



WINTER 2020

Tennessee field notes

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GROUNDDED IN SCIENCE

Bioacoustics gains traction as a tool for measuring forest conservation

An emerging science is showing promise when it comes to studying and conserving forests. And it's based on the most basic of premises—listening to nature.

The field of bioacoustics employs recorders, microphones and specialized software to document the sounds of a forest. According to conservation scientists, bioacoustics can potentially revolutionize how to analyze and measure the impact of conservation and other activities on forests for ecological health, recreation and productivity.

“There is a steep learning curve to navigating this exciting new field of study and the rich body of data it generates,” says Terry Cook, The Nature Conservancy’s state director in Tennessee. “We are just getting started with examining how bioacoustics can advance our work in Tennessee.”

Bioacoustics 101

Traditionally, assessing a forest’s health and measuring conservation results involved sending researchers into a forest to conduct

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The Nature Conservancy's mission is to conserve the lands and waters on which all life depends.

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FROM THE DIRECTOR

Director's Message



In this issue of *Tennessee Field Notes*, we cover what has become a controversial topic in some circles: science. Since 1951, science has served as the cornerstone of The Nature Conservancy's mission.

For almost 70 years, TNC has convened like-minded partners and committed citizens around data and facts that lead us to the places in need of conservation. Our commitment to science has never wavered. What *has* changed are the tools we use to guide our work, exciting new developments that likely reach beyond the imagination of TNC's founders.

Within these pages, we highlight how cutting-edge science is advancing TNC's mission in Tennessee. If you are reading this, you likely already read the feature story about how we are employing high tech bioacoustics equipment to inventory wildlife and study how our actions impact forests at the Bridgestone Nature Reserve at Chestnut Mountain and, soon, in the Central Appalachians.

On Page 4, we introduce you to a new generation of remote sensing tools that seem right out of a science fiction story. See for yourself how the art and science of cartography has evolved from lines on a map to something assembled with data generated by light pulses sent from a laboratory traveling several miles above the earth. This issue also features how our staff in Tennessee is utilizing scientific data to inform dam removal, connect floodplains and measure carbon.

The Conservancy's commitment to using science to guide staff and resources to our planet's most imperiled lands, waters and wildlife is what sets us apart from our peers. I hope that it is also a reason why you continue to support our work in Tennessee.

None of the accomplishments you read about in this issue of *Tennessee Field Notes* would be possible without an organizational culture that values science. The projects we pursue in Tennessee reflect lessons learned from hundreds of scientists working in pursuit of TNC's mission around the world.

Thank you for helping us reach for the stars, truly, when it comes to advancing science on behalf of the health of our planet. Happy holidays and best wishes as we approach a new year.

Be safe, and be well.

A handwritten signature in black ink that reads 'Terry Cook'.

IN MEMORIAM It is with incredible sadness that we report the passing of our longtime board member and enthusiastic supporter of The Nature Conservancy's mission, Jim Williams. A generous leader, Jim always offered a kind and encouraging word, and will be greatly missed by our board and staff in Tennessee.



GROUNDING IN SCIENCE

(CONT'D FROM FRONT PAGE)

time-consuming and sometimes costly surveys. While valuable, a field study can only cover so much ground in a day. And, in the case of animals, a human presence can scare away the subjects of a study.

The advent of trail cameras has remedied some of these challenges to compliment the work of field scientists. Strategically positioned throughout a forest, these cameras provide a snapshot or video of a particular area during the day or night, and in any season. An unfortunate drawback is that the cameras only photograph what is directly in front of them.



Enter bioacoustics, which boasts instruments capable of capturing simultaneous sounds from a large portion of forest, including signals from bats, birds and amphibians, basically anything that has a call.

“Without creating a disturbance, we can capture a baseline of sounds and even identify often elusive and rare inhabitants of our preserves and natural areas,” adds Cook.

Taking Stock of Species

In Tennessee, TNC is exploring bioacoustics in two primary ways. First, a grant from the Barbara J. Mapp Foundation makes it possible to incorporate this science into inventorying species inhabiting the Bridgestone Nature Reserve at Chestnut Mountain, beginning with bats.

