entails visiting an area multiple times at a specific time of day and over a period of months or often, an entire season. This requires a lot of staff time and travel expense. We are also limited by how many areas can be covered with available staff.

A trail camera is relatively inexpensive by comparison and can be set up to record data over a period of days at a time, requiring only periodic checks to replace SD cards

and freshen up the batteries. Staff then review the images in the lab to record what species were seen and when.

The goal is to take photos good enough to recognize the species, not 'picture book' quality images (see photos at right). With recent advancements in trail cameras; we wanted to see if their photo quality had reached levels good enough to identify species of pollinators.



Southern dogface, (*Zerene cesonia*) – the yellow butterfly in the center of this image – visits a lupine patch being monitored by a trail camera in the Apalachicola National Forest. Detail of southern dogface butterfly above right.



Pollinators play a pivotal role in our ecosystems, pollinating our crops, gardens, and native wildflowers. To see if it was possible, we set up trail cameras in the Apalachicola National Forest (ANF), to identify pollinators visiting one of our rarest wildflowers, the sundial lupine (*Lupinus perennis* L.). This ephemeral flower was chosen not just because it's beautiful, but because it is also the sole host plant for the frosted elfin butterfly (*Callophrys irus*), a species of conservation concern across its range. Therefore, we were able to see if the trail camera was 1) able to identify sundial lupine pollinators, and 2) capable of identifying pollinators as small as the frosted elfin — with only a 1-inch wingspan.

The camera was set up three feet away from a small, dense patch of lupine and recorded an image every five seconds. After just two days, the 32GB SD card was full of photos, about 9,600 of them. After a few long days of searching through the photos, with a cup of coffee in hand, we were able to find 219 individual insect visitors. Amazingly, about 97% of the photos contained insects that were identifiable. Turns out, the lupine flower is a busy place.



The trail camera was set up on a t-post (left) a few feet away from the sundial lupine patch (right).

Bees (bumblebees [*Bombus* spp.]) made up the majority (62%) of the visitors and butterflies were the next most common visitor making up 38% of identified pollinators. We found surprisingly eclectic amounts of butterflies, from tiger swallowtails (*Papilio glaucus*), pipevine swallowtails (*Battus philenor*), and zebra swallowtails (*Eurytides marcellus*), to southern dogface (*Zerene cesonia*), and cloudywings (*Thorybes* spp.), to those as small as the whirlabout (*Polites vibex*).

—Trail Camera continued on page 14

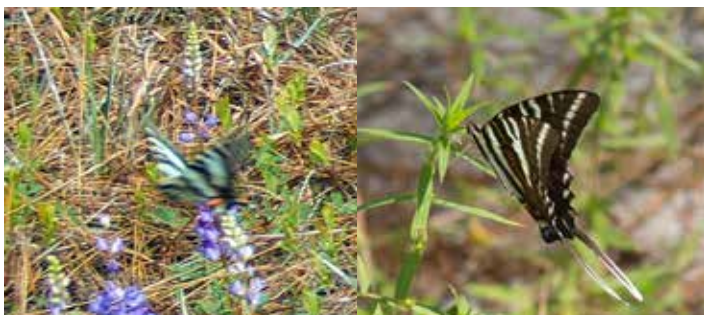
Paired images of trail camera photo (left), and “better quality” photo (right).



Bumblebee (*Bombus* spp.)



Pipevine swallowtail (*Battus philenor*)



Zebra swallowtail (*Eurytides marcellus*)



Whirlabout (*Polites vibex*)



Frosted elfin (*Callophrys irus*)



Trail Camera continued –

We didn't find the rare frosted elfin in the camera photos, even though they have been spotted elsewhere in the ANF. However, the whirlabout and the elfin have similar wingspans, so it is likely it could have been identified if it was present. Unfortunately, we had to wait another year to try again, since the adult frosted elfins were finished flying for the season by the end of the study. But one year later, when setting up the camera on another patch of lupine, we were able to find the elusive elfin.

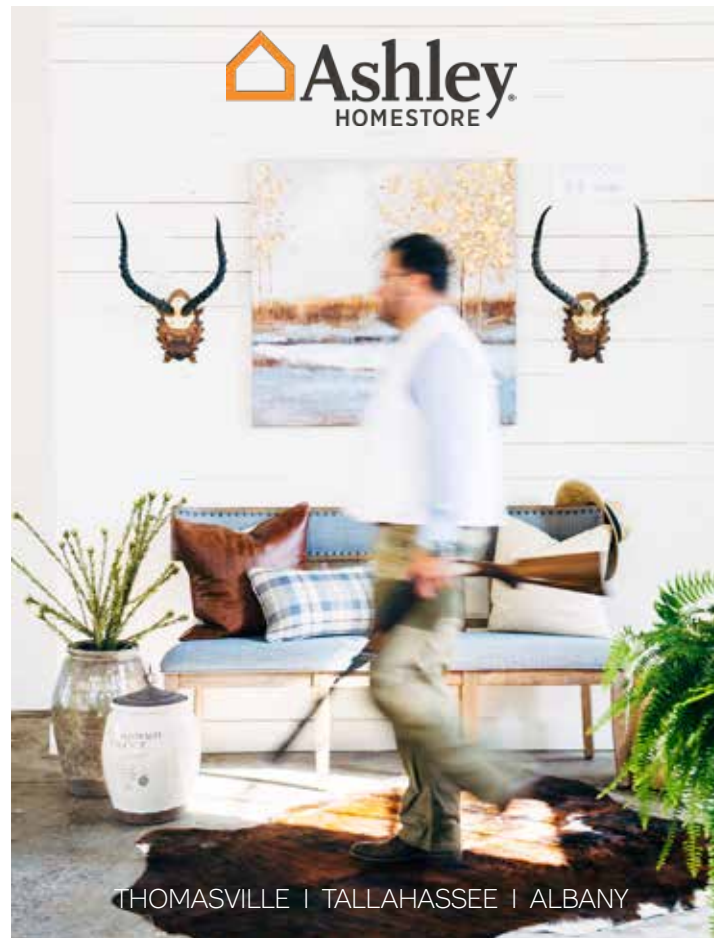
Despite the blur and haze of the pixilated images, these photos represent important pieces of information in the management of elfins and lupine in the ANF.

While the ability to identify pollinators will depend on what is flying at the time and location of the camera, these cameras can offer an effective, affordable, and relatively easy-to-use tool for monitoring pollinators and even small, rare species of conservation concern. ■



Female frosted elfin ovipositing on sundial lupine flower bud. Notice the egg, circled in blue, nestled in between the young bud. Upon hatching, the young caterpillars have ready access to nutritious new growth. Photo by Dave McElveen

About the authors: Robert Meyer is a woodpecker biologist in the Stoddard Lab at Tall Timbers. Dave McElveen is a Tall Timbers Research Associate who studies butterflies.



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# Stoddard Bird Lab

The Stoddard Bird Lab conducts problem-solving research designed to reverse the population declines observed for many birds associated with fire-maintained ecosystems. Over the decades, the lab also has provided important information on the bird mortality associated with communication towers and the unique characteristics of rare old-growth pine forests, and special monitoring programs developed by the lab are used to track rare birds on scores of public lands.

The lab also makes use of innovative tools that have been developed to help conserve habitat on private lands. This effort focuses primarily on the large population of endangered Red-cockaded Woodpeckers found in the Red Hills region and extends to over 130,000 acres in Georgia and Florida. The lab also has received numerous awards for other scientific contributions, conservation initiatives, and effective outreach.

Donations are essential for developing data-driven solutions to the problems confronting many pineland birds. To learn more about the Stoddard Bird Lab and to contribute to the program, visit the lab's [web pages](#).



*Photos courtesy of Tara Tanaka.*



# Need Fire?



*Fire Ecology Research Scientist Kevin Roberston, above, directs the Fire Ecology Program at Tall Timbers. Photo Rose Rodriguez*

## The Fire Ecology Program needs your support to help you keep fire on your land.

Prescribed fire faces many challenges that can only be met with sound science. The Fire Ecology Program conducts research to provide the public with applicable, science-based information on the appropriate use of fire for maintaining natural plant communities while protecting the health and safety of the public. Research focuses on both plant ecology and fire science, including fire behavior, emissions, remote sensing, and fire effects on soil.

Contributions made directly to the Fire Ecology Program at Tall Timbers will be used to help supplement the program with internships, supplies and capital needs.

To learn more about the work of the Fire Ecology Program and make a donation to the program, [visit](http://www.talltimbers.org).





# Secrets of the Stumps

## SAVING FIRE HISTORY AT TALL TIMBERS

BY JEAN HUFFMAN AND NEIL JONES

**For over 20 years we have been on a mission**—to save the irreplaceable records of past fires contained in the stumps of our oldest longleaf pines. This is the story of why these records are important, how the Tall Timbers Tree-ring Lab came about, and a quick look at our research past, present and future.

To us, a very old stump is a true thing of beauty that is worth protecting and learning from, an irreplaceable window into the past. What makes these stumps so valuable is the records that are contained within their annual growth-rings: rainfall, hurricanes, frost, volcanoes, many aspects of human use and history, and much more. But what we are interested in primarily are the detailed records they contain of fire history.

Those that were not are resin-filled and rot-resistant and can sometimes persist for well over 100 years. However, these very old stumps are becoming rarer and rarer as they are rapidly being lost to development, fire, decay, commercial stump removal and the collection of lighter-wood.



*Old longleaf pine stump from St. Joseph Bay State Buffer Preserve.*

People and lightning have been burning the pine forests of the Southeast for thousands of years, but no one kept detailed records of fire until very recently. The trees, however, were keeping precise fire records by producing fire scars within their growth-rings.

Old fire-scar records are contained in old stumps and dead trees, whose cross-sections are required for fire history work. However, these are extremely rare. Nearly all of the old longleaf pines were cut during the last 100 or so years, and then even their stumps were mostly removed.



*Time is running out for protecting these rare and rapidly disappearing natural historical records. Old stumps are being lost to development, decay and fire. A recently dead old growth stump burning in the Red Hills (Wade Tract).*

—Stumps continued page 18



*Map of 30 of the sites where the authors have collected sections of stumps for fire history research from 1997 to the present.*

The first element of our mission has been to collect and preserve what is left of these stumps and their fire records before they are lost forever. We have collected cross-sections of old stumps across a latitudinal range from Rookery Bay and the Big Cypress Reservation in South Florida to the Red Hills of southern Georgia, and many diverse sites in between.

