

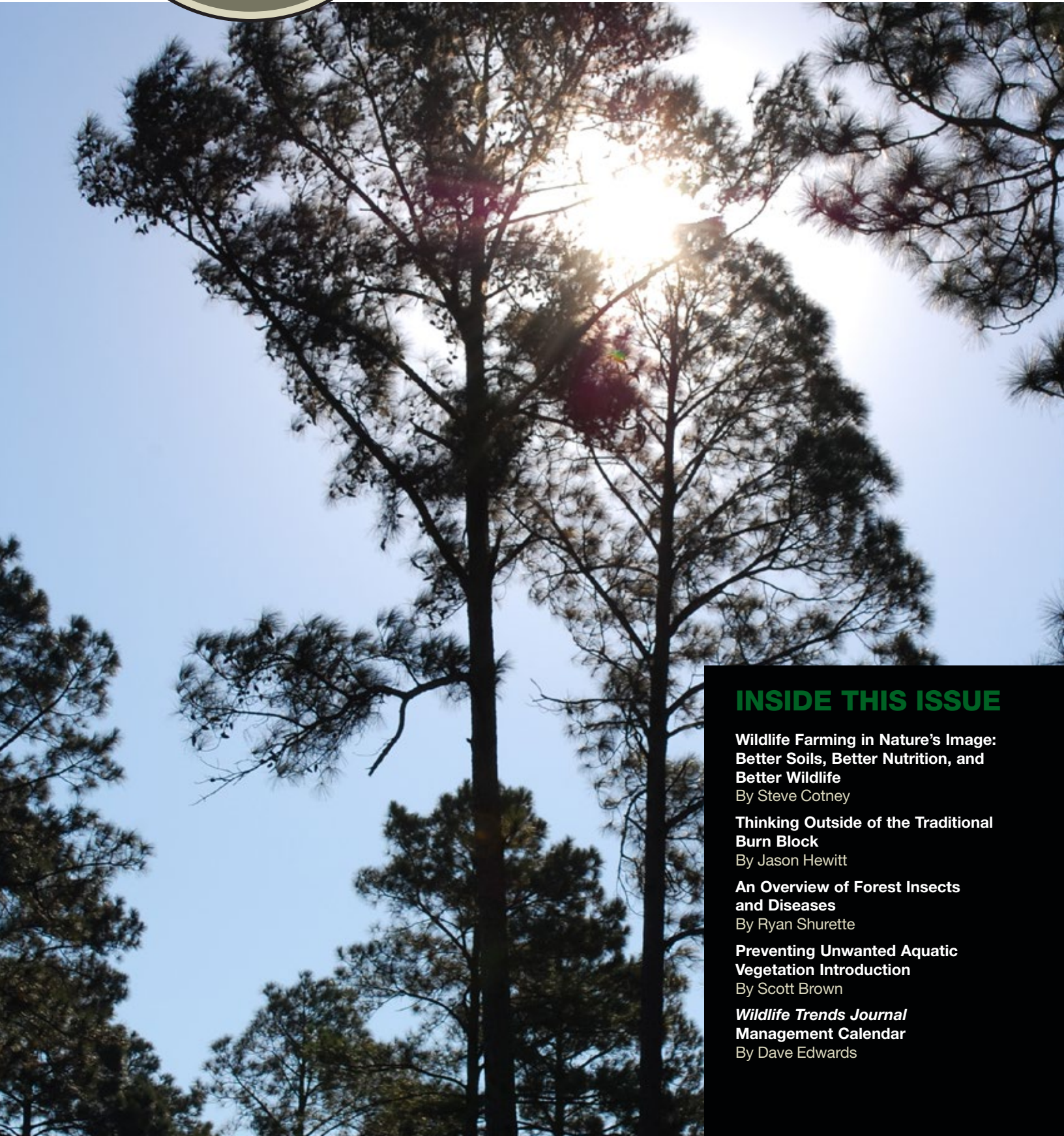
PRACTICAL WILDLIFE MANAGEMENT INFORMATION



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Earl Says...

Three years ago, I along with a group of friends joined together to start a new National Wild Turkey Federation banquet in our area. We named it the Black Belt Chapter because we are centered in Pike Road, Alabama which is a suburb of Montgomery. I am the President but this banquet was the brainchild of a friend of mine, Phil Savage. And now Phil has been nominated for the NWTF National Board of Directors.

For over 20 years Phil has been a volunteer, Vice President and State Chapter President for the NWTF. He's also founded two successful chapters including our local chapter. I know he will be a great asset to the organization and I'm asking for your help to get him elected.

If you are a member of the NWTF, you also receive a subscription to Turkey Country Magazine. In the latest issue is a tear out ballot for the Board of Directors. You must vote for three nominees or your vote won't count. Phil has suggested also voting for Ronnie Reagin (Georgia) and Scott Hill (New Jersey). There is no postage needed so simply make your selections and drop it in the mail.

Thank you for allowing me to tell you about my friend Phil and I would appreciate your support for him. The NWTF is a great organization and I know Phil will help make it even better.

Andy Whitaker
Publisher/Editor



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Cover photo by Andy Whitaker



Wildlife Farming in Nature's Image: Better Soils, Better Nutrition, and Better Wildlife

By Steve Cotney

Steven L Cotney is a Certified Wildlife Biologist with 21 years of land and wildlife management experience. Steve is currently the Farm Manager and Wildlife Biologist for Bunn Farm located in Tuscaloosa, Alabama. Steve can be reached by e-mail at slcotney1987@yahoo.com or by phone (256) 794-2143.



Tebow, the author's yellow lab, checking out the corn and soybean growth.

“There is nothing more difficult to take in hand, more perilous to conduct, or more uncertain in its success, than to take the lead in the introduction of a new order of things.”

– Niccolo Machiavelli (1469-1527)

Since 1997, much has changed in the deer management arena. In 20 years of White-tailed deer research, there has been a plethora of information generated from deer herd and habitat research. Many great improvements in technology are available today to aid landowners and hunting clubs to address every aspect of deer biology, deer management, habitat management, herd monitoring, hunter management/safety, etc. Landowners and hunting clubs can take this management information and tech-

nology to their property allowing them to be more self-sufficient while learning more about their property and deer herds than ever before.

During this 20-year period, the Quality Deer Management Association (QDMA) has become the leading “go to” organization for management of White-tailed deer herds and habitat. Early on, the QDMA established four cornerstones to establish a sound deer management program - **Hunter Management, Herd Management, Herd Monitoring, and Habitat Management**. All four must be present on any given property to have a sound deer management program. Not one single cornerstone will support a deer

management program on its own, but for purposes of this article it is only necessary to discuss a portion of Habitat Management.

Habitat Management can be broken down into either **Natural** or **Agriculture**. Now, let’s narrow down the Agriculture, better known as Food Plots. Food plots are planted for two reasons, either to attract deer for harvest in the fall/winter or to provide nutrition during spring/summer in critical growing periods. Open any hunting magazine today and you will find multiple articles addressing this subject and the many pieces of tillage equipment needed to implement food plots. Food plots are so popular amongst landowners/hunting clubs, but most only

plant during the fall/winter centered around hunting season.

Today we have some of the best variety of cultivars for every planting season or planting zone available to develop highly nutritious food plots for our White-tailed deer herds across the U.S.A. Some are suited for the spring/summer planting season and some are suited for the fall/winter planting season of the year, but each have their time, place, and purpose in the diet of White-tailed Deer. Combine both spring/summer and fall/winter food sources on any given property and you have a staple of year-round agricultural nutrition to offer.

Now that you’re thinking about food



One tractor pass system. Roller Crimper on front and No-till Drill in back. Most efficient way to plant.

plots and thinking this is another article about conventional food plot management, let's answer a few questions before you lose interest and possibly turn the page. Do I plant in "dirt" or do I plant in "soil"? Do I use every implement at my disposal to manipulate the ground into a suitable seed bed to plant? How many repetitions does it take me? How much time and fuel is involved? Do I allow plants and soil life to do the work for me? Think about that for a moment. This article is not about conventional food plot management. It's full of information, gives credit where credit is due, and will lead you to some individual farmers and scientists who are part of a **Soil Health Movement** spearheaded by the USDA-NRCS.

There are leads to help you establish practices to allow your "dirt" to become "soil". So, grab a beverage, a comfortable chair, and a computer with internet connection before you read this article. At some point it will be necessary to research the people and the documentation shared to get you thinking about changes you can apply to your food plot program next year to rejuvenate your soils and save money leading to year-round food plot production for your deer herds.

In 2012, Robin "Buz" Kloot, Research Associate Professor at the University of South Carolina, had no idea what impact he would have upon many in the agriculture industry after producing the documentary "*Under*

Cover Farmers". What you will learn from this documentary is it is not about the equipment, but about the soil. In 2015, we took the principles behind the alternate farming method and implemented them to change our wildlife farming practices on land under our control to reap the benefits in the soil, the crops, and money savings.

Since leaving Auburn University in 1996, we started our career paths as wildlife biologists beginning with deer research, then on to the deer hunting industry and private land/wildlife management. All the while learning the trade and hungry for the newest research findings and newest technology pertaining to deer management. Herd management, herd monitoring,



The buffalo of the future, a roll crimper. The roll crimper will roll and flatten the vegetation, while the crimper (blades) will crimp plants to terminate plant function. No need for herbicides.

and hunter management has always been part of our deer management programs, but we were always heavily involved in developing year-round food plots wherever we went in our career cultivating the latest and greatest “Magic Bean” food plots. Well, after a combined 40+ years of experience, we are here to share that magic beans only exist in the “Jack and the Bean Stalk” fairy tale. Jack used all the magic beans in the process of stealing the goose that laid the golden egg and the magic harp from the giant. If you have never heard the magic bean theory, then let us define it for you.

The “magic bean” that everybody has been looking for is defined as a plant that will grow in a wide variety of soils, not pH sensitive, drought resistant and is high enough in protein to max out a buck’s antler growth potential. Plus, it must grow fast enough to outgrow weed competition, withstand heavy deer browse, and be available for most of the year. Through the years, seed companies have spent millions of dollars look-

ing for this holy grail of cultivars, only to come up short. However, we have found an answer and it’s a no-brainer to us! It is not in what you plant, but rather a process of how you plant multiple food plot species at different times of the year spring/summer and fall/winter to complement each other. It will help you conserve the soil, it will provide year-round nutrition, and it will save you money. The most critical player in the process is the soil.

While a lot of people think of soil only as dirt, a medium used to just plant in, we are focusing on the biology that builds and makes up soil, basically giving it life. Soil is alive with structure and pore space, while dirt is dead and compacted. Over time, our conventional tillage practices have produced compacted dirt with a hardpan, a dead environment. One with low organic matter, low moisture retention, dependent on synthetic fertilizer, and highly susceptible to erosion. Dirt is only a part of the soil, texture and structure, and almost all the time we forget what truly makes

up the soil, what makes plants thrive, how plants exchange nutrients to soil life below the surface and then transfer nutrients to deer above the ground.