Cook says, “One week per month, throughout the year, we are placing four recorders at key locations to gain knowledge about which of Tennessee’s 16 species of bats utilize the Reserve, and how they move and hibernate, through the seasons.”

This winter TNC will also use bioacoustic recorders to study owls with a specific goal of determining the presence of elusive Northern Saw-whets. He adds, “The cooler months bring some unexpected surprises that can enhance our management approach and the role places like Chestnut Mountain play in conserving species and habitats of the Cumberland Plateau.”

Searching For Soundscapes

The Conservancy also intends to employ bioacoustics in establishing a general, baseline soundscape of the forest at Chestnut Mountain. With that in hand, scientists can compare the soundscape before and after management or restoration activities, or other human induced or natural disturbances, to determine the impact on wildlife.

Using bioacoustics to measure the impact of conservation at Chestnut Mountain emulates TNC’s work in Indonesia and Gabon, where scientists teamed up with International Paper foresters to collect and analyze soundscape data to monitor the impact of selective logging on the surrounding tropical forest. That pilot revealed that selective logging had an immediate and substantial impact on the forest’s soundscapes, a finding that



“Without creating a disturbance, we can capture a baseline of sounds and even identify often elusive and rare inhabitants of our preserves and natural areas.” —TERRY COOK

sparked further study on how long it would take the forest’s soundscape to return to pre-logging levels.

Now the partners are building on this work in two new geographies: Southern Mexico and in the Central Appalachians, a region that includes Tennessee.

“We look forward to learning about how forest management practices like short-leaf pine restoration or prescribed fire affect the wildlife we are inventorying at Chestnut Mountain,” says Cook. “We are glad to have another tool to help us determine best ways to conserve this unique ecosystem in the face of many pressures, including habitat loss and a warming climate.”

Charting A Course

MODERN CARTOGRAPHY IDENTIFIES THE BEST PLACES TO INVEST TIME AND RESOURCES

Dating back to prehistoric times, humans mapped everything from local streams to hunting grounds and stars in the sky in an effort to make sense of the world around them. As a formal science, cartography emerged during Greek and Roman civilizations as curious scientists studied and speculated on the size and shape of the earth.

Those early mapping pioneers would be in awe of the technology used today by Nature Conservancy scientists like Tennessee's Geographic Information System (GIS) Manager, Joey Wisby.

“With the advent of several new Global Positioning System (GPS) and remote sensing technologies, together with the globalization of data made possible by the internet, we find more and more ways to employ mapping for

conservation purposes with each year,” says Wisby.

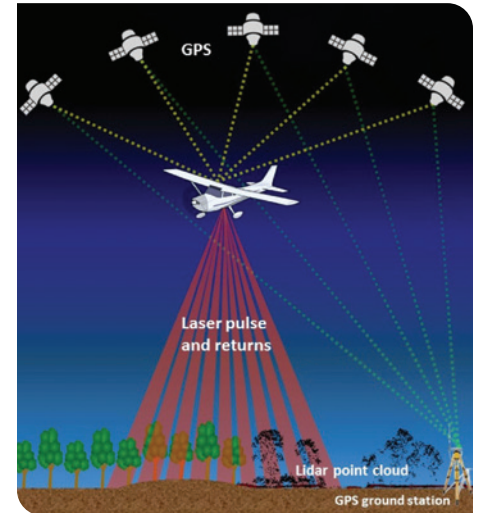
During 2020, that breakthrough came with availability of LiDAR (pronounced LIE•dar, short for light detection and ranging), a new generation of remote sensing tools that use light in the form of a pulsed laser to measure variable distances to and from earth from instrumentation situated on an airplane. The light pulses, combined with other data recorded by this flying laboratory, generate precise, three-dimensional information about the shape and surface characteristics of the Earth.

“We have the ability to map the ground with more detail than ever, from specific hiking trails to an entire forest or even an individual tree,” adds Wisby.

