

Discovering the Sandhill Ecosystem



By Grace Howell and Eleanor Sommer
School of Forest Resources and Conservation
University of Florida
2009 [updated Nov. 2021]

This story was written for Junior 4n H youth in Florida to study the sandhill forest ecosystem for the [4-H Forest Ecology Contest](#).

While many of the events narrated in this story are fictional, the places, plants, and animals described are real, and facts about them are true.

This story may be reprinted and used for educational purposes but cannot be sold for profit. Please cite as: Howell, Grace and Sommer, Eleanor. (2009) Discovering the Sandhill. University of Florida, School of Forest Resources and Conservation.

Contents

A New Place to Explore.....	3
A Hike Through the Forest.....	6
A Plant Discovery	8
A Very Strange Creature.....	10
Pines or Grasses?.....	12
Smoke in the Air!	14
Fire for the Forest	16
Rest and Reassurance	18

A New Place to Explore

Juliet Anderson and her father spent most Sunday afternoons exploring natural areas. Juliet had just recently moved to Keystone Heights, Florida with her mother and younger brother at the beginning of the school year, and she felt like they had moved to another planet. She missed her old school and friends, her old neighborhood, and her old life in a big city. She was at a new school and living down a dirt road in the country, just outside of a tiny town in the middle of nowhere. It made her feel better to see her father when he drove down from Jacksonville to visit on the weekends.



Figure 1: A Florida forest beckons explorers – and tortoises!

“Don’t worry, Sweet Pea, I know you’ll find *something* you like about this place,” he said. “Let’s explore the area and see if we can’t come up with an adventure or two!”

One cool Sunday in November they made an exciting discovery: Juliet lived only two miles from Goldhead Branch State Park! Her father bought an annual state park pass that allowed them to visit whenever they wanted to. They began to explore the park a little more each weekend, and every time they visited, they saw or learned something new.



Figure 2: Goldhead Branch State Park

Their favorite hiking trail started in a ravine along a beautiful creek and meandered through a shady forest before opening into a sunny, sandy trail with tall pines and grasses.

This was a sandhill ecosystem, according to a sign that also had a short explanation. Juliet was fascinated with the plants and creatures that lived there. The first curious thing they came upon was a mysterious oval-shaped hole in the sand. It looked like a burrow, but Juliet couldn't imagine why it was shaped like that or who could have made it. It seemed too small for a fox or coyote den, but why would a rabbit make a hole so wide? As they walked along the trail they saw several other burrows just like it. Juliet felt very puzzled.

"Look!" her father said. "Maybe that's our little digger!"

A hard rounded shell crept through the tall grass ahead of them.

"What is that turtle doing out here in the sandy forest?" Juliet asked. "I thought turtles lived near water."

"Honey, that's not exactly a turtle," said Juliet's father.



Figure 3: A gopher tortoise

“That’s a tortoise!
Tortoises are in the
turtle family, but they
live on dry land. I have
heard that gopher
tortoises live around
here, but I’ve never seen
one before. Did you
know that they are a

threatened species in Florida? That means that their habitat is disappearing and they are becoming endangered! Wow, aren’t we lucky to see one!”

Juliet took one look at the tortoise’s shell and realized it would fit like a puzzle piece in one of the burrows they had just seen. Just then, the tortoise noticed the intruders and picked up its crawling pace to a swift scurry. And sure enough, it made a beeline for the closest burrow and quickly disappeared into the sandy hole. This was an amazing discovery for Juliet. She couldn’t wait to go home and read more about these gopher tortoises. It was only the beginning of many discoveries she made about this unique place! Juliet and her father continued their walk, on the lookout for tortoises and their burrows.

“Wow, Dad, look! There’s a cactus growing in the sand. This sandhill is such a strange place. If it weren’t for all these pine trees, I might think we were in the desert!”

“Yeah, I see what you mean,” he said. “It is like a desert. But look at all this grass, too! I don’t think I’ve ever seen so many kinds of grass in one place. I am so used to seeing boring old lawn grass. These are beautiful!”

