

CU IN THE WOODS

Clemson Extension Forestry and Wildlife Newsletter



Joro Spider Q&A

By Dave Coyle

They're big. They're brightly colored. And they give a lot of people the creeps.

It's spider season, y'all! Joro spider season, to be specific. Every late fall for the last few years, we've seen a massive uptick in the number of Joro spiders in South Carolina. Initially just found in the Upstate, they can now be found in the Piedmont and Sandhill regions, too. This summer and fall have been especially good for spiders due to the weather, which is why it may seem like you're seeing more spiders than usual (because you are!). These are natural population fluctuations – some years the populations are up, and in other years the populations are down. 2025 happens to be an up year.



Joro spiders, *Trichonephila clavata*, are large non-native orb-weaving spiders. Image credit: Dave Coyle, Clemson University.

Joro spiders, due to their size, propensity to put webs everywhere – including on houses, carports, and landscape plants – and bright color, tend to garner a lot of attention every fall. Let's dispel some myths and get some answers on some of the most common questions we're often asked about Joro spiders.

Q: Are they native to the U.S.?

A: No, they are an invasive species from Asia, which likely got here by hitchhiking on a container.

Q: How long have they been here?

A: They were first documented in north Georgia in 2014 but were likely there several years prior – probably since about 2010 based on conversations with local residents.

Q: Are they dangerous to people or pets? More specifically, will they bite me?

A: No, they are not dangerous. They are quite docile, and studies show they would rather not be on you – when held, they typically try to crawl off and drop to the ground. A recent study also found that in order to get a Joro spider to bite you, the spider had to be REALLY antagonized. So long story short, if you get bit by a Joro, you probably brought that on yourself by irritating (e.g., physically pinching or squishing) the spider.

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Upcoming Events

Find out about all of our upcoming events by visiting our events page:

<https://www.eventbrite.com/o/clemson-extension-forestry-and-wildlife-75733679603>

Looking for more forestry and wildlife information?

Check out our blog page for past articles and other great forestry and wildlife information-

blogs.clemson.edu/fnr

Joro spider q&a cont.

Q: Are they venomous?

A: Yes, all spiders are venomous – that's how they subdue their prey. However, their venom is not medically relevant to humans, unlike that of black widow or brown recluse spiders (a bite from those will send you to the hospital!).

Q: Are Joro spiders good for the environment?

A: Mostly no. While they will eat some harmful pests (like mosquitoes, or stink bugs), all spiders will do this – not just Joro spiders. And there is mounting evidence that where there are a lot of Joro spiders, the native orbweaver spiders disappear, showing a clear negative impact on the environment.

Q: What should I do if I have a Joro spider on my house? Or porch? Or deck? Or anywhere on my property, really?

A: Probably the easiest thing to do is just ignore the spiders – they don't want to get in your house, and as already mentioned they aren't dangerous. But yes, they can be annoying, as their webs can stretch up to 20 feet across! Any physical removal method works great (a stick, a broom, your foot, etc.). There are several sprays labeled for spider control and these are available at any home and garden store. We do not recommend using products that are not labeled for spider control (e.g., machine lubricant) as spraying these substances all over your yard or home may cause unwanted damage to property and impact people or pets in the area.

Find out more about the Joro spider in this video (https://www.youtube.com/watch?v=zhO_bwwg-E4) or on our

Clemson Extension HGIC page (<https://hgic.clemson.edu/factsheet/the-joro-spider/>). If you have Joro spiders on your property, please report them to iNaturalist (<https://www.inaturalist.org/>) or Joro Watch (<https://jorowatch.org/>).

Read more about what a bite from a Joro spider feels like: <https://academic.oup.com/jme/advance-article/doi/10.1093/jme/tjaf103/8296680?searchresult=1>

Learn how to manage Joro spiders on your property: <https://academic.oup.com/jee/advance-article/doi/10.1093/jee/toaf225/8296679?searchresult=1>

County Forestry Associations

Abbeville County Forest Landowners Association

Contact: Stephen Pohlman

Aiken County Forestry Association

Contact: Janet Steele

Anderson Forestry & Wildlife Association

Contact: Carolyn Dawson

Calhoun-Orangeburg Forest Landowners Association

Contact: Janet Steele

Darlington/Florence Landowners Association

Contact: TJ Savereno

Edgefield County Forestry Association

Contact: Stephen Pohlman

Greenville Forestry & Wildlife Society

Contact: Carolyn Dawson

Greenwood County Forestry Association

Contact: Stephen Pohlman

Kershaw County Forest Landowner Association

Contact: Robert Carter

Laurens County Forest Landowners Association

Contact: Jeff Fellers

Lexington County Forestry Association

Contact: Janet Steele

Lowcountry Landowners Association

(Beaufort, Colleton,
Hampton, Jasper)

Contact: Mike Windhorn

McCormick County Forestry Association

Contact: Stephen Pohlman

Newberry County Forestry Association

Contact: Jeff Fellers

Salkehatchie Forestry Association

(Allendale, Bamberg and
Barnwell)

Contact: Janet Steele

Saluda County Forestry Association

Contact: Stephen Pohlman

Tri-county Forestry Association

(Berkeley, Charleston,
Dorchester)

Contact: Mike Windhorn

Williamsburg County Forest Landowners Association

Contact: Tancey Belken

Not All Foresters are the Same!