While LiDAR airplanes and instrumentation belong to the U.S. Geological Service, the agency contracts with state governments, like the state of Tennessee, which recently made data available to non-profits, universities and other non-governmental organizations.

“The uses for LiDAR range from floodplain mapping and agricultural and natural resources planning to engineering and economic development planning,” says the state of Tennessee's GIS director, Dennis Pedersen. “LiDAR data is becoming an increasingly valuable tool for cities and counties in Tennessee for projects that ultimately can save money. We're glad to make this data open and available for more Tennesseans to use.”

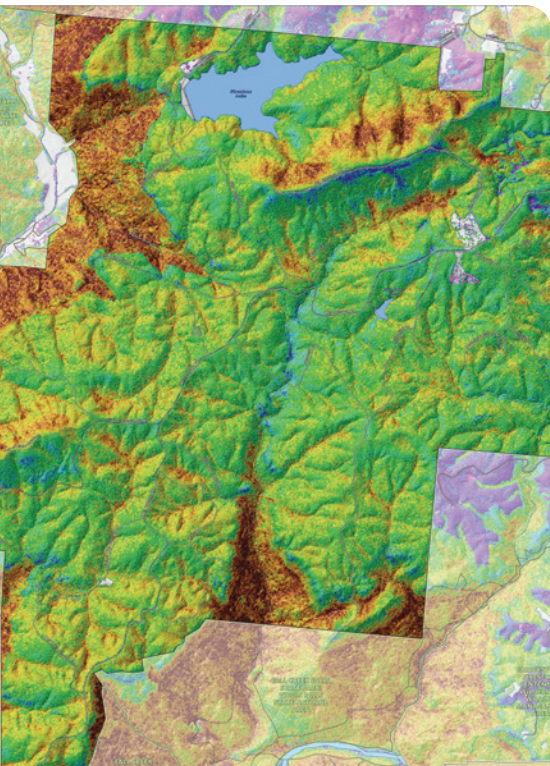
In his role at TNC, Wisby has been putting that data to work, especially



during the COVID-19 quarantine. A big accomplishment includes using LiDAR to map tree heights for the entire Cumberland Plateau.

“The LiDAR data provides great detail about the history and quality of a forest,” says Wisby. “For example, 30’ trees mean the forest has been recently logged, 100’ trees indicate a mature forest capable of storing significant amounts of carbon and a lack of trees might indicate opportunities for restoration. Having results at this scale provides new insight into the overall health and opportunities within this important ecosystem.”

Wisby is also using LiDAR to map landscapes surrounding rivers and streams that are key to providing shade, controlling erosion, and absorbing nutrients and other pollutants—all factors that play into water quality. He adds, “Now we can map these riparian zones with a new level of accuracy and pinpoint areas where streamside restoration can benefit important habitats downstream. It's an exciting time to be a modern-day cartographer.”



LANDMARK LEGISLATION

The Great American Outdoors Act becomes law

Tennessee's wild and scenic spaces represent more than just lands and waters—they reflect a collective history, culture and way of life for all Tennesseans. That is why The Nature Conservancy was thrilled when the U.S. Senate (73-25) and the U.S. House of Representatives (310-107) made conservation history with their bipartisan support and passage of the Great American Outdoors Act (GAOA), which was signed by the President last summer.

“The GAOA is a legacy that we leave for future generations,” says Sally Palmer, TNC’s director of science and policy in Tennessee. “The new law secures resources needed to care for our public lands—places that are key to our state’s economy, our communities and our well-being.”

The GAOA provides \$900 million in full and permanent annual funding for the Land and Water Conservation Fund (LWCF), which is supported by royalties from offshore oil and gas revenues—not taxpayer dollars. Since 1964, the LWCF, which has rarely been fully funded at its Congressionally authorized level, has provided Tennessee with more than \$214 million to conserve natural, historic and cultural resources at places like the Big South Fork National River and Recreation Area, Stones River National Battlefield and the Lower Hatchie National Wildlife Refuge.

