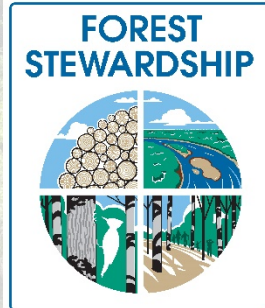


Florida Forest Stewardship Landowner Short Course



Friday, March 9, 2018
8:30 am to 3:00 pm ET
Austin Cary Forest Campus
Gainesville, FL

Choose your topics for the day and learn about the possibilities of forest and natural resource management.

Enjoy this opportunity to gain some useful planning and management skills, and connect with the local and statewide professionals and resources that are available to assist you.

Topics (Pick 2):

- Forest health
- Timber marketing and forest certification
- Wildlife management
- Tree identification
- Prescribed fire and prescribed burn associations



Table of Contents	Page
Short Course Information and Assistance	
Agenda	3
Workshop Contacts	5
Florida Forest Stewardship Program fact sheet	6
Florida Tree Farm Program fact sheet	7
Silviculture Best Management Practices	8
Forestry Wildlife Best Management Practices for State Imperiled Species	9
Forest Health	
My Pine is Under Attack – What do I do?	10
Got Invasives? Get Assistance.	14
Timber Marketing and Forest Certification	
Scott Sager: Timber Sales	15
Sample Timber Sale Contract and Map	21
Steps to Marketing Timber	27
Chris Demers: Forest Certification	33
Wildlife Management	
Ten Tips for Increasing Biodiversity in Your Pine Plantations	36
Bobwhite Quail	40
Feral Swine: Impacts on Game Species	42
Tree Identification	
How to Identify a Tree	44
Prescribed Fire	
Dave Conser: Prescribed Burning Factors and Issues	56
The Value of Forming a Prescribed Burn Association	60
UF/IFAS Forest Management and Stewardship Extension Publications	
	63
<p>We appreciate the support of our 2018 Florida Forest Stewardship Program Sponsors -listed on the back cover-</p>	

Florida Forest Stewardship Landowner Short Course Agenda

March 9, 2018

Austin Cary Forest Campus

8:30 am Sign in, meet & greet

9:00 Welcome & Introduction: Start with Your Plan

9:30 Proceed to concurrent workshops

Concurrent Breakout Workshops:

9:45-11:45 Concurrent Workshops #1 (Choose 1 for the morning session)

- 1) **Forest Health:** This session will provide the latest information on forest insects using, and sometimes harming, southern forests.
Leader: Dr. Jiri Hulcr, UF/IFAS School of Forest Resources and Conservation (SFRC)
- 2) **Timber Marketing and Forest Certification:** Learn the essential steps to marketing timber and the increasing importance of having your forest certified.
Leaders: Scott Sager and Chris Demers, SFRC
- 3) **Wildlife Management:** Learn valuable wildlife habitat management strategies and get the latest information about feral pigs and how to manage them.
Leaders: Joe Vaughn, Florida Fish and Wildlife Conservation Commission (FWC) and J. C. Griffin, USDA Animal and Plant Health Inspection Service
- 4) **Tree Identification:** Learn the basics and take the mystery out of identifying trees.
Leaders: Scott Sager and Chris Demers, SFRC
- 5) **Prescribed Fire:** Be informed before you burn. Learn the proper planning necessary for a safe and successful prescribed burn. We will also discuss current opportunities to partner with other landowners and professionals to learn about and participate in prescribed burns.
Leaders: Dave Conser, Florida Forest Service and Jessica Rodriguez, FWC

12:00 pm Lunch

1:00-3:00 Concurrent Workshops #2 (Choose 1 for the afternoon session)

- 1) Forest Health
- 2) Timber Marketing and Forest Certification
- 3) Wildlife Management
- 4) Tree Identification
- 5) Prescribed Fire

3:00 Conclusion, Evaluation, Adjourn

Short Course Resource Contacts

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Dave Conser Alachua County Forester Florida Forest Service 5353 NE 39th Avenue Gainesville, FL 32609 (352) 395-4927 David.Conser@freshfromflorida.com	Dr. Jiri Hulcr Assistant Professor UF/IFAS School of Forest Resources and Conservation PO Box 110410 Gainesville, FL 32611 (352) 273-0299 hulcr@ufl.edu	Scott Sager Forester UF/IFAS School of Forest Resources and Conservation PO Box 110410 Gainesville, FL 32611 (352) 846-0846 sasager@ufl.edu
Chris Demers Extension Program Manager UF/IFAS School of Forest Resources and Conservation PO Box 110410 Gainesville, FL 32611 (352) 846-2375 cdemers@ufl.edu		Joe Vaughn Landowner Assistance Biologist Florida Fish and Wildlife Conservation Commission 5353 NE 39th Avenue Gainesville, FL 32609 (352) 955-2241 Joseph.Vaughn@MyFWC.com

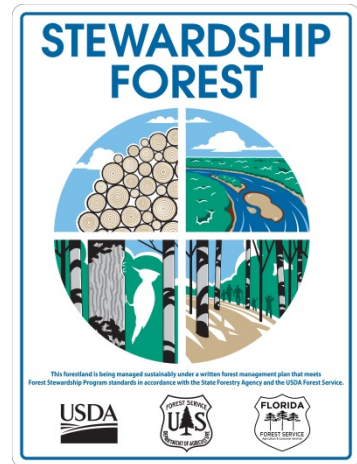
Questions about this or other Forest Stewardship Program activities can be directed to
Chris Demers, (352) 846-2375 or by email at cdemers@ufl.edu.
For more information and events see the Florida Forest Stewardship Program web site at:

http://www.sfrc.ufl.edu/forest_stewardship

Florida's Forest Stewardship Program

Forest Stewardship is active management of forest land to keep it in a productive and healthy condition for present and future generations, and to increase the economic, environmental and social benefits of these lands. Forest Stewards are landowners who manage their forest lands on a long-term basis by following a multiple resource management plan.

The Forest Stewardship Program addresses the improvement and maintenance of timber, wildlife, soil and water, recreation, aesthetics, as well as forage resources.



Eligibility

Private forest landowners with at least 20 acres of forest land and a desire to manage their ownerships according to Stewardship principles can participate in the Forest Stewardship Program. Also, adjacent landowners, with similar management objectives, may combine their holdings to meet this acreage limitation.

Benefits to Landowners

- A customized management plan that is based on the landowner's objectives. The plan will include forest stand characteristics, property maps, management recommendations, and a five-year time line for future planning. This plan also serves as documentation of active management on the property that may help reduce tax liability.
- An opportunity for public recognition as a certified "Forest Steward".
- Educational workshops, tours and the quarterly Florida Land Steward newsletter developed and distributed by the University of Florida, IFAS Cooperative Extension Service and other partners.

How to Enroll

Contact your local Florida Forest Service County Forester and tell them that you would like to have a Forest Stewardship Plan prepared for your property. More information and application online at: **<http://FreshFromFlorida.com/ForestStewardship>**



Tree Farm Program

The American Tree Farm System® is a program of the American Forest Foundation and was founded in 1941 to promote the sustainable management of forests through education and outreach to family forest landowners. Nearly 26 million acres of privately owned forestland and 80,000 family forest landowners in 46 states are enrolled in this program and committed to excellence in forest stewardship. About half of all Tree Farms are located in the South.

Eligibility

Private forest landowners with at least 10 acres of forest land and have a desire to manage their ownerships according to sustainable forestry guidelines can participate in Tree Farm.

Benefits to Landowners

Tree Farmers are good stewards of their forestland committed to protecting watersheds and wildlife habitat and conserving soil. They manage their forestland for various reasons, including timber production, wildlife, recreation, aesthetics, and education/outreach. Tree Farmers receive many benefits:

- Representation on local, state, and federal issues affecting forestland owners.
- Exposure to a network of forestry professionals and landowners committed to sustainable forestry.
- Invitations to workshops, tours and the quarterly Florida Land Steward newsletter produced by University of Florida IFAS and other partners.
- Certification that meets international standards of sustainable forest management.
- Participation in local, state, regional, and national Outstanding Tree Farmer of the Year awards and recognition.

Getting into the Program

Contact your local Florida Forest Service County Forester and tell them that you would like to join the Tree Farm program. More information here:

<https://www.treefarmsystem.org/florida>



Florida Forest Service

Silviculture Best Management Practices

Silviculture Best Management Practices (BMPs)

Silviculture BMPs are the minimum standards necessary to protect our state's waterbodies and wetlands from degradation and sedimentation that can sometimes occur because of erosion from forestry operations. Silviculture BMPs should be applied on all bonafide ongoing forestry operations, especially those adjacent to waterbodies and wetlands, and may be enforced by federal, state and local authorities.

Silviculture BMP Courtesy Checks

Silviculture BMP courtesy checks are available for landowners, land managers, and loggers. These courtesy checks provide a "report card" on Silviculture BMP implementation for recent or ongoing forestry operations. This helps future management planning and evaluates the performance of contractors on your property.

Silviculture BMP Site Assessments

On-the-ground Silviculture BMP site assessments are available to determine which Silviculture BMPs apply to planned operations on a specific site. This helps with harvest plan development, road layout, mitigation of existing problem areas, etc.

Silviculture BMP Notice of Intent

The Silviculture BMP Notice of Intent (Rule 5I-6 F.A.C.) is a voluntary, one-time pledge that a landowner signs, indicating intent to adhere to Silviculture BMPs on their property. Once a landowner has signed the Notice of Intent, he or she will become eligible to receive a *presumption of compliance* based on reasonable evidence with state water quality standards during future ongoing forestry operations. This is very important if a landowner's property falls within an area covered by a Florida Department of Environmental Protection Basin Management Action Plan for impaired waters.

Additional Services

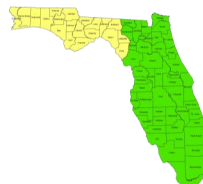
For information on the services listed above or any other services provided by the Florida Forest Service's hydrology section, please contact your local BMP Forester.

Roy Lima

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Florida Department of Agriculture and Consumer Services
Adam H. Putnam, Commissioner



Forestry Wildlife Best Management Practices for State Imperiled Species



- Forestry Wildlife Best Management Practices for State Imperiled Species (WBMPs) were adopted into Florida Administrative Code (Rule 5I-8) on October 21, 2014.
- WBMPs were developed through a partnership between the Florida Department of Agriculture and Consumer Services' Florida Forest Service and the Florida Fish and Wildlife Conservation Commission (FWC).
- WBMPs are **voluntary** practices designed as a practical approach for avoiding and minimizing the loss of **State Imperiled Species** due to silviculture operations.
- WBMP practices address the 16 State Imperiled Species which are considered to be potentially vulnerable to silviculture operations including ten aquatic species, two burrowing animals, and four nesting birds.
- WBMPs are designed to supplement the existing water quality-based Silviculture BMPs which already provide many valuable benefits to the conservation and management of fish and wildlife in Florida.
- Landowners and other forestry resource professionals can enroll in the voluntary program by completing a WBMP Notice of Intent. Those who do not wish to enroll will continue to be subject to all current laws and regulations regarding State Imperiled Species.
- Once enrolled, applicants who **properly implement** WBMPs will no longer be required to obtain a permit authorizing the incidental take of State Imperiled Species during bonafide ongoing forestry operations. In addition, they will not be subject to any fines or penalties associated with an incidental take of the State Imperiled Species covered by the WBMP Manual.
- WBMPs are not designed to facilitate wildlife habitat restoration or species recovery and expansion. Also, they do not address any Federally Listed Species. For information on Federally Listed Species, refer to FWC's online "Florida Wildlife Conservation Guide."
- To obtain more information or a copy of the WBMP Manual and Notice of Intent, contact your local Florida Forest Service BMP forester (see below) or a FWC Landowner Assistance Program biologist (850) 488-3831.

Florida Forest Service BMP Foresters

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My Pine Is Under Attack—What Should I Do? ¹

Jiri Hulcr²

This guide is intended to help tree owners and Extension personnel make decisions about pine trees that display signs of attack by wood borers. The information presented here pertains only to Florida and the adjacent southeastern region. Other regions may have different pines and different tree pests. The guide pertains mostly to pines grown on a non-industrial scale, such as in private backyards. Large acreages may require more stringent diagnostics. The author takes no responsibility for any financial or other outcomes of decisions users of this guide may make. There are many sources of pine stress other than insects; for complete advice, please contact your county Extension agent or post your question at the Tree Health Diagnostics Forum at the University of Florida website: www.sfrc.ufl.edu/treehealth. All images are by the author unless attributed otherwise.

The Problem

Bark beetles are among the most common causes of pine death in Florida. Their attacks are associated with obvious injuries to pine trunks and with the oozing of resin. Because the injuries are so evident, bark beetle infestations are frequently reported. Landowners often ask for assistance with this issue: “*Something is attacking my pine. What should I spray it with?*” The answer to this question is threefold:

a. First, make sure the tree has actually been attacked by bark beetles. There are many causes for declining pine health. Partial needle loss or color change is common—it may not be caused by bark beetles, and may not even indicate a health problem. If the whole tree is changing

color rapidly, however, and especially if there is sawdust or resin on the tree trunk, you need to act quickly and get a reliable diagnosis. Anytime you are unsure, contact a tree health professional, or our team at www.sfrc.ufl.edu/treehealth.

b. Next, make sure it is not already too late. If you can clearly see that a pine is being attacked by bark beetles, it may as well be already dead. Pine trees are not like oaks. Oaks and many other broadleaf trees can regenerate from even a bad disease or stress, but pines typically cannot. Once on the path to death, there is no recovery for a pine tree. But you can protect the pines around! Even if you can’t save this pine, you can determine the cause of death using this document, and see if you can prevent other nearby pine trees from dying.

c. Finally, realize that spraying a dying pine with an insecticide usually doesn’t work. You will probably not be able to reverse the course of tree death. Once your pine tree is suffering so much that it appears dying, your best option is to simply remove it. Insecticides or fungicides will not help it recover.

1. This document is FOR331, one of a series of the School of Forest Resources and Conservation, UF/IFAS Extension. Original publication date May 2016. Visit the EDIS website at <http://edis.ifas.ufl.edu>.

2. Jiri Hulcr, professor, School of Forest Resources and Conservation, UF/IFAS Extension, Gainesville, FL 32611.

When do insecticides NOT work on dying pines?

- When the causal agent is hidden inside, inaccessible, or gone. A surface spray won't reach any of the insects inside.
- When the tree is too sick. Sometimes, even if you inject the chemical into the tree, it won't get to the impacted tissue because the vascular system is already failing.
- When insecticides make the problem worse. You may be doing more damage than good: by spraying the surface, you are killing the predators and parasites of bark beetles. Those natural enemies of the pest are your friends!

When DO insecticides work on pines?

- Prophylactically, on high-value pines that are healthy and alive. Some wood borers, such as the black turpentine beetle, may colonize living pines, and may be controlled by spraying.

1. Is Your Pine Attacked By Bark Beetles? Look Closely At The Bark

- The pine seems to be declining, but the bark has no beetle symptoms (no dust, no holes). When you peel off a tiny piece, the tissue is yellow and wet (healthy) → **Not bark beetles**.
- The bark has occasional holes, but no resin flow. The holes do not penetrate the tissue under the bark; that wood is yellow and wet (healthy) → **Bark boring insects, no concern**.
- The bark is producing dry, brown or white sawdust, also known as frass. There are tunnels under the bark: **Non-epidemic bark beetles**. Your pine is definitely dying; however there is low likelihood of these beetles spreading to the neighboring pines. To see whether you need to take further action, → **go to 2**.
- Resin is coming out of the bark on many places. This resin can have different colors or shapes. There are tunnels under the bark you may have bark beetles. → **go to 3**.

2. The Presence Of Non-Epidemic Bark Beetles Means That Your Pine Is Dying

Non-epidemic bark beetles attack pines that are stressed. These are mostly the *Ips* pine engravers, the black turpentine beetle, or one of a few other species of wood borers. Non-epidemic bark beetles do not usually spread to neighboring pines, and no further action is typically needed, unless those neighboring pines are also stressed. However, the beetles may multiply quite a lot, and sometimes you may want to protect the neighboring trees if they are a little stressed. Here we will determine whether you should remove the attacked tree:

- The attacked pine is rather solitary, there are not many other pines nearby, or all the other pines are less than 10 years old → **removal not necessary**.
- There are other mature pines just next to the attacked tree. It is fall or winter: the beetles are unlikely to emerge → **removal not necessary**, though recommended later.



- There are other mature pines just next to the attacked tree. It is spring or summer, so the beetles will be able to emerge → **remove the attacked tree soon**.

3. You May Have “Epidemic” Bark Beetles

- Epidemic bark beetle species are capable of multiplying fast and killing adjacent pines. The only truly epidemic species in Florida is the southern pine beetle. But it is actually rare, and similar symptoms may be caused by the black turpentine beetle and the *Ips* beetle, both of which are more common and less dangerous than the southern pine beetle. → **See the next section, “Distinguishing Dangerous Bark Beetles.”**

Distinguishing Dangerous Bark Beetles

The Black Turpentine Beetle

The resin flows only from spots at the base of the tree (rarely above 8 ft). The flow is conspicuous (>1 in). This is the black turpentine beetle, a species that is rarely epidemic: → **removal recommended, but not urgent**. Monitoring of surrounding trees is critical. This is the one case when an insecticidal spray may help.



The Ips Beetle

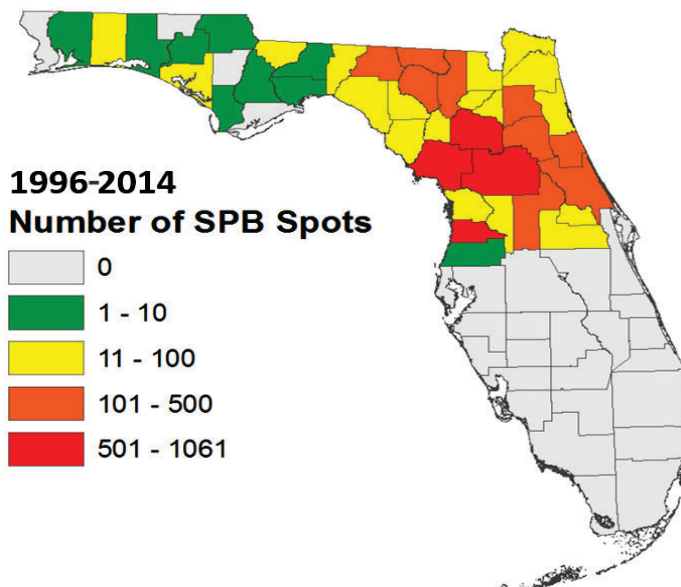
Resin flows from many sources all along the trunk. Peel off the bark (use a hatchet). If you see two types of tunnels—larger straight vertical ones and many smaller curved ones, they were made by the non-epidemic *Ips* beetles that happened to attack a still living but certainly stressed pine. *Ips* beetles rarely mount an outbreak, and never in a healthy, thinned stand → **removal usually not necessary**, but also go back to “The Presence of non-epidemic bark beetles means that your pine is dying.”



