


Tall Timbers eJournal

SUMMER 2021

A photograph of two people standing in a field of tall, dry grass. In the foreground, a person wearing a camouflage jacket, a green backpack, and a hat is looking towards the camera. A red string is tied around their waist and extends down into the grass. In the background, another person in a blue shirt and jeans is standing further back. The background is filled with tall palm trees under a blue sky with scattered white clouds.

PAWPAW — WHAT'S IN A NAME?
DEEP SWAMP SILENCE
FIRE-DEPENDENT BUTTERFLIES
WHERE THE FIRES NEVER STOPPED
TALKING WITH TYA28
A REFLECTION ON FORESTERS

THE COVER PHOTO AND PHOTO ON THE OPPOSITE PAGE ARE BY STODDARD BIRD LAB (SBL) BIOLOGIST MARY MACK GRAY. PICTURED ARE SBL DIRECTOR JIM COX AND SBL TECHNICIAN DESTINEE STORY BRADEN DOING BLACK RAIL SURVEYS IN THE MARSH GRASSES ON THE FLORIDA GULF COAST.



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FEATURE

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Searching for the Super Secretive Black Rail

BY JIM COX



Tall Timbers eJournal

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FROM THE EDITOR

Most articles in this issue have one thing in common — fire.

For the **Archives Corner** I wrote how Tall Timbers' founder Herbert Stoddard influenced Harold Biswell. Biswell was an early proponent of using controlled burning in California to manage its mixed conifer forests. The 7th Tall Timbers Fire Ecology Conference, chaired by Ed Komarek, and held in California was dedicated to them.

Pawpaws (*Asimina sp.*) are the **Flora** feature. Some species are fire-dependent. For the **Fauna** feature, "Deep Swamp Silence," author Peter Kleinhenz shares how he listens for two migratory songbirds, the prothonotary warbler and the Swainson's warblers.

The three articles in the **Research & Land Management** section are all related to fire, but with different topics: fire-dependent butterflies, fire history in the Red Hills region, and a conversation with a longleaf stump cross-section section. And under **Reflections**, a Tall Timbers supporter, Wayne Stephens, shared a poem he wrote — "Foresters."

Our feature this issue is about the secretive and endangered Black Rail, a marsh bird that depends on some fire. The Stoddard Bird Lab is collaborating on this research using new technology.

Finally, Bill Palmer, Tall Timbers President/CEO has the Last Word.

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In every issue I ask for feedback, so email me a note with your thoughts. I will include it in our next issue.

Rose Rodriguez
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TALL TIMBERS

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Harold H. Biswell,
and the
California Connection

BY ROSE RODRIGUEZ



*Harold Biswell leading a discussion about prescribed fire during one of his field days in Yosemite National Park, California, USA, fall 1976. Photo credit: Mike Yost
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ARCHIVES CORNER

BY ROSE RODRIGUEZ

Herbert L. Stoddard, Harold H. Biswell, and the California Connection

We've watched with horror as wildfires have devastated millions of acres in California and other western states in recent years. Lives and livelihoods have been lost, and communities have been destroyed. In the Red Hills region of south Georgia and north Florida such devastation is unlikely thanks to the use of prescribed fire for forest and game management. Herbert L. Stoddard wrote about the importance of controlled burning in his classic book, *The Bobwhite Quail*, and published often on its use. One such article, "Use of controlled fire in Southeastern upland game management," was published in the 1933 *Journal of Forestry*.

Harold H. Biswell, a professor in the School of Forestry at the University of California, Berkley, mentions Herbert Stoddard in an article he wrote, "Prescribed Burning in Georgia and California compared," that was published in 1958, in the *Journal of Range Management*, and cites Stoddard's *Journal of Forestry* article.

During the record-setting wildfire season in 2020, Tall Timbers was busy re-engaging in California. Morgan Varner, Tall Timbers Research Director, and I looked back at the Fire Ecology Conferences, held across the world, for some of the history. Dr. Varner, asked historian Juanita Whiddon to find any correspondence between Herbert Stoddard (a Tall Timbers' founder) in the Archives, and he asked me to do research on Biswell to see what connections there might be between Biswell and Tall Timbers.

Biswell presented at the 2nd Tall Timbers Fire Ecology Conference (FEC) in 1963, held in Tallahassee, Fla. His paper is titled, "Research in Wildland Fire Ecology in California." In it he states, "I first became interested in the use of low-intensity fires while doing research on the interrelationships between timber growing and grazing on the Georgia Coastal Plain. Some of my first information was gained from reading articles by Herbert L. Stoddard, Sr. I can say that he is a Master in the *Art* of controlled burning in the pine forests of the deep Southeast." Stoddard presented at the conference representing Tall Timbers, as did E. V. (Ed) and Roy Komarek. So, all the men were acquainted in person, as well as through their publications on fire.

In 1967, the 7th Fire Ecology Conference was held in Lake County, California at Hoberg's Resort in November. Ed Komarek was the conference chairman, and Stoddard, as president of Tall Timbers gave the welcome. The conference was simply titled *California* and was dedicated to Harold Biswell, Homer Shantz, Herbert Stoddard, Sr., and Harold Weaver. The dedication states:

These men all have made important contributions, not only to clarify both in a practical and a scientific sense the ecological place of fire in the complex scheme of nature, but to demonstrate its usefulness in the management and preservation of desirable vegetations; vegetations which have a fundamental relationship to the productivity of the land for food, fiber and recreation.

Upon those who follow, administrator, scientist, and land manager alike, falls the responsibility of correction past mistaken ecological judgment and of accepting the challenges the use of controlled fire



1967 photo from the 7th Fire Ecology Conference Proceedings, opposite the dedication page. L-R: Harold Weaver, Herbert L. Stoddard, Sr., and Dr. Harold Biswell pose in a stand of ponderosa pine at Hoberg's Resort where fire hazard had been reduced by controlled burning.

poses in a society of growing complexity. The Tall Timbers Fire Ecology Conferences are dedicated to providing an avenue of communications between diverse disciplines to broaden the base for a better ecological understanding of fire in the total ecosystem, an ecosystem in which man now finds himself spot-lighted as the central figure.

Biswell presented the paper, "Forest Fires in Perspective." The following excerpt mentions the prescribed burning research he did in Georgia, before joining the Department of Forestry (Range Management) at Berkeley.

Since surface fires were so effective in nature in creating and maintaining open, park-like forest conditions with low fire hazards, I thought it worthwhile to do some research and testing of this phenomenon. The prospect of using such fires in the ponderosa pine forest type seemed so good that my associates and I started experiments in prescribed burning on the Teaford Forest in the central Sierra Nevada near North Fork in April of 1951, and at Hoberg's in the North Coast Range in the fall of 1951. The results have been published in several places (Biswell 1959, 1961, 1963, 1967). Before that time, I had just finished six years of study of prescribed burning in the pine forests of the southeastern United States, and had been most favorably impressed with the results. Only a small amount of prescribed burning was being done in the southeastern United States at that time, but now it is a regular part of most forest management programs, and is widely used.

From the 1967 proceedings it is evident that most authors lamented the 1966 fire season and how bad it was — 268,000 acres burned in 1966. In 2020, 4.2 million acres burned.

So, it was with much interest that I read the recently published article in the journal *Fire Ecology* titled, "Introduction to the article by Harold Biswell: Prescribed Burning in Georgia and California Compared." It was written by Scott Stephens, who is at the Department of Environmental Science, Policy, and Management University of California, Berkeley, and three of Biswell's PhD students at Berkeley, who are now fire ecologists in the west.

It was disappointing no mention was made by the authors of Herbert Stoddard and his influence on Biswell and his fire research, or of the connection with Tall Timbers' visionary Ed Komarek. The *Fire Ecology* article states,

"Beginning in the early 1950s and continuing until his mandatory retirement in 1975, Harold continued not only his research but a broad extension program of workshops, demonstration tours, and public lectures."

Unfortunately, no correspondence between Stoddard and Biswell has been found in Stoddard's papers. However, there are copies of letters between Ed Komarek and Biswell regarding an educational film that was being planned by producer Lewis L. Ellsworth from Los Angeles, California, dealing with the regrowth of burned forests. Ellsworth's research led him to both Ed Komarek and Harold Biswell, who were mentioned in a *Science* magazine article on prescribed burning. Ellsworth sent them the identical letter dated September 1, 1971, with his request for information. Correspondence between the three men continued that fall, with Komarek copying Biswell, and Biswell copying Komarek. As a result, Komarek sent Ellsworth copies of past fire ecology proceedings to answer the questions he wanted answered, and Biswell agreed that the film should concentrate on the mixed conifer forests in northern California (Whitaker's Forest, King's Canyon National Park, Yosemite and Hoberg's). Biswell further stated that he would be pleased to read Ellsworth's manuscript, and that he would take the film maker on a burn in November, if it rained. There is no further correspondence to indicate if the film was ever made (and Google was no help.)

No other correspondence has been found in the Archives between Biswell and anyone associated with Tall Timbers, except for a copy of a letter sent to Biswell in September 1988 that was found in the Komarek papers. Biswell was invited by Roy Komarek, Larry Landers and Sharon Herman, from Tall Timbers, and Ron Myers from The Nature Conservancy to participate in a panel discussion at the 17th Fire Ecology Conference held in Tallahassee in the spring of 1989. The conference was titled *Catastrophic Fire in Wildlands: Management Challenges and Options* and was co-sponsored by The Nature Conservancy. The topic was chosen to address the wildfires out west in 1988, especially the immense Yellowstone area fire. The letter to Biswell states, "Catastrophic wildfires are difficult to predict or control and managing them poses special problems."

The letter continues:

High intensity or catastrophic fires are frequently deemed to be incompatible with human occupation or economic development of an area. Smoke hazards and public concern for wildlife add complications.

—Archives Corner continued on page 8

However, research and natural history studies suggest that continued existence of some ecosystems depends on difficult fires. Because the future of these habitats is in doubt, Tall Timbers Research Station and The Nature Conservancy are co-sponsoring a conference to consider the issues involved in their management. Public opinion and agency directives based on problems with high intensity or catastrophic fires will influence management policies for all fire dependent habitats in the future. Consequently, the 1989 Fire Ecology Conference will provide a forum

for information and ideas of value to all who are concerned with fire management of wildlands.

No reply to the letter has been found. And, after reviewing the proceedings published from the 17th FEC, there is no mention of Biswell on any of the panel discussions, nor is he cited. He must not have attended. When doing my research, I found out that Biswell's papers at the University of California, Berkeley have not been processed, so there is no finding aid to help in my search for any correspondence between Stoddard, the Komareks or others at Tall Timbers.



Hoberg's Resort

Hoberg's Resort in Lake County, California was the location of one of Harold Biswell's fire research plots, where he was studying understory burning in ponderosa pine stands on the property. His studies, which he started in 1951, showed that prescribed fire could be used to reduce fuel hazards. As Hoberg's was private property, he didn't have to deal with the limitations that would have been put on his use of prescribed fire for research on public lands. The Hoberg family must have been agreeable to his research.

