

An interview with Carol Denhof, president of the Longleaf Alliance and co-author of *The Forest that Fire Made: An Introduction to the Longleaf Pine Forest* (University of Georgia Press, 2023)

(RS edited this transcript for clarity and length)

Rob Shapard: Can you tell me a bit about writing the book and how it came together?

Carol Denhof: John McGuire has been the lead author, and really the motivating force behind getting the book to the finish line. He contacted me about putting together a field guide for longleaf pine that was really targeted at an audience that doesn't know a lot about longleaf.

The book really is for folks who have never even seen a longleaf forest or don't know anything about it; people who are just learning about longleaf. The idea was to give a general introduction to the longleaf ecosystem, the progression and evolution of that system since the 1800s and before, and then identification of some of the animals and plants that occur in longleaf.

So, if you were walking on a trail in a longleaf forest and you saw a certain bird or mammal or plant, you could reference this book, and have it help identify what you're seeing.

It has taken many, many years to finish the book, just because, as a writer, you're working on projects in fits and starts. We shopped it out to several different publishers and eventually landed on the University of Georgia Press, and they've been great to work with.

It was exciting to finally get a hard copy of the book. We're proud of the product; it tells a good story of longleaf, and the feedback from folks has been really positive.

The partner of one of my staff members is responsible for the cover photo, which is beautiful. We liked the title, *The Forest that Fire Made*, because that's what we say a lot in talking to people about the longleaf pine ecosystem. Fire is such an important part of that system. It drives the ecosystem as a whole; it drives the populations of all the animals and plants in the system.

Byron Levan came in as an expert on many of the animal species in the third chapter. In terms of the amphibians, reptiles, and many of the mammals, he's more the expert.

I'm a plant person, so all the ground cover and understory species were my responsibility in the book. John is a really good naturalist; he has historically been more focused on forestry and tree species, but he also knows many of the bird species and other animals. And it was great to bring Byron in the last few years to help us finish the writing, because he has expertise that we didn't necessarily have in our pocket.

RS: Can you say more about the vision for the book, and where it might fit among some of the other books about longleaf?

CD: There are some amazing texts on longleaf, but most of them are fairly technical. Many of them delve deeply into forest management practices, and that doesn't necessarily resonate with folks who are not managing land. That's a little deeper in the weeds than some folks want, who are picking up a book to learn a little bit about longleaf and the animals and plants that live there. Ours is more about introducing people to the longleaf habitat.

We talk about the use of prescribed fire with longleaf. Most of us in natural-resources management in the Southeast understand that fire is a natural process that has occurred in these habitats for millennia – natural fires ignited by lightning strikes, or by Indigenous people who inhabited this area way before Europeans settled here. They were using fire to manage herds of wildlife and things like keeping habitats open.

But we have a lot of people moving into the Southeast now who have not been exposed to prescribed fires. Part of the purpose of this book is to educate folks about those burning practices, which can be scary to someone if they aren't familiar with it. We want to convey to the reader that fire, if managed responsibly, can be used easily to manage those forests.

We also talk in the book about some of the benefits of longleaf forests; and we touch a little on the work of restoration that we're doing now. But we wanted the book to be a field guide.

All the species profiles in the book speak to the diversity of the longleaf system. I mean, you get hundreds of plant species just within a small area of longleaf. You can get over thirty species in a one-meter square plot; they are really packed in!

Kids are taught about the tropical rainforests and the diversity there, the insects and plants that people don't even know exist. But so many people don't know anything about the longleaf forest, which, for many of us in the Southeast, is in our backyard. Providing that education was an important part of doing this book.



RS: In reading the book, I thought that Chapter Three on flora and fauna in the longleaf ecosystem illustrates that biodiversity very well.

CD: I'm glad that comes across. Longleaf pine certainly is special as a tree species; and we spend a lot of time talking about the different life stages of longleaf, the way it grows and those different stages that it goes through.

But the big story is the longleaf ecosystem, and the diversity and resilience of the system; and how it's so important in protecting against wildfire, if you're using prescribed fire, to preserve that biodiversity and protect water resources as well.