ECO-Farming, simply is just “Farming in Nature’s Image or Mimicking Nature”. To explain let’s go back in the history of the North American continent to establish basic understandings of the processes. Some 300 years ago or more, the Bison roamed the plains of the Mid-West during daily life cycles of an annual journey from here to there across the landscape. The Bison were never stationary and would frequent back to the same grounds only after an undefined time. In the process of their journey, the Bison were trampling down vegetation in tight groups and leaving bodily excretion of scat, which became armor for the soil and organic fertilizer for the new plants, respectively. The armor protected the soil from heat, rain compaction, and run-off, as well as increased water infiltration and water retention. Both the armor and scat decayed over

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time to create the house and food to soil organisms involved in the **Soil Food Web**. The Soil Food Web, in turn, provided nutrients back to the next seasonal generation of plant communities to propagate. The relationship of the Bison, Native Vegetation, and the Soil Food Web created some of the most fertile soils known in historical records to this date. And some years later would become very attractive to settling farmers due to their rich organic content and crop growth abilities.

“The destruction of soil is the most fundamental kind of economic loss which the human race can suffer.”

Erosion and Prosperity, *The Essential Aldo Leopold: Quotations and Commentaries*.

When our ancestors migrated from east to west across the North American continent implementing their European farming practices first to survive then later to thrive by making a living, they reduced the **Organic Soil Health** along

the way through repetitive tillage practices. Farming became harder and harder while Organic Matter and Soil Food Web declined driving soils acidic and poor in health. Farmers needed help to grow a crop and couldn't rely on the soils due to nutrient depletion. What was the remedy? Fast forward in time when **Synthetic Inorganic Fertilizers** hit the market, maybe somewhere in the early to mid-1900's. Modern chemistry at the time created a solution, commercially made N, P, and K, plus the addition of Lime could aid in crop growth.

No doubt this synthetic quick fix caught on real fast amongst farmers everywhere, but it became a detrimental decision over time. Farmers and soils became dependent upon the synthetic inputs to grow crops to make a living.

Fast forward to today, the commercially made N, P, and K production is dependent upon fossil fuels. Fossil fuel costs fluctuate, therefore driving the costs of inorganic fertilizer up and down. In the past decade or so, the prices have been so high few farmers could

afford synthetic inputs to farm and stay afloat. This resulted in many farmers losing their farms to the banks for the inability to continue farming in the conventional ways. Basically, the once fertile soils across the continent have been turned into “DIRT” and just treated as a textured medium to plant crops which are very dependent upon synthetic inputs to do so. These soils are compact, dry, eroded, and thirsty suffering from the lack of moisture retention. Did Mother Nature intend for this inorganic process? Absolutely not!

Now, change has come and is gaining popularity in the Agriculture Industry. A few farmers across this continent from Canada, North Dakota, Ohio, North Carolina, so on and so forth are changing their farming practices to mimic Mother Nature to improve soil health. These farmers are **ECO-Farming** and applying the following soil health principles: 1) Minimizing Disturbances by removing tillage practices, 2) Planting Crops with No-Till Planters, 3) Providing a Continuous

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Roll Crimped legume mix and planted corn to your left. Standing cereal grain mix before roll crimp on right. Over 50 to 70 percent of the cereal grain mix consists of Rye grain, the major contributor of biomass and armor for the soil.

Living Root to maximize biodiversity in the soil by use of cover crops after crop harvest, 4) Maximizing Soil Cover with cover crops (moisture retention, weed suppression, organic matter input), 5) Restraint in the use or not using Synthetic inputs at all (fertilizers, herbicides, fungicides, insecticides), and 6) Reducing field passes. In a nutshell, allowing Mother Nature to do her thing to convert plain dirt to soil and allowing the Soil Food Web to thrive once again.

Soil Health

What do you mean Soil Health? Soil Health means improving organic matter, improving aggregate stability, increasing water infiltration, increasing available water, improving nutrient cycling, and balancing and diversifying soil biology. What do you mean by Soil Food Web? The Soil Food Web is made of a diversity of organisms ranging in

size from the tiny one-celled bacteria, algae, fungi, protozoa, complex nematodes, micro-arthropods, earthworms, insects, small vertebrates, and plants. Each have a purpose to eat, grow, and move through the soil to create pore space. They make it possible to have clean water, clean air, healthy plants, and moderated water flow. The applied principles of farming in Nature's Image will increase the soil health which in turn increases the livelihood of the Soil Food Web. Now that's Mother Nature at her finest and she's been doing it for years without soil disturbance, synthetic fertilizers, fungicides, herbicides or insecticides way before our ancestors altered the process with conventional farming practices. And that's as simplified as we can explain ECO-Farming. The "E" = **Eternal No-till**, the "C" = **Continuous Living Cover Crop**, and the "O" = **Other Best Management**

Practices. ECO-Farming = Farming in Nature's Image.

Cost savings are adding up every year for these farmers. The cost of seed (cash and cover crops), soil tests, and diesel (plant, harvest, and re-plant) are the ECO-Farmer's biggest expense. These farmers are experiencing reduced to no fertilizer costs, reduced to no herbicide costs, no fungicide costs, no insecticide costs, reduced fuel costs, no second job to make ends meet, more time with family and other activities. These farmers are allowing Mother Nature and just seeds (Cash and Cover Crops) to improve Soil Health. Beneficial insect populations are thriving to predate the negative insects affecting crops. And the atmosphere is providing free Carbon Dioxide, Nitrogen, Phosphorus, and much more. Yes, FREE! These farmers are not in the "RED", they're in the "Black" and



Early growth of soybeans through cereal grain mix, basically coming through the armor. The armor will reduce soil temps, retain moisture underneath, and decay in future to improve soil organic matter and soil nutrients.

not dependent on cost-share programs. They are profitable and signing the back of the check, instead of the front. Their soils are nutrient rich and prosperous, producing crop yields equal to or above crop yields from conventionally managed farms.

What's really exciting to know about farming in Nature's Image? It was started by Agriculture Farmers about 20 or more years ago. Not by University Research, but just plain farmers like Gabe Brown (Bismarck, North Dakota), Dave Brandt (Carroll, Ohio), Ray Styer (Rockingham County, North Carolina) and others. Kudos to these guys for radically breaking away from conventional methods of the agriculture industry and to pioneer change on their farms. Since the recognition of the efforts of these farmers, the Soil Research Scientists from all over the U.S. have been catching up with the farmers to explain the

science behind Mother Nature's ways of Soil Health, like Ray Archuleta (NRCS), Dr. Elaine R. Ingham (Soil Food Web, Inc.), Rick Haney (USDA-ARS) and many others. And today, technology advances have allowed these soil scientists to capture and quantify data much easier to share results of a better way to farm to the public. Together, they all have sparked a Soil Health Revolution!

Now that you have been introduced to the Farming in Nature's Image method, we imagine the wheels are turning in your head. You're making plans to change your food plot strategies to improve your food plots and soil health on your property. Also, you're probably scratching your head wondering how to soil test the organic side of your soil. Let us introduce you to a new soil test, the **Haney Soil Health Test**. This test is gaining recognition and one we strongly

feel will replace the traditional soil test in the future.

*"To be a successful farmer one must first know the nature of the soil."
Xenophon Oeconomicus, 400 B.C.*

Haney Soil Health Test: It Rains Water Not Chemicals!

Recently, we listened to a presentation in Hickory, North Carolina, "Soil Health Principles" by Rick Haney in August of 2017 at the Southern Soil Health Field Day. The session covered the basic soil health principles necessary to build soil health in managing soil in Nature's Image, and most importantly soil testing procedures of Traditional Soil Tests vs. Haney Soil Health Tests. This is where it gets interesting in listening to the differences between the two soil tests.

During the presentation, Rick Haney shares information from two different

agriculture research locations illustrating the **Yields Attributable to Fertilizer and Fertilizer Uptake** by the crops, the **Magruder Wheat Test Plots**- Oklahoma State University (70 years of data) and the **Morrow Corn Test Plots**- University of Illinois (45 years of data). Respectively, 40% and 57% of synthetic fertilizer got into the Wheat and Corn. Respectively, where did the other 60% and 43% come from? Then he shared information from some of his colleagues growing 300 bushels of corn/acre in agriculture test plots with high rates of fertilizer and the control grew 220 bushels of corn/acre without fertilizer. How did the control plot grow 220 bushels of corn/acre with no fertilizer? How is that not the story? He then shares a slide showing the contents found in a surface acre of soil – 2,000,000 lbs. of soil in the first six inches, 40,000 lbs. of Soil Organic Carbon, 4,000 lbs. of Organic Nitrogen, 2,000 lbs. of Organic Phosphorus, and 1,000 lbs. of Soil Microbes (all rough numbers). At this point are thoughts in

your mind not generating questions to the obvious? That crucial nutrients might be coming from somewhere else other than synthetic fertilizers? What's the story on the organic side of the soil? Wait! First, let's look at what the Traditional Soil Tests have offered us for many years.

Traditional Soil Test (TST) are the most widely used to date, which only estimates concentrations of inorganic nutrients to determine fertilizer recommendations for agriculture. A TST is an analysis of soil chemistry contained in a soil sample to determine Nitrogen (N), Phosphorus (P), Potassium (K), pH levels, base saturation, cation exchange capacity, organic matter, Nitrate Nitrogen (NO₃), Soluble Salts, etc. The TST lab test and procedures use a variety of chemicals like Sulfuric Acid, Hydrochloric acid, Nitric Acid, Acetic Acid, Phosphoric Acid, KCl, Ammonium Acetate, Diethylene triamine pentaacetic acid, Ethylenediaminetetraacetic acid, and Ammonium Nitrate to assess the condi-

tion of the soil sample. These chemicals are harmful to humans. Don't you think these chemicals are also harmful to soil life? Yes! TST measures the Inorganic Nutrient side of the soil, but does not measure the entire Soil Biology. One credit to the TST is the measurement of **Soil Organic Matter (SOM)** and the SOM is the house for soil microbes. Basically, this is where soil microbes live according to Rick Haney and other Soil Scientists. With the description of TST and its ability to estimate the inorganic benefits in mind, let us move on to the Haney Soil Health Test to compare.

The Haney Soil Health Test (HSHT) program was developed by Rick Haney, USDA-ARS, and is designed to assess soil health by utilizing "green chemistry". The HSHT can be used on any soil type and management scenario. The "green chemistry" utilizes water, a soil microbial indicator, and a naturally occurring organic acid (H₃A). It is an integrated approach to soil testing using chemical and biological soil test data. It is designed to mimic Nature's approach

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to soil nutrient availability on the organic side of soil. Rick Haney states many times, "It rains water not chemicals!" HSHT basically asks the soil three questions: 1) What's your condition, 2) Are you in balance, and 3) What can I do to help you? HSHT determines Inorganic Nitrogen, Inorganic Phosphorus, Inorganic Potassium, Organic Nitrogen, Organic Phosphorus, Water Extractable Carbon, and Carbon: Nitrogen Balance. All this data is integrated to provide the following results:

Solvita 1-day CO₂-C is a measure of the microbial activity in the soil and highly related to soil fertility.