In a paper titled "Dr. Biswell's Influence on the Development of Prescribed Burning in California," by Jan W. van Wagtendonk presented at the *Biswell Symposium: Fire Issues and Solutions in Urban and Wildland Ecosystems*, in February 1994, Walnut Creek, Calif., he wrote: "One of the most dramatic results of Dr. Biswell's research at Hoberg's occurred when a wildfire burned into an area previously prescribe burned and was easily controlled (Biswell 1963). In the treated area scarcely any needles on the trees were scorched, while outside of it a majority of the trees were killed. Thinning stands of ponderosa pine diminished debris accumulation for at least 20 years, and when accompanied with fertilization, increased growth by 134 percent (Agee and Biswell 1970a, b).

Jan van Wagtendonk was one of Biswell's graduate students, and was a USGS fire ecology research scientist at the Yosemite Field Station. He was a contributor to the *Fire Ecology* journal article by Scott Stephens previously mentioned.

Hoberg's Resort has an interesting history. It was founded in 1885 by the Hoberg family as a lodge with

a few cottages, then grew to be one of the largest privately-owned resorts in California, popular with celebrities and politicians. In 1967, it was the site of the 7th Tall Timbers Fire Ecology Conference, with George Hoberg in attendance.

In 1971, Hoberg's was purchased by the Maharishi Mahesh Yogi. Maharishi Mahesh Yogi was the "guru" to The Beatles rock band; they traveled to his ashram in northern India in 1968, to attend an advanced Transcendental Meditation training session. After this, the Maharishi retired and traveled to regions of the western world where he would conduct lectures.

The Maharishi bought the resort as a place where he could foster a serene lifestyle for his guests, which included small cottages for living quarters and vegetarian meals taken outdoors in a communal setting. The resort became a private retreat for the Transcendental Meditation movement in the United States. It was closed to the public, and the property became known as the Center for the Science of Creative Intelligence, a place for the practice of meditation.

In July 2010, Cobb Mountain Partners purchased the property from Marahishi Global Administration and they began a major renovation to return it to its original purpose as a resort. It had not been open to the public for over 30 years.

Sadly, in 2015, the "Valley Fire" swept through and destroyed the newly renovated Hoberg's Resort & Spa. Perhaps Harold Biswell's research studies that showed frequent prescribed burning "fire-proofed" western forests will finally be heeded.



What's in a name? Pawpaw or Papaw? Dog Banana or Indian Banana?

BY ROSE RODRIGUEZ WITH JOHN TOBE

Pawpaws belong to the genus *Asimina*. The plants are monoecious, that is they have pistillate and staminate flowers (sexual organs) on the same plant. The trees and shrubs in the genus are found throughout Florida.

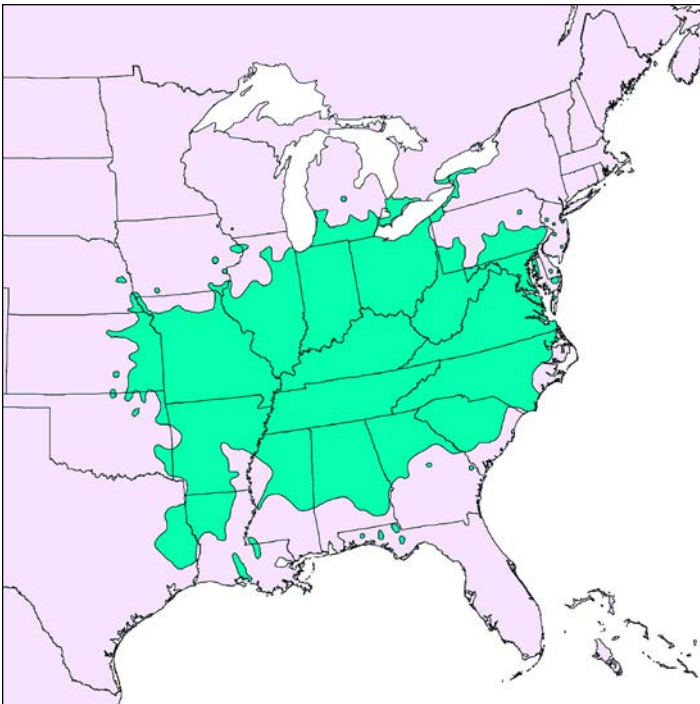
The various species include *Asimina triloba* the Common Pawpaw. It is also known as Dog Banana or Indian Banana. *A. triloba* is a small deciduous tree (up to 30 feet), native to the eastern United States and Canada; north Florida is its southern range.



Asimina triloba. Photo by Scott Bauer, USDA - USDAARS Image Number K7575-8, Public Domain.

In *The Trees of Florida*, author Gil Nelson, states that it is the only pawpaw that reaches tree stature in Florida. The plant has large green leaves that are simple and alternate. The small maroon flowers have a “fetid” smell when opened, apparently because it’s pollinated by “scavenger insects.”

“Pawpaw flowers are insect-pollinated, but fruit production is sometimes limited as few if any pollinators are attracted to the flowers’ faint, or sometimes nonexistent scent. The flowers produce an odor similar to that of rotting meat to attract blowflies or carrion beetles for cross-pollination. Other insects that are attracted to pawpaw flowers include scavenging fruit flies, carrion flies, and beetles. Because of irregular fruit production, some believe pawpaw plants are self-incompatible, requiring cross-pollination between trees of different clones (patches).”



Map by Elbert L. Little, Jr., of the U.S. Department of Agriculture, Forest Service, and others - USGS Geosciences and Environmental Change Science Center: Digital Representations of Tree Species Range Maps. Public Domain, <https://commons.wikimedia.org/w/index.php?curid=29451138>



Common pawpaw flower. Photo by John Tobe

– Continued on next page



Yellow-billed Cuckoo by John James Audubon. The painting depicts a "pawpaw" tree and a cuckoo with a butterfly, perhaps a zebra swallowtail. The image is Plate 2 in Audubon's *Birds of America*, printed between 1827 and 1835 in London. This work is in the Public Domain.

The Common Pawpaw is a patch-forming understory tree found in well-drained, deep, fertile bottomland and hilly upland habitat. Pawpaws (*A. triloba*) are the largest edible fruit trees native to North America, producing yellowish-green to almost black fruit, usually three to six inches long. The tasty flesh is pale to bright yellow and contains a network of glossy, dark brown seeds. The fruit's flavor is described as "... sunny, electric, and downright tropical: a riot of mango-banana-citrus that's incongruous with its temperate, deciduous forest origins. They also have a subtle kick of a yeasty, floral aftertaste a bit like unfiltered wheat beer." Besides being eaten raw, the fruit is used to make ice cream and baked goods. It was a favorite dessert of George Washington, and Thomas Jefferson grew pawpaw trees at Monticello. (Pawpaws: America's Best Secret Fruit by Sara Bir. <https://www.seriousseats.com/what-are-pawpaws-wild-fruit-midwest-how-to-prepare-and-eat-pawpaws>)

My interest in the plant was peaked after I read an article, "The Pawpaw Pusher," by Bill Heavey in the February/March 2021 issue of *Garden & Gun* magazine. It's about Heavey's first encounter with a pawpaw, and the efforts to make the tasty fruit commercially viable. And, because I had just edited the article in this *eJournal* issue by Dave McElveen on fire-dependent butterflies, I knew pawpaws are important for the zebra swallowtail butterfly, *Eurytides marcellus*. The butterfly's caterpillar feeds exclusively on the plants leaves, which are toxic; chemicals in the bark and leaves contain small amounts of acetogenins, which remain present in the zebra swallowtail butterfly through all its life



Zebra swallowtail butterfly caterpillar. Photo by Alani Davis stages, making it unpalatable to birds and other predators. Other animals enjoy pawpaw fruit: rodents, opossums, raccoons, foxes and black bears.

I ran into my friend, John Tobe who as director of ecologic restoration and conservation for a consulting firm, is a font of knowledge on plants. I told him I was doing an article on pawpaws for the next *eJournal* issue. John was enthusiast about the topic and offered to share some information about *Asimina* species found in Florida, and photos of the plants he and his colleague, ecologist Alani Davis, had taken during their ecological restoration work.

According to John, many *Asimina* species are endemic to Florida, or are almost endemic as several extend into south Georgia. These are all shrubby or dwarf plants. (See the table for the list and status.) He states that there are two species not endemic to Florida: *A. parviflora* and *A. triloba* that were probably left in the coastal plain after the last ice age. "*A. parviflora* is the best adapted to coastal plain conditions of the two," John says. "I first found it as a groundcover, about two feet tall growing on a north slope of the Withlatchoochee River. In late November the entire slope would be golden in fall color from the [leaves of] *A. parviflora*." John further states,

It can be argued that all *Asimina* species in Florida are adapted to fire or at least disturbance. *A. triloba* is the most fire sensitive. Restricted to refugia sites, this plant will disappear with warming climate. It is found with other refugia species in rich, oak-beech-magnolia forests. When I see it north of here, it's usually growing in floodplains, which are disturbed by flood pulsing. *A. parviflora* is found in oak-pine forests and ecotones along wetlands/floodplains—often in forests that burn. Like *A. triloba* it reaches its maximum size north of Florida.

John has a Common Pawpaw tree growing in his south Georgia garden that is about 15-20 feet tall. He says the tree has short-lived stems, but it suckers [clonal patching]. He notes further that the tree produces abundant fruit, but it's not very tasty to him, although he says animals strip the plant of its fruit, so it must be tasty for them. John notes that north of our area, this is the species that has been selected for superior fruiting qualities to sell commercially. The problem for commercial pawpaw growers is that the fruit doesn't ship or store well. As a result, it is usually only found at farmers markets in the late summer or fall when the fruit ripens.



Ripe pawpaw fruit. Photo by Manuel Conde - Public Domain, <https://commons.wikimedia.org/w/index.php?curid=6758596>

Alani told John that he learned during his gopher tortoise agent training (given by the Florida Fish & Wildlife Conservation Commission), that the fruit of *A. longifolia* is sought after by gopher tortoises. The tortoises like the fruit so much that they will eat the sand where the juice from the fruit has dripped.