Data now are showing that keeping forests intact helps protect our water sources. And longleaf is especially good because it's drought resistant. We've got folks we work with in Texas and Louisiana, it's been so dry, and they're having wildfires out there. With climate change, we're looking at how longleaf can play a role in combatting some of those changes.

If you think about how longleaf is more resilient to fire damage, it has an advantage over some other pine species. And with longer growing seasons, you're going to have longer fire seasons, and potentially more drought occurrences.

Longleaf is also resilient to insect damage, compared to other pine species such as loblolly. One reason is that it's drought resistant; it doesn't show as much stress in those types of situations, which is when beetles can move in. And there is more sap in longleaf than other species, which is a little bit more of a deterrent.

It's also more resilient to wind damage. We're getting more consistent and frequent hurricane impacts, and more severe hurricane impacts, as we've seen in the last few years. Longleaf tends to be more resilient to those higher winds than some of the other pine species.

That said, no tree is going to be able to withstand category-five wind levels, so it's all relative. But in category-three hurricanes, longleaf is going to fare a lot better than others.

Looking at all these resilient aspects of longleaf, it gives it an advantage if you're looking at forest management with an eye toward climate-change mitigation.

RS: To backtrack for a moment, tell me about yourself – where did you grow up, and what were some of the steps along the way to your current work?

CD: I grew up in southwest Georgia in a little town called Blakely. It's a very rural county, Early County. A lot of peanuts are grown there, and there's also a lot of timberland and such. I went to school at Georgia Southern University; I got undergraduate and MS degrees in biology there.

For my master's, I did a survey of a biodiverse power-line right-of-way in southeast Georgia, building a plant list of all the species in this one area; it had longleaf-turkey oak sandhills on these ridge tops, and then it would just dip down into pitcher plant bogs.

You'd have a sandhill that dips down into these hillside seeps with different species of pitcher plants and sundews, all kinds of carnivorous plants, and then rises back up to longleaf and dips back down. That's really where I fell in love with the ground cover that inhabits these systems.

Then I spent a short time down in Florida at the Disney Wilderness Preserve. I did an internship there for about six months before I moved back to Georgia and started working at the Jones Ecological Research Center at Ichauway. I worked with Kay Kirkman there as her research technician, and we focused on groundcover in longleaf. I learned so much there, and just further cemented my love of the longleaf system.

After the Jones Center, I started working with the Atlanta Botanical Garden. That was a great position, too, because it allowed me to focus on some of the rare species in Georgia and the Southeast. I was focusing on pitcher plant species, rare species that occur in this region, and working on other species as well, doing species reintroductions, propagation, working to augment populations of rare species.

And that position led to working with the Longleaf Alliance. I started with the Alliance as a ground-cover coordinator, and really focused on groundcover restoration in the Southeast. That was in 2011, and I assumed the role of president in 2019. So, everything I've done has really been in and around longleaf pine, always keeping at least one foot in that ecosystem, because it's such a fascinating system.

One of the unique things about the Longleaf Alliance is that we do a lot of work with private landowners. There are a lot of preserves in the Southeast, and there are some federally owned properties as well, which make up a lot of long-term protected longleaf areas. But most of the land that is longleaf-appropriate in the Southeast is privately owned.

Being able to work with landowners, from their point of view, their objectives and needs is important. Landowners need certain things from their land. But being able to work with them to think about the whole ecosystem approach to longleaf is important as well.

We're not going to try to make a landowner do something they don't want to do. They're not going to do that, obviously, and we don't think that is our role. But if they are interested in longleaf and they see all the benefits that this system has, from economics to biodiversity to climate resilience, we can really pique an interest there and work with them.



RS: What are some of the challenges to longleaf-restoration work, the biggest hurdles?

CD: In terms of the effort at-large, there are some bottlenecks that we are starting to see in the reforestation pipeline, related to tree production. It's something the Longleaf Alliance is starting a brand-new project on now – working with nurseries to expand capacity for growing seedlings.

Every year, landowners want to plant longleaf, but if they don't get their trees reserved early enough, they get put on a waiting list. The nurseries run out of trees every year.