Water extractable organic C (WEOC) reflects the quality of Carbon in your soil. The food that soil microbes eat.

Water extractable organic N (WEON) is the amount of total water extractable N minus the inorganic N. it is highly related to WEOC that is broken down by soil microbes.

Organic C : Organic N Balance is a critical component of the nutrient cycle.

Soil Health Number looks at the balance of soil C and soil N and their relationship to microbial activity. The number indicates your soil health and what it needs to reach its highest sustainable state.

Cover Crop Mix is a suggested multi-specie cover crop planting mix based on soil test data to help increase Soil Health and improve soil fertility of your soil. %Legume and %Grass.

Available N-P-K present in your soil lb./ac.

Nutrient Value per Acre is the value in dollars of nutrients currently in your soil.

NO₃-N (Nitrate) is the amount of N in your soil like CST.

Haney Test N Evaluation lbs./acre is the amount of available N measure using the Haney Test.

Nitrogen Difference lbs./acre represents the difference in the amount of N using the Haney Test compared to the NO₃-N.

Nitrogen Savings/Acre represents the amount of nitrogen saved in dollars per acre when using the Haney Test

compared to CST measuring only NO₃-N based on current Nitrogen costs.

Fertilizer Recommendations provides recommended values from N, P, K in lbs./acre that your soil needs to produce stated yield goal.

Conclusion

Now you've been introduced to a new farming method and a new soil test method. You are probably scratching your head and thinking these boys are crazy. In sharing this information, there are two old time sayings that come to mind; 1) "You can't teach an old dog new tricks, and 2) "If it ain't broke, don't fix it. Trust us, we were skeptical at first, as well. The further we researched the methodology, the wheels got to turning in our minds and we experienced our "A Ha!" moment. It's simply a change of mindset in planting wildlife food plots. We are all in and are realizing the benefits of the whole process in just two years. ECO-farming is a smarter and a less expensive meth-

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After roll crimp and no-till activities, you have corn emerging through legume mix and soybeans emerging through cereal grain mix.

od of wildlife farming to improve soil health and allow year-round food plot nutrition to be less expensive!

As stated in the beginning, this article contains leads and we are giving credit where credit is due. We didn't come up with this farming method, they did and we learned from them. You can research everyone mentioned and the journey will lead you to additional sources. Each one will discuss ECO-farming on their properties and their success. Now keep in mind, agriculture farmers farm for a living and harvest crops for monetary gain, Wildlife Farmers do not. Wildlife farmers plant crops to nourish target animals of interest, like the White-tailed deer. For years, those managing food plots have always followed

techniques of conventional tillage used by Agriculture Farmers. These ECO-farmers just thought outside of the box and worked with nature to arrive at the same or better product with less out-of-pocket expense. So, why not change your way of thinking and join the Soil Health Revolution?

Part 2 of this article will be available in a later issue of *Wildlife Trends*. We will discuss our processes in developing our Spring/Summer and Fall/Winter food plots and share cost savings we have experienced to date. So, stay tuned for the updates. Meanwhile, we have created a Facebook page, **Natur3Way Wildlife Farming**. Natur3Way Wildlife Farming is a story within itself of two farms – One has been managed organi-

cally and the other is at the other end of the spectrum. Only separated by a river, we have the same soils and have managed the grounds for wildlife with conventional tillage for years – only one has had a complete tool chest of herbicides. We are seeking answers to two important questions: how much fertilizer do we really need and how much equipment can we do without? You can check in from time to time and view shared articles from across the country about Soil Health and our seasonal planting techniques. Ultimately, our goal is share our success, detour any pitfalls before others may experience, communicate cost savings and show year-round food plot nutrition can be achieved without breaking the bank.

Thinking Outside of the Traditional Burn Block

By Jason Hewitt

Jason Hewitt graduated with a BS in Biology from Georgia Southern in 2003 and is currently the General Manager of Clarendon Farms, owner and broker of Private Land Management, President of the SC Plantation Manager's Association, and the Vice Chair of the SC Prescribed Fire Council.



This picture shows several age classes of longleaf, the feed trail planted in Browntop Millet, first year cover on the right, and 3-year rough on the left.

“Whether you think you can, or you think you can't- you're right.”- Henry Ford. It took reading that one a few times before I really got it. It's a quote that I think about every time the word “can't” comes to mind. At 16, I started working on a plantation just outside of my hometown of Albany, GA. I learned a lot in those days but most importantly, I figured out plantation management is what I wanted to do for the rest of my life. It's a job that requires a lot of hats to be worn and expectations are high from those paying the bills. The drive for success and the scale at which we currently work forced us to create a system that is efficient, easy to follow, and provides everything that our target game species require to thrive- not just survive. This article is a focus on burning practices in a mature upland longleaf pine ecosystem on a property in Beaufort County, South Carolina with early release

quail hunting as a primary focus and perpetual sustainability in mind. It is impossible to only discuss the burning portion of our management practices without touching on all the steps we go through to maintain our upland habitat.

First, a little backstory of how and why we arrived where we are today. Like many other quail hunting properties, we employ a continuous feed trail on our quail courses and we use that trail as a road to hunt from during quail hunts. About five years ago, the quail hunting wasn't bad, at just under 3.5 coveys per hour, but it wasn't great either. We set out to eliminate as many inconsistent hunts as possible. Using GPS/GIS data, we mapped out the feed trails and began to look at exactly where the dogs ran during our hunts. This led to discovering large holes in our quail courses that were untouched by the noses of the birddogs. Surprisingly, our dogs seldom ran more than 40 to 50 yards laterally from the

feed trail. They may run 200 yards ahead of us but if they began to run out to the sides, the handler would inevitably call them back to the front. This led us to keep our feed trails between 80 and 100 yards apart minimizing overlap in the centers and maximizing the use of the property.

With the new feed trail in place, we had to figure out how to maintain diverse, quality habitat along every inch of the trail. Diversity in early successional habitat includes three things: **forbs, grasses, and shrubs**-each being equally important. For most sites, three years is the longest interval without manipulation before our cover is too tall to hunt. The desire to maximize efficiency, use the longest disturbance frequency interval possible to provide ample escape cover for quail, and the desire to evenly disperse this throughout the property led to using the feed trail as a fire break. This creates two very large burn blocks, stretching

across the entire property. We burn one side one year, the other side the next year, and do not burn anything for a year giving us a three-year burn rotation. Our off year is spent spot spraying fast growing, less desirable hardwoods such as sweetgum and cherry.

Traditional wisdom says a mosaic pattern is best for providing the necessary diversity for wildlife. On our scale, a true mosaic is painfully inefficient and mistakes are easy to make. If fire escapes a block it is not always easily contained. By using the feed trail as our fire break, we disk a worn path that is easily identified, making mistakes unlikely. Back fires are easier to utilize because they don't have to travel more than 100 yards. Every land manager with thousands of acres to burn hates to use backfire because they are just too slow. With this method, we primarily use back fires and flanking fires, making jumping breaks even less of an issue. Containment of spotting fires is



Map of our burn block.

easier with the next break never more than 100 yards away. The two cover types are evenly distributed throughout the property creating an edge and that edge is at the center of what we hunt.

After burning, we mow any stems that fire didn't top kill, avoiding clumps of longleaf regeneration. Before quail season, a checkerboard pattern is mowed every 30 to 50 feet using either a 6' or 7' mower. From one year to the next the mowed lanes move. After fire and three growing seasons, a mower has been over most of the property. Those areas with longleaf regeneration are important for the sustainability of our forest. We live in a high wind prone area with hurricane force winds two years running. The younger trees are not nearly as susceptible to high winds as the older trees. Should a tornado or hurricane take out our older trees, our forest will rebound quickly thanks to the age diversity found here. The diverse age classes also provide regular income and allow us to thin the older trees as the younger trees mature. By

letting the young trees grow in clumps we can thin the outside trees, leaving taller trees with less limbs and more desirable lumber to mature.

In a stand that is more than three years removed from logging or some other type of soil disturbance, we see mostly grasses and small shrubs the first year after a fire. After two growing seasons the shrubs are large enough for a covey to hide under and the grass becomes less prevalent. In year three, shrubs begin to dominate and thickets are plentiful but are still low enough to hunt after checker boarding. In areas that have been logged or otherwise disturbed, the first three growing seasons have more forbs than those more than three years removed from logging. In areas where native grasses begin to take over, we will disk after burning. This is only done in areas where the trees are far enough apart to avoid damaging the root systems of any large trees and again avoid areas with longleaf regeneration.

Most of you that manage property for

quail do many of these steps, if not all. If you want to experience better hunting, you need to change something. Look at your current feed trail overlaid on a satellite image. Use GIS measuring tools to see how far apart yours is. If you have birddogs, you are likely using a Garmin to keep up with them. Read the instructions and you can learn how to put the tracks on a satellite image. It might surprise you. Even if you don't have access to professional level GIS software, there are easy to use, free options out there with measuring tools. Course design should be mapped out with consideration of the natural topography and obstacles. I have worn out a mouse or two with all the digitizing and measuring. I had to stop looking at things like ditches, fields, or roads as obstacles. To create the most efficient hunting opportunities we had to make changes. We installed ditch crossings to make the feed trail flow like it needed to, let fields go fallow, and clear-cut areas to make new fields. This approach will not be for everyone