Credits: William M. Ciesla

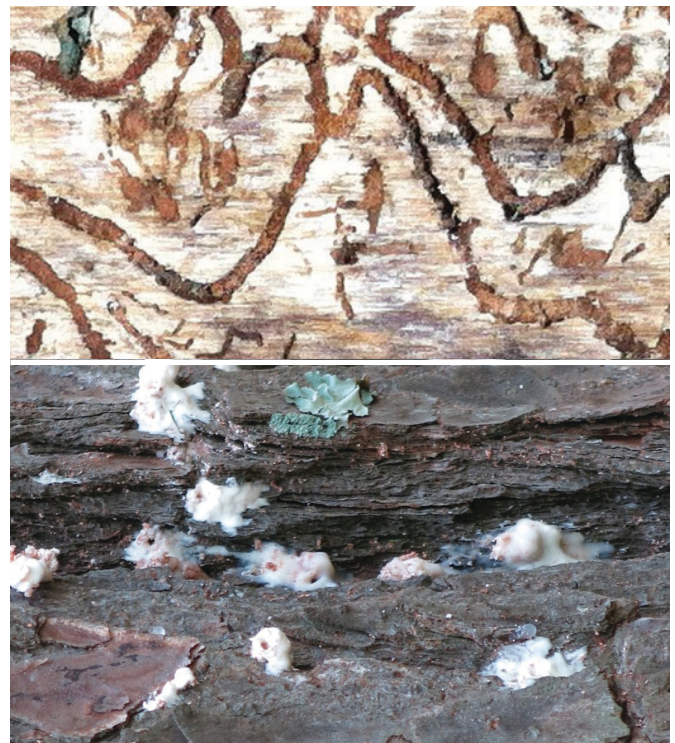
The Southern Pine Beetle (SPB)

Resin emerges from many sources all along the trunk, dozens or hundreds. It appears less like a flow of resin and more like popcorn-like white balls of resin. Importantly, most of the resin balls are in the crevices between bark flakes, not on top of the flakes. Peel off the bark: with SPB, all the tunnels will be curved and winding. This is the only pine bark beetle in the Southeast that can cause an epidemic. If you discover these symptoms, and if you live north of Orlando, → **remove the tree immediately**. Depending on the stage of the colonization, you may also need to **remove the neighboring trees**. Please refer to <https://edis.ifas.ufl.edu/in333>, the UF/IFAS publication about the southern pine beetle, for more guidance.



The southern pine beetle does not occur south of Orlando.

Credits: J. Eickwort, Florida Forest Service



Additional Considerations

1. Use Different Management Strategies for Different Settings

Note that pest management in backyards and small pine groves may differ from management in pine plantations. In residential areas, we recommend a more active suppression than in plantations. In plantations, owners should wait and watch, and only if the rate of infestation exceeds their tolerance for economic losses, they should treat the affected areas by a clear-cut. Suppression of an outbreak in a plantation often requires heavy machinery, which may lead to further stress of the non-attacked trees. Suppression is usually less invasive in small settings.

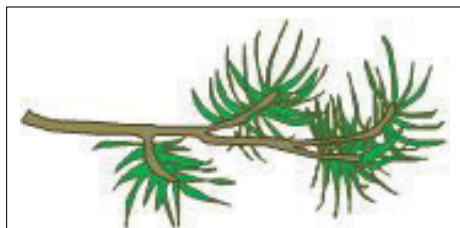
2. Note the Time Since the Attack

If you have determined that your pine tree was colonized by bark beetles that may cause harm to additional trees around, you may need to remove it. However, the **urgency of removal** is very much dependent on the length of time that has elapsed since the attack.

Combine the bark symptoms with your observation of the tree crown. What do the needles look like?

Additional Information

More information on these insects can be found in EDIS publications <https://edis.ifas.ufl.edu/in701> (*Ips* beetles), <http://edis.ifas.ufl.edu/in636> (black turpentine beetle) and <https://edis.ifas.ufl.edu/in333> (southern pine beetle). For information about Florida's SPB prevention program see <http://www.freshfromflorida.com/Divisions-Offices/Florida-Forest-Service>.



Needles are green and appear healthy, even though the bark has been colonized by beetles, and the new generation is hatching.

Remove immediately!



Needles are red. Red needles indicate advanced colonization of the tree. A new generation of beetles has probably already hatched!

Remove immediately!

Also, take a look at the neighboring trees. Do you see any resin? That may be an indication of new attacks.



Needles are grey, dead and dropping needles. The colonization is over. The aggressive beetles are gone, and what's left are their predators and parasites.

You can leave the tree on site.

(Unless it presents a hazard, for instance because it may fall on a structure.) Long-dead trees are your friends! They sustain natural enemies of bark beetles.

Make sure you **check neighboring trees for attacks!**

Got Invasives?

Invasive exotic plant problem? Find a program to help by using FloridaInvasives.org.

The Florida Invasive Species Partnership has collected, evaluated and categorized assistance programs into a single resource, making it easier to find the financial and/or technical assistance available to Florida landowners to prevent or control invasive exotic species problems. FloridaInvasives.org has an online resource of management assistance programs to help in your fight against problematic plant species. This resource takes the guesswork out of finding the agencies or organizations offering assistance and will direct you to available programs. The Landowner's Incentives Database will also provide the requirements for each program, to help you decide if they are a good match for your needs.

Why was FloridaInvasives.org developed?

Invasive species have been identified as being costly ecologically and economically statewide in Florida. The Florida Invasive Species Partnership (FISP) is a collaboration of public and private entities in Florida, formed to link efforts at preventing and controlling invasive exotic plants across agency and property boundaries. FISP has developed an on-line tool of available financial and technical assistance sources to make it easier for landowners and land managers to find them.

How does FloridaInvasives.org help you?

FISP has created a searchable database, the [Florida landowner incentives database](http://FloridaInvasives.org), accessible at FloridaInvasives.org that allows you to find an assistance program for your needs. Search by your county, target species or other pertinent information into the online tool, and you will retrieve a current list of available programs.

FloridaInvasives.org will help provide focus to your search so that you can get the right person at the right program.

FloridaInvasives.org:

- Builds community awareness,
- Leverages limited resources through cooperation and
- May reduce individual land management costs.

This resource will be regularly updated with the most current program information to provide you the most up-to-date opportunities.

Go to FloridaInvasives.org to find out more.

Species Shown from top to bottom:

Mexican Petunia, Boston Fern, Mimosa, Cogongrass, Camphor



Think Locally, Act Neighborly

invasive species know no boundaries!

Timber Sales

The Sale Process,
and the Common Wood Products

Forest Stewardship Workshop

Scott Sager
Friday 9 March 2018

UF UNIVERSITY of
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& Conservation



First, some terminology...

Logger – the folks who cut the trees and load them, and (typically) truck the wood to the mill

Timber Buyer – the folks who buy the wood from the landowner (you), arrange for the logging, and coordinate the payments; may be the logger, or may contract the harvest to a separate logger

Mill – the place where the wood is turned into poles, plywood, lumber, paper, chips, energy, etc.; typically the timber buyer contracts with the mill to bring them wood

Consultant – the folks who work for the landowner (you), and NEVER EVER, UNDER NO CIRCUMSTANCES, IN NO WAY SHAPE OR FORM works for the logger, timber buyer, or mill

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Second, some big principles...

There's a lot of money at stake. Even first-thinning can generate hundreds-of-dollars per acre. Clearcutting a mature stand can generate thousands-of-dollars per acre.

Keep it simple. Anything you can do to lower the risk for the timber buyer, the better the price you can get. Anything you can do to make the loggers' job easier, the better the price you can get.

This isn't gardening. Logging uses large, heavy, awkward equipment, in an unpredictable environment. When you sell timber you give the buyer some control over the condition of your land... things will get broken, and at times it's going to look bad.

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Third, do you really want to do this yourself?

You CAN sell your own timber, but it will take a lot of work. There's also a reasonable chance you'll make more money if you hire a consultant. Timber markets are regional, diverse, complicated, and in constant flux, and most landowners are selling timber no more than every few years.

Hire a consultant if...

- the sale is "once in a lifetime"... large area; very big-, old-, and/or valuable-trees
- it's complicated... lots of separate areas; requires coordination with several owners or neighbors; variety of products
- you can't be there every day, you live far away, you have a life...

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The Process...

Planning

Contracts

Marketing

Monitoring

Wood Products...

The "Big Nine"



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Proper, Prior, Planning...

How will they get to the wood? How will they get the wood back to the road? Log trucks are big and heavy, and road damage is inevitable. Poor access makes wood less valuable. Liability makes wood less valuable.

Gates should be at least 16'-wide if set directly on the road.

Overhead clearance (power lines, branches) should be at least 15' (and more likely 20').

Can bridges and culverts support the weight? In Florida, 88,000-lbs at least...

Can they get off (and back on) the public road safely?

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Proper, Prior, Planning...

How will the logger get the wood from the stump to the road? Once the trees are cut, they need to be moved to the loading deck. At the deck they are typically trimmed of branches, cut to specific lengths, and loaded on trailers.

Decks need to be on (or VERY near) roads.

You need a deck within a quarter-mile of anywhere trees are cut.

Decks should be on drier ground, and located so that the logger can avoid dragging wood through wetlands.

The fewer the number of decks, the better. The smaller the size, the better.



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Proper, Prior, Planning...

Where do you want the trees cut? Where do you not want trees cut? You probably know where you want to harvest... where do you NOT want logging equipment to go?

Follow Best Management Practices (BMPs)... both *Silvicultural* and *Forestry-Wildlife*.

Think about "look and feel". Avoid graveyards or other historic sites. Think about the view from your porch or driveway, or the view from your neighbor's house. Recreational areas to avoid?

Clearly mark boundaries. Roads or fences work great; otherwise, mark every 2nd or 3rd tree along the edge with paint (yellow is common). Mark the side facing into the harvest area, and mark at least 5' high.



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Proper, Prior, Planning...

Which trees do you want cut? Which trees do you want left? Even in a clearcut, you may have specific trees you want to retain.

You don't have to mark any trees. This makes sense if it's a clearcut, but even in thinnings you can provide instructions, and then leave it to the loggers. Realize their limitations, though.

Clearly mark trees. Use paint (blue is common). Mark three sides of the tree. Mark at least 5' high.

You can either mark the trees to cut, or the trees you don't want cut. Which way would you mark fewer trees?



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Contracts

Sure it's a legal document, but more importantly it's clear communication. Some landowners feel like a contract shows a lack of trust... it's more about avoiding confusion. A buyer who won't sign a contract should scare you.

Develop a contract ahead of time (you can modify it later).

All contracts should at least...

- identify the parties involved
- state the actions to be taken
- indicate the timeframe
- describe the consequences for breach

Good contracts say everything twice... what you should do, and then what you shouldn't do.



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Contracts

Some specific details in a timber sale contract...

How long? A year is typical; more than a year reduces risks for the timber buyer and can generate more bids; less than a year can do the opposite.

Provide bidding instructions. Specify a closing date/time, how bids should be formatted (sealed?), and any other materials you want (price, but also insurance documentation, deposit check, etc.).

Specify that the logger will comply with all *Silvicultural* and *Forestry-Wildlife* BMPs.



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Contracts

More details in a timber sale contract...

Provide a map. Indicate the area to be harvested. Indicate expected gate and road access, including where they'll get back to the public road.

"Thou shalt nots"... Prohibit dumping oil, hydraulic fluid, or similar. Prohibit operating equipment outside of the harvest area. Prohibit starting fires. Prohibit trash/littering.

Define your expectations at completion. Who is responsible for damage to roads, gates, or other infrastructure? Do you want branches and tops piled, or spread back into the stand?

Specify how you will get paid...



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Contracts

How WILL you get paid? Timber sales by private landowners are typically done one of two ways: lump-sum, or pay-as-cut. Both work, and have different strengths and weaknesses...

In lump-sum, the landowner defines which trees to cut, and the timber buyers assess the harvest and provides a "total" bid. Each buyer will want to do a detailed inventory of your sale area.

For instance, lump sum...	
Buyer X	\$26,000
Buyer Y	\$31,500
Buyer Z	\$29,990



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Contracts

In pay-as-cut, the landowner defines which trees to cut, and the product(s) they expect it to produce, and the timber buyer assess the harvest and provides a "per-product" bid. The landowner needs to have a "detailed" inventory of the sale area.

For instance, pay-as-cut...		
Buyer X	\$4/ton pine pulpwood	\$12/ton chip-n-saw
Buyer Y	\$4/ton pine pulpwood	\$13/ton chip-n-saw
Buyer Z	\$5/ton pine pulpwood	\$12/ton chip-n-saw

In this scenario, if the sale was 40% pulpwood and 60% chip-n-saw, Buyer Y would win. If the sale was 60% pulpwood and 40% chip-n-saw, Buyer Z would win.



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Contracts

Lump-sum sales are easier to manage, but can generate fewer bids (maybe, lower bids). Pay-as-cut sales are harder to manage, but can generate more bids (maybe, higher bids).

	Lump-Sum	Pay-As-Cut
More Common for...	Clearcuts	Partial Cuts (thinnings)
Risk to Timber Buyer	Higher (fewer bids?)	Lower (more bids?)
Landowner Must Have Inventory	No	Yes
Payment Timing	Up-Front	Periodically, as it's cut
Will It Get Harvested?	Almost Certainly	Probably
Concerns About Timber Theft?	Low	Higher



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Finding the Right Buyer

Where to start... You're looking for reputable buyers, who are reasonably local.

County Forester – A great resource for local contacts. Can't provide "references" or make specific suggestions, but can help you identify options.

Forest Stewardship – Very comprehensive list, organized by region.

Master Logger – Large list of folks with some basic training. Even though they're "loggers", most are also timber buyers, or work regularly with timber buyers and can pass along your sale info.



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Finding the Right Buyer

Getting the word out... You want to distribute your sale widely, and provide enough information to get them interested.

Mail it to them. Not all timber buyers use email. A hard copy is still the best way to reach them.

Provide a cover letter with some basic information. How old? How many acres? Planted or naturally-regenerated? Species? Trees per acre? Average diameter?

Send the contract. A good contract will answer most questions.

Allow at least two months before closing.

Give them your phone number.



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Finding the Right Buyer

The bidding process... Once you've widely distributed your sale information, folks should begin contacting you. Some will schedule a visit; others will just show up. It only takes one good bid to make a successful sale (though the more, the better).

Be prepared! Boundaries and trees should already be marked. Have copies of the contract (with map) handy. Be ready to discuss details about access, decks, etc. Don't contradict the contract!

Submit an "internal bid". This sets the minimum price you're willing to accept, in a fair way.

Hold to the bidding instructions. Don't open bids early. Make sure all documentation is in order.



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Finding the Right Buyer

Selecting the winner... If the sale is lump-sum, you know immediately who has the highest bid. If the sale is pay-as-cut, you'll probably need to do some math. Either way, as long as they've exceeded your internal bid, congratulations!

Decide who to award the sale to. In most instances this is the highest bidder, but not always. Consider reputation. Consider whether they've actually been to see the sale.

Promptly contact the winner. Arrange to get the check (if lump-sum). Ask when they expect to begin work.

Promptly contact all other bidders and thank them for their interest. You don't have to tell them who won, what the other bids were, how many bids you received, or anything else.

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What to Worry About During Logging

Are they taking care of the ground? Once the loggers start work you'll want to visit every 2-3 days. Loggers are professionals, and should be treated that way, but if something's wrong (or could be wrong, soon), say something. If something's REALLY wrong then tell them to stop, and call the timber buyer.

Are they cutting the right trees? Not just are they thinning to your specifications, but are they aware of where boundaries are?

Are they being careful when they harvest? Look at stump heights. Look for rutting. Look for skinned- or damaged-trees. Be realistic, but be firm.

Are they making a mess? Look at road conditions. Look for trash. Check gates and other infrastructure for damage.

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What to Worry About During Logging

Are you getting paid what you should? For lump-sum sales, they've paid you already and can take (or leave) anything they want. For pay-as-cut, it's much more complicated.

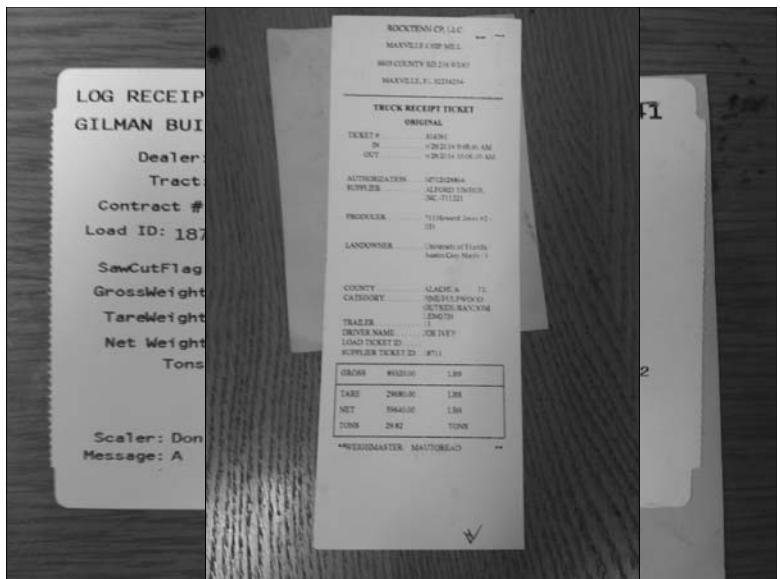
Are they skidding and loading everything they cut? You're getting paid by the ton, so any wood that doesn't go to the mill is money you've lost. Look for cut trees that are left in the woods. Look at the "cast-off" pile.

Are they sorting the wood correctly? You get paid more for chip-n-saw, so make sure they aren't sending chip-n-saw trees to the pulp mill. Realize that size matters, but so does how straight, branchy, or diseased the tree is.

Are you getting paid for every load of wood that leaves?

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What to Worry About During Logging

ARE you getting paid what you should? A relatively easy, and cheap, approach is to use a game camera.



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Getting the Most for Your Stumpage

Maximize Competition – Distribute your sale information broadly. An additional stamp is cheap.

Access Matters – Poor roads make timber less valuable. Maintain good roads. Think about access through neighbors.

More Wood – It costs a lot just to move logging equipment. Harvest multiple stands under the same sale. Consider bundling sales with your neighbors.

Timing is Important – Make contracts as long as reasonable. Sell dry stands during wet times, and wet stands during dry times.

Make it Easy – The easier it is for the timber buyer, the more likely they'll bid, and the higher they'll bid.

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The Major Wood Products

Markets are complicated. Stumpage demand is a function of weather, the economy, mill openings/maintenance/closings, and what other landowners are doing. You can't predict any of these.

Product specifications aren't constant, or consistent... changes in supply, changes in equipment, changes in competition.

"Niche" markets open and close all the time... small pine logs exported to China for concrete forms, hardwood for railroad ties, the Gainesville biomass plant, etc.

We tend to think about "pulpwood, chip-n-saw, and sawtimber", but it's much more complicated than that...

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The Major Wood Products

Poles	
Species	slash, longleaf, sometimes loblolly pines
Size	11" DBH, or greater 4" diameter at 40', or greater
Form	no sweep, minimal branching, no defects
History	very old use of wood; since 1950s, wood preservatives have dramatically increased the usable lifespan
Stumpage Value	very high, can support long haul distances
Mills	typically includes wood-treating facilities (expensive)
By-Products	bark (mulch, fuel), sawdust (pulpwood, fuel)

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The Major Wood Products

Plywood	
Species	slash, longleaf, sometimes loblolly, sometimes sand pines
Size	13-26" DBH 8" diameter at 35', or greater
Form	minimal sweep, no branching, no defects
History	invented by the Egyptians; variations in number of "plys" (3 or 5); glued together cross-grained
Stumpage Value	very high, can support long haul distances
Mills	cheap, and typically beside railroad lines
By-Products	bark (mulch, fuel), sawdust (pulpwood, fuel), "cores" sold as landscape timbers or fenceposts

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The Major Wood Products

Chip-N-Saw	
Species	slash, longleaf, loblolly, sometimes pond pines
Size	8" DBH, or greater 6" diameter at 35', or greater
Form	minimal sweep, branching okay, no defects
History	"lumber" has long been used, but small-diameter mills only common since the 1960s
Stumpage Value	moderately high, haul distance becomes an issue
Mills	generally cheap
By-Products	bark (mulch, fuel), sawdust (pulpwood, fuel)

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The Major Wood Products

Pulpwood-Tissue Paper	
Species	any pine, and most hardwood (mix of fiber lengths)
Size	Pine... >5" DBH; 4" diameter at 15' Hardwood... >7" DBH; >4" diameter at 50'
Form	no form restrictions, but no burn char
History	common since the 1950s
Stumpage Value	low value, haul distance critical
Mills	very expensive, need ample water supply for bleaching, often located near ports
By-Products	typically burn all "waste" to produce energy... commonly self-sufficient (and then some)

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The Major Wood Products

Pulpwood-Kraft Paper	
Species	slash, longleaf, loblolly, pond, sand pines
Size	5" DBH, or greater 4" diameter at 15', or greater
Form	no form restrictions
History	common since the 1950s
Stumpage Value	low value, haul distance critical
Mills	very expensive, often located near ports
By-Products	typically burn all "waste" to produce energy... commonly self-sufficient (and then some)

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The Major Wood Products

Pulpwood-Cellulose

Species	slash, longleaf, loblolly, pond, sand pines
Size	5" DBH, or greater 4" diameter at 15', or greater
Form	no form restrictions
History	common around 1970
Stumpage Value	low value, haul distance critical
Mills	very expensive, often located near ports
By-Products	typically burn all "waste" to produce energy... commonly self-sufficient (and then some)

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The Major Wood Products

Bioenergy-Pellets

Species	slash, longleaf, loblolly, pond, sand pines
Size	5" DBH, or greater 4" diameter at 15', or greater
Form	no form restrictions
History	"oldest use of wood", pellet mills common since 1990s
Stumpage Value	low value, haul distance critical
Mills	cheap, located to serve export markets
By-Products	carbon credits?