By Stephen Pohlman

Did you know that the term ‘forester’ is kind of a generic term used by much of the public to describe someone who works in the forest as a professional? That’s kind of like saying all medical doctors are doctors. Foresters are the same way. In this article, I will explain the differences between foresters and how different agencies play different roles in forestry. Let’s start by naming the first one.

The consulting forester is often referred to as simply ‘a consultant’ in the forest industry. The consulting forester’s job is to represent their client (which is you, the landowner) while managing your property. Typically, a landowner would hire a consulting forester to manage their property according to the objectives that the landowner has communicated to them. The consulting forester’s job is to accomplish the landowner’s goals based on needed forest activities, such as site prep, tree planting, thinning harvests, understory competition control,

and final harvest. Then, the entire process starts over with site prep. The consultant will shop out these forest activities on your behalf to get you the best price possible.

Some consultants can provide other services. Thus, it’s always important for a landowner to ask as many questions as possible before deciding whom to hire. Most consulting foresters belong to the Association of Consulting Foresters (ACF) and will also be registered foresters through the Society of American Foresters (SAF). Registration through SAF is literally what gives an individual the right to be called a ‘forester’. Oftentimes, consulting foresters are paid either through commission on a timber sale or a flat fee for services rendered. Since consulting foresters are working on your behalf, they are not wood buyers; that would fall on the shoulders of a procurement forester.



A consultant will help you develop a management plan that will work best for your objectives. Image credit: Stephen Pohlman, Clemson Extension.

A procurement forester is a wood buyer. Some procurement foresters work directly for a mill, some work for a firm known as a wood dealer, and some work for large logging operations. They are not consulting foresters, though they may offer friendly advice on forest management. A procurement forester’s job is to provide you with a fair market price for your timber. At the end of the day, they are the ones who are paying for your wood. They are also who is responsible for lining up which logger will be operating on your land during the harvest. Some companies’ procurement foresters have begun venturing into reforestation (site prep

and tree planting) in efforts to work one-on-one with landowners to help make sure future timber stands are available. Most companies encourage their procurement foresters to be registered foresters with SAF. At a minimum, the head procurement forester for a company will be SAF-certified while the other procurement foresters work under their supervision.



There are several state agency foresters who offer a wide variety of services. Image credit: Stephen Pohlman, Clemson Extension.

State Agency Foresters (SC Forestry Commission, Clemson Extension, and SC Dept of Natural Resources) are unique in that we are all state-funded agencies with different roles to support the citizens of South Carolina. Though each agency is interested in managing natural resources in South Carolina, each one does it in different ways due to the way each is charged to operate. I will not bore you with each agency’s Mission Statement, as a quick Google Search will easily turn that up, but do know that all three state agencies offer landowner advice for managing natural resources. Some agencies also offer services for a fee, such as controlled burning through the SC Forestry Commission or landowner education workshops through Clemson Extension, which are two quick examples, but not limited to just that. State agencies can provide you with lists of contacts to help you reach your natural resource goals. Agencies do this since the government cannot show favoritism toward any one company over another. You are encouraged to call at least three on that list to know you are getting a fair price for the services you are soliciting. Other than educational content during your interaction with the state, this is a state agency’s effort to help you reach those you need to complete your management goals, should you not be able to do it on your own. Depending on the agency and position held, some employees will be SAF-certified, and others may be certified wildlife biologists through The Wildlife Society.

Federal Agency Foresters (US Forest Service, US Fish and Wildlife Service, etc.) are federally funded agencies. Typically, they manage the forest lands to which their job is assigned. These would be places like Sumter National Forest, Francis Marion National Forest, etc., and other places like such. You might know someone whom such an agency employs, and they may give you friendly advice about your property; however, they are not in the business of coming out and looking at a landowner’s property to

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not all foresters are the same cont.

give assessments or offer advice. This article is a very brief description of the differences between the many types of foresters. Due to the many nuances of differences between industry and governmental agencies, I could not have listed everything, and you still be reading at this point? If you find yourself still uncertain of who you need to contact to help you on your natural resource journey, you can always call your local Clemson Extension office to speak with your local area forestry agent, as we will be glad to assist you and/or point you in the right direction.