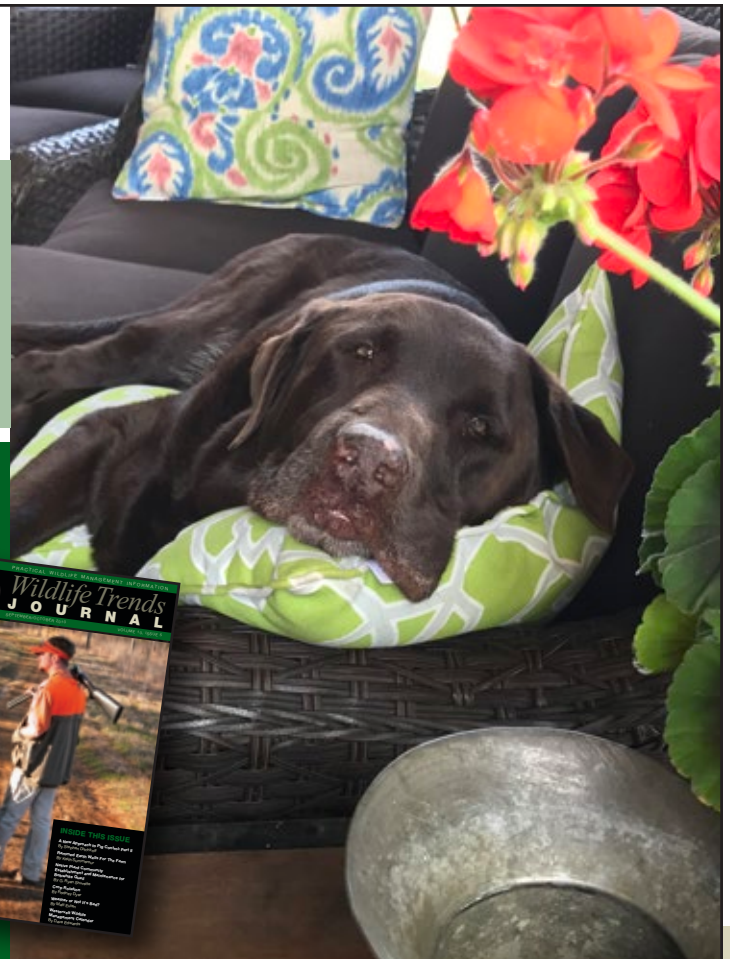
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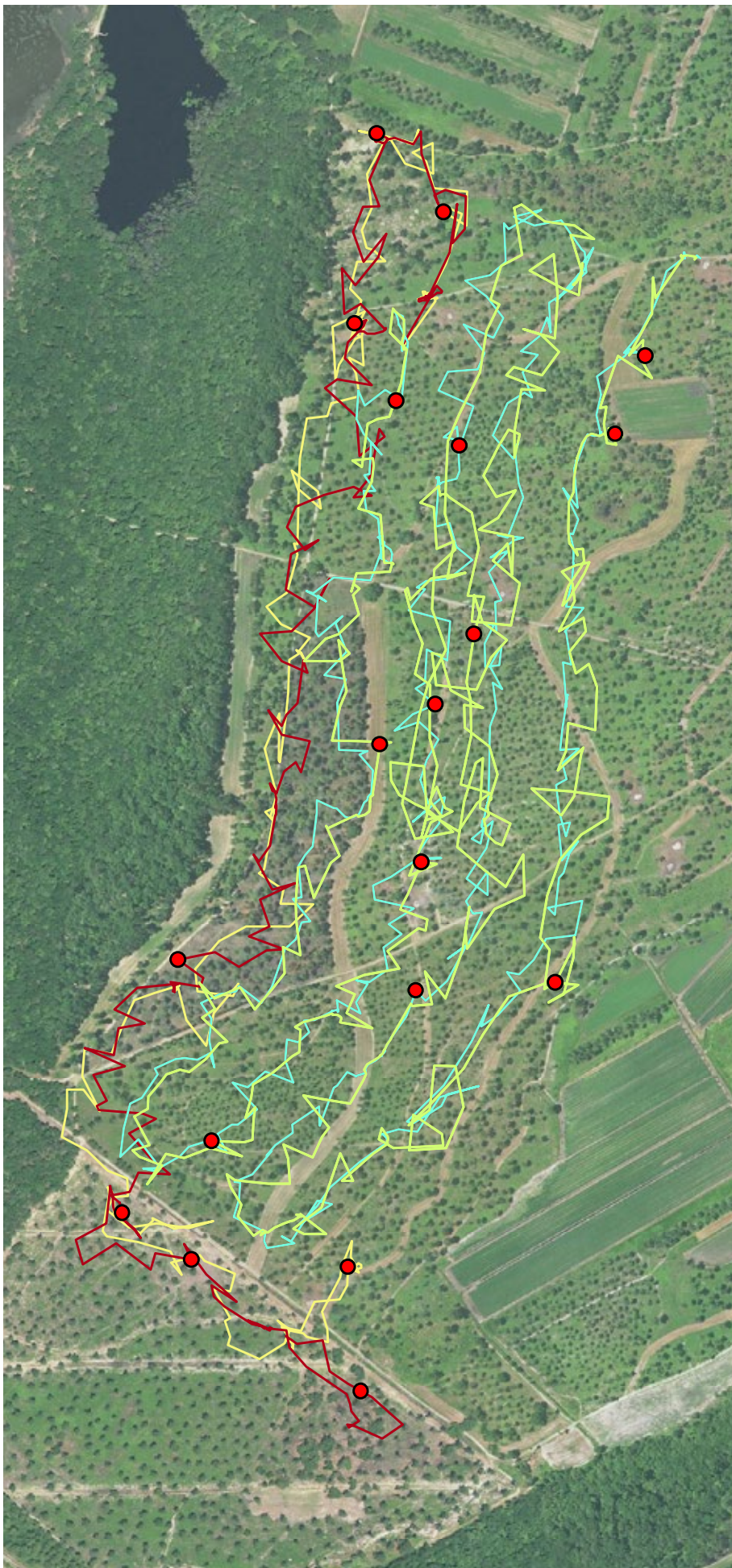
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but it has improved our hunting success significantly. Before undertaking these efforts, our season averages were under 3.5 coveys per hour. For the last two seasons, our best hunts were over 11 coveys per hour, and the combined average for the last two seasons is 5.34 coveys per hour. This past spring, four guys, four 4-wheelers, and a tractor with disk on standby averaged burning 300 acres per day. They would disk the feed trail early in the morning while waiting for the dew to dry and then stage the tractor in the area they were burning. The tractor was only used if rakes and water tanks couldn't get a jump contained.

Every property is unique and within the property there are areas that may respond differently to a specific treatment. Soil types, hydrology, weather patterns, site index, pH, past uses and practices, just to name a few, are variables that can affect the outcome of implementing any management strategy. There is no silver bullet management plan. Each property manager must gather as much knowledge as possible to determine what the best approach is for the land they are working. They need to recognize if a treatment worked and what to do differently if it didn't. We came up with the idea of the continuous burn block out of the desire to create the greatest opportunity to see quail in the air. It evolved into a system that is challenging to implement but straight forward to maintain. While this article may help you with a cookbook approach, my hope is to inspire you to try something new on your property. If you find a reason you can't, remember what Henry Ford said.



Map of our dog tracks during a hunt (the red dots are covey finds).

An Overview of Forest Insects and Diseases

By Ryan Shurette

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The adult southern pine beetles bore into the bark and excavate winding S-shaped tunnels with galleries for their eggs and larval brood. Photo USDA Forest Service.

A hundred and fifty years ago, the forests that occupied the eastern United States looked very different from the way they do today. This difference can largely be attributed to the disappearance of a single tree species. From Maine, south to northern Florida, and west to Mississippi, the American chestnut tree (*Castanea dentata*) once numbered in the billions. Among the hills and uplands of the Appalachian Mountains and the piedmont and ridge and valley regions it was sometimes the single most common tree species. About one in four trees is believed to have been an American chestnut in some forests. Historical accounts from early botanists and naturalists describe how some mountain landscapes would turn creamy white each year during summer when this tree flowered. The American chestnut has been called the perfect tree. It was big; commonly reaching a diameter of ten feet

across and growing to a hundred feet tall. It produced excellent strong, straight, and rot-resistant lumber and timbers, and was often used for log cabin construction, fence posts, cross ties, and framing timbers and lumber. American chestnut trees also produced tons of sweet nuts in the fall that were hugely important for a wide variety of wildlife species. Raccoons, squirrels, deer, turkeys, passenger pigeons, and many other wild animals enjoyed an abundant food source in the form of chestnuts on the forest floor. According to many historical accounts, the sight of “clouds” of hundreds of thousands passenger pigeons darkening the skies to feed on ripe chestnut mast was once commonplace. The abundant chestnut fruits were also highly sought after by humans and their livestock. Cattle and hogs were free ranged in the forests around the time of the chestnuts ripening, and wagons (and even railcars) were loaded with the sweet fruits to be sold in the cities as holiday treats.

And then around 1904 an organism appeared on the scene that would alter the ecology and culture of the eastern American forest. A bark fungus called *Chryphonectria parasitica* (also known as the Chinese chestnut blight) was accidentally brought into the country on imported Chinese chestnut trees in and around the area that is now the Bronx Zoo. This fungus grows and produces toxins in the tissues of the cambium layer under the bark of chestnut trees. This tissue damage essentially girdles the tree and kills it within a few months. The American chestnut did not have any natural resistance to the Asian pathogen, and so from New York the fungus spread like wildfire across the eastern half of the country via airborne spores. By 1945 the damage was done. Today only an isolated few American chestnut trees remain, most in the form of small stump sprouts that are periodically killed back before they can reach the age of flowering. Using the limited amount of genetic material that has

been collected from the few blight-resistant trees that persisted, researchers and conservationists are building a seed source for restocking and restoration for this once dominant tree. Perhaps someday this species will return to some level of its former glory but the ecological and economic impacts of its absence for such a long time is difficult to quantify.

A very similar fate unfolded for the American elm. Another stately tree specimen, the American elm was prized for its aesthetic beauty and shade in both rural front yards and along the streets of towns across the country. But it was also suddenly and drastically reduced across its range in an amazingly short window of time due to Dutch elm disease. A different species of non-native fungus (*Ophiostoma ulmi*) was responsible for this disease. The first cases of Dutch elm disease were observed in 1930 in Cleveland, Ohio and by the late 1980’s it had decimated the American elm population. The *O. ulmi* fungus produces microscopic spores which are transmitted from infected trees to healthy trees by two kinds of elm bark beetles; non-native European bark beetles (*Scolytus* spp.), and the native elm bark beetle, *Hylurgopinus rufipes*. The beetles do not kill the trees outright, but they inoculate them with the fungus. The American elm was hardest hit of the elm species. Other elms (including winged and slippery elms) were less susceptible to mortality from this disease. If you enjoyed the shade of a large American elm as a child, chances are it is gone today.

The two examples above clearly illustrate how diseases and insects can significantly affect forest ecosystems across large landscapes, especially when those pathogens are not native to the region. These however are extreme cases of wide-spread diseases in trees, and most native pests and fungi are less likely to cause range-wide mortality events. In this article we will provide an

overview of the biology, damage, and potential control of some of the most common forest insects and diseases in the East. Since so much of our region’s timber and forestry industry involves pine forests, we will focus predominately on those insect and diseases that affect pines. However, we will also mention a few important hardwood pests to be watchful for as well.

Pine Forest Pests

One of the most important pine forest insects in the US is the **Southern Pine Beetle** (*Dendroctonus frontalis*), or SPB (Figure 1). This small black bark beetle measures about 2 or 3 millimeters long and ranges from the forests of New England down into and across the entire southeastern United States, westward into Texas, Arizona, and New Mexico, and southward down into Mexico and Central America. As its name implies it infects the cambium layer of various pine species (including but not limited to loblolly, Virginia, pitch and pond pines in North America) through its life cycle. The SPB will also infect longleaf and other pine types but epidemic outbreaks are not typical in the less-preferred pine species. During normal, non-epidemic years the SPB populations remain at relatively low levels and infestations (spots) are seen only sporadically across the local landscape, often following damage to individual pine stands caused from drought, fire, harvest operations, or other diseases. However, this



One of the most important pine forest insects in the US is the Southern Pine Beetle. Photo USDA Forest Service.