A Hike Through the Forest

The next week, Juliet presented her father with some facts about their discoveries. “Dad, did you know that the gopher tortoise is a 'keystone species'? And we live in Keystone Heights! Isn't that cool?”

“If you say so... but what *is* a keystone species?” he asked her. Juliet felt so smart, getting to teach her father something new and interesting.

“A keystone species is an animal—or plant, I guess—that the rest of the ecosystem depends on. Gopher tortoises make burrows way down in the sand and lots of different animals use them for shelter or protection from forest fires. There are even some animals that live in the burrows with the tortoises, like sand skinks and beetles. And when a tortoise dies or goes to live in a new burrow, other kinds of animals will live in the old one. AND, I read that gopher tortoises like to eat the cactus we saw. They're called *prickly pear cactus* and they get big red fruits on them that even people can eat. I read that you can make jelly out of them. If we find them somewhere besides a state park, I'd like to collect some fruit to make jelly.”

“Okay, that sounds fun,” her father replied. “But we will have to be really careful not to eat any spines—that could be disastrous!”

“Yeah, and painful! We'll have to find a recipe that tells us how to prepare them,” Juliet added.



Figure 4: Prickly pear cactus

As they entered the park for their Sunday hike, they stopped at the ranger's station to see if they could get any more information about the park. They told him about their discovery of the sandhill.

"Oh, I'm so glad you discovered that trail!" said the ranger, whose nametag read "James Kittle." "That is the most special thing about this park. Did you know that a healthy sandhill ecosystem is actually kind of rare these days? There used to be a whole lot more, but many have been converted to neighborhoods and parking lots. Across their range the large longleaf pines were all harvested and replaced by different kinds of trees. I am so glad that this little bit will always be protected. And I'm proud to help protect it! Are you interested in helping too?"

"Sure I am!" said Juliet excitedly. "But what can I do? How can I help, Mr. Kittle?"

"Well, most importantly you can help by staying on the trail when you're out there. There are many delicate plants that live in the sandhill and we even have some baby longleaf pine trees that look just like grass! Also, you can help by learning as much as



Figure 5: Longleaf pine in the grass stage.

possible about the sandhill ecosystem. Maybe you will even think about becoming a scientist, resource manager, or landowner one day and protect sandhills that way!"

"I am already learning about it!" she said. "We saw a gopher tortoise last week and I went home and read all about them on the Internet."

"Alright then!" said Mr. Kittle. "You are already becoming a naturalist! Would you like to

take some information about the sandhill with you? We have a brochure about wildflowers, a guide to plants and trees, and a wildlife list. Y'all have fun out there, ya hear?"

“Thank you!” said Juliet and her father at the same time. They were excited to get back out and see new plants and animals.

A Plant Discovery

As they walked down the trail towards the sandhill, Mr. Anderson skimmed over the handouts.

“This pamphlet lists the most common plants and trees in the forest. Let’s try to identify some of them!”

The tall longleaf pines that Mr. Kittle had mentioned were visible before they even got to the sandhills sign.

“Look at those round puffs of long needles. I can see where they get their name!” said Juliet. “They seem like the kings of the sandhill. There are definitely more of them than any other trees.”

As they turned and walked into the sandhill, they immediately saw beautiful wildflowers blooming among the tall grasses. Some were as tall as Juliet and they were purple, her favorite color! She wanted to know what they were so she looked at the wildflower pamphlet.

“Oh, look! It’s right here. This tall purple spike must be the blazingstar. It has these little flowers bursting out all along the top of the stalk. How pretty they are!”



Figure 6: Blazingstar and swallowtail butterfly.

Mr. Anderson was looking at some flowers that were just as tall, but that had more of a flat head of purple flowers. A black swallowtail butterfly was sitting on top of it as if it was a plate of nectar!

"These must be the deertongue," he said as he looked at the description. "They have small rounded leaves at the base of the stalk. Maybe that's where their name comes from."

"Look at this one, Dad! This plant is rusting!" Juliet exclaimed.

"Hmmm. I don't think plants can rust. Let's see if this plant is on the brochure. Yep, here it is," he said as he showed his daughter. "It's called a 'rusty lyonia.' It is easily identified by all of the dense, rust colored scales and hairs. What a neat plant!"