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The Major Wood Products

Mulchwood

Species	anything... specialty markets for "red bay" and cypress
Size	anything that will load
Form	no form restrictions
History	common around 1950s
Stumpage Value	low value, haul distance critical
Mills	cheap, and often co-located with dimensional-wood mills
By-Products	bark sometimes sold for fuel

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The Major Wood Products

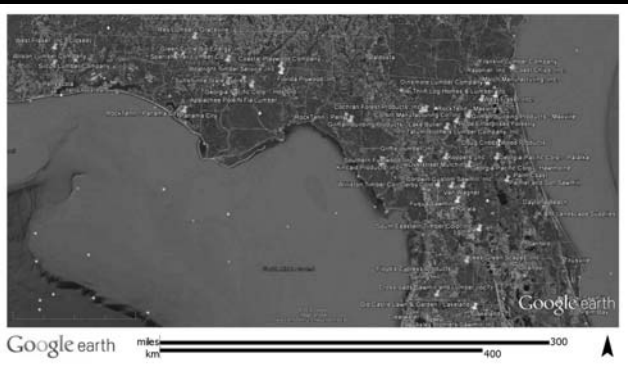
Bioenergy-Biomass

Species	anything
Size	anything that'll load
Form	no form restrictions
History	"oldest use of wood", many proposed since 2000 (few built)
Stumpage Value	low value, haul distance critical
Mills	moderately cheap; can't realistically compete with other fuels, so need local utility support
By-Products	public relations?

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The Major Wood Products



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Questions...

Extension Publications

<http://edis.ifas.ufl.edu/fr130>

<http://edis.ifas.ufl.edu/fr297>

<http://www.aces.edu/pubs/docs/A/ANR-0560/ANR-0560.pdf>

Association of Consulting Foresters

<https://www.acf-foresters.org/>

Scott Sager

UF/School of Forest Resources & Conservation

352.317.7675 ~ sasager@ufl.edu

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UNIVERSITY OF FLORIDA_TIMBER SALE 2017_AUSTIN CARY FOREST

Offer Terms & Conditions of Sale

1. **AWARD** - Award will be made on an "All-or-None Offer Total Offer" basis. Any contract awarded pursuant to this Offer will be awarded to the single best Offeror, or to none at all.
2. **OFFER FORM** - All offers shall be submitted using the Timber Sale Agreement with one (1) complete original offer and one (1) complete photocopy in a sealed envelope.
3. **OFFER DELIVERY** - All Offers shall be delivered to 10625 NE Waldo Road, Gainesville FL 32611 no later than **3:30 PM Thursday 13 July 2017**. Any Offers not received before or by that time will not be accepted and/or returned to Offeror.
4. **QUALIFICATIONS OF OFFERORS** - This offer will be awarded only to a responsible Offeror qualified by experience to provide the work specified. Operations will be supervised by a Master Logger, and bidder must be willing to provide proof of Master Logger status.
5. **INQUIRIES** - The University will not give verbal answers to inquiries regarding the specifications, or verbal instructions prior to or after the award of the offer. Direct all inquiries to Scott Sager (352) 317.7675, sasager@ufl.edu.
6. **INSPECTION OF FACILITIES** - It is the Offeror's responsibility to become fully informed as to the nature and extent of the work required and its relation to any other work in the area. Arrangements for Offeror's inspection of the Forest and facilities and/or activity schedules may be secured from Scott Sager (352) 317.7675, sasager@ufl.edu.
7. **INSURANCE - NON-CONSTRUCTION** - The Contractor shall purchase from and maintain with a company or companies, lawfully authorized to do business in Florida and acceptable to the University, such insurance as will protect the Contractor from claims arising out of or resulting from the Contractor's operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable. All insurance policies shall be issued and countersigned by representatives of such companies duly authorized for the State of Florida and shall be written on ISO standard forms or their equivalents.

The Contractor shall file with University of Florida Purchasing Certificates of Insurance prior to the commencement of the work and shall file certificates of insurance evidencing the renewal of such policies at least thirty (30) days prior to the date the each applicable insurance policy is scheduled to expire (purchasing@ufl.edu or fax (352) 392-8837).

Contractors Liability Insurance - The Contractor shall provide the ISO Commercial General Liability policy for general liability coverage's for limits of not less than of \$1,000,000 per occurrence. Coverage's shall be maintained without interruption from date of commencement of work until date of final payment.

Worker's Compensation - The Contractor shall secure and maintain for the life of this Agreement, valid Worker's Compensation Insurance as required by Chapter 440, Florida Statutes.

Automobile Liability - The Contractor shall secure and maintain during the life of this Agreement, Automobile Liability insurance on all vehicles against bodily injury and property damage in the amount of at least, \$1,000,000 per occurrence.

8. **PROTECTION OF PROPERTY** - The successful Offeror shall guard against damage or loss to the property of the University, and shall be held responsible for replacing or repairing any such loss or damage. The University may make additional charges as deemed necessary to insure reimbursement

or replacement for loss or damage to property through negligence of the successful Offeror or his agents.

9. **USE OF TERMS** - The terms SELLER, University of Florida, UF, University, Austin Cary Forest, ACF, IFAS, and Institute of Food and Agricultural Sciences are used synonymously in this Invitation to Offer unless otherwise indicated. The terms PURCHASER, vendor, proposer, offeror, and contractor are used synonymously in this ITB unless otherwise indicated.

UNIVERSITY OF FLORIDA_TIMBER SALE 2017_AUSTIN CARY FOREST

TIMBER SALE AGREEMENT

THIS OFFER, made this _____ day of _____, 2017, between the UNIVERSITY OF FLORIDA hereinafter called the SELLER, and

Company Name

Company Address

Representative and Title

Signature (*Signature of Authorized Representative*)

City

State

Zip

Hereinafter called the PURCHASER.

ARTICLE I

Preamble

For and in consideration of the promises and agreements hereinafter contained, SELLER agrees to sell and permit PURCHASER to cut, and PURCHASER agrees to cut, remove, and provide suitable payment for as specified, such cut timber specified in this Agreement, subject to the Agreement provisions.

ARTICLE II

Description

The SALE AREA at the University of Florida, Austin Cary Forest (ACF), contains approximately 33 acres, more or less, in Sections 28 and 33, T8S, R21E. Timber is to be cut as described in Article III, within the boundaries of the sale area. Boundaries of sale area are shown on Figure 1.

ARTICLE III

Timber Included

This Agreement includes only that timber described below within the specified sale area indicated on the attached Figure 1. The sale area is composed of approximately 33 acres of un-thinned 1986 slash pine plantation, with an estimated density of 395 trees-per-acre, and an estimated average DBH of 8.3" and height (4" top-diameter) of 61'.

All merchantable timber within the sale boundaries is to be harvested, including both planted pine and incidental natural hardwood/cypress. Sale boundaries are marked with yellow paint, or by clearly indicated roads.

ARTICLE IV

Conditions of Sale

PURCHASER agrees to cut and remove timber included in this Agreement in strict accordance with all conditions, *Florida Silvicultural Best Management Practices* (BMP's), *Florida Forestry-Wildlife Best Management Practices* (WBMP's), and requirements contained herein. All timber in this contract transfers to PURCHASER when full payment is made. All scale tickets are the property of SELLER, and can be made available to SELLER by all wood processing mills at request of SELLER.

This Timber Sale is a **LUMP-SUM** sale for all within the sale area. The University of Florida reserves the right to reject any and all offers. A PURCHASER offer, lump-sum will be placed in a sealed envelope and opened at the date and time of the offer opening.

The successful Offeror must submit the total payment as indicated in their bid within five days of being notified in writing that the University of Florida accepted his Offer. The successful Offeror has 30 days

after offer opening, or two days prior to commencing harvesting (whichever is earlier), to meet with the ACF Forester, Scott Sager, or his designate, to sign the Timber Sale Agreement, and submit the security deposit.

The successful Offeror for this sale shall have one (1) year after the date of the Opening Date/Time to complete harvest operations. Extensions will be considered only when Acts of God or other extreme contingencies beyond the control of PURCHASER prevent this time schedule from being followed. The PURCHASER may make a written request for an extension at least fifteen (15) days prior to the Agreement termination, with the reasons for the request stated therein. Extensions are granted at the sole discretion of SELLER.

PURCHASER and/or his employees shall exercise care at all times against the starting and spreading of fires in the sale and surrounding areas. PURCHASER shall be held liable for all damages caused by such fires. Damages will be determined by one person representing the PURCHASER, one representing the SELLER, and a third person chosen by both parties.

Logging crew members will comply with Florida's current *Silvicultural Best Management Practices* and *Forestry-Wildlife Best Management Practices* in all operations. Logging operations may be temporarily suspended if weather conditions dictate, at the sole discretion of SELLER.

Stumps shall be cut as low to the ground as possible. Logging slash and debris (e.g., branches, non-merchantable tops and similar) will be piled at the deck. Roadways will be kept clear of logging debris.

Loading areas/decks will be specified by the SELLER, in cooperation with the PURCHASER, but no more than three decks are anticipated.

The right of ingress to, and egress from, the sale area is hereby granted to PURCHASER, for the duration of this Agreement. Designated ingress to and egress of the sale area is via established gates on State Road 24 (Waldo Road). See attached Figure 1 for additional information.

PURCHASER agrees to leave all roads in a similar condition as when harvesting conditions began, including but not limited to, similar conditions of passability relative to vehicular traffic; and removing all logging debris, branches, and similar. Any stabilization materials must be approved by SELLER in writing prior to installation.

Operations on the sale area may be suspended by the Forester or his representative after written notice has been served on PURCHASER if the conditions and requirements contained in this Agreement are disregarded. Failure to comply with any of said conditions and requirements would be sufficient cause for termination of this Agreement and the use of the security deposit.

PURCHASER shall be responsible for seeing that the logging area, particularly around the logging ramps, shall be free from any litter, such as, oil cans, drums, paper, and other refuse.

PURCHASER agrees to dispose of equipment fluids (including, but not limited to, motor oil, hydraulic fluid, and transmission fluid) off-site and in a proper manner. PURCHASER further agrees that under no circumstances whatsoever will any carcinogenic, controlled, toxic or otherwise hazardous substances or materials, or a container presently or formerly holding such substance(s), be allowed to drain, percolate on or into, or be stored, dumped, buried or otherwise contaminate, taint, or affect the sale area or any area adjacent to or in the vicinity of the sale area.

PURCHASER agrees to assume full responsibility and be liable for all damages to persons or property incurred in or resulting from the harvesting of timber. PURCHASER agrees further, by the acceptance of this Agreement, to release, acquit, indemnify, save, and hold harmless the SELLER and the State of Florida, their officers, agents, and representatives from any and all claims, loss, damage, injury, and

liability, whether for personal injury or otherwise, resulting from, arising out of or in any way connected with the work to be performed under this Agreement.

PURCHASER must maintain, in accordance with University policies, Workers Compensation Insurance, property liability insurance and vehicle liability insurance during the time any of his/her personnel are working on the sale area, and shall furnish SELLER with a **Certificate of Insurance stating UF as additionally insured** prior to start of any work on the timber sale.

PURCHASER shall notify the Forester at least four (4) working days prior to the completion of the sale so that a compliance inspection can be made.

Decisions of SELLER shall be final in the interpretation of the regulations and provisions governing the sale, cutting, and removal of timber covered herein.

ARTICLE V

Price and Bond

LUMP-SUM AMOUNT: _____.

Payments will be made within five (5) days of receipt of written notification of award, by check made out to **UNIVERSITY OF FLORIDA** and delivered to the ACF Forester, Scott Sager, University of Florida, 10625 NE Waldo Road, Waldo FL, 32609.

Security Deposit

A Security Deposit of \$5,000 will be made to the SELLER and delivered within 30 days of notification of award, or two (2) days prior to the commencement of harvesting, whichever is earlier. The purpose of this deposit is to cover any damage to University of Florida property (including but not limited to damage to roadways and drainage structures, damage to gates and fences, damage to residual trees, damage to signs, or similar), and to compensate for breach of any contract provisions (including but not limited to excessive rutting, failure to remove refuse, failure to adequately pile non-merchantable tree material, and similar). The ACF Forester and a representative of the PURCHASER will make a compliance inspection of the Sale Areas to determine if all conditions of the contract have been honored. If all conditions have been met the entire Security Deposit will be returned to the PURCHASER.

THIS WILL BECOME A LEGALLY BINDING ACCEPTANCE OF OFFER AND TIMBER SALE AGREEMENT UPON DATE OF SIGNATURE BY THE AUTHORIZED UNIVERSITY OF FLORIDA REPRESENTATIVES AND ALL TERMS & CONDITIONS SHALL BE IN EFFECT AS OF THAT DATE:

UNIVERSITY OF FLORIDA:

Dr. Jack Payne

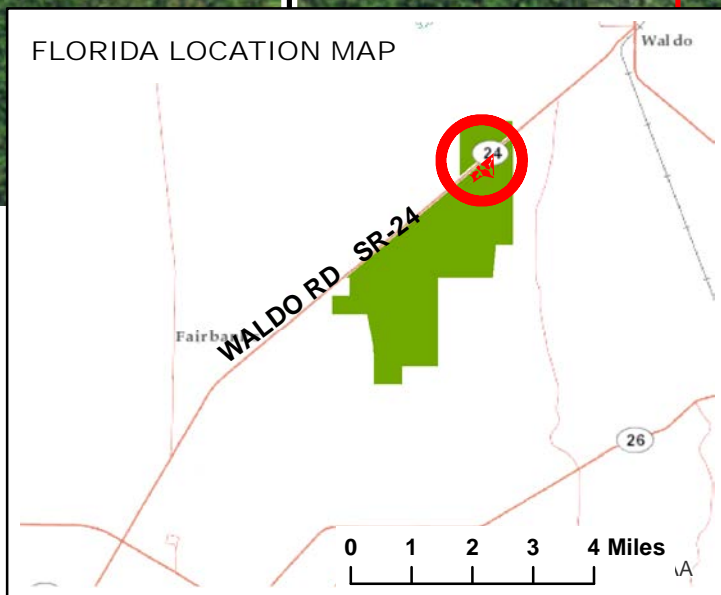
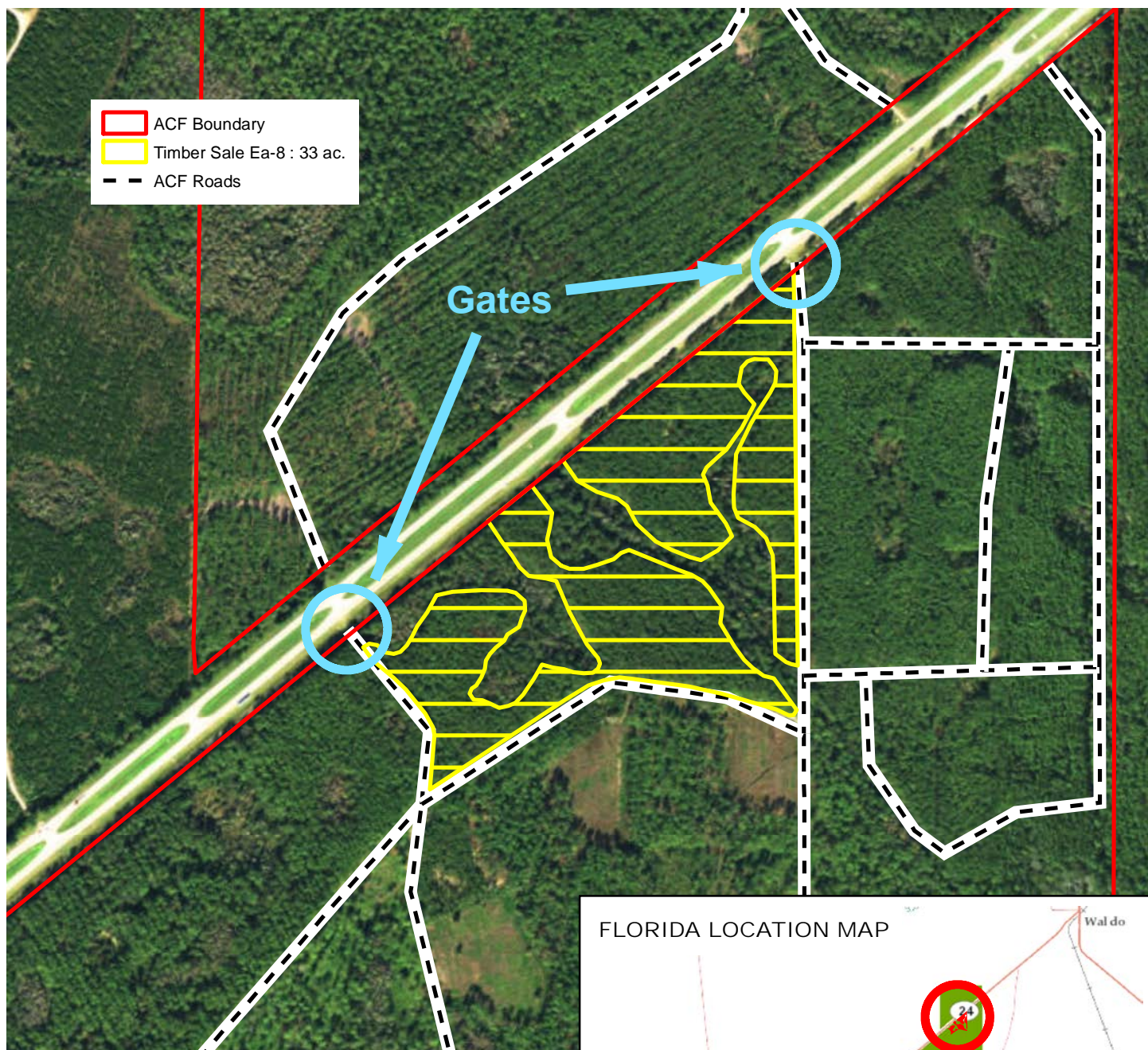
Senior Vice President for Agriculture
and Natural Resources

Date

Dr. Terrell "Red" Baker

Professor and Director, School of
Forest Resources & Conservation

Date



31 May 2017

0 660 1,320 Feet

Steps to Marketing Timber¹

Chris Demers and Alan Long²



Marketing timber involves selling forest products in a competitive market to get the best return on your investment or to meet other objectives. This process requires some planning and pre-sale preparation before you advertise or talk to prospective buyers. Timber sales should be approached in a business-like manner to ensure that both the seller and buyer are satisfied with the results. Following are some important guidelines to follow when planning and conducting a timber sale.

Start with Your Objectives and Financial Situation

Timber is sold for many reasons. The most obvious reason is to convert the timber asset into money. However, the decision to sell timber should be based on the objectives

you have for your land. You may harvest trees in order to regenerate or improve the future value of a stand, reduce stand density (thinning), salvage damaged timber, maximize profits, improve wildlife habitat, or develop recreational opportunities. These types of management decisions should start with a written management plan, which outlines your objectives, identifies the steps necessary to achieve them, provides a timetable to guide management activities, and is the first step to a successful harvest.

Consider Your Tax Situation

How you treat the expenses and income associated with your forestland for tax purposes depends on the scope and nature of your timber-related activities. If you have a small holding with occasional transactions, you would most likely treat these activities as an investment. If your holdings produce regular and continuous transactions, your forestland may constitute a business. Regardless of your tax status, it is extremely important to maintain thorough records for all management activities and costs.