The LWCF has also been used to build hiking and biking trails in state and local parks, and to construct playgrounds and ballfields in local communities across Tennessee. And the LWCF is responsible for funding the nation’s



Forest Legacy Program, which helps conserve working forests to maintain viable forest product businesses. Matching funds from states and local governments further leverage this financial support to benefit projects in Tennessee and around the country.

Another component of the GAOA includes the Restore Our Parks Act, which invests \$1.9 billion annually—for five years—to address a maintenance backlog in national parks like the Great Smoky Mountains National Park and other public lands which, according to Palmer, represents an issue that Senator Lamar Alexander has long championed

as an original co-sponsor of this new law.

“This year, we have seen an increase in the recreational use of parks and other natural areas that are deteriorating due to inadequate funding over the past decade or more,” says Senator Bill Frist, a member of The Nature Conservancy’s Global Board of Directors. “It is great to see so many people turning to nature in order to stay safe and healthy. I speak on behalf of TNC’s trustees, members and staff in thanking Senator Alexander and our entire Tennessee Congressional delegation for supporting this new law that benefits every American.”

CONSERVATION UPDATES

Science guides The Nature Conservancy's work around the state



Restoring Shortleaf Pines

The Conservancy completed a shortleaf pine-oak restoration plan for approximately 250 acres at the Bridgestone Nature Reserve at Chestnut Mountain. Once the most common and widespread pine species in Tennessee, shortleaf pine-oak forest has declined due to fire exclusion and conversion to other land uses, a loss which also contributed to the decline of plants and animals that depend on this fire-adapted habitat, including the Bachman's sparrow, rusty patched bumblebee and pine snake. Guided by the plan, TNC conducted prescribed burns throughout the fall to restore native warm season grasses, shrubs and wildflowers, and will plant shortleaf pine seedlings in early spring 2021.



#SidelineCarbon

The American Conservation Coalition Campus (ACC Campus) is partnering with TNC to pursue their goal of offsetting at least 50 percent of the carbon footprint associated with professional sports team travel by 2025. First at bat in this effort is TNC's Bridgestone Nature Reserve at Chestnut Mountain, where TNC will work with ACC Campus, participating sports teams and individual athletes to hit a homerun in offsetting their carbon footprint and fighting climate change. Learn more at www.sidelinecarbon.com.



Removing Dams

The Conservancy is working in partnership with the Tennessee Wildlife Resources Agency and the National Fish and Wildlife Foundation on removing a high-priority dam at Harms Mill on the Elk River. Currently in the design phase, the Harms Mill Dam removal ranks as one of the top five priority dam removal projects out of 2,000 identified in the state. It also represents the only major barrier on the river's mainstem that separates 804 linear miles of streams below the dam from 780 miles upstream. The removal would benefit 46 species of greatest conservation need, including 19 that are federally listed and an additional 139 fish species that occur in the river.



Connecting Floodplains

The Conservancy is tailoring spatial information generated by TNC's new interactive, online Mississippi River Basin floodplain prioritization tool to guide restoration in West Tennessee. In this part of the state, TNC's primary objective is to reconnect stream channels with their floodplains to reverse the effects of channelization and erosion. In addition to generating new data, partnerships and funding sources, TNC expects that focusing the tool within a smaller geography will inform decisions related to water quality, wildlife habitat, agriculture, flooding and conservation issues specific to the region.

Staff Spotlight: Joey Wisby Marks 25 Years

This year, The Nature Conservancy's Tennessee Geographic Information Systems (GIS) Manager, Joey Wisby, marks 25 years with the organization. To celebrate this milestone, we are sharing a few things about Joey.

Proudest Accomplishment My involvement in developing the Tennessee State Wildlife Action Plan—the initial plan in 2005 and the 2015 revision. In addition to a printed document, the plan builds on a set of living databases designed to be analyzed, queried, mapped and updated to support the everyday conservation work of TNC and our partners.