The second element of our mission is to learn as much as we can about past fire regimes from the remains of these old trees. We started our Florida fire history work on a barrier island — Little St. George Island in Franklin County. We collected cross-sections of old, recently dead slash pines and found that since the 1860s, even on a small barrier island, fires burned frequently. After this, we discovered a goldmine of beautiful, rare, very-old longleaf pine stumps at the St. Joseph Bay State Buffer Preserve. Working with Dr. William (Bill) Platt from L.S.U., the fire histories from the stumps of these two sites formed the basis of dissertation research (by co-author Jean Huffman). The resulting fire history led to great insights about past fire regimes in a region that had no other fire histories completed. It was also a breakthrough discovery of how to find fire scars in southern slash and longleaf pines that were previously thought to be rarely scarred by fire.

Soon after completing the Buffer Preserve fire history, we began working again with Dr. Platt on a project reconstructing the fire history of Avon Park Air Force Range in Central Florida. We used old trees that were recently downed from hurricanes Jeanne and Charley and some older stumps to produce a 250-year fire history, the first and still only fire history for peninsular Florida.

One of the most gratifying things about this work for us is the interest and involvement of fire-managers, from helping us conduct the research, to adjusting their management in response to the results. Land managers have played a crucial role in finding stumps, helping us remove them, and, in the case of Steve Morison at the Tiger Creek Preserve in central Florida, helping advance methods of collecting and processing tree cross-sections. The work we did with these studies has already influenced fire managers' use of fire on the ground. For instance, until recently many management publications suggested a fire interval of 3-5 years for Florida pine flatwoods, whereas our research in flatwoods found that fires were mostly occurring every 1-3 years during the past two centuries. With the historical record to back them up, land managers have felt more confident using fire more frequently.



*Steve Morrison cutting a stump in an old-growth longleaf pine stand in South-central Florida. This is one of a series of sites in Central Florida on and off of the Bombing Range and Lake Wales Ridges where we have collected many fire-scarred cross-sections of old stumps.*





*A longleaf pine showing a series of well-formed fire-scars from the early 1800s. The earliest scar was formed in 1812, followed by scars in 1816, 1822, 1824 and 1829. Three of these scars occurred in the early lightning season (May-June) and two (1822 and 1829) were in the dormant season (January or February).*

## THE TALL TIMBERS TREE-RING LAB

In the fall of 2015, we realized that our unique and valuable collection from over 25 sites really needed a safe home where it could be archived for the future and the data it contained would not be lost. Collaborating with Fire Ecology Program scientists Dr. Kevin Robertson and Dr. Monica Rother, and with support from Tall Timbers administration, we transferred and housed our collection at Tall Timbers and established the Tall Timbers Tree-ring Lab.

Since its establishment, the Lab has completed several projects that are published or submitted for publication. Most recent is a fire history of the Red Hills region using material from Tall Timbers, Millpond Plantation, and other sites. We established that frequent fire has continually been applied throughout the 20th century, without capitulation to the government's campaign against fire, as some have assumed. We also published two papers about methods for collecting and analyzing fire scars from longleaf pine. First, to be able to interpret the seasonal timing of our fire scars, we developed a new fire-scar classification system for southeastern pines based on over a decade of monitoring seasonal growth of regional pines. We also documented the import-

ant discovery of how to find fire scars in Florida longleaf, including sampling stumps near the soil surface, where fires were most likely to scar them. Prior to this discovery it was difficult to find many fire records in the highly fire-resistant longleaf pine. These projects pave the way for future tree ring research in the Southeast, where very little fire history research has been completed, and where the fire regimes and methods for reconstructing them are quite different than traditional approaches developed mostly in the West.

Currently we are working to complete analyses and publications on what will likely be our most important work. Analysis of our extensive collections from the St. Joseph Bay State Buffer Preserve and Tyndall Air Force Base has revealed extensive fire-scarring dating back to the early 1500s and will soon result in a comprehensive look at the frequency, season and spatial characteristics of fire over time in the coastal Florida Panhandle. The Lake Wales Ridge collection is also being dated now, and will result in another landmark fire history spanning about five centuries that may help guide future management and conservation policy for longleaf pine ecosystems in that region.

—Tree-ring Lab continued page 20





*An old stump that contains a wealth of records of past fires. This stump from the Apalachicola National Forest has a “box-cut”. These old box-cut scars (one is visible in the photo, the other is on the backside of the stump) indicate that this is a very old stump. Pockets or “boxes” like these were cut into the bases of pines to collect resin from the middle 1800s until the Herty method of collecting resin was developed in 1909.*

Tree-ring Lab continued—

We will learn much from these projects, but we will have only scratched the surface of what we can learn from our rich collection, and old stumps known to still remain in the field. We plan to use this material to gain an increasingly complete understanding of how fire regimes have varied over time and across different habitats and regions. We are seeking support to continue this important work that few others have the expertise and opportunity to pursue. Details about historic fire frequency, season, and spatial patterns, which can only come from tree-rings, will provide important information for managers seeking to better understand and manage fire on their sites. In a time when the threats to prescribed fire, and everything that depends on it, are many, the results of our work will continue to build a solid scientific basis for the maintenance and restoration of frequent prescribed fire for the conservation of our iconic fire-dependent communities and their imperiled wildlife. ■

## DETERMINING SEASON OF PAST FIRES

The seasonal timing of fire within the year can be determined by the position of the scar within the growth ring. The enlarged area of the fire scar shows a “transition season” scar that formed between the light-colored early, or spring wood, and the darker-colored late, or summer wood. Our research has shown this transition between early and latewood to occur usually in June—so this fire likely occurred around June of 1794.



## DETERMINING FREQUENCY OF PAST FIRES

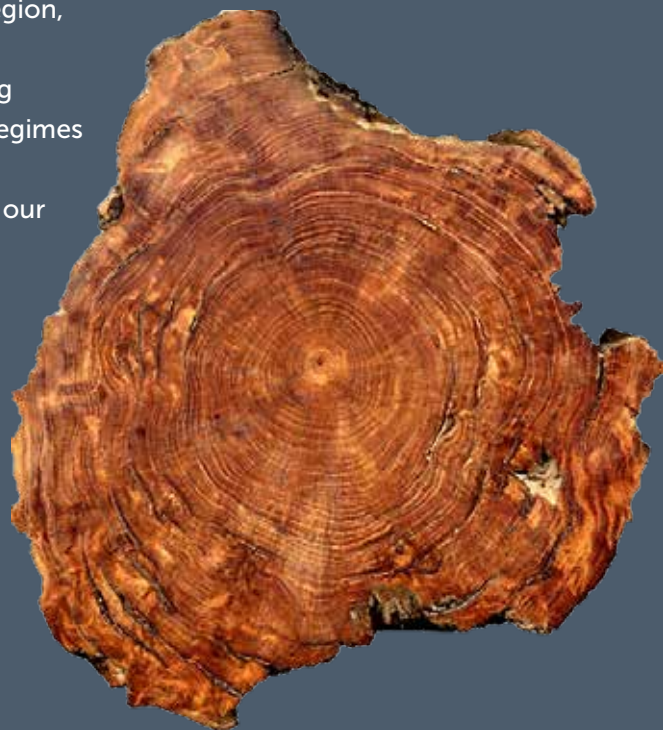
We determine the frequency of past fires by compiling all of the fire-scar dates from a group of trees in a small area. Fire doesn't usually kill the cambium of a longleaf pine because of its very fire resistant bark, but when a tree is injured by fire it is more likely to then record scars from subsequent fires. This photo shows an area within a longleaf pine cross-section that has an unusually high concentration of fire scars from the 1800s.



*Tree section with a high concentration of fire scars.*



Our scientific studies, and other studies conducted in the region, have documented the ability to use stumps like this one to obtain a wealth of data on past climate conditions (including precipitation patterns and droughts) and past disturbance regimes (including fire regimes, hurricanes, and river flow volumes). This contributes to greater understanding of the ecology of our southeastern pine savannas.



*A fire-scarred cross-section of an old stump from Avon Park Air Force Range in Central Florida.*

*About the authors:* Jean Huffman is a dendrochronologist, fire ecologist, and land manager. She and Neil Jones research fire history in association with Tall Timbers and Louisiana State University.



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# The March Mules – Moving Bobwhite for Population Recovery

BY THERON TERHUNE AND CLAY SISSON





*The sleepy effect of sunrise feels as though lead weights are dangling from my eyelids, and my persistent head bobs may appear to driver's passing by that I am rocking out to Van Halen or Pink Floyd.*

Little do they know that a hundred or more bobwhite quail are covertly tucked away in wooden transport boxes in the back seat clandestinely “on the move” across state borders. Buuurrrmph, buuurrrmph — it’s during these times I am actually thankful for the obnoxious-sounding, wash-board-grooved pavement located to the right of the white lines as they remind me time and again to stay awake and focused. Translocation seems akin to smuggling drugs across state lines late at night and early mornings attempting to get birds to their destination as soon as possible.

While we have yet to be pulled over translocating birds, scores of scenarios run through our minds as to how we would explain to an officer that he/she could not or should not open the boxes taped up with different colored duct tape, emitting a not-so-pleasant smell and labeled accordingly with property names. Jacked up on Mountain Dew, high on No-Dose, eyes dilated, dark circles under the eyes from sleep deprivation, cheeks red from slapping myself and chewing bubble gum like I own stock in Dubble Bubble the miles add up. Um, yes officer ... here is my license, registration and scientific collection papers. Or, alternatively, just play it cool and act like everything is normal? And if he/she asks just recommend they carefully open the box in their own vehicle?! I doubt we’d get off with just a warning!! The things we do ... for the love of bobwhite!

The process of translocation is indeed long, and one that is a year-round adventure for the Game Bird Program at Tall Timbers—from helping landowners and land managers meticulously whip habitat into shape for the receipt of birds, to securing permits for moving birds from one state into another, to locating adequate numbers of source birds for translocation, to assessing bobwhite and predator abundance on both source and recipient sites, to planning and coordinating pre-baiting, trapping and transport of wild birds. It is a tedious and painstaking process, but a worthwhile venture in the name of science and bobwhite conservation.