The Monster in Your Yard

By Robert Carter

You don't even know it is there. It lurks in the dark of your yard, searching for prey while its venom drips off its iron-red teeth. It is a formidable hunter, consuming more than its weight in food daily. It has probably walked by you when you are outside in the dark, camouflaged by its dark pelt. Fortunately, you are not on the menu. It is the one-ounce short-tailed shrew, one of the few venomous animals.

There are two short-tailed shrew species in South Carolina: *Blarina brevicauda* (northern short-tailed shrew) and *Blarina carolinensis* (southern short-tailed shrew). Northern short-tailed shrew can be found in the foothills and mountains of SC, while southern short-tailed shrew can be found statewide except for the mountains. They are both 2 to 4 inches long, with a tail about one-third the length of the body. The southern short-tailed shrew is slightly smaller. The dense pelage is dark gray with some silver specks, which separates them from shrews in the *Sorex* and *Cryptotis* genera, which have brown pelage and longer tails. Northern and southern short-tailed shrews are difficult to distinguish without analyzing the skull, teeth, and DNA. At first sight, shrews can be mistaken for mice, but they have a wedge-shaped face with an elongated movable nose and tiny ears and eyes covered by hair. They are nearly blind and likely only detect light. They do not need to see well because they spend most of their time underground or under leaf litter. Their elongated nose, along with the strong front legs, helps them to burrow through soft soil and leaf litter. They are rarely seen alive due to their fossorial, underground lifestyle.

Short-tailed shrews hunt invertebrates such as grubs, insects, spiders, snails, and worms and sometimes capture lizards, amphibians, mice, and ground-nesting birds. They occasionally consume plant material, especially in the winter. Due to their preference for insects and snails, shrews

contribute to controlling pests. The neurotoxins produced by a gland at the base of the incisor teeth paralyze or kills their prey. The toxins are secreted into the saliva and are chewed into the prey. Some paralyzed prey is taken back to their nest and stored for several days before being consumed. Shrew saliva also contains enzymes that help break down muscle tissue. For a human, the bite can be painful but only causes bruising.



Southern short-tailed shrew (*Blarina carolinensis*). Photo by R. Altig, from the American Society of Mammalogists Image Library, <https://www.mammalsociety.org/image-library/blarina-carolinensis-20>

Shrews have a voracious appetite and often consume up to 100% to 150% of their body weight in a day. With a heart rate over 800 beats per minute, going a few hours without food can lead to starvation. This appetite is due to their active nature, high metabolism, and small size. Small animals have a greater ratio of surface to

volume, so a greater proportion of their skin is exposed to the environment. Therefore, it is easier for them to lose heat to the environment. They ingest a large number of calories to maintain their metabolism and normal body temperature, especially in the winter. As an adaptation to their high caloric needs, they store some energy in specialized brown fat that is also found in human babies and bears.

Shrews begin mating in early spring and may have several litters per year. They typically have 2 to 6 blind, helpless offspring in an underground nest of grass and leaves deeper in their burrows. They can produce a large number of offspring per year, but many do not survive the first year. The average shrew's lifespan is two years.

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Shrews can inhabit a variety of habitats, but they prefer moist, yet not saturated, soils. They often have a surface burrow system in leaf litter and a deeper burrow system. It is not unusual for several individuals to share burrow systems, but they hunt alone. Shrews are more abundant in areas with high plant diversity because plant diversity supports a diversity of insects and small animals. They especially like ecotones because they support a greater diversity of prey. An ecotone is where two habitats meet, such as the border

the monster in your yard cont.

of a forest and a field. Decaying logs and brush piles are also utilized. Prescribed burns reduce habitat quality for shrews by reducing the amount of leaf litter. Home range size depends on prey density and varies from 1 to 2.5 acres. Home ranges are marked by scent glands on the belly and vigorously defended, although they often overlap. The gland also produces an odor similar to a skunk that deters predators.

With poor vision and sense of smell, shrews must use other tricks to navigate. One trick is vibrissae, whiskers, to detect surroundings and prey. The most impressive trick is echolocation. They produce ultrasonic clicks and then interpret the echo to understand their surroundings. They produce other noises, such as chirping for courtship and interacting with competitors.

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Legumes, Inoculation and Nitrogen Fixation: Frequently Asked Questions

By Marion Barnes

Q: What are the benefits of planting legumes in wildlife food plots?

A: To enhance the quality of your wildlife food plots, consider incorporating legumes into your management strategy. Legumes belong to a family of plants that, with the assistance of *Rhizobium* bacteria, have the ability to remove nitrogen gas from the atmosphere and convert it into a form of nitrogen that plants can use. The legume host receives nitrogen in exchange for sugars and other compounds that the bacteria need to survive and fix nitrogen. Legumes provide benefits in addition to adding large amounts of nitrogen to the soil. They are highly digestible and have high nutritional value, with high levels of protein, calcium, phosphorus, and magnesium. Notably, phosphorus and calcium are particularly important during lactation in does and antler development in bucks.