Money from a timber sale could significantly raise your taxable income, but part of that money is your investment, or basis, in the timber sold. The basis must be adjusted up for new purchases or investments and down for sales and disposals. In general, it is most often advantageous to report your timber sale income as a capital gain rather than as ordinary income. Capital gain income is taxed at a lower rate than ordinary income and is not subject to the self-employment tax. These points are made to emphasize

1. This document is SS-FOR-17, one of a series of the School of Forest Resources and Conservation Department, UF/IFAS Extension. Original publication date January 2002. Revised February 2013 and March 2016. Visit the EDIS website at <http://edis.ifas.ufl.edu>.

2. Chris Demers, forest stewardship coordinator; and Alan Long, professor (retired); school of Forest Resources and Conservation; UF/IFAS Extension, Gainesville, FL 32611.

the importance of considering federal income taxes and knowing your tax status before planning a timber sale, but they are by no means complete. Consult a tax attorney, certified public accountant or a knowledgeable forester about your specific tax situation. For the latest timber tax updates and information see <http://www.timbertax.org/>.

Financed Property

If your property is financed, the timber on it is probably covered by the mortgage and, if so, might be part of the lender's collateral. If it is, the lender will require notification and may require that all or a part of the proceeds from a timber sale be applied to the loan. Regardless, the timber buyer will need a release from the mortgage. This will need to be determined and all relevant arrangements made in writing with the lender before you sell timber in order to avoid future legal or financial complications.

Know What You Are Selling and Its Value

To determine the value of the timber you are selling you should know what products you have to sell. Unless you have experience with forest inventory, it is best to seek the services of a professional forester for this. A forester can accurately estimate the number and volume of trees by product class and then appraise the current market value of the timber you want to sell. This is extremely important because the price of different product classes can vary significantly and will dictate in part how much the buyer will pay for the timber. This information will be worth the price of the inventory when it is time to sell. As with some other forest operations, per acre costs for inventory tend to increase for small properties and non-uniform stand conditions.

Your timber is worth as much as the buyer will pay for it at a certain time. This price is determined by current market conditions, local competition for particular tree sizes, mill requirements, difficulty of logging a site, harvesting equipment, total volume in each product class, size of the sale, volume per acre, quality of the timber, and distance to different mills. All these factors interact to cause timber prices to vary considerably from place to place and over time, and this variability will affect the price a buyer will pay for your timber. In addition, each buyer may have a different set of cost constraints that will influence what the buyer can offer for a particular sale.

Time Your Sale Strategically

Try to sell your timber when prices are high relative to past prices and expected future values. It is easy to compare current and past prices, but anticipating how prices will change in the future is much more difficult. This requires some knowledge about the behavior of timber prices and markets over time.

Timber price trends have two components: long-term trends and short-term fluctuations. Long-term trends are controlled by major economic factors such as building construction, global paper consumption, foreign currency exchange rates, mill openings and closures, and availability and accessibility of timber resources locally and in other regions. These market trends last for periods of years or decades. Short-term fluctuations often coincide with the seasons or certain weather conditions. Over much of the South, periods of very wet weather can inhibit loggers' ability to harvest timber, resulting in a decreased timber supply and subsequent increased prices. Conversely, timber prices tend to decrease or remain stable during dry weather, when timber is more accessible and supplies increase. As a rule of thumb, it is best to sell timber when current prices are above the long-term trend line. Take advantage of active market periods and avoid selling, if possible, during periods of decreased demand for your products. The advantage of growing trees is that you can usually "bank on the stump" until market conditions improve. Salvage sales after fires or hurricanes obviously do not enjoy this luxury. Information about the timber market can be obtained by subscribing to timber market periodicals and checking with local timber buyers, foresters, and forest owners.

To track trends, you can obtain average prices for the past 3 to 12 months from your local UF/IFAS Extension office.

Decide on a Selling Method: Negotiation or Sealed Bid

The two selling methods used in the South are negotiation and sealed bids. In a **negotiation**, the seller arrives at a price after negotiating with one or more potential buyers. This method may yield a fair price but it may not be as high as the value of a bid sale that receives responses from a larger number of potential buyers. Sellers do not usually have as much information about current market values as the buyers in a negotiation. However, negotiation is necessary and appropriate when: the tract is small and/or irregular; small volumes are sold per acre; timber is sold from a thinning or salvage sale; there are few mills within a reasonable trucking distance; specialty products are sold;

and when the seller prefers or has a previous working relationship with a certain buyer.

In a **sealed-bid** timber sale, the seller advertises the sale to as many prospective buyers as possible. The seller may specify a minimum bid or the right to refuse all bids. Potential buyers submit confidential written offers that are opened at a specified time and place. Each bidder is allowed a single bid and no bids are accepted after the bid closing. Sealed bids are most appropriate when the area to be harvested is large and uniform (i.e., clearcut harvest). Sealed bids historically have yielded the highest price to the landowner and take advantage of competition among buyers. Generally, the likelihood of finding a buyer who is willing and able to offer a high price increases with the number of bids. This selling method is not suitable for small, irregular tracts; and it eliminates opportunities for negotiation.

Decide on a Payment Method: Lump Sum or Pay-As-Cut

A critical step in marketing timber is deciding on the payment method. The two methods of payment for timber are lump sum and pay-as-cut. In a **lump sum** payment, the seller and buyer agree, either by negotiation or through the bid process, on a total price for the timber before it is cut and the full payment is made at contract closing. A lump sum can also be paid in installments. This payment method is best when the sale boundary is easily defined and the timber to be cut is uniform. The advantages of lump sum payments for sellers are that they receive full payment before harvesting begins and risk of timber loss is transferred to the buyer. When sealed bids are used for lump sum sales the seller uses competition among buyers to find the buyer willing to pay the highest price, and the landowner may benefit if a particular buyer overestimates the amount of timber in the sale. On the other hand, and depending on the circumstances, some bidders may offer a lower price for lump sum than they would for pay-as-cut because of their costs for: (1) spending time to accurately determine the amount of timber in the sale before they bid; (2) financing the money they would pay you before the harvest begins; and (3) shouldering the risk of loss once the bid is accepted. Keep in mind that this type of sale may take longer to complete because both the seller and buyer should have an accurate inventory of the products to be harvested. Therefore, it may not be the best method when trying to salvage timber after a fire, storm, or other disaster.

The **pay-as-cut** payment, or *scale sale*, is the most common method of selling timber. This type of sale requires the seller and buyer to agree on per-unit prices and specifications for each product before harvesting. There is usually an initial advance payment or deposit, with subsequent payments as the timber is harvested. The seller retains ownership of the timber and risk of loss until it is harvested. This method is best when: the seller needs to sell quickly, thinning, harvesting areas with difficult or uncertain access, a timber cruise will be difficult or inaccurate because of non-uniform conditions, or when the seller wants to ensure capital gains tax treatment of income. Close monitoring of this type of sale is critical because improper sorting of the timber products by the logger can significantly reduce the income from the sale. Another disadvantage of this kind of sale is that the total amount of income is unknown until the end of the sale.

Tax tip: income from both lump sum and pay as cut timber sales can generally be treated as capital gains if your woodland is categorized as a business or investment.

Advertise the Sale and Select a Buyer

The sale advertisement or notice of a sealed bid sale should include specific information about the sale and be distributed to as many prospective buyers as possible. County foresters can provide a list of reputable timber buyers in your area. The following items should be in the notice:

- **Your name, address, and phone number** and/or that of the forester managing the sale.
- **The location of the timber.** A map, legal description, and directions, as well as how the sale boundaries will be marked.
- **Description of the timber.** Keep this general, such as all timber or timber within a specific unit.
- **Type of bid.** Lump sum or pay-as-cut.
- **Time when buyers can inspect the sale area.** Usually at least one month is allowed between the notice and bid opening.
- **Date, time, and location of bid opening and notification of winning bidder.** Also notify all unsuccessful bidders promptly.
- **Down payment.** This is not necessary, but if you require it, an amount of 5 to 10 percent of the bid price is reasonable and should be returnable to unsuccessful bidders.

- **Provisions for payment.** Specify preference for a personal or certified cashier's check and time of payment.
- **Limitations or special ownership considerations.** Include provisions for best management practices, harvesting deadline, access restrictions, times when loggers cannot operate (e.g., during wet weather), leave trees for wildlife, restoring roads, etc.
- **Performance bond requirement.** Often 10 percent of the sale price (less on large sales) is held in escrow to ensure that the buyer abides by the contract terms. The deposit is refunded immediately following the sale given adherence to contract requirements.
- **Insurance requirements.** Always insist on a certificate of insurance: workers compensation, general liability, and vehicle.
- **Requirement that a Master Logger conduct the logging operation.**
- **Statement of the right to refuse all bids.**
- **A copy of your timber sale contract if you have one you prefer.**

Sale notices can be distributed to potential buyers by mail, fax, personal delivery, or as some sellers now do, through the Internet. You may want to know something about the potential buyers' credentials and reputations. Choose carefully the recipients of your notice. Once you advertise for bids, you are obligated to sell your timber to the highest bidder, unless you do not want bidders on your next sale. The Florida Forestry Association maintains a Master Logger Directory, which lists loggers that have completed an educational program in safety, proper harvesting techniques, business management, and environmental protection and regulations. This directory is available online at <http://www.floridaforest.org/>. Many mills will not purchase timber today unless the loggers have completed the Master Logger program. A poor logging job may be expensive to correct.

Contract with a Buyer

The sale transaction must include a formal, legally binding, written agreement specifying the responsibilities and expectations of both parties. A well-written sale contract will save both the seller and buyer money by eliminating problems, or even litigation, that can result from misunderstandings. The contract will ultimately serve as the mechanism by which any disputes are resolved.

The contract does not need to be lengthy or complex but it must reflect the expectations and responsibilities of the

seller and buyer. An effective timber sale contract will contain the following provisions:

- **Identification of parties.** Include addresses, phone numbers, and e-mail.
- **Method of payment.** This should specify the amount the purchaser agrees to pay the seller as a lump sum or pay-as-cut as well as how the buyer will provide verification of the amount of timber cut and paid for.
- **General description of timber sold.** Describe how the trees or harvest area will be marked, and a provision for trees that grow into a merchantable size during the contract period.
- **Care of property.** Describe each part of the property that could be subject to damage (i.e., fences, roads, bridges, buildings, nest boxes, residual trees, etc.). Include allowable limits of damage and provisions for repair or payment for damages.
- **Arbitration.** Specify a method for settling disputes. Arbitration panels are generally preferred over litigation in courts.
- **Guarantee of ownership.** All buyers will require a title search and an abstract that show clear ownership, especially if a lump sum payment is agreed on.
- **Right of ingress and egress.** Provide buyer the right to come and go to remove timber. Specify entrances and roads to use.
- **Harvest method.** Address the layout of log decks, log roads, and areas to be cut. State any restrictions on equipment use and logging during wet periods or other times (e.g., hunting season). Include provisions for use of Silvicultural Best Management Practices, compliance with environmental regulations, local ordinances, and specify that you reserve the right to inspect the logging site and, if necessary, halt all operations.
- **Penalties for noncompliance.** Detail penalties for noncompliance with contract terms. Address penalties for activities such as cutting non-designated timber, as well as for damaged property, including damages to adjacent landowners' property. Specify provisions for payment of penalties and an escrow account or performance bond.
- **Length of agreement.** State the beginning and end dates of the agreement and provisions for or against renewing the contract if it expires before harvesting is complete.
- **Insurance requirements and indemnification of seller.**

- **Bottom line.** Signatures of all parties, signature dates, notarization of agreement, and registration at the courthouse.

In addition to the above contract provisions, you may wish to consider additional clauses to cover special situations. One that can prevent many problems is a statement for or against assignment of the contract to a third party. You may be fully protected by the contract between you and the buyer but that protection may be compromised if the buyer reassigns the contract to another logger or mill.

Try to prepare a short contract with clauses that are relevant and important to you. Long, complicated, restrictive contracts may scare buyers away and make supervision of the operation difficult. Buyers sometimes have pre-written contract forms, which may satisfactorily reflect your objectives, but the decision to use a buyer's contract should be based on sound legal advice.

Supervise the Operation

Review the contract with the logger, timber buyer, or forester before harvesting begins; and be sure they understand your harvest objectives. If they know you and are familiar with your objectives they should make a greater effort to do a good job; their reputation depends on it. You and/or a forester should visit the area frequently once the operation begins to make sure it is in compliance with the contract terms. Violations of the contract should be addressed immediately. Once the harvest is complete according to the terms of the contract, write a letter releasing the buyer from the contract and refund the performance bond.

Assistance

Professional foresters can assist you in selling your timber. Consulting foresters, county foresters, and industry foresters are all available in varying capacities to help you through the process. Consulting foresters can perform all duties of the sale, including an inventory, the sale contract, and harvesting supervision for a fee. Research has shown that timber sales handled by qualified consultants consistently bring significantly more money than sales sold by landowners on their own. Landowners can get a directory from the Association of Consulting Foresters (ACF) or can go to ACF's website to find an ACF member in their area. The Florida Division of Forestry also maintains a consultant directory, by geographic area, that is available free to landowners. See <http://edis.ifas.ufl.edu/FR125> for tips on selecting a consulting forester.

County foresters' services are free but they are limited to technical advice on management practices and management plan preparation for properties 160 acres or less. Your county forester can be found in the phone book under State Government Offices, Florida Division of Forestry.

Industry foresters can also provide management and marketing assistance via their landowner assistance program (LAP), which can be found under timber company names in the phone book or on the Internet. A typical LAP is free of charge and helps with timber sales, reforestation, mapping, and other land management tasks.

Other recommended sources of assistance include an attorney for counsel on the sale contract and an accountant, for advice about the sale with respect to your specific tax situation.

Conclusion

Marketing your timber or other forest products is usually the culmination of a long investment strategy and a means to reach a variety of resource management objectives. It deserves patient planning, careful consultation and a keen knowledge of what and why you are selling. It is also the beginning of the next management period for your property. Planning for forest regeneration should be as much a part of your sale as wise marketing.

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FOREST CERTIFICATION



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What is Forest Certification?

- **System** to recognize and promote environmentally responsible forestry and the sustainability of forest resources
- **Process** of labeling wood that has been harvested from well-managed forests. Standards include:
 - ✓ Environmental / Ecological
 - ✓ Economic
 - ✓ Social
- **Driven** by consumer demand for wood harvested from sustainably managed forests, as well as landowner interest in sustainable forestry.

Why Did Forest Certification Arise?

- **Environmental awareness and concern**
 - **1960's-70's:**
 - Environmental/Forestry legislation:
 - Multiple Use and Sustained Yield Act of 1960
 - Clean Water Act of 1972 impacted forest management on all lands.
 - **1980's:**
 - Despite the legislation, increasing public scrutiny of forest practices.
 - Concerns included global forestry issues, such as tropical deforestation.



Certification Standards Born

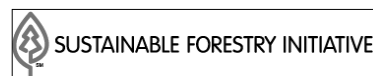
- **1990's:**
 - **Certification standards developed** – Global forest stakeholders developed forest practice standards that are now the framework for today's forest certification programs.
 - **1992 UN Conference on Environment and Development (Rio Earth Summit)** – Established vision of sustainable development
 - **1993 Montreal Process** – Working Group on Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests
 - FSC and SFI Standards originated from these criteria



Types of Certification Systems

- **Forest Management Certification**
 - Forest management evaluated against sustainability standards. Can be issued as standard or group.
- **Standard Certification**
 - Landowner or organization certified individually and subject to periodic audits.
- **Group Certification**
 - Group of landowners or organizations certified collectively as one group or under one certificate holder.
 - **Lower cost** - small sample of owners' property is audited annually
- **Product Certification - Chain of Custody**
 - Wood is tracked from certified forest to finished product.
 - Involves mills, manufacturers and retailers. Finished product has label or logo identifying the certification system.
 - FSC, SFI, Program for Endorsement of Forest Certification (PEFC)

Major Forest Certification Systems



Forest Stewardship Council

"Forests For All Forever"

- **International** - began in 1993 to address tropical forestry, expand to include temperate and boreal forests
- **Standard and Group Certification**
 - Many certification bodies worldwide – 3 in US:
 - Rainforest Alliance, Scientific Certification Systems Global, and Bureau Veritas
 - Annual office and field audit, auditors accredited by FSC Accreditation Services International
 - Rigorous standards and high audit cost
- New **Small and Low-Intensity Managed Forest Standards** for Family Forests: 1,000 hectares (2,470 acres) or less.
- **Forest and Product certification** –
 - **chain of custody** monitored to ensure all or portion of material in the final product is from certified sources
 - Emphasis on **environmental and social** criteria
 - More at <https://us.fsc.org/>



Sustainable Forestry Initiative

"Good for you, Good for our forests"



- SFI, Inc. is independent 501(c)(3) charitable organization – manages the SFI program
 - Fully independent, Governed by SFI Board, State SFI Implementation Committees
 - **SFI Board: 3-chamber**, representing
 - Environmental
 - Economic
 - Social
- **Forest and Product Certification** - General emphasis on **management and operations balanced with environmental and social criteria.**
 - Land management standards
 - Domestic and international fiber sourcing standards
 - Research, training, legal, and social standards
- See standards at <http://sfiprogram.org/>



American Tree Farm System

"The Sign of Sustainable Forestry"

- "Tree farming" started in the 1940s to introduce the public to the capabilities of sustainable forestry.
- The first Tree Farm was established in 1941 by Weyerhaeuser in Montesano, WA.



American Tree Farm System

"The Sign of Sustainable Forestry"

- Today Tree Farm administered by **American Forest Foundation**, <https://www.treefarmssystem.org/>
- State Tree Farm Programs
- Group Certification
 - Regional, State or Independently Managed Groups
- Eligibility
 - Private or public ownership 10 to 10,000 acres
 - non-industrial - no publicly traded companies, small business allowed
 - Commitment to sustainable forest management and conformance with standards



American Tree Farm System

"The Sign of Sustainable Forestry"

Standards include:

- Written management plan
- Compliance with laws, BMPs
- Reforestation, afforestation
- Wildlife habitat, biodiversity, invasive species control
- Aesthetics
- Special or historical sites
- Practical harvesting guidelines



American Tree Farm System

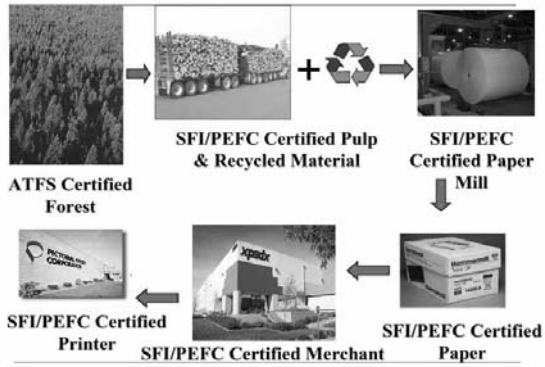
"The Sign of Sustainable Forestry"

Forest and Product Certification

- **Lands certified by the American Tree Farm System are a source of fiber for the Sustainable Forestry Initiative (SFI, Inc.) and PEFC chain of custody programs.**
- Certified Tree Farmers get a certificate number for chain of custody tracking.
- In 2016 "states decision" - certification or recognition?
 - Florida and most states are on the certification track.
- In 2017 the Florida Tree Farm program gained 501(c)(3) status.



Chain of Custody Example



Why Get Your Forest Certified?

- Market premiums (?)
- **Market Access –**
 - Many mills/companies need some certified wood
 - Some only buying certified wood or final products
 - McDonalds now requiring 100% certified packaging material
 - Europe very green – some export markets 100% certified
 - Green Building Certification <http://www.usgbc.org/leed>
 - US Green Building Council LEED standards - FSC Standards only
 - 2016 – new compliance path for “responsibly sourced” domestic wood includes SFI and PEFC
- Energy wood and carbon trading markets

Why Get Certified?