I can't attest to the tastiness of the Common Pawpaw fruit, but with its flesh being described as "luscious like custard, sweet like a banana with hints of mango and papaya, even pineapple," I'm ready to give it a try. ❖

| Asimina Species | Endemic to Florida | Endemic to Florida and South Georgia | Location of Species |
|-----------------------|--------------------|--------------------------------------|--|
| <i>A. incana</i> | | ✓ | North and central Florida; extends into south Georgia |
| <i>A. manasota</i> | ✓ | | 2 counties in southwest Florida – a candidate for extinction |
| <i>A. obovata</i> | ✓ | | Found in deep well drained sand of Lake Wales Ridge, central to north/central Florida |
| <i>A. pulchella</i> * | ✓ | | Very rare, probably going to be extinct. Found in 1 county on the east coast and 2 counties in southwest Florida |
| <i>A. pygmaea</i> | | ✓ | North/central Florida, extends into south Georgia |
| <i>A. longifolia</i> | | ✓ | Found in coastal plain of north Florida, Georgia and Alabama |
| <i>A. reticulata</i> | | ✓ | Found in south, central and north/central Florida and barely into Georgia |
| <i>A. tetramera</i> * | ✓ | | Only found in 2 counties in south Florida – another candidate for extinction |

*Threatened and Endangered Plants in the Preservation of Native Flora of Florida Act. These are species of plants native to Florida that have limited ranges and might be in danger of extinction.

Table References

Florida Atlas of Vascular Plants – <https://florida.plantatlas.usf.edu>

Native Plants of North America – <https://www.wildflower.org>

Preservation of Native Flora of Florida Act – <https://www.fdacs.gov/Divisions-Offices/Plant-Industry/Bureaus-and-Services/Entomology-Nematology-Plant-Pathology/Botany/Florida-s-Endangered-Plants>

For more about the origin of the genus name *Asimina*, it's cultivation by Native Americans east of the Mississippi before Europeans arrived, it's many uses beyond its culinary delights, visit <http://www.eattheweeds.com/?s=Asimina>, by Green Deane.



Asimina longifolia in the pine flatwoods, flowering in May after a prescribed fire in March 2020. The site is located in the Sweetwater Mitigation Bank, Bay County, Fla. Photo by John Tobe

ABOUT THE AUTHORS

Rose Rodriguez, is the *eJournal* editor and Tall Timbers Information Resources Manager. She is a self-described plant lover, with an interest in historic gardens and incorporating native plants into her own garden.

John Tobe, PhD, is the director of conservation and ecological restoration for ERC, Inc., an environmental consulting firm. John holds a MS in plant ecology/floristics, and a PhD in plant systematics from Clemson University. He is an Adjunct Professor at Florida State and Florida A&M Universities. John contributed an *eJournal* article on Florida Soapberry in the [Summer 2016 issue](#).

FLORA & FAUNA



Conserved, mature cypress forest on the upper Aucilla River exemplifies prime prothonotary warbler breeding habitat. Photo by Peter Kleinhenz.

Deep Swamp Silence

BY PETER KLEINHENZ

Have you ever heard deep swamp silence? It's far from true silence, of course, but not a single sound wave from a human can be heard. Every sound that does make itself known seems to echo through the waterlogged wilderness. The wind leaves branches creaking after it passes. The ripples in still water expand in gurgling tones after a turtle slides into the murky blackness. And bird calls, well, they seem to go on forever.

The swamps of North Florida and South Georgia harbor a lot of life and, as a result, their deep swamp silence can be quite loud. This is especially true in spring, when the stars of this soundtrack return. As colors fill the visual palette, the songs of migratory songbirds fill in any gaps there

might be in the deep swamp silence by noisily overwhelming all but the loudest human sounds.

Two migratory songbirds sing songs that seem especially well-suited to the dark swamps within which they can be heard. The two birds look, sound, and act quite different from one another but they belong to the same family of birds, *Parulidae*. Birds in this wood-warbler family are generally insectivorous, migratory, and very, very beautiful. Many of the genera (plural for genus) in this family contain many species, but further proof of the differences between the two swampy songsters can be found in the fact that each belongs to its own unique genus. They exhibit differences, sure, but, in their contribution to deep swamp silence, they are almost the same.

“Tweet, tweet, tweet, tweet, tweet.” It’s like the source of this song is firing missiles of sound through the swamp, trying to break through to a potential mate within earshot. This simple, but piercing, song belongs to one of the most striking birds in North America, the prothonotary warbler. Adult male prothonotary warblers absolutely shine with a yellow that appears even brighter within the shaded settings where it is typically seen. The brilliance of their color matches many of their avian compatriots in the mangrove swamps of Central and South America where they winter. But, here in the swamps of the Eastern U.S., they positively outdo all other birds in the color department. The dazzling male, after all, wants to be noticed.



A male prothonotary warbler shines like a jewel in a dark swamp along the lower Aucilla River. Photo by Preston Ballard.

In spring, the race is on for prothonotary warbler males. They must fly thousands of miles, often journeying non-stop across the Gulf of Mexico, to their breeding grounds. Upon arrival, there is even more to do. Males must investigate all of the best-looking woodpecker holes in the dead trees that stand in the swamps they call home. They locate several holes, then pop in and out as they “tweet, tweet, tweet, tweet, tweet”. Ideally, a female will investigate these holes and pick the one she likes best. It is here that she will raise her young. If successful, both the female and male may return to the exact same site to nest until the end of their lives.

“Teer, teer, teer, we-tee, widow.” This is a song that does not demand a mate but, rather, yearns for one. Perhaps the desperation is needed, as the song emanates from a bird that is not gaudy and not prominent. The Swainson’s warbler, instead, behaves in a way that matches its rather drab, brown plumage. This is a skulker, a bird that is far more likely to be heard than seen. Swainson’s warblers forage on the ground, excavating insects and even lizards



A male Swainson's warbler sings “Teer, teer, teer, we-tee, widow” from its perch. Photo by Preston Ballard.

from beneath leaf litter. That preference for feeding in leaf litter ties them to habitats that do not have standing water year-round, but they are definitely still a bird of the swamp in most of their range. It’s just that they prefer the periphery, where the vegetation is thicker and where insect prey abounds. In other words, Swainson’s warblers like areas that people do not.

Swainson’s warblers, in fact, seem to delight in their avoidance of people. They commonly winter in rocky, tropical dry forest in the Caribbean and Yucatán, where poor soils and the presence of large sinkholes have generally kept people at bay. During migration, they stick to places where thick vegetation keeps them hidden. In their breeding range in southeastern swamps and portions of the Appalachians, they might emerge into the open for a few seconds, but they will quickly dart to a more concealed location. Even their nests look just like a clump of dead leaves caught in a tangle of vegetation, despite containing a carefully-designed cup of leaves and twigs that is softened with pine needles.

Male Swainson’s warblers must sing, however, to attract their mates, and it’s this contribution to deep swamp silence that gives them away. Males defend huge territories that may be as large as 45 acres. They fling their songs and calls like arrows from their territories, vigorously defending their space in the swamp. To me, their song always seems to be coming from somewhere a little wilder than the place where I’m standing. Maybe that’s why they’re one of my favorite birds, and why the sound of deep swamp silence gives me hope that those wild places have not completely vanished.

Deep swamp silence, created by the loudness of nature amongst the quietness of humankind, can be a rare find

– Continued on next page

these days. That being said, it exists in abundance within an hour of where I live here in Tallahassee, Florida. In particular, the Aucilla River watershed harbors plenty of places where the sounds and impacts of human-kind fade away, and fade away rapidly. There are places in the watershed, deep in the heart of shrubby swamps far from any roads, that I can confidently say no human has been to in over 50 years. It's here that deep swamp silence is the most vociferous.

Prothonotary warblers prefer blocks of habitat that are at least 250 acres in extent and full of dead trees, which often equates to mature, intact swamp forests. Swainson's warblers are a little bit less picky but, as mentioned previously, still need plenty of room to roam. Prothonotary warblers have declined by over 40% since the late 1960s due to habitat loss. A relative of Swainson's warbler that also preferred dense canebrakes and swampy thickets, the Bachman's warbler, is already extinct. However, thanks to a corridor of public conservation lands, coupled with private landowners that take a relatively hands-off approach to their wetlands, both species are thriving in the Aucilla watershed. In certain places, particularly in the lower reaches of the Aucilla, the songs of prothonotary and Swainson's warblers are among the most common bird songs heard. I am optimistic that, at least in one place in the Southeast, the sounds of deep swamp silence will deafen ears for eternity. ❖



Healthy, old-growth bald cypress trees are extremely rare in Florida but exist in abundance along certain stretches of the upper Aucilla River where deep swamp silence is the loudest. Photo by Peter Kleinhenz.

ABOUT THE AUTHOR: Peter Kleinhenz is the Aucilla River Watershed Coalition Coordinator with the Tall Timbers Land Conservancy.

"Thank you Benners Contracting for serving as our partner in the restoration of Gannett Pond."

A photograph showing a green John Deere tractor and a yellow excavator working on a construction site. The tractor is in the foreground, and the excavator is in the background. They are working on a dirt area with some vegetation. A wooden fence is visible on the left side of the image.

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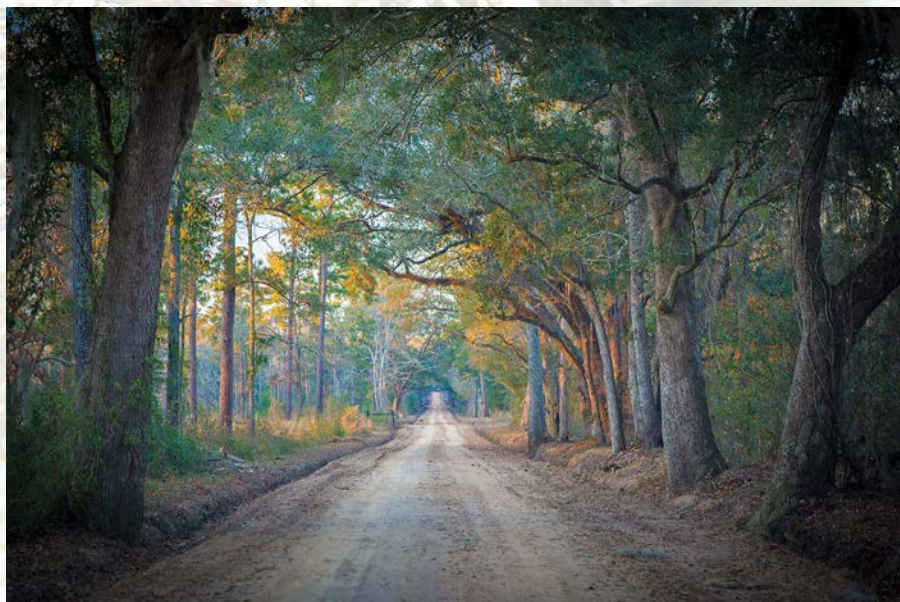
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Tall Timbers Land Conservancy



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



Fire-Dependent Butterflies of the Greater Red Hills

BY DAVE MCELVEEN

There are 21 species of butterflies in the Greater Red Hills Region that might go extinct without fire! They are fire-dependent.

What's a Fire-Dependent Butterfly?