Q: Why plant legumes for nitrogen?

A: The price of commercial nitrogen fertilizers has increased significantly in recent years. The time of cheap inputs has

passed. The cost of natural gas-based nitrogen fertilizers (high energy requirements to produce synthetic fertilizers) will almost certainly continue to increase. When the cost of fossil fuels is high, the prices of commercial nitrogen fertilizers increase. So, if you can eliminate a portion of your nitrogen fertilizer cost by growing legumes in your food plots, why not do so?

Q: How does “biological nitrogen fixation” work?

A: The ability of legumes to obtain nitrogen is the result of a symbiotic (you scratch my back I’ll scratch yours”) relationship between the legume and the *Rhizobium* bacteria in the soil. When *Rhizobium* bacteria infect the roots of legume plants tiny gall-like structures called nodules are formed on the roots of the legume host plant which in turn receives nitrogen in exchange for sugars and other compounds the bacteria need to survive and fix nitrogen. This biologically “fixed” nitrogen supplies the legume plant with nitrogen and also becomes available to non-legume

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legumes, inoculation and nitrogen fixation: frequently asked questions cont.

plants in food plot mixes as well as for post-season crops through decomposition of roots and above ground plant material (stems & leaves).

Q: Why do legume seed need to be inoculated?

A: Inoculating legume seed with nodule-forming bacteria has been a standard practice since the early 1900's. Seed inoculation ensures good nitrogen fixation by legumes. Inoculation is the process of applying *Rhizobium* bacteria prior to planting to help the plant fix nitrogen. Inoculation is recommended if the legume to be planted has never been grown in the field or has not been grown for several years. Rhizobia bacteria are very common in the soil and there are many different species. Because the legume-rhizobia relationship is very specific, not all Rhizobia bacteria can form nodules on all legumes. That's why it's important to select the correct inoculant for the legume species you are planting, or nodules will not form. Be sure to check the inoculant package for the legume species you are growing.

Q: When does the "infection of roots by bacteria" happen and how?

A: With proper inoculation seedling legume roots will quickly become infected with *Rhizobium* bacteria, and nodules will begin to appear on legume roots usually 21 to 28 days after plant emergence. As plants become older, the number and size of nodules will indicate the extent of nitrogen fixation. Soil fertility and pH are directly related to the number of *Rhizobium* bacteria present in the soil. Make sure the soil pH is adequate for proper legume growth and calcium, phosphorus and potassium levels are not limited. Soil conditions such as moisture and temperature also influence bacteria's survival and nitrogen fixation. Soil *Rhizobium* populations can be reduced by any stress (drought) that reduces plant activity.

Q: How can I tell if nitrogen is being fixed?

A: A simple way to determine if root nodules are actively fixing nitrogen is to dig up a few strong, healthy plants. Carefully brush away soil from the roots and root hairs. Look for the number and size of the nodules present (are there many or only a few?) Root nodules can vary in size, number, and shape depending on the legume species and sometimes among species between different varieties. Cut a few nodules in half. If the nodule is pink to dark red inside, then nitrogen fixation is occurring. The pink and red colors are due to a compound, leghemoglobin, that controls oxygen flow to the bacteria. If the insides of nodules are green to white, then no nitrogen is being fixed.

Q: When is the nitrogen available?

A: Biologically fixed nitrogen is available to the host legume once the roots become infected & well nodulated. Nitrogen

transfer from legumes like clover to grasses such as small grain occurs mainly through the breakdown of decomposing plant material, such as roots and leaves, becoming available for non-legume plants to absorb. The majority of the excess nitrogen produced by legumes benefits crops planted in the next growing season.

Q: Should I apply nitrogen fertilizer to a clover/ small grain wildlife food plot at planting?

A: The amount of nitrogen fixed by legumes varies depending on legume species, soil conditions, proper inoculation, the amount of bacteria available, etc. It's easier for the legume to take up commercial nitrogen fertilizer from the soil than to fix nitrogen from the atmosphere. The more commercial nitrogen applied to the soil, the less bacterial infection occurs, fewer nodules are formed and lower amounts of biological nitrogen will be fixed. However,



Root nodules for nitrogen fixation formed by *Rhizobium* bacteria on the roots of soybean plant. Photo credit: Tomasz - stock.adobe.com.

keep in mind that it takes several weeks after emergence for properly inoculated legumes to begin fixing nitrogen. Therefore, a small amount of commercial nitrogen fertilizer applied as a starter may prove beneficial to legumes and grasses planted in a mixture. Typically, 20 to 30 pounds per acre of nitrogen is recommended at planting for legume-grass mixtures when establishing wildlife food plots. An additional 20 to 30

pounds per acre may be applied if more forage is needed during the growing season. Remember, over-application of nitrogen will make nodules "lazy".