- Workshops, tours, webinars, other educational opportunities
- Connection to a network of landowners, foresters, extension, natural resource professionals
- Newsletters, magazines, web resources
- Representation on important policy issues



Ten Tips for Increasing Wildlife Biodiversity in Your Pine Plantations¹

Holly K. Ober, Stanton Rosenthal, and William Sheftall²

Many forest landowners are interested in managing their property to achieve more than one objective. It is quite common for forest landowners in Florida to aspire to produce timber products while also providing habitat for wildlife. Some individuals are most interested in increasing the abundance of game species to maximize hunting opportunities, and they should see the publication, “Ten Tips for Encouraging the Use of Your Pine Plantations by Game Species,” at <http://edis.ifas.ufl.edu/UW318>, for more information. High priority for other forest landowners is providing habitat that will attract a diversity of wildlife species. Here we discuss strategies to achieve this goal.

Production of timber products and enhancement of wildlife diversity are compatible objectives. However, some trade-offs may be necessary because strategies that maximize timber growth are typically not exactly the same as strategies that will provide habitat for a wide variety of wildlife species. For this reason, it is important to prioritize your objectives and decide where wildlife ranks relative to timber production in your land use planning. If wildlife is your first priority, you may want to incorporate all ten of the tips listed below. If timber production is your top priority and wildlife is second, you may want to adopt fewer of the suggestions provided on ways to tweak pine plantations to provide habitat for a range of wildlife species.



Figure 1. Pine plantations can provide habitat for many wildlife species.

Credits: Holly Ober, UF/IFAS

Tip #1—Manage Your Timber on Long Rotations

An individual forest stand will provide habitat for different suites of wildlife species at different points in time as the stand ages. For example, some wildlife species thrive in the early stages of stand development and others at the later stages. Few animals thrive in middle-aged stands because of heavy shading. Landowners who manage on short rotations always have many stands in the middle-aged stage, which

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U.S. Department of Agriculture, UF/IFAS Extension Service, University of Florida, IFAS, Florida A & M University Cooperative Extension Program, and Boards of County Commissioners Cooperating. Nick T. Place, dean for UF/IFAS Extension.

means that a large portion of their land is in a stage where it is not producing quality habitat for most wildlife species. Increasing the rotation length of each stand will ensure that a greater number of stands will be producing quality habitat for a variety of wildlife species at any particular point in time.

Mature stands of trees are the most valuable from a wildlife perspective. Many wildlife species thrive in conditions provided by more mature forest stands and will congregate in the few older stands they can find.

Tip #2—Promote Cavities, Snags, and Logs

Cavities are an important habitat feature for a large number of animals. Nearly 40 species of birds and a variety of mammals require cavities for nesting, roosting, and denning. Hardwood trees (broadleaved trees such as oaks, maples, beech, and sweetgum) and cypress often develop cavities while alive, whereas most conifers (cone-bearing softwood trees) such as pines are more likely to develop cavities after death. Because cavities are often the limiting factor for species that use them (the “limiting factor” is the one key habitat element missing from a given area), it is recommended that trees with cavities always be retained unless they pose a safety hazard during logging operations. If trees with cavities are in short supply, artificial nest boxes can be used as a partial substitute in areas where den trees are lacking. See *Helping Cavity-Nesters in Florida* at <http://edis.ifas.ufl.edu/UW058> for additional information on providing artificial cavities for wildlife.

Snags (standing dead or dying trees) provide additional benefits for wildlife in the form of hiding places beneath peeling bark, branches free of foliage to serve as perches for foraging raptors, and food for many animals in the form of insects and fungi. Because artificial nest boxes provide only cavities and not these other resources, nest boxes should not be thought of as an equivalent substitute for dead and dying trees.

Once snags have fallen to the ground, they provide resources for an entirely different group of animals. Logs are used as shelter, as basking sites, as navigational aids, and as a cafeteria of different foods for wildlife which feed on insects, spiders, worms and fungi. See *Dead Wood: Key to Enhancing Wildlife Diversity in Forests* at <http://edis.ifas.ufl.edu/UW277> for additional information on the importance of dead wood for wildlife and tips on how to provide it.

Tip #3—Increase Spacing Among Trees

Planting pines at high densities (greater than 600 trees per acre, or tpa) is a strategy often used to maximize growth rates of pines. With this strategy, little sunlight can reach the forest floor, so little vegetation is able to compete with the pines for nutrients and water. Complete lack of groundcover greatly reduces the ability of a stand to provide food and/or cover for most wildlife species. Many animals rely on herbaceous plants (i.e., grasses, legumes and forbs) on the forest floor for food, and if herbaceous plants are absent, animals will not use the stand.

Two modifications can make pine plantations more suitable for wildlife. First, pines can be planted at lower densities (350 to 500 tpa). Alternatively, pines can be planted at high densities, and then thinned several times early in the life of the stand. The first thinning should occur when trees reach a merchantable size (usually about 15 years for pulpwood). Later thinning can occur at 5- to 10-year intervals thereafter.

Tip #4—Use Herbicides to Selectively Control the Hardwood Mid-Story

In stands with widely spaced pines, hardwood shrubs and trees can develop into a dense mid-story that blocks sunlight from getting to the ground. A dense mid-story also increases competition among pines, shrubs, and herbaceous plants growing at the ground level. As mentioned in tip #3, the herbaceous plants that grow at the ground level provide an extremely important source of food for wildlife. Herbicides can be used to selectively remove the hardwoods without harming desirable herbaceous plants and shrubs that produce berries, such as beautyberry, wax myrtle, sumac, plum, and saw palmetto. See <http://edis.ifas.ufl.edu/fr158> for specific recommendations on how to control hardwoods in pine stands.

Tip #5—Use Fire to Stimulate Non-Woody Groundcover and to Control Hardwoods

Florida experiences more lightning strikes than any other state in the country. These lightning strikes often start natural wildfires in wooded areas, which stimulate the growth of many plants that serve as food for wildlife. Prescribed burning is a technique that can be used to obtain the same

benefits that would occur after a wildfire, but under more controlled conditions.

Fire can increase habitat quality for wildlife in several ways: it reduces the hardwood mid-story, increases the abundance and diversity of herbaceous plants, and improves the quality of herbaceous plants as wildlife food. The new, succulent herbaceous growth that sprouts soon after a fire is more palatable and more nutritious than the older, tougher plant growth cleared away by a fire. Also, fire increases seed, fruit, and flower production of many plants, which results in a greater diversity and increased quantity of food for wildlife.

Tip #6—Consider Your Choice of Pine Species Carefully

Most of the southeastern Coastal Plain was historically forested with longleaf pine (*Pinus palustris*), so native wildlife species are well adapted to longleaf forests and savannas (sparsely forested grasslands). The branching architecture of longleaf pines is such that more sunlight reaches the forest floor in longleaf stands than in slash pine stands (*Pinus elliottii*). Due to their inability to self-prune, even less sunlight reaches the ground in loblolly (*Pinus taeda*) and sand pine (*Pinus clausa*) stands. Longleaf pines have a longer life span than other southern pines, making them more suitable for the longer rotations many wildlife species prefer. Longleaf pines are also more resistant to many of the insects and diseases that plague other southern pines, such as southern pine beetle. Finally, longleaf pines are preferred by red-cockaded woodpeckers because the trunk of longleaf pines will exude a sticky resin when pecked by woodpeckers below their nest cavities, which provides insurance against predators such as rat snakes

Tip #7—Do Not Be Too Thorough When Cleaning Up After Logging

Logging debris such as tree tops and limbs (called slash) can be a valuable source of food and cover for many smaller animals. If retaining some slash on the ground will not impede future plans for initiating a new stand of trees, some slash can be left—either spread out to break down and recycle nutrients into the stand to improve growth, or collected in small piles to provide escape cover and food for animals. Either approach has the added benefit of reducing the costs associated with collecting and removing these materials after timber harvest.

However, it is important to recognize that leaving large amounts of slash on the ground for extended periods can increase the risk of wildfire. Prescribed burning on a regular basis can greatly reduce this risk while also maintaining the diversity of ground layer plants that provide food for wildlife.

Tip #8—Maintain Habitat Diversity

The greater the variety of food and cover available in a given area, the greater the variety of wildlife that can reside there. Providing diverse food sources in the areas next to managed pine stands will allow the stands to support more wildlife. Many hardwood trees and shrubs provide hard mast (nuts from oaks, hickories, beech, etc.) and soft mast (fruit from cherry, dogwood, persimmon, wax myrtle, plum, etc.) that serve as food for wildlife.

Drainages and bottomland forests are areas where hardwoods naturally predominate, and a variety of food resources is typically available there. These areas should not be converted to pines, but should be allowed to stay as is. If any hardwoods are harvested from these areas, care should be taken to retain those individual trees that consistently produce large mast crops. See <http://edis.ifas.ufl.edu/UW293> for additional information on managing oaks for wildlife, and tips on selecting “leave trees” during timber harvest operations.

Providing a diversity of cover options is also important. Small patches of low brushy vegetation in and around pine stands can provide escape cover as well as food resources. Periodically disturbing such areas will stimulate early successional mast-producing species such as blackberries and dewberries, while preventing the growth of woody plants. Creating and maintaining a few small openings will benefit those species that thrive in areas where forests and open areas meet (edges).

Tip #9—Create Travel Corridors

Most wildlife avoid exposed, treeless areas during daylight hours. In agricultural landscapes where forest stands tend to be isolated, planting narrow forest lanes (3 to 5 rows of trees) to connect isolated stands can increase animal movement between stands. Similarly, fence rows can serve as travel corridors for animals wanting to move between forest stands if natural vegetation is allowed to grow up along them, and if invasive exotic vegetation is controlled. Unfortunately, birds perching on the fence are equal opportunity planters of both desirable and invasive species! See

http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_025925.pdf for tips on creating natural fence rows.

Tip #10—Protect Riparian, Aquatic, and Wetland Areas

Standing or moving water is an essential resource for most species of wildlife. All animals require some form of water, and most vertebrate species get their water by drinking (although some can get adequate water from dew and humidity). Many species also require water for breeding, or they require as food some organism that lives only in water bodies. The lush vegetation that grows in wet areas also attracts many wildlife species searching for cover. For all these reasons, areas surrounding water bodies (such as streams, rivers, lakes, ponds, wet sinkholes and even simple low-lying depressions that fill periodically with water) are hotspots of activity for wildlife. Efforts should be made to protect these areas from erosion, such as retaining buffers around them when harvesting and creating bridges to pass over them rather than placing roads through them.

Guidelines have been established for forestry and road-building activities in and near wetland areas, called Best Management Practices (BMPs). See http://www.floridaforestservice.com/publications/silvicultural_bmp_manual.pdf for details on harvesting, skidding, and road building BMPs.

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Bobwhite Quail

FWC LANDOWNER ASSISTANCE PROGRAM

• Guidelines

Bobwhite quail have very specific habitat requirements that must be met in order to have quality habitat. The basic types of habitat include:

- Nesting habitat
- Brood-rearing habitat
- Roosting habitat
- Protective habitat
- Foraging habitat

Nesting Habitat—this is probably one of the most limiting factors for quail populations. Quail nest in fields dominated by bunchgrasses. Bunchgrasses are Native Warm Season Grasses that grow in clumps as opposed to sod-forming grasses like Bahia grass. Common bunchgrasses include broomsedge, little bluestem, Indian grass, and wiregrass. Quail will nest most often at the base of one of these clumps of bunchgrasses.



Ideally you should have at least 30-40% of your property in nesting habitat.

Brood-rearing Habitat—Foraging habitat for young chicks needs to be in close proximity to nesting cover so that newly hatched chicks do not have to travel far to reach food. During the first 3 weeks of life, a

bobwhite quail chick feeds exclusively on insects. Insects are high in protein and water. The best brood-rearing habitat consists of forbs with good overhead cover and lots of bare ground. Look at a stand of ragweed to get a good image of what this looks like. Forbs (weeds) are important because they attract more insects than do grasses. About 40-60% of your habitat should be in brood rearing habitat.

Roosting Habitat—Typical roosting habitat is very similar to nesting habitat except there are a few more woody plants nearby for escape cover.

Protective Habitat—Protective cover can be divided into two major categories. Escape cover and Thermal cover. Escape cover consists of shrubs that provide protection from predators, and thermal cover provides protection from the weather. Some shrubs can achieve both types of protection. The main characteristics are that the shrubs have a dense canopy and are open at ground level. A good way to picture a shrub that provides good escape and thermal cover is to think of a plum. Plums create thickets that allow quail a place to get away from a predator but also have an open understory that allows them a place

Quick notes:

- **Nesting cover**
bunch grasses
30-40% of habitat
- **Brood rearing**
Lots of forbs
to attract insects. Near
nesting habitat. 40-60% of habitat
- **Roosting habitat**
bunch grasses with a
few more woody plants
for escape cover
- **Escape cover**
Brush such as
plums in thickets that are
30ft x 50 ft. 5-20% of habitat
- **Bare ground**
Essential for
travel and finding food.
25% of habitat



WILDLIFE HABITAT

MANAGEMENT
NOTES
BOBWHITE QUAIL

Florida Fish and Wildlife
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BOBWHITE QUAIL

to loaf during the mid-day heat. These protective thickets should be about 1500 ft² (30ft x 50ft). Plums can be planted in strategic areas to accomplish this need. About 5-20% of bobwhite habitat should be in protective cover.

Escape cover



Foraging Habitat—Quail feed on insects, small fruits and nuts, green foliage, and seeds of grasses, sedges, and forbs. Quail pick seeds off of the ground not off of the seed head on the plant. They are weak scratchers so seeds must be easily found on bare ground. That is why sod grasses and too much leaf litter make it almost impossible for quail to find the food they need. During reproduction, bobwhite hens require 23-28% protein in their diet. Insects readily provide this nutrition and are important for adult hens as well as newborn chicks.

Seeds of grasses and forbs (with the exception of legumes) do not provide this high protein diet. Managing for insect populations is much more important than most landowners realize.

Habitat Management—Good quail habitat consists of tall bunch grasses for nesting that is near (within 75 ft) escape and thermal cover (brush), and as close as possible to brood-rearing and foraging habitat (weeds), all with a good amount of bare ground. Take this interspersed habitat types and repeat it across your property and you have quality habitat. The more you can replicate this patchwork of habitats across your property the more coveys you will have provided quail are in the vicinity of your property. Quail live and die within a 1/4 mile of where they are born. If there are no quail within a mile of your property, you may have a hard time attracting them no matter what you do to your habitat. The best management practice you can use is prescribed burning. The second would be winter disking to increase desirable foods. Remember, bobwhites are a farm game species. They do not do well in forests unless they are very open.

HABITAT MANAGEMENT

COMMON FOODS

Grass seeds: panicums, paspalums, foxtails, dropseeds

Forbs: beans, peas, milk peas, cowpeas, clovers, ragweed, beggar ticks, dove weed, pigweed, spurge, peppergrass, wood sorrel, geraniums, tick trefoils, partridge pea.

Mast: acorns, grapes, blackberries, strawberries, pine seeds

Ag crops: millets, corn, sorghum, sunflowers

WOODY COVER

Plums

Blackberries

Sumacs

Minimum size 30ft x 50ft



NESTING COVER

Native Warm Season Grasses

Broomsedge

Little Bluestem

Indiangrass

Chalky bluestem

Wiregrass



MANAGEMENT TECHNIQUES

Prescribed burning—removes ground litter and sets back succession to grassy/forb habitat.

Disking—can stimulate weeds and increase bare ground.

Roller chopping—reduce brush to make it more susceptible to fire.

Mowing—opens up travel lanes and sets back succession.

Field borders—plants that help transition from woods to fields.

Food plots—food is generally not a limiting factor for quail. Not needed.

Water – free standing water is not a requirement for quail.



Florida Fish and Wildlife
Conservation Commission

MyFWC.com

For more information on Quail
Management visit these sites:

www.myfwc.com

www.naturalresources.msstate.edu/

www.extension.missouri.edu/publications

www.quailforever.org

LAP Regional Coordinators:

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Ginger Morgan 386-758-0520

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FERAL SWINE: Impacts on Game Species

What Are Feral Swine?

Feral swine (also called wild pigs, boar, feral hogs, and many others) are a destructive invasive species. They vary in color from black to brown and even patchwork colors, and range in size from 75 to 250 pounds. Feral swine belong to the family *Suidae* and were introduced into the United States in the 1500s by early explorers and settlers as a source of food. Over centuries, domestic pigs, Eurasian boar, and their hybrids have escaped, been released, and been reintroduced, setting the scene for the rapidly expanding populations we have today.

Why Are They Considered an Invasive Species?

Invasive species are defined as plants or animals that are non-native to an ecosystem and often have broad negative impacts on the environment where they are introduced. With feral swine populations over 6 million and distributed across more than 35 States, the damage they cause is significant to the environment, economy, and human health. Feral swine damage to habitats, predation on wildlife, and disease transmission can be linked to the decline of nearly 300 native plants and animals in the United States, including native game species.



What Is Their Impact?

Feral swine directly impact native game species by preying on the nests, eggs, and young of ground-nesting birds and the young of larger animals such as deer. They compete with native wildlife for important food sources, displace other animals through aggression and competition, and can spread diseases and parasites. The most far-reaching impact feral



swine have on game species and other wildlife is habitat change and destruction through their rooting, wallowing, trampling, and feeding behaviors. Feral swine are ecosystem engineers, which means they can change their environment by altering water quality and runoff in wetland environments, shifting plant composition and distribution in grasslands, and decreasing tree diversity in a forest. Feral swine are a risk to native game species such as deer, quail, grouse, turkey, and many others, as well as to the economic stability of businesses that depend on these game species to succeed.



What Can I Do?

Feral swine cause problems by damaging native ecosystems, preying on or competing with native wildlife, and spreading diseases.

- **Do not relocate feral swine** to new areas or transport them to other States.
- **Share the knowledge;** discourage transportation and spread of feral swine.
- If you live in a State with no or low levels of feral swine, **report any sightings, sign, or damage** to wildlife or agriculture officials in your State.



GAME SPECIES at Risk From Feral Swine Impacts and Damages

Upland Birds

Upland game species such as quail, woodcock, and grouse are at risk from predation by feral swine because they nest on the ground. In addition to direct predation, feral swine destroy important upland game bird habitat by rooting up and eating native plants, allowing the growth and spread of invasive weeds.



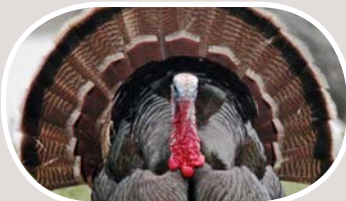
Deer

The feral swine diet consists largely of vegetation; therefore, they compete with herbivores for food sources. Most notably, feral swine compete with deer (white-tailed, mule, or black-tailed) for seasonal resources such as acorns or beech nuts. They easily disperse deer from prime feeding areas, will prey on fawns, and transmit diseases to which deer are vulnerable.



Turkey

Wild turkeys are ground nesters, leaving their eggs and young exposed to feral swine predation. Additionally, feral swine compete with wild turkeys for important seasonal resources such as acorns. Since feral swine can eat larger amounts of food and digest it more quickly than turkeys, they easily outcompete these birds for vital seasonal food sources.



Furbearers

Foxes, weasels, raccoons, and other furbearers prey on eggs, small mammals, carrion, and invertebrates, which are also desirable food sources for feral swine. A group of feral swine, called a sounder, can easily displace smaller, often independent, furbearers from a food source. Feral swine also carry many diseases and parasites, such as giardia, which may be passed on to furbearers.



Small Game

Feral swine outcompete small mammals for important seasonal resources such as acorns. They have also been known to raid the buried food caches of squirrels, leaving them with no stores for winter. Feral swine even actively hunt small mammals such as ground squirrels. Furthermore, feral swine rooting and feeding behaviors alter forest growth and diversity, damaging crucial habitat for small game animals.



Big Game

Feral swine feeding behaviors and preferences are similar to black bears, meaning they may compete for food resources such as vegetation, berries, acorns, and more. Some large predators, such as mountain lions, may benefit from feral swine as prey, but this can put them at risk of contracting the diseases and parasites feral swine carry.



Want To Learn More?

Call Wildlife Services, a program within the U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service, at **1-866-4-USDA-WS** or visit www.aphis.usda.gov/wildlife-damage/stopferalswine to learn more about the problems caused by this invasive animal, as well as to seek advice and assistance in dealing with feral swine.