We're also looking at seed production and genetics of longleaf, making sure that we are harvesting seeds that are genetically superior. If you think about longleaf, it's a long-lived species. We want to ensure the trees are going to live for a long time and be healthy. And we're working to make sure we have seed orchards that are viable and thriving so we can produce more seeds, for nurseries to grow more seedlings.

I would say another problem that we tend to run into is getting more fire on the landscape. We spend a lot of energy trying to get landowners trained up on fire, because you need to have a lot of experience before you just light it up, right?

We help landowners work together, and we do training workshops for folks to be more comfortable with using fire on their properties. For the last twenty years, the federal government has been providing a lot of funding to establish longleaf stands, and what needs to be happening is landowners managing with fire. But that's not always happening.

We like to say, "If you have longleaf and you're not burning it, it's not going to be longleaf for very long." It's going to be invaded by other woody competitors like oaks and other hardwoods, as well as other pine trees.

That's something that keeps landowners from achieving full restoration of longleaf. There are other obstacles that landowners run into, especially if it's small tracts of land; it's harder to get contractors to come in and do thinning or other work if it's a small tract. And it's more expensive than planting loblolly because there are different needs in terms of management.

Some people think about restoring forests as just planting trees, and you're done. But with longleaf, that's not the case. It's an actively managed forest type. You're burning every two to five years, depending on where you are. It takes more handholding than some of the other forest types. It takes more time and money to get that done.



RS: As a biologist, do you have a favorite plant in the ecosystem, and a favorite animal? Or maybe your top-three?

CD: Oh, that's a hard question for a plant person; it's like asking who your favorite child is. But I love grasses, and probably the most iconic grass species in the longleaf ecosystem is wiregrass. I do have a love for that species. It creates this beautiful vista, if it has good coverage and it's in a regularly burned longleaf forest.

Wiregrass is also integral to getting fire into an area. It is extremely pyrogenic; and it's a bunch grass, so it traps pine needles within the grass blades. It creates this great fuel in longleaf forests.

Wiregrass will only flower if it's burned during what we call the growing season. If it's burned in the winter, it may look like it's flowering, but it's not setting viable seeds. It needs to be burned between April and June for it to flower and set viable seed in the fall. It's a perfect example of fire adaptation.

I also love pitcher plants. I have done so much work with them over the years, from graduate school days to the Atlanta Botanical Garden, and I just love them. They're fascinating as carnivorous plants that eat insects. It's just a very cool group of plants, all those carnivores, and I get a little crazy if I get into a pitcher-plant bog, because there are so many cool things to see.

My other top-three plant is one I did a good bit of research on at the Jones Center –American chaffseed. It's a federally listed species that occurs in longleaf forests. In southwest Georgia, it occurs around the margins of depressional wetlands within longleaf forests.

If American chaffseed is not in bloom, you probably wouldn't see it. It's not super-showy. But when it is blooming, it's interesting.

It also has an interesting growth mechanism – it is what we call a hemiparasite, because it's somewhat parasitic on other plants it's growing with, but it also photosynthesizes. It's getting food from chlorophyll and photosynthesis, but it's also getting some nutrients from its neighbors. That one has a special place in my heart as well.

For animals, there are some obvious ones that are the iconic species in the longleaf ecosystem, such as the gopher tortoise. Gopher tortoises are these ecosystem engineers, you could say. And they're keystone species. They create burrows that can be very deep; and [researchers] have found up to three hundred species that cohabitate in these burrows.

If you were to take the gopher tortoise out of that ecosystem, you're going to have a domino effect on all these other species. So, the gopher tortoise is one of my favorites.

The red-cockaded woodpecker is also a fascinating species; it's the only woodpecker that creates cavities in living pine trees, and it is so closely related to the longleaf ecosystem. We've restored and conserved a lot of longleaf acres across the Southeast because of that bird. Just being able to manage for the endangered species, you're managing all these forests sustainably.

There are so many species, I could go on and on. But those are some of my top ones.

RS: Do you want to share any concluding thoughts to share about the book?

CD: We hope that people will be able to use it to learn more about longleaf. We'd really love to get it into school systems and have this be a textbook in high school and middle school libraries and introduce young people to the longleaf system as well. And we hope to distribute it as widely as possible, so we can raise awareness about this ecosystem and why it's so special.