Resources

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Stumpage Price Trends in South Carolina for Q3, 2025 & Market Updates

By Puskar Khanal

South Carolina Hardwood Pulpwood Prices Continue Decline

In the third quarter of 2025, the average statewide prices for pine and hardwood pulpwood in South Carolina were \$5.70 per ton and \$4.50 per ton, respectively. Compared to the first quarter of 2025, pine pulpwood prices have dropped by approximately 16%, while hardwood pulpwood prices have seen a more significant decline of about 32%. Both pine and hardwood pulpwood prices have been steadily falling since the third quarter of 2024, with hardwood prices experiencing a much sharper decrease. Meanwhile, pine pulpwood prices have remained relatively stable over the last two quarters. Interestingly, while hardwood pulpwood prices were higher than pine in the previous quarter, this trend has reversed in the latest update. Notably, both pine and hardwood pulpwood prices have fallen below \$6 per ton in both the Lowcountry and Upstate regions of South Carolina.

South Carolina Sawtimber Prices Show Mixed Trends in Q3 2025

In the third quarter of 2025, the statewide average prices for pine and hardwood sawtimber in South Carolina were \$22.80 per ton and \$16.00 per ton, respectively. Compared to the previous quarter, pine sawtimber prices increased by about \$1.00 per ton, while hardwood prices saw a slight decline of approximately 25 cents per ton. Over the past two years, the changes in pine stumpage prices have been less significant than those for hardwood stumpage.

Pine stumpage prices have dropped by roughly 2%, with hardwood prices seeing a much steeper decline of around 37% compared to the same period last year. Notably, hardwood prices have fallen more sharply in the Upstate region than in the Lowcountry, although both regions have experienced declines. This trend signals a challenging market environment for hardwood stumpage sellers across the state. Additionally, hardwood sawtimber has consistently sold for less than pine, and the price gap has continued to widen in this latest quarter. This growing disparity highlights the ongoing difficulties faced by hardwood producers in South Carolina.

Wood Market is Local: Stumpage prices for both sawtimber and pulpwood in your local markets could vary significantly

as compared to the above statewide averages depending on: size and species composition, quality of timber, total acres and volume, logging operability, distance from nearby mills, and overall market condition.

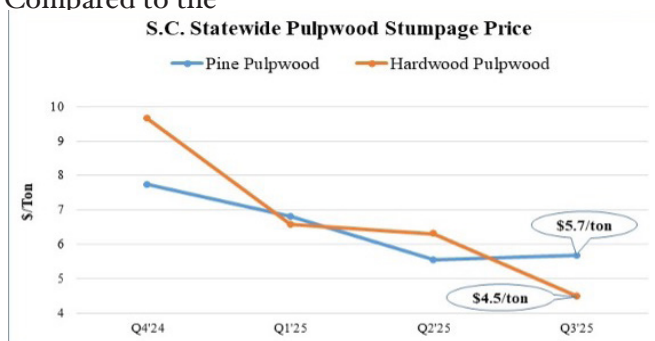


Figure 1. Hardwood pulpwood continues a steady price decline, while pine pulpwood remains stable. Graph credit: Puskar Khanal, Clemson University.

Data credit: The sawtimber and pulpwood price data included in this newsletter are published with permission from TimberMart-South Athens, GA 30605 email tmart@timbermart-south.com.

Clemson Forestry Research Updates

Impact of Forest Product Manufacturers on Forestland Attributes Across SC (Awasthi et al., 2025)

Between 2011 and 2021, the forest product manufacturing landscape in South Carolina showed significant shifts. The number of biomass industries grew dramatically, while the number of pulp and paper mills stayed the same. Biomass production capacity increased across the state, particularly in the Piedmont region, while paper mill capacity saw mixed trends. Despite overall growth in timber resources, harvest volumes and live tree density decreased in some regions, particularly in the Coastal Plains. The distribution of mills also shifted, with clusters moving closer to urban areas,

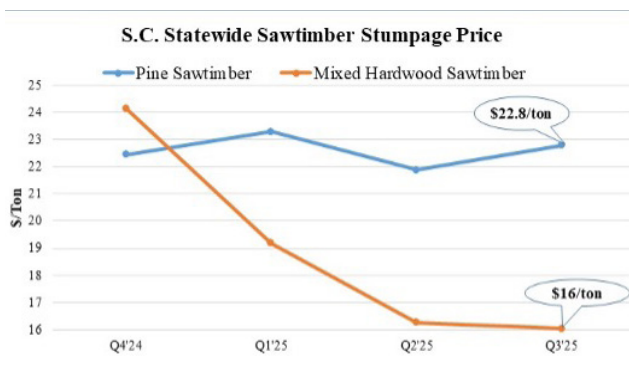


Figure 2. Hardwood sawtimber prices have had a steep decline from Q4'24, while pine sawtimber remains stable. Graph credit: Puskar Khanal, Clemson University.