Southern pine beetle infestation may be identified by whitish or yellowish pitch tubes in the bark crevices that look like pieces of popcorn stuck to the pine tree. These pitch tubes will typically be concentrated on the upper half of the tree. Photo CT.gov, Dept. of Energy and Environmental Protection.

beetle can cause major and wide-sweeping damage when local conditions warrant and populations swell to outbreak levels. Some experts suggest a 6-10-year cycle for local population peaks for SPB, although they typically occur at high concentrations in one or more locations somewhere within the range each year. The USDA reports annual estimated timber losses from SPB to be in excess of “100 million board feet of sawtimber and 30 million cubic feet of pulpwood” (Clarke and Nowak, 2009). This same report indicated a timber loss of \$1 Billion during the outbreaks of 1999-2002 in the eastern US.

Since the SPB is a native species, our native pines are in some ways adapted to dealing with them in low numbers. A healthy pine tree can sometimes produce enough resin to “pitch” out the beetle as it attacks the tree. Pine trees that are stressed however are more susceptible to a successful attack. These stressed host trees produce certain chemical indicators that the beetles can recognize and hone in on. Female adult beetles release pheromones themselves when a suitable host tree is found. This

pheromone attracts males as well as more female beetles. As males arrive they too produce pheromones that attract even more beetles. What the SPB lacks in size it soon makes up for in numbers. The adult beetles bore into the bark and excavate winding S-shaped tunnels with galleries for their eggs and larval broods (Figure 2). The larvae feed on the cambial tissues and when sufficient numbers infect a pine tree, its natural defenses collapse and the tree begins to die as the cambium function deteriorates. The larvae pupate and the emerging beetles expand into adjacent trees and the “spot” grows.

An SPB infestation can be identified by whitish or yellowish pitch tubes in the bark crevices that look like pieces of popcorn stuck to the pine tree (Figure 3). SPB pitch tubes will typically be concentrated on the upper half of the tree. The infected tree’s needles will remain green in the early stages of infestation and then fade into yellow and red as they die. The head of the spot typically moves in one direction or another, away from the dead and dying trees. Although there are native preda-

tors of SPB’s, including several woodpecker species and the clerid beetle (*Thanasimus dubius*), the most effective ways of dealing with them on a property is through vegetation management. Preventative thinning in a young or overstocked pine plantation is one of the most common ways of mitigating the threats and losses from SPB. Not only does thinning in dense pine stands open up the canopy for the release and expansion of herbaceous understory plant communities and wildlife habitats, but it also reduces the stress of the stand making it less likely to attract SPB in the first place. Infestations in thinned healthy loblollies for example have been shown to be less likely to develop into spots of more than a few trees, and are also slower to expand. Longleaf pines are typically more resistant to SPB infestation (due in part to the increased amount of resin production) and are less likely to become infected. Once a spot develops, the most common and effective method of control is to perform a “cut and leave” or a “cut and remove” treatment around the head of the spot, felling the yellow fading infected trees and a buffer (of about two tree lengths) of the green unaffected trees inward towards the spot head. The trees are either salvaged (removed) if they are commercially viable or left in place to decay. Early suppression treatment will generally result in fewer trees lost. Chemical treatment (lindane) of infested spots was sometimes used in the past but it is not common now.

In the South, other common pine bark beetles include the **Black Turpentine Beetle** and the **Ips Engraver Beetle**. While SPB’s typically attack the top half of the tree, Black turpentine beetles usually concentrate on the lower 8 feet of the trunk and Ips engravers may attack the entire tree. Therefore, the pitch tube concentration zone is one of the initial methods to help determine which species is affecting your pines. Sloughing pine bark can

be also removed to examine the characteristics of the insects and their burrows. Ecology and life cycle of these beetles is similar to the SPB however damage and treatment implications can be different, depending on which species is present. At ¼" in length, the black turpentine beetle is a bit larger than the SPB. It has a rounded abdomen like the SPB and can be similar in color, but it creates significantly larger pitch tubes near the base of the trunk. This species burrows within the pine cambium in a downward direction, parallel to the wood grain. Eggs are laid along these tunnels and larvae follow the adult tunnels, feeding on the soft inner bark. Black turpentine beetle infestations are typically much less of a concern than those caused by SPB and damage is generally at a much smaller scale. Chemical treatment (including insecticides such as permethrin and bifenthrin products) is still sometimes used as an effective method for turpentine beetle suppression. Ips engravers are smaller than turpentine beetles (usu-

ally less than 3 mm) and have a spiked, or "chewed off" abdomen. They create small pitch tubes that resemble those made by the SPB. Ips burrows are straighter than SPB and typically run parallel to the wood grain. Eggs are laid in these burrows and upon hatching larvae typically feed out from them at 90-degree angles, creating the characteristic "engraved" patterns under the bark. Engravers also serve as vectors for and carry the spores of *Ophiostoma* and *Ceratocystis* fungi, which cause "blue stain". As more and more engravers inoculate the tree with fungal spores, these fungi grow and infect the tree with threadlike mycelia, eventually degrading the phloem and penetrating into the sapwood killing the tree. Therefore, an Ips-infested tree usually cannot be saved and would not generally be treated with an herbicide.

A few species of weevils are also pests of yellow pines. Weevils are similar to the beetles described earlier but are generally larger (about ¼ inch long) and have stouter legs and elongated



Ips engraver beetle burrows are straighter than SPB and typically run parallel to the wood grain. Eggs are laid in these burrows and upon hatching larvae typically feed out from them at 90 degree angles, creating the characteristic "engraved" patterns under the bark. Photo USDA Forest Service.

"snouts". The **Pales Weevil** (*Hylobius pales*) is one of the more common species and its preferred host species are loblolly, longleaf, shortleaf, slash, pond, and sand pines. Sometimes referred to as "reproduction weevils", Pales weevil adults feed on pine seedlings while the larvae feed on the roots of cut or damaged pines. Adults are attracted to the odors from fresh flow resin and use these damaged trees as hosts for their



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young. For Pales control, pesticides such as Sevin or Malathion are often used in some areas. However, the most economical strategy for control is to postpone planting of a recently harvested pine stand for a period of a year. This window of time will reduce or eliminate the risk of emerging adults affecting the newly planted seedlings. A similar species, **Deodar weevil** (*Pissodes nemorensis*) larvae feed on the inner bark tissues much like bark beetles, however they actively feed during the fall and winter instead of in warmer months. The larval chambers of the Deodar weevil appear under the bark as rounded chip cocoons and are easy to see in infested trees. Adults emerge in spring and remain inactive through the warmer months until fall when the cycle starts over again. The insecticides mentioned above can be used to treat infestations but the Deodar weevil is also a vector for **pitch canker fungus**, which can also affect and cause mortality in yellow pines itself.

Other pine pest insects include the **Pine Sawfly** (*Neodiprion* spp.), the **Nantucket Pine Tip Moth** (*Rhyacionia frustrana*), and the **Pine Webworm** (*Tetralopha robustella*). There are several species of pine sawfly and they can affect virtually all the southern pine species. The flying adult looks somewhat like a wasp and females deposit their eggs along the grooves of pine needles. Upon hatching, larvae begin to feed on the outer parts of the needles, defoliating branches, seedlings, or the even the majority of the crown in extreme cases. Pine sawfly infestations do not usually kill or significantly harm the host tree and therefore are seldom cause for concern. Although there are several effective insecticides (like Sevin or Malthion) that can be used to protect individual ornamental or otherwise important trees, native predators typically reduce infestations before they can become a concern. The Nantucket pine tip moth also affects most southern pines but does not typically infest long-



Pine sawfly infestations (larvae shown here) do not usually kill or significantly harm the host tree and therefore are seldom cause for concern. Photo USDA Forest Service.

leaf pines or white pines. The elusive adult moth is only about ¼ inch long and is brownish gray with reddish patches on the wings. More commonly seen is the brown foliage, dying tips, and other damage caused to the meristem shoots of the pine branches. The larvae of the moths hollow out the shoot tips as they feed and then pupate there before emerging. Like pine sawfly, the tip moth does not usually kill the tree but can cause stunted or deformed growth in some cases. In most cases no forestry control measures are ever recommended. The pine webworm is also a type of moth which is similar in its ecology and life cycle to the tip moth. Instead of infesting the inside of the pine shoot however the larvae build a silken web (typically filled with brownish frass pellets) near the ends of the pine seedling shoots where they live and feed on the needles. Several larvae typically occupy each web nest. Like the tip moth, the pine web worm seldom kills the seedling and control management is not generally needed.

A variety of **fungi** are known to affect live pine forests across the US. While each species has its own niche and attack strategy, all are similar in that they grow in or on the tree tissues and cause harm by one of a few ways;

stealing nutrients, producing toxins, or blocking the physiological functions of the tree. We will mention a few of the most important to the timber and forestry industry. **Brown Spot Needle Blight** is a fungal disease caused by *Scirrhia acicola* that primarily affects longleaf pine in the South. Seedlings in the grass stage are most susceptible. This fungus is identified by yellowish spots that develop on the seedling needles, which eventually turn to a brown color. As the fungus persists, the seedling will defoliate in the affected areas. This disease doesn't typically kill the seedling but it does generally cause significant reduction in growth rates and vigor. For a recently planted longleaf stand, the most common and effective control measure is to prescribe burn the longleaf plantation to kill the fungus and spores and to encourage the longleaf regeneration to bolt out of the grass stage. Certain fungicides (such as Chlorothalonil) can also be used where burning is not an option.

Heterobasidion annosum is the name of the fungus responsible for **Annosus Root Rot**. This is an important disease with regards to commercial production of pine pulp and timber. Like other fungi it often enters the host tree (mostly loblolly or slash pine) via a break in the bark or other wound. Once inside the tree it migrates to the heartwood and down into the roots where it causes decay. This rotting of the root tissues will cause sparse crowns in an infected stand and has a high mortality rate over time. The easiest way to identify the Annosus rot fungus is by the whitish tan conk, or mushroom body, that often appears at the base of infected trees, although not all infected trees will express conks. Annosus root rot is often associated with well-drained sandy soils and local county foresters can often provide soil maps with high risk soil areas. Thinned or select cut tree stumps in an infected stand should be covered with borax. However, once the fungus infects a stand it is often necessary to

clear-cut the stand and start over.