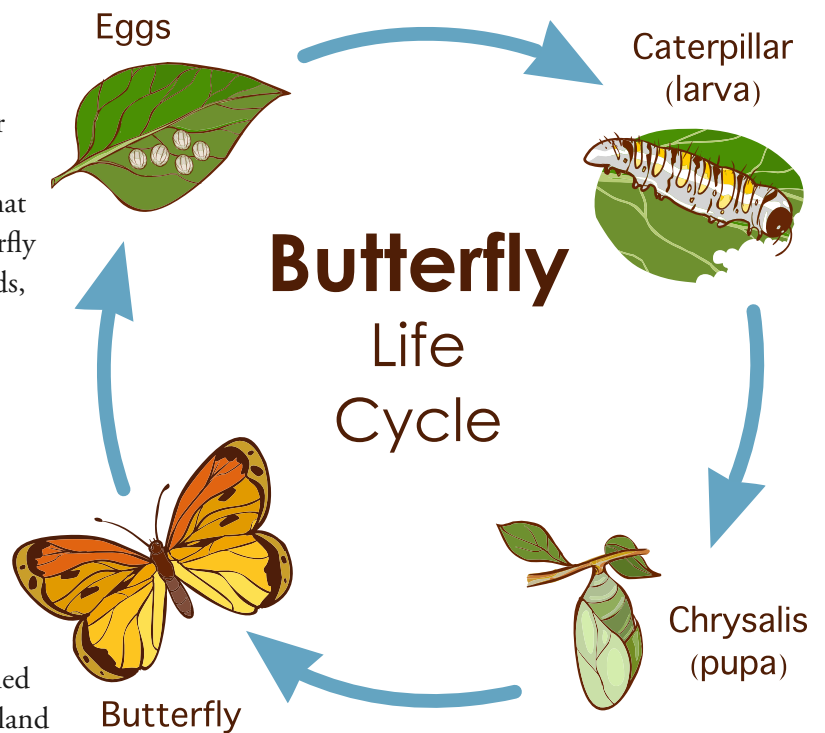
Being fire-dependent means relying on fire-maintained plant communities for some or all of their life cycle. For butterflies that means that either the adults need nectar or caterpillars need host plants in a plant community that requires fire to remain healthy. In our region, any butterfly largely restricted to sandhill, upland pine, pine flatwoods, or any combination of these three is fire-dependent. If those plant communities don't burn periodically, hardwoods take over and the species disappear.

Where is the Greater Red Hills?

The Greater Red Hills Region covers parts of Gadsden, Leon, Jefferson, and Wakulla counties in Florida, and Grady and Thomas counties in Georgia. The region is bounded on the west by the Ochlockonee River, on the south by the Gulf of Mexico, on the east by the watershed of the Aucilla River, and on the north by the Tifton Upland of Georgia.

What is a Butterfly's Life Cycle?

Butterflies have four life stages: egg, caterpillar, pupa (aka chrysalis), adult. Adults feed on nectar or sap from plants and the females lay eggs on a plant of their choosing called the "host plant." Many species are adapted to one or just a few plants as their host plants. The eggs hatch into caterpillars that feed on the host plant. As caterpillars eat and grow, they shed their old skin (molting), grow a new, larger skin and continue feeding. They do this four times usually until they're full grown. Then they attach themselves to a surface, molt one more time, and form a hard outer shell. This is the pupa or chrysalis that then transforms into an adult caterpillar. After transforming, the adult emerges from the chrysalis, dries its wings and flies away. This completes the life cycle.



Many species have more than one cycle in a year. These are called multi-brooded species. Multiple broods in a year allow them to take advantage of Florida's long warm season, and are a hedge against any one brood failing due to drought or other conditions.

Adults are mobile and can fly through the woods looking for nectar flowers, and when it's time, to lay eggs on the right host plant. But caterpillars are not very mobile. They can move a few inches or feet, but that's it. So, once an egg is laid that's where the caterpillar will have to stay.

Caterpillars are little eating machines, as anyone who has raised a Monarch can attest. They feed almost constantly, which can take only a few days for some species. Adults are mostly short-lived (Monarchs are an exception), living at most a few weeks. No wonder they are always in a hurry!

In the Greater Red Hills, the 21 species of butterflies that are fire dependent represent ten families (Table 1). One species of each family on the following pages is highlighted. Information on the other species can be found at the Alabama Butterfly Atlas, <https://alabama.butterflyatlas.usf.edu/>.

Table 1: Fire Dependent Butterflies of the Greater Red Hills

| Common Name | Genus | Species |
|-------------------------------|---------------------|---------------------|
| SWALLOWTAILS | | |
| Pipevine Swallowtail | <i>Battus</i> | <i>philenor</i> |
| Zebra Swallowtail | <i>Eurytides</i> | <i>marcellus</i> |
| SULPHURS | | |
| Southern Dogface | <i>Zerene</i> | <i>cesonia</i> |
| HAIRSTREAKS | | |
| Frosted Elfin | <i>Callophrys</i> | <i>irus</i> |
| BLUES | | |
| Ceraunus Blue | <i>Hemiargus</i> | <i>ceraunus</i> |
| METALMARKS | | |
| Little Metalmark | <i>Calephelis</i> | <i>virginiensis</i> |
| ADMIRALS AND RELATIVES | | |
| Goatweed Leafwing | <i>Anaea</i> | <i>andria</i> |
| SATYRS | | |
| Georgia Satyr | <i>Neonympha</i> | <i>areolata</i> |
| Common Wood-Nymph | <i>Cercyonis</i> | <i>pegala</i> |
| SPREAD-WING SKIPPERS | | |
| Confused Cloudywing | <i>Thorybes</i> | <i>confusis</i> |
| Mottled Duskywing | <i>Erynnis</i> | <i>martialis</i> |
| Wild Indigo Duskywing | <i>Erynnis</i> | <i>baptisiae</i> |
| GRASS SKIPPERS | | |
| Swarthy Skipper | <i>Nastra</i> | <i>lherminier</i> |
| Dotted Skipper | <i>Hesperia</i> | <i>attalus</i> |
| Meske's Skipper | <i>Hesperia</i> | <i>meskei</i> |
| Crossline Skipper | <i>Polites</i> | <i>origenes</i> |
| Palmetto Skipper | <i>Euphyes</i> | <i>arpa</i> |
| Berry's Skipper | <i>Euphyes</i> | <i>berryi</i> |
| Dusky Roadside-Skipper | <i>Amblyscirtes</i> | <i>alternata</i> |
| GIANT SKIPPERS | | |
| Yucca Giant-Skipper | <i>Megathymus</i> | <i>yuccae</i> |
| Cofaqui Giant-Skipper | <i>Megathymus</i> | <i>cofaqui</i> |

For More Information

Online identification and natural history:

- Alabama Butterfly Atlas at <https://alabama.butterflyatlas.usf.edu/>
- Florida Museum of Natural History <https://www.floridamuseum.ufl.edu/wildflowers/butterfly-search/>

Field guide: *A Swift Guide to Butterflies of North America*, Jeffrey Glassberg

Swallowtails

Swallowtails are large, colorful and conspicuous butterflies named for their characteristic “tails”. Tails streamline airflow over their wings in a way that enhances their ability to glide. We have seven swallowtails in our region, two of which are fire dependent: Pipevine Swallowtail (*Battus philenor*) and Zebra Swallowtail (*Eurytides marcellus*).



Zebra Swallowtail. Photo by Alani Davis

Zebra Swallowtail

The Zebra Swallowtail looks like its namesake with its black and white stripes. It has the longest tails of all the Swallowtails. Males fly a few feet above the ground patrolling for females around their host plants from February to late October.

Size: 2 ½ - 3 ½”

Habitat: open pinelands and brushy fields

Foods: Adults nectar on many different flowers; males also gather at mud puddles, wet roads and riverbanks to sip dissolved minerals; caterpillars feed on a variety of pawpaws (*Asimina* spp.).

Abundance: common

Larvae of the zebra swallowtail butterfly feed exclusively on young leaves of the various pawpaw species, but never occur in great numbers on the plants.

Sulfurs

The Sulfur family is named for their yellow color, and the name “butterfly” may derive from their buttery-yellow color. Their rapid and low flight, usually with only short stops for nectar, draws one’s eye to them. They only sit still for a moment usually with their wings closed. We have six species in our Region, of which one is fire dependent: Southern Dogface (*Colias cesonia*).

Southern Dogface

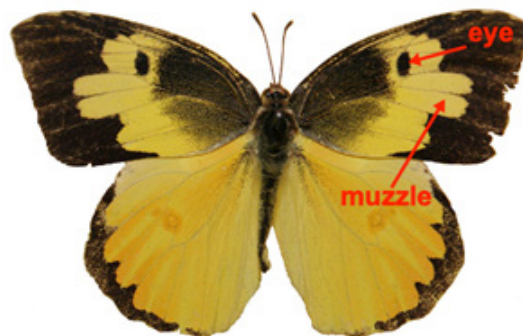
The Southern Dogface is named for and easily distinguished by the dog-face pattern on its forewings. The pattern is so bold, you can see it as it flutters around, and even though these butterflies always rest with wings closed, you can usually see the distinctive pattern through from the other side. Two color forms occur. In most of the summer, the undersides are a bright, clear yellow. In late summer and fall, the undersides are colored with a pink mottling along the margins and some of the veins. Males patrol open areas for females. Eggs are laid on the undersides of terminal leaves of host plants.

Size: 2-2 1/2”

Habitat: old fields and open pinelands.

Foods: Adults visit flowers for nectar and also take moisture and minerals from puddles and other wet ground. Caterpillars eat wildflowers in the legume family.

Abundance: Common.



Southern Dogface. Photo by Megan McCarthy-Wikimedia Commons

Hairstreaks

Hairstreaks are small intricately patterned butterflies likely named for the usual presence of short, hair-like tails. Many have a dark eye-spot near the outer edge of their hindwings. They “saw” their closed wings to attract predators to these spots, who mistake their rear end for their head. Males release pheromones to attract females during courtship rituals. We have 13 hairstreak species in our region of which one is fire dependent: Frosted Elfin (*Callophrys irus*).



Frosted Elfin. ©Dave McElveen

Frosted Elfin

The Frosted Elfin is named after elves, due to its small stature, and the white frosting on its hindwings. The focus of much Tall Timbers’ research, the Frosted Elfin is a rare inhabitant of sandhills that is only found near its host plant, sundial lupine (*Lupinus perennis*).

Size: 1”

Habitat: sandhills with sundial lupine

Foods: Adults feed on blueberries and other early-spring bloomers; caterpillars feed only on sundial lupine.

Abundance: rare



Blues

Blues are named for the blue on their wings. They are relatively small with weak, fluttery flight as compared to Swallowtails, Sulfurs and Hairstreaks. We have four in our Region of which one is fire dependent: Ceraunus Blue (*Hemiargus ceraunus*).



Ceraunus Blue. ©Sara Bright

Ceraunus Blue

Ceraunus Blues flutter near the ground and seem to take forever to alight.