How to Identify a Tree¹

Michael G. Andreu, Erin M. Givens, and Melissa H. Friedman²

Introduction

Trees benefit people economically, socially, and ecologically. They provide shade on hot days, the paper and wood products that we use every day, and food and clean water for wildlife and humans alike. Trees also make up a large portion of the foliage in our yards and landscapes, creating a beautiful mosaic of colors, shapes, and sizes.

There are many reasons people want to learn how to identify trees. You might be a naturalist who would like to know what tree species comprise a nearby natural area, a vacationer interested in identifying a beautiful tree you saw along a trail, or an aspiring dendrologist (a scientist who specializes in tree identification). Whoever you are and whatever your level of experience, if you're interested in identifying a tree, this publication will help.

Tree identification may seem daunting, especially when you find yourself confronted with a forest full of trees you don't recognize. In fact, it is actually a logical and easily learnable process. It starts with gathering a set of clues. These clues can then be used to make an informed decision about the tree you are attempting to identify. The more clues you have, the more likely you will be able to reach the best conclusion about the tree you are trying to name. Like a detective, to be successful at tree identification, you will need to sharpen your observational skills. As with most newly acquired skills, it may seem overwhelming at first, but with practice you will begin to find that it is simply a

matter of paying attention to a few details about the tree and the environment in which it is found.

This publication is designed to guide you through the process of identifying a tree.

Identifying Characteristics

When you approach a tree with the intention of accurately identifying it, it is best to focus on the following set of characteristics:

- Range
- Habitat
- Bark
- Leaves
- Twigs
- Flowers
- Fruits and Seeds

Think of this list as a set of filters that will reduce the number of potential species a particular tree might be. As you observe each characteristic you will be able to filter or eliminate trees that do not possess the same characteristic. This will allow you to narrow your list of potential trees and ultimately determine the tree species of interest. Remember, in most cases you will need to use more than one characteristic to properly identify a tree. For additional information about each tree characteristic, a list of references has been provided at the end of this document.

1. This document is FOR234, one of a series of the School of Forest Resources and Conservation Department, UF/IFAS Extension. Original publication date March 2010. Revised October 2013. Reviewed October 2016. Visit the EDIS website at <http://edis.ifas.ufl.edu>.

2. Michael G. Andreu, assistant professor and Extension specialist of forest systems; Erin M. Givens, research assistant; and Melissa H. Friedman, biological scientist; School of Forest Resources and Conservation, UF/IFAS Gulf Coast Research and Education Center, Wimauma, FL 33598.

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Range

The first characteristic to consider is where the tree is located geographically. Each tree species is generally restricted to a particular geographical area where conditions are suitable for its growth and reproduction. Determining the natural range and potential locations of where a tree might occur can be helpful for eliminating and reducing the number of species it is likely to be. For example, if you are in the Florida panhandle, it is not likely that you're going to see an aspen tree (*Populus* sp.), since the range of the aspen is primarily limited to the western portion of the United States. Maps or descriptions of a tree species natural range can be found in most field guides.

Habitat

The next clue or characteristic to use when attempting to identify a tree in a forest or natural area is to observe the type of habitat the tree is growing in. Different trees compete well in different growing conditions. For example, bald cypress (*Taxodium distichum*) is typically found in wet sites such as floodplain forests or swamps (Figure 1A). This is because it is better suited than other species to occupy areas where there is standing water for extended periods of time. In contrast, other trees such as sand live oak (*Quercus geminata*) do not deal with standing water well and you will not find them on such sites. Similarly, sand pine (*Pinus clausa*) grows on dry sites and more specifically in habitats known as scrub (Figure 1B) that typically have well-drained, sandy soils. Therefore, the physical and environmental conditions not only help you determine what type of tree you are looking at, but also what type of habitat you are in. However, there are species that can grow within a wide range of physical and environmental conditions, and consequently can be found in a variety of habitats. For example, red maple (*Acer rubrum*) can commonly be found growing in wet swampy areas and woodlands, but can also occur on drier sites such as upland slopes. Other factors such as how often the site burns or is affected by storms can also influence the species composition on a particular site. Determining what type of habitat you are in will help narrow down your list of potential tree species.

Some of the more common habitats in Florida are bottomlands, flatwoods, hammocks, marsh, scrub, sandhill, and swamp. The suite of tree and plant species that are commonly found in a given habitat are called plant communities. In Florida, eighty-one native plant communities have been described by the Florida Natural Areas Inventory (FNAI) non-profit organization.



Figure 1. Cypress trees in a floodplain swamp (A) and sand pine in scrub habitat (B).

Credits: A: Melissa H. Friedman, B: Michael G. Andreu

Caution: These habitat characteristics are helpful in identifying trees that grow in natural settings such as parks or natural areas that have minimal human disturbance. Habitat characteristics are not as helpful in urban environments, as trees are often planted in spots where they would not naturally occur. However, older remnant trees (native and existing prior to development) are often good indicators of what type of habitat existed before development.

Bark

Although this may sound odd, one of the first tree characteristics you'll want to examine is the bark. This is because the bark of a tree is readily observable and almost always accessible. Leaves, on the other hand, can be 30 feet above your head and difficult to view or even absent, especially during the winter months.

When observing a tree's bark, focus on such features as its texture, color, and the presence of lenticels (or pores). Tree bark may be smooth (Figure 2A), furrowed (Figure 2B), flaky (Figure 2C), or warty (Figure 2D). Furrowed bark has cracks and fissures, flaky bark tends to peel or flake off easily into thin layers, and warty bark has small nodules that look like warts. People typically think of bark as brown, but it comes in many colors. Depending on where you go and how closely you look, you may see trees with bark in many shades of white, gray, brown, red, purple, green, and yellow. Some trees contain several colors of bark all at once. For example, sycamore (*Platanus* sp.) bark often has a tan exterior and flakes off to reveal a lighter colored interior bark (Figure 2C). It is this mottled pattern that distinguishes sycamores from most other trees and thus one can usually identify this tree from a distance by simply looking at the bark. In some cases the tree bark will have a readily identifiable texture or pattern from the lenticels (Figure 2E), which can be vertical, horizontal, or spot-like. The presence of lenticels can help you in the identification process by allowing you to filter out the trees that do not have them. For

example, black cherry (*Prunus serotina*) trees have distinct lenticels (Figure 2E), while oaks (*Quercus* spp.) (Figure 2B), maples (*Acer* spp.), and sycamores (Figure 2C) do not.

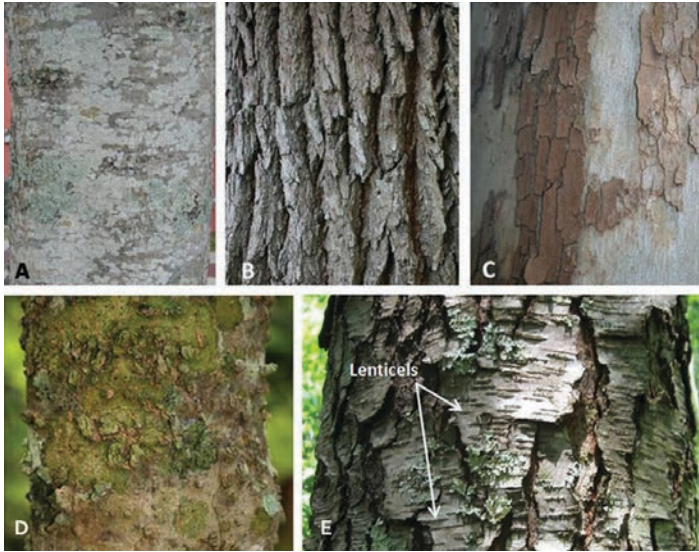


Figure 2. Some different bark textures include: A) the smooth bark of a beech (*Fagus* sp.) tree, B) vertically furrowed bark of a live oak (*Quercus virginiana*), C) flaky bark of a sycamore tree, D) warty bark of the sugarberry tree (*Celtis laevigata*), and E) lenticels on the bark of a black cherry (*Prunus serotina*) tree.

Credits: A, B, D, and E: Michael G. Andreu, C: Erin M. Givens

It is important to remember that the bark of a tree can change in color and texture with age. For example, the lenticels of a black cherry tree (*Prunus serotina*) look like dots covering the surface of brown bark and twigs when the tree is young (Figure 3A). As this tree matures the lenticels elongate and become horizontal striations (or parallel lines) on the bark's exterior (Figure 3B).

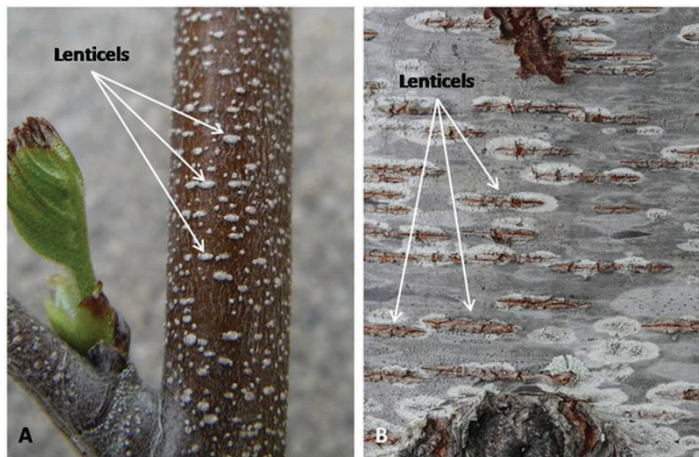


Figure 3. On these black cherry trees you can see lenticels, a distinguishing characteristic for this tree. A) shows young black cherry bark containing dot lenticels, and B) shows an older black cherry bark with horizontal lenticels.

Credits: Walter Givens

Leaves

Leaves can be a determining factor when trying to identify a tree. In fact, there are many trees that can be identified by the leaf alone. Leaves are highly variable ranging from the needlelike leaves you see on pine trees (*Pinus* spp.) (Figure 4A) to the broad leaves of sycamore trees (Figure 4B). Leaf characteristics such as their persistence, structure, complexity, shape, venation, surface, smell, taste, and arrangement on the branch, all help to determine what species a tree is. Take your time when reviewing the diagrams and pictures below, as they will help you learn how to recognize some of these leaf characteristics.

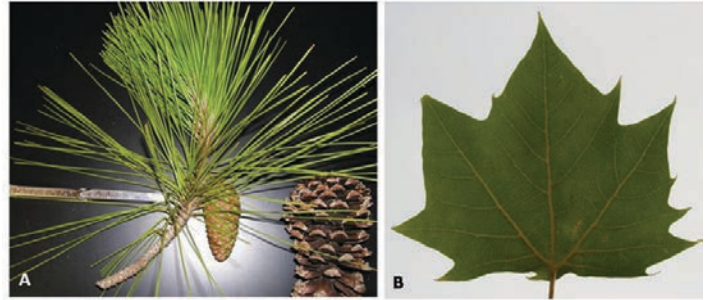


Figure 4. The difference between A) needlelike pine tree leaves, and B) the broad leaf of a sycamore.

Credits: A: Michael G. Andreu, B: Erin M. Givens

Leaf Persistence

Leaf persistence refers to trees that are evergreen and maintain their leaves year-round or deciduous and shed their leaves during cold and/or excessively dry times of the year. While it may be challenging to know whether a tree is evergreen or deciduous during the warmer months of the year, leaf persistence is a useful filter when you're trying to identify a tree. For example, laurel cherry (*Prunus caroliniana*) and black cherry may appear similar, but you can distinguish between the two during the colder months of the year if you know that laurel cherry is evergreen and black cherry is deciduous.

One way to determine leaf persistence is to look at older twig growth (previous seasons) vs. new twig growth (current season). On many plants, you can identify where new growth began by locating the terminal bud scar nearest the end of the twig (Figure 5). All growth between the end of the twig and its nearest terminal bud scar is new growth. If you only see leaves on this portion of the twig, you are probably looking at a deciduous species. This is because deciduous plants shed these leaves after the season is over. When the next season comes around, the plant puts out leaves on new twig growth. However, if you see leaves present (i.e. "persisting") on an older portion of the twig, that plant is an evergreen species.

While you can be fairly certain that species with leaves on older sections of a twig are evergreen, more care must be taken to declare a tree deciduous. This is because the absence of leaves on old growth twigs can also be due to leaves dying or falling off for a variety of reasons other than seasonal shedding. Therefore, it is always a good idea to look at multiple twigs, and multiple specimens, when trying to determine leaf persistence.



Figure 5. A terminal bud scar on the deciduous species sweetgum (*Liquidambar styraciflua*) indicates where new twig growth begins each season.

Credits: Lynn Proenza

Leaf Structure

Leaf structure refers to the parts that make up a leaf. Generally, a leaf has a blade, a petiole, and sometimes stipules (Figure 6). The leaf blade is the expanded portion of the leaf, the petiole is the supporting stalk that connects the leaf blade to the branch, and stipules are small vegetative structures that form at the base of the petiole or on the twig.

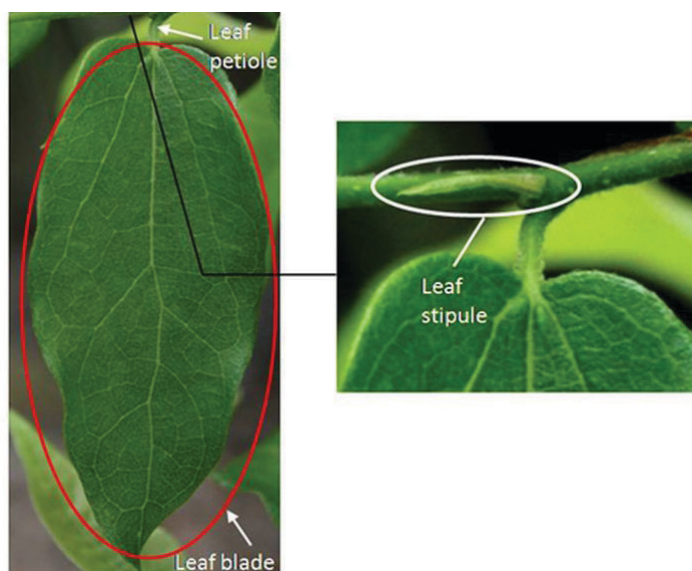


Figure 6. Components of a simple leaf.

Credits: Michael G. Andreu

Some trees have stipules that are persistent and others have stipules that drop off shortly after leaves emerge. In some cases the scar left by the stipule is distinctive and can help identify the tree. For example, tree species in the Magnolia family (Magnoliaceae) have a stipule scar completely surrounding the twig (Figure 7). Knowing this can help to distinguish between a sweetbay magnolia (*Magnolia virginiana*) and a swamp bay (*Persea palustris*), both of which can look similar and grow on similar sites. Learning which trees do and do not have these leaf parts can be helpful for identifying trees.

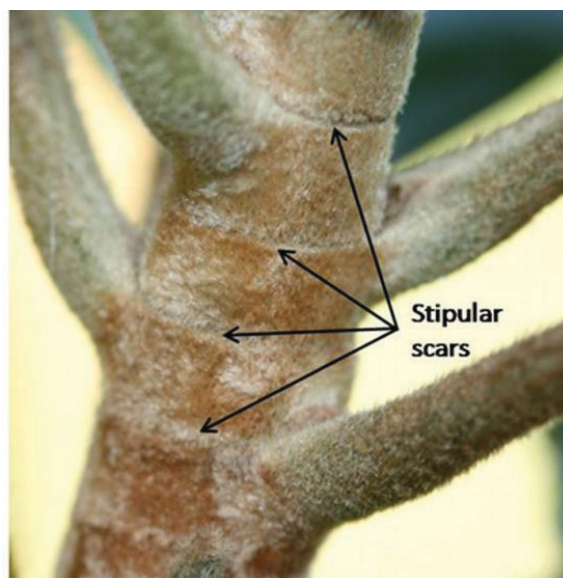


Figure 7. Stipular scars encircling a magnolia twig.

Credits: Walter Givens

Leaf Complexity

Leaf complexity refers to whether the leaf is simple or compound. If a leaf has a single blade, it is simple (Figure 6); usually you can see a bud where the leaf meets the stem or branch. If the leaf has multiple blades attached to a common stalk or petiole, then it is compound and the individual blades are called leaflets. Compound leaves can be pinnately, bi-pinnately, trifoliolately, or palmately compound (Figure 8). You can determine if a leaf is simple or compound by looking for a bud at the base of the leaf. If you cannot find a bud below a leaf, you may be looking at a leaflet which is part of a compound leaf. Leaf complexity is a great filter because most tree species have simple leaves. If your tree has compound leaves, then you can eliminate a large number of tree species that have simple leaves and consequently get closer to determining which species you're observing.

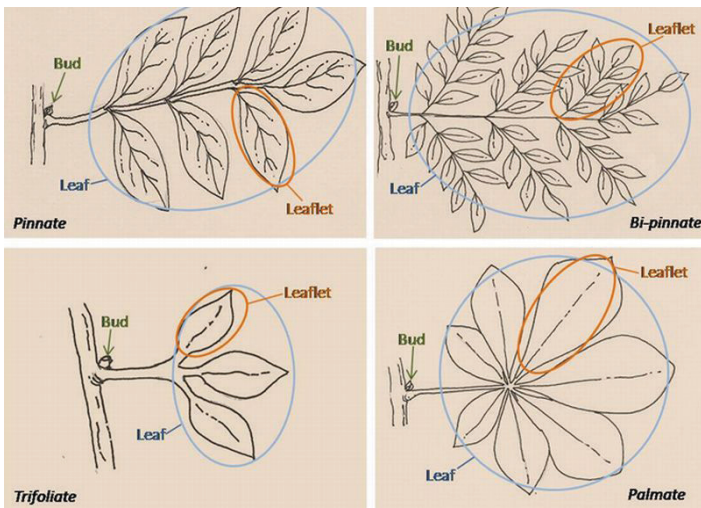


Figure 8. Compound leaf types.
Credits: Line drawings by Becky Brown

Leaf Arrangement

Leaves can be arranged along a twig in one of three ways: alternate, opposite, or whorled. Alternate arrangement is when one leaf is attached at each node and the leaves emerge in an alternating pattern on the twig (Figure 9A). Opposite arrangement is when leaves emerge paired on each side of the twig (Figure 9B). Whorled arrangement is when more than two leaves are found at the same node (Figure 9C). Leaf arrangement is another great filter because while many tree species have an alternate leaf arrangement, fewer species exhibit opposite or whorled leaf arrangement. Therefore, you can narrow your list of potential trees when you see a particular type of leaf arrangement. Examples of trees with opposite leaf arrangements include the various species of maple (*Acer* spp.) and ash (*Fraxinus* spp.).

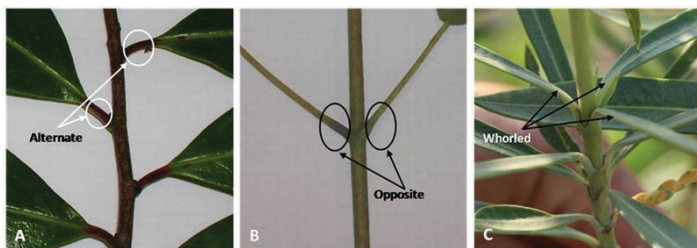


Figure 9. The three main types of leaf arrangement are: A) alternate leaf arrangement, B) opposite leaf arrangement, and C) whorled leaf arrangement.

Credits: A and B: Mary E. Thornhill, C: Walter Givens

Leaf Shape

The overall shape of the leaf or leaflet blade can often help you to identify the tree. Botanists have developed names and descriptions for all of the leaf shapes in nature. For example, a long, slender pine needle is described as acicular (Figure 4A and Figure 10). Additional common leaf shapes

are: deltate, elliptical, lanceolate, linear, obovate, and reniform (Figure 10).