Juliet discovered another flower and called to her father. "I guess we missed seeing this plant in full bloom. It looks like it's about to fall off the plant because it's sagging." Juliet said, sounding disappointed.

"Actually, that's how this particular flower always looks," her father reassured her. "This plant is called a pawpaw. The white flowers look like they're drooping, but in fact that is how they grow. And if you take a leaf and crush it up in your hand it will smell like green peppers!"

Juliet carefully grabbed a leaf and crushed it in her hand. "Wow! It really does smell like green peppers! I think I know what I want for dinner tonight!"

The pair continued down the trail. "Oooh, look at this oak tree, Dad. I've never seen one of these before. It looks like it's blue!" Juliet said.

"Yes, the underside of the leaf is blue. That means that this oak tree is a bluejack oak," Mr. Anderson said.

"A bluejack oak. I'll have to look that up when I get home. I don't know anything about a bluejack oak. I love when I learn new trees and plants!" Juliet said excitedly.

Further down the trail Juliet saw another oak tree. “This one is a sand post oak, Dad. I know this one because the leaves are lobed which makes it look cross like.”

“Wow! Well, you just taught me a new tree today as well, Juliet. I will be sure to read all about it when I get home. We can share our notes next weekend if you’d like,” Mr. Anderson said.

“I would love to! Oooh, I can’t wait!” she said with a giant grin.

“The acorns of these oak trees provide a lot of food for many animals in this park,” he explained.

“Well then, I’m glad they are growing here!” Juliet answered.

A Very Strange Creature

Over the next few months, Juliet and her father walked nearly every weekend. During the coldest months, the sandhill stayed active with little birds hopping around. One chilly day they saw the strangest thing.

“Dad, look! Is that a monkey over there?”

“What? A monkey? You silly, there aren’t any monkeys out here!” he said as he looked to where she was pointing. “Oh my goodness!!! That DOES look like a monkey!”

A black furry creature was sitting on the ground under an oak tree eating acorns. It had a long bushy tail and loped along the ground in the strangest manner. It had a silver face and looked kind of like a giant squirrel or monkey.

“Hey! What a minute. I think I



Figure 7: Fox squirrel, the largest species of tree squirrel in North America.

remember reading about a fox squirrel in the pamphlet that Mr. Kittle gave us,” said Juliet. “Maybe that’s what it is. It does kind of look like a squirrel, but it’s so BIG!”

Just then the fox squirrel noticed them and bounded off in the opposite direction. It reached a big pine tree and scampered up the trunk. Juliet and her father walked carefully over to the place where they had first seen it.

“Wow, look at the size of these acorns, Dad!”

The squirrel had hit a jackpot with this particular tree. There were plenty of acorns everywhere underneath it. Acorns meant that the tree was an oak, but what kind of oak could it be? The pamphlet only listed a few oaks that lived in the sandhill. Juliet and her father each picked up a dried leaf and tried to figure it out. They were both already familiar with the canoe-shaped leaves of live oak, but this leaf had large lobes. It had to be something else. So it was either a post oak, a red oak, or a turkey oak. Staring at the deeply-lobed leaf, Mr. Anderson was reminded of the shape of a turkey footprint.

“Hey, maybe these are called turkey oaks because of the shape of their leaves! Let’s check the field guide when we get home.”

He had checked out a tree and plant identification book from the



Figure 8: Turkey oak leaf

library to help him and Juliet learn more about the sandhill. He pulled out his camera and took a picture of the leaf. They examined and took pictures of the bark of the tree, too, which was rough and knobby and had a dark, blotchy coloring. This was their next challenge!

Pines or Grasses?

The winter included many exciting visits to the sandhill. Before they knew it, it was springtime! The grasses sprouted back, the oaks started flowering, wildflowers appeared in the grasses, and the strangest thing was happening with the pine trees. Big fuzzy white plumes were starting to rise from the center of the tufts of needles. Juliet was so curious. When she saw Mr. Kittle at the entrance booth, she asked about them.