Size: ¾”

Habitat: most any open area including lawns.

Foods: adults feed on flowers of many species; caterpillars on a variety of legumes.

Abundance: common

Metalmarks

Metalmarks derive their name from the shimmering metallic marks on their wings. They have a weak, fluttery flight and stay near the ground. We have one in our Region and it is fire dependent: Little Metalmark (*Calephelis virginiensis*).

Little Metalmark

The Little Metalmark is a beautiful rich, red-orange above with silver metallic markings. It often wags its wings when alight. They are partial to yellow, daisy-shaped flowers when nectaring and seldom venture far from their host plants.

Size: 1”

Habitat: damp, grassy clearings in pine woods; usually found near its host plant vanillaleaf (*Carphephorus* spp.).

Foods: adults nectar on a variety of flowering plants; caterpillars feed on Vanillaleaf.

Abundance: uncommon

Little Metalmark, at left. ©Sara Bright

Leafwings and Emperors

Male butterflies in this family perch on foliage and tree trunks, usually 5-15 feet off the ground. They often fly out to challenge intruders. We have three species in our region, one of which is fire dependent: Goatweed Leafwing (*Anaea andria*).



Goatweed Leafwing. ©Sara Bright, Alabama Butterfly Atlas.

Goatweed Leafwing

This odd named butterfly takes its name from its host plant in the Midwest – goatweed – and its mimicry of a dead leaf when its wings are closed. When perched on tree trunks, their subtly patterned underwings render them invisible. They even resemble falling leaves — if frightened, they may drop to the ground and remain motionless. Goatweed Leafwings overwinter as adults and fly on warm winter days.

Size: 1 3/4"

Habitat: dry, open woodlands

Foods: Adults feed on tree sap, dung and rotting material; caterpillars feed on various species of croton (*Croton* spp.).

Abundance: uncommon

Satyrs

Satyrs were named after the Greek and Roman gods and are brown, medium-sized butterflies with a bouncy flight. They tend to stay close to the ground and weave among the grasses. They don't stray far from where they were born. Most rest with their wings closed. We have eight species in our Region, of which two are fire dependent: Common Wood-Nymph (*Cercyonis pegata*) and Georgia Satyr (*Neonympha areolate*).



Georgia Satyr. ©Sara Bright

Georgia Satyr

Georgia Satyrs are found in our wet, pine savannas where they bouncy along among the grasses. They have a lovely, distinct orange-brown ring on their hindwing with 4-5 yellow-edged eyespots inside. If you look for them they are easy to spot!

Size: 1 1/4 – 1 3/4"

Habitat: moist, grassy clearings in flatwoods and pine savannas

Foods: Adults feed on mud, dung and decaying matter, rather than nectar. Caterpillars feed on various sedges and grasses.

Abundance: uncommon

Spread-wing Skippers

Skippers derive their name from their characteristic rapid erratic flight. They have short wings optimized for fast take-offs and maneuvering. The spread-wing Family of Skippers hold their wings open flat when feeding or at rest. We have 16 species in our region of which three are fire dependent: Confused Cloudywing (*Thorybes confusus*), Wild Indigo Duskywing (*Erynnis baptisiae*) and Mottled Duskywing (*Erynnis martialis*).

Mottled Duskywing

The Mottled Duskywing is light brown above and strongly checkered (aka mottled) with dark blotches. It's known for congregating at the top of hills to find mates. They are in decline throughout their range for reasons that are unclear.

Size: 1 – 1 1/4"

Habitat: dry, open woods with their host plant present



Mottled Duskywing. ©Vitaly Charny

Foods: Adults feed on mud and decaying matter, and will also sip moisture and minerals from damp soil. Caterpillars feed only on New Jersey Tea (*Ceanothus americanus*).

Abundance: rare

Grass Skippers

Grass skippers are named such because they lay eggs on and the caterpillars feed on grasses. They are small with rapid darting flight that's hard to follow with the eye. They alight with their wings closed or partially open, adopting a "jet fighter" pose with the hindwings held flat and the forewings raised at a 45-degree angle. We have 32 species in our region of which seven are fire dependent: Swarthy Skipper (*Nastra lherminier*), Dotted Skipper (*Hesperia attalus*), Meske's Skipper (*Hesperia meskei*), Crossline Skipper (*Polites origenes*), Berry's Skipper (*Euphyes berryi*), Dusky Roadside-Skipper (*Amblyscirtes alternata*) and Palmetto Skipper (*Euphyes arpa*).



Palmetto Skipper. ©Vitaly Charny

Palmetto Skipper

The Palmetto skipper is well-named as its sole host plant is saw palmetto (*Serenoa repens*). One of our larger skippers, it is a handsome bright golden-orange below with a cream-colored body.

Size: 1 ¾ - 2"

Habitat: open pine savannas with a palmetto understory

Foods: Adults nectar on a variety of flowers. Caterpillars feed on the young leaves of saw palmetto.

Abundance: uncommon

Giant-Skippers

Giant-Skippers derive their name from their large size—the biggest of all our butterflies. They are fast and powerful fliers—up to 60mph has been reported. We have two species in our region, both of which are fire dependent: Cofaqui Giant-Skipper (*Megathymus cofaqui*) and Yucca Giant-Skipper (*Megathymus yuccae*).

Yucca Giant-Skipper



Yucca Giant-Skipper. ©Vitaly Charny

The Yucca Giant-Skipper is named for the yucca plants (Spanish bayonets) it uses as a host. It usually rests with its wings closed, which are brown/black with several yellowish-white markings visible.

Size: 2-3"

Habitat: dry, open woodlands with yuccas present

Foods: Adults do not feed. Caterpillars bore into the bud of the yucca plant and feed on the roots.

Abundance: uncommon

About the Author: Dave McElveen is a Tall Timbers Research Associate who works with the Stoddard Bird Lab.

RESEARCH & LAND MANAGEMENT



Herbert Stoddard burning the longleaf pine forest at his Sherwood plantation, 1941. Photo by Lorene Squire

The Red Hills Region – Where the fires never stopped

BY KEVIN ROBERTSON, MONICA ROTHER, JEAN HUFFMAN, CHRIS GUITERMAN, NEIL JONES, BREANNE WARD

Historians and tree ring records agree that almost all of the U.S. experienced a period when periodic fires stopped occurring, usually beginning around the turn of the 20th century and often lasting until the present. What often appears in the tree ring record as the abrupt cessation of fire scars corresponds to the ramping up of government policy that eventually declared a virtual war on both wildfires and intentional burning. However, in a very few places, fires were either allowed to ignite naturally and spread, or they continued to be set by people who had the capacity and motivation to do so. Such locations include parts of the Flint Hills of Kansas, Cross Timbers of Texas and Oklahoma, mountain wilderness areas of the Southwest, and rangelands of south and central Florida.

Evidence from fire scars confirms that the Red Hills region of southern Georgia and northern Florida is on the list of the few places where frequent fire never stopped. Controlled burning every one or two years for management of northern bobwhite quail is known to have been an integral part of the Red Hills management tradition since the late 19th century. However, there is also the local tale that a decline in quail numbers in the nineteen-teens and

twenties was because local landowners gave into pressure from the government to stop burning. Historian Albert Way doubts the story, recording in his book *Conserving Southern Longleaf - Herbert Stoddard and the Rise of Ecological Land Management* that there was no historical evidence that burning had ever stopped. In fact, Stoddard's notes



Externally scarred shortleaf pine used for fire scar dating after being cut as part of a Tall Timbers timber thinning.

suggest that burning was widespread when he arrived in the early 1920s.

To bring light to the issue, sections of dead trees from the Millpond Larkin property, Arcadia Plantation, and Tall Timbers were used to identify and date fire scars that formed in open wounds of trees from the late 19th century to the present. During periods when tree wounds were actively recording fires as scars in tree rings, the average fire return intervals varied little among the properties, from 1.8 to 2.1 years, with no evidence for an extended period of fire exclusion. Results were published in the journal *Forest Ecology and Management* (Rother et al. 2020).



Tree section with fire scars from Tall Timbers Research Station

To look further into the question, we combed through the diaries of Henry Beadel, owner of Tall Timbers Plantation, from 1920 through 1940, to look for evidence of burning on the property. In each year except 1921, when he may have been traveling, there were multiple references to burning, such as “Air full of broomstraw smoke all day” in 1920, “Burned broomstraw here and there” in 1927, and “Hunted rabbits, burning as we went” in 1933. The dates were all in late February to early April, corresponding to the traditional time of burning in the region. As the old-fields were much younger then, they tended to be dominated by broomstraw (*Andropogon virginicus*), a typical early-successional grass, as confirmed by historic photographs of the property.

Confirming the continuous history of frequent fire in the Red Hills establishes the region as an essential reference point for management of fire-dependent ecosystems throughout the South and other parts of the country. Presumably the sequence of frequent fires has never been broken, from when lightning and indigenous Americans started fires, to the burning of range by cattlemen, to the quail era that continues today. Consequently, the Red Hills harbors the finest examples of native old-growth and



Breanne Ward recording references to burning from the Henry Beadel diaries.

second growth native pine savannas seen anywhere, providing benchmarks for restoration and laboratories for understanding the natural function of these ecosystems. The use of frequent fire to restore abandoned farmland to old-field pine woodlands that support a wide range of native and imperiled wildlife is also a success story that is being imitated on other landscapes. The resilience of the region to wild-fire and climate change because of the legacy of frequent burning stands in contrast to most of the rest of the country, providing a template of what might be accomplished with a purpose and will to burn. ■

References:

- Rother, M. T., J. M. Huffman, C. H. Guiterman, K. M. Robertson and N. Jones 2020. A history of recurrent, low-severity fire without fire exclusion in southeastern pine savannas, USA. *Forest Ecology and Management* 475: 118406.
- Way, A. G. 2011. *Conserving southern Longleaf: Herbert Stoddard and the rise of ecological land management*. Athens, Georgia, University of Georgia Press.

About the Authors:

Kevin Robertson is the Tall Timbers Fire Ecology Program Director; Monica Rother is an assistant professor in the Department of Environmental Sciences at the University of North Carolina, Wilmington; Jean Huffman is a dendrochronologist who researches fire history in association with Tall Timbers and Louisiana State University; Chris Guiterman is an assistant research scientist for the University of Arizona's Laboratory of Tree-Ring Research; Neil Jones researches fire history in association with Tall Timbers and Louisiana State University; Breanne Ward was a biologist with the Tall Timbers Fire Ecology Program who now works at Ordway-Swisher Biological Station.

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](#).



Talking with TYA28

BY JEAN HUFFMAN (JMH)

What could a longleaf pine that germinated in the 1400s and grew for more than 300 years tell us about its life? Well, one old longleaf—TYA28—can tell us quite a lot. In this “ghost-of-longleaf-past” interview, I will interpret for TYA28, guided by what we see recorded in one cross-section of its stump to let this tree tell its story.