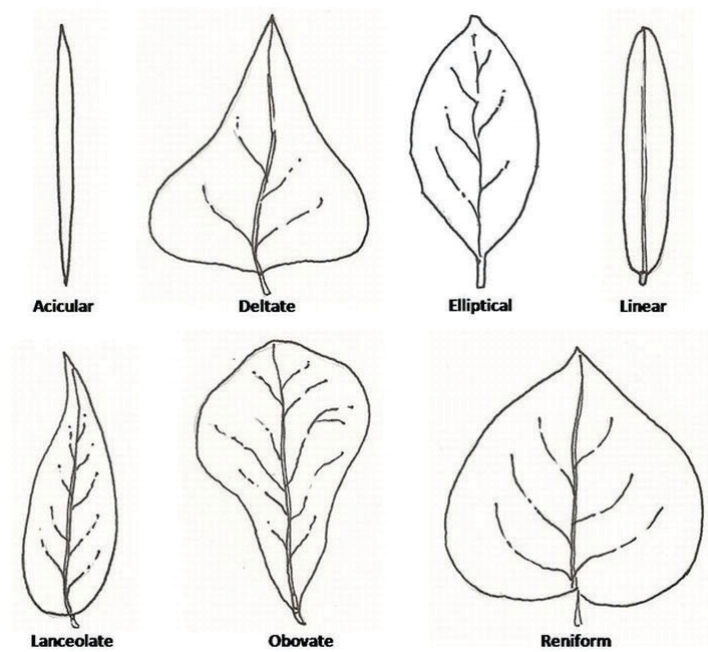


Figure 10. Seven different leaf shapes.
Credits: Line drawings by Becky Brown

Leaf size and shape may vary due to environmental conditions or due to a tree's physical growth habits. For example, if a tree is shaded by other trees growing near it, the leaves found near the top of the shaded tree may be very different from those found near the base of the same tree. In the shaded areas, larger leaves maximize the amount of surface area exposed to sunlight. Leaves that are exposed to full sunlight and wind (usually near the top of the tree) are usually smaller. One might think that the shapes of leaves for a given tree species would be constant but in fact the leaves of some tree species can vary considerably (Figure 11). This natural variation can be confusing and frustrating for beginners, but it is also fascinating when you begin to speculate why the variation occurred. The key is to use *all* of the tree's characteristics rather than focusing on one particular trait to determine what kind of tree it is.

In addition to naming and describing leaf shapes, botanists have also classified the many different types of leaf margins (Figure 12A), leaf tips or apices (Figure 12B), and leaf bases (Figure 12C). Figure 12 illustrates these three characteristics on an eastern redbud (*Cercis canadensis*) leaf. The leaf margin or edge of this redbud leaf is smooth (with no serrations or dentations) and is called *entire*. This leaf also has a *short-acuminate* apex and its base is *cordate* or heart shaped.



Figure 11. A water oak (*Quercus nigra*) tree showing variability in its leaf shapes with its most characteristic one in the upper right corner. Credits: Michael G. Andreu

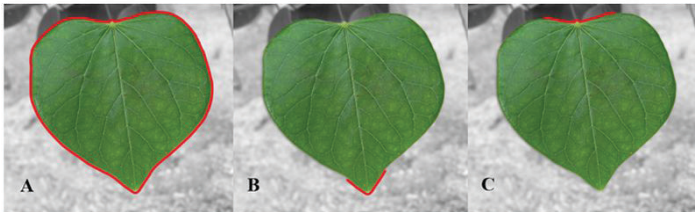


Figure 12. Components of a leaf consist of the margin (A), apex (B), and base (C). Credits: Walter Givens

Leaf Venation

Leaf venation refers to the branching pattern of the leaf's veins. Two common types of leaf venation are pinnate (having veins emerging on either side of the mid-vein) and palmate (primary veins emerging from a single point like fingers from the palm of a hand) (Figure 13). While venation may seem like a subtle characteristic to observe for identification purposes, it can be a very distinct characteristic for some tree species and is therefore useful in the tree identification process.

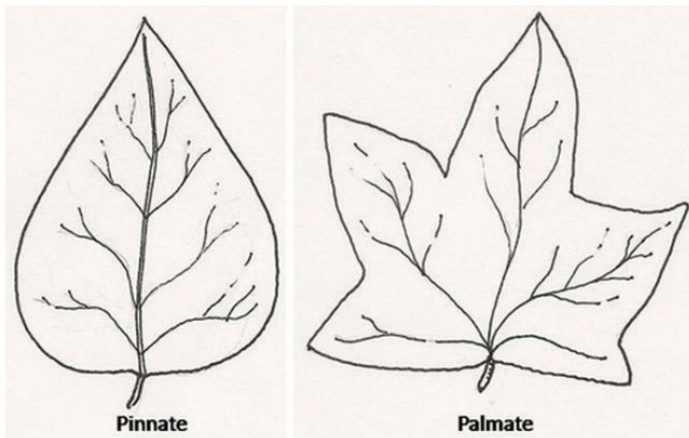


Figure 13. Two different kinds of leaf venation. Credits: Line drawings by Becky Brown

Leaf Surface

The leaf surface can be characterized by its texture, thickness, and color, and by the presence or absence of hairs (pubescence). Leaves with hairs are called “pubescent,” and those without are called “glabrous.” Many leaf surface characteristics can be determined by looking at or feeling the leaf, but some may require a hand lens or some kind of magnification to view, such as the presence of very small hairs or small glands. Be sure to look at the top and bottom surfaces of the leaf to evaluate all of its characteristics.

Trees have various leaf textures; some leaves are smooth to the touch while others are rough. Leaf texture can be a useful characteristic to distinguish two species that are similar in appearance, for instance, American elm (*Ulmus americana*) and slippery elm (*Ulmus rubra*). American elm has a smooth upper leaf surface while slippery elm has a rough upper leaf surface. In some cases leaves have glands on their surfaces, which causes the leaf to feel slightly bumpy or to appear to glisten while other leaves feel or look waxy. Leaf thickness also varies; some leaves are thick and leathery and some are thin and light. In Florida, some find it difficult to distinguish a live oak leaf from a laurel oak (*Quercus laurifolia*) leaf. However, the live oak leaf is typically thicker than a laurel oak leaf, and knowing this can help to distinguish these two species from one another. The presence or absence of hairs on the leaf surface will also help distinguish the many different tree species you observe. Finally, it is important to observe the colors of the upper and lower surfaces of a leaf. Leaves can be dark green, light green, bluish-green, or rust colored. This may also help distinguish between live oak, which is lighter green on the underside of the leaf than on the top, while laurel oak is the same green color on both surfaces. Another example is southern magnolia (*Magnolia grandiflora*), which has a rusty-orange pubescent underside (Figure 14B). This characteristic in combination with its thick leathery leaves and smooth bark makes this species very easy to identify.

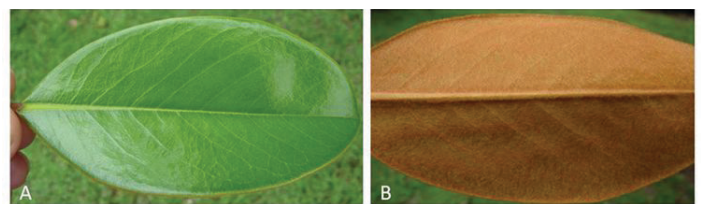


Figure 14. Magnolia leaves are glabrous on their top surfaces (A) and often have a rusty-orange pubescence on their bottom surfaces (B). Credits: Melissa H. Friedman

Leaf Smell or Taste

When examining the tree, you should use all of your senses. What does the leaf smell like when crushed in your hand?

Is the odor strong or barely noticeable? Distinguishing sweetgum (*Liquidambar styraciflua*) from red maple is not always easy (Figure 15), but if you crush a leaf of both species you will be able to *smell* the difference. Sweetgum has a very distinct (not unpleasant) aroma while red maple does not smell at all. You can also taste leaves, but use caution, because **some tree leaves are toxic**! For those non-toxic species, you can taste whether they are bitter or sweet. For example, if you taste the black cherry tree leaves, you will find they taste bitter, and sourwoods (*Oxydendrum arboreum*) are named for their sour-tasting leaves.

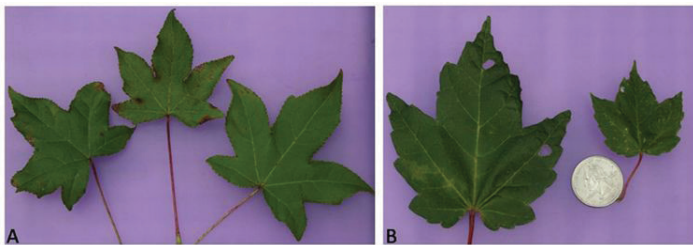


Figure 15. Sweetgum (A) and red maple (B) leaves side by side.
Credits: Michael G. Andreu

Twigs

The next tree characteristic that will help you identify what species you have is the twig. It is best to focus on the most recent twig growth because the older branches lose some of their key features. Usually the new growth of a twig is green, but in some cases it may be brown (Figure 16). The most important features of the twig are its buds, scars, lenticels, pith, and thorns, all of which are discussed further in the following sections.



Figure 16. Old and new growth on a tree.
Credits: Walter Givens

Buds

Buds are growth or potential growth points on a twig. There are two types of buds: axillary and terminal buds (Figure 17). Axillary buds are the buds located at the point where

the leaf meets with the twig. The terminal buds are located at the tip or apex of the twig; they are usually larger than the axillary buds.

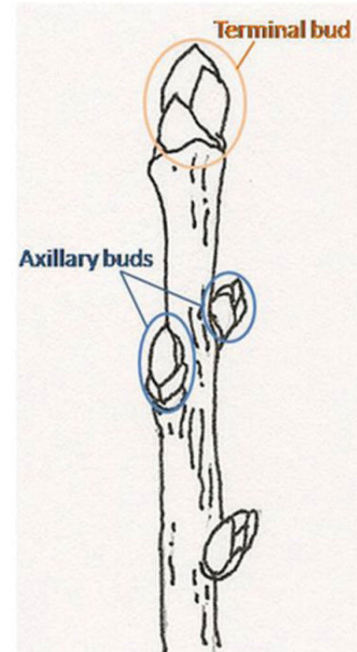


Figure 17. Location of terminal and axillary buds, as they appear on a twig.
Credits: Line drawing by Becky Brown

Buds are either scaly or naked (Figure 18A and B). Bud scales are modified leaves or stipules that protect the growing portion of the twig. Naked buds lack scales and are common in trees that originate in tropical climates.



Figure 18. Scaly buds (A) and naked buds (B).
Credits: Michael G. Andreu

Scars

A leaf scar is found on the branch or twig at the point where a leaf was once attached. The shape and size of leaf scars can be distinguishing features that will help you identify a tree species. If you look closely at the leaf scar (you may need a hand lens), you may see one or more dots known as vascular bundle scars. This is where the strands of the plant's vascular tissue (equivalent to veins and arteries) pass from the twig to the leaf. The leaf scar's size and shape and the number of vascular bundles are unique features that are very useful for tree identification, especially in the

winter when there are no leaves to observe. For example, Figure 19 illustrates a leaf scar on a sweetgum tree that has three vascular bundles.

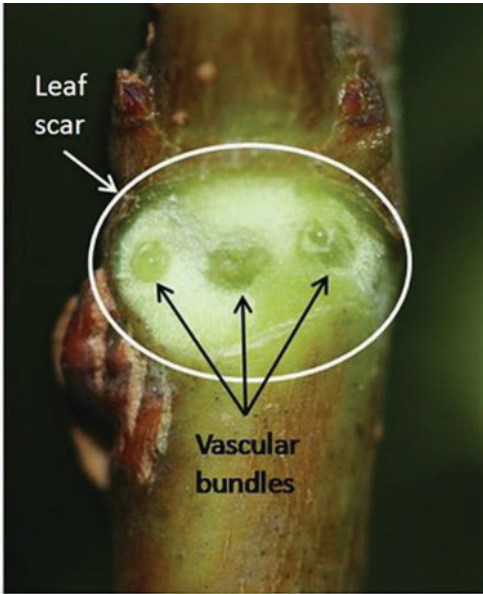


Figure 19. A sweetgum leaf scar showing three vascular bundles.
Credits: Walter Givens

Another type of scar that may be present on the twig is the stipular scar. Remember, stipules are the small, leaf-like structures that form at the petiole base or on the twig (see Figure 6). When the stipules fall off they leave stipular scars. Generally, if the tree has stipules they occur in pairs. The stipular scars for each stipule would occur on the top of the leaf scar. In a few species, the stipular scars are fused together and encircle the twig. For example, magnolias have stipular scars that encircle the twig (Figure 7). If you see this, there is a good chance that the tree you're examining is a type of magnolia or tulip poplar (family Magnoliaceae) or sycamore (family Platanaceae).

Lenticels

As stated earlier in the “bark” section, lenticels are raised, cork-like areas on tree bark that expose the underlying tissue to air. Lenticels vary in shape and size from species to species, and on the same tree. The shape and size of the lenticels may also change as the tree ages. Lenticels can be horizontal (Figure 3B) or vertical striations, or dots (Figure 3A).

Pith

The center portion of the twig is called the pith. The pith usually has a different color and texture than the wood around it. If you take a cross-section of the twig (cut the twig in half longitudinally) (Figure 20), you will be able to observe the pattern of the pith.

The pith can be diaphragmed; partitions or bars exist across the pith (Figure 21A), chambered; divided into empty chambers (Figure 21B), or continuous with no partitions (Figure 21C).



Figure 20. Example of how to cut a twig in order to view the pith.
Credits: Erin M. Givens

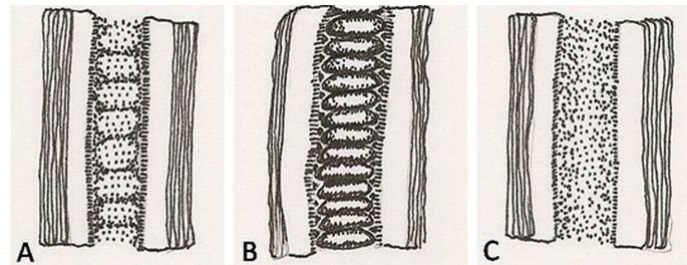


Figure 21. Solid diaphragmed pith (A), chambered pith (B), and solid homogeneous pith (C).

Credits: Line drawings by Becky Brown

Thorns

Pointed structures known as thorns, spines, and prickles are important characteristics for identifying some species because most tree species do not have them. Thorns can be located along the branches and twigs of a tree or they can be found along the main trunk (e.g. honey locust, *Gleditsia triacanthos*). Thorns are modified stems, spines are modified leaves, and prickles can occur anywhere on the twig or leaf (Figure 22).

Flowers

Reproductive features, such as the flower, can sometimes be very distinctive for tree identification. While some flowers of trees are showy (flowering dogwood, *Cornus florida*) other tree flowers are inconspicuous and small (oaks). Therefore, the flowers (if visible) must often be used in conjunction with other characteristics for identification.

Trees that have flowers are called angiosperms. Flowers generally have four parts: sepals, petals, stamens, and pistils (Figure 23). If a flower has all of these parts it is

called complete. If it is missing any of these parts it is called incomplete. When a tree is flowering, it has reached the point when the flower is mature and pollination is possible.



Figure 22. Thorn on a Jerusalem thorn (*Parkinsonia aculeate*) tree.
Credits: Walter Givens

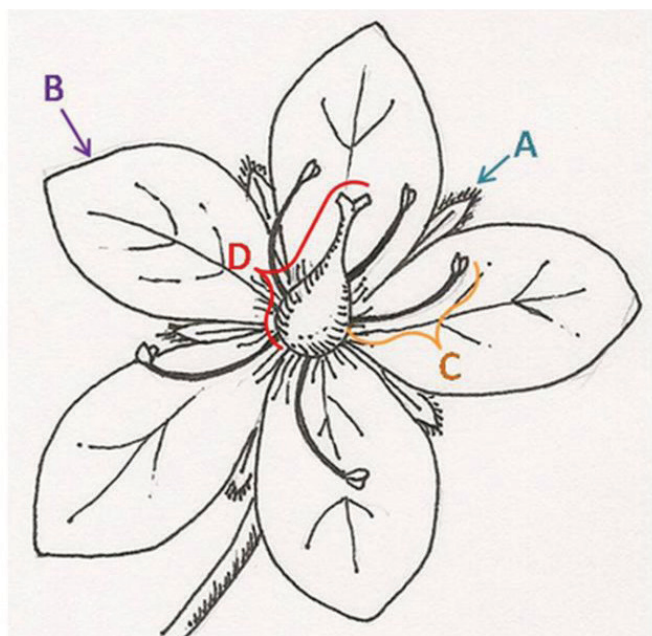


Figure 23. Basic flower anatomy: sepal (A), petal (B), stamen (C), and pistil (D).

Credits: Line drawing by Becky Brown

Flowers may be single or in clusters. The arrangement of several flowers on a branch system is called inflorescence. Some of the more common inflorescence types are spike, catkin, raceme, panicle, cyme, umbel, and head (Figure 24).

It is important to remember that some trees lack “flowers” and instead bear their seeds in cones (Figure 25A) or

berry-like structures (Figure 25B). These types of trees are called gymnosperms. Examples of gymnosperms commonly found in Florida are pines (*Pinus* spp.), eastern redcedar (*Juniperus virginiana*), and cypress (*Taxodium* spp.). Florida is also home to two other gymnosperm tree species that are considered uncommon or rare, the Florida yew (*Taxus floridana*) and the Florida Torreya tree (*Torreya taxifolia*).

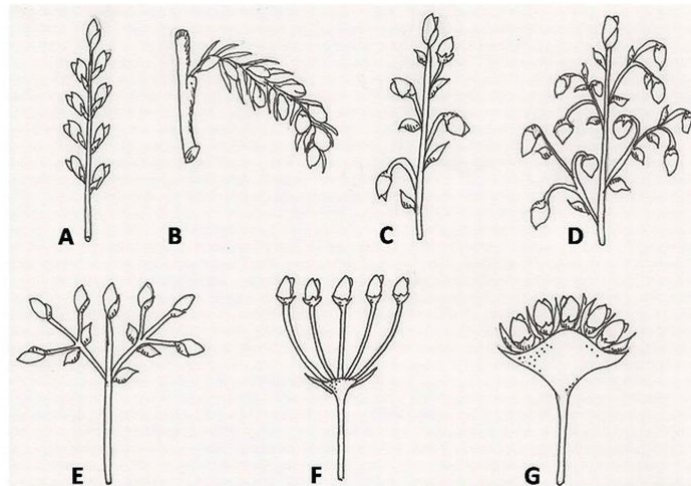


Figure 24. Flower inflorescence types: spike (A), catkin (B), raceme (C), panicle (D), cyme (E), umbel (F), and head (G).

Credits: Line drawing by Becky Brown



Figure 25. Cone of slash pine (*Pinus elliotii*) (A) and berry-like structures of eastern redcedar (B).

Credits: Walter Givens

Fruits and Seeds

Fruit structure is often very unique and can be a great way to identify the tree. You often find the fruit of a tree lying on the ground below it, which is ideal because it allows you to examine it closely; just make sure the fruit comes from the tree you are trying to identify. Binoculars can be very helpful for examining tree leaves and fruits that are out of reach.

When the ovary inside of the flower is pollinated, a “ripened” ovary or fruit is produced. An apple (Figure 26) is

a delicious example of the fruit produced after the ovary of the flower has been pollinated.



Figure 26. Apple pome or fruit.

Credits: Walter Givens

The fruit or ovary houses the seed(s) and the ripened seed(s) house an embryo inside. As a seedling begins to develop, the fruit provides nourishment for it. Figure 27 shows examples of various tree fruit types.