Fusiform Rust (*Cronartium quercuum*) is another serious pest that typically infects loblolly and slash pines. This fungus uses oaks as its alternate host and it produces orange spores on the underside of the oak leaves. On pines it forms distinctive orangish-yellow blisters that form on stems or trunks in the springtime. The blisters can develop into swelled canker-like masses. Seedlings may die within a few years of infection while older pine trees may be weakened or eventually break at the infection site. Control measures for fusiform rust may include using a genetically resistant seedling source, or specific systemic fungicides (like Triadimefon) for protection of individual ornamental pines. Sanitation thinning to remove heavily infected trees in a stand is also a common practice. **Little Leaf Disease**, caused by the fungus *Phytophthora cinnamomi*, predominately affects shortleaf pines as they mature (after 20-25 years old). This disease usually affects shortleaf stands on poor,

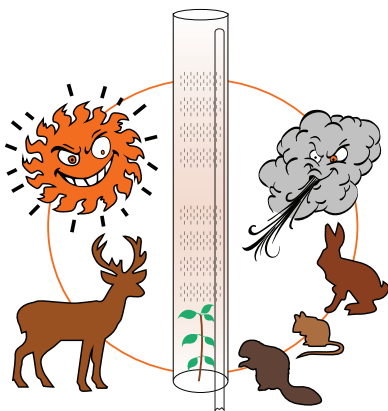
highly eroded or clay soils. The fungus is spread by spores in the soil that infect the root hairs of the tree. As the disease progresses the tree becomes chlorotic and yellow, and often produces smaller needles and abundant “stress cone” crops before it dies. Reducing prescribed fire in shortleaf stands on sites that have high risk for little leaf disease has been recommended as a possible preventative measure. A similar fungal agent, *Leptographium* spp., can cause **Loblolly Decline** in loblolly pine stands on contaminated soils. As in little leaf disease, loblolly decline is typically expressed in older trees (over 30 years) on poor, highly disturbed sites. This disease is often spread by a number of bark beetle and root weevil species (Eckhardt et al., 2007). For prevention of this disease land managers should consider planting loblolly on higher index sites where they are more naturally occurring. Longleaf pine may be a better choice when replanting stands on dry, poor soils and ridges where stress is likely.



Control measures for fusiform rust may include using a genetically resistant seedling source, or specific systemic fungicides (like Triadimefon) for protection of individual ornamental pines. Sanitation thinning to remove heavily infected trees in a stand is also a common practice. Photo USDA Forest Service (R. Anderson).

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Hardwood Forest Insects and Disease

Hardwoods (which are flowering plants) are very different, both physiologically and ecologically, from conifers. Therefore, it stands to reason that the pests that affect them are usually quite different as well. But just as in pines, hardwoods are plagued by insect and fungal pests that sometimes result in significant damage over time. The **Gypsy Moth** (*Lymantria dispar*) is one notorious insect pest of eastern hardwood forests. The gypsy moth is not native to the US. It was introduced from Europe by a French scientist in 1869. The first large outbreak was recorded in 1889 in Massachusetts and it has now spread across the Northeast and into parts of the West, although it has not



*Dogwood anthracnose is caused by the fungus *Discula* sp., and in the past couple decades this disease has become a serious pest of flowering dogwoods in the East. Early symptoms include tan spots on the leaves (with purple spot margins). Photo University of Maryland Extension*



The Emerald ash borer is an invasive jewel beetle from Asia that feeds on ash tree species. It arrived in Michigan near Detroit sometime around 2002. Photo USDA.gov

yet become a serious pest in the Southeast. The adult female moth is white (males have more dark brown lines) with fine gray or black markings on the wing. Gypsy moth larvae (caterpillars) have a distinctive pattern of 5 pairs of blue spots and 6 pairs of red spots along the back. This species can be extremely prolific during outbreak years and larvae can defoliate entire hardwood forests. While there are some semi-preventative tactics (fertilizing, covering trunks with burlap, etc.) that homeowners might employ, monitoring is about the only measure that typically occurs in forestry applications for this species (McManus, et al, 1989). A similar species, the **Forest Tent Caterpillar** (*Malacosoma disstria*) is widespread and infests a wide variety of hardwood species. This plain looking moth is native to the US and its larval form defoliates leaves and branches much like the gypsy moth, however outbreaks are not usually as severe. According to the USDA, outbreaks occur at 6 to 16-year cycles in northern regions but southern forests see annual infestations in many areas. (Batzer and Morris, 1978). Larvae grow to about 2 inches long and are black and slightly hairy with beige footprint shaped spots down the back. Another very similar species is the **Eastern Tent Caterpillar** (*M. americanum*) whose larvae are also black but have a white stripe down the

back with pale blue spots on either side. Eastern tent caterpillars typically choose cherries, apples, crabapples, or pecans as their hosts. Both tent caterpillar species' larvae spin web tents where they can take refuge from avian predators. Control of these two native species is not usually needed due to the many native predators (including birds, wasps, flies, and fungi) that keep populations in check. *Agrilus planipennis*, aka the **Emerald ash borer** is an invasive jewel beetle from Asia that feeds on ash tree species. It arrived in Michigan near Detroit sometime around 2002. Like so many other invasives it likely hitched a ride in plane or ship cargo. In its native Asia it typically occurs at low population levels and does little harm, but here in the US it has been very destructive. The larvae feeds on the inner tissues of ash trees and according to the Arbor Day Foundation it has killed around 40 million ashes in the state of Michigan alone. The emerald green adult is fairly easy to identify, as well as the D-shaped exit holes it leaves as it emerges from the tree trunk bark. This species has been mainly affecting forests in the midwestern and northeastern states but it is now spreading into other areas as well, including many southern states. Movement of firewood is believed to be one of the chief ways it's spreading so quickly, and as a result quarantine zones in infested areas (including some counties in Texas, Louisiana, Arkansas, Alabama, Tennessee, Georgia, and the Carolinas, to name a few) are now in place. It is illegal to transport firewood from these areas. A hotline has also been set up for sightings of this beetle.

In hardwoods, there are several fungal agents that can cause diseases. **Anthracnose** for example is a fairly common group of diseases caused by *Gloeosporium* spp., *Gnomonia* spp., and *Apiognomonia* spp. that affects sycamore, maple, oak, ash, and other hardwoods. Symptoms typically include lesions on the leaves (often with color-

ful margins at the edges of the damaged tissues beginning near the leaf veins) although the effects vary depending on the hardwood host species. In sycamores, it often also affects the twigs and shoots. Control management is generally not needed and Anthracnose is generally considered to be of little importance to forest health as it seldom kills trees, except in the case of **Dogwood Anthracnose**. Dogwood anthracnose is caused by the fungus *Discula* sp., and in the past couple decades this disease has become a serious pest of flowering dogwoods in the East. It is unclear whether this fungus was recently introduced or mutated into a more destructive pathogen, but it has affected dogwood populations across their range. Symptoms include tan spots on the leaves (with purple spot margins), twig die-back and epicormic sprouting on limbs and eventually the trunk, and brown cankers at the base of dead limbs. If detected early, pruning of

affected limbs and a spring application of a balanced (not high nitrogen) fertilizer may curb this disease on ornamental or high value dogwoods, but once significant die-back occurs the tree will typically not be able to be saved. Along coastal plain areas of the southeast, **Laurel Wilt** is a relatively new disease that kills young and mature redbay trees, as well as others in the laurel family (including sassafras and avocados). The causal fungus (*Raffaelea* sp.) is transmitted by the tiny (2 mm) non-native **Redbay Ambrosia Beetle**, which is believed to have been introduced from southeast Asia. Laurel wilt has already affected entire stands of redbay in Florida and adjacent gulf coast states. The main recommendation for control is to avoid transport and movement of contaminated wood or debris. Research is ongoing in an attempt to find out more about this disease, determine its potential extent, and the indirect effects from its impacts.

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Preventing Unwanted Aquatic Vegetation Introduction

By Scott Brown



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Scott Brown is a biologist and regular contributor to *Wildlife Trends Journal* with over 30 years experience in research and managing natural resources throughout the Southeast. Scott founded Southern Sportsman Aquatics & Land Management in 2007 and now has clients from Texas to Florida, and into the Carolinas. Scott can be reached at scott@southernsportsmanaquatic-sandland.com or (336) 941-9056.

Private landowners, cities, counties, states and the Federal Government have spent millions of dollars annually to manage undesirable aquatic plants, and every resource user can help prevent the spread of undesirable plants and animals.

It is not uncommon for vegetation to be introduced into a waterbody where it was not intended. Some shoreline and submerged vegetation is good for fish and wildlife, but there are many species of aquatic vegetation, both native and non-native (exotic), that are not desirable for smaller, privately owned and managed lakes. Some plant species are more easily transplanted from waterbody to waterbody than others. Knowing how plants are moved around and the biology of particular species can help prevent the unwanted movement and establishment of undesirable aquatic plants. Properly identifying aquatic plants and knowing how they can propagate helps you know what measures are needed to be taken to stop it from being successfully introduced into your lake. Some plants can spread through seed only, some can spread from seed and/or roots (even by underground plant parts being uprooted and

relocated), some by fragmentation, while some aquatic plant species spread by all methods.

How Plants Spread from Lake-to-Lake

There are four ways plants can move from waterbody to waterbody. Plants can be spread by **wind broadcasting seeds, water movement, animals and humans**. Only one of these methods can be drastically reduced with proper preventative measures.

Plants such as Cattail spread quickly via seed heads exploding in fall and winter, along with help from wind and water. The seeds get spread in waterbodies they are currently in and surrounding and can begin to grow in waterbodies receiving wind currents from the established site. Seeds from various aquatic species can be transport-

ed to a site even before a lake is built, and once a waterbody is complete, conditions become right for that particular species to germinate and it shows up without any human assistance.

Flowing water can also spread aquatic plants. Some species such as Hydrilla, coontail and Naiad can spread by fragmentation. Plants like Nuphar (water lilies) can spread by roots being uprooted, then flowing down stream and re-establishing. Storms, boat propellers and animals may fragment plant species and then they flow downstream to another waterbody, or can be transported by flood waters from nearby, unconnected, waterbodies including creeks and rivers.

Animals such as ducks, wading birds and grazing animals (wild and domestic livestock) can move plant species from site to site. Ducks can transport plants

in their bill or on their feet. Wading birds such as herons and others feed on small fish in the shallows where vegetation is present. Some plant material may get in their mouth by accident and expelled in a different lake, or plants or seeds stick on their feet while flying is not uncommon. Even birds of prey such as eagles and ospreys can move plants by grabbing plants with their fish and later setting down to eat, or accidentally dropping everything over another nearby waterbody. Some plants may be consumed by wild or domestic animals from one waterbody and deposited through defecation at another, transferring seeds or plant matter unaffected by the digestive process.

Humans moving plants intentionally or unintentionally is very common. I have had sportsmen admit to relocating Hydrilla on purpose, to either attract



Keeping your boat ramp weed free helps prevent the unwanted movement of aquatic vegetation.



Studies show vegetation helps attract and is beneficial to waterfowl and fish. But certain species of aquatic vegetation are invasive and can be very expensive to manage.

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waterfowl or in hopes to create habitat to grow trophy largemouth bass. I hope by now everyone is familiar with Hydrilla, and similar invasive plants, and understand it is not a good plant to have and it is now illegal to relocate that aquatic species, along with several other non-native or invasive plants. We commonly recommend introducing native, desirable plant species into a new waterbody or one void of quality aquatic vegetation for erosion control, aesthetics and fish habitat, but this is controlled and all the species recommended should be native, have been proven to be easily managed and not a significant threat to get out of control becoming a time and/or financial burden. Many states and the Federal Government have spent substantial amounts of money educating people regarding the consequences of relocating aquatic plants intentionally or unintentionally. The most common transplant method of aquatic plant species is by boat trailer. Assuring boats and trailers accessing your waterbody are clean is highly recommended. Many lakes receive plant species that establish in this manner. This applies to both private and public waters. The final way humans spread undesirable vegetation from waterbody to waterbody is through the aquarium and Koi pond industry. Never throw a nonnative, invasive plant purchased at a pet store that is intended for a Koi pond or aquarium into a pond, lake, creek, river or sewer drain. It is also recommended to only use native, noninvasive plant species in these situations.