JMH: So, when did your life begin?

TYA28: I began my life as a new seedling in the late 1400s. The first of my annual growth-rings that you can see is 1488, but I was a grass-stage seedling for some years before this.

Where did you live?

I lived my entire life in one spot, surrounded by my immediate and extended family, not far from the Gulf of Mexico, on what is now the Panhandle coast of Florida.

What most influenced your growth?

Through my life many things influenced my growth. Sometimes I was competing with my siblings, sometimes winds damaged my limbs and set me back, but by far the most influential thing, year after year, was rainfall. Dry years were tough, and I grew very little; years with more rainfall, especially rainfall in the late summer, allowed me to grow faster and really put on the wood. The same was true for my neighbors and extended family that grew near me.

Can you tell us anything about fire? When did you experience your first fire? When did you start recording fire? Did fire ever hurt you?

Fires were like rain. They sustained me and happened regularly throughout my entire life. Although I didn't record them, my first fires occurred before I was out of

the grass-stage. Fires didn't hurt me then because of my long needles, which helped protect me from the heat, and almost never injured my trunk because my bark is so thick and fire-resistant.

But as I got older and my branches and cones fell on the ground near the base of my trunk, the fire would sometimes become hot enough and last long enough to actually kill a bit of my cambium. After my cambium was damaged, I would move resin to that spot to protect myself from insects and then grow over that injury as quickly as possible. This location of dead cambium and the resin and distorted growth that came after it resulted in a record of that fire—a fire-scar.

I had many small injuries from fires, in fact I recorded more than 120 individual fire-scar injuries caused by many fires over the centuries. The first time I formed a fire-scar in this part of my trunk was in 1517, when I was about 19 years old, and the last was in 1753, when I was about 265. Though I went on to record more fires after 1753, those records were lost after I died and my sapwood (the soft outer layers of recently formed wood), and some outer layers of heartwood rotted and weathered away.

—TYA28 continued on next page

Usually I only recorded a portion of the many fires that burned around me, but sometimes I would record a series of many fires only one or two years apart. Many of the fires throughout my life happened in May and June, near the beginning of the lightning season. This was just after I completed my early-wood (the lighter colored part of the growth ring), and before forming my late-wood (darker portion of the growth ring).

What were some other big events in your life?

Hurricanes were life-changing event in our community and happened many times during my life. When hurricanes came ashore, many longleaf were killed by being snapped and uprooted, but many of us lived for centuries, weathering the frequent hurricanes. Often adult trees would either die or be damaged, and have reduce growth rates, while the younger more flexible trees would survive and would thrive and grow quickly after hurricanes. We recorded these hurricane events in our rings, although these recordings are harder to interpret than our records of fire and rain.

Well, this has been great to get such insight into your life. I want to thank you for this interview and for recording some of your history — especially some of the fires that happened during your life.

You're welcome! Maybe in the future, as you understand my language better, I can tell you more about fire, hurricanes and other events in my life. I hope this story of my past helps you understand more of what was important to me and my community, and that you can use that knowledge to help take care of my descendants who are living with you today.

Final note from JMH:

We named this longleaf pine TYA for the site it was collected, Tyndall Air Force Base. It was the 28th stump that we collected for the study that we at the Tall Timbers Tree-ring Lab are conducting—reconstructing five centuries of fire history at Tyndall Air Force Base and the St. Joseph Bay State Buffer Preserve. We compile the records of many trees including many of TYA28's neighbors, to get the complete records of past fires that a single tree cannot provide.

You can bring TYA28 and all of its history home with you; it will be included in the upcoming Kate Ireland Auction happening at Tall Timbers October 14, 2021. ■

About the author: Jean Huffman is a dendrochronologist, fire ecologist, and land manager. She researches fire history in association with Tall Timbers and Louisiana State University.



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REFLECTIONS

FORESTERS

By Walter Stephens

This story is for foresters,
A strange society,
Who sometimes see the need to burn
The ground beneath their trees.

The reason for this practice is
Often by scientists seen,
Who'll tell you that sometimes a fire
Is part of nature's scheme.

You ever note how when a fire
Has crept across the land,
With one good rain and ten warm days
The ground is green again?

That fire was used to clean the duff
Collected down below.
The elements left in that ash,
Soon help the earth to grow.

Wild creatures there both large and small
All quickly do return
To feast upon this tender browse
Left by a gentle burn.

But wildlife feed is not just why
You burn beneath the trees,
It's mostly done to clean out fuel –
Avoid catastrophes.

Your trees have grown for many years,
They're stately and they're tall
But down below, the brush grew too
And made a prickly wall.

The needles that your trees have shed
Along with chunks of bark,
Have lodged down there in vines and brush
Just waiting for a spark.

And one fine day when it is dry,
A weather front comes in,
Sends dust clouds racing 'cross the fields
Before the howling wind.



Then on that day right near your trees,
A young man drives his truck.
He's 'bout smoked down his cigarette
So pitches out the butt.

The spark it gracefully descends
Down to the grass below.
The cigarette soon breaths the wind,
The ash it starts to glow.

The blaze right then is very small,
It's timid just at first,
But when it sees your trees and brush
It flares up with a burst.

The brush and vines that have grown thick
Will feed the blaze quite well
Until it is a tree tall fire,
An inferno from Hell.

It roars and groans and pops and cracks,
Creates an atmosphere,
Of wind and whirling, burning sparks,
Consuming all that's near.

And when the raging beast is past,
The silence is profound,
For death and rocks and wisps of smoke
Will seldom make a sound.

Next day when walking on your land
Which once grew tall and graceful trees
The only things your eyes see now
Are snags which smolder in the breeze.

If only you had burned that ground
When moisture heat and wind were right,
You'd not now see this sterile scene
Of smoking spires against the light.

A burn controlled is man's attempt
To mimic nature's plan,
Except to choose the day that's right
To gently heat the land.

So when you see the foresters
String drops of fire near brush that's dense,
Know well that they do burn for all
To clear a line for self-defense.

Forgive the vagrant sheets of smoke
That may obscure the scene,
For this must be the price we pay
To keep our forests green.

A fire is just a basic tool
You use with caution now and then
For in the long life of a tree
It's not just if a wild fire comes
But rather – it is when...

About the author:

Walter Stephens is a forest owner from Tifton, Georgia, with 1500 acres of slash and longleaf pine, who manages his forest using controlled burning during the winter months and through July 4. Mr. Stephens enjoys reading our research publications on land management. He shared this poem with us.

Birds are some of the most colorful animals on earth, but surveys used to monitor bird populations rely upon human ears much more than human eyes. Bird songs and call notes are distinctive even for species like mockingbirds that mimic calls of other birds. The distinctive traits of each species make it much easier to hear and count a singing bird than it is to find the bird with your eyes.

Nowhere is the value of song more important than for secretive marsh birds. Furtive grebes, rails, and bitterns skulk, scurry, and weave through dense marsh vegetation hiding from view. They use their voices to maintain contact with kith and kin, but their vocal bouts occur at odd hours of the day or night and are less predictable than the boisterous chorus that songbirds engage in each morning. To improve detection, secretive marsh birds are often coaxed to sound off with a bit of deception, such as clicking two pebbles to mimic notes of the Yellow Rail or blasting recorded calls of a Clapper Rail using a boom box to entice a response.

Playbacks double the detection of most secretive marsh birds, but the small and super secretive Black Rail seems to take pride in defying all attempts to be monitored. It's the smallest rail in North America, and a species that practically every bird watcher hopes to see at some point in their career. Securing a decent view is not easy given rat-like behavior and a fondness for dense vegetation where human legs must be lifted high to clear the tussocks. The bird has also become increasingly rare in recent years with estimated declines of 80% or more for some areas. These losses have led to listing of the rail as a threatened species, and there are a lot of unknowns when it comes to sustaining the bird in the face of sea level rise and other stressors.

Black Rail continued on page 30

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Searching for Super Secretive Black Rail

BY JIM COX



Female Eastern Black Rail in South Carolina, USA. (Photo: Christy Hand, South Carolina DNR, taken under SCDNR research permit BB-20-06).



The monitoring used to track Black Rails takes place at unusual hours of the day. This crew is preparing to conduct nighttime surveys.

Searching for the Super Secretive

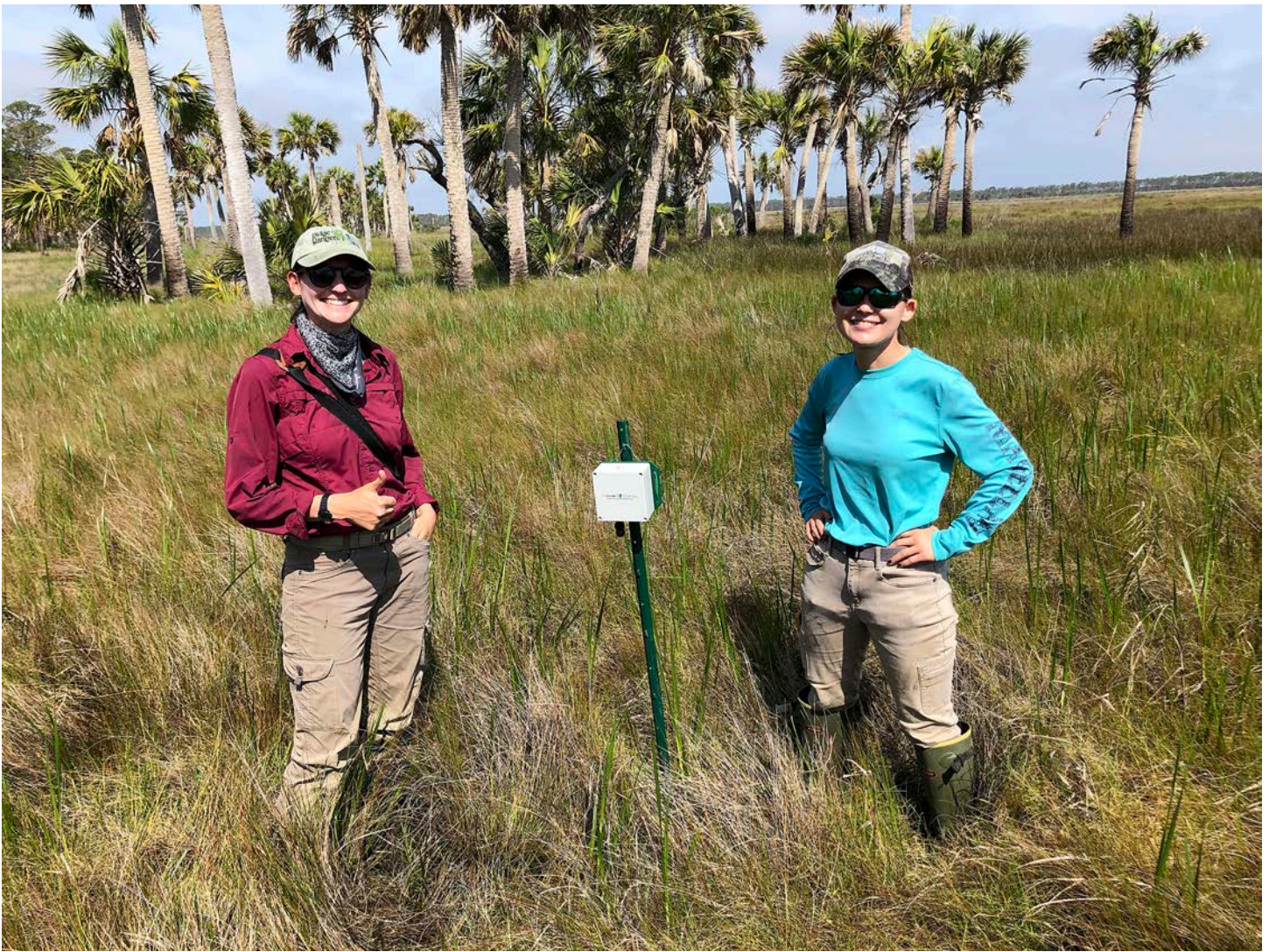
Florida, a state whose ecology is thoroughly entangled with fire, is one of the strongholds for the Black Rail. Fires that launched in upland habitats certainly worked their way into the marshes that rails inhabit with some regularity, but how frequently and with what intensity the fires affected coastal marshes are not well known. Black Rails associate with high marsh sites that are adjacent to uplands and are not inundated regularly. These marshes are also dominated by volatile grass species such as salt marsh bulrush, sand cordgrass, salt cordgrass, and salt grass that can carry fire under many conditions. Rail marshes also transition to shrubs and trees if fire is not applied with some regularity, but we don't know much about the frequency with which these fires came through and how Black Rails responded.