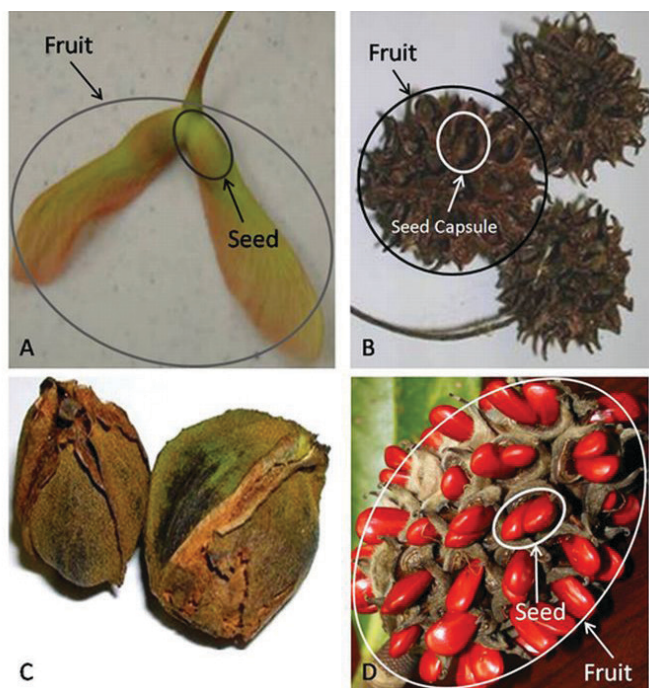


Figure 27. Four different kinds of fruit: red maple samaras (A), sweetgum capsule (B), bitter pecan (*Carya aquatica*) nut (C), and magnolia follicle (D).

Credits: A–C: Mary E. Thornhill, D: Michael G. Andreu

Conclusion

Learning how to identify a tree is not easy, especially in the beginning! It requires patience and perseverance. Take notes on any and all of the characteristics you can observe that have been discussed in this publication. The Tree

Identification Sheet provided in Appendix A at the end of this publication will remind you of those characteristics that will help you identify a tree. If you cannot observe a certain characteristic listed on the sheet, leave it blank. Then use your field guides and try to determine what tree species you have based on your field observations. After you have identified the tree, it's good practice to use your reference material to fill in the characteristics you were not able to observe. This "filling in what you missed" will help you learn more about the tree and become more familiar with the characteristics that can be used to identify this tree. It will be a great resource, too, if you should choose to build your own database. Most importantly, highlight the characteristics that you found easy to observe and unique to the tree. These key characteristics will help you identify the tree in the future. Remember, sometimes there are variations in a tree's characteristics (e.g., leaf characteristics). Expect to encounter these variations, which show trees adjusting to changes in their environments. Variation can be a challenge, but it also keeps tree identification fun and exciting!

Acknowledgements

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Appendix A. Tree Identification Sheet

	Tree Identification Process	Tree Characteristics
Habitat	Type (e.g., bottomland, sandhill, scrub)	
	Soil composition (e.g., sand, muck)	
	Soil color	
	Site wet or dry (e.g., wetland or upland)	
	Wet site description (e.g., freshwater or saltwater)	
Range	Location of tree (e.g., city, portion of state)	
	Range of tree (use reference material)	
Bark	Bark texture (e.g., smooth, fissured)	
	Bark color	
	Lenticels present (yes or no)	
	Lenticel description (e.g., horizontal, dots)	
Leaf	Leaf petiolate or sessile	
	Stipules present (yes or no)	
	Simple or compound leaf (include # of leaflets)	
	Leaf arrangement (e.g., alternate, opposite)	
	Overall leaf shape (e.g., lanceolate)	
	Shape of leaf apex (e.g., acuminate)	
	Shape of leaf base (e.g., cordate)	
	Leaf margin (e.g., serrulate)	
	Leaf venation (e.g., pinnate, parallel)	
	Leaf surface texture (e.g., smooth, bumpy, scaly)	
	Leaf thickness (e.g., thick and leathery)	
	Leaf color (upper surface)	
	Leaf color (lower surface)	
	Leaf pubescence (hairs) present (yes or no)	
	Leaf smell	
	Leaf taste (use caution)	
	Twigs	Bud type (naked or scaly)
Leaf scar description (e.g., shape, size)		
Leaf scar # of vascular bundles		
Stipular scars present (yes or no)		
Lenticels present (yes or no)		
Lenticel description (e.g. horizontal, dots)		
Pith description (e.g. continuous, diaphragmed)		
Thorns present (yes or no)		
Flowers	Flowers present (yes or no)	
	Cones present (yes or no)	
	Single flower or multiple flowers	
	Flower description (e.g. shape and color)	
Fruits/ Seeds	Fruits present (yes or no)	
	Fruit description (e.g. shape, color, size)	
Additional Notes		
Common Name:		Scientific Name:

Prescribed Burning Factors and Issues

by Dave Conser, Florida Forest Service, April 28, 2016

Fire is vitally important to almost every ecosystem in Florida.

“Florida is designed to burn, and burn it will.” - John Bethea, former Director of the Florida Division of Forestry

We cannot just “Let it burn” any old way. We have suppressed natural fires for so long that we must bring fire back in a properly managed way. This is prescribed burning.

Objectives

Your objectives as a landowner are paramount. What do you want your land to be? What condition is it in now? How do you get to the future condition you desire? This is your objective. Some landowners need to know what the possibilities are. Then they often have an “Ah ha!” moment. “Now I know what I want!” Then the issue becomes, how does my land get there?

Prescribed burning is like any other land management practice. What are your objectives? How can prescribed burning help meet your objectives? What is your objective for burning? Every landowner is unique, every forest is unique, and every fire is unique.

Here are some possible objectives for prescribed burning:

- Ecosystem Restoration
- Wildlife Habitat
- Aesthetics
- Wildfire Hazard Reduction
- Competition Control
- Insect and Disease Control
- Site Preparation
- Grazing
- Access

These objectives determine the type of fire we need.

What type of fire helps move toward restoring the forested ecosystem, creating diversity and resiliency? Improves wildlife habitat? Controls competition? Reduces the hazard of a wildfire?

Prescribed fire on your property depends on 3 things: Objectives, Weather and Fuels.
The “Prescribed Burning Triangle”!

As a burner I must consider these 3 things. Given your objective I will look at the current condition of the fuels that will burn, and then choose a day with weather parameters that will coordinate these 3 things. If you haven't burned in a long time, if ever, then the fuel loading is probably high. I will choose a day with weather that will consider the high fuel loading, so I can still meet your objectives. Understand, prescribed burning is an art and a science, and inexact at that! There is an unpredictability to nature, and in particular, weather.

If you as a landowner have an aversion to losing any trees, or very few, burning is not for you. An ugly truth of prescribed burning is this: The hazard of having to harvest your stand because of unintended damage from a prescribed burn is higher than the hazard of a wildfire damaging your forest to the point of necessitating a salvage harvest. (About 1% in north central Florida.) This compares to selective harvesting (thinning).

Fuels

Fuels are what carry the fire. They are the dead, dry, fine material at the ground level. Pine needles and dead grass are great fuels. Discontinuous fuels make for a discontinuous fire. Without fuel at the ground level, the vegetation above the ground level will not burn. A field full of tall, dead weeds will not burn without ground fuels below, regardless of how flammable it looks from a distance!

Without burning, fuels build up to dangerous levels. A prescribed fire will reduce the hazard of a wildfire destroying your forest. A prescribed fire will also accomplish many other things that make it very worthwhile.

Given the fuels in an area to be burned, a good prescribed burner then considers what weather parameters are needed to accomplish the objectives.

In most cases, we want the fuels to be dried out in the surface of the duff (the leaves and vegetative debris right at the ground surface), but moist in the lower portions of the duff. Stick your hand down in the duff and feel! The highly scientific and effective “hand method”! One area we must check duff moisture is at the base of trees. If this duff is dried out in the lower portions we stand a good chance of killing our trees, since this duff will bake for a long time, cooking the inner layers of the trees. A burned out doughnut shape around the base of trees is a very bad sign.

The number of days since rain has a tremendous impact on proper fuel moisture. Dry days, with low relative humidity, obviously dry out fuels.

Weather

We choose a range of weather parameters that will hopefully meet our objectives, considering the fuels.

Minimum relative humidity, wind speed and wind direction are most critical.

Relative Humidity

It needs to be dry enough to burn well without being so dry that it burns too well! Depending on the situation, good relative humidity may range from 30% to 50%.

Wind

Proper wind speed causes the fire to spread properly, and keeps excessive heat out of the tree tops. Too little wind and the fire just doesn't move well. Even a fire that backs against the wind (backing fire) moves better with wind than without. Too much wind and we may have control issues. I like wind speeds of 5 to 15 mph, depending.

Consistency of wind direction is also extremely important. For cooler burns we need the fire to not run with the wind, called a head fire. For these type burns, 2 to 4 days after a cold front passage, in winter, often results in consistent northwest, north or northeast winds. This is also when we can often count on duff moisture to be dry in the top, and moist below. First burns are often best done in these conditions.

Wind direction determines how we light the fire, and where our smoke goes.

Other weather factors include dispersion index, temperature, transport wind speed, mixing height, drought indices, Lvor index, cloud cover, chance of sea breeze wind shifts, and others.

Season of Burn

We can burn in the winter, or dormant season, or we can burn in the late spring – summer, or growing season. We have traditionally burned in the dormant season, because it's easier. But nature burned the woods in the lightning season, or growing season. Statistics show most of north central Florida burned in May, June and July. Only limited acreage burned earlier or later. May 15 through June is the sweet spot in my opinion. Vegetation responds better to this seasonality of burn than any other. Wiregrass seed production only occurs with growing season burning. The wildlife are adapted to burning during this time. Turkey nesting is a great example.

First burns should almost always occur in the dormant season, in order to reduce fuel loading. Sandhill sites are sometimes an exception to this rule.

Growing season burns are more difficult. Wind direction is more variable. Temperatures are higher, creating a greater hazard for damage to trees. However, growing season burns control hardwood competition much more effectively. Hardwoods have expended their stored food reserves and have not replenished them in May and June. Hardwoods burned in the dormant season resprout and do ok. Hardwoods burned in May or June often die after the second time around.

Technique

Given our Prescribed Burning triangle of Objective, Weather and Fuels, we choose a technique.

How will we burn this particular tract on this particular day? We almost always establish a blackline, a barrier to the fire getting away. We do this with a fire break of some type, on the downwind side of the tract, and light a back fire that backs into the wind. Once we've established a wide enough space of burned area (the blackline), we then choose a number of techniques.

Spot fires are the best. Plain and simple. This is a technique of setting individual spots of fire a certain distance upwind of the backing fire and a certain distance from each other. They burn with the wind (head fire), sideways to the wind (flank fire) and back against the wind (back fire). We pick a distance apart so that the head fire part of each spot won't get too hot before it runs into the backing fire. When 2 fires come together fire intensity goes up. So we consider that. Actually, we make a guess, and then adjust. Also, as the day goes on, it gets drier and sometimes more windy. So we adjust as we go through the day. We adjust for flame length – how long are the flames, and how much good or bad might they do. I use a spot fire technique about 90% of the time.

Other main techniques include strip head fires, flank fires, and ring fires. The book you have with your

materials, “Introduction to Prescribed Fire in Southern Ecosystems”, details and diagrams these techniques. A spot fire technique is depicted on the front cover. For good reason.

Strip head fires are solid strips of fire that head into the backing fire. We set strip heads a certain distance back from the backing fire so that we get just the flame length and fire behavior we want. These are particularly appropriate where fuels and weather combine to limit flame lengths too much with other techniques. One disadvantage of strip heads is that they have a greater potential to trap critters between 2 fires.

Flank fires are appropriate where wind direction is quite consistent, or fuels are such that periodic heading of the flank fire won't get too hot. We set flank fires by lighting lines of fire straight into the wind. Hot spots occur where the flanks burn together. Flank fires are good for burning a lot of area with less ignition work.

A **ring fire** is the most exciting technique. We light a back fire, establish a black line, then light the sides, or flanks, finally lighting the upwind side, to head into all the rest of the fire. A ring of fire. It's most appropriate for site preparation burns. It has the highest potential to trap critters.

Assistance, Training and Liability

Sources of assistance include the following:

Florida Forest Service
Private Contractors
Burn Teams

Or, you can become comfortable and competent to burn your own land.

Training is available, in the form of several courses. These include S-130, S-190, Certified Prescribed Burn Manager, etc.

Becoming a Certified Burner has advantages in the area of liability. The Florida Legislature passed a statute that protects burning when carried out by a Certified Burner. To be found liable, a Certified Burner would have to be found grossly negligent, rather than simply negligent.



**SOUTHERN
Fire Exchange**

Uniting Fire Science and Natural Resource Management



SFE Fact Sheet 2016-2

The Value of Forming a Prescribed Burn Association

John Diaz, Jennifer E. Fawcett and John R. Weir

Introduction

Prescribed burning is the application of fire to the landscape to meet multiple land management objectives.¹ It is one land management practice that can be used to restore the natural balance of ecosystems in a safe and calculated way, while also reducing wildfire risk. While most plant communities in the South are dependent on fire to maintain plants and native wildlife, many lands do not receive as much fire as they need.

In the South, the majority of forest land is privately owned. This means that the ability to manage fire-dependent and fire-adapted ecosystems is contingent upon the private landowner's capacity to use prescribed fire on their lands. Many landowners already use prescribed fire for accomplishing their management goals, but most do not. To some, burning is viewed as a risky and daunting task, which hinders their willingness to utilize prescribed fire. However, evidence shows that with the help of neighbors and other landowners, prescribed burning is easier, safer, and more economical than when trying to burn on one's own.^{2, 3, 4}

The development of Prescribed Burn Associations (PBAs) is becoming an increasingly popular approach to increase private landowner's ability to utilize prescribed fire.

What Is a Prescribed Burn Association?

A PBA is a group of local landowners and other concerned citizens that form a partnership to conduct prescribed burns.³ PBAs have successfully increased prescribed fire use by landowners and land managers, mainly by making it easier and safer to use prescribed fire.⁴ The goal of a PBA is to promote the safe and responsible use of fire in the region through increasing landowner access to education, training, technical support, funding, equipment for burning, and hands-on experience to achieve multiple management objectives.³ Each PBA is operated by private landowners and other local volunteers.³ Examples of PBA-led activities can include conducting training and workshop events, working to improve prescribed burn laws, tracking prescribed burn activity in the region, and purchasing burn equipment for use by PBA members.³

PBAs can be formed at various levels, such as local, county, or multi-county, depending on the need. A state-level PBA, such



Members of the Roger Mills County PBA in western Oklahoma get ready for a prescribed burn. Photo: John Weir.

as the Prescribed Burn Alliance of Texas (www.pbatexas.org) or Oklahoma Prescribed Burn Association (www.ok-pba.org), can also be formed to support existing local, county, or multi-county PBAs and to help develop new PBAs within the state. These larger-scale PBAs can assist local organizations by providing additional resources, promoting the establishment of local PBAs, and advocating in state legislatures and regulatory agencies. Such state-level fire coalitions and prescribed fire councils were a driving force in passing "Right-to-Burn Acts" that established prescribed burning as essential to maintaining and restoring ecological integrity.⁵

In 2015, there were 62 known PBAs in eight states, along with two statewide burn associations (Oklahoma and Texas) and one regional alliance.⁴ This represents an increase from the 50 PBAs that were in existence as of 2012. In 2016, a new PBA was developed in North Carolina (North Carolina Sandhills Prescribed Burn Association) increasing the current figure to 63.⁶

For more information and an interactive map of existing PBAs, please visit www.gpfirescience.org/fire-organizations-agencies.



Members of the North Carolina Sandhills PBA shared resources and equipment to conduct a prescribed burn on a landowner's property. Photo: Brady Beck Photography.

Barriers to Burning and How PBAs Can Help

According to surveys, landowners have listed several reasons they do not burn.^{7, 8, 9} These surveys identified the following major barriers, which are described in more detail below:

- Liability concerns
- Lack of capacity
- Lack of training and/or experience
- Resource concerns (including limited access to equipment)
- Weather (including narrow burn windows and limited burn days)

Prescribed Burn Associations can help members to

- Obtain insurance and effectively manage risk by addressing the other needs,
- Increase available peer support to burn,
- Gain experience through assisting with burns,
- Take advantage of narrow burn windows by deploying quickly and having multiple groups burning at once, and
- Pool equipment to increase resource availability.

Liability

The fear of liability is arguably the most significant concern related to prescribed burning among landowners. By increasing capacity, experience, and equipment through a PBA, liability risk will subsequently be reduced. Planning burns with multiple landowners, where neighbors assist one another, reduces liability as well because if a landowner burns only their property, the biggest concern is keeping the fire on their property. If multiple landowners plan their burns together, they allow fire to pass freely from one property to another without the worry or fear of liability. This also can make burning more economical due to using natural or man-made firebreaks that may exist on a neighboring property, along

with burning larger blocks at once, thus reducing costs, time, and number of burn days needed.

PBAs exhibit relative success in mitigating issues of liability in relation to the occurrence of spotfires (a fire started by flying sparks or embers at a distance from the main fire) and escaped burns. A study by Weir et al. found that spotfires occurred on prescribed burns conducted by PBAs at the identical rate (1 of 5 burns) relative to experienced crews within the same region.⁴ They also found that only 1.5% of a total of 1,094 fires conducted by PBAs escaped, with no reported insurance claims against any of the PBAs or members. This demonstrates that PBAs can manage spotfires and mitigate the potential for escaped burns.

Also, in some cases, PBAs can provide prescribed fire liability insurance at an affordable rate to landowners through a group discount. Potential damages caused by escaped fires, suppression costs, injury to people assisting with the burn, or problems caused by smoke are usually covered with insurance. A minimal annual fee and additional charge may incur for each burn the landowner would like to have insured.

Capacity

A significant challenge for prescribed fire implementation both at a national and regional level is lack of capacity. Research shows that there is a lack of trained prescribed fire managers, training opportunities, private contractors, and partnerships that has resulted in a major bottleneck for the appropriate application of prescribed fire.¹⁰ PBAs provide a successful method for building prescribed fire capacity through the development of a collaborative network of landowners, government agencies, conservation groups, and other interested individuals and organizations that come together with the common goals of expanding the use of prescribed fire in a specific geographic region.

Training and Experience

Knowledgeable landowners who are well equipped with an informed crew are less concerned about liability because they know how to effectively plan and manage prescribed fire.¹¹ Successful PBAs can also assist in confronting negative local attitudes and reactions to burning. For example, one Texas PBA was able to successfully rebut accusations of property damage and received an apology in the local paper from the accuser.⁵ Weir et al. surveyed 50 PBAs located in five Great Plains states about their formation, burn history, fire planning, member experience, external assistance, and other information.⁴ The majority of respondents reported that their members had a mix of training or experience prior to joining the PBA, with 75% reporting that some members did not have prior training or experience and 88% reporting that some members did have prior training or experience. This shows that PBAs provide an opportunity for peer-to-peer learning as both experienced and non-experienced burners can work side-by-side to gain valuable experience in the implementation of prescribed fire.

Resources

In the same survey of PBAs, members indicated that drip torches, radios, slip-on pump units and ATV sprayers, ATVs, weather instruments/kits, utility vehicles, flappers/swatters and fire rakes were commonly used on burns.⁴ Gloves, flame retardant shirts and pants, and goggles/safety glasses were reported as the personal protective equipment most frequently worn on burns. Members identify the value of pooling their equipment so no one person has to buy all of the equipment needed to burn. Some PBAs partner with their local fire department to rent or use equipment for conducting burns, as well as having the local fire department present with additional manpower and equipment for burns.³

In addition to equipment, PBAs can receive funding through grants or donations. The aforementioned survey found that all responding PBAs received funding in the form of private donations, nongovernmental organization grants and donations, along with state and federal grants ranging from \$500 to \$250,000.⁴ The funds have been used for needs such as equipment and training activities.

Weather

Narrowing burn windows as a result of weather or limiting burning to a single season of the year also presents a very significant challenge when coupled with the aforementioned impediments related to capacity. Experience has shown that PBAs are more efficient in accomplishing prescribed burns than landowners burning on their own because they can organize the required labor and support quickly within the often narrow window of desired weather conditions.⁴ Also several PBAs have enough members and equipment available to conduct multiple burns in a single day.

Summary

The total value of forming a PBA is not only realized by one individual, but by many. The services resulting from an active PBA benefit neighbors, as well as the community through healthy forests and rangelands, reduced wildfire impacts, and the multitude of other benefits that prescribed burning provides. A video, produced by the North Carolina Sandhills Prescribed Burn Association, depicts the value of this PBA to its members: <https://youtu.be/HaHt6ZLYd3o>. More information about forming a PBA is available at <http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-2819/F-2880web.pdf>.

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