*At left, Mark Sasser, Tall Timbers' Alabama Regional Quail Biologist releases quail translocated from Georgia to Triple Creek Farm in St. Clair County, Alabama, in March 2020. Photo by Clay Sisson. At right, male bobwhite. Photo by Shane Wellendorf.*

## What is translocation?

Translocation describes the physical processes of capturing, transporting, and releasing wild individuals (bobwhite) from designated donor sites to recipient sites, with the ultimate objective being a viable population that exists in perpetuity, and oftentimes equally important is sustaining a moderate recreational harvest.

## Why is translocation needed for bobwhite?

We could write a dissertation on the scientific validity of translocation, in fact we have, but truly the reason we move birds all over the country is because we love this pint-sized bird, and without translocation some places simply would never again hear the distinctive ‘bob-white’ call echoing through the tall pines or reverberating atop the blades of grass in the prairie. The bobwhite is arguably the most romantic of game birds to hunt, with intricate rules of etiquette while hunting from horseback, with mule-drawn wagons and double-barrel shotguns, and behind pointing bird dogs.

There is something nostalgic about sneaking up behind a bird dog locked on point among the eerie silence of the woods—yet with the din of crunching leaves, scores of songbirds scuttling and calling about, and wind whirring through the treetops—knowing an explosion of plump-sized feathered rockets will erupt from the cover. Few, if any, other wildlife species bridges the social connection between people, dogs and the pensiveness of nature as does the

Prince of Game Birds. How can someone not fall in love with such a magnificent bird?!



—Translocation continued on page 24

For many, though, having bobwhite return to their property it is not so much about the hunt but about restoring the bird and its long-lost call — reminiscent of their youth — to their property once again.

In the movies *The Patriot* and *The Gladiator*, Mel Gibson's and Russell Crowe's characters' scream, "HOLD THE LINE," with the intent to champion the troops and prevent a collapse of their armies and winning the battle. In a similar vein, translocation serves as a means to "holding the line" relevant to range creep or range contraction which bobwhites are experiencing along the northern periphery of their historic range.

In many places and some portions of most states, especially in the northeastern and midwestern United States, you commonly hear: "becoming scarce," "likely to be extirpated," "we used to see them all the time," "almost exterminated," "only a few left to breed," "hunting season should be closed," and "they were here everywhere, and then they were just gone," resound among landowners, old-time hunters, biologists and scientists throughout the bobwhite's range. Unfortunately, these phrases were all too common for species that no longer exist like the Dodo bird and the passenger pigeon; but, these words were also penned to describe the plight of the wood duck in the late 1800s and early 1900s, whose comeback is one of the greatest in history for a game species.

Despite some similarities between wood duck and bobwhite quail in terms of their downward population trajectories, several differences make an equally epic comeback for bobwhite a much more difficult row to hoe. Not only are bobwhite non-migratory, but they require early-successional plant communities, which in much of their range is created and maintained largely through the proper application of prescribed fire — a practice that incites fear for many, and as a result has been suppressed or excluded over much of the country. The different and rapidly-changing landscape of today (rapid human growth and urbanization, for example), compared to that of the early 1900s is a more permeable landscape that's less than favorable to population persistence and natural recolonization for a non-migratory species like bobwhite, especially in light of resistance to management actions such as prescribed fire. The results have not only impacted bobwhite, but harmful human

activity on the landscape impacts scores of songbirds, invertebrates and mammals.

Whereas bobwhite have declined precipitously (>80%) since the 1960s, research has also demonstrated that insects have declined by more than 76% during the last 2 decades while grassland songbirds have declined by nearly 55% since 1970. Put another way, our human-influenced world makes it easier for many species and especially birds like bobwhite to disappear and fall through the holes in the landscape than to reappear naturally given the porous habitat available to wildlife. As a result, the once abundant bobwhite whom appeared as a natural byproduct of land-use practices many decades ago is now a limited commodity that requires substantial dollars and intentional effort to produce and maintain. And, given this permeability of the landscape combined with the highly fragmented and isolated habitat patches, natural recolonization is very unlikely in many areas. Consequently, translocating wild bobwhite provides a means to artificially disperse birds for recolonizing areas that have recently been restored and where quality

**Since 2002, the Game Bird Program at Tall Timbers has translocated a total 6,554 birds resulting in restoring wild birds to harvestable population levels on more than 86,000 acres. The estimated economic value of this wild bird resource is \$4,822,368!**

habitat management is in place to ensure long-term success. In spite of the challenges to population recovery, we have had major success using translocation to augment, bolster, and even reintroduce bobwhite along the east Coast.

We began dabbling with moving bobwhite and attempting to study individual and demographic re-

sponse following translocation in 1997. Since that time, we have continued to implement, investigate with experimental studies, and monitor population responses pre-, during and post-translocations, to advance the needle in reintroduction science, as well as to facilitate bobwhite conservation and population recovery.

## Translocation Success Stories

This has led to dozens of bobwhite restoration success stories over the years, from population supplementation and augmentation to complete reintroduction. It has been our experience that when implemented correctly — that is, under the right conditions and right timing — translocation is an exceptional conservation tool to restore and recover bobwhite with a high probability of success. To date, we have translocated birds to 19 different properties located in 8 different states (see Figure 1).





Figure 1. Recipient sites (indicated by the quail inside green circles) for translocations conducted along the east Coast by the Tall Timbers Game Bird Program since 2002. Observed population increases ranged from 333% to 3200% as well as served as a reintroduction on sites where quail were extirpated.

## Translocation Success Story in Georgia

Our first major success story began in 2003, on a private property (2,964 acres), located in Marion County, Georgia. This marked our first large-scale research study where we compared translocated birds to resident birds to understand the genetic and demographic response associated with translocation. We found that introgression (hybridization) of translocated and resident bobwhites was high, and the reproductive potential of translocated birds was equal to or greater than resident birds. This study also provided some of the initial parameters, such as site fidelity and minimum property size (>1,500 acres), required to achieve success with translocation.

In a 3-year timeframe, the population density on this property increased 333%, and has maintained an average bird density of 1.25 birds per acre or greater since. Bobwhite have been hunted on this property for more than 15 years now, and this property also became the first translocation recipient site to donate birds for translocation to another site.

## Translocation Success Story in North Carolina

A large property (>14,000 acres) located near Wilmington, North Carolina is not only infused with rich family history and culture, but renders a unique perspective on the efficacy of translocation. Thanks to funding by The Moore Charitable Foundation in 2013, we were able to begin an intensive, long-term research project (still ongoing), to understand vital rates on a property with soil nutrient limitations, to investigate the need for repeatability (recurring injections of translocated birds) to achieve population targets, and the first study to evaluate chick ecology and survival of translocated birds compared to resident birds.

Overall, we discovered that managing cover in poor soils, while challenging, can be successful when providing additional resources such as: supplementing brood fields with nutrient-rich material (cured hog manure, or decomposing debris); leaving vegetation along drains or lowlands to provide much needed structure for escape cover and brood-roosting cover; supplemental feeding; and intensive

meso-mammalian predator control. In addition, while chick production was similar for translocated and resident birds, chick size, growth, and survival were slightly lower for translocated birds than for resident birds—potentially indicating that stress of translocated adult birds could be manifested in their progeny.

This property experienced population growth upward of 3200% in a 4-year period, growing from less than a bird per 20 acres to more than 1.65 birds per acre. The landowner is now hunting this property regularly and moving 3–4 coveys per hour, on average, and some days moving greater than 5 coveys per hour.

An interesting twist to this restoration success story is that during 2018, the second year removed from translocation, this property was hit by a category 4 hurricane (Hurricane Florence), high winds (130+ mph) and abundant rainfall (>35 inches) pummeled the study site causing severe damage to trees, habitat and the birds themselves.

Fortunately, we were able to monitor the effect on bobwhite using radio-telemetry as part of our long-term research efforts. We lost ~20% of our adult radio-tagged birds during the hurricane event. Bobwhite chick loss was even greater with nearly 100% of bobwhite chicks <4 weeks old succumbing to the impacts of the storm. We also observed ~55% loss of chicks ages 4–8 weeks old, while chicks greater than 8 weeks of age fared much better—similar to adult birds (~25% loss).

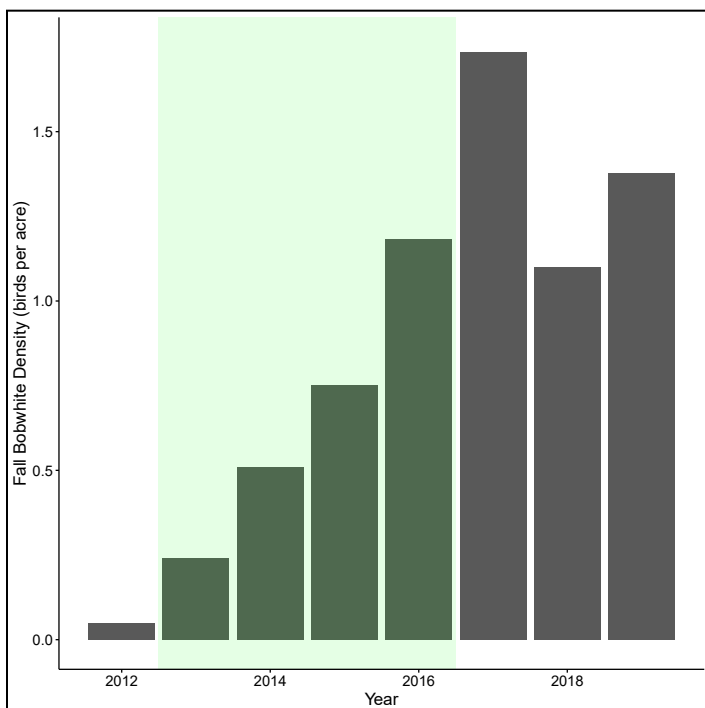


Figure 2. Fall bobwhite density increased by ~3200% in a 4-year period (green highlighted section) as a result of translocation on a property in North Carolina.