“What are those big white things coming out of the pine trees? They look like aliens or something!”

“Oh, yes. Isn’t it a beautiful sight? Well, it’s springtime, the beginning of the growing season for all of the plants and trees. That is the new growth on longleaf pines. We call them *candles* and we say that they are *candling*. Those buds are full of wax that protects the new growth until it is ready to come out.”

That day in the sandhill it seemed all of the creatures were celebrating warmer weather. Brilliant Red-headed Woodpeckers flew from tree to tree and a pair of Bald Eagles soared overhead calling to each other with a screeching sound that reminded Juliet of the way her grandmother laughed.



Figure 9.1: Red headed Woodpecker



Figure 9.2: Bald Eagle

On the ground, Juliet saw the immature longleaf pines that were candling.

“Dad, I thought those were tufts of grass before! They look just like this other grass over here, but now that I know about candling, I can tell the difference.”

They walked with alert eyes and suddenly came upon a snake laying on the sand, soaking up some sunshine. It had a black head, but about halfway down its very long and slender body it started to get lighter and was a creamy whitish color toward the tip of its tail. Its scales were well defined, making it look almost like a rope. When it became aware of Juliet and Mr. Anderson, it lifted its head off the ground and looked at them for a moment. Then it slithered quickly to the side and darted away as quick as lightning through the low bushes.



Figure 10: Coachwhip snake

“Wow!” exclaimed Juliet. “That was the fastest snake I’ve ever seen!”

When she got home that day, Juliet looked up the snake to identify it. It was very clear that they had seen a coachwhip! She couldn’t wait to go back and tell Mr. Kittle about this!

Smoke in the Air!

The next Friday, Juliet was happy to be done with school for the weekend. When she got off the bus in front of her house, the smell of smoke was alarming. Everything in her neighborhood looked OK, but the smoke seemed to be coming from the direction of Goldhead Branch State Park. Immediately she ran in the house and yelled for her Mother. She needed to go see what was happening to her special sandhill forest!

“Shhhhh!” said her mother. “The baby is sleeping!”

“Mom, can you please take me to Goldhead?” Juliet whispered frantically, not even stopping to explain why. “I’m sorry, but I can’t take you right now,” replied her mother. “You can take the bike trail if you promise to be very careful.”

“OK, I will!” She promised over her shoulder as she jumped down the steps and swung onto her bike. She carefully crossed the road, got onto the trail that led all the way to the park, and started peddling as fast as she could.

Her heart raced with fear. Was the forest burning down? What would happen to the animals? What about all of the plants and trees? Would this place be destroyed forever? Visions of death and destruction clouded her thoughts.

As she approached the park, she could see that the forest floor was covered in ashes, completely blackened. Her eyes filled with tears as she rode forward. A big yellow sign blocked her path on the trail ahead, and she rode up to look at it. “Prescribed Fire” it said. Beyond it, yellow caution tape was drawn across the path with a smaller sign which said “PARK CLOSED temporarily due to prescribed burn.” She wondered what that could possibly mean. She knew that the doctor prescribed medicine when she was sick, but she had never heard of prescribed *fire*!

Looking around at the burned forest, she tried to get some clues. It seemed that the fire had been kept within certain boundaries. She couldn’t see any flames anywhere. There were some smoking logs on the ground. Pine warblers chirped and flitted around through the

charred brush. Juliet wondered what they were so chipper about. Didn't they see that their home was a wasteland now? Then she looked up at the tall pines—most of the needles were still green! The trunks of the trees had black marks that were about as tall as she was, but above that, they seemed mostly just like they had last weekend!



Figure 11.1-11.2 Prescribed fire.

Fire for the Forest

"Well, this is just weird," Juliet muttered to herself. Just then she noticed a person walking through the smoking debris, dressed in green pants, a bright yellow shirt, gloves, and a hardhat. As the person came closer, Juliet could hear the cinders crunching under the boots and see that there was soot all over the person's pants. Now Juliet could see that the person was a woman. Juliet waved to her and shouted, "Excuse me, Ma'am! Excuse me, but what happened here? How terrible that there was a forest fire! This used to be my favorite place and now it's ruined!"

"Oh, don't you worry! Everything is just as it should be," the woman said with a big smile. "Hi, I'm LaToya. I am the natural resource manager here at Goldhead. It's my job to make sure we are taking good care of this sandhill ecosystem. There aren't many of them left, you know."

She explained that the sandhill was a *pyrogenic* ecosystem and that it needed frequent fires to stay healthy.

"Many of the plants and trees of the sandhill need fire in order to make seeds or reduce competition from other plants so that they can grow. The animals benefit, too, because many feed on the seeds produced. Fire keeps the shrubs growing low to the ground so gopher tortoises can reach their food. I sure have never seen one climb a tree to get the leaves!"

She explained that many plants, such as palmettos, grasses, and wildflowers grow back from their roots. "There also will be more sunny spaces for seeds to grow, and the ashes will help nourish these young plants," she told Juliet. She assured Juliet that the fire was not a wildfire, but a prescribed burn.

"As the natural resource manager, I have to prescribe treatments to keep the forest healthy, like these controlled fires when the conditions are just right. We burn this part of the park often enough so there is never too much fuel built up to make a really big, hot fire. That way when we do burn, it doesn't kill very many of the trees. The trees, which are adapted to frequent fires,

like the longleaf pines, have thick flaky bark to protect them. Some of the smaller oaks get burned back, but they usually re-sprout from their roots.”

Juliet was a little relieved, but she still wasn't quite sure. “What about the animals?” she asked. “I mean, I know about the tortoise holes being a good place for some animals to hide during a fire, but what about other animals?”

“Yes, that's right. Many small animals like snakes, frogs, lizards, mice, and rabbits go down into gopher tortoise holes to wait out the fire. Bugs hide under bark or fly up into the tops of trees where they won't get cooked. Big things like deer can easily outrun a slow-moving prescribed fire. There are very few critters that get caught in the flames. This is their home and they are used to fires! I tell you what, why don't you come back in a few weeks and see for yourself. I bet you will be surprised at what you see!”

“Okay. Thank you for explaining all this. I was really worried!” said Juliet. She had had enough excitement for one day and she turned her bike around and headed home.

Rest and Reassurance

When she got home, she was very tired and plopped on the couch next to her mom.

Her mom sniffed the air in Juliet's direction. "Phew! What have you been up to? You smell like a campfire!"

Juliet laughed and told her mother all about her afternoon adventure. Then she went to bed and fell quickly into a deep sleep.

It was two weeks before Mr. Anderson could come to visit again. Juliet couldn't wait to tell him all about the fire and what she had learned from LaToya. She hoped that everything really was OK, but knew that she'd have to see for herself.

"Dad, I sure do hope she's right and our special place isn't ruined!"

They returned to the park and Mr. Anderson couldn't believe how different everything looked. To Juliet, it seemed like forever since she'd been there. She was eager to see if her special spot was really going to recover from the fire.

When she and her father arrived, she ran down the main trail. When they turned onto the sandhill trail, her heart was pounding. But what she saw made her relax and smile.



Figure 12: Forest after a prescribed fire.

Around the bases of the blackened saw palmetto leaves, there was green. Green leaves sprouted from branches of trees. Everywhere she looked she saw bits of green grass poking up and little bracken ferns uncurling from the blackened ground. Just like always, little sparrows and warblers flitted about merrily. They saw a kestrel perched on a limb of a pine tree and a gopher tortoise ambling about in the newly cleared forest. She knew that everything would be okay.

During the next few months, she and her father watched the leaves sprout and grow and the animals continue with their business as if nothing had ever happened. Even the baby pines, whose green needles had burned off, sprouted new growth from those funny white protective buds. Juliet came to understand the importance of fire in the sandhill ecosystem, and that her special place was a wonderful remnant of a natural ecosystem, forever protected by the park.

Places to see sandhill forests in Florida:

Ocala National Forest
Blackwater River State Forest
Eglin Air Force Base
Wekiwa Springs State Park
Torreya State Park
San Felasco Hammock
Morningside Nature Center
Janet Butterfield Brooks Preserve