The Stoddard Bird Lab is monitoring 5-6 different public land holdings where prescribed fires recently worked their way into the high marsh areas used by Black Rails.

The work is part of a larger collaboration spanning the 5 states along the Gulf with support from the National Oceanic and Atmospheric Administration.

We learned quickly that monitoring this bird takes a lot of sweat and leg work compared to some of the pineland species we track. Rail census stations are set up 400 meters apart where simply walking to a station can take 10-15 minutes of mud slogging. Once you arrive, chances of detecting a Black Rail can be disappointingly low, even when a playback is used.

The most effective playback calls are the distinctive *kickee-doo* call *grrr* notes that males use to defend territories. Even then, the finicky nature of the Black Rail requires some very specific survey protocols. Counts are performed for 10 minutes rather than the 3-5 minutes used to monitor a host of other species. Black rails appear to be most responsive 1-2 hours before sunrise and after sunset, but the bird's response to playback is also affected by moon phase, wind



Heather Levy (left) is heading up the rail project with help from Heather Hill (right). They're standing next to the first autonomous recording unit set out on St. Vincent National Wildlife Refuge.

speed, time of year, ambient noise, and even luck. One recent study suggested census stations need to be revisited 10 times just to determine accurately whether or not the bird is present. This translates into 3 hours of staff time to sample a single station point once travel time is added. Counts also need to be conducted with mild winds, something that can be difficult to predict from an inland office. Few things are more frustrating than to head out for an evening of rail monitoring only to find out you have to wait for 30 minutes for the winds to calm down.

Enter the Machine

Developing better monitoring procedures have been a priority for rail biologists for decades. One of the new technologies used to address the finicky nature of the bird is autonomous recording units (ARUs) that sit outside for days and record ambient sounds. The units take about 10 min to set up, work rain or shine, morning and night, and never

complain about mosquitoes, no-see-ums, and yellow flies as they wait quietly to record vocalizations of this elusive beast.

The downside of ARUs is processing the hours and hours of vocalizations the units collect. Biologists working at the University of Alberta recently found that it might take more than 2.5 human lifetimes to go through the ARU data they had collected. The Gamebird Program at Tall Timbers used ARUs to monitor Wild Turkeys and collected nearly 50,000 hours of recordings. It was physically impossible to process all the recordings at the time, so they worked through a subset of 4,450 hours to calculate gobbling activity.

One of the enticing new technologies emerging that can help make ARUs more efficient is to use computers to find the meaningful chirps and calls buried amid the bustling wind, passing motorcycles, fog horns, and other

– Black Rail continued on page 32

noises that ARUs pick up. It's fortunate the distinctive 3-syllable *kickee-doo* call of the Black Rails is the most frequent call used. The "*kickee*" notes are each about 0.07 sec in duration separated by with a 0.1 sec gap. Both syllables have frequency peaks around 3310 and 1605 kHz. The closing *doo* syllable is a longer (0.2 seconds) and has lower frequency peaks at 950 and 1800 kHz. There are many other metrics that might be culled from digitized sound files, but this information can help computers look for similar patterns elsewhere in a file.

It was with a goal of working smarter, not harder, that the Stoddard Bird Lab began collaborating last year with Professor Sonia Haiduc and MSc candidate Mayur Jain at Florida State University. Sonia specializes in software engineering and Mayur was keenly interested in assessing how new computer algorithms for detecting acoustic signals might be applied to conservation of the Black Rail. At the start of this effort, only one published article had attempted to sift through ARU data using computers to find Black Rail calls, and that study had very mixed results. The procedures used turned up over 12,000 possible calls, but human reviewers found only 67 true calls following several weeks of painstaking review.

First, we needed some calls to analyze, so we borrowed ARUs the Gamebird Program had used for the Wild Turkey study, and headed off to the St. Johns National Wildlife Refuge near Orlando, a known hotspot for the Black Rail in Florida. We set 2 ARUs out in the marshes and returned a week later to retrieve them. A quick review of 2-3 hours of data suggested we had lots of Black Rail vocalizations amid the 160+ hours of field recordings and could start testing different methods for finding the wheat amid the chaff.

Mayur began working with *RavenPro*, a software package developed by the Cornell Lab of Ornithology for assessing and analyzing bird vocalizations. He created a template in *RavenPro* that could identify Black Rail calls reliably. The template makes use of the frequency and spacing of the notes, but he also discovered something else—a totally new application at Cornell called *BirdNET* that claimed to be capable of identifying the recorded songs of every bird in North America.

"I uploaded a couple of our training files to *BirdNET* to test it out" Mayur says. "Each time, it came back with a positive Black Rail detection as well as detections for some of the other species. If *BirdNET* had an *Application Programming Interface* available," he added, "I could develop a

standalone application that could upload a lot of ARU files and have the files assessed using *BirdNET*."

We quickly contacted Holger Klinck, director of the Center for Conservation Bioacoustics at Cornell, to see what options there might be. Meeting over Zoom, he detailed how *BirdNET* works and some of the incredible projects where it was being used.

"*BirdNET* uses an artificial neural network to rank the most likely bird species calling in each recording," he said. "It assigns a probability to each call, indicating the algorithm's level of confidence in the classification it has made."

"It's a really, really rough approximation of the human brain," he added, "that was developed by analyzing hundreds of recorded bird calls, each 'labeled' with its corresponding species. The network then teaches itself which features can be used to associate a call with a bird's identity using thousands of extremely subtle features in the recordings that humans cannot easily hear."

BirdNET and other automated systems for reviewing huge data sets have benefitted from recent advances in human-speech and music-recognition technology, as well as the tremendous amount of training material available for the birds in North America. Most of the 3,000+ species *BirdNET* can identify are found in Europe and North America.

"Currently, we're helping to process recordings from over 2,000 ARUs set out in California's Sierra Nevada mountain range," he said. "Those ARUs are generating nearly a million hours of audio that would take an army of 1,000 humans several decades to process."

"As important," he added, "you don't need to develop a special interface to work with *BirdNET*. We have the processing tools already in place for storing and assessing thousands of hours of field recordings for a few pennies per hour."

What astounding news! When we closed out the Zoom session, we contacted several biologists using ARUs to monitor Black Rails and asked if they would share some of their data. The goal was to test the *BirdNET* system using recordings from 3-4 locations and then convene a meeting to assess results. We uploaded files from Mississippi, Florida, South Carolina, Colorado, and Maryland that Cornell then passed through the system. When the level of confidence *BirdNET* assigned to a vocalization was 0.8 or higher, it was accurately finding Black Rail vocalizations most of time.

One of the people helping with this assessment was Christy Hand, a biologist with the South Carolina Department of Natural Resources. Hand has worked with Black Rails for many years and collected tons of audio recordings. In 2016, she began collaborating with Elizabeth Znidarsic at Charles Sturt University who'd made progress detecting calls by Australian rails.

"We just published a paper describing successful use of machine learning to scan acoustic recordings for Black Rails," Hand said. "It works, but the tools do not offer the convenient processing framework Cornell has in place. South Carolina DNR is reviewing data from *BirdNET* and is encouraged by the results," she said.

Better Monitoring Equals Better Conservation and Management

The Stoddard Bird Lab is using 20 ARUs to complement the playback surveys we'll be doing for Black Rails over the next 5 years. The focus is to get a better handle on the role that fire plays in maintaining habitat for Black Rails.

Brushy shrubs such as marsh elder and eastern baccharis can overtake the marshes in the absence of fire, and it's estimated that shrubby wetlands increased by 4,000 acres in Florida from 1985-96, while potentially rail-suitable wetlands declined by 260,000 acres. Fire helps to maintain the grasses rails prefer.

Fires applied on St. Johns, St. Marks, and St. Vincent National Wildlife Refuges (NWR) all slip into high marsh areas with some regularity, and these sites have been strongholds for the rail for decades and point to the potential important role that fire may play in maintaining suitable habitat conditions. On the other hand, fires can also have negative effects for Black Rails. For example, a burn that consumed 90% of the vegetation in a 2,400-acre marsh on St. Johns NWR resulted in direct mortality of about 40 Black Rails. A more-patchy burn conducted on a nearby 1,600 marsh had no direct mortality. Black Rails also have a flightless period each year when they molt their flight feathers that may need to be considered if rails are documented in an area.

– Black Rail continued on page 34



Recently burned saltmarsh bulrush (right) grading into unburned black needlerush (left). Subtle changes in elevation and vegetation can promote/impede fire. This unburned patch of black needlerush could have served as a refuge for Black Rails during the burn.



Aerial view of Mallard Slough on St. Vincent National Wildlife Refuge. Yellow dots show the locations of autonomous recording units listening patiently for calls of the Black Rail. The dark colored areas in the northern portion of the marsh burned in Fall 2020.