likely due to lower land costs and easier access to skilled labor. Interestingly, areas with higher aboveground carbon tended to have more mature forests, whereas regions with higher harvest volumes showed declining tree densities. The expansion of biomass mills, in particular, contributed to higher harvest volumes, which may impact long-term carbon storage potential. Despite these changes, biomass mills appeared to have a larger influence on

forest attributes than other types of mills, highlighting the growing role of the biomass industry. These findings suggest a complex balancing act between increasing forest product demands and the need for sustainable forest management practices that support both carbon sequestration and timber production.

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stumpage price trends in South Carolina for Q3, 2025 & market updates cont.

Understanding the Drivers of Deer-vehicle Collisions in SC (Sharma et al. 2025)

This study analyzed deer-vehicle collision data in South Carolina from 2018 to 2021 and identified key factors that contribute to these accidents. The highest number of collisions occurred in October, especially between 8:00 PM to 10:00 PM and 6:00 AM to 8:00 AM, when deer are most active. Collisions were more common on main roads and in areas with developed land or cultivated spaces, which are habitats that deer frequent. The study also found that counties with denser road networks, like Charleston and Greenville, had more DVCs. Using machine learning, a model was developed to predict DVCs based on factors like proximity to developed areas, water sources, and land cover types. The model showed that developed areas and traffic flow are significant contributors to DVCs, suggesting that managing traffic speeds, adding barriers, or adjusting road designs around high-risk areas could help reduce accidents. This study provides valuable insights for future strategies to prevent DVCs, particularly in high-risk areas during peak times.

Forest Industry Update (Source: Newsletter, NASAF Forest Market Committee)

Blog Summary – Growing the Future: Celebrating the Impact of Southern Forest Products

National Forest Products Week (October 19-25, 2025) celebrated the vital role southern forests play in the U.S. economy, with the region producing over half of the

nation's sustainable timber and generating more than \$251 billion annually. Southern forests are known as the world's wood basket, supplying timber for common products like paper, lumber, furniture, and flooring. However, they also provide lesser-known materials used in a variety of industries. For example, cellulose derived from wood is used in pharmaceuticals for tablet stability, in textiles like rayon for clothing and bedding, and even in bio-plastics for food packaging and medical products. Additionally, terpenes extracted from wood are used in fragrances and flavors for a wide range of consumer products.

The South also leads in renewable energy production through forest biomass, with materials like tree trimmings, sawdust, and wood chips being converted into energy resources like wood pellets, syngas, and biogas. These renewable energy sources help reduce carbon emissions and support cleaner energy alternatives. The region's forests are primarily owned by private landowners who practice sustainable forestry, ensuring the long-term viability of these valuable resources. By balancing resource use with ecological preservation, southern forests support over 1.1 million jobs and continue to contribute to both the economy and environmental health.

Canada Goose Impacts on Pond Ecosystems and Management Strategies

By Mike Windhorn and Molly Jones

Canada geese are grazers that prefer well-maintained lawns next to a body of water. They are very wary of predators, so they prefer large open areas where they can easily see an approaching predator. They also use ponds for rest and relaxation, where they feel safe.

Canada geese are not only destructive to ponds, but they can also compact soil and kill grass by overgrazing, make lawns unsightly with accumulations of droppings and feathers, and just be a nuisance due to their aggressive behavior and noise.

Water quality is significantly impacted by the nutrient outputs of Canada goose populations utilizing ponds. A mature goose can produce up to 2-4 lbs. of manure daily. During breeding season, the population of geese can increase 10-17%.

Manure droppings contain an abundance of phosphorus, a limiting nutrient, that will increase algal bloom potential as well as aquatic weed growth. Increased levels of phosphorus can lead to eutrophication conditions, increasing primary

productivity within the pond. Eutrophication can become harmful to the natural balance of a pond and result in fish kills due to depleted dissolved oxygen levels in the water. Droppings along the banks will be washed into the pond during rainfall events through runoff.

Goose manure contains heightened levels of E. coli bacteria. Fecal bacteria count in goose droppings are 25 times higher than in human waste. The introduction of goose manure into a water body may lead to significant bacterial levels, creating a human health hazard, inhibiting recreational use of the pond.

Many people have tried many different approaches to repel Canada geese from their property. They have discovered that not one single approach is effective in the long term, but an integrated approach works best.