Favorite TNC Memory Our staff organized a workday and showed up en masse to help when my family was among the victims of the 2010 flood in Nashville. Board members, most of whom I, as someone working mostly behind the scenes, had never met, donated money to our recovery. The Conservancy's headquarters made a donation from their disaster relief



fund, and we received cards and emails from staff from around the world (and even a smoked salmon filet from the Alaska Chapter). The outpouring of love and support was overwhelming and humbling.

Favorite Place to Spend Outdoors in Tennessee I am an avid cyclist and lucky to live within biking distance of Percy Warner Park. In addition to great hiking trails, the park has an 11-mile paved loop which, according to the app I use to track my rides, I've lapped nearly 500 times, almost always in my TNC cycling jersey. Over the years, I've seen owls, hawks, rattlesnakes and even a bobcat.

Partnership In Action: Ed Carter Retirement



The Nature Conservancy extends best wishes to Ed Carter upon his retirement after an extraordinary career with the Tennessee Wildlife Resources Agency (TWRA), TNC's primary government

agency partner in the state. From land acquisition and nongame species initiatives to habitat restoration and wildlife research, TWRA's commitment to conserving nature expanded under Ed's leadership. In honor of his 49 years of public service and achievements, TNC is proud to play a role in ensuring that Ed's legacy lives on at the Ed Carter Unit of the North Cumberland Wildlife Management Area, a place that TNC and TWRA worked together for many years to protect. We look forward to seeing Ed outside enjoying the many Tennessee lakes, rivers and lands he helped to conserve during his extraordinary career.

Warm Welcome to New Board and Staff Members

The Nature Conservancy welcomes **Dr. Jefferson Chapman** as TNC's newest trustee in Tennessee. A Knoxville native and TNC member since 1975, Jeff recently retired as director of the University of Tennessee's McClung Museum after 30 years spent establishing the museum as a prominent university and community asset and, in his words, "advancing the understanding of the earth and its peoples." In retirement, Jeff hopes to lend his experience to protecting archaeological sites and natural assets in the Cumberland Forest and other parts of Tennessee.



Last spring, **Kristi Weber** joined The Nature Conservancy's staff as its Tennessee donor relations manager. Born and raised in northern Illinois, Kristi earned a B.A. in Sociology and Psychology from Vanderbilt University and stuck around for Nashville's beauty and small-town feel. In her role, Kristi connects with donors about their philanthropic and conservation interests. In her words, "I have always been passionate about protecting and restoring the natural world, and so I love working with colleagues and donors to make that happen."



STAFF MILESTONES

Congratulations to the following members of our staff who recently realized work and life milestones:

- **TNC's 25-Year Club:** Terry Cook & Gabby Lynch
- **TNC's 20-Year Club:** Sally Palmer & Alex Wyss
- **TNC's 15-Year Club:** Corey Giles
- **Welcome** to our new conservationist, Ezra Rose, who was born to Steven and Courtney Gervais on September 14.



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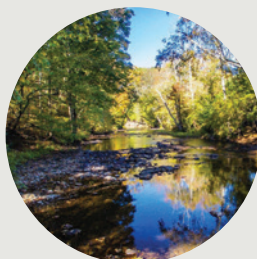
TENNESSEE TIDBITS

Land Protection Wins

The Conservation Fund and The Nature Conservancy acquired two tracts that safeguard more lands and waters for wildlife and Tennesseans:

A 229-acre in-holding within Campbell County's North Cumberland Wildlife Management Area and surrounded by state-owned conservation land, to be transferred to the State of Tennessee for permanent wildlife habitat protection and public outdoor recreation.

304 acres along the Conasauga River, in Polk County, to protect over a half-mile of federally Designated Critical Habitat for 11 endangered aquatic animals.



The **CARES Act**, passed in response to the COVID-19 pandemic, includes provisions to support charitable giving. Even if you do not itemize deductions on your tax return, you can still claim and benefit from making contributions during 2020.



For additional information on this and other aspects of the CARES Act and charitable giving, please contact our director of philanthropy, **Britt Moses**, at britt.moses@tnc.org.