The good news is that despite this devastating blow to the population—about a 45% decrease in fall abundance—the population rebounded within 1 year following the hurricane event (see Figure 2). And this is without additional translocation, indicating that translocation can help to obtain population targets (e.g., 1 bird per acre), and with the proper habitat management and adequate resources, the population can withstand natural random weather events like hurricanes.

## Translocation Success Story in Alabama

From 2013–2015, we conducted the first ever interstate translocation of wild birds from Georgia to Alabama onto 4,500 acres of an historic quail property near Union Springs, Alabama.

This property had been managed for quail hunting for decades, but had been liberating pen-raised birds prior to the season, for many years in recent history. The new owner stopped this “cold turkey,” and contracted with Tall Timbers to move 100 wild quail per year onto this site for 3 consecutive springs, after allowing the property to be “cleansed” of pen-raised birds for an entire year.

A covey census, the fall prior to the first release, indicated a population of wild birds of only .25 birds/acre. After modifications to the management program, 300 wild birds were translocated over 3 years. The covey census 3 years later indicated a density of 1.25 birds/acre, a 400% increase. The wild bird hunting on this site has been good since then, and the landowner is happy.

This site also hosts the National Shooting Dog Championship field trial each year in February, where in 2020, several dogs had 5–6 finds and the winning dog had 9 finds on wild birds in 1.5 hrs. In 2018, this landowner expressed his gratitude and displayed his conservation ethic by in turn becoming a donor of wild birds for translocation to another newly developed site in Alabama.

## Translocation Success Story in Maryland

A property (~750 acres) located on the Eastern Shore of Maryland was the first situated in an ag-dominated landscape; a complete design and implementation of habitat was required. An additional challenge with this property was that no quail were known to exist there or known to exist within 50 miles of the property. When we started working on this property <2% of the habitat was quality year-round cover for bobwhite. Therefore, our 5-year management plan prior to translocation involved establishing



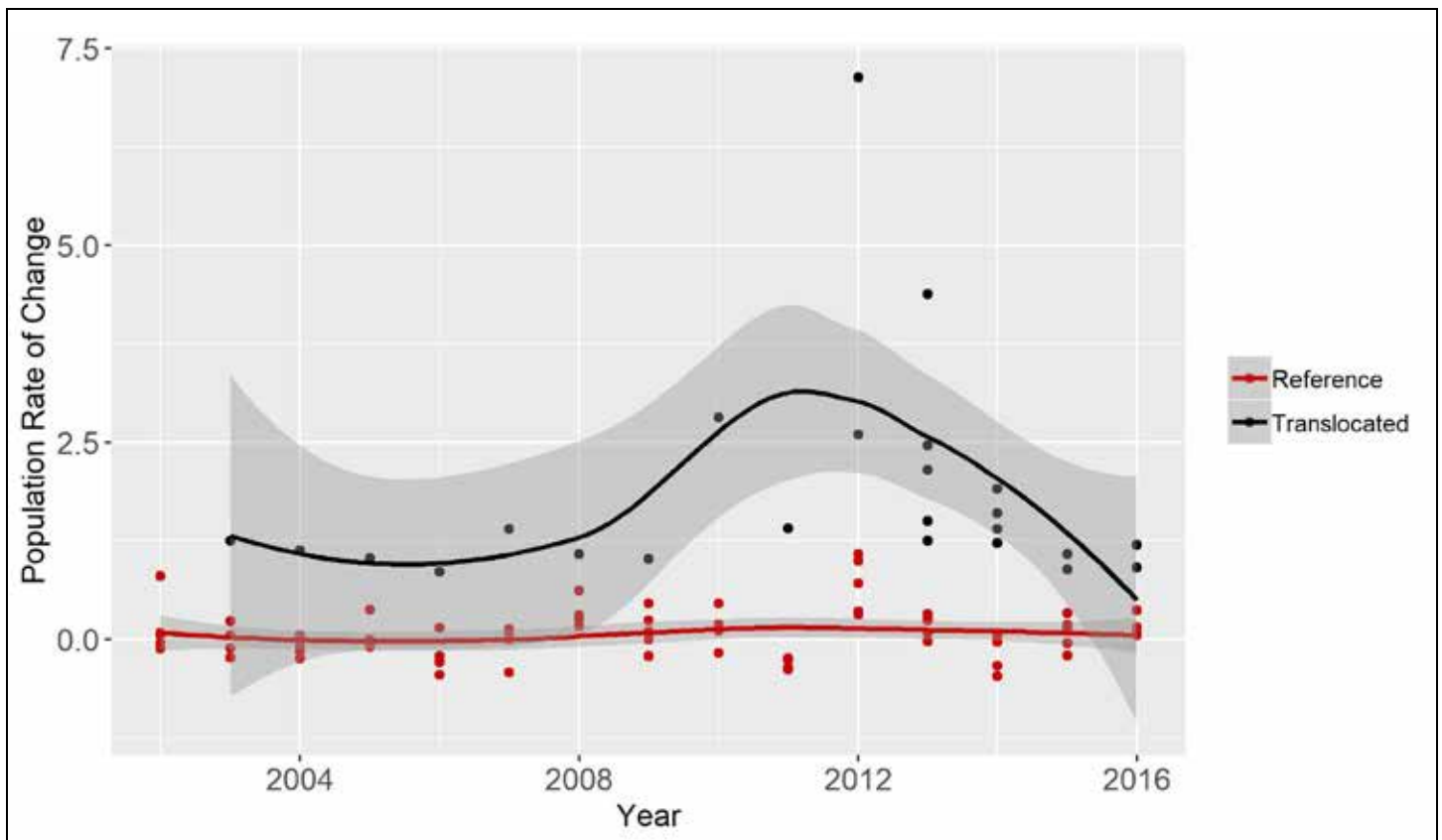


Figure 3. Population growth rate for translocation sites (black) during years of was 1.5 to nearly 5 times greater than reference areas (red) not receiving translocation.

from the ground up quality year-round cover for bobwhite on 25% of the farm. Now, more than 10 years later, with intensive habitat work and 4 years of translocation beginning in 2015, this property has approximately 0.75 birds per acre, and bobwhite are consistently being seen and heard on this farm being intensively managed, as well as on adjacent farms.

This is a true bobwhite reintroduction success story! While still recent since the translocations, we will continue to monitor the population on this property for the next several years, to evaluate its long-term success since the translocation plug has been removed.

All of these properties have several attributes in common aligning the stars for translocation success including being intensively managed, and having dedicated resources and staff necessary to establish and maintain high-quality habitat prior to, during and post-translocation.

When implementing intentional and intensive habitat management, we have observed regular population increases of 182%–343% (see Figure 3), over a 3–4-year time period. When comparing this to a backdrop of long-term regional population declines, these are staggering numbers and reflect the potential success of translocation to recover bobwhites when conducted properly.

These success stories are contingent on donors of wild birds. Since 2002, the Game Bird Program at Tall Timbers has translocated a total 6,554 birds resulting in restoring wild birds to harvestable population levels on more than 86,000 acres. The estimated economic value of this wild bird resource is \$4,822,368! This is a significant contribution by private landowners to bobwhite conservation! Without the generous contribution of birds by the plantation communities each and every year, especially in the Red Hills and Albany regions, our translocation and population recovery efforts simply would not be possible.

## What is the key to successfully translocating bobwhite?

Translocation is not a panacea, but requires the right conditions and the right timing to be successful. First and foremost, the success of ANY translocation is predicated on having good HABITAT! Without the proper quantity and quality of habitat, producing adequate resources to meet the daily requirements of bobwhite, translocation will most definitely fail. In each of the success stories presented above, a common thread is a large enough property (minimum of 750 acres, preferred >1500 acres), with contiguous high-quality habitat, dedicated resources to managing that



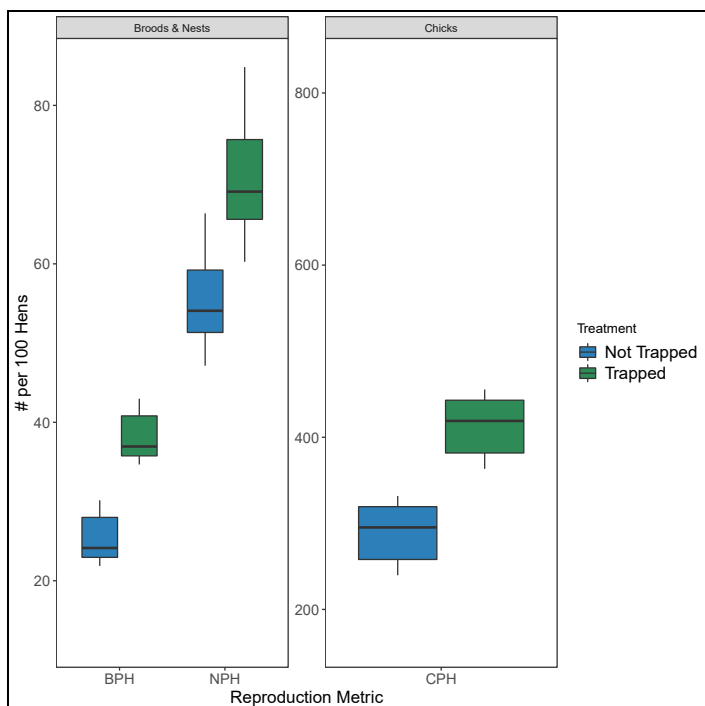


Figure 4. The number of nests produced per hen (NPH), broods produced per hen (BPH), and chicks produced per hen (CPH) on trapped sites was higher than non-trapped sites on our study sites, indicating that trapping can improve reproductive output, which is especially important to for population growth, restoration and translocation success.

habitat with the implementation of a proper burn program, feed program and predation management program.

Whereas food supplementation and predator control are often considered “optional” management practices, we consider them absolutely “necessary” to provide the best opportunity for success during translocation. Research clearly demonstrates the effectiveness of trapping to reduce meso-mammal predators and increase reproductive capacity of bobwhites (see Figure 4).

Similarly, previous and on-going research projects indicate the survival and reproduction on nutritionally supplemented sites is much higher than areas without supplementation (Figure 5). Since the success of translocation hinges both on birds surviving and reproducing, supplemental feeding, and predator control are no-brainer management actions that can tip the scale in the right direction.

Of course, there are numerous other details to hammer out and pay attention to beyond getting the habitat and resources right, such as matching the appropriate source of birds to ensure genetic integrity, site similarities, and stocking densities—all of which our research has helped or shed light. Finally, the timing of translocation is critical to ensuring that optimal capture of an adequate number of source birds, while minimizing exposure time prior to reproduction. For most properties in the Southeast, we

have found that the first 2–3 weeks of March are ideal to achieve this balance, but on more northern sites, like the Mid-Atlantic states, this timing may be too early. In this case, greater numbers of translocated birds may be required to yield enough founders and elicit similar reproductive output, as compared to more southern translocation sites.

While there are naysayers about the efficacy of translocation, we have experienced firsthand that under the right conditions and the right timing, translocation is highly successful with the potential to bolster population levels to sustainable moderate annual harvest in as few as three years! This in most cases is more than half the time required through natural recolonization. For each property gained, more acres are added back to the landscape, and our goal of “holding the line” for wild bobwhite is extended for yet another year.

Like a phoenix rising from the ashes, the first quail explodes from a wooden transport box filling the void of bobwhite on a newly restored site. The sight of these birds pouring out of transport boxes never gets old to us! So, the Bobwhite Cartel will forge ahead and the March Mules will continue to deliver the goods to partners and properties that put in the effort—doing their part to restore habitat for bobwhite conservation. ■

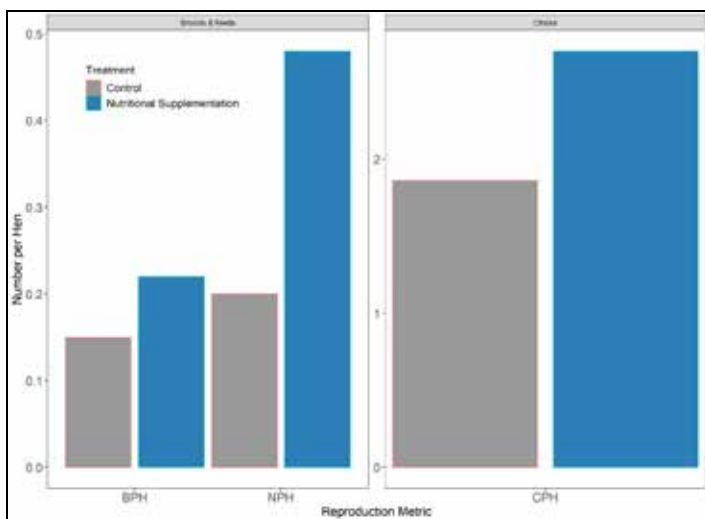


Figure 5. Reproductive output for translocated birds, measured in broods produced per hen (BPH), nests produced per hen (NPH), and chicks produced per hen (CPH), was higher on areas receiving supplemental feed compared to a control area not receiving feed. Supplemental feed provides translocated birds easy access to food, reduces home range size and movements, and increases reproductive success.

#### ABOUT THE AUTHORS:

Dr. Theron Terhune is the director of the Game Bird Program at Tall Timbers. Clay Sisson is the director of the Albany Quail Project & Dixie Plantation Research.



# *Keep Coveys Rising*

## **Quail Management Research** *Where Science Meets Management*

*The Game Bird Program's mission is to conduct pragmatic research advancing the science of game birds, and transferring that science-based knowledge to general land use practitioners.*

The hallmark of the Game Bird Program is long-term research with historical roots dating back to Herbert L. Stoddard's seminal work on Northern Bobwhite and prescribed fire.

Our research provides objective information that managers can use to assess their program. Each year more than 1,000 bobwhites are radio-tagged and monitored by game bird program staff on several properties from Florida to Maryland, providing valuable regionally-specific management information for land use practitioners in the Southeast and along the East Coast.

The science-based information collected helps to calibrate and refine management practices which is tested on multiple study sites throughout the Southeast. More importantly, these methods are applied and verified on over 1 million acres of managed lands by talented managers and landowners in the Red Hills and Albany regions, Central Florida, Alabama, the Carolinas and the Mid-Atlantic states of Maryland and New Jersey. We owe much of our ideas and success to them!

To learn more about the Game Bird Program visit,  
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## Tall Timbers' Bobwhite Quail Management Handbook

Edited by William E. Palmer and D. Clay Sisson

*"The Tall Timbers Bobwhite Quail Management Handbook is an essential tool for anyone wanting to understand the ecology and management of bobwhites in their eastern range...."*

The original Tall Timbers quail management handbook, Bobwhite Quail Management: A Habitat Approach, was written in 1985 by Larry Landers and Brad Mueller at about the time the first radio-tags were being deployed by the Tall Timbers Game Bird Lab. The third edition update was printed in 1992, and stated "we plan to update this material as we gain more information from ongoing studies." Since that time, the staff of the Tall Timbers Game Bird Program has radio-tracked over 25,000 wild quail on study areas in five southeastern states. A great deal of research and management experience has been gained and shared at meetings, through publications, and at field days since 1992. What has not been done, and is attempted in this book, is to boil all this research and experience down and present it in one place. These are the tried and true techniques backed by research that have proven successful for wild quail on hundreds of thousands of acres. Our target audience for this handbook is the same now as it was then: land managers, landowners, and hunters in the southeastern coastal plain. And, while not a scientific publication per se, the information presented was developed from long-term research and therefore we hope will be of interest to wildlife managers and biologists across the entire bobwhite range.

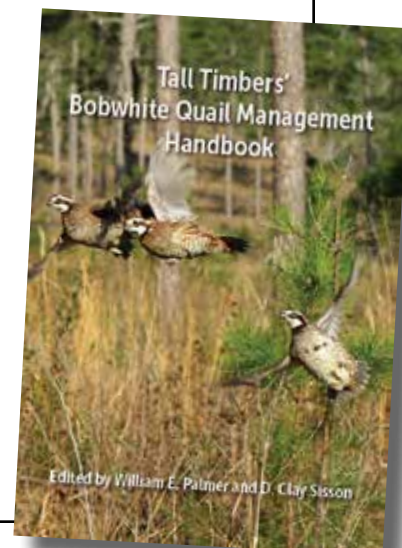
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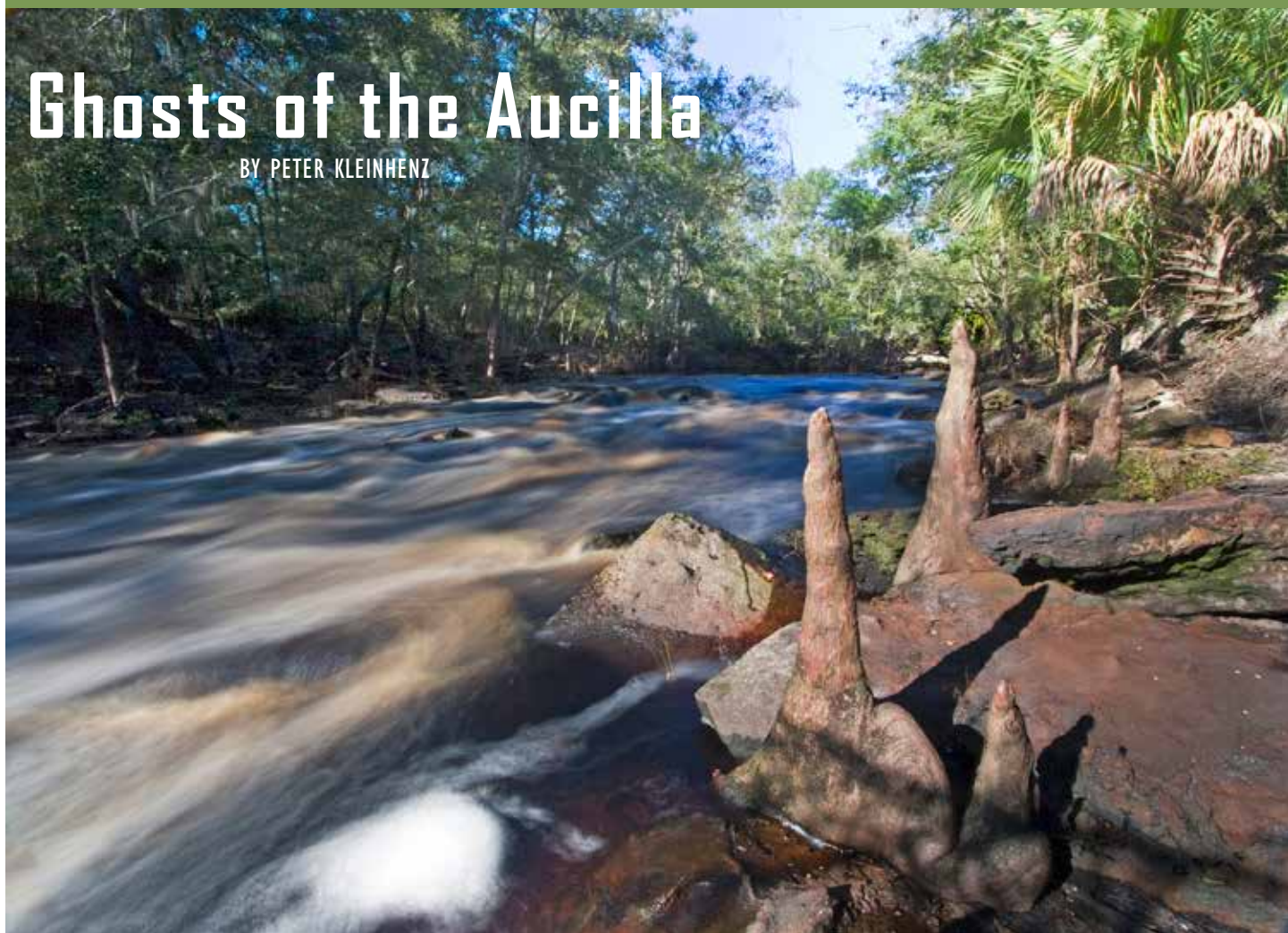


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# Ghosts of the Aucilla

BY PETER KLEINHENZ



AUCILLA RIVER. PHOTO COURTESY OF THE FLORIDA FISH & WILDLIFE CONSERVATION COMMISSION

I'll never forget my first time walking the banks of the Aucilla River. The jet-black waters moved sluggishly towards a pockmarked wall of limestone. My confusion about what happened to the river was only addressed when I noticed a faint swirl on top of the water.

Sticks, leaves, and other debris moved in a clockwise fashion, indicating that there was far more happening down there in that inky blackness than I could imagine. I was looking at Mother Nature's magic trick; a river disappearing right before my eyes.

This mysterious scene was almost chilling, as I envisioned being sucked into that whirlpool and thrust into the network of caves below. I leaned back against an ancient cypress that loomed over the site, looked up, and noticed a large cavity in the trunk. It was at that moment when I first met the ghosts of the Aucilla.

The stage was set for the phantoms I was to meet. Everything around me was as it had been decades, centuries, even millennia before. Mature trees, the opaque water, the

absence of sound. The only things missing were the ghosts. And, so, my mind filled in the blanks.

I looked up and saw a white bill slowly coming out of the hole in the cypress. Cautiously, the largest woodpecker my brain had ever processed emerged from the cavity. It flew to a nearby water oak and began hammering at the trunk in twos, giving one loud tap followed by a softer tap that seemed to echo the first. Then a stick cracked. The Ivory-billed Woodpecker silently flew off into the depths of the swamp, startled by the noise. I turned to identify the source and saw a man my age. He was holding a spear.

The man noticed me and took off running down the banks of the river. I chased after him until I saw the others. In front of me was a group of Native Americans, shirtless



and brandishing spears attached to atlatls. Terrified as I was, they didn't seem to mind my presence. Their attention was directed towards the brush toppling down on the other side of the bank. A thunderous eruption of noise preceded the curved tusks of a mastodon crashing through the vegetation.

Poised and ready, the men swung-pulled the atlatls behind their heads. When the moment was right, they thrust the atlatl forward, throwing the spear that had been attached to it at high velocity towards the massive beast. All spears struck their target. After several minutes, the mastodon dropped.

I couldn't believe my mind's eyes. I needed a break from this violence and retreated to an area further from the river. Here, a sweet, ascending call emanated from a patch of river cane. A pretty little Bachman's Warbler flitted up to the top of some cane and revealed the source of the sound. Its call blended with the similar-sounding Northern Parula call that I was actually hearing as I sat by the banks of the Aucilla River that day. The ghosts were gone, and there I was.

More Ivory-billed Woodpeckers were collected out of the Aucilla River drainage than anywhere else in their range.

Cut marks on mastodon tusks and other archaeological evidence suggest that Native American hunters utilized the watershed as far back as 14,500 years ago. The last group of Bachman's Warbler on the Aucilla River was officially recorded in 1895. Today, all of this is no more. But there's hope for what remains.

Tall Timbers has received a grant to fund conservation work in the Aucilla River Watershed. Through the acquisition of conservation easements, we hope to preserve the incredible legacy of what is no longer present, while ensuring the survival of what is. With your help, we can ensure that portions of this watershed stay as wild as they ever were. ■

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**ABOUT THE AUTHOR:** Peter Kleinhenz is the Aucilla River Watershed Coalition Coordinator with the Tall Timbers Land Conservancy. Peter is also the producer and host of the *Wild Wander* video series. View the videos here: <http://Youtube.com/wildwandershow>

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*"Ghosted" graphic of the Bachman's Warbler is a painting by Louis Agassiz Fuertes - <https://archive.org/stream/warblersofnortha00chap#page/64/mode/2up>, Public Domain, <https://commons.wikimedia.org/w/index.php?curid=26698459>*



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# Tall Timbers Land Conservancy



## LAND CONSERVATION

Established in 1990, the nationally accredited Tall Timbers Land Conservancy has become one of the largest regional land trusts in the country, conserving over 133,000 acres of land from Tallahassee, Florida to Albany, Georgia. Our conservation easements protect working lands that provide critical upland wildlife habitat and intact wetland ecosystems, vital to the health and well-being of the region. The public benefits from these easements as they serve to protect the region's water quality, clean air, wildlife and distinctive canopy roads.



## REGIONAL PLANNING, ADVOCACY, & EDUCATIONAL OUTREACH

The Land Conservancy also works closely with communities on “smart growth” planning and advocacy, and is engaged in coordinating a Greater Red Hills Awareness Initiative to enhance local awareness and understanding of the importance of the Red Hills region and increase support for its long-term conservation.



To learn more about the Tall Timbers Land Conservancy or to make a contribution to its programs: the Land Conservancy, Advocacy and Planning or the Greater Red Hills Awareness Initiative, please visit, [talltimbers.org/landconservancy.html](http://talltimbers.org/landconservancy.html)







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## *What's that blooming along the road?*

### **Tung Trees Growing Along Roadsides — a Legacy of a Once-thriving Industry in the South**

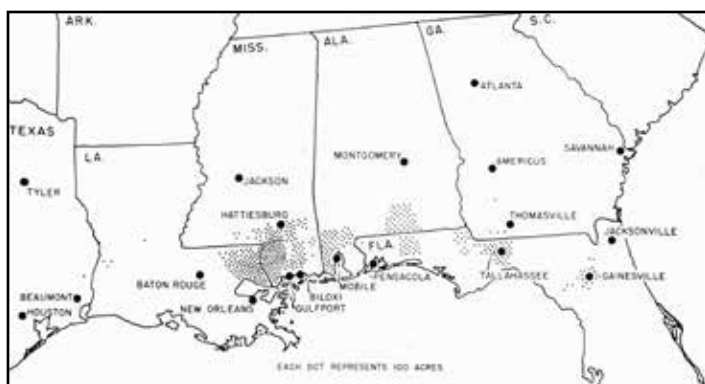
BY ROSE RODRIGUEZ

**YOU DON'T NOTICE THE TUNG TREES IN THE RED HILLS** until you see them in bloom along the side of many of our roads in the spring. The trees' flowers are a beautiful creamy apricot color with magenta throats tinged with yellow.

Where I walk in my Tallahassee neighborhood, the trees grown in a weedy strip of vegetation and reach toward the road for the sun, showing off their blossoms, which then drop and yield round green seed pods.

It's been weeks since the flowers have gone and the seed pods are now fat and shiny yellow-green. The trees are now being crowded by other vegetation nearby that has come alive as the weather has warmed and the rain is abundant. Cat briars have twined around the branches and Spanish needles, and poison ivy are everywhere at the base of the trees. It's an unhospitable place to explore. I stay a healthy distance away to take my photos.

But, that's not how these trees once existed in the Red Hills or elsewhere in north Florida and other Gulf South states – consigned to roadside ditches. No. Tung trees were once planted in groves and there was a thriving industry of tung growers in the “Tung Belt” that was served by the American Tung Oil Association, and supported by the U.S. Department of Agriculture and the Tung Research and Development League among other organizations, which celebrated this tree. What happened?



*Tung Belt*

What happened was World War II. In 2013, Whitney Snow, a doctoral student at Mississippi State published a thorough history of the Tung industry for her PhD titled, “Tung tried: agricultural policy and the fate of a Gulf South oilseed industry, 1902-1969.” See sums up the fate of the industry here:

The U.S. tung oil industry began as a government experiment in plant diversification but businessmen mistakenly interpreted this interest as an endorsement of domestic production and began growing

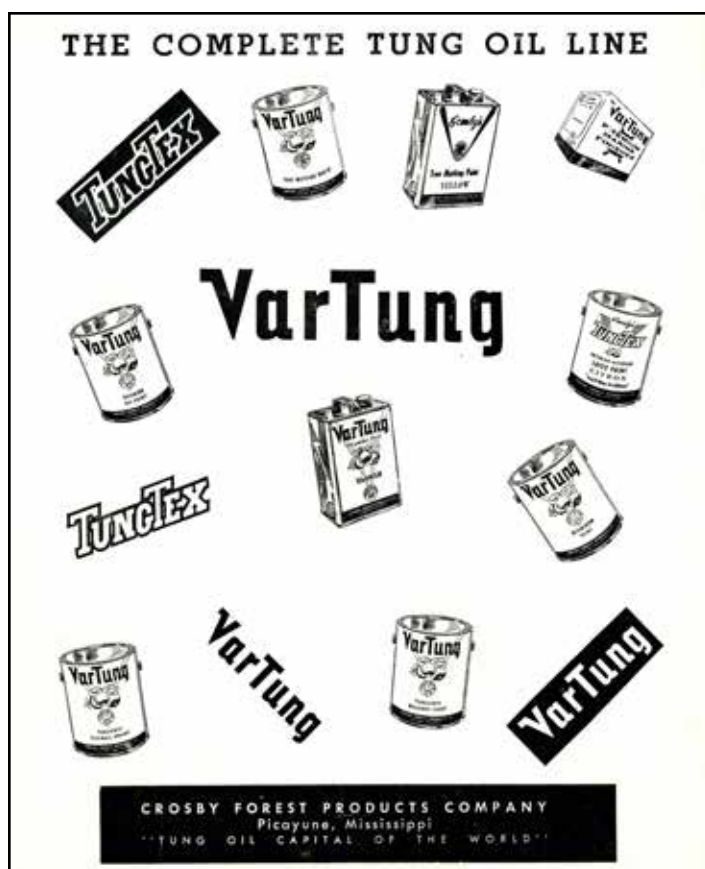


tung trees in the Gulf South states of Florida, Georgia, Alabama, Mississippi, Louisiana, and Texas. The new crop quickly caught the attention of paint, varnish, and ink companies in the northern and Midwestern states and created a buzz among chemurgists [those who advocated the development of new industrial chemical products from organic raw materials, especially from those of agricultural origin] like Henry Ford and other industrialists who eagerly expanded tung acreage. With the erection of the first crushing mill in 1928, the tung oil industry began but it did not acquire any semblance of maturity until World War II.

The war thrust the nascent tung oil industry into strategic status. Used as a varnish on military airplanes and naval vessels, a brake lining, a machinery lubricant, a liner for tin cans, and as electrical insulation, demand exceeded supply. Traditional consumers had such a difficult time purchasing tung oil during the war that they turned to other oilseeds or new synthetic oils. The war both aided and crippled tung oil by highlighting its chemurgic uses and deterring consumers given that shortages encouraged the quest for alternatives. Despite a barrage of synthetic competitors and imports, domestic tung growers continued production in the hopes that the discovery of new industrial markets would increase demand and attract government support in the form of parity, tariffs, and quotas.

Between 1949 and 1969, a series of agricultural policies granted protection but from the outset federal support proved reluctant and tenuous because production remained miniscule, quotas threatened to heighten diplomatic tensions, and wealthy, part-time growers comprised the bulk of parity recipients. Hurricane Camille has often received credit for bringing a swift end to the industry but imports, competitive oilseeds, synthetics, and freezes had delivered powerful blows to the extent that many farmers stopped growing tung long before 1969. Indeed, Camille proved nothing more than a death knell to a waning industry that had become dependent on government largesse.

In the Red Hills region, many landowners, like naturalist Herbert Stoddard (see pages 7-9), embraced the tung oil industry before and after World War II, and planted acreage in tung trees. Whitney Snow mentions Stoddard in her paper, and interviewed Leon Neel, his business partner in their forestry business about Stoddard's groves.



An advertisement on the back cover of the September 1961 issue of the *American Tung News*.

The Florida Memory Project has an article, "Florida's Not-So-Native Tung" that discusses the tung industry in Florida. Tallahassee is noted as an early location for the cultivation of tung trees. William H. Raynes, who owned a farm off Miccosukee Road planted five tree seedlings in 1906 that he was given. Only one survived, and it lived until 1940. But thousands of acres were planted in Leon County and elsewhere in north Florida, including Gainesville, where the first nut crushing mill was built in 1928.

In the appendix of Snow's dissertation are tables from the U.S. Census of Agriculture that show how the industry had dwindled by 1969 to 42 farms, as shown below, from a high of 800 farms in 1950. ■

County	Farms	Acres	Trees
Calhoun	1	1,953	172,580
Jackson	10	1,929	185,430
Jefferson	11	6,668	469,734
Leon	6	2,700	260,600
Other	4	711	60,931
TOTAL	42	13,961	1,149,275

— Tung continued on page 38

# The Source of Tung, its Past, and Future

BY ROSE RODRIGUEZ

TUNG TREES ORIGINATED IN THE YANGTZE VALLEY OF SOUTHERN CHINA where the oil produced from the nuts was used for thousand of years as a coating to waterproof ships, among other uses.

On a website, *First State Woodturners*, is an account by Eric Krum of tung oil's history. It states that during the Song Dynasty, the earliest references for Chinese use of tung oil is in the writings of Confucius around 500 to 400 BC. "The Chinese have used tung oil, also known as China wood oil, for at least 2500 years for building waterproof boats and paper parasols, wood finishing, wood waterproofing, caulking, inks and paints."

Even as the Tung industry was becoming more commercially viable during the depression years of the 1930s, tung oil was imported to the U.S. from China. But in 1931, Japan invaded Manchuria, and the supply of oil diminished. Later, because of China's war with Japan, 1937-1945, exports were impossible. Once this supply of oil was cut-off, domestic tung oil production became important, especially after the 1949 Communist victory in China when imports ceased during the Cultural Revolution.

At one time, Leon County was the second largest producer of tung oil in Florida. In his book, *From Cotton to Quail*, (1968), Clifton Paisley notes several plantations that planted tung acreage in Leon County in the 1930s—Meridian Plantation and Leon Tung Orchards are two. Leon Tung Orchards was bought by Florida State Supreme Court Justice, Stephen C. O'Connell with three business associates and renamed Turkey Roost Plantation. It was planted in 1700 acres of tung trees. O'Connell would become the president of the University of Florida in 1967, where he presided until he retired in 1973.

In 1984, Lea Wolfe did a site inventory of Turkey Roost for the Florida Master Site File, Leon County Plantation Survey. Located in the lower northeast of the county, Wolfe stated that although the plantation was "historically significant for the tung industry..., it never operated as a quail preserve." She further notes that Turkey Roost's tung oil production employed 300 workers at its supremacy, with 8 permanent workers who lived on the plantation. The production complex included a huller building, dryer building, office/barn and four workers' houses.

Nut pickers were paid by the bag rather than by the hour, but when the minimum wage laws were extended to farm workers in 1966, labor costs for this labor-intensive industry made continued tung oil production unprofitable. Killing frosts, competition from South American imports, the use of natural substitutes like linseed oil, and cheaper synthetics were its doom.

A substantial Jefferson County grower was Tungston Plantation at Capps, which had a large processing plant.

Like the Leon County tung groves, by 1969 profits from tung had plummeted and it no longer made sense to continue oil production. The last nuts were harvested in the Red Hills in the early 1970s. Tung

groves were bulldozed to make way for pasture and cattle. And the old processing plants, like the one at Capps that stood until about four years ago, were eventually torn down.

Recently, however, there has been an interest in growing tung trees for oil production again. One grower reviving the industry is Greg Frost of Gulf Coast Tung Oil located in Tallahassee, Florida, which is now partnered with the Constitution Group. Their website states, "The partnership joins experience in Tung oil production with global financial and entrepreneurial expertise. Resulting from a shared vision and common goals, our regional orchard\* operations have already expanded significantly with ramped up Tung oil production coming in the near future."

Frost planted his first tung trees in 2011, on 30 acres leased from Jeff Phipps. In a phone interview, Frost stated that a niche market for the higher quality tung oil has always existed, and he and his family are leading the way by helping others establish orchards; showing farmers how tung as an alternataive crop can diversify and increase their income; and, by providing harvesting and milling services for other growers. *Gulf Coast Tung Oil* now has planted and additional 400 acres. Frost has also planted 3-acres as a seed orchard for trees he was provided from the Thad Cochran Southern Horticultural Laboratory in Poplarville, Mississippi. This late-blooming 'Spiers' cultivar blooms two or three weeks later; after a late hard freeze in the spring of 2019, these tree were the only ones without blossom loss.

\*(Orchard and grove are used interchangeably in the tung industry.)



The question is whether new investment in an old industry will pay off. In an article, "Reviving Tung" for *FloriAgriculture* magazine, C. B. Crawford states that the paint industry is shifting away from chemical synthetics and back to tung oil as a green product. As a result, Frost thinks the time is right for investment in the tung industry. He is quoted in the *Picayune Item*, a Mississippi newspaper, ("Resurgence of Gulf tung industry has local ties," September 21, 2019), about the timber industry that was heavily damaged by Hurricane Michael in 2018, and what might replace it. "About 30 people showed up in March (2019) for a town hall meeting to discuss tung oil at the Jackson County, Florida, Extension Office. One big issue will be if they get help removing the downed timber, so they can plant tung trees," said Mr. Frost. ■



Street sign for Old Tung Grove Rd off Hwy 90 near Jefferson County line.

—Tung trees continued on page 40

## Photo Gallery from the Florida Memory Project



Farm worker gathering nuts from tung trees at Capps, Florida, 1946. Photo courtesy of the Florida Memory Project.



A worker feeds tung nuts into a machine inside a tung oil plant in Tallahassee. 1949, Photo by Red (Benjamin L.) Kerce. Photo courtesy of the Florida Memory Project.



Tung trees with green nuts at a Waukeenah, Jefferson County, Florida plantation, July, 1952.



Ann Keith and Lettie Jane Pruitt under tung trees in blossoms at Tungston Plantation, Capps, in Jefferson County, Florida. Photo circa 1950s by Karl E. Holland, courtesy of the Florida Memory Project.



Aerial view of tung tree orchard in bloom – Tungston Plantation in Capps, Florida, March 1961. Photo by Karl E. Holland, courtesy of the Florida Memory Project.



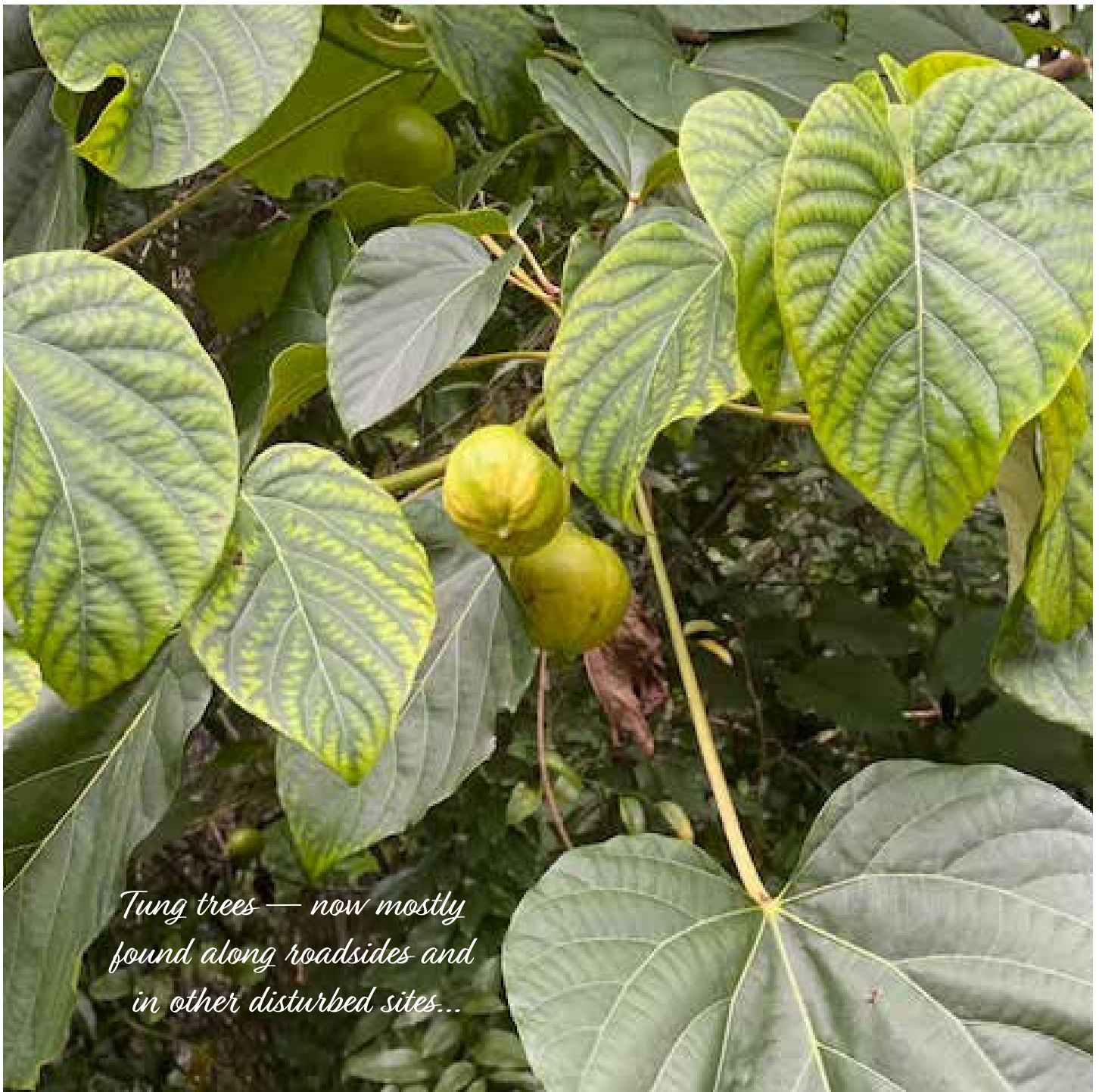
Machines gathering tung nuts in Capps, Florida. Photo by Karl E. Holland. Photographed in January 1962. Photo courtesy of the Florida Memory Project.



Workers loading tung nuts on to conveyor in Capps, Florida, 1962. Photo by Karl E. Holland, courtesy of the Florida Memory Project



A field of bulldozed tung trees off U.S. Highway 27 between Capps and Tallahassee (1976). Photo courtesy of the Florida Memory Project.



*Tung trees — now mostly  
found along roadsides and  
in other disturbed sites...*

*Tung nuts on a tree growing in a ditch by the road. Photo by Rose Rodriguez*

The tung oil tree, *Aleurites fordii*, is listed as a Category II invasive species by the UF|IFAS Center for Aquatic and Invasive Plants, but according to IFAS, this non-native (imported from China) has not yet altered Florida plant communities to such an extent to be ranked a Category I invasive. All parts of the tung tree are poisonous even though it has been used to treat skin conditions and constipation. The seeds are the most dangerous part of the plant. One seed can be fatal to a human. Symptoms may include severe stomach pain, vomiting, diarrhea, weakness, slowed breathing, and poor reflexes. The leaves give some people a poison-ivy-like rash. ■



#### ABOUT THE AUTHOR:

Rose Rodriguez is the *eJournal* editor, information designer and a frequent contributor.



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## Prescribed Fire Science Consortium

Through the recently created Prescribed Fire Science Consortium (RxScience), Tall Timbers, the US Forest Service, managers, and researchers from across the country have teamed up to focus on the pressing needs of prescribed fire science. This group intends to address the problems of predicting fire behavior of ignition patterns, resulting smoke transport, and fire effects — collaboratively. The consortium research uses a multi-disciplinary approach to investigate how variation in fuels and fire behavior governed by the fluid dynamics associated with wildland fire, result in fire effects and smoke transport. Leveraging tools like LiDAR, infra-red imagery, and GIS, we are working to perform cutting edge fire research and create next generation models and tools to bring prescribed fire into the twenty-first century.



# George M. Sutton's Watercolors for Georgia Birds: A New Look

By Robert L. Crawford and Rosalie Rodriguez

George M. Sutton (1898–1982), an esteemed ornithologist, was also one of the preeminent bird artists of the Twentieth Century. He was asked by his friend Thomas D. Burleigh, who worked on his manuscript for *Georgia Birds* during the 1940s and '50s, to provide the illustrations. Sutton painted a series of individual portraits of a select group of Georgia birds shown in their natural habitats. Sutton arranged to spend the spring and summer of 1952 with his friend Herbert L. Stoddard at Stoddard's Sherwood Plantation in southern Grady County. They made a field trip to the Georgia coast near Savannah and Brunswick to study shore birds. Otherwise Sutton sought, studied, and painted birds in Stoddard's backyard. Sutton described his experiences with Stoddard and his Meridian Road neighbors in an affectionate essay in the front matter of *Georgia Birds*, and in charming one-paragraph vignettes for each painting. Sutton gave the original *Georgia Birds*' watercolors to Stoddard, whose son later donated them to Tall Timbers; they are part of the Stoddard Collection.

Burleigh's *Georgia Birds* was published in 1958. Sutton was disappointed in the reproduction of the color plates in the book as a result of the engraving process used. Robert L. Crawford and Rosalie Rodriguez



Herbert Stoddard and George Sutton at Sherwood Plantation.

have collaborated on a new book, *George M. Sutton's Watercolors for Georgia Birds: A New Look*, which features the paintings beautifully reproduced and Sutton's original essay and vignettes.

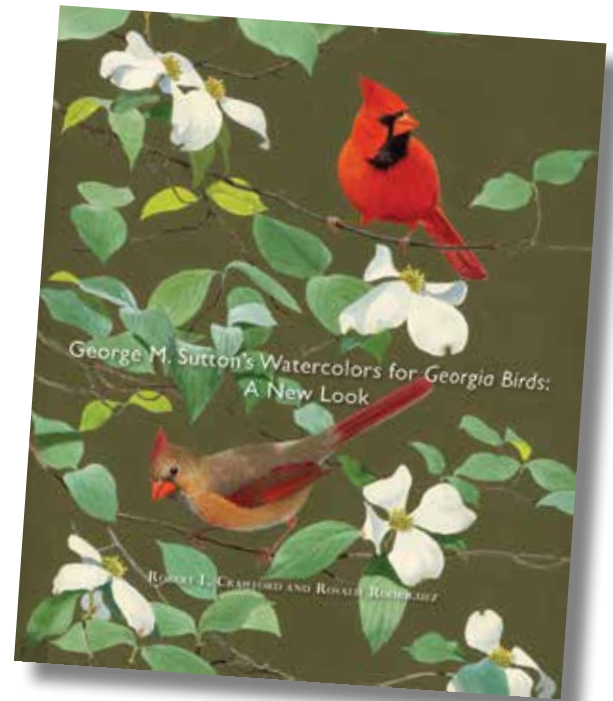
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## THE LAST WORD

The history of the Red Hills is intertwined with the gilded age, and of course quail hunting, but also with consumption (aka tuberculosis), a contagious disease. During the last quarter of the nineteenth century, the clean air of the piney woods around Thomasville, Ga. was promoted by a Thomasville physician as therapeutic for those with consumption. Affluent consumptives evacuated the industrial northeast to heal their lungs among the piney woods of the region, coming with their relatives who discovered the mild southern winters and fine quail hunting. Many luxury hotels were built to accommodate the influx of wealthy northerners. When it was discovered that consumption was contagious (spread by coughing and sneezing), this promotion stopped, but the enthusiasm for quail hunting had not. By the early twentieth century, Red Hills' quail culture was firmly in place.

However, it seems that consumption wasn't the only contagion that brought people to the Red Hills. Juanita Whiddon, our archivist and resident expert on the history of Tall Timbers, recently sent me the following in an email: "This may not be the first time Tall Timbers has been affected by a pandemic. I decided to go over the Beadel diaries for 1918–19, to see if Henry Beadel wrote about the Spanish Flu. Sure enough, one of his architectural partners had a near deadly case, with fever of 104 degrees and then developed pneumonia. He lived near the Beadels on Long Island [New York]. He was out from work for more than two months. When he returned to the office, the three partners dissolved the firm, and Henry and Genevieve decided to buy Uncle Edward's place [Tall Timbers] on Lake Iamonia. Think that maybe they might have been inclined to get out of a pandemic-stricken city, and breathe the piney woods air?" Whatever their rationale for buying Tall Timbers, we are glad they did! It was a few years later that Stoddard began his quail research, and 40 years later, Mr. Beadel took Stoddard's suggestion and started Tall Timbers Research Station.

So how is Tall Timbers handling this pandemic? First, we are thankful for being in the situation that we are, as so many have suffered greatly from this tragedy. Our staff has not only been thankful to be here and working, they remain highly productive. Most are working remotely when appropriate, but also in the field, as our research and management continues on our properties, as well as our satellite projects in Alabama, Central Florida and the Carolinas.

In this issue, Theron Terhune and Clay Sisson highlight one of our greatest wildlife programs, translocation. Being national leaders on this, they document how through tired eyes and long miles thousands of quail have been swept away at night from the region to help kick-start new properties. Quail successes both here and in many places have inspired donation of new funds to develop an East Texas Quail Project to help guide quail restoration in the piney woods of Texas! Closer to home, the imaginative tale spun by Peter Kleinhenz in "Ghosts of the Aucilla," demonstrates the passion our staff has for protecting the natural resources and history of the Red Hills. There are many hours of webinars, grant writing, phone calls and negotiating to gain access to NCRS funds to help protect the region. These hard won, but important victories, are but one step toward the ultimate goal of conserving the Red Hills.

Our efforts to lead on prescribed fire research, management, and training have expanded greatly, and this year is no exception. Since January, we've highlighted the value of prescribed fire as the solution to the wildfire issue with top officials, such as the Secretary of Agriculture and Secretary of Interior, heads of national agencies, among many others. National collaborations demonstrating the importance of prescribed fire range from: virtual reality training tools, to establishing demonstration forests, to incorporating latest fire technologies, to safely applying fire and tracking the response through time. With these efforts we are paving the way for an objective, science-based fire program on state and federal lands. We also began a social media campaign educating the public on the importance of prescribed fire!

And let's not forget the swine! China has discovered yet another virus in swine that could result in human infections. But here and now, we are more concerned with their damage to crops, ecosystems, and habitat for other wildlife. We are launching, along with the USDA and NRCS, a regional swine removal project, testing to see if control efforts can reduce regional populations.

As Clay Sisson likes to say about managing quail—plan for the worst and hope for the best. Tall Timbers has worked hard building key staff, resources, and programs to help people achieve their natural resource management goals and to protect the region from threats! While we couldn't have planned for a pandemic, we are grateful to have been prepared for the worst and excited to be making progress during these difficult times. Hoping you and yours are safe and healthy.