Prevention of Establishing Undesirable Plants in Your Lake

As stated earlier, of the four methods, only one is truly controllable, and even that it is not 100% successful. But, things can be done to reduce the chances of an infestation of undesirable plant species in your lake and others.

It is impossible to prevent undesirable seed from blowing onto your shores and



Water Hyacinths are very common in Koi ponds, but this plant is an exotic and invasive. Throughout the years it has been spread intentionally and unintendedly throughout the Southeast, and is expensive to control with herbicides on public and private waters.



Nuphar is one plant that cannot be spread from leaves and stems, but seeds and displaced roots can move and propagate downstream from flooding.



Large bass have been associated with Hydrilla and other similarly submerged vegetation, but many of these plant species are undesirable and should never be intentionally or unintentionally moved around from lake to lake.

plants beginning to grow. Obviously, keeping birds and other wildlife out of your waterbody is unrealistic. The wind will blow and wildlife will come and go, but frequently survey the shoreline and submerged vegetation, looking for any undesirable plants that appear. Once a new undesirable species is discovered, they should immediately be removed or treated with herbicide. On many occasions we discover lake owners and/or lake managers do not perform periodic visual plant surveys of the lake and vegetation. The sooner an undesirable plant species is discovered, the quicker and less expensive it is to remove it. If you see a new plant, properly identify it and make a management decision whether it should stay or go.

Too often people see a small amount of plants and decide to let it go since it is not yet an issue. Depending on the plant species, this may be the correct decision or a grave mistake. A plant introduction by wind or animal may appear anywhere in the lake on the shoreline or in shallow water. Plants introduced by livestock may first appear where they have access, if it is not the entire lake.

Plant movement and the spreading by water in some situations can be reduced. A historical flooding event, hurricane, etc. is not a situation that can be controlled. Knowing what aquatic plant species are present upstream and in surrounding connected waterways is helpful. Outflow or even inflow grates can be areas to temporarily stop plants

from entering or leaving to be manually removed at that spot with herbicides. Purposely pushing undesirable or exotic plants out of your waterbody is only spreading them, not recommended and may be illegal. Landowners managing undesirable plants in connected waterbodies together will be more successful than doing it independently. If upstream has a hydrilla infestation and you treat yours only, it will not be long before the plant reappears again in your lake. Introduction by inflowing water usually is identified by an undesirable plant species first appearing at an inflow from an upstream source.

The last method of movement by humans is the one most controllable by you and that's regulating boat and trailer access. I am not saying to not let boats launch in your lake, but users need to take precautions to reduce the chances of an undesirable plant being introduced. Unintentional plant introduction will first appear at the boat ramp/launch and possibly at the first stop by anglers or hunters using boats after launching. We have seen this on larger private lakes where the "hot fishing spots" show the newly introduced plant shortly after it appears at the ramp. Making users aware of your desire to not unintentionally or intentionally without your permission introduce a plant is advisable. We have not documented it, but it has been expressed by clients that previous lake management companies brought in undesirable plants. When pulling out of an infested lake, plants will stick to trailer, boat and possibly transport in live-well/fish tanks. Boat, trailer, motor and live-wells should be picked clean at the site they are acquired. Going home or to a new launch site is not recommended to pick clean. Plants, even though on shore or even on cement/gravel/sand can provide them opportunity to wash into nearby water sources down ramp, in city drains/sewers, etc. and establish where not desired. Keeping boat and trailer out of water

and allowing all remaining plant material to dry a few weeks before relaunching helps. Besides boats, (hunting, fishing, skiing and recreational cruising), jet skis and their trailers can also unintentionally move plants. Some aquatic plant species seeds can germinate even after drying. Lightly spraying with an herbicide will also help prevent the spread, but again seeds will not be affected. Windblown while driving is not a way to properly remove or kill transported plants. Moving weeds from nearby public lakes to private lakes is very common, and may be the most common way to introduce undesirable plants into your lake. Hydrilla and similar plant introduction falls in this category and we have seen it numerous times throughout their region. If you are dredging or scraping an older waterbody, be aware of what plants are there, how they spread and plan your work to

prevent their unwanted transplant. Hydrilla has tubers in the soil. If scraping and removing them in a lake restoration project, remember that they can lay dormant 6-8 years before re-sprouting. When depositing this lake bottom material, it needs to be deposited in an upland dry area, not in a wet or commonly flooded area where they can regrow at their new location.

Working in the public sector for many years has given me insight on how humans have contributed to the movement and establishment of plants and animals around the country. Just because a plant is beneficial to fish and/or wildlife on a large public waterbody, it may not be entirely beneficial to that entire ecosystem and may have more negative impacts than known, and be extremely detrimental to your aquatic ecosystem. Intentionally or unintentionally moving plants into your lake is inadvisable until

an educated management decision is made regarding the species that nothing but benefit comes from such an introduction. As stated earlier, several native plant species introductions will be all positive for your fish and wildlife, but many other species will be detrimental and costly to control in the future, and that is not desired. Addressing newly discovered plants early is much easier and cheaper to manage than waiting until it becomes an issue. Correction may include one method or a combination of herbicide treatments, stocking of grass carp and/or mechanical removal of the problem plant species. Some plant issues can cost tens of thousands of dollars to correct depending on the lake size. And on larger lakes it can cost in the hundreds of thousands to millions of dollars to manage. Most of the time, the undesirable species never permanently goes away.



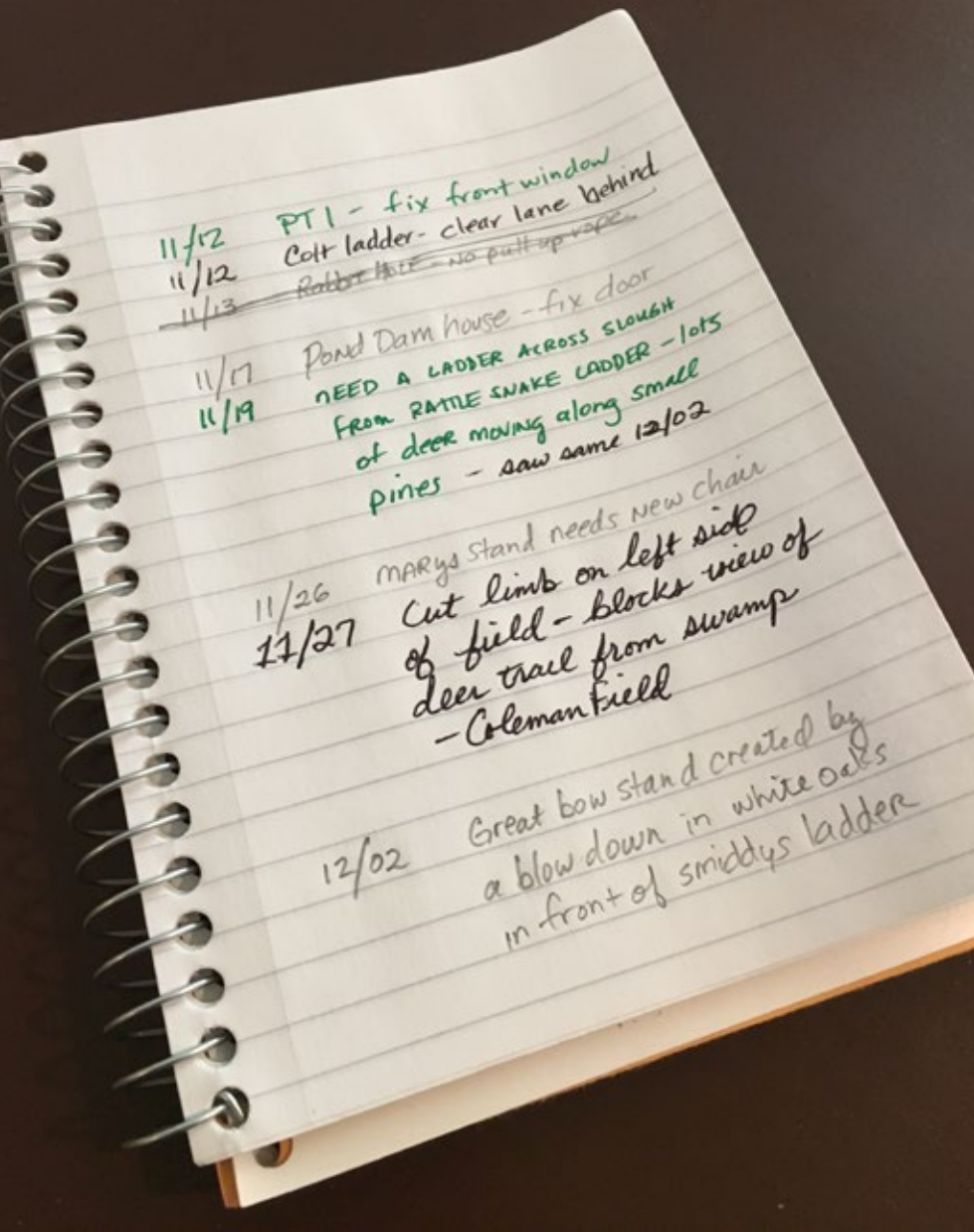
Everyone, including lake management companies, should clean their boat, trailer and live well/tanks before leaving a site where the plants are to prevent the unwanted movement of aquatic plants.

Wildlife Trends Journal Management Calendar

By Dave Edwards

December/January 2018

Dave Edwards is a certified wildlife biologist and regular contributor to *Wildlife Trends Journal* and other hunting/wildlife publications. Dave was honored as QDMA's 2007 Deer Manager of the Year and nominated in 2011 as Alabama Wildlife Federation's Wildlife Conservationist of the Year. Dave is General Manager for Cabin Bluff Lodge and President of Tall Tines Wildlife & Hunting Consultants, Inc. Contact him at Dave.Edwards@CabinBluff.com or 912-464-9328.



Keep notes on adjustments needed to deer stands

Although everybody makes “mental notes” of improvements needed when sitting/hunting in a particular deer stand, these needs are often forgotten when the time comes to work on stands. I find it extremely helpful to physically keep a running list of repairs or improvements needed to deer stands. At our property we record deer stand notes in a

spiral notebook that is kept at the camp. That way, everybody can add their notes right after the hunt while it is fresh on their minds. Stand repairs and improvements range from fixing a squeaky board to relocating the stand altogether. This is also where we record notes of new areas identified that need a stand. Once hunting season is over, we check our notes and go to work making repairs and adjustments as

Maintaining a running list of repairs and improvements needed to deer stands will be handy once this work starts later in the year.

needed. Our goal is to do this work before spring green-up, which also includes full-scale scouting missions to find (and install) new stand locations. By doing this work in late winter we significantly reduce the disturbance/pressure applied in preparing for the season next fall.