The first step in an integrated management plan is to recognize what Canada geese are attracted to. They look

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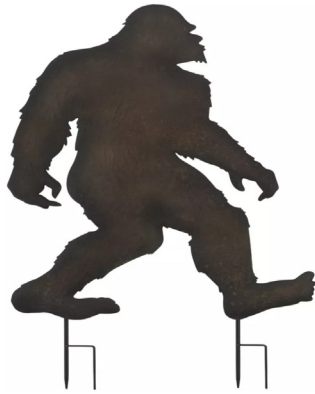
Canada goose impacts on pond ecosystems and management strategies cont.

for large, open, well-maintained lawns next to a pond. This situation provides food, water and an opportunity to see and escape from an approaching predator.

Making modifications to this situation will make the area less goose friendly. Installing rock borders, hedges, or fencing along the water's edge will make the grazing on lawns less attractive. An even easier and more cost-effective alternative is to simply stop mowing within twenty feet of the water's edge. Just allowing this natural riparian vegetative buffer to grow to a height of six inches or more will discourage the geese from leaving the water to graze.

Canada geese prefer to graze on the young, tender shoots of lawn grasses. Mowing less often allows lawn grasses to mature and become less palatable to geese. Fertilizing less and irrigating less will also reduce the number of young tender shoots.

Canada geese are very wary of predators and are always on the lookout. Predator decoys such as foxes, coyotes, snakes and Sasquatch are effective in repelling geese for short periods of time. Geese are highly intelligent creatures and will learn in just a few days that the decoy has not



Decoys can be effective in managing for Canadian geese if used properly.

moved and poses no threat. So, the location of the decoy should be changed every three to four days.

Canada geese are included in federal migratory bird protections, and it is illegal to touch, capture, or otherwise harm them without proper permits and/or outside of the federally regulated hunting seasons. It is permissible, however, to employ harassment techniques to make a pond or lawn less hospitable. These techniques include trained dogs and radio-controlled vehicles such as cars, boats or planes. Loud noises such as fireworks, air horns, whistles and blank guns are also effective in the short term. There are also chemical repellents that make the grass taste bad to geese. Most are nontoxic and based on human food additives, but need to be applied at least once per week and after significant rainfall to remain effective.

Finally, hunting is an effective method for controlling Canada goose populations. A state hunting license and a federal migratory bird stamp are required to participate in the various seasons. Please consult www.dnr.sc.gov for details.

For additional information, view Clemson HGIC fact sheets:

- <https://hgic.clemson.edu/factsheet/resident-canada-geese-along-the-waterfront/>
- <https://hgic.clemson.edu/factsheet/resident-canada-geese-management-options/>
- <https://hgic.clemson.edu/factsheet/e-coli-water-health/>

Factors Affecting Biochar Production Locations in South Carolina

By Puskar Khanal

Biochar and Importance in SC

Forests cover about two-thirds of South Carolina's land area and provide not only timber but also a vast source of renewable biomass- the leftover wood from thinning, logging, or forest management activities. Much of this material is currently underused, often left to decompose or burned in piles, which can increase wildfire risks and release carbon dioxide into the atmosphere. Biochar can store carbon for decades, improve soil quality, and reduce greenhouse gas emissions. This research study aimed to identify the optimal locations for biochar production facilities in South Carolina, maximizing environmental benefits while minimizing transportation and production costs.

Biochar is produced through a process called pyrolysis, which transforms wood waste into a stable form of carbon rather than allowing it to decay and release carbon dioxide. Once added to soil, biochar enhances water retention, improves soil fertility, and increases nutrient availability, thereby supporting the growth of crops, particularly in

sandy or degraded soils typical in South Carolina. Biochar also has environmental and economic benefits: a) Capture and store carbon, b) Reduce wildfire risk by converting excess forest fuel into a useful product, c) Create new economic opportunities for rural areas and forest industries, and d) Support agriculture by enhancing soil health and water efficiency.

Biochar Market in the South

The biochar market in the southern United States is gaining traction, driven by the region's abundant woody and agricultural biomass, a favorable environment for soil-amendment use, and growing interest in both regenerative agriculture and carbon-sequestration solutions. Recent reports indicate that the U.S. South already dominates the national biochar market, mainly due to its large forest and agricultural sectors, which drive feedstock availability and end-use demand. Technology and production models are evolving from small experimental units to more established mid-scale facilities aligned with forest-residue utilization,

continued on page 10

factors affecting biochar production locations in South Carolina cont.

and policy interest is increasing through federal and state programs that recognize biochar's role in environmentally smart forestry and agriculture. However, the market remains nascent with challenges including inconsistent quality standards, limited awareness among producers and landowners, and uncertain economics for distributed mid-scale operations. Addressing these barriers is crucial for the region to fully scale biochar production, link forestry residues with soil health markets, and achieve both environmental and economic benefits.