Fire set in neighboring pine flatwoods moving into a wetland area on St. Marks National Wildlife Refuge. Photo by Greg Titus

Fires slipping into marsh habitats also have complex outcomes because of variation in the fuels, tidal influences, and subtle changes in topography as high marshes grade slowly into more frequently inundated areas dominated by less flammable plants. The ignition techniques used to launch a fire could also have effects on the rails. Aerial ignitions help make burning more efficient, but also create more complex fire convergence patterns as multiple fire lines move through the marsh. Since Black Rails appear to run rather than fly, it is important that they have an escape route when fire lines approach. Plant recovery also depends on soil, fire intensity, and post-burn conditions. Species such as salt grass and sawgrass also are susceptible to flooding events after a fire and may not recover for long periods afterwards. Season of fire can also influence species dominance with spring burns shifting the dominance from salt marsh bulrush to salt marsh cordgrass.

The fire frequencies recommended for coastal systems range from once every 2 years to longer intervals >12 years. Natural fire frequencies have not been firmly established, but responses of coastal species point to benefits from regular and frequent applications. The focus of this research is to assess 2 different fire frequencies within the ranges recommended and monitor the response rails have over a 5-year period. The study enables both short and long-term effects to be monitored, while also setting up the conditions necessary to monitor fire effects over a broader 10-year period. Given all the unknowns surrounding marsh burning and greater efficiencies ARUs might provide for monitoring Black Rails, we are also monitoring Seaside Sparrows, Yellow Rails, and other rare species that can be easily tracked using point counts and other techniques.

Our ARUs are out there now collecting data on this extremely rare bird. They're perched quietly, patiently waiting for the time when the wind, lunar cycle, tides, luck, and other factors all align and a Black Rail, if present, calls under the perfect conditions needed for its voice to be heard. Thanks to serendipity, collaboration, and some unusual twist and turn, we'll be able to find those rare moments quickly, efficiently to answer an age-old question: if a rail *kickee-doo*s and no one is around, does it make a sound? ■

About the author:

Jim Cox is the director of the Stoddard Bird Lab at Tall Timbers.



Collaborators: Sonia Hadic and Mayur Jain

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.

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, <https://talltimbers.org/game-bird-program/>

To give to a specific Game Bird project [click here](#).





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.

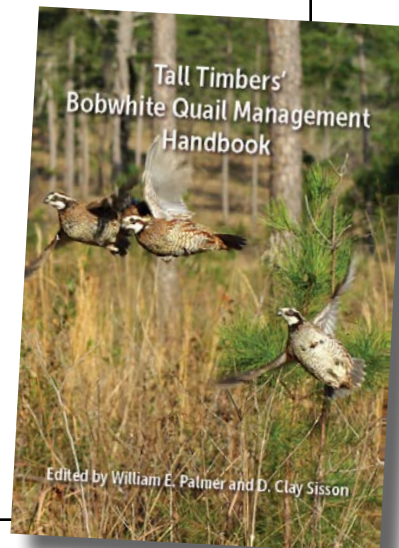
Published by Tall Timbers Press

Details: Hardback, 7 x 10; 160 pages

Price: \$30.00 + tax (FL residents) and \$5.00 S/H

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**The perfect gift for
the quail enthusiast!**



THIS BOOK MAKES A GREAT GIFT!

Diamonds in the Rough

Natural History of the Eastern Diamondback Rattlesnake

D. Bruce Means

“This book should be required reading for everyone considering becoming a field biologist. It is a wonderful marriage of pure scientific data and vast experience afield, harmoniously woven into a very readable yet technical quilt. By injecting notes from thousands of hours spent traipsing through every suitable ecological niche, Means has thoroughly revealed and defined the natural history of this most majestic of U.S. snakes. Although the amount of information is mind boggling, the text flows so well that it’s hard to put the book down once you start reading it. There is absolutely no doubt, this is destined to be one of the classic animal studies. Simply put, it is THE monograph on the Eastern Diamondback Rattlesnake. Arguably, no more definitive work on a reptile has ever been printed.” — MANNY RUBIO, author of *Rattlesnake - Portrait of a Predator*, and *Rattlesnakes of the United States and Canada*.

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Wildland Fire Science Program

Research for Fire We Use

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Wildland fire research in an interdisciplinary field of science that studies wildfire and prescribed fire combustion, spread, and fire effects. The program at Tall Timbers is dedicated to integrating research into management applications.

Prescribed Fire Science is the core focus of our program with the goal of facilitating its safe and effective use by advancing our knowledge of interacting fire lines, fire-atmospheric feedback driving smoke transport, and a mechanistic understanding of fire effects. These key topics will improve tools to address management constraints now and in the future.



RESEARCH



OUTREACH & EDUCATION



TRAINING



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

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.



Herbert Stoddard and George Sutton at Sherwood Plantation.

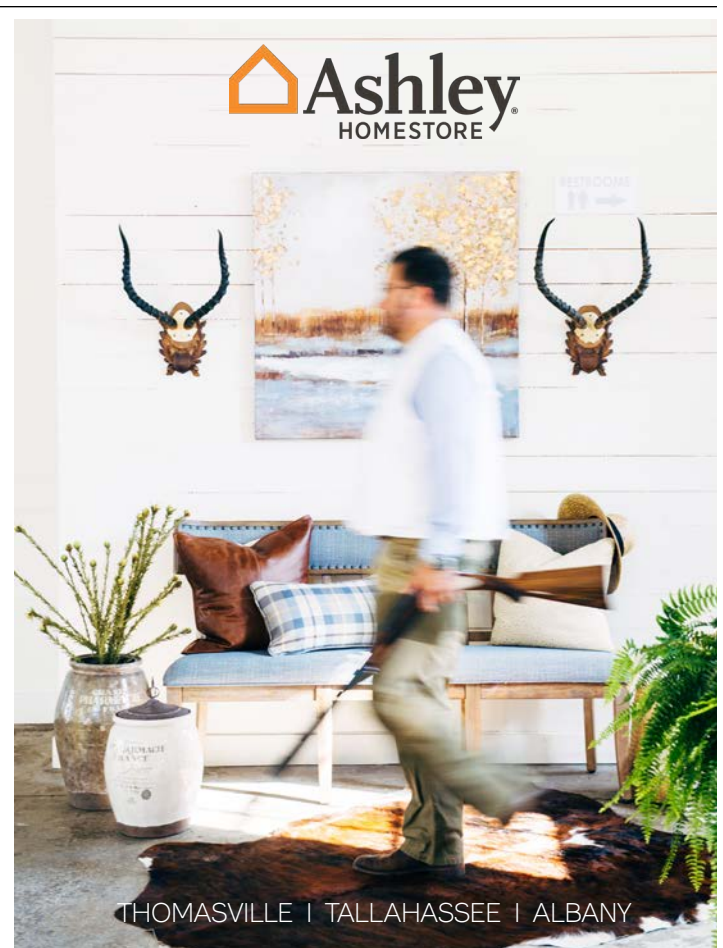
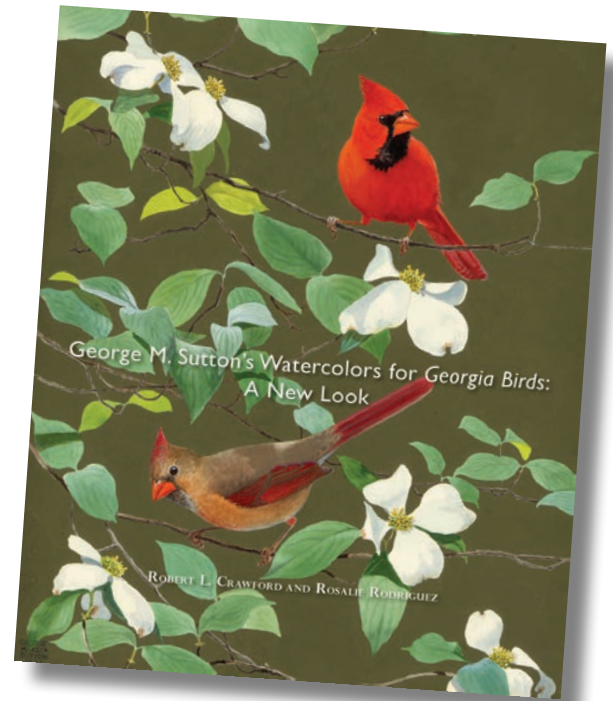
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THE LAST WORD

Articles in this issue highlight Tall Timbers' past influence and present research in prescribed fire demonstrating an appreciation for this land management tool for over a century. We are in the envious position of asking questions about fire application to coastal systems, and how butterflies respond to fire scale and season, rather than worrying about wildfires destroying ecosystems for years to come. Contrast the evidence from tree ring scars showing that fire never left the Red Hills, and our life with frequent prescribed fire, to the story of California's lost fire culture. Stoddard and Biswell, as outlined in the "Archives Corner," presented evidence for the many benefits and values from applying prescribed fire and warned of a future without it. Those areas that did not heed their advice are today suffering severe consequences. Consider how prescribed fire remains the number one land management tool applied to forests in the Red Hills, as well as in Florida, Georgia, and Alabama. The challenge becomes *how* to return prescribed fire to the rest of the nation. It is no longer enough to say "we need more prescribed fire." It is now time to help determine how.

Tall Timbers' staff are once again heavily engaged with states and federal agencies providing guidance for returning fire to fire-suppressed regions, especially in the west but also in the east. To succeed at reducing wildfires will require returning frequent prescribed fire to fire suppressed areas, but how do we get there? We are proposing significant investments into the *science* of prescribed fire to develop improved predictive models and ultimately computerized tools to assist with planning and implementing prescribed fires. Not only will these technologies help to plan safe and effective prescribed fires, but they will also to help train a new workforce to implement fires by providing virtual simulations. Our staff and colleagues are working to essentially "map" forest vegetation that fires consume, and with this data, run improved models that predict how fires behave with incredible detail and accuracy. Using this technology, people can run test fires virtually to predict the conditions and techniques to safely achieve the goals of the prescribed fire. In essence, these new "tools" will objectively help pass on a century of fire experience and knowledge to the much-needed new workforce of fire practitioners we need to start reducing fuels and restoring biodiversity.

State and federal agencies are only now understanding the immense workforce that needs to be trained to ramp up prescribed burning. It is not a "one and done," rather a repetitive process to return to the same forests and re-apply fire time and time again. The recent move of the National Interagency Prescribed Fire Training Center to Tall Timbers is part of our collaborative effort to help increase the application of fire through advancing science and training. Further, the appointment of our Director of Fire Science and Applications to the USGS to help them to implement a science-based approach to increasing fire on public lands are all indications that — this time around — people are paying attention to the need for more fire. A manager of a quail property once told me if it took 20 years to mess up a property with poor management, it will take 20 years to fix it. Hopefully areas struggling with wildfire will adopt these new technologies to help them return to a healthy forest ecosystem so that 20 years from now, they are studying how butterflies in their woods respond to fire season, rather than how to stop a wildfire from destroying the forests.

BILL PALMER



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