Take care of equipment

As a land manager, quality/working equipment is essential to suc-

cess. While the list of equipment used to manage hunting/recreational properties is wide ranging, most managers have, use, and need the basics such as farm tractors, tractor implements (such as harrows, mowers, grain drills, spreaders, sprayers, etc), UTVs, chainsaws, and other mechanical “hand tools”. To remain in good working order, this equipment will require proper maintenance. Without maintenance, these tools will begin to wear down until they eventually break. This can result in costly repairs and added downtime in which nothing can be done until the machinery or equipment is fixed. Nothing is more frustrating that planning a food plot planting project, getting everything ready, finally getting the right weather and soil moisture, then having a tractor or implement break down. There are two forms of maintenance. The first being **repair**

maintenance, which is conducted once the equipment has started to malfunction or has completely broken down. **Preventative maintenance** is a program designed to prevent equipment from failure – resulting in less repair maintenance. Preventative maintenance varies depending on the equipment but generally consists of checking/replacing fluids, seals, filters, hoses, blades, batteries and/or electrical parts, screws/bolts, etc. In a nutshell, it is giving equipment some love before neglect results in breakdowns. Winter is a great time to conduct preventative maintenance on equipment. Doing so can be a relatively easy project between hunts. Of course, there’s absolutely no way to avoid breakdowns and damage in the long term. No matter how much care you give your equipment, it will ultimately break down. However, preventative maintenance

certainly slows down functional decline but also helps keep equipment in reasonably good shape in the event that you decide to trade it in or sell for new. On larger, more complicated equipment like farm tractors, skid steer machines, back hoes, etc, keep in mind that maintenance must be done properly to be effective. If you decide to do it yourself and it’s not done correctly, you are not only wasting time, but may damage the equipment. For this equipment, consider an annual “checkup” by a professional. Although hiring a professional mechanic to perform preventative maintenance and checkups will be an expense, think about all the time and money that you’ll save by fixing it once instead of over and over. Part of your preventative maintenance program may include hiring a mechanic each winter to visit your “equipment shed” to perform check-



Late winter is a great time to perform routine and preventative maintenance to equipment.

ups. One of my philosophies is that if you take care of your equipment, it will take care of you.

Ensure doe harvest goals are met

Ideally, it is best to harvest does early in the season and/or before the rut. Doing so will save food resources for remaining deer and immediately improve the sex ratio for the upcoming breeding season which will conserve energy for your deer herd. An unbalanced sex ratio will result in extended breeding seasons where bucks can lose up to 30% of their body weight from excessive breeding activities. Consequently, under these conditions, bucks enter spring trying to recover. The highly nutritious spring food then goes towards body main-

tenance versus body/antler growth for the following year. The extended breeding season associated with an unbalanced sex ratio also results in poor hunting due to the lack of breeding competition. That is, there are so many does that bucks do not need to compete. In this case, hunters generally do not see much breeding activity such as chasing, rubs or scrapes. We often refer to this as a **diluted rut**.

By the time you get this issue of *Wildlife Trends* it will be late in the hunting season in most states. If you have not met your doe harvest goals, get to work. If needed, recruit the help of friends. Holding a “doe harvest weekend” is a great way to get participation from club members or friends. Make a big deal out of it

by having a cook out at the camp with “awards” for those that harvest the largest doe, oldest doe, or most aggregate weight. These events can sometimes be the most memorable hunts of the year.

Prepare for last phase of duck season

If you have multiple duck ponds and hunt waterfowl through the season, strategic/staggered flooding schedules help maximize hunting opportunities by extending the food supply in ponds. That is, by not flooding some ponds or areas early in the season you essentially “save” these ponds and their associated food for later in the season. Thus, if you’ve “saved” ponds on your property for the late phase of duck season, mid-



Managing hunting pressure will ensure great late season duck hunting on small ponds

late December is the time to initiate flooding of these areas. Maintaining water depths of 12"-18" is ideal for puddle ducks such as wood ducks, mallards, gadwall, teal, etc.

If you enjoy duck hunting but only have one or two small "duck holes" on your property, enhancing these areas (water management, plantings, etc) and managing the hunting pressure will ensure you have exciting hunts each time you go. Like most wildlife, ducks react to hunting pressure. As hunting pressure increases, the number of ducks using the area decreases. Managing the pressure simply means that you don't hunt the pond too often and allow the area time to rest between hunts. A good rule of thumb is to not hunt a small pond (or any small area where ducks use) more than once per week. It is also a good idea to not hunt the area in the morning and afternoon of the same day. If food sources remain and you allow the pond to rest lon-

ger than a week, you will be pleasantly surprised at the number of ducks that will be using the pond, especially if migration is still underway and there is hunting pressure on surrounding areas.

Trap and remove nest predators

If managing for wild turkeys is a goal on the property you hunt, don't overlook the value of removing nest predators such as raccoons and opossums. Having said this, attempting to control predators should not be a priority if you are not actively managing the land to promote quality turkey habitat. Creating and maintaining quality habitat should be the highest strategy on our list for managing turkeys. By the way, wild turkeys are a species that responds quickly to good habitat management such as thinning timber, burning, understory control, roadside management, etc. However, research has clearly demonstrated that nest predators, partic-

ularly raccoons, can significantly impact nesting success rates and thus turkey population growth. Not only will they eat the eggs, but they may even kill the hen turkey. Winter is a great time to trap and remove nest predators. This is also when hunters spend the most time at a property. Trapping offers a great mid-day management activity during a weekend at the camp. The key in being successful and efficient is to pick good trap locations. Water sources, feeders, and food plots can be good places to start. There are many effective traps available. The most common are live traps (cage traps) and steel traps (leg hold traps). If you use leg hold traps, I recommend "soft-catch" or offset jaw traps. These traps do not damage the foot of the trapped animal in the event that you catch a dog or other non-target critter. If you have never trapped before, you will learn a lot by trial and error. I recommend doing a little homework by surfing



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the web and YouTube to learn effective techniques. One more thing to know is that nest predators are prolific and have relatively high reproductive rates. This means that populations can rebound quickly. To be effective in controlling nest predators and helping turkeys, you must significantly reduce nest predator populations and continue to aggressively remove them each year.

Prepare deer stands for the off-season.

Once deer season ends, it is a good idea to “summer-ize” them. That is, to ensure they are in good working order next season there are a few things to do. Ladder and lock on stands should be loosened or removed from the tree to allow the tree to grow during summer and prevent it from absorbing the attached chain or strap of the stand. This not only protects the stand from potential damage, but is good for the tree. If the stand is not going to be removed from the woods, remove any cushions or seat straps and burlap/camo covers that may be on a stand. This will prolong their life and prevent the weather or critters from ruining them before the next season. Cushions and covers should be removed from tripods or other stands as well. Although they should already be secured, double check the tie downs and anchors of a tripod. There are two kinds of tripods – those that have blown over and those that will. Making sure they are securely anchored will reduce the chances of a tripod getting blown over. Shooting houses should be cleaned out and sealed up as much as possible. Sealing them (meaning closing the door and windows) will reduce damage by squirrels, owls, etc. It will also reduce wasps as well (notice I said reduce). Cleaning shooting houses out in late winter is much nicer than trying to do it in August! Obviously, all climbing tree stands and pop-up

blinds should be removed from the woods and stored over the summer. When “summarizing” ladders and lock on stands, it is VERY important to revisit these stands just before hunting season starts again the next year to reattach the chains/straps and tighten everything. One trick we use to identify stands that are ready is to tie a piece of flagging onto the stand once it has been tightened and checked. Use the same color flagging for each season. For example, this year we are using blue flagging. Next year we will use orange flagging. So if a hunter gets to a stand this season and does not see the blue flagging, he will know that the stand may have been overlooked and/or has not been checked and secured.

Implement “hinge cutting” to create quality habitat while improving timber stands

Timber Stand Improvement (TSI) is the general practice of removing lesser quality or undesir-

able trees within a forest to reduce their competition with desirable trees. An example may be a situation where a quality oak tree is surrounded by lots of young or mid-aged red maple trees. As you can imagine, the ground below is layered with fallen leaves and because sunlight is not reaching the ground, little vegetation exists – which is poor wildlife habitat. Removing the red maples would increase sunlight, water, and nutrients for the oak allowing it to grow more vigorously (this is known as “releasing” the oak) and due to increased sunlight, plants would begin to grow on the forest floor. Hinge cutting is simply a variation of the normal TSI technique. Rather than completely cutting down undesirable trees, trees are cut only half-way through. They fall, or “hinge” over, and create instant cover but do not die, so they continue to produce leaves and vertical shoots. If they are desirable browse species, a new food source is created. Hinge cutting

is a good way to provide food for browsing animals such as deer, provide thicket cover for quail and rabbits, nesting cover for turkeys, and release the best quality saplings/trees for optimal growth, all at the same time. Hinge cutting is an excellent way to create both food and cover within large areas of park-like oaks without cover, near wildlife food plots, or along transitions between different habitats such as along edges of fields. If planned well, hinge cut areas can be strategically located to create thickets (bedding and loafing cover for deer) in a way that will influence deer movement and enhance hunting success.

Methods used to hinge cut vary depending on how large the undesirable trees are. Hinge cut trees at waist height. For small-diameter stems, the simplest way is to hold the sapling in one hand, bend, and whack the bend with a machete. Two or three shallow cuts side by side will allow a better bend than one

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deep cut. A hand saw or a chainsaw is easier for larger stems. After the cuts, force the sapling down until it is parallel to the ground.

Assess progress and create a plan for improvements

With hunting season coming to an end, it's time to revisit the wildlife management program on your property to assess whether or not your management strategies are working to help you achieve desired goals. Doing so may reveal limiting factors that may be preventing you from reaching your management goals or maximizing your efforts. Addressing limiting factors and implementing improvements where needed will help you succeed. Unfortunately many landowners and hunting clubs keep doing the same thing and expect different results. Depending

on the wildlife species you are managing for, late winter or early spring is generally a great time to assess habitat needs, review current management strategies and how wildlife or habitat has responded to these strategies, and devise a plan for addressing needs. While a general property assessment is easily done by a landowner, I recommend getting the assistance of a professional experienced wildlife biologist to help identify less obvious and often times overlooked strengths and weaknesses of your property or wildlife management program. I can't tell you how many times I have been helping a client where I made what I thought was an obvious recommendation that they had never thought about or recognized as a limiting factor. My point is that it is always good to get another set of eyes when assessing

your property, particularly from someone that does not see the property often and/or someone that is an experienced wildlife/land manager. With the property wildlife management goals in mind, and from this assessment, you and/or your wildlife consultant can develop a list of several to many management activities that will address limiting factors identified. Depending on the property, this can be a relatively short list or a very long list of activities that need to be addressed. Many of you have heard me say this before, but consistent good hunting doesn't happen by accident. It takes planning, hard work, patience and an understanding that Mother Nature is dynamic and things are constantly changing requiring adjustments in management strategies to reach desired results.



Incorporating strategic hinge cuts of less desirable trees will create structure and food within open hardwood habitats.



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