Study Approach

Using a spatial modeling framework, we identified nine optimal locations across South Carolina for biochar production facilities (Figure 1). These sites were determined through a multi-criteria decision analysis that incorporated forest biomass availability, slope, soil characteristics, proximity to croplands, wildfire occurrence, and accessibility to mills and transportation routes. Areas unsuitable for development such as water bodies, urban lands, or federally owned forests were excluded from analysis.

Results – Potential Biochar Locations in SC

The study identified Orangeburg, Chesterfield, Hampton, Darlington, Florence, Williamsburg, Sumter, and Clarendon Counties as the most suitable areas for biochar production facilities in South Carolina. These locations combine abundant forest biomass resources with proximity to existing wood mills and major transportation routes, making them ideal for medium-scale, distributed biochar operations. Across all nine priority sites, researchers estimated an annual biomass availability of roughly 71,000 tons, capable of producing approximately 14,200 tons of biochar per year. Orangeburg County showed the highest potential output, followed closely by Chesterfield and Hampton, indicating that these regions could serve as central hubs in a future biochar production network.

Transportation modeling revealed favorable logistics and manageable costs. Average hauling distances between biomass sources and proposed facilities were 30 to 35 kilometers, supported by well-connected road networks. The average transportation cost of \$12–13 per ton accounted for only about 13% of total delivery expenses, while processing and chipping averaged \$77 per ton. These findings suggest that biochar production could be economically feasible, particularly when the feedstock comes from forest thinning, restoration projects, or mill

residues that currently hold little or no market value. Strategic siting of facilities near these resource flows could significantly lower costs while improving the efficiency of biomass utilization.

Spatial mapping also showed a notable overlap between high-biomass forestlands and wildfire-prone areas, emphasizing the dual benefits of this approach. Establishing biochar facilities in these zones could help reduce hazardous fuel loads while converting waste material into a valuable soil amendment. South Carolina's forests, covering about 67% of the state's land area (5.2 million hectares), represent an underused resource for sustainable biochar production. Most forests are privately owned, dominated by pine plantations and mixed hardwood stands that generate substantial residues during thinning or harvesting. Converting this biomass into biochar aligns with broader environmental mitigation and sustainable land management goals, offering both ecological and economic value.

Biochar's long-term benefits make it an attractive option for both forestry and agriculture. It locks away carbon for decades, improves soil structure and water retention, and can enhance crop productivity, particularly in South Carolina's sandy, nutrient-poor soils. Counties such as Orangeburg, Chesterfield, and Hampton are particularly well-positioned to connect forestry feedstocks with nearby agricultural lands that could utilize biochar to enhance soil health. From a policy and economic standpoint, the development of decentralized, mid-scale biochar facilities could generate new opportunities in rural communities, including participation in carbon credit schemes, job creation, and market diversification. Furthermore, deploying mobile pyrolysis units in remote areas could expand access to this technology, reduce transport needs, and support local forest restoration and wildfire prevention efforts, making biochar a cornerstone of sustainable resource management across the state.

Reference

Sharma, S., & Khanal, P. (2026). Mapping biochar potential in South Carolina: A spatial strategy for climate mitigation and soil restoration. *Biomass and Bioenergy*, 205, 108532.

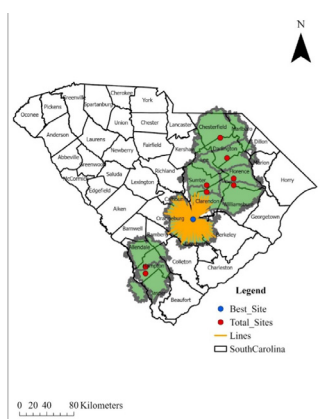


Figure 1: The blue point represents the best location for biochar production sites. The other red points represent the potential sites for biochar production.

Chainsaw Workshops

The Chainsaw Safety and Handling workshop

focuses on:

- basic safety and handling of chainsaws
- proper selection of well-fitting PPE
- selecting chainsaws based on intended use and physical limitations
- basic saw cuts on downed trees
- operating practices to reduce fatigue/body stress
- basic chainsaw maintenance

The Tree Felling workshop focuses on:

- directional felling using the open-face felling method
- techniques to stay in control while felling trees to reduce the risk of injuries and damage to residual trees or structures.

Register at: bit.ly/FNRClemsonEvents

Chainsaw Safety and Handling

- 12/11/25- Clemson
- 1/15/26- Sandhill REC
- 1/29/26- Aiken
- 2/13/26- Clemson
- 3/12/26- Clemson

Tree Felling

- 12/12/25- Clemson
- 1/16/26- Sandhill REC
- 1/30/26- Aiken
- 3/13/26- Clemson

*must have attended a chainsaw safety and handling workshop prior to tree felling

Workshop Details:

- Run from 9 am to 3 or 4 pm
- Participants bring their own lunch
- Registration is limited to 10
- Cost is \$75 ea
- Must be 18